Voting in VR

Polling place signage in an interactive environment

Center for Civic Design
Tasmin Swanson, Evie Lacroix, Randy Hadzor, Whitney Quesenbery

Engineering for Democracy Institute
Gretchen A. Macht, PhD, Amber Fearn

THE
UNIVERSITY
OF RHODE ISLAND

ISE 521
Collin Batchelor, Ryan Benvenuti, Kirk Brown,
Shubham Chomal, Malinda Fry

How this project came about

Engineering for Democracy Institute

Tools to help election offices plan polling place layouts

Center for Civic Design

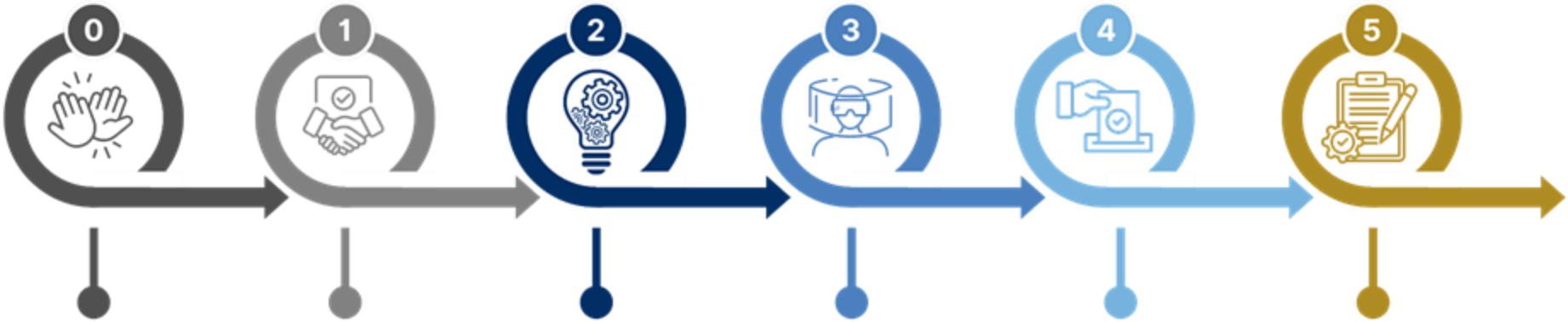
Best practices for election design, including signage for polling places

Could putting these tools together solve the problem of helping voters navigate the path to voting in person?

Contents

About the project

About the project



Introduction

Members of Center for Civic Design and the Engineering for Democracy Institute met at the PLEJ meeting in Minnesota 2024.

Plan

Identify areas for collaboration and cooperation between the Engineering for Democracy Institute and the Center for Civic Design

Center for Civic Design

Engineering for Democracy Institute

Pilot Test

Collect Data at URI from Engineering Students, most likely familiar with technology, in order to assess the viability of VR for signage testing

THE UNIVERSITY OF RHODE ISLAND COLLEGE OF ENGINEERING

We are here

Improvement

Improve the VR towards a high-fidelity representation of a polling location to increase the accuracy of results testing various aspects of signage guidelines and increasing in-person voting efficiency and experience

Phase 2

Collect Data from Election Officials in order to assess the location and placement of signage for in-person voting locations

PLEJ PARTNERSHIP FOR LARGE ELECTION JURISDICTIONS

Guidelines

Update Center for Civic Design signage guidelines based on functionality, user experiences, and usability

How this project began

It all started with a discussion at the 2024 Partnership for Large Election Jurisdictions conference

How might we….

- Help election officials include placement of signs in their polling place plans?
- Integrate best practices for signage designs into guidance?
- Make it easier for poll workers to manage voter pathways through their polling place?

How we decided to collaborate

Integrate CCD signage into an EDI polling place model

- Create a 3D virtual reality model of a polling place as a class project for URI engineering students
- Design the polling place layout based on CCD observational research in 2024 and 2017
- Add signage for information and navigation from the CCD toolkits
- Test the model, starting with a pilot test at URI

Building the virtual reality environment

Created as a class project at URI

About the VR environment

VR allows **flexibility, portability, and convenience**

- Quick turnaround
- Easy manipulation
- Real time monitoring
- Anytime, anywhere

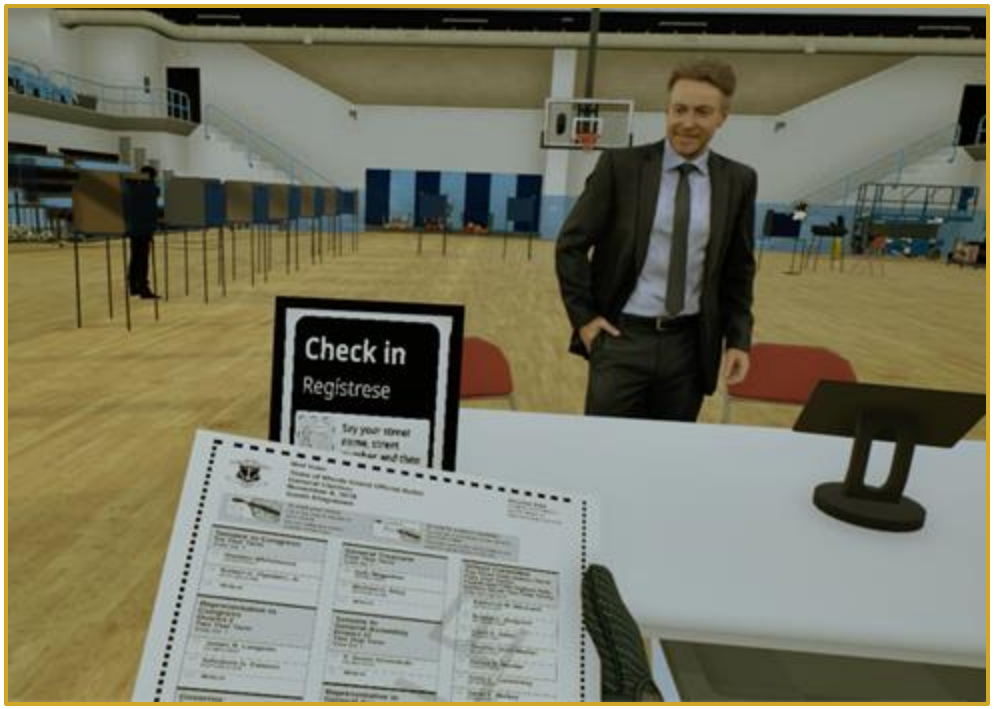
Meta

oculus

UNREAL ENGINE

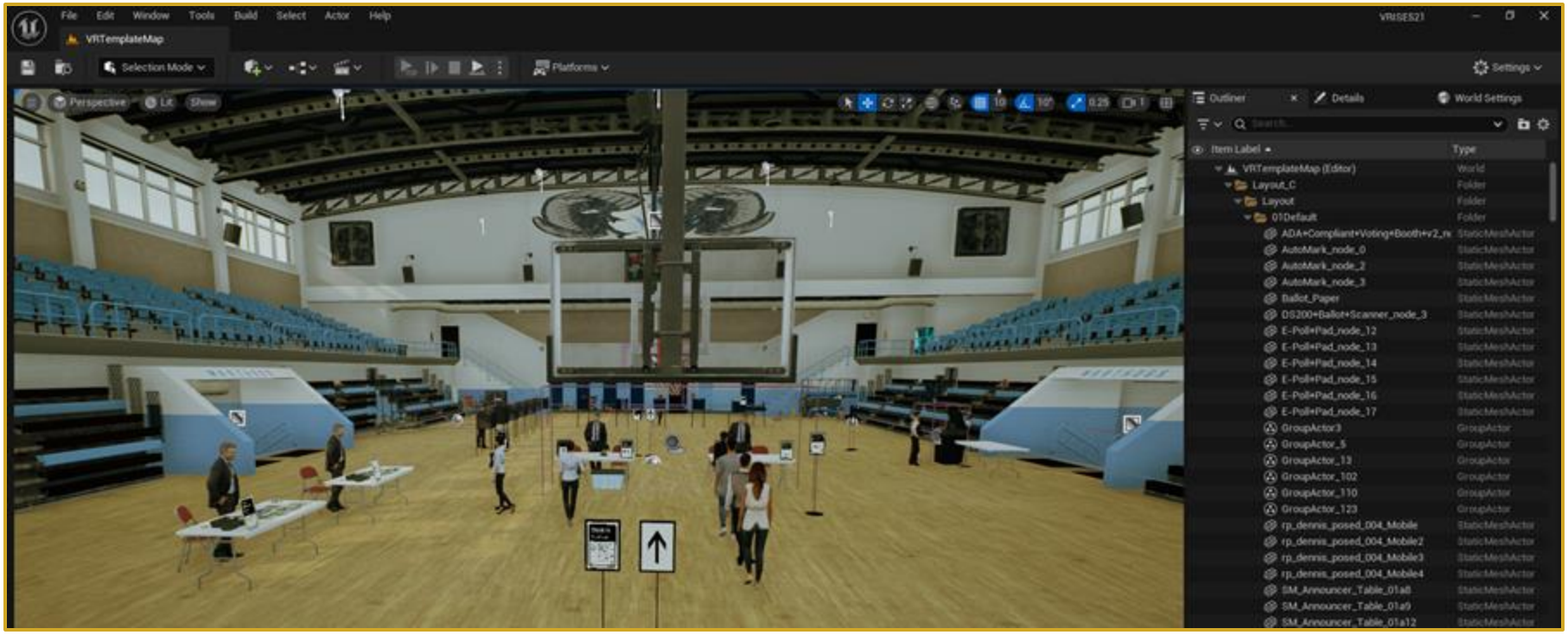
VR environment includes:

- Purchased gymnasium model
- **Realistic** voting layout
- Voting station objects:
  - Voting booths
  - Signs
  - Furniture
  - People
- **Ballot-in-hand** feature



THE UNIVERSITY OF RHODE ISLAND EDI Center for Civic Design

About the VR environment



Pros

- ★ **Smaller footprint**
- ★ Environment **variety**
- ★ Quick iteration
- ★ Consistency

Cons

- ❑ VR can cause dizziness and nausea
- ❑ Upfront work creating simulation
- ❑ **Learning curve** for VR user
- ❑ Reproduction **quality** can impact experience
- ❑ VR can cause participants to act as if they are playing a game rather than simulating reality

Collaboration on final preparations

The URI/EDI and CCD teams worked together on the final details of the session plan and the VR environment.

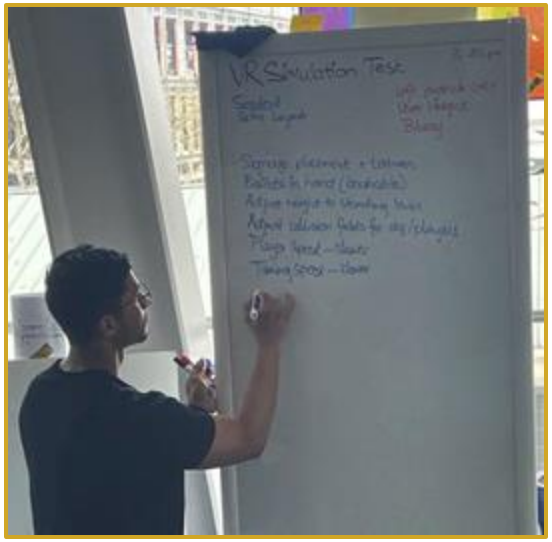
- Checking the legibility of the VR signs
- Identifying content for each of the layers
- Reviewing the moderator guide and the details of the testing sessions

Reviewing the pilot study plans

Randy checking out the signage

Finalizing the moderator guide

Evie testing the VR



Brainstorming final VR adjustments

The signs

A set of signs for the virtual space drawn from CCD’s work

Sign templates

Anywhere a voter needs to decide where to go, or what to do, a poll worker or sign should be there to help them.

- The CCD toolkit includes signs for common steps in the voting process
- Ready-to-use templates can be customized as needed

What do signs communicate?

