UXR Final Report
CMU Campus Navigation

User Experience Research

Francine Gemperle
Linda Pan, Silin Liang

Executive Summary

Exploration

Through exploration such as observation and literature review, it was found that campus navigation faces widespread issues.

User research

Through surveys and interviews, it was found that users generally feel confused during navigation due to the lack of signage on campus, with indoor navigation issues being more pronounced than outdoor ones.

Insights

Challenges of In-Building Navigation, Propensity for Independence, and Desire for Shortcuts are considered as 3 three main insights.
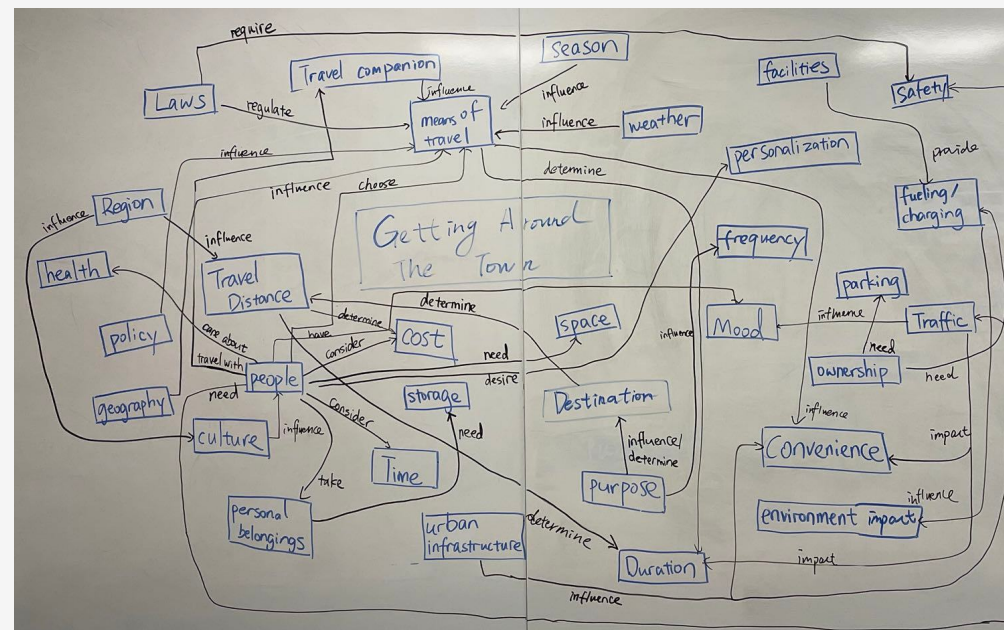
Conclusion & Analysis

Must: Increased interior signage
Should: More intuitive interior zoning & Clear positioning mechanism
Could: Smart, personalized digital assistance

Initial Exploration

These approaches gave a comprehensive view of how users interacted with the campus environment and revealed key navigation challenges.

Concept Map

Our concept map initially focused on common issues related to 'getting around town'. After discussion, since **we all have experienced getting lost on campus**, we chose to focus on the topic of **CMU campus navigation**.

Literature Review

Participants who experienced higher workload during campus navigation took more time and made more wrong turns.

They were often stressed, particularly due to the lack of escalator information and closed doors, which forced longer walks. Many suggested that navigation apps should offer route options (e.g., shortest, accessible) and immediate notifications when taking wrong directions to reduce stress.

Tahir, R., & Krogstie, J. (2023). Impact of navigation aid and spatial ability skills on wayfinding performance and workload in indoor-outdoor campus navigation: Challenges and design. Applied Sciences, 13(17), 9508.

https://doi.org/10.3390/app13179508

Hypothesis

People often encounter difficulties while navigating the CMU campus.

