

# Usability Test Report Of ImageCast X 5.0 with 36 Participants for VVSG 1.0

Version: 5.0

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# Table of Contents

<b>Chapter 1: Executive Summary</b>	<b>1</b>
<b>Chapter 2: Introduction</b>	<b>4</b>
2.1 Full Product Description	4
2.1.1 External Printer	5
2.1.2 Joystick	6
2.1.3 Headphones	7
2.2 Testing Objectives	7
<b>Chapter 3: Method</b>	<b>8</b>
3.1 Participants	8
3.2 Context of Use in the Test	9
3.2.1 Tasks	9
3.2.2 Test Location	10
3.2.3 Voting Environment	12
3.2.3.1 Display Devices	12
3.2.3.2 Audio Devices	12
3.2.3.3 Input Devices	12
3.2.4 Test Administrator Tools	14
3.3 Experimental Design	14
3.3.1 Procedure	14
3.3.2 Participant General Instructions	15
3.3.3 Participant Task Instructions	15
3.4 Usability Metrics	15
3.4.1 Effectiveness	15
3.4.1.1 Completion Rate	15
3.4.1.2 Errors	15
3.4.1.3 Assists	15
3.4.2 Efficiency	16
3.4.2.1 Time on Task	16
3.4.3 Satisfaction	17
3.4.3.1 Satisfaction Rating	17
<b>Chapter 4: Results</b>	<b>19</b>

4.1 Data Analysis .....	19
4.2 Presentation of Results .....	20
4.2.1 Performance Results .....	20
4.2.2 Satisfaction Results .....	22
<b>Chapter 5: Conclusion .....</b>	<b>23</b>
Appendix A: Participant Demographics .....	24
Appendix B: Test Ballot Specification .....	27
Appendix C: Instructions for Participants .....	33
Appendix D: Results .....	39
Revision History .....	43
List of Figures .....	44
List of Tables .....	45

## CHAPTER 1: EXECUTIVE SUMMARY

A usability test of the ImageCast R X 5.0 tabulator was conducted between July 27th and August 25th, 2016 in the Dominion Voting Systems (Dominion) offices and Atlantis Community Center facility. The purpose of this test was to fulfill the requirements of the Voluntary Voting System Guidelines (VVSG) 1.0.

Testing took place in a simulated polling place with a registration desk, voting booths with the ImageCast R X (ICX) voting system, external printer, and accessibility peripherals. This configuration was set up at the Dominion office in Denver, CO, and at the Atlantis Community Center in Denver, CO.

The users for the usability test were recruited by Dominion. These users were tested in two separate sessions using test ballots provided by Dominion. These test ballots included the following contests:

- United States Senator
- Representative in Congress for the 8th District
- Representative in State Legislature for the 69th District
- States Prosecuting Attorney
- County Sheriff
- County Clerk
- County Treasurer
- County Register of Deeds
- County Supervisor for the 11th District
- Judge of the 30th Circuit Court
- Opinions on polling place closure
- A Panama Canal funding question
- Funding the Louisiana Purchase
- State and Local tax collecting agencies policies
- Extending the tenure of the President to three terms

This test ballot was used to simulate tasks that voters would be asked to perform during an actual election.

Each user was directed to work on their own with little to no assistance. They were only assisted by the facilitator once they became blocked by the system or asked for help. Once blocked, the users were then asked for their input as to why they believed they were blocked, after which they were guided past the block.

Below is a high-level summary of the results:

Results Summary	
Successful Completion	94%
Average Voting Time	3.11 min for general 22.1 min for blind 8.81 min for low vision 9.21 min for limited dexterity
Minimum Voting Time	2 min
Maximum Voting Time	45 min
Voter Confidence	92% of the users had high confidence
Voter Satisfaction Score	86% of the users were satisfied with this system

Table 1-1: Results Summary

During a second round of ICX system testing, the instructions were modified to study how the users would perform the following tasks:

Change a selection

Find the bottom of the candidate list

Change the size of the text

Select the high contrast view option

These additional tasks explored the controls and interface on the device that aren't commonly accessed.