Directional

Identify decision points and help voters navigate along a continuous visible pathway

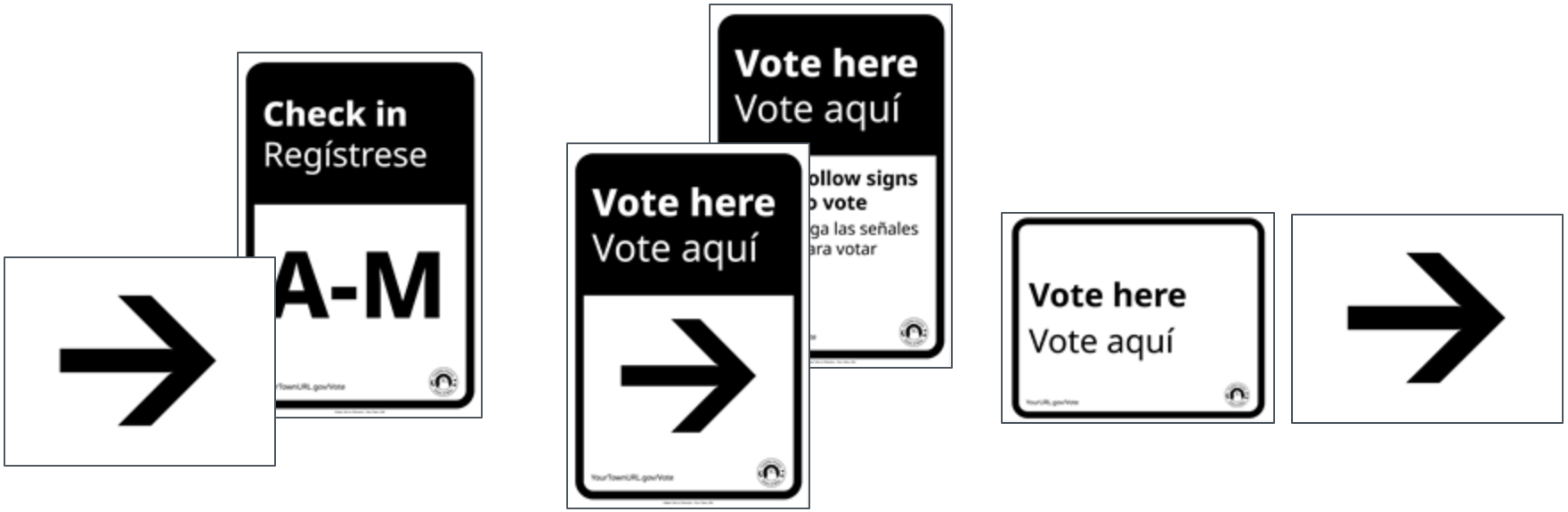
- **Larger text**
  Designed to be viewed from a distance
- **Less text**
  Use 1 to 2 words per language

Informational

Provide instructions or supporting information about a specific part of the voting process

- **Smaller text**
  Designed to be viewed close up
- **More text**
  Use 1 to 2 sentences per language

Template variations



Depending on placement and how much text is needed, you can decide how best to highlight the information.

- Less text can be larger on the same size signs
- Smaller text must be read from closer up
- Arrows are helpful companions for signs that indicate direction or navigation

Many roles are involved in setting up signage

Setting up signage in the VR testing environment was very similar to setting up signage in the real world.

Process step	How we did it in this project
Designing the signage	CCD created the templates, guidance, and starter set of signs
Planning the polling place layout	URI created the virtual polling place layout
Preparing the signs	URI mapped the sign images into textures to be models for the 3D sign models
Placing the signs in the polling place	CCD and URI collaborated on which signs to include in the different layers and how to place them in relationship to other objects in the virtual space

How we tested

Procedures for testing the virtual polling place

How we tested

Locations

- 2 study rooms
- Fascitelli Center for Advanced Engineering, URI Kingston Campus, Kingston, RI

Scenarios

- 6 variations were tested
- Different levels of signage

Participants

- **14 Engineering students at URI**

4 female
10 male
All aged 20-23

- Range of voting history
- Range of VR/video-game experience

Procedure

1. Consent forms and disclosures
2. Pre-questions, instructions, and scene-setting
3. Participants navigated the VR polling location while describing their thoughts
   a. Enter location, get ballot, mark ballot, cast ballot, and leave location
4. Follow-up and demographic questions

Voting history of the 14 participants

Registered to vote

12 Registered in:
1 Massachusetts
1 Connecticut
4 New York
6 Rhode Island

2 Not registered
1 Rhode Island
1 Turkey

November 2024 voting experience

9 voted in November 2024:
7 in person
1 by mail
1 online

1 was not sure

4 did not vote

Study room setup

PC display
The main display for the computer shows a preview of what the VR headset sees

VR - Oculus Rift
A headset that is connected to the PC with a wire which displays the VR to the participant

Individual meeting room
Private space large enough for up to 6 people

Data collection roles

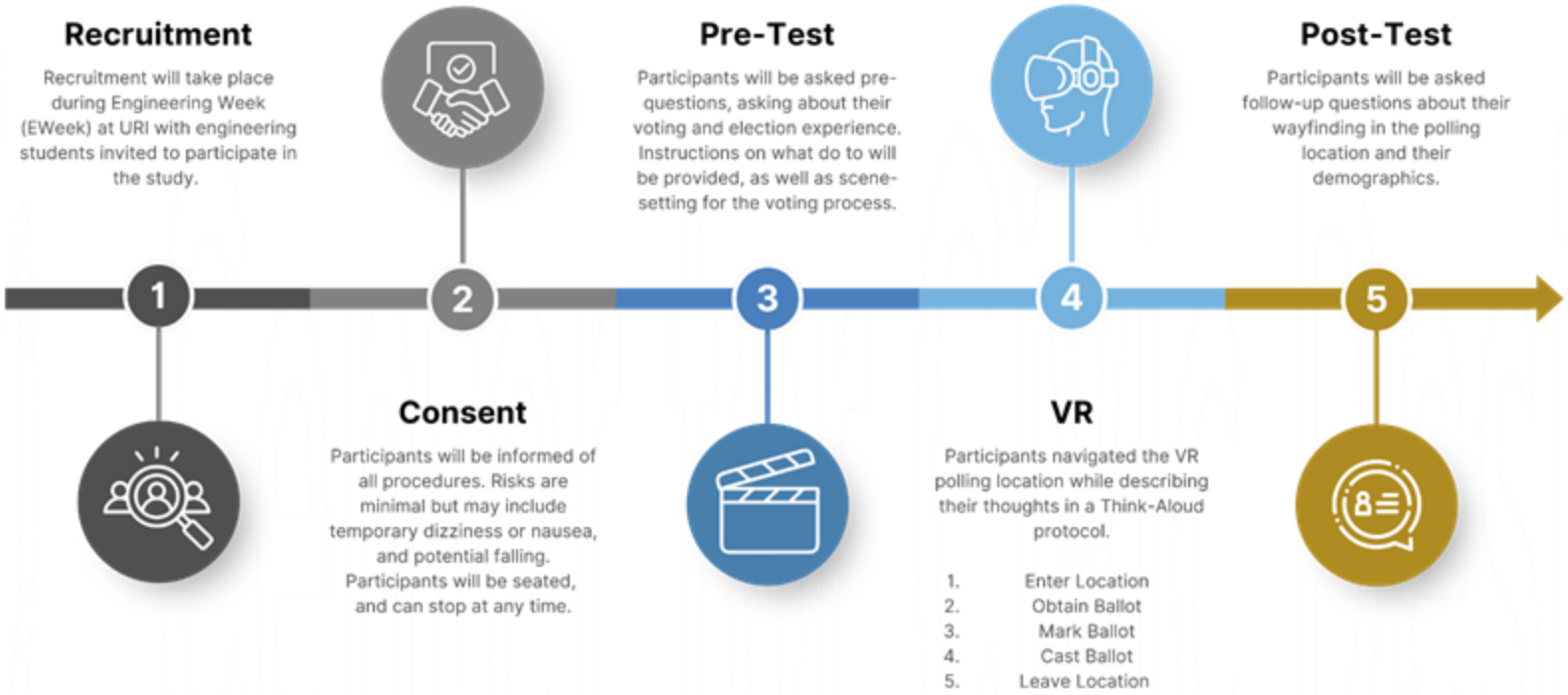
Technologist
In charge of operating the PC and helping the participant with the VR gear

Participant
Wears the VR headset and performs the experiment, under the guidance of the moderator

Notetaker(s)
Take notes of everything that is said and anything shown on the VR preview

Moderator
In charge of guiding the participant through the experiment

Procedure



Locations

2 study rooms at the
Fascitelli Center for Advanced Engineering,
URI Kingston Campus, Kingston, RI, USA

Eligibility criteria

> **18** years or older
\+ Engineering Students

Procedure

Recruitment

Recruitment will take place during Engineering Week (EWeek) at URI with engineering students invited to participate in the study.

Recruitment: Start
10:30 AM

Recruitment: End
2:30 PM

THURSDAY, APRIL 24 (TODAY)

CCRI Meet-and-Greet | 10:00-10:30 AM | Bliss Hall 410 (not open to the general public)

Join us for a special Meet-and-Greet event aimed at fostering connections between Community College of Rhode Island (CCRI) students considering a transfer to our engineering programs. This is a great opportunity for CCRI students to learn more about our programs and experience the vibrant engineering community at URI.

College of Engineering Picnic | 11:30-1:00 PM | Engineering Quad

Get ready to soak up the sun (fingers crossed!) and enjoy time filled with fun, food, and festivities at our Annual College Picnic on the Quad! This cherished tradition brings together students, faculty, staff, alumni, and friends of the College for a memorable outdoor gathering that celebrates the spirit of our engineering community. Please RSVP to ensure we have a proper headcount for ordering food. In case of rain, the picnic will be in Toray Commons of FCAE.

RISICA Lecture and Reception | 4:00-6:00 PM | FCAE 010

Lecture: 4:00–5:00 PM in FCAE 010

Reception: 5:00–6:00 PM, immediately following the lecture, outside 010

We are honored to welcome Mechanical Engineering alumnus Daniel Harple '86 as our distinguished speaker. A visionary entrepreneur, investor, inventor, and engineer, Harple has played a pivotal role in shaping the Internet as we know it today. Best known for his contributions to collaborative groupware, Voice over IP, and interactive

Prep 2 Study Rooms
10:00-11:00 AM

Data Collection: Start
11:00 AM

Data Collection: End
2:30 PM

THE UNIVERSITY OF RHODE ISLAND EDI Center for Civic Design

Procedure

Participants signed an informed consent, including that there were minimal risks of temporary dizziness and nausea.

We had precautions for safety, such as having participants seated (in case of dizziness or falls). They were informed that they could stop at any time.

Procedure

Pre-Test

Participants will be asked pre-questions, asking about their voting and election experience. Instructions on what do to will be provided, as well as scene-setting for the voting process.

Time *2 minutes*	**Part 1: Journey mapping** *We will start the recording now. If you want to stop recording at any point, let us know, and we will stop the recording.* *Before we get started, we have some questions to ask you about your background and experience with VR and voting* **NOTE: At any point during the questions, if the participant doesn't get a satisfactory amount of information to answer the questions, ask, " Tell me more?"*	
Voting Experience		
	Are you registered to vote?	
	When was the last time you voted?	
	Where was the last place you voted?	
	Have you had any involvement in elections as a poll worker or otherwise?	
VR Experience		
	Have you used Virtual Reality (VR) before?	
	Are you comfortable using VR?	
Ending		
	Before we move on, are there any questions you have for us?	
Misc *Place to record notes if the Moderator asks a follow-up question not recorded above*		

Instructions
participants are guided through each step with instructions and an opportunity to ask questions

Voting experience
Includes familiarity with polling places

VR experience
Background in VR (including games)

Procedure

VR

Participants navigated the VR polling location while describing their thoughts in a Think-Aloud protocol.