Where should I go?
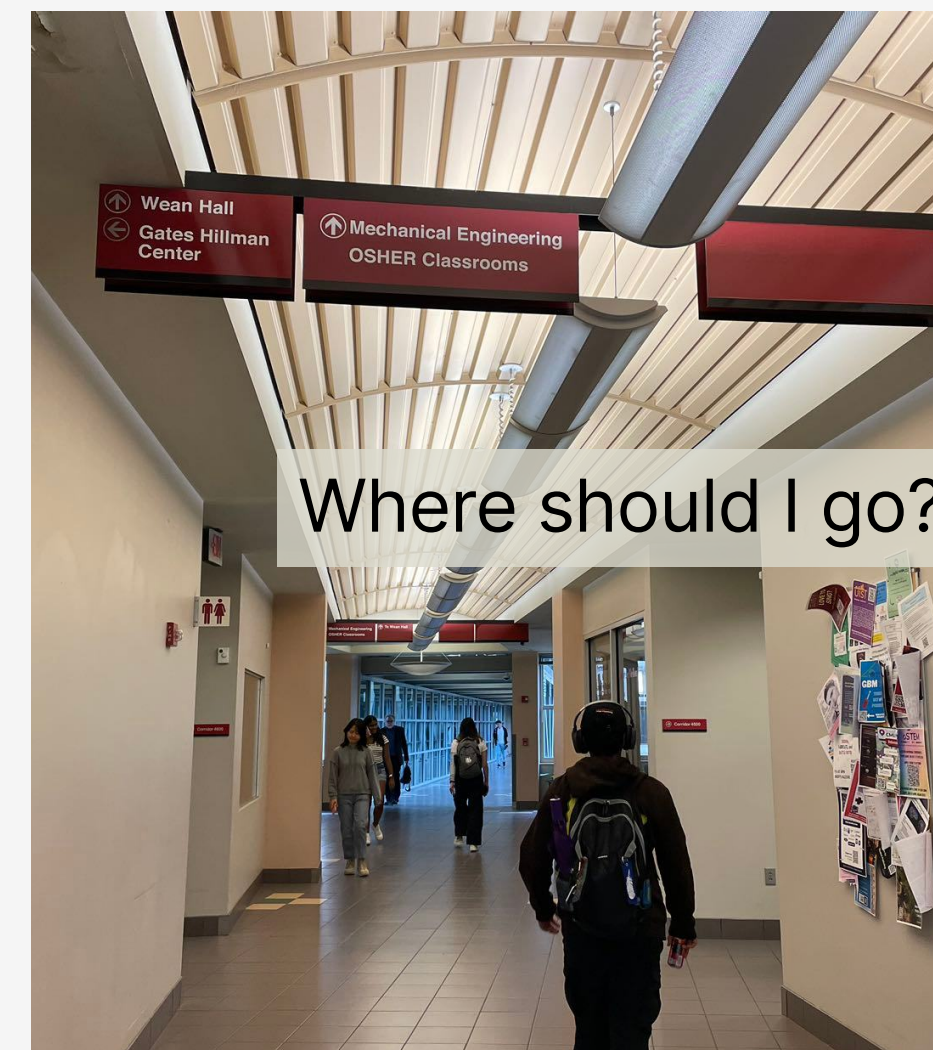
Observation

Observation involved tracking how students, faculty, visitors moved through campus, identifying moments of confusion or inefficiency.

We found that people often feel confused at **intersections and building entrances**, likely because these are key decision points. Additionally, we observed that navigation challenges are **more frequent indoors than outdoors**.
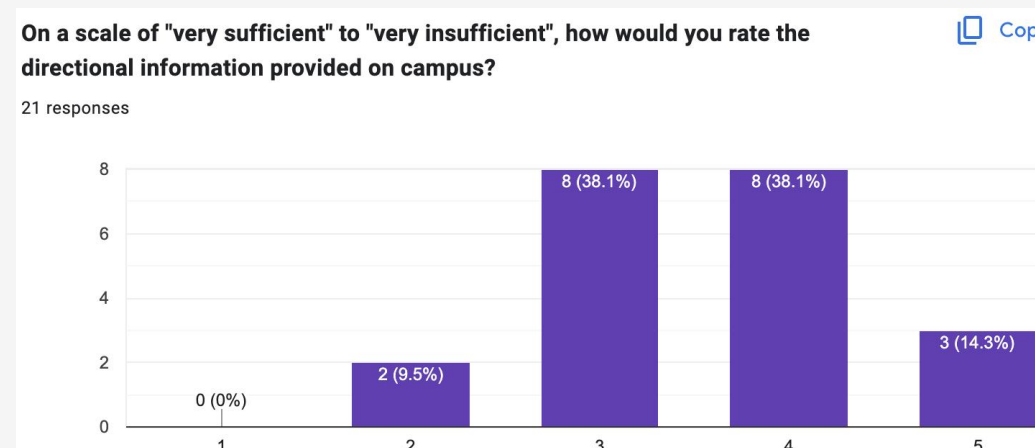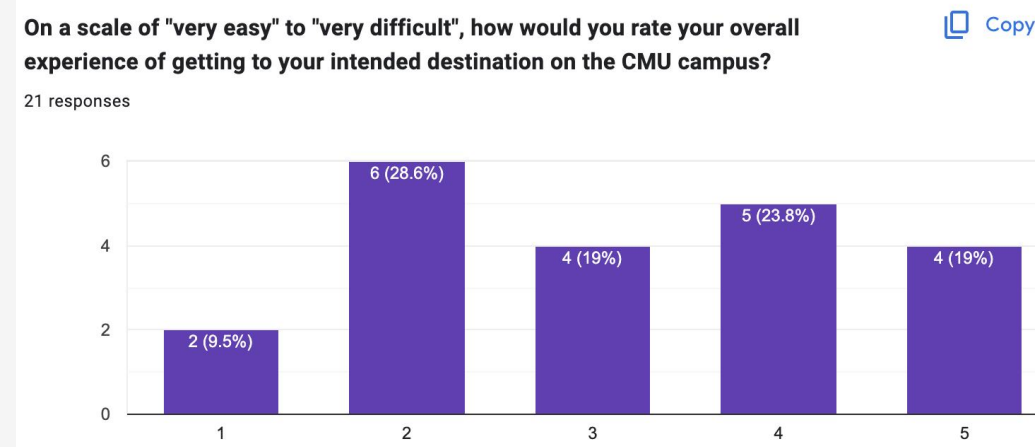
Inquiry

Survey

The online survey on CMU campus navigation received 21 responses. Key findings include:

1. Ease of Navigation: Most participants found campus navigation to be **somewhat challenging,** 20% participants think it's very difficult.
2. Directional Information: Respondents rated the sufficiency of campus signages and directional information, **53% of them consider there is a apparent lack of information.**

On a scale of "very easy" to "very difficult", how would you rate your overall experience of getting to your intended destination on the CMU campus?