The users in this study were recruited to obtain the broadest spectrum of potential voters. One quarter of the users fell into the category of general. These voters do not have any physical impairment that would prevent them from using the voting system. The voting system uses peripheral devices and settings that allow users with a variety of physical abilities to vote. The user ability groups included:

- General without any disabilities
- Users with low vision or totally blind users
- Users with limited dexterity
- Users that have difficulty accessing the device due to the use of a wheelchair or other physical impairment that limits their access to the interface

The intended environment for this system is any typical polling location. The system should be positioned to allow the user to view the entire display. It should

reside within a voting vestibule or voting station that would afford the voter privacy. The vestibule or voting station should have adequate access to two (ICX 21 and ICX 15) or three (ICX 12.2) 120v outlets to power the system and its peripheral printer.

## CHAPTER 2: INTRODUCTION

### 2.1 Full Product Description

The ICX voting system is a tablet based interface that supports three screen sizes (21-inch, 15-inch, and 12.2-inch). The primary method for the user to control and vote on the system is by using the touchscreen to navigate and select entries.



Figure 2-1: Photos of the ICX 21, ICX 15, and ICX 12.2

### **2.1.1 External Printer**

Once the user has finished the voting and review process, the user prints a paper ballot using an external printer. Output of their printed voting session includes an account of their selections and a secure-QR code. The secure-QR code is scanned using a central count tabulator.



Figure 2-2: Photo of the External Printer



### 2.1.2 Joystick

A joystick was used as an interface for users who werent able to use the touch screen interface. This joystick is a hand held device that uses up, down, left, and right inputs to navigate through the voting session. The joystick interface includes printed labels including raised Braille lettering.



Figure 2-3: Photo of the Joystick

### **2.1.3 Headphones**

Headphones were used to audibly inform and direct the user through the session. These are used in conjunction with the joystick or touch screen during an audio session.



Figure 2-4: Photo of the Headphones

## **2.2 Testing Objectives**

The objective of the testing was to observe and record a variety of users as they interacted with the ICX voting system. Some of these users had a disability that would factor into how they utilized the system. A test facilitator conducted a pre and post interview and prompted the user as needed to glean additional information and insight. This information will be used to provide feedback to the development and design teams for future enhancements. The information may also be used to educate poll workers and revise the system operations manual.

## CHAPTER 3: METHOD

### 3.1 Participants

A total of 36 participants, with a varying mix of backgrounds and demographic characteristics, were recruited to participate in the usability test.

The participant users were categorized by ability, gender, age, and voting experience.

The ability groups consisted of:

- General Ability: 9 Users
- Blind: 10 Users
- Low Vision: 10 Users (see note below)
- Dexterity Impaired: 9 Users (see note below)

**NOTE:** Some individuals fell into both the low vision and limited dexterity classifications.

The user group genders were broken down as follows:

- Female: 16 Users
- Male: 20 Users

The user group ages consisted of:

- 25-39 years: 7 Users
- 40-59 years: 18 Users
- 60-79 years: 11 Users

Recent voting experience:

- Paper: 24 Users
- Electronic: 9 Users
- Never voted: 3 Users

Users were compensated \$20 each for their participation in the study.

## **3.2 Context of Use in the Test**

User testing was performed at the Dominion Voting offices and at the Atlantis Community Center, both in Denver, Colorado.

### **3.2.1 Tasks**

During the usability test, participants were instructed to vote in a simulated election consisting of one test ballot with 11 contests and 5 referendums, including:

- United States Senator
- Representative in Congress for the 8th District
- Representative in State Legislature for the 69th District
- States Prosecuting Attorney
- County Sheriff
- County Clerk
- County Treasurer
- County Register of Deeds
- County Supervisor for the 11th District
- Judge of the 30th Circuit Court
- Opinions on polling place closure
- A Panama Canal funding question
- Funding the Louisiana Purchase
- State and Local tax collecting agencies policies
- Extending the tenure of the President to three terms

### 3.2.2 Test Location

The initial round of testing was conducted at the Dominion Voting offices in Denver, Colorado. The equipment was setup in a conference room and lobby of the office, simulating a typical polling location.