1. Enter Location
2. Obtain Ballot
3. Mark Ballot
4. Cast Ballot
5. Leave Location

Time *6 minutes*	**Part 2: Virtual Reality** *Now we are going to help you put on the VR equipment. Please let us know if you feel uncomfortable or become dizzy or nauseous at any time, and feel free to remove the equipment at any time.* In this scenario, you have just arrived at your local high school's gym to vote on election day. You will need to check in, mark, and cast your ballot. While you move through the simulation, please talk out loud to say what you're seeing and thinking. We will tell you when you have arrived at each location and completed each task. If you need help or assistance, feel free to let us know. You can withdraw from the study at any time without consequence. Ok, now go vote!. *NOTE: At any point during the questions, if the participant doesn't get a satisfactory amount of information to answer the questions, proceed with, " Tell me more?" *NOTE: In this section, the notetaker should record what they see on the monitor and record any points of confusion or obvious wins for the participant.	
	When the person reaches the check-in table and stands in front of the e-pollbook **You have arrived at the check-in and received your ballot. Please proceed to the next step.**	
	When the person stands at a voting booth or the BMD. **You have marked your ballot. Please proceed to the next step.**	
	When the person stands in front of the ballot scanner. **You have cast your ballot. Please proceed to the next step.**	
	When the person stands in front of the exit doors. **You have found the exit! Thanks for voting.**	
Misc *Place to record notes if the Moderator asks a follow-up question not recorded above*		

Set up
Participant set up to use the VR

Instructions
Explain the procedure, confirm comfort and consent

Interaction
Participant allowed to interact on their own

Prompts
At key points, prompts to confirm status and direct participant to next step

Observations
Notetakers recorded observations of actions and participant comments

Procedure

Post-Test

Participants will be asked follow-up questions about their wayfinding in the polling location and their demographics.

Time *6 minutes*	**Part 4: Post VR** *You can remove the VR headset at this time. We are now going to ask you some generic questions about your experience.* *NOTE: At any point during the questions, if the participant doesn't get a satisfactory amount of information to answer the questions, proceed with, " Tell me more?"*	
	Did the signage inside the polling place help you navigate to the different areas? Why or why not?	
	How easy or challenging was it to follow the instructions on the signs? Why or why not?	
	What about the signs was helpful to you? What was unhelpful? Why or why not?	
	What suggestions would you have for improving the signage at polling places in future elections?	
	Any additional comments about your experience?	
Misc *Place to record notes if Moderator asks a follow-up question not recorded above*		

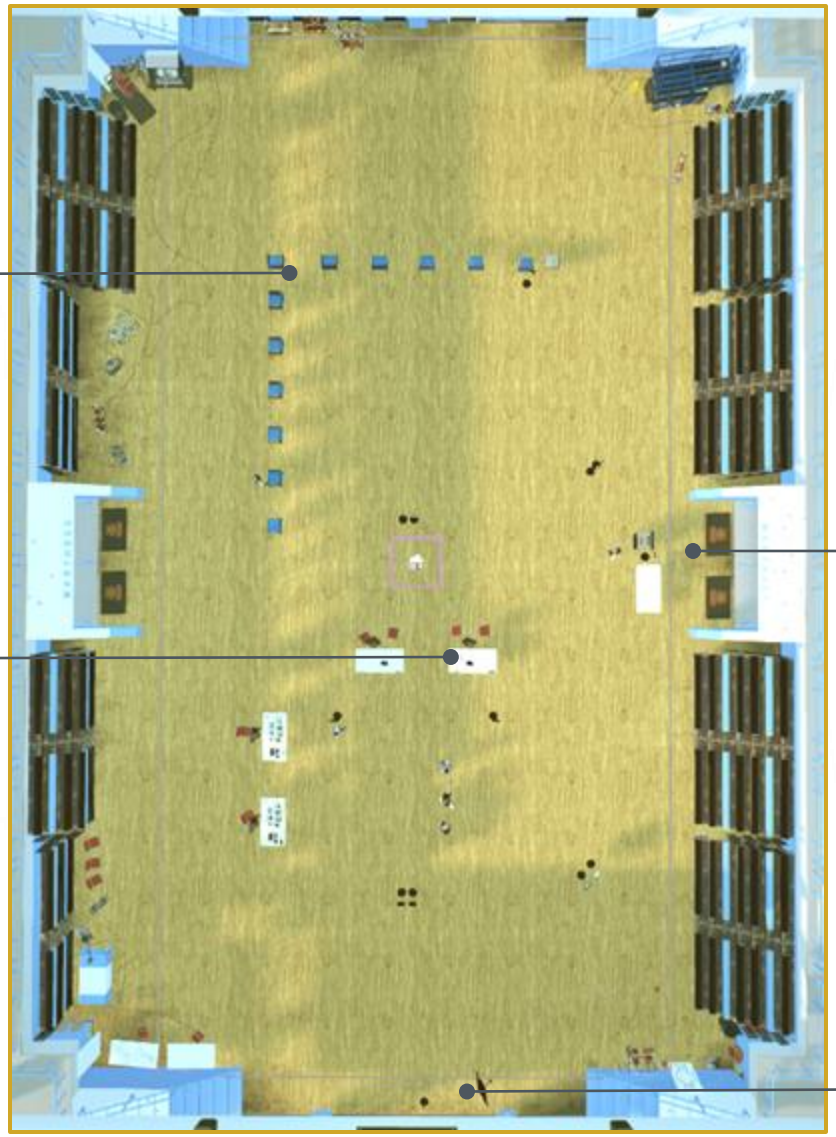
Questions about the signs:
Did they help with navigation?
Did they give clear instructions?
Were they generally helpful?

Summary
Opportunity for comments and suggestions

The pilot test

Bringing the teams together to test the virtual polling place

Voting experience



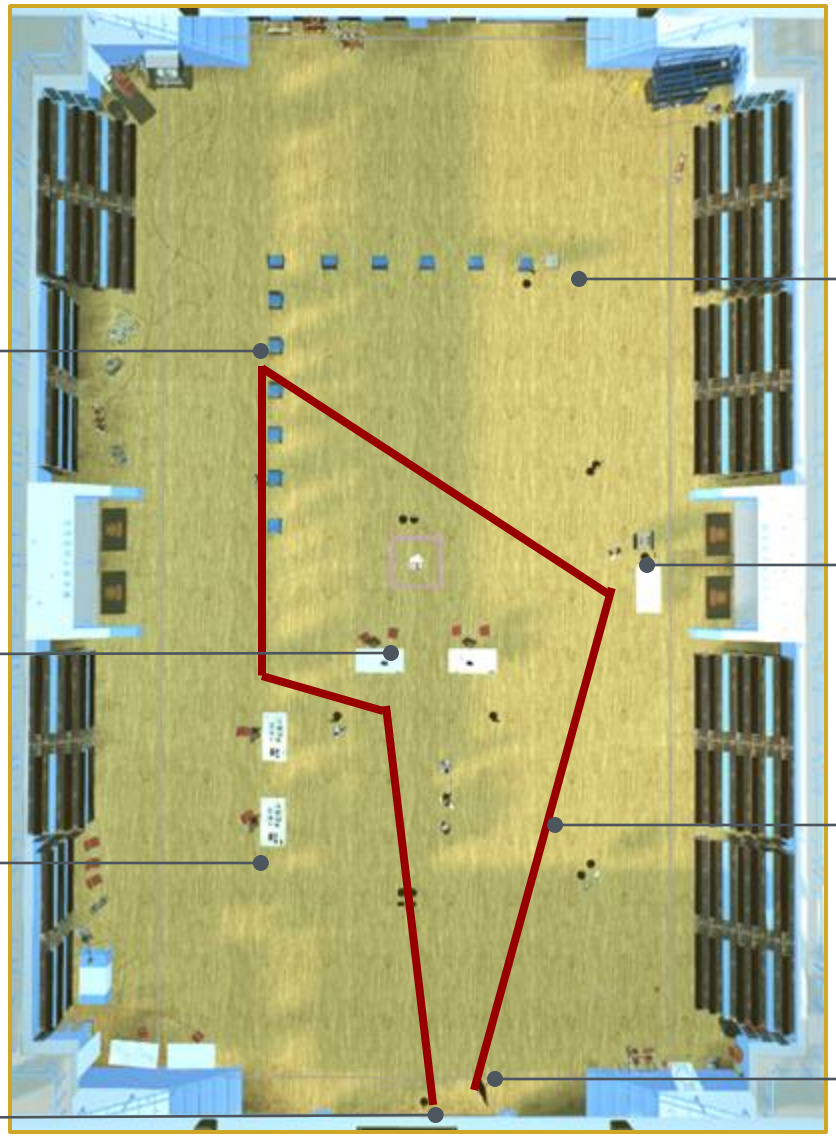
Step 3
Go to empty voting booth and mark ballot

Step 2
Proceed to check-in desk and receive ballot

Step 4
Cast ballot at scanner/counting device

Step 1
Enter the polling place

The polling place layout



Voting Booths
Voting booths behind the check-in tables

Check-In Tables
Check-in tables directly in front of the entrance where voters get their ballot

Help Tables
Tables for same day registration and other assistance

Entrance / Exit

Accessible BMD
An accessible ballot marking device at the end of the row

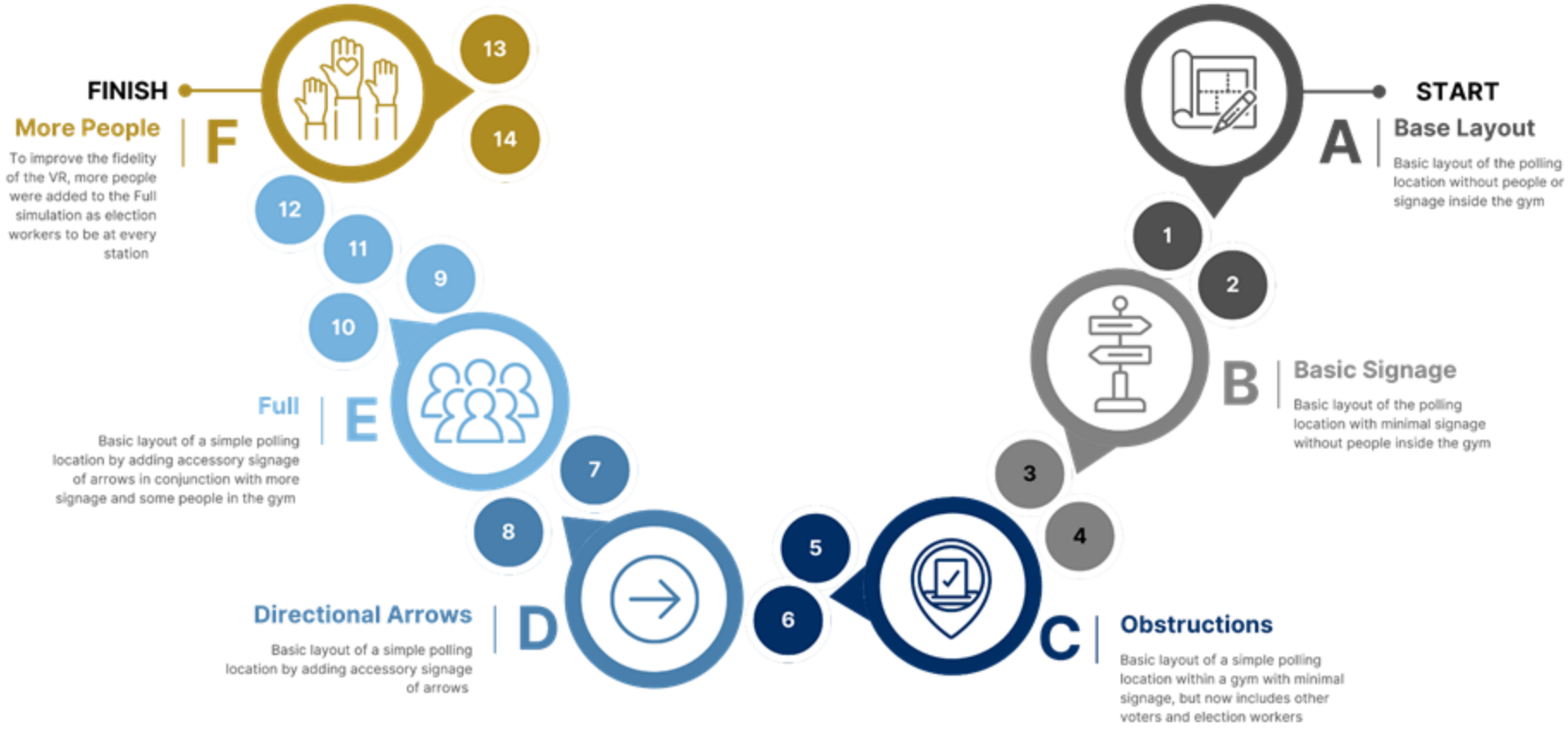
Ballot Scanner
Insert your marked ballot here and get a "I Voted" Sticker

Red Path
The ideal path for participants to move through the space

Notice Board
A notice board near the entrance

Changing the environment throughout the day

We used Rapid Iterative Testing and Evaluation (RITE) as our research method. Every 2-4 participants, we updated the VR environment to address problems identified by the most recent participants.