21 responses

On a scale of "very sufficient" to "very insufficient", how would you rate the directional information provided on campus?

21 responses

Interview

5 graduate students, 3 undergraduate students, 3 faculty, 2 visitors are interviewed.
The findings are: For students and faculty, they struggled with **internal navigation due to complex building layouts, confusing entrances, and varying elevations.**
There was a strong demand for clearer signage and **more intuitive zoning within buildings, as well as interest in shortcuts between buildings.**
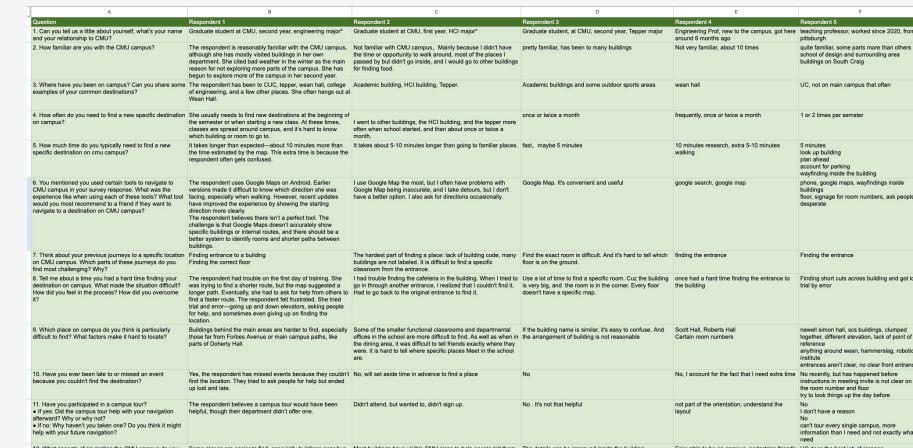
Role Play

During the role-play exercise, one of us used the **think-aloud method**, verbalizing her thoughts and reactions at each stage of navigating the CMU campus. This approach provided valuable insights into the user's **real-time psychological responses**, including moments of confusion, frustration, and decision-making.

We found that the user sometimes deviate from Google Maps to save time, **attempting to find shortcuts even if it may result in getting lost.**

Codesign

In the co-design phase, we had three parts: storytelling about the difficulties encountered while finding places, marking specific locations on the map that caused challenges, and identifying the most frequently used landmarks and tools during navigation.

We found that the common reason for **struggling finding the destination is the lack of signs.**
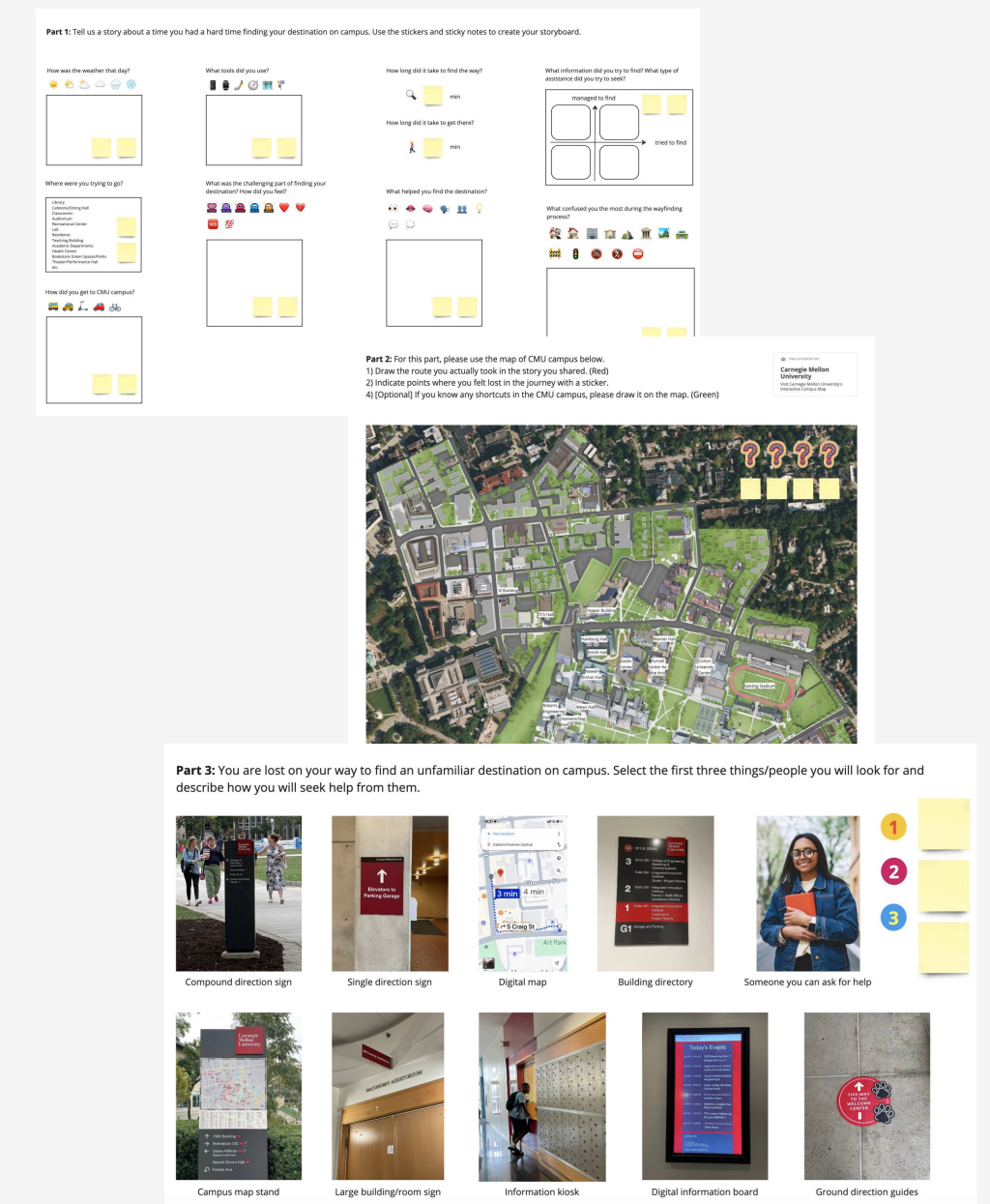
Persona & User Journey Map