Subsequent testing sessions were conducted at the Atlantis Community Center. The Atlantis Community Center was previously utilized by the City and County of Denver as a polling location. The lighting and ambient level of background noise at both locations were typical to a standard voting location.



Figure 3-1: Photo of the Atlantis Community test location

A check-in desk was set up adjacent to the voting area where the users were interviewed and informed of the protocol of the study.



Figure 3-2: Photo of the Check In Desk

### **3.2.3 Voting Environment**

During the usability test, all participants were instructed to use ICX 5.0 just as if this system was implemented at their local polling location.

#### **3.2.3.1 Display Devices**

With this system there are three interface screen sizes (21-inch, 15-inch, and 12.2-inch).

#### **3.2.3.2 Audio Devices**

Users who did not require an audio session were tested on additional ICX systems. Initial testing sessions were done on alternating ICX systems, to determine if one system had any impact for a first time user.

Users who required an audio session were provided with a joystick interface and an audio session was initiated for them by the facilitator. Due to the audio interface being identical on all ICX sizes, participants were not asked to vote an audio session on each machine size as no additional insight would be gained from this additional testing.

#### **3.2.3.3 Input Devices**

During the test, participants used a four-way joystick controller with Braille labels to navigate throughout the voting session (see Figure 3.3). Two-way paddle switches and a sip and puff device were also available but not chosen for use by any of the participants.





Figure 3-3: Four-way joystick controller



### **3.2.4 Test Administrator Tools**

A questionnaire was used, please see Appendix C Instructions for Participants. Participants' votes were recorded by the system, similar to a real-world election. Test facilitators used a stopwatch to time voter sessions.

## **3.3 Experimental Design**

### **3.3.1 Procedure**

The testing process involved the user and a facilitator acting as a poll worker.

Time slots of one hour were allocated for each user. This time was used for the pre and post interviews, and testing on the ICX voting platform.

During this time the facilitator recorded and directed the user through the first questionnaire (see example in the Appendix C).

All three screen sizes were tested, unless the user was using an audio only session as audio sessions are identical on each machine and do not depend on screen size. If the user required additional time to complete the test, it was the user's and facilitator's prerogative to allow the procedure to continue or terminate the procedure before completion of all the tasks.

The user goals for testing this system involved:

- Ability to successfully complete the voting process with little to no errors, blocks, or states of confusion (asking for help)
- Measure confidence in the system that the ballot will be cast accurately

### **3.3.2 Participant General Instructions**

During the usability sessions, the participants were instructed that they should work

alone and that the test facilitator would not be able to assist or answer any questions during the study unless they became blocked and would typically ask a poll worker for help at that point.

### **3.3.3 Participant Task Instructions**

1. User check-in and pre-interview.
2. Poll worker explained voting procedures.
3. If the user desired, an audio voting session was set up on the system and the assistive peripherals were given to the user.

Once the user was ready to begin using the voting system, the test procedure commenced. The test procedure involved:

User activated their session on the voting system. If the user needed assistance the poll worker activated the session for the user.

User selected ballot choices

User reviewed ballot selections

User printed ballot selections for submission

Once the user was finished on the first system, they continued on to the remainder of the ICX machines.

Post interview and compensation.

## **3.4 Usability Metrics**

### **3.4.1 Effectiveness**

To measure the effectiveness of the ICX, the testing team measured voters' completion rate, errors encountered and assists provided.

#### **3.4.1.1 Completion Rate**

The testing team measured a completion rate of 94%.

#### **3.4.1.2 Errors**

The testing team calculated an error of 25%.

#### **3.4.1.3 Assists**

To measure voters' abilities to successfully use the ICX without assistance, the testing team recorded the number of users requesting assistance.

The following is a breakdown of assists by task:

The voter checks in with the 'Election Official': 0

The user is issued an activation card: 0

User activates their card: 17

User selects contests: 4

User reviews selections: 4

User prints ballot: 3

### **3.4.2 Efficiency**

In the initial voting session the user was not prompted unless they asked for help. The facilitator then indicated what the nature of the assistance was on the questionnaire, and what kind of actions were observed prior to the prompt. Repeat errors were also indicated in the performance results section.