Variations in the layout

Level A
Base layout

Level B
Basic signs identifying locations

Level C
Added obstructions + people

Level D
Added directional arrows with arrows

Level E
Full set of signs

Level F
Added more people

What we learned

Observations
Insights
Data

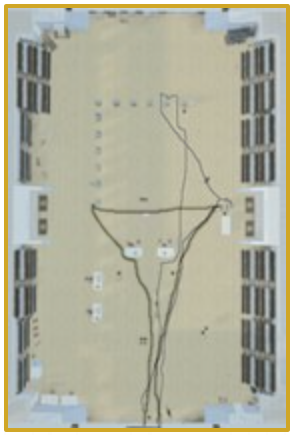
Observations: Voter pathways

Navigation pathways in the 6 levels of the VR simulation complexity

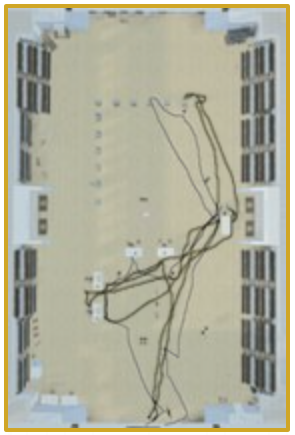
Pathways

Through the six levels (or scenarios) we added people — both voters and poll workers — added objects, and enhanced the interaction with the ballot.

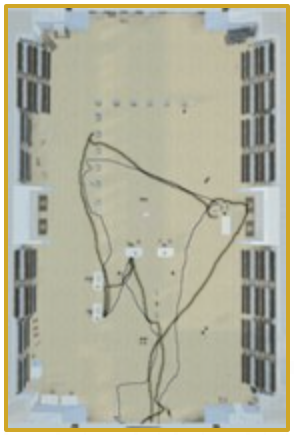
As the virtual polling place got more realistic and crowded, the pathways participants took became more varied.



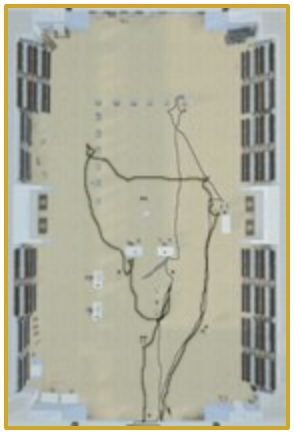
Level A



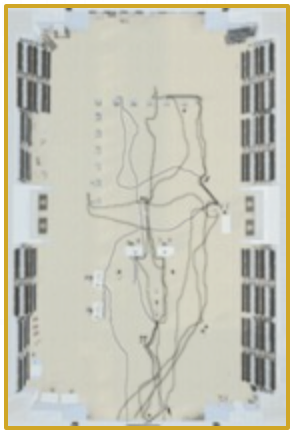
Level B



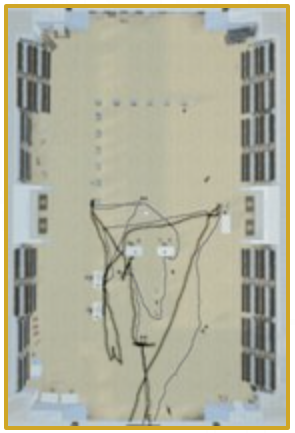
Level C



Level D



Level E



Level F

Level A observations

Participant moving directly even without signage.

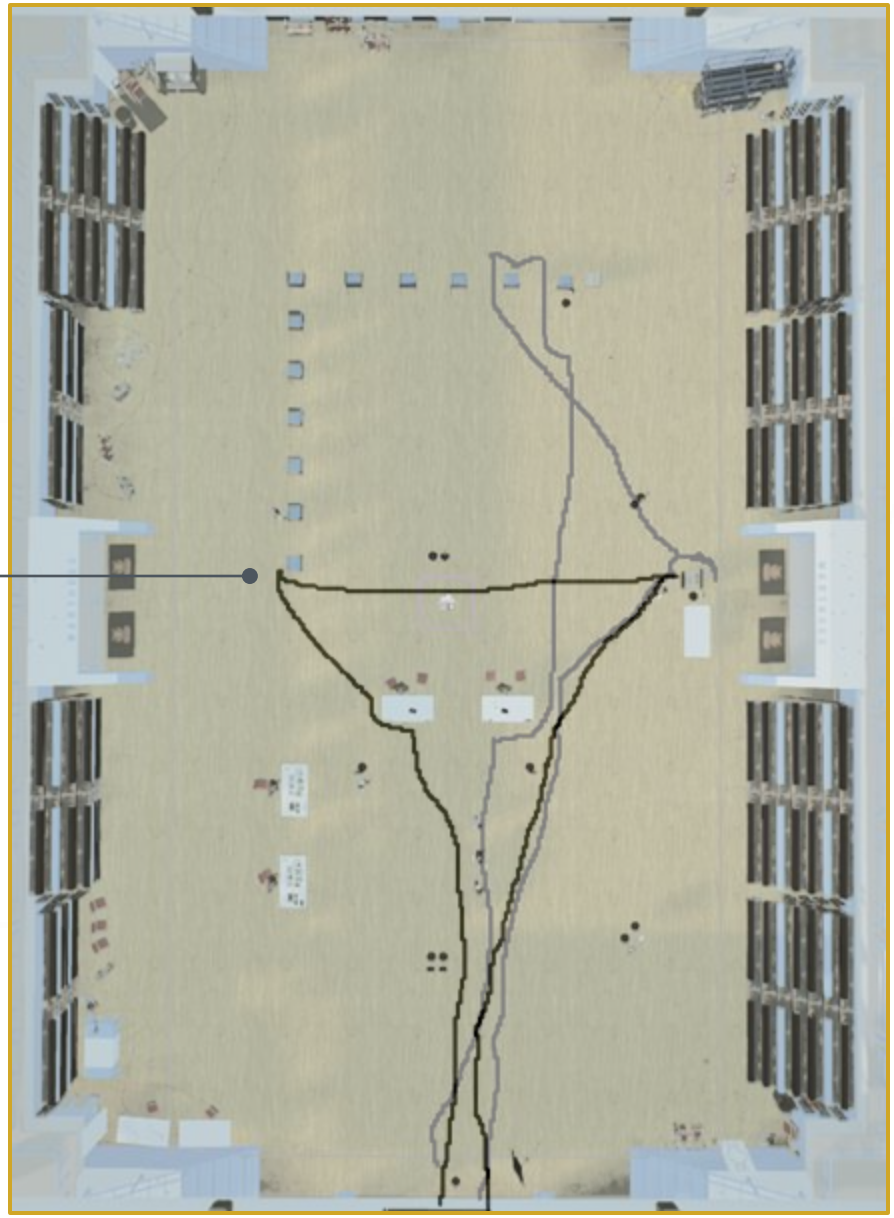
With prior experience in a polling place and few elements, navigation is easy.

Base layout

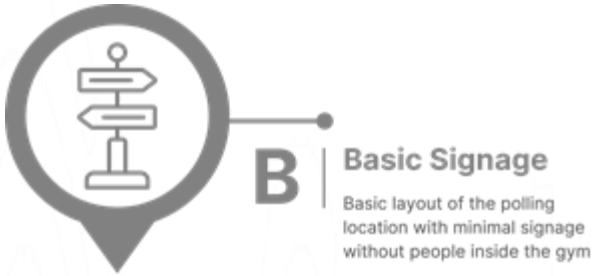
- ❑ **No** signage
- ❑ **Few** poll workers
- ❑ **No** voters

Spaghetti diagrams

- ➔ Heart 1
- ➔ Heart 2



Level B observations



Lots of unnecessary movement from participants.

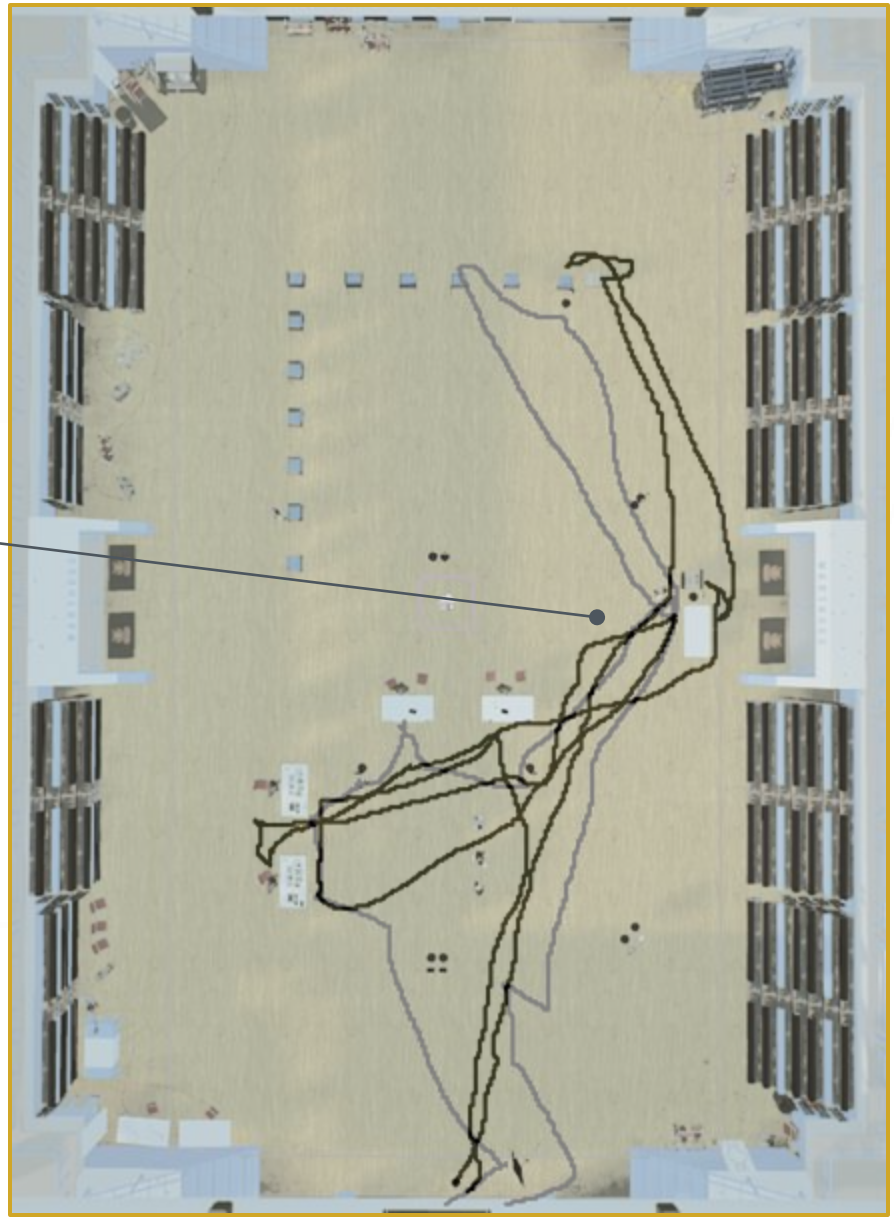
With no sign at the scanner, participants got distracted by the ballot marking device at the end of the row of voting booths.