Student
- **Age:** 23
- **Familiarity with Campus:** General familiarity
- **Comfort with technology:** Very confident
- **Needs:** Clearer estimation of traveling time
- **Pain Points:** The discrepancy between the estimated time provided by the navigation system and the actual time required leads to anxiety.

This journey describes the experience of a new graduate student who felt confused during her first walk to the health center.

Faculty
- **Age:** 45
- **Familiarity with Campus:** General familiarity
- **Comfort with technology:** General confidence
- **Needs:** Clearer indoor signage and the desire for navigation apps to have indoor navigation
- **Pain Points:** Difficulty navigating indoors, not knowing which entrance to enter and how to get to the specific classroom

This journey describes the difficulties a professor encountered while walking to a classroom in Tepper to attend an academic event.

Persona 1 (Student)

Age: 23
Occupation: Graduate Student

Familiarity with campus
Comfort with technology

Scenario: Heading to University Health Services (UHS) for the first time for an appointment
Travel Method: walking

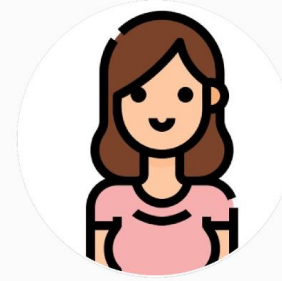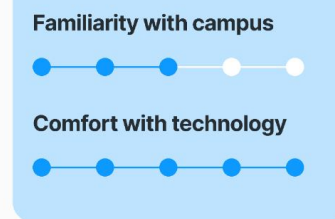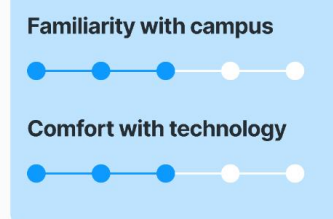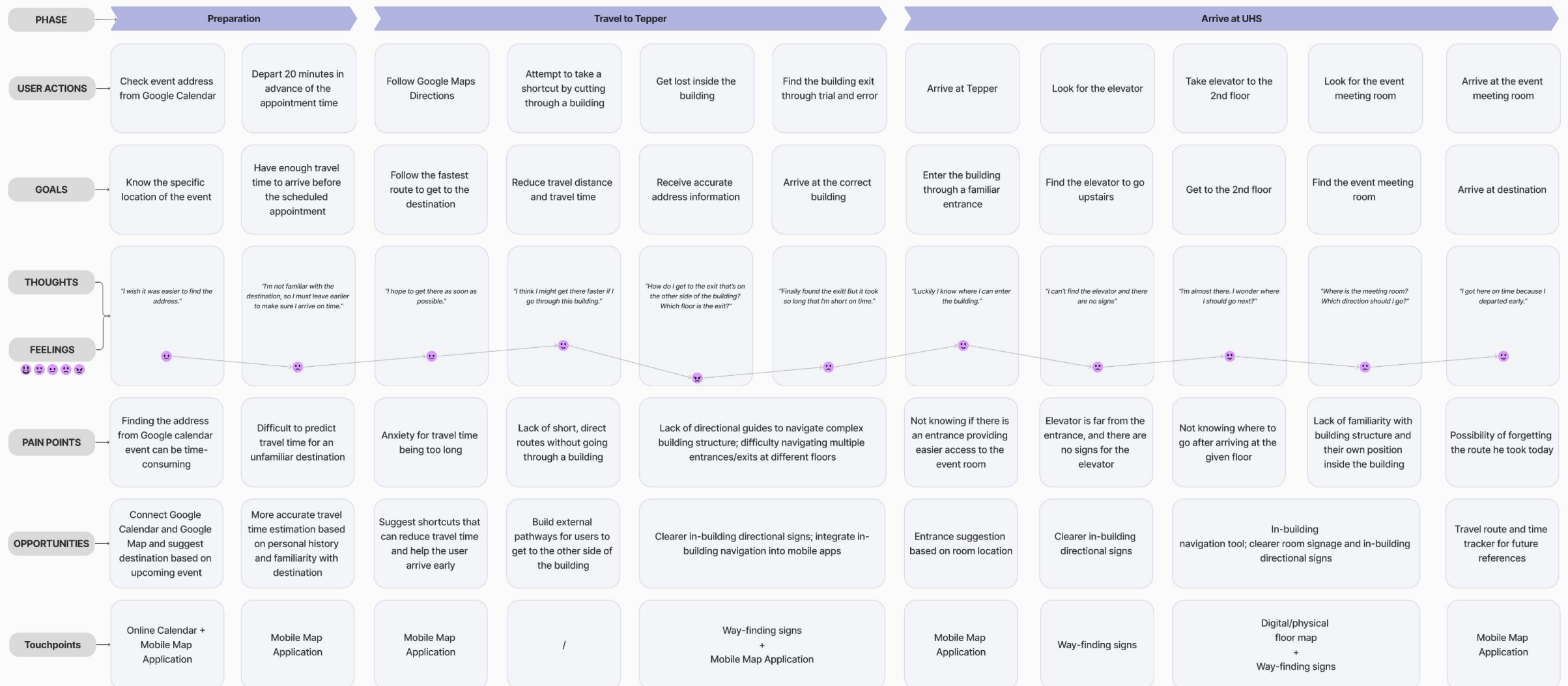|	Preparation		Travel to Highmark Center				Arrive at UHS				
USER ACTIONS	Search for the address on Google Maps	Depart 15 minutes in advance of the appointment time	Follow Google Map directions	Arrive at the destination, but realize it is the wrong address	Call UHS office to receive the correct address	Redirect to the correct address and arrive at Highmark Center	Find the entrance	Check building directory	Take elevator to the 3rd floor	Look for UHS signs	Arrive at UHS
GOALS	Know the specific location of the appointment	Have enough travel time to arrive before the scheduled appointment	Follow the fastest route to get to the destination	Arrive at the correct building	Receive accurate address information	Arrive at the correct building	Enter the building from an entrance closest to UHS	Find out which floor UHS is on	Get to the 3rd floor	Find UHS office space	Arrive at destination