If the user had an error and then recovered from that error, either initially or repeatedly, we considered this wayfinding and learning the interface. These investigations by the user should not be considered failures or errors, and were only noted if multiple users displayed the same behavior.

#### **3.4.2.1 Time on Task**

Each participant was timed on their initial voting session. General time to completion varied due to different users concerns, voting styles, reading comprehension levels, and other environmental factors.

The following table breaks down average, minimum, and maximum voting times

by ability group:

Voting Times by Ability Group				
	General	Blind	Low Vision	Limited Dexterity
Average Time	3 minutes	22 minutes	10 minutes	9 minutes
Minimum Time	2 minutes	10 minutes	3 minutes	2 minutes
Maximum Time	7 minutes	35 minutes	32 minutes	45 minutes

Table 3-1: Voting Times by Ability Group

### 3.4.3 Satisfaction

To measure voters' satisfaction with ICX, the testing team asked participants about their confidence that they had used the system correctly and their overall satisfaction with the system.

#### 3.4.3.1 Satisfaction Rating

After the user completed testing on the ICX system, a post-session interview was conducted. The facilitator asked the user for insight on:

- What problems they encountered
- Improvements they would make
- Whether they would use the system if available in the next election
- Which ICX screen size they preferred
- If they had confidence in their vote being recorded accurately

The following tables contain the results for confidence level, system preference and screen size preference.

<b>Vote Confidence Level of Participants</b>	
<b>Confidence Level</b>	<b>Number of Participants</b>
100%	33
75%	1
25%	1
0%	1

Table 3-2: Vote Confidence Level of Participants

<b>System Preference</b>	
Would use	89%
Would not use	11%

Table 3-3: System Preference

<b>Screen Size Preference</b>	
<b>Screen Size</b>	<b>Preference</b>
12.2 Inch	18%
15 Inch	27%
21 Inch	55%

Table 3-4: Screen Size Preference

## CHAPTER 4: RESULTS

### 4.1 Data Analysis

All of the questionnaire information was captured using pen and paper by the study administrators. A pre-interview from questionnaire one was performed. The users were tested on three different sized ICX platforms (21-inch, 15-inch, and 12.2-inch). The user was then given the post-interview from questionnaire one. Their activities were observed and annotated manually. If they had difficulty with a task, this was annotated on one of the questionnaires and incorporated into the Observed Behavior sections of this report. The user's initial test session was conducted as if it were a real election. Very little instruction was given by the facilitator and assistance was only offered via short, terse prompts.

As noted in the Methods section, if the user needed a prompt and then quickly learned from this prompting then the task was marked as a pass with prompt. If the user needed repeated assistance on the same issue then this was seen as a failure of the system.

The ballot consisted of the following contests:

- United States Senator
- Representative in Congress for the 8th District
- Representative in State Legislature for the 69th District
- States Prosecuting Attorney
- County Sheriff
- County Clerk
- County Treasurer
- County Register of Deeds
- County Supervisor for the 11th District
- Judge of the 30th Circuit Court
- Opinions on polling place closure
- A Panama Canal funding question
- Funding the Louisiana Purchase
- State and Local tax collecting agencies policies
- Extending the tenure of the President to three terms

The users were tested on whether they could complete a series of tasks. Testing sessions were scored based on three criteria:

- Tasks were completed with no assistance.

- Tasks were completed with minimal assistance.
- Tasks were unable to be completed without assistance throughout the session.

The voting session was also timed to the nearest minute, but were not included in the pass/fail criteria.

## **4.2 Presentation of Results**

This section details the results of task completion, time to completion, and satisfaction. The average time for all users to complete voting was 2 minutes. The minimum time observed for a voter to complete a session was 2 minutes while the maximum observed time was 33 minutes.

### **4.2.1 Performance Results**

Most of the users were able to successfully vote using the system with little to no prompting. There were a few individuals who failed to get through the session due to specific difficulties on a number of tasks. All of the failing users self-identified as technically inexperienced.

For example, users were confused by the directions being heard during an audio session.

Each session was broken up into six activities:

- The user checks in with the Election Official
- The user is issued an activation card
- The user inserts their card in the ICX
- The user selects contests and choices
- The user reviews their selections
- The user prints their ballot.