Base layout

- ❑ **Minimal** signage
- ❑ **Few** poll workers
- ❑ **No** voters

Spaghetti diagrams

- ➔ Heart 3
- ➔ Heart 4



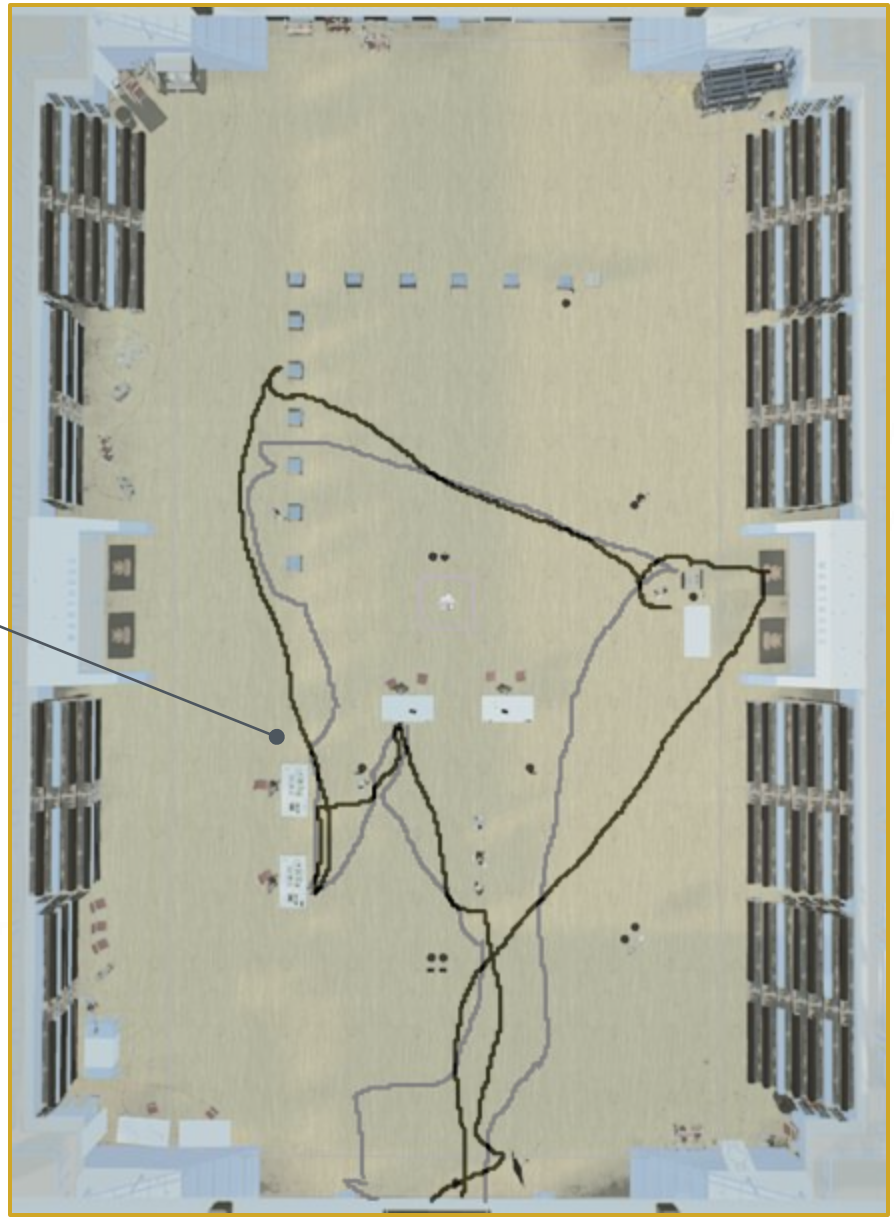
Level C observations

C | Obstructions

Basic layout of a simple polling location within a gym with minimal signage, but now includes other voters and election workers

Both participants moved unnecessarily toward other tables.

Objects in the virtual space are attractive detours to explore.



Base layout

- ❑ Minimal signage
- ❑ **Added voters**
- ❑ Few poll workers

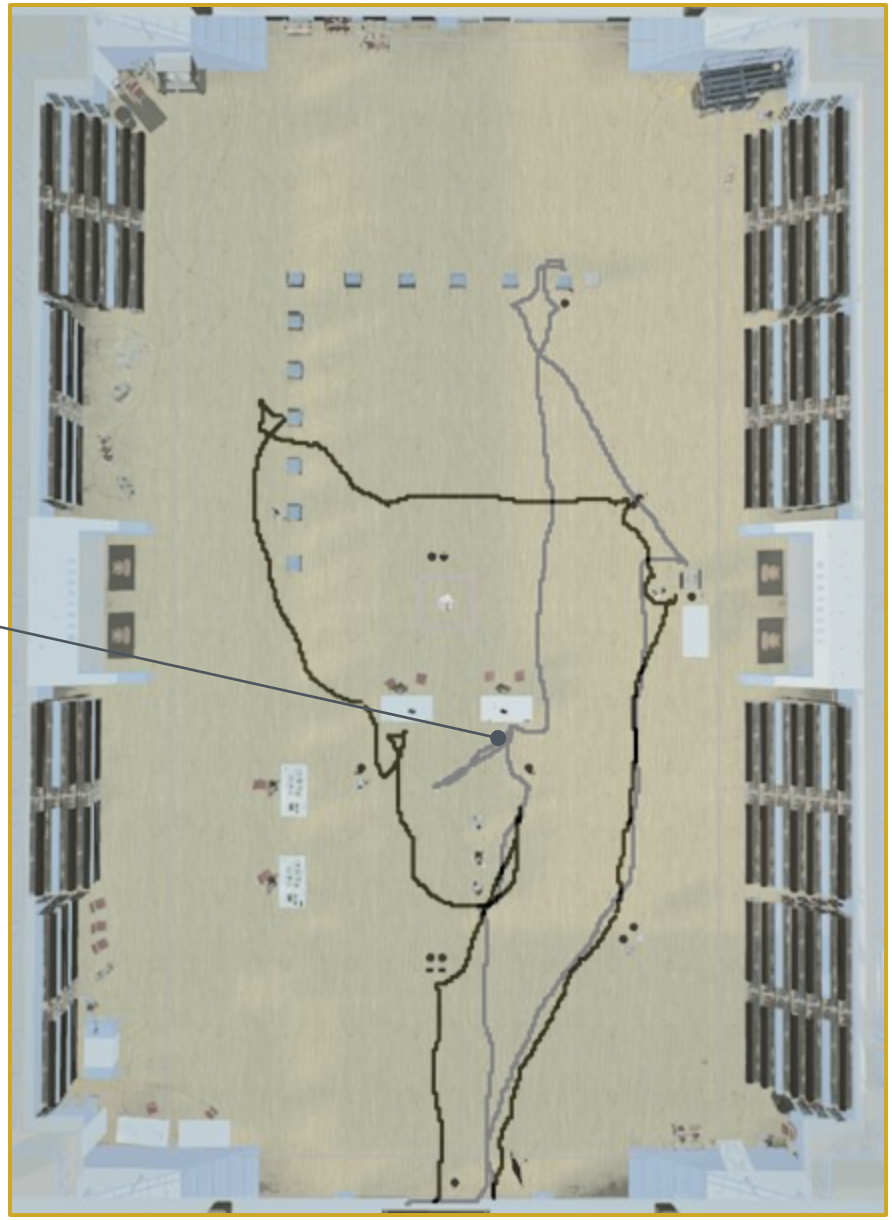
Spaghetti diagrams

- ➔ Heart 5
- ➔ Heart 6

Level D observations

Participants move toward outside of check-in table and flow toward ballot marking stations closer to them.

With worker at both tables, the space between them is treated less like 'public' space.



Base layout

- ❑ Minimal signage
- ❑ **Added arrows**
- ❑ with voters
- ❑ with poll workers

Spaghetti diagrams

- ➔ Heart 7
- ➔ Heart 8

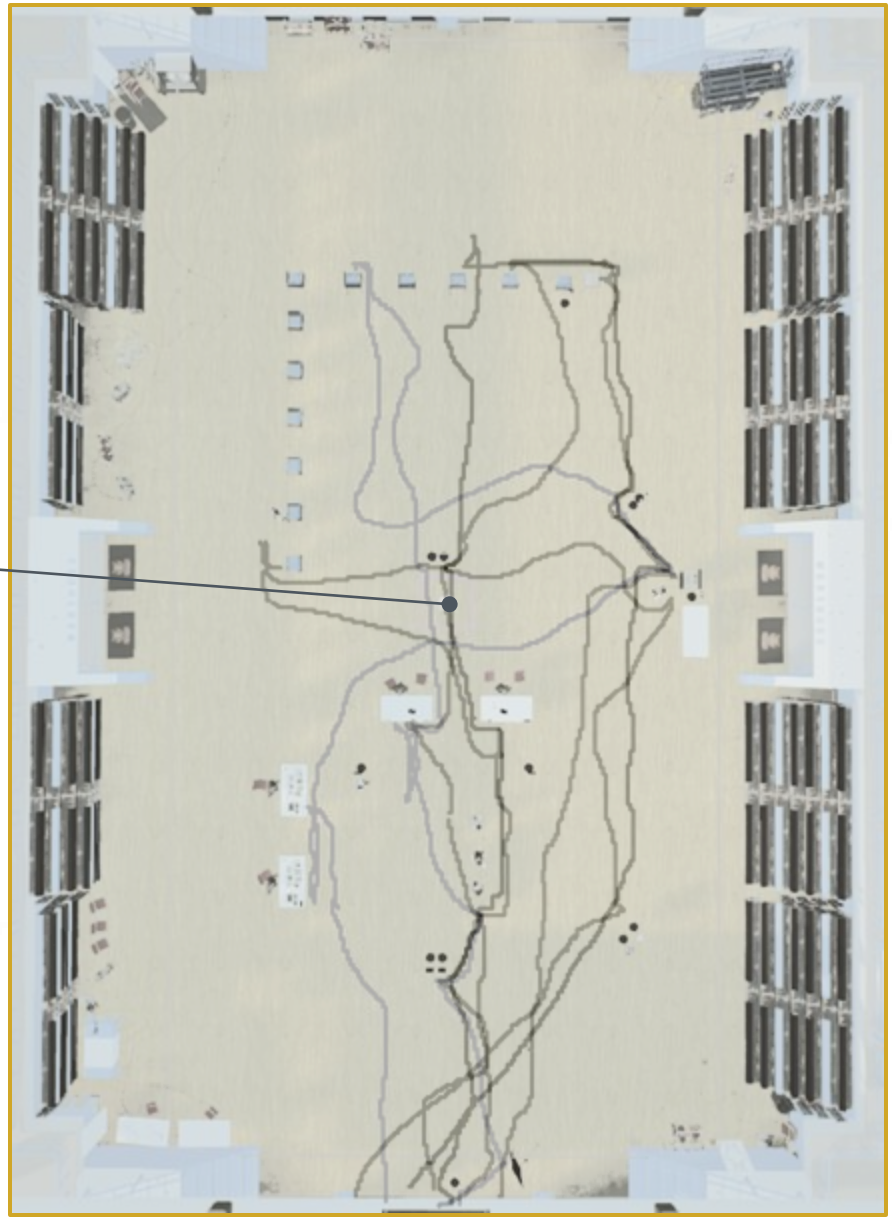
Level E observations

E | **Full**

Basic layout of a simple polling location by adding accessory signage of arrows in conjunction with more signage and some people in the gym

Participants flowing in between check-ins.

A sign placed beyond the tables invited navigation between them to get to the voting booths.