THOUGHTS	"I wonder if the address I found online is correct."	"I'm not familiar with the destination, so I must leave earlier to make sure I arrive on time."	"I hope to get there as soon as possible."	"Oh no, Google map has led me to the old UHS address. What should I do?"	"I hope I heard the address correctly."	"Finally found the correct building! Now I just need to find the UHS office space."	"Where is the entrance? I hope it's close to UHS."	"Where can I find the building directory, and which floor should I go to?"	"I'm almost there. I wonder where I should go next?"	"Where is the sign for University Health Center?"	"I got here 10 minutes late and missed the appointment."
FEELINGS											
PAIN POINTS	Not sure if the address is correct	Difficult to predict travel time for an unfamiliar destination	Anxiety for travel time being too long	Detour and time loss due to wrong address	Lacking means to quickly recover from the error	Shortage of remaining travel time	Building entrances are hard to find and lack indication where they could lead to	It takes extra time to find the building directory	Not knowing where to go after arriving at the given floor	Lack of familiarity with building structure and their own position inside the building	Suffering consequences from being late to the scheduled event
OPPORTUNITIES	Provide clear building address and specific room number with the online appointment	More accurate travel time estimation based on personal history and familiarity with the destination	Suggest shortcuts that can reduce travel time and help the user arrive early	More timely updates of address information	In-person assistance or self-serve kiosk for way-finding	Suggest shortcuts or faster means of travel (e.g. bus, bike)	Clearer building signages; entrance suggestion based on room location	Building directory at each entrance	In-building navigation tool; clearer room signage and in-building directional signs		Smart canceling or rescheduling tool when users can't arrive on time
Touchpoints	Online booking system + Online calendar	Mobile Map Application	Mobile Map Application	Search Engine + Mobile Map Application	Human/digital information kiosk	Mobile Map Application	Way-finding signs + Mobile Map Application	Building directory	Digital/physical floor map + Way-finding signs		Online booking system + Online calendar

---

Persona 2 (Faculty)