The user checks in with the Election Official

- All 36 users were successful in carrying this activity out.

The user is issued an Activation Card

- All 36 users were successful in carrying this activity out.

The user inserts their card in the ICX

Many of the users had difficulty with this task and needed prompting.

- 19/36 users were able to perform this task
- 17/36 users needed assistance or a prompt

- Of the users who needed prompting:
- 9 were blind
- 6 had low vision and
- 4 were dexterity impaired

The user selects contests and choices

Most of the users were able to perform this task without prompting.

- 30/36 users were able to perform this task.
- 4/36 users needed prompting.
  - Of the users who needed prompting:
    - 3 were blind and
    - 1 was dexterity impaired.
- 2/36 users failed to learn this task without repeated assistance.
  - Of the users who failed:
    - 1 was blind and
    - 1 had low vision

The user reviews selections

Most of the users were able to perform this task without prompting.

- 30/36 users were able to perform this task
- 4/36 users needed prompting
  - Of the users who needed prompting:
    - 4 were blind
    - 2/36 users failed to learn this task without repeated assistance
- Of the users who failed
  - 1 had low vision and



- 1 was dexterity impaired

User prints their ballot

Most of the users were able to perform this task without prompting.

- 32/36 users were able to perform this task
- 2/36 users needed prompting
  - Of the users who needed prompting:
    - 2 were blind and
    - 1 was dexterity impaired.
- 1/36 user failed to learn this task without repeated assistance
  - The user who failed had low vision.

### **4.2.2 Satisfaction Results**

The majority of the users had perfect confidence in the accuracy of their votes.

- 33 of the users had 100% confidence in the accuracy of their vote.
- 1 user had 75% confidence in the accuracy of their vote.
- 1 user had 25% confidence in the accuracy of their vote.
- 1 user had 0% confidence in the accuracy of their vote.

31/36 users reported they would use this system, and 4/36 reported that they would not if available during their next election (one user did not express a preference). For users who expressed a preference, screen size preferences were:

- 6 users preferred the 12.2-inch screen.
- 10 preferred the 15-inch screen.
- 19 users preferred the 21-inch screen.

## **CHAPTER 5: CONCLUSION**

Based on the results of the testing, various usability issues were uncovered and a series of performance-based findings and recommendations were developed. The product development team is currently in the process of implementing the system improvements in order to resolve the usability issues uncovered and to help improve voters overall success and satisfaction using ICX.

## APPENDIX A: PARTICIPANT DEMOGRAPHICS

Participant Demographics				
Participant	Gender	Age	Types of voting machines	Technical Proficiency
1	Female	40-59	Optical scan	Proficient
2	Male	40-59	None	NotProficient
3	Female	60-79	Optical scan	Proficient
4	Female	25-39	Optical scan	Proficient
5	Male	60-79	DRE	Proficient
6	Male	40-59	DRE	Proficient
7	Female	60-79	None	NotProficient
8	Male	60-79	DRE	NotProficient
9	Male	40-59	Optical scan	NotProficient
10	Male	40-59	Optical scan	Proficient
11	Female	25-39	Optical scan	Proficient
12	Male	40-59	Optical scan	Proficient
13	Male	40-59	Optical scan	Proficient
14	Female	40-59	DRE	NotProficient
15	Male	40-59	Optical scan	NotProficient

Table A-1: Participant Demographics

Participant Demographics				
16	Male	40-59	Optical scan	NotProficient
17	Female	25-39	DRE	NotProficient
18	Male	40-59	DRE	Proficient
19	Female	40-59	Optical scan	NotProficient
20	Female	60-79	Optical scan	Proficient
21	Female	40-59	None	NotProficient
Participant Demographics				
Participant	Gender	Age	Types of voting machines	Technical Proficiency
22	Male	40-59	Optical scan	NotProficient
23	Male	25-39	Optical scan	NotProficient
24	Male	60-79	DRE	Proficient
25	Male	25-39	None	NotProficient
26	Male	40-59	Optical scan	NotProficient
27	Male	40-59	Optical scan	Proficient
28	Male	60-79	Optical scan	Proficient
29	Male	40-59	DRE	NotProficient
30	Male	25-39	Optical scan	Proficient