Full layout

- ❑ **Full signage**
- ❑ with arrow signs
- ❑ with voters
- ❑ with poll workers

Spaghetti diagrams

- ➔ Heart 9
- ➔ Heart 10
- ➔ Soul 1
- ➔ Soul 2

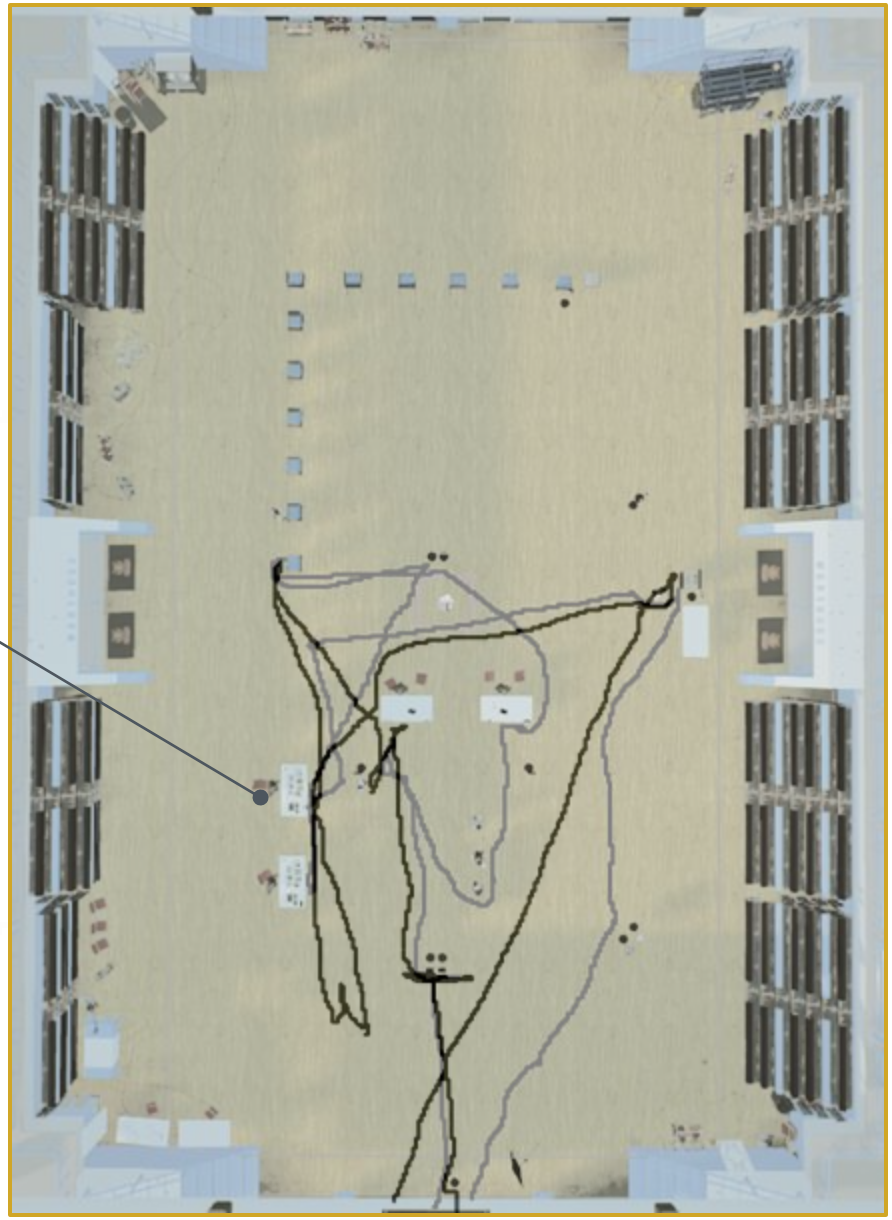
Level F observations

F | **More People**

To improve the fidelity of the VR, more people were added to the Full simulation as election workers to be at every station

Both participants traveled to other tables with people standing behind them.

Both workers and signs in the middle of open space drew participants to them.



Full layout

- ❑ Full signage
- ❑ Full arrow signs
- ❑ With voters
- ❑ **Added** poll workers

Spaghetti diagrams

- ➔ Heart 11
- ➔ Soul 3

Insights:
Qualitative analysis

Interaction in the virtual polling place

How well did the signs work?

How well did the VR tool work as a way to plan a polling place?

Interaction in the virtual polling place

The first instinct was to explore the space

Starting at the entrance, they were given some time to get oriented to the VR controls and practice using them.

However, once set up, they dived right into the task. After the instruction, "Ok, now go vote!"

- Most walked forward to the tables directly ahead of them
- Some explored the notice board to their right
- Some were sidetracked by the tables to their left

"I saw the sign and went straight to check in." (Level B)

"[I'm] looking at lots of arrows[I] will follow them." (Level D)

"[This was] pretty straightforward with multiple options. I took the straightest path. [It was] easy." (Level A)

Familiarity with polling places led to more confidence

Some of the participants had voted or seen a polling place before.

- Many commented that the virtual polling place felt familiar and made navigation decisions based on that knowledge
- They made an assumption that they would receive a ballot at check in, so they were not surprised when one appeared in their hands

[Seeing the Vote Here sign] “Similar set up at my community center to go get ballot.” (Level D)

“This looks like [my] high school gym.” (Level A)

“I assume this [ballot] is what I get from talking to guy [poll worker].” (Level C)

Seeing (virtual) people helped participants navigate

Participants used (virtual) people in the space to make navigational decisions as often as they used the signs and the voting stations.

- The line of people checking in was a strong cue
- Any (virtual) poll worker served both as a signpost and a possible source of information
- As we added people to the virtual space during the day, this effect got stronger

"I'm going to walk to the people." (Level B)

"[I'm walking] to the line. I see a queue for this table I'd rather go to this other one to see what to do. Walk to the guy, talk to him see what I can do." (Level C)

"[At the scanner] maybe if there was a person standing there as well [it would be easier to find." (Level E)

Interaction in the virtual polling place

Adding more virtual elements affected the interaction

- When the space was mostly empty, there were few decisions to make, and most simply walked forward to the check-in tables or the back of the line
- As new people, signs and objects were added, they explored more, sometimes looking for a way around the lines at the check-in tables
- Signs were helpful in finding the low-resolution voting booths

[Looks at the Moderator and Same Day Registration tables, but there are no poll workers there] (Level B)

[Walks to table. Read Same day registration sign] "I'm assuming I'm already registered and I have what I need." (Level C)

[Followed "Mark Your Ballot" sign to an empty booth] (Level E)

We learned some things about planning sign placement

- **Information and instructions** ("Say your name and address") should go exactly where they will be used
- **Directional identifier signs** ("Ballot scanner") help voters know they have found a point once they are close to it
- **A sign at a decision point** (Choosing a check-in table) combines informational and directional and needs both design elements
- **Single arrows** indicate a single pathway to the next step

Setting up the layers required a preliminary theory about how people would use the signs:

The sign design signals the function:

- ➔ **Directional**
  Wayfinding + navigation
  Where am I? Where should I go?
- ➔ **Informational**
  Instructions or other information.
  What is this step? What do I do here?

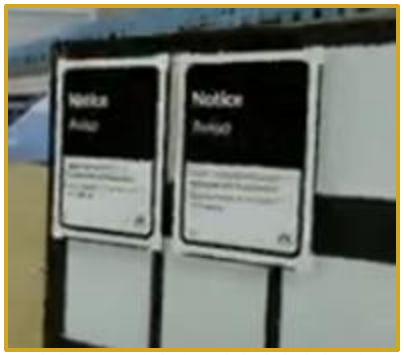
How well did the signs work?

Glitch: The signs were hard to read in the VR space

The poor legibility of the signs from a distance was a technical glitch.

However, because participants had to move close read, it was clear when they were paying attention to the signs.

- Many of the participants commented that the signs were hard to read a distance when they hoped to be able to
- When asked, the moderator told them to just move forward until they could read them



View from 18" away from the notices near the entrance

"Are you supposed to be able to read the signs?" (Level D)

"[They are] a little blurry and hard to see from distance." (Level E)

[At about 4 feet away, said] "The top text is legible…the paragraph [below] is pixelated." (Level B)

How well did the signs work?

Signs with a clear type and message were most effective

By the final levels there were several types of signs. Participants used them in different ways.

- **Arrow signs** were easy to read at a distance, and were used with the moderator's verbal cue
- **Station identification** signs were helpful in confirming when they reached the right location
- Many explored the **notice board** at the entrance, but said it was not helpful

"I didn't pay any attention to the signs. I usually don't look at signs Just find my way around." (Level C)

"[The] main arrows [told me where to go." (Level E)

[Walks toward sign beside scanner and reads] "So that's the last step." (Level B)

"I'm gonna look at the sign over here, it says 'notice' – not really a help." (Level C)

How well did the signs work?

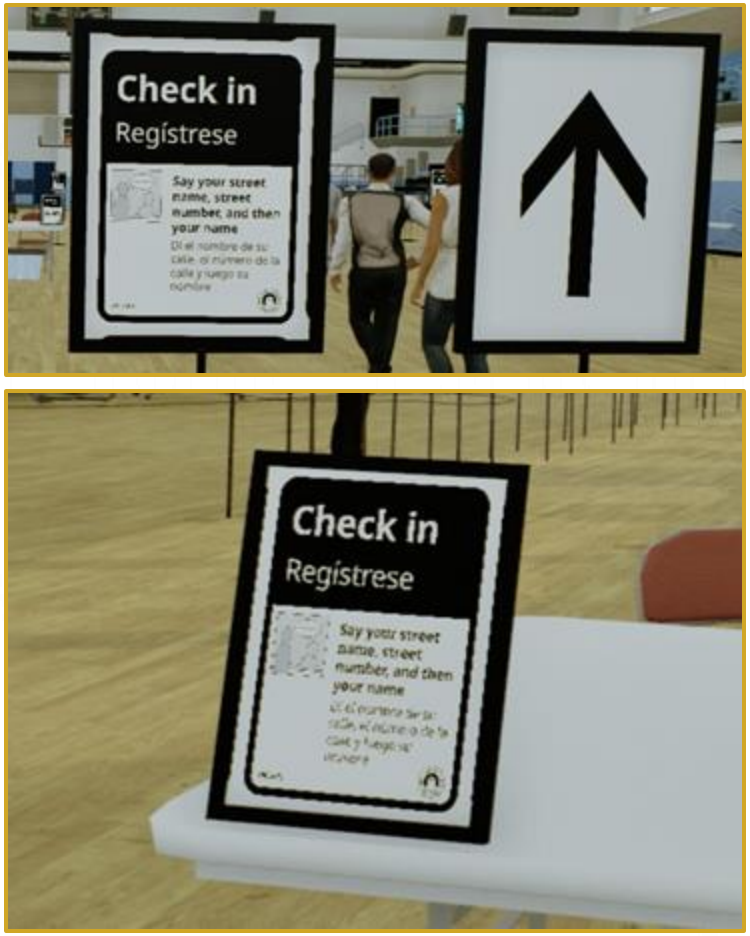
Instructions must go where voters need to use them

Instructions to say your name and address at the check-in table were misplaced when at the start of the line.

- The placement put the instructions before the decision about which table to go to
- The time to get from the end of the line to the check-in table was variable

The same sign was repeated at the table itself.

Multiple participants stopped at these signs and said their name and address to no one in particular. Then, when they reached the table (and 2nd sign), they repeated this information. (Level E/F)



Signs at the end of the line (top) and at the table (bottom)

How well did the signs work?

"Decision signs" can be confusing if not in the right place

Signs directing voters to a table by last name confused almost everyone and were not immediately visible.

- They did not know what the "A-M" and "N-Z" signs meant
- They mostly puzzled it out, but it took time to resolve the confusion

"[It was] unclear if this meant first or last name." (Level D)

"Not the correct line for me, probably go over there." (Level E)

"Letter and a number – I didn't understand what that was about." (Level C)

How well did the signs work?

Arrows were universally understood to be for navigation

The difficulties reading signage text made the signs with arrows (added in Level D) more attractive and useful for navigation.

- Arrows + text clearly identify a navigational sign
- When a sign with an arrow was placed in the open space between the check-in tables, participants noticed it and headed more confidently to the voting booths

"The arrow is what I see first." (Level D)

"Looking at lots of arrows.Will follow them." (Level D)

How well did the VR work as a polling place?

Familiarity with voting in person made a difference

Although all of the participants were able to successfully vote, their prior experience voting made a difference.

- Even having seen a polling place before was enough to provide a starting point for 2 participants

"This is similar to [how I voted] in Turkey." (Level A)

"[This is] similar to the polling place in my high school. This looks a lot like that." (Level C)

How well did the VR work as a polling place?

Participants noticed the bilingual text on signs

Some terminology and translations confused or misled participants.

- The “Moderator” role is an unusual term, only used in 1 state
- The Spanish translation for Check-in (Regístrese) is similar to the term for same-day registration

Commented that “the French” (Regístrese) is similar to same day registration. (Level B)

[Read the check-in sign, then went to the notice board] “I’m hoping for some kind of instructions to read before asking for help.” (Level C)

How well did the VR work as a polling place?

Behavior changed as elements were added at each level

The first-person perspective made it easier to see how participant behavior changed (and how well the signs worked) as the virtual environment got more complex and realistic.

- Getting to the check-in table was the most difficult interaction with several decisions
- Voters in line acted as a cue, but also blocked the view of signs at the table
- We did not have much time to try different placements of signs

Challenges for this experiment
The signs were hard to read at any distance. Was this an accurate simulation of how they would read in real life?

In a real polling place, the workers also provide instructions and can also answer questions.

Interactions with the ballot were represented very minimally it simply appeared in their hand at the check-in table and disappeared when they reached the scanner.

How well did the VR work as a polling place?

The tool allows easy experimentation with signs

Even with a relatively simple virtual environment, participants were able to engage with the simulation.

- The virtual space was realistic enough for people to want to find the correct check-in table
- Adding complexity each layer allows us to try different things, and learn what is needed for a realistic simulation
- The environment was effective in visualizing spatial relationship, which was helpful to understand how far away things are, how large signs might need to be, and where more signs might be needed to maintain a continuous visible pathway

Game behavior is not the same as real life.