Age: 45
Occupation: Engineering Professor

Familiarity with campus
Comfort with technology

Scenario: Heading to Tepper to attend an academic event
Travel Method: walking

	Preparation		Travel to Tepper				Arrive at UHS				
USER ACTIONS	Check event address from Google Calendar	Depart 20 minutes in advance of the appointment time	Follow Google Maps Directions	Attempt to take a shortcut by cutting through a building	Get lost inside the building	Find the building exit through trial and error	Arrive at Tepper	Look for the elevator	Take elevator to the 2nd floor	Look for the event meeting room	Arrive at the event meeting room
GOALS	Know the specific location of the event	Have enough travel time to arrive before the scheduled appointment	Follow the fastest route to get to the destination	Reduce travel distance and travel time	Receive accurate address information	Arrive at the correct building	Enter the building through a familiar entrance	Find the elevator to go upstairs	Get to the 2nd floor	Find the event meeting room	Arrive at destination
THOUGHTS	"I wish it was easier to find the address."	"I'm not familiar with the destination, so I must leave earlier to make sure I arrive on time."	"I hope to get there as soon as possible."	"I think I might get there faster if I go through this building."	"How do I get to the exit that's on the other side of the building? Which floor is the exit?"	"Finally found the exit! But it took so long that I'm short on time."	"Luckily I know where I can enter the building."	"I can't find the elevator and there are no signs"	"I'm almost there. I wonder where I should go next?"	"Where is the meeting room? Which direction should I go?"	"I got here on time because I departed early."
FEELINGS											
PAIN POINTS	Finding the address from Google calendar event can be time-consuming	Difficult to predict travel time for an unfamiliar destination	Anxiety for travel time being too long	Lack of short, direct routes without going through a building	Lack of directional guides to navigate complex building structure; difficulty navigating multiple entrances/exits at different floors		Not knowing if there is an entrance providing easier access to the event room	Elevator is far from the entrance, and there are no signs for the elevator	Not knowing where to go after arriving at the given floor	Lack of familiarity with building structure and their own position inside the building	Possibility of forgetting the route he took today
OPPORTUNITIES	Connect Google Calendar and Google Map and suggest destination based on upcoming event	More accurate travel time estimation based on personal history and familiarity with destination	Suggest shortcuts that can reduce travel time and help the user arrive early	Build external pathways for users to get to the other side of the building	Clearer in-building directional signs; integrate in-building navigation into mobile apps		Entrance suggestion based on room location	Clearer in-building directional signs	In-building navigation tool; clearer room signage and in-building directional signs		Travel route and time tracker for future references
Touchpoints	Online Calendar + Mobile Map Application	Mobile Map Application	Mobile Map Application	/	Way-finding signs + Mobile Map Application		Mobile Map Application	Way-finding signs	Digital/physical floor map + Way-finding signs		Mobile Map Application

Key Insight 1

Challenges of In-Building Navigation

Indoor navigation poses a greater challenge than outdoor navigation due to **complex building layouts, inconsistent signage, and limited visual cues**

For CMU students and faculty, indoor navigation is often more difficult than outdoor navigation. The complex layout of many CMU buildings is a main factor for this problem. Non-intuitive zoning creates disorientation, as spaces are segmented in ways that don't always follow a logical flow. Varying entrances distributed across different floors confuse users as they try to enter to exit a building. Arbitrary building connectors leave users bewildered where they could lead to.

Inconsistent signage adds to the challenge. Many buildings lack clear, standardized signs, forcing people to rely on limited or unclear directions. This makes it difficult for users to find their way, especially in large and multi-storied buildings.

Additionally, the absence of strong visual cues such as distinct landmarks to pin point one's position further complicates indoor navigation. Without these guiding elements, users may feel disoriented or frustrated as they search for directions. The combination of these factors highlights the need for better indoor navigation solutions.

Complex internal layouts make navigation challenging.

👀 **What users see:**
A huge spiral dividing the space into irregular zones

🤔 **How users feel:**
Confused about where they are and how to get to other zones
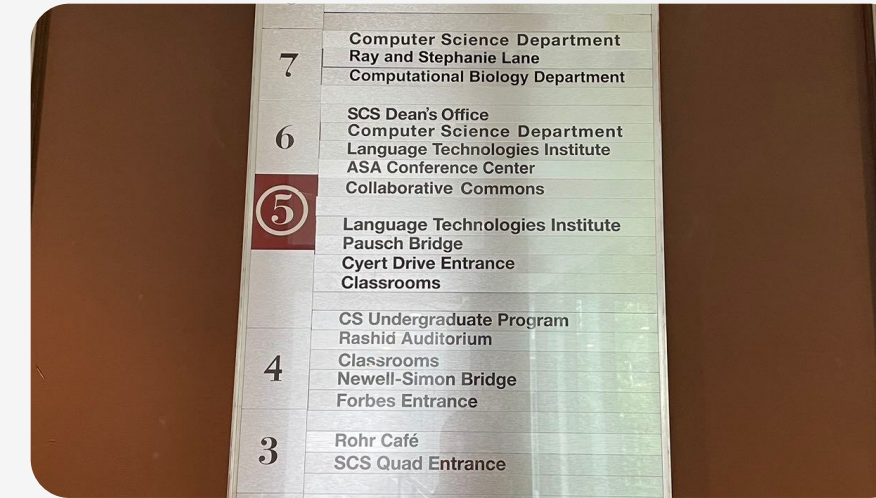
👀 **What users see:**
A building directory showing entrances on different floors

🤔 **How users feel:**
Confused about which entrance to use and where the entrances lead to

👀 **What users see:**
A tunnel leading to a different building

🤔 **How users feel:**
Uncertain about where this could leads to

Inconsistent signage leaves users without clear direction.
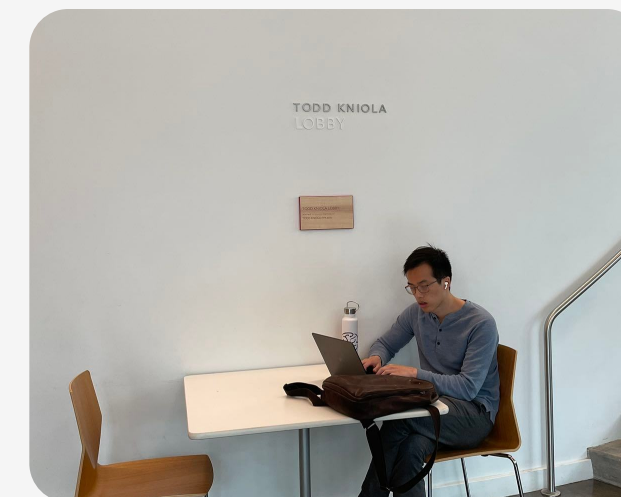
👀 **What users see:**
Inconspicuous or non-existing signages in certain buildings