Table A-1: Participant Demographics (Continued)

Participant Demographics				
31	Male	40-59	Optical scan	NotProficient
32	Female	60-79	DRE	NotProficient
33	Female	40-59	Optical scan	NotProficient
34	Male	60-79	Optical scan	NotProficient
35	Female	60-79	None	NotProficient
36	Male	60-79	Optical scan	NotProficient

Table A-1: Participant Demographics (Continued)

## APPENDIX B: TEST BALLOT SPECIFICATION

Information Applicable to Whole Ballot	
Date	July 26, 2016
Party Line Voting Method	Disabled for partisan contest; open primary

Table B-1: Information Applicable to Whole Ballot

Information Applicable to Every Contest	
Full-term or partial-term election	Full term
Voting Method	Simple vote for N candidate(s) - (i.e. no ranked voting)

Table B-2: Information Applicable to Every Contest

Contest #1	
Title of Office	United States Senator
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-3: Contest #1

- Option #1.1: Barry Goldwater
- Option #1.2: Daniel Webster
- Option #1.3: Write-in

Contest #2	
Title of Office	Representative in Congress 8th District
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-4: Contest #2

- Option #2.1: Martin L King
- Option #2.2: Caesar Chavez
- Option #2.3: Write-in

Contest #4	
Title of Office	Prosecuting Attorney
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-5: Contest #4

- Option #4.1: Babe Ruth
- Option #4.2: Write-in

Contest #5	
Title of Office	Sheriff
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-6: Contest #5

- Option #5.1: John Wayne
- Option #5.2: Write-in

Contest #6	
Title of Office	Clerk
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-7: Content #6

- Option #6.1: Billie Holiday
- Option #6.2: Write-in



Contest #7	
Title of Office	Treasurer
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-8: Contest #7

- Option #7.1: Elvis Presley
- Option #7.2: Write-in

Contest #8	
Title of Office	Register of Deeds
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-9: Contest #8

- Option #8.1: Hank Williams
- Option #8.2: Write-in

Contest #9	
Title of Office	County Supervisor 11th District
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-10: Contest #9

- Option #9.1: Michael Jackson
- Option #9.2: Write-in

Contest #10	
Title of Office	Judge of Circuit Court
Partisanship	Non-partisan
Minimum Votes Allowed	1
Maximum Votes Allowed	1
Maximum Write-in Votes Allowed	1

Table B-11: Contest #10

- Option #10.1: Audrey Hepburn
- Option #10.2: Katherine Hepburn
- Option #10.3: Lucille Ball
- Option #10.4: Bette Davis
- Option #10.5: Eatha Kit
- Option #10.6: Write-in

Referendum #2	
Title of Proposition	Waterway Joining the Atlantic
Wording of Proposition	Shall there be a waterway joining the Atlantic and Pacific Oceans through the Isthmus of Panama?

Table B-12: Referendum #2

Referendum #1	
Title of Proposition	Polling Places Closure
Wording of Proposition	Do you favor closing all polling places simultaneously throughout the nation during the Presidential Elections?

Table B-13: Referendum #3

Referendum #4	
Title of Proposition	Collecting Taxes Though State and Local Agencies
Wording of Proposition	Are you in favor of abolishing the Internal Revenue Services and collecting taxes through state and local agencies?

Table B-14: Referendum #4

Referendum #5	
Title of Proposition	Presidential Election for no More Than Three Terms
Wording of Proposition	Shall the President of the United States be elected for no more than three terms?

Table B-15: Referendum #5

## APPENDIX C: INSTRUCTIONS FOR PARTICIPANTS


TEST SUBJECT NAME: _____	
TEST SUBJECT DATE: _____	
<b>DOMINION VOTING</b>	<b>SUCCESS RUBRIC 1</b>
<hr/>	
USABILITY STUDY SUMMER 2016 DOCUMENT VERSION 2.0 JULY 28, 2016	<b>WARM UP QUESTIONS AND DEMOGRAPHIC INFORMATION</b>
	1. How long have you lived in Colorado? _____
	2. Age Range? ____ 18 - 24    ____ 25 - 39    ____ 40 - 59    ____ 60 - 79    ____ 80 +
	3. Did you vote in the last election? If so what type of ballot? paper: electronic? _____
	4. Who do you ask when you don't understand a technology? Do you do independent research, or rely on your social network? _____
	5. Do you have a smartphone? If so what kind? _____
<hr/>	
	<b>CONTEXT SETTING</b>
	<hr/>
	<a href="http://wearelousy.com">wearelousy.com</a> <span style="float: right;">pg. 1 of 3</span>

Figure C-1: Questionnaire 1 Example

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"In our example today we're testing the overall usability and experience of these voting machines. It's crucial that we identify any concerns or issues you may encounter, so please let us know everything you're feeling and thinking. There are no wrong answers here.

We will begin the test as if you are arriving at a polling place normally..."

Start time:

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

A. The Voter checks in with the "Election Official": **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

B. The Voter is Issued an Activation Card: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

C. Voter activates their card: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

D. Voter selects candidate: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

E. Review: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

F. Print: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_


**PASS WITH PROMPT** \_\_\_\_\_

End time:

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**WRAP UP AND ADDITIONAL QUESTIONS**

---

 [wearelousy.com](http://wearelousy.com) pg. 2 of 3

---

Figure C-2: Questionnaire 1 Example

"In our example today we're testing the overall usability and experience of these voting machines. It's crucial that we identify any concerns or issues you may encounter, so please let us know everything you're feeling and thinking. There are no wrong answers here.

We will begin the test as if you are arriving at a polling place normally..."

Start time:

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

A. The Voter checks in with the "Election Official": **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

B. The Voter is Issued an Activation Card: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

C. Voter activates their card: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

D. Voter selects candidate: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

E. Review: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

F. Print: **PASS** **FAIL**

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

**PASS WITH PROMPT** \_\_\_\_\_

End time:

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_



**WRAP UP AND ADDITIONAL QUESTIONS**

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pg. 2 of 3

---

Figure C-3: Questionnaire 1 Example

1. What was the biggest frustration you had?

ICX: \_\_\_\_\_

\_\_\_\_\_

ICP: \_\_\_\_\_

\_\_\_\_\_

ICE: \_\_\_\_\_

\_\_\_\_\_

2. If you were in charge of the design of this machine, what would you change?

ICX: \_\_\_\_\_

\_\_\_\_\_

ICP: \_\_\_\_\_

\_\_\_\_\_

ICE: \_\_\_\_\_

\_\_\_\_\_

3. Which machine did you prefer? Why? (If applicable)

\_\_\_\_\_

4. How confident were you that your vote was accurately captured?

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

5. If this machine were available where you vote, would you use it?

ICX: \_\_\_\_\_ ICP: \_\_\_\_\_ ICE: \_\_\_\_\_

6. Do you have any questions for us?

\_\_\_\_\_


 [wearelousy.com](http://wearelousy.com) pg. 3 of 3

Figure C-4: Questionnaire 2 Example

F.	Can you please make the colors inverted, meaning white on black?	PASS	FAIL
<hr/>			
<i>Go ahead and reset the controls to your liking and continue on to the next screen.</i>			
<i>This time, don't vote for anyone but complete the screen.</i>			
<i>This time, don't vote for anyone but complete the screen.</i>			
G.	At this point I'd like you to try and complete or finalize the ballot.	PASS	FAIL
<hr/>			
H.	Can you show me how to "double-check" your selections?	PASS	FAIL
<hr/>			
I.	Can you please return to the context I asked you to leave blank?	PASS	FAIL
<hr/>			
J.	Can you please enter your own candidate's name?	PASS	FAIL
<hr/>			
K.	Can you please finish the voting process?	PASS	FAIL
<hr/>			
<hr/>			
pg. 2 of 3			

Figure C-5: Questionnaire 2 Example



**WRAP UP AND ADDITIONAL QUESTIONS**

1. What was the biggest problem you had?

---

2. What would you do differently?

---

3. Which machine did you prefer? Why? (If applicable)

---

4. Who do you ask when you don't understand a technology? Do you do independent research, or rely on your social network?

---

5. How many hours do you spend online a week?

---

6. Do you have any questions for us?

---

Figure C-6: Questionnaire 2 Example

## APPENDIX D: RESULTS

User Task Performance - All Users				
Activity	Pass	Pass with prompt	Fail	Did not finish
The User checks in with the Election Official	36			
The User is issued an Activation Card	36			
User activates their card	19	17		
User selects contests	30	4	2	
User reviews selections	30	4	2	
User prints	32	3	1	

Table D-1: User Task Performance - All Users

User Task Performance - General				
Activity	Pass	Pass with prompt	Fail	Did not finish
The User checks in with the Election Official	9			
The User is issued an Activation Card	9			
User activates their card	9			
User selects contests	9			
User reviews selections	9			
User prints	9			

Table D-2: User Task Performance - General

User Task Performance - Blind				
Activity	Pass	Pass with prompt	Fail	Did not finish
The User checks in with the Election Official	10			
The User is issued an Activation Card	10			

Table D-3: User Task Performance - Blind

User Task Performance - Blind				
User activates their card	1	9		
User selects contests	6	3		
User reviews selections	6	4		
User prints	8	2		

Table D-3: User Task Performance - Blind

User Task Performance - Low Vision				
Activity	Pass	Pass with prompt	Fail	Did not finish
The User checks in with the Election Official	10			
The User is issued an Activation Card	10			
User activates their card	4	6		
User selects contests	9		1	
User reviews selections	9		1	
User prints	9		1	

Table D-4: User Task Performance - Low Vision

User Task Performance - Dexterity Impaired				
Activity	Pass	Pass with prompt	Fail	Did not finish
The User checks in with the Election Official	9			
The User is issued an Activation Card	8	1		
User activates their card	5	4		
User selects contests	8	1		
User reviews selections	7	1		
User prints	9	1		

Table D-5: User Task Performance - Dexterity Impaired

## REVISION HISTORY

Rev.	Date	Author	Summary
1	03-07-2019	brtian.fizsimmons	Created 5.11-CO branch from trunk

## LIST OF FIGURES

Figure 2-1: Photos of the ICX 21, ICX 15, and ICX 12.2 .....	4
Figure 2-2: Photo of the External Printer .....	5
Figure 2-3: Photo of the Joystick .....	6
Figure 2-4: Photo of the Headphones .....	7
Figure 3-1: Photo of the Atlantis Community test location .....	10
Figure 3-2: Photo of the Check In Desk .....	11
Figure 3-3: Four-way joystick controller .....	13
Figure C-1: Questionnaire 1 Example .....	33
Figure C-2: Questionnaire 1 Example .....	34
Figure C-3: Questionnaire 1 Example .....	35
Figure C-4: Questionnaire 2 Example .....	36
Figure C-5: Questionnaire 2 Example .....	37
Figure C-6: Questionnaire 2 Example .....	38

## LIST OF TABLES

Table 1-1: Results Summary .....	2
Table 3-1: Voting Times by Ability Group .....	17
Table 3-2: Vote Confidence Level of Participants .....	18
Table 3-3: System Preference .....	18
Table 3-4: Screen Size Preference .....	18
Table A-1: Participant Demographics .....	24
Table B-1: Information Applicable to Whole Ballot .....	27
Table B-2: Information Applicable to Every Contest .....	27
Table B-3: Contest #1 .....	27
Table B-4: Contest #2 .....	28
Table B-5: Contest #4 .....	28
Table B-6: Contest #5 .....	29
Table B-7: Content #6 .....	29
Table B-8: Contest #7 .....	30
Table B-9: Contest #8 .....	30
Table B-10: Contest #9 .....	30
Table B-11: Contest #10 .....	31
Table B-12: Referendum #2 .....	31
Table B-13: Referendum #3 .....	31
Table B-14: Referendum #4 .....	32
Table B-15: Referendum #5 .....	32
Table D-1: User Task Performance - All Users .....	39
Table D-2: User Task Performance - General .....	40
Table D-3: User Task Performance - Blind .....	40
Table D-4: User Task Performance - Low Vision .....	41
Table D-5: User Task Performance - Dexterity Impaired .....	42



# End of Document