- Figuring out the rules of a space is part of a game, so exploration can be part of the fun of play.
- Few games rely on reading signs because in games they don't usually provide much context, but participants quickly learned to use the signs as cues
- As a research team, we used both the technical "level" and research "scenario" to describe the iterations we created.

Data:
Quantitative analysis

Voting time to completion

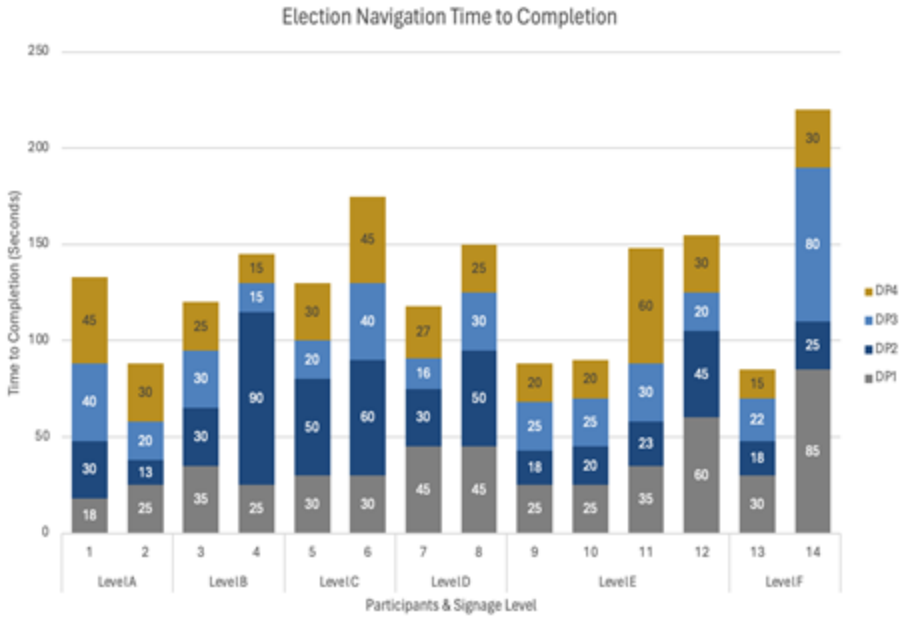
Participant pass/fail

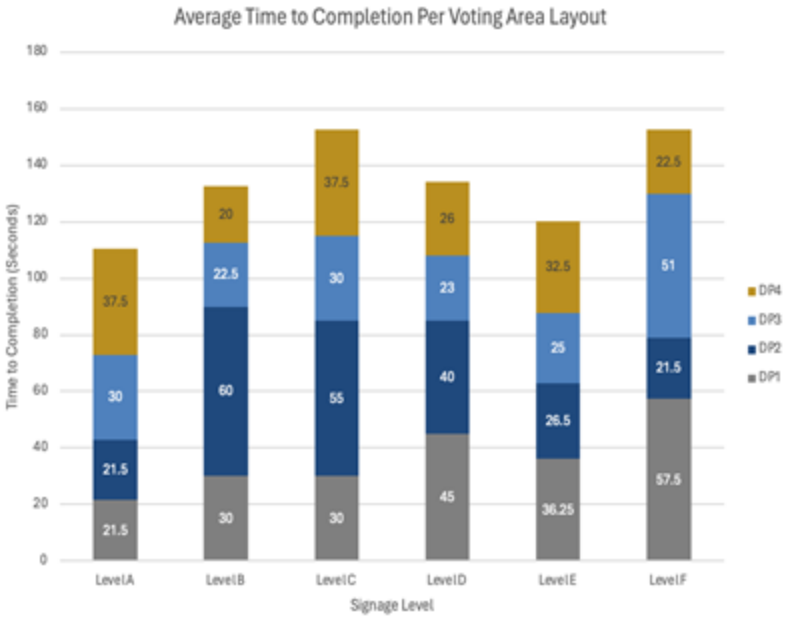
VR experience

Voting experience

Voting time to completion results

Average completion times vary greatly, even within layout levels.





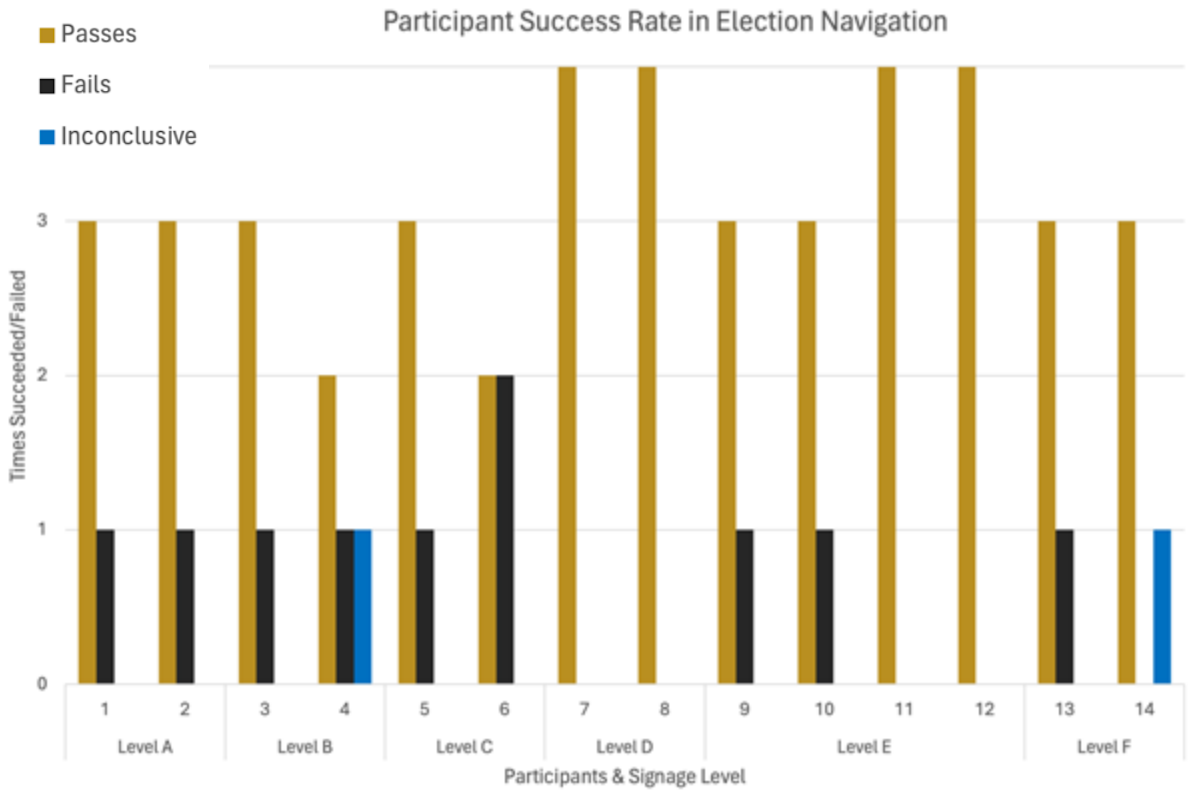
Fastest Time to Completions in levels **A**, **E** and **F**
Longest Time to Completions in Levels **B**, **D**, **E** and **F**
Biggest time difference within a level in Level **F**

DP2 has the highest average Time to Completion followed by **DP1**

Participant pass/fail results

On average, participants succeeded more than they failed. That is, they had to be assisted by the moderator to complete a step in the voting process.

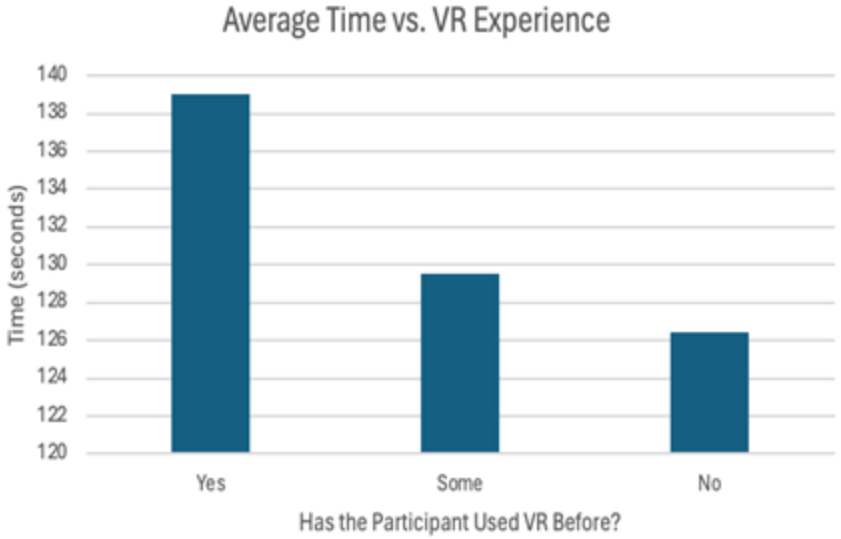
- Participants on average **failed more tasks in the first 3 levels** than the last 3
- Participants with the highest pass rate took between around 100-150 seconds total



VR experience

Participants who had never used VR before were equally as successful as those with VR experience.

Participants with VR experience took longer (+13sec avg) to complete the task than those with no prior experience.



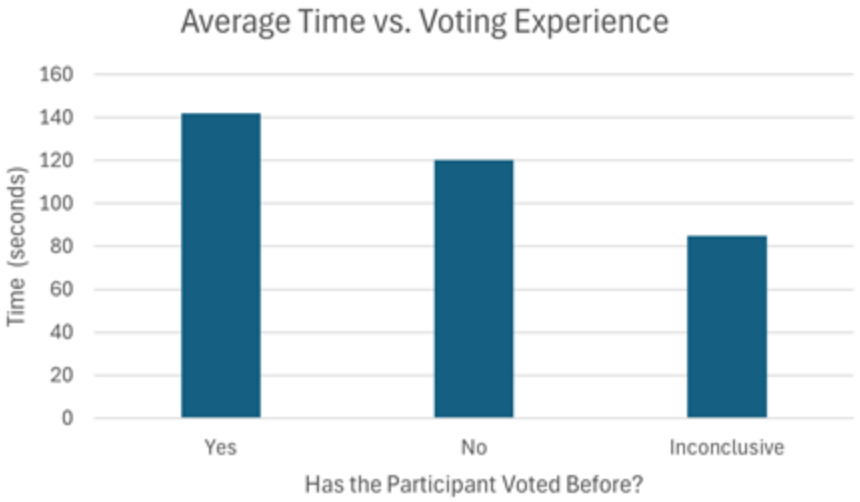
Has used VR before	Time (seconds)
Yes	138
No	129
Inconclusive	126

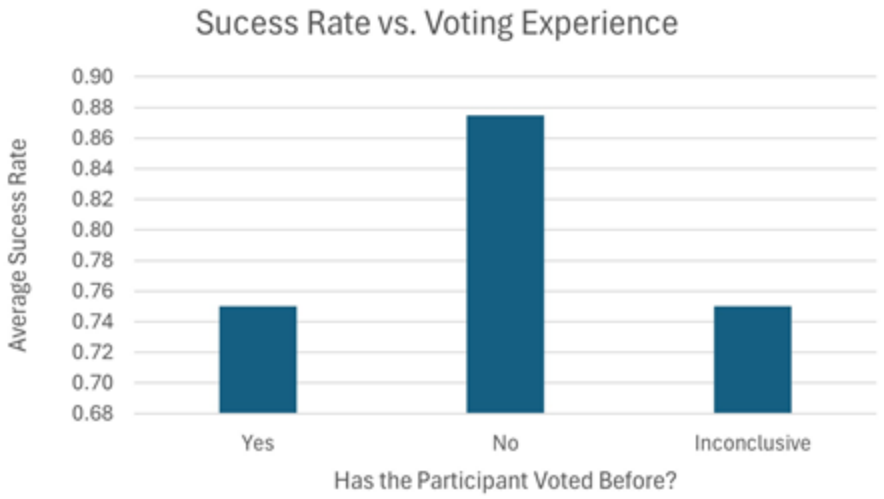
Has used VR before	Success rate
Yes	0.80
A little	0.75
No	0.80

Voting experience

Experienced voters generally spent more time within the polling location.