🤔 **How users feel:**
Confused about where they are and what direction to take

Lack of visual cues causes disorientation and frustration.
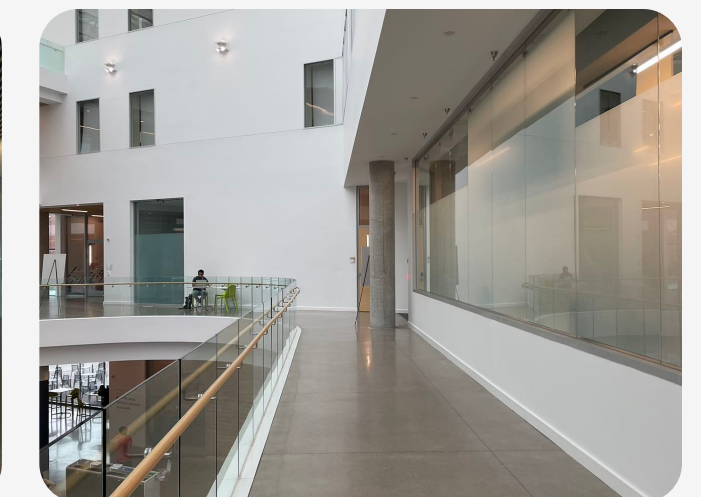
👀 **What users see:**
No visual cues or landmarks in their surrounding

🤔 **How users feel:**
Confused about where they are

Source: User Interview; Role Play; Observations

Key Insight 2
Propensity for Independence

Users show preference for independent navigation over seeking assistance, as they **long to have greater control over their decision-making process** throughout the journey.

Users often prefer navigating the CMU campus independently rather than seeking help from others, primarily due to a stronger belief in their own problem-solving abilities. The ability to find their own way with limited information enhances their sense of autonomy. In contrast, many individuals are hesitant to rely on in-person assistance due to the uncertainty and awkwardness associated with seeking help from strangers

To improve people's navigation experiences, it is crucial to equip them with resources that facilitate independent navigation while also offering support to help them bounce back from setbacks. Providing tools that enable users to maintain control fosters confidence throughout their journey. By prioritizing these elements, we can create a more positive experience that aligns with users' desires for self-reliance.

Users prefer independent navigation due to their **expectation of self-reliance** and **discomfort with trusting strangers**.

- **Awkwardness of interacting with strangers**
- **Lack of trust in other people's knowledge**

- **Expectation to be self-reliant**
- **Confidence in their own way-finding skills**
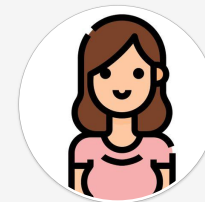
"I don't often ask random people for help, because they **often don't know the place I'm looking for, and that makes me feel really awkward.**"

"I don't find it necessary to ask for someone's help, because **I can usually figure it out by myself.**"

How users typically find their way on their own:

- ❌ Trial by error
- ➡️ Look for directional signs
- 🔡 Look for building or room signs
- 📱 Use digital navigation tool

What users need to independently navigate the CMU campus:

- 📍 Know where they are
- 🗺️ Know where their destinations are
- 🏫 Recognize the destination by its appearance
- 🆘 Effective response mechanism to errors

Key Insight 3
Desire for Shortcuts

Users show strong desire to take shortcuts through buildings **to reduce travel distance and time**, but **lack the necessary information to be successful**.

During our interview and codesign sessions, we discovered that users often have a strong desire to take shortcuts through buildings. Their main motivation is usually to minimize travel distance or travel time to their destination.

However, they frequently encounter challenges due to insufficient knowledge and support. While some individuals may learn about shortcuts through personal experiences, this knowledge tends to be acquired on a case-by-case basis, leaving many users in the dark about more efficient routes. Compounding this issue is the lack of effective means to share or access information about these shortcuts. Users may be aware that faster paths exist, but without a clear way to communicate this knowledge, the opportunity to benefit from these shortcuts remains largely untapped.

Additionally, navigating the often complex and confusing interiors of buildings aggravates the challenge. As mentioned earlier, the lack of intuitive signage and in-building navigation tools further prevents user from finding and utilising the shortcuts they seek.

Users like to take shortcuts to **minimize travel distance and time.**

- Most users prioritize **finding the fastest route** to their destination.

- Users believe taking short cuts can help them **minimize travel distance and travel time**.

- When users are unfamiliar with the layout of the building, **they can get lost** when trying to get through.

8 out of 13

Interviewers mentioned finding the fastest route as a priority
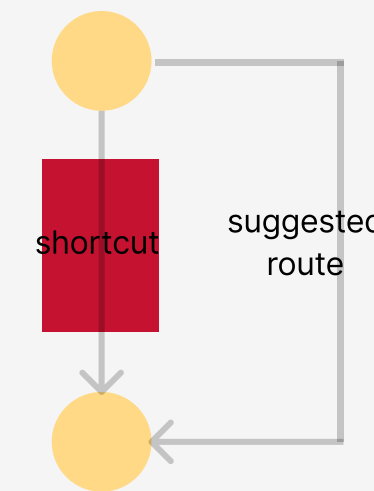
One interviewer sketched the left diagram to explain why she decided to take a shortcut: it was much faster than the route suggested by Google Maps.

shortcut / suggested route
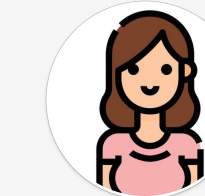
"Since I didn't know the shortcut, I had to find my way out of the building by asking others for directions, which took me extra time. I was super frustrated."

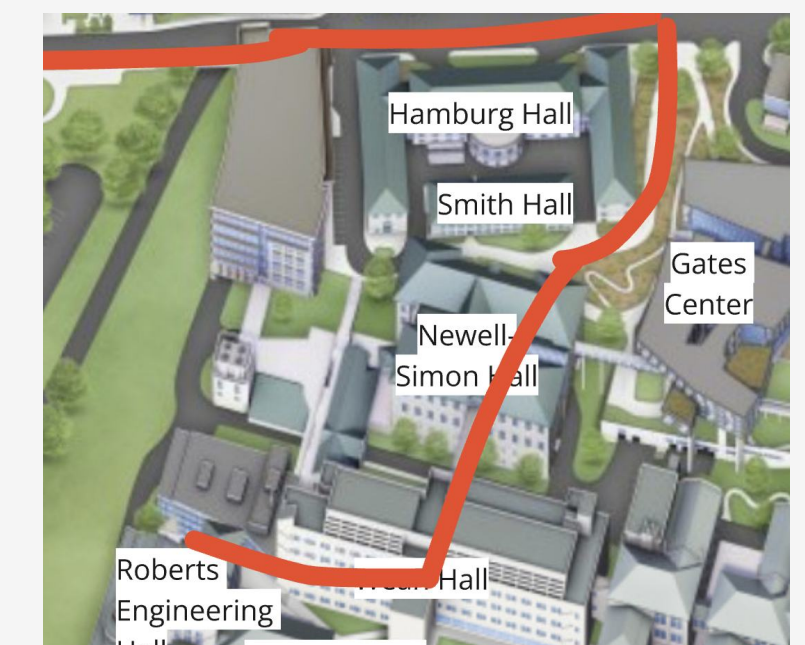## Users **lack means to learn about shortcuts** from external sources.

Shortcut knowledge are usually acquired case-by-case by users when they attempt to find one. They are rarely passed down from someone else due to the lack of effective means to communicate this knowledge.
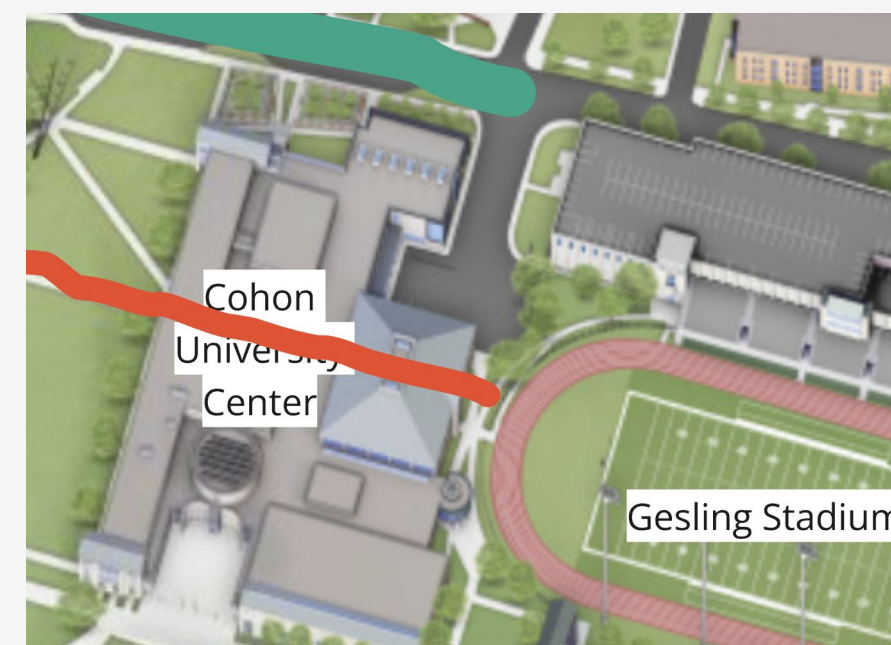
User sketch of shortcut to Gesling Stadium

User sketch of shortcut to TCS Hall

User sketch of shortcut to Scott Hall

Recommendations

Product Opportunity Gaps

Indoor navigation gap

Integrate indoor navigation with existing mobile map

More prevalent and conspicuous way-finding signs

Independent navigation gap

Self-serve way-finding kiosks

Shortcut sharing gap

Community platform for users to share and search for shortcuts

As-Is Experience

Perplexing indoor navigation

Isolated problem solving with no assistance

Discover shortcuts case-by-case

To-Be Experience

Simplified and consistent indoor navigation

Digitally assisted independent navigation

Instant access to shortcut knowledge on demand

Criteria of Successful Solution

MUST
- Increased interior signage

SHOULD
- Highly intuitive interior zoning
- Clear positioning mechanism

COULD
- Smart, personalized digital assistance