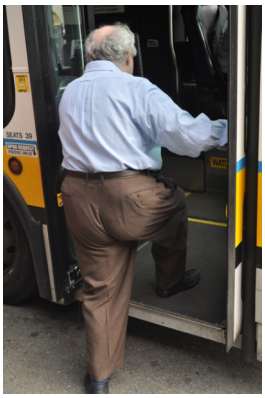

User/Expert Field Analysis of Public Transit in Cambridge, Massachusetts

Part I: Core Report

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July 17, 2014

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Part I – Core Report

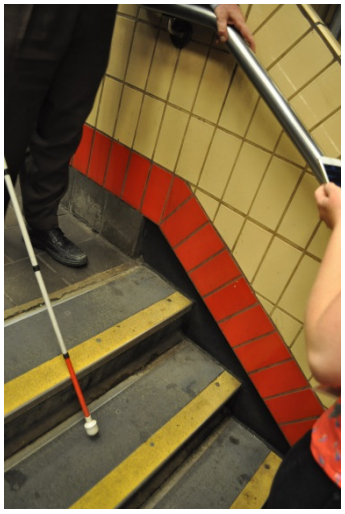
Part II – Qualitative Data from Interviews

Due to the large file size this is a separate document. See the document labeled Part II if you are interested in this additional material.

Context

The Institute for Human Centered Design (IHCD) is an international educational and design non-profit committed to the role of design in expanding opportunity and enhancing experience for people of all ages and abilities. The City of Cambridge Development Department invited IHCD to submit a proposal in response of an RFP to work with a group of seniors in Cambridge in relation to public transit as part of their Healthy Aging: Public Transportation Strategic Planning. IHCD proposed to work with the community with an emphasis on the participation of "user/experts." A user/expert can be anyone with a functional limitation who has developed natural experience in dealing with the challenges of our environment defined holistically to include physical, information, communication, service, attitude and policy environments.

While the city was originally calling for a scope of work that was more centered on a series of community meetings and a survey with minimal infield analysis, IHCD proposed to engage senior user/experts by using a combination of participatory and contextual inquiry research methods. Through our 36 years of work IHCD has found that while focus group style meetings can be valuable for issue identification, we have not found that sufficiently detailed information about impediments and preferred solutions arises. The city agreed and found additional funding for IHCD to conduct the reviews.



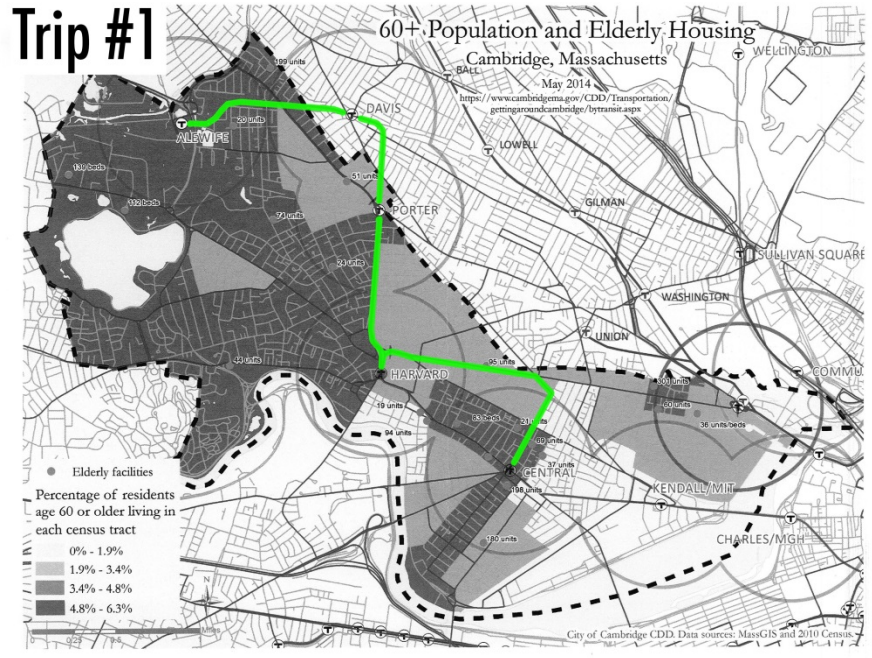
Process

IHCD's team of designers met with ten seniors to conduct reviews of the major T stations and bus lines in Cambridge. Each senior would be taken through one of three "trips" that had been created by IHCD based on data collected by the City of Cambridge. The data illustrated on the maps below that illustrated where major MBTA stations and bus lines align with areas where there are high concentrations of seniors as well as senior centers and healthcare

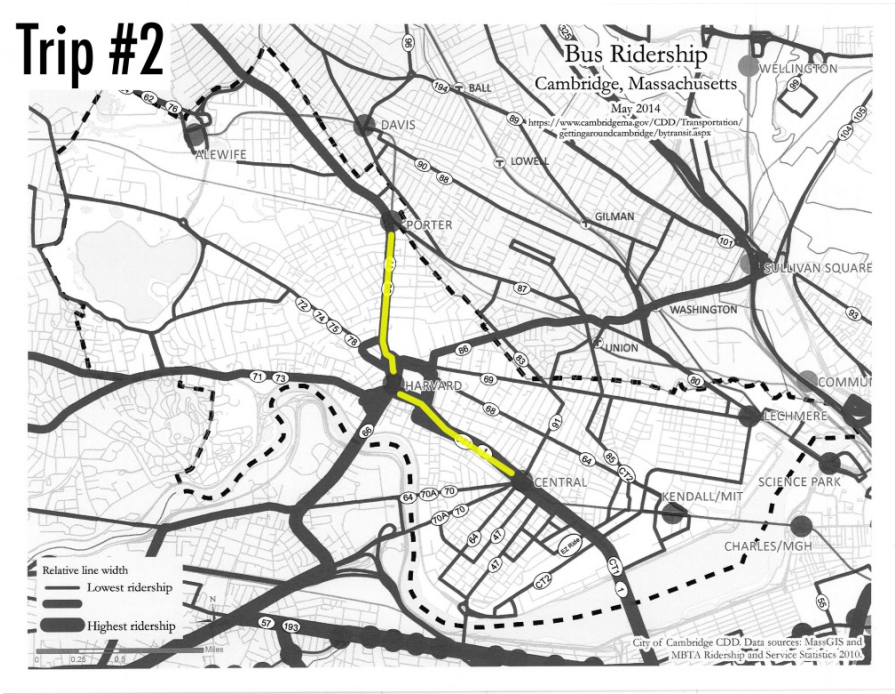
facilities. Each trip took two hours and was defined by a series of four actions that occurred several times in each trip: arrival at the bus or T station, waiting inside the bus stop or T station, boarding, and finally getting off of the bus or train.

IHCD shares a perspective on functional limitation in the 21st century with the policies of the World Health Organization (WHO) that redefined disability as a contextual phenomenon in the International Classification of Function, Disability and Health in 2001. The context is about an individual with a functional limitation intersecting with their environment. Using WHO's model, IHCD evaluated and broke its findings into five environments, the physical, informational, communication, attitudinal, and policy environments. Each trip was voice recorded and documented.

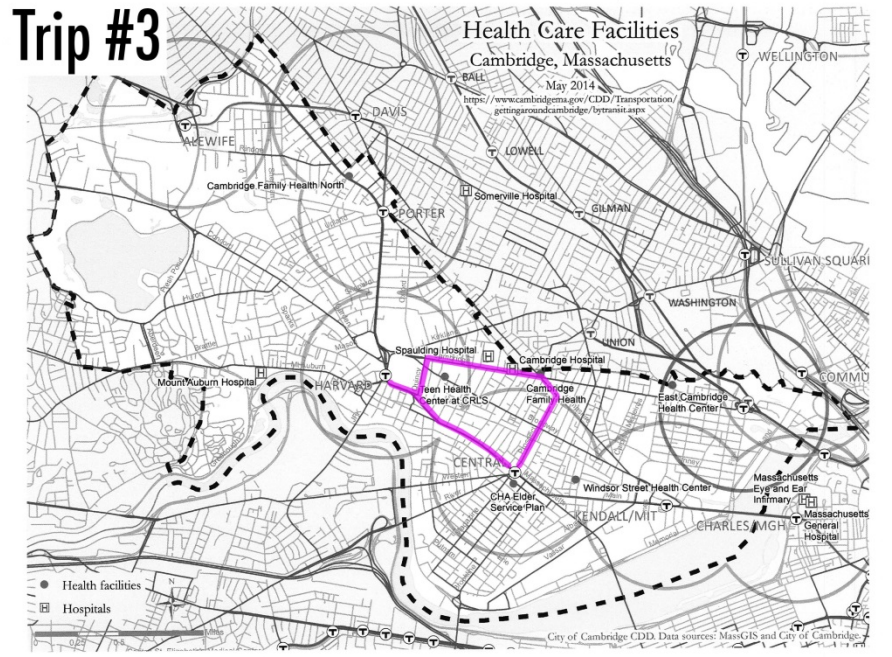
Maps of Cambridge, MA:



Map of Cambridge shows 60+ elderly housing.



Map of Cambridge showing bus ridership.



Map of Cambridge showing health care facilities.

Trip Chain Table:

TRIP CHAIN							
Trip 1	ALEWIFE	HARVARD Station	BUS 69	BUS 91	CENTRAL Square		
Trip 2	CENTRAL Square	BUS 1	HARVARD Square	BUS 77	PORTER Square	CENTRAL Station	
Trip 3	CENTRAL Square	BUS 91 or 83	BUS 69	BUS 91	HARVARD Square	HARVARD Station	CENTRAL Station

Table explaining the three trips

Action Illustration:

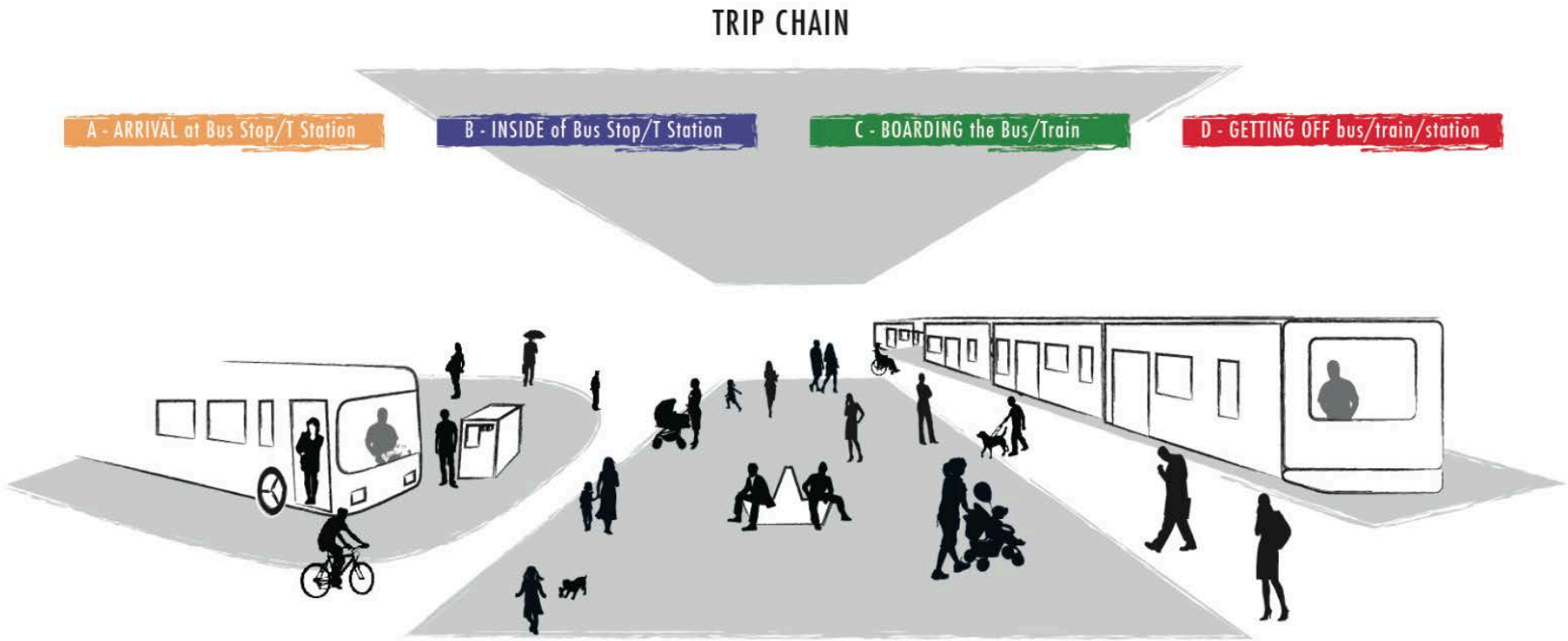


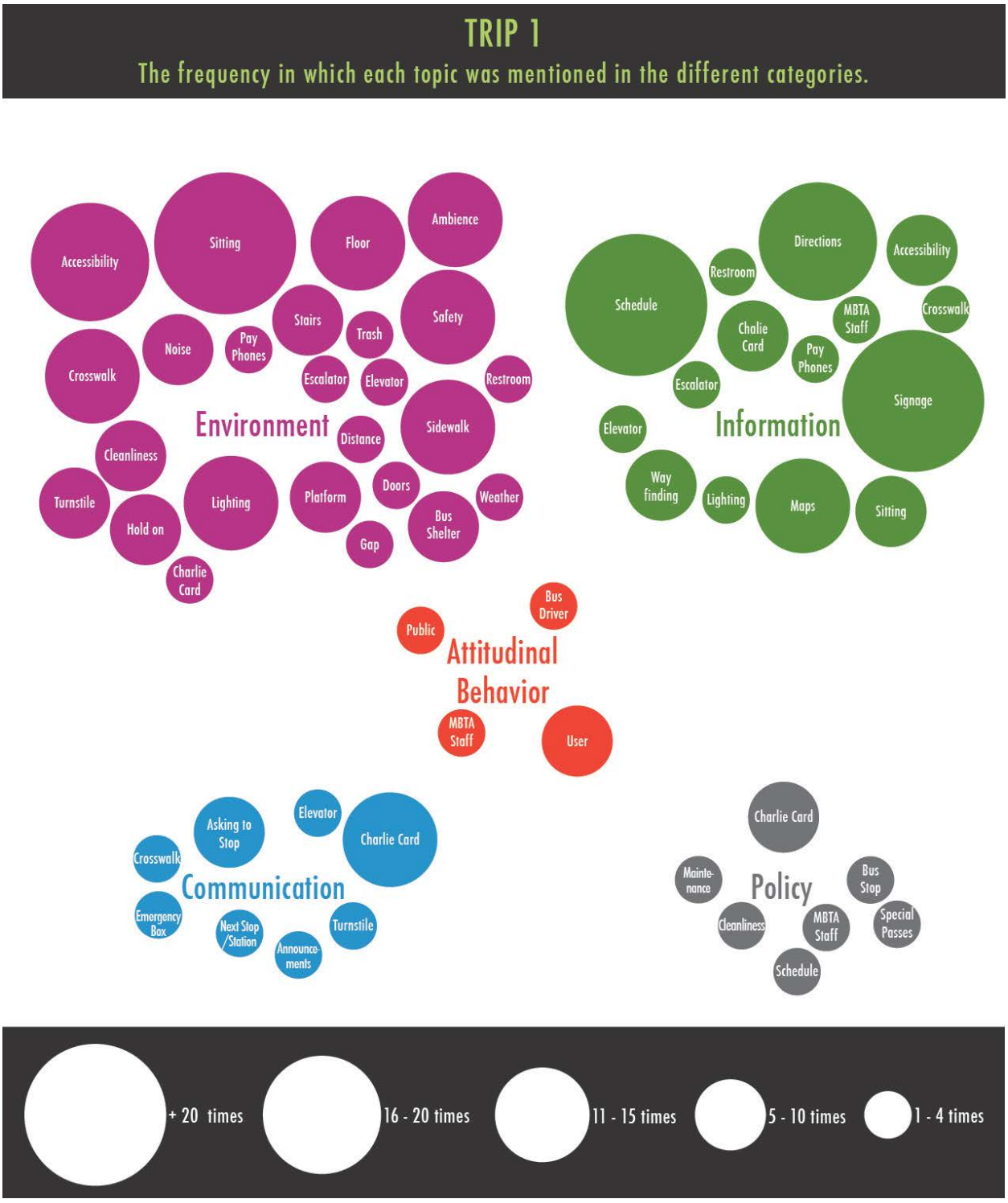
Illustration of the four actions taken through out the trips.

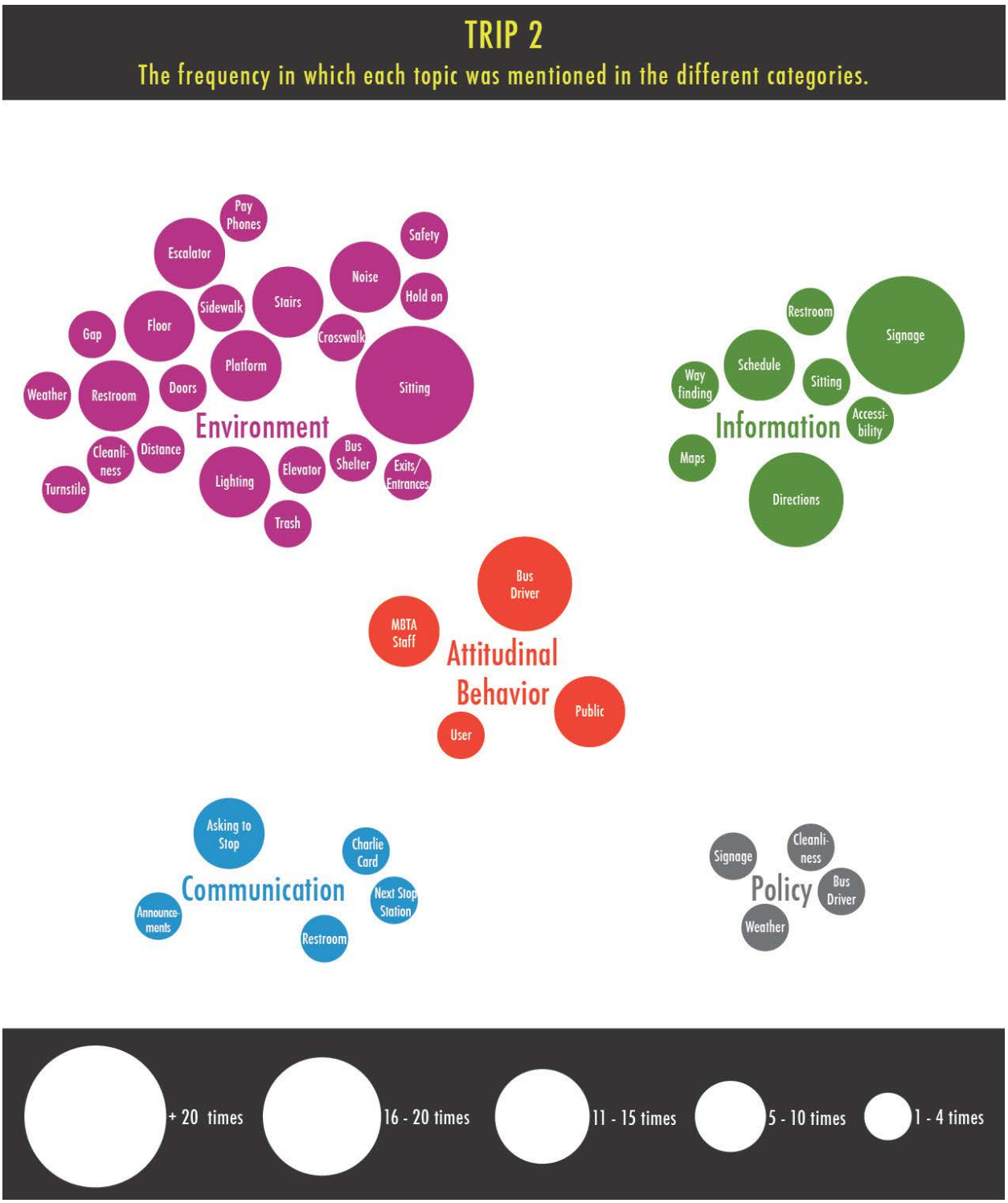
Trips Broken Down by Action:

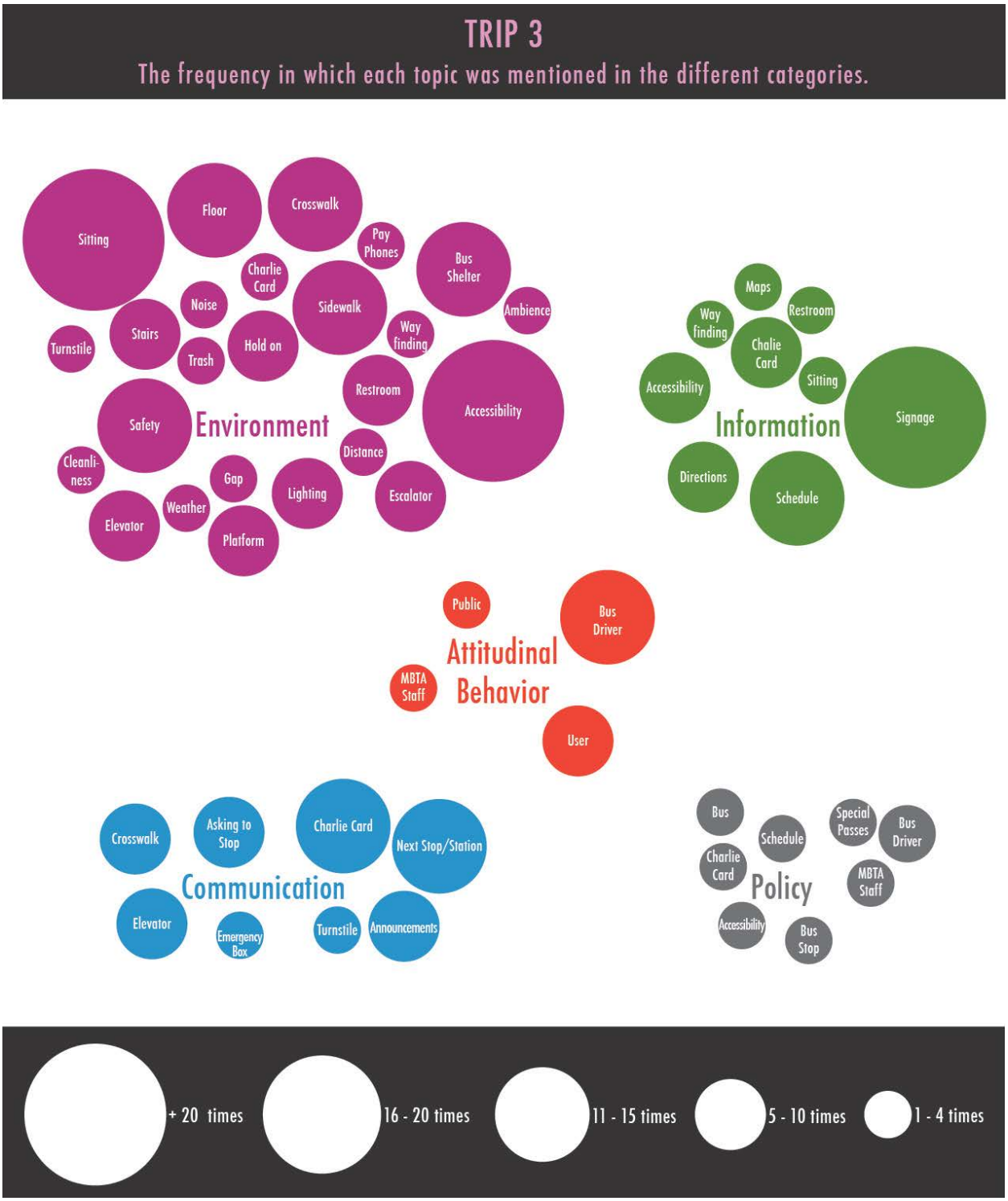
	TRIP CHAIN											
	A - ARRIVAL at Bus Stop/ T Station	B - INSIDE of Bus Stop/ T Station	C - BOARDING the Bus/Train	D - GETTING OFF bus/train/station	A - ARRIVAL at Bus Stop/ T Station	B - INSIDE of Bus Stop/ T Station	C - BOARDING the Bus/Train	D - GETTING OFF bus/train/station	A - ARRIVAL at Bus Stop/ T Station	B - INSIDE of Bus Stop/ T Station	C - BOARDING the Bus/Train	D - GETTING OFF bus/train/station
Trip 1	Location: Alewife to take the train to Harvard	Location: Alewife to take the train to Harvard	Location: Train train to Harvard	Location: Harvard	Location: Harvard Square to take the bus 69	Location: Bus Stop (outside) to take the bus 69	Location: Bus 69 To Bus Stop to transfer to bus 91	Location: Bus Stop To take the bus 91 to Central	Location: Street to take the bus 91 to Central Square	Location: Bus Stop To take the bus 91to Central Square	Location: Bus 91 To Central Square	Location: Bus Stop Arriving in Central Square
Trip 2	Location: Central Square to take the bus 1 to Harvard	Location: Central Square to take the bus 1 to Harvard	Location: Bus 1 to Harvard	Location: Harvard Square to take the bus 77 to Porter	Location: Harvard Station to take the bus 77 to Porter Square	Location: Bus Stop at Harvard Station to take the bus 77 to Porter Square	Location: Bus 77 to Porter Square	Location: Porter