First-time voters demonstrated a higher overall success rate compared to those who had voted before.





Has voted before	Time (seconds)
Yes	140
No	120
Inconclusive	84

Has voted before	Success rate
Yes	0.75
No	0.87
Inconclusive	0.75

Conclusions to investigate further

The VR experience might affect the interaction.

VR experience might lead to overthinking simple tasks. Participants may apply other strategies that don't align with the current simulation.

- Experienced participants may explore the space more thoroughly
- Inexperienced users might approach the task with a fresh perspective, focusing more on the immediate task and not being distracted with prior habits
- VR controls or interactions may be different from previous experience causing hesitation or error

Previous voting experience might affect the interaction.

- Voters might have been over confident and less reliant on signage as they are familiar with a polling location
- Prior experience could have created expectations causing confusion when environments differ
- Experienced voters might spend more time paying attention to the environment rather than the task itself because it is familiar
- Previous voter might be used to waiting in lines and not in a rush or don't expect to vote quickly

Conclusions and next steps

Can a blended team make research magic?

What worked best

- ★ There is energy and creativity in collaboration
- ★ Two groups with very different skills and approaches amplify the work with their perspectives
- ★ Work span multiple disciplines and come together quickly

Challenges to plan for

- ➔ Matching the academic calendar to elections
- ➔ Setting milestones and key moments for collaboration
- ➔ Knowledge sharing - technical skills, work approach, and election knowledge
- ➔ Distance and collaboration opportunities

How well did the VR tool work as a way to plan a polling place?

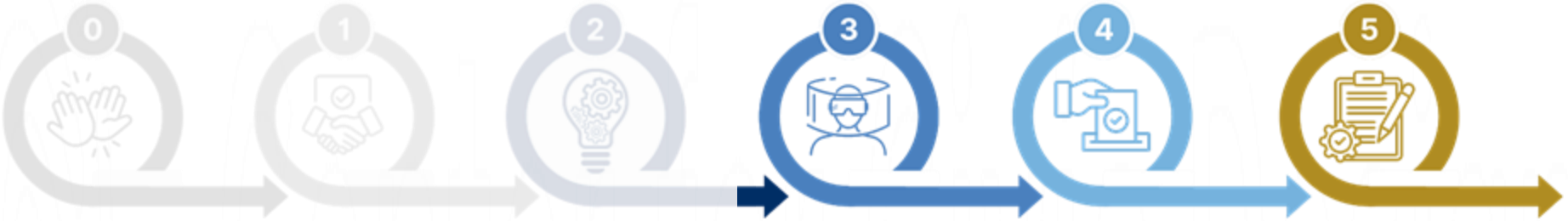
What is needed to make the virtual polling place realistic enough to use with confidence?

- Test sign and text sizes in the real world and program them in the virtual one to provide similar legibility at a distance
- Design voting booths, accessible voting systems, and ballot scanners that are realistic enough to be recognized
- Use line wait time calculators to figure out how to populate the virtual space for slow, medium and peak times

How might election officials use a virtual polling place to help plan real ones?

- Testing different layouts to use, and seeing how they work both with just a few voters and in a big elections
- For training, to show poll workers how to set up signs to be most effective, visible, and used
- For voter education helping new voters learn what happens in a polling place, how poll workers can help them, and other services that are available (like same-day registration)

What's next for this project



0-2. Introduce plan, run Pilot Test

Watching a participant as they get their ballot at the check-in table

3. Improve the model based on the Pilot Test

4. Collect data from election officials on effective placement

5. Use what we learned from the Pilot Test to add signs to other EDI tools and update CCD signage toolkit and guidance

For more information

Gretchen A Macht, PhD
Amber Fearn
macht@uri.edu
afearn@uri.edu

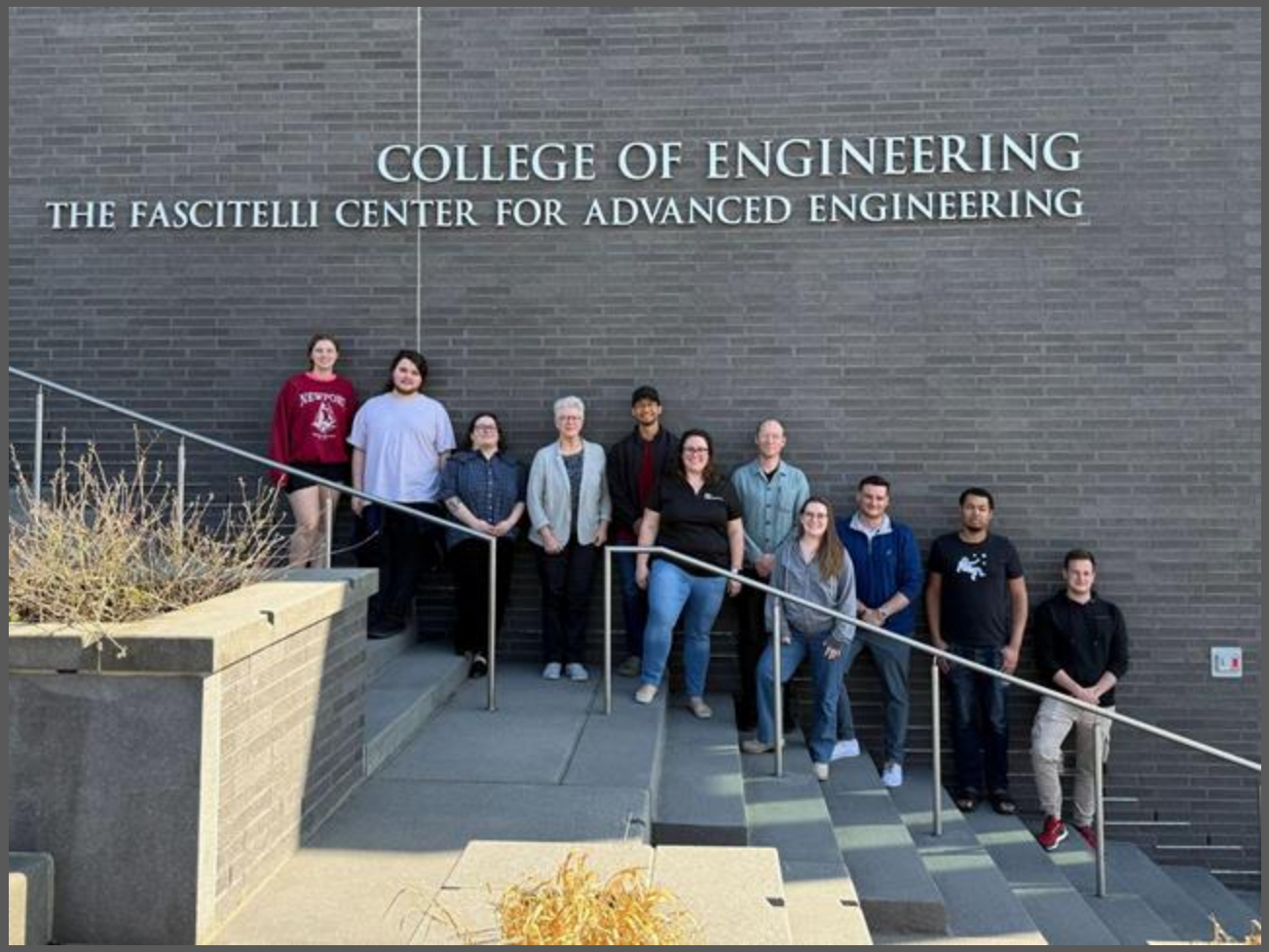
Engineering for Democracy Institute
uri.edu/edi
edi@etal.uri.edu
@engr4democracy

Whitney Quesenbery
Tasmin Swanson
whitneyq@civicdesign.org
tasmin@civicdesign.org

Center for Civic Design
civicdesign.org
hello@civicdesign.org
@civicdesign

About the team

Bios



Engineering for Democracy Institute

- Gretchen Macht, PhD
- Amber Fearn

University of Rhode Island

- Kirk Brown
- Collin Batchelor
- Malinda Fry
- Ryan Benvenuti
- Subham Chomal

Center for Civic Design

- Tasmin Swanson
- Randy Hadzor
- Evie Lacroix
- Whitney Quesenbery

Gretchen A Macht, PhD

Assoc. Professor, URI | Executive Director, EDI

Engaging and Intellectually Stimulating

Reflection points:

- Bridging Industry Practitioners & Academia
- Harmonizing Taxonomies
- Not All VR Systems Are Created Equal
- Sharing Hands-On Data Collection Across State Lines
- Deepened Practical Understanding of Qualitative Methods
- A-Ha Moments
- Being Comfortable with Inferences & Interpretations

Top project highlight:

Meeting at the intersection of

Qualitative & Quantitative

Kirk Brown
Technologist | VR Coder

New skills & Experiences

Reflection points:

- Wrote the code to make a ballot appear in-hand
- Performed Technologist role for 5 subjects
- Participants clearly used signs (even when the didn't read them) and visible people as navigation aides
- Wish we had tested all the hardware a week prior to the day of the experiment
- Got my first qualitative experience

Top project highlight:

Spotting patterns in participant behavior

Collin Batchelor

Layout Design | Video Coder

Initial & Revised on Voting Area Layouts

Reflection points:

- Designed initial layouts for strategically placing various signage, crowding, and layouts
- Reviewed 14 VR simulation playbacks and compiled all quantitative data relative to observant's success and made intellectual inferences from this quantitative data
- Learned the importance of consistency to minimize variables between measuring candidates.
- Realized that different humans prefer different variations of shapes and language to direct their flow
- Has learned that VR can be a useful tool for observing and reviewing back where attention and focus are concentrated

Top project highlight:

1st qualitative experience

Malinda Fry
IRB | Recruitment

This project taught me a lot about research and communication, and I really enjoyed the process of bringing it all together.

Reflection points:

- Timely participant recruitment to ensure a steady flow
- Learned how to clearly communicate research design and ethic through IRB revisions
- Initially informed classmates of voting processes
- Managed IRB and recruitment to keep project running smoothly

Top project highlight:

IRB form required clear, thorough detail and alignment will all aspects of the study.

Ryan Benvenuti

Technologist | VR Coder

This was quite a stressful, yet rewarding process.

Reflection points:

- Live time iteration creating new layout step
- Managed to overcome the only major technical hurdle we faced
- Took the processed data and displayed said information in detailed graphs

Top project highlight:

Successfully driving and live time iterating on the VR polling location

Shubham Chomal
Technologist | VR Coder

Working on this VR project

Reflection points:

- Created and set-up the VR environment and modelled missing assets
- Trained UE5 to teammates
- Created pipeline to easily switch signs
- Created a Comprehensive Instructional Guide for future team use

Top project highlight:

Setting-up the VR system

Tasmin Swanson

Program manager | Notetaker

Collaboration leads to richer outcomes

Reflection points:

- Enjoyed seeing this collaboration come to life, from a 30 second conversation, to a full-fledged project
- Adapting signage originally developed for specific offices to a more general use case helped refine the set
- Getting to use VR for the first time
- Navigating little hiccups along the way as we each learned more about new-to-us research methodologies

Top project highlight:

Iterating in the VR environment in real time

Randy Hadzor
Information designer | Signage

Valuable insight of what's working and what could be improved for the signage toolkit, templates and guidance

Reflection points:

- Communication dynamics
- Students working through challenges, interacting with the templates, putting their skills together, and everything coming together right on time
- Unique ways of thinking and perspectives applied to voting and wayfinding
- Interesting seeing how the participants navigated and interacted with the signage with the think aloud protocol
- It is always interesting to see how signage is used

Top project highlight:

Participants telling their friends how much fun it was when leaving the testing room

Evie Lacroix

Civic researcher | Test moderator

Learning a new method for testing

Reflection points:

- Quickly teaching the ins and outs of quantitative testing
- Learning more about the balance between qualitative and quantitative research
- Introduction to the possibilities of VR testing

Top project highlight:

Thinking about elections through an engineering lens for the first time

Whitney Quesenbery
Director | Researcher

A new way to explore design options!

Reflection points:

- Learning how to blend two ways of learning
- Trying out a new way to test setting up a physical space
- Sharing what we've learned working in different states
- Learning about how VR is created
- Qual + quant!

Top project highlight:

Seeing a collaboration between engineering and design take shape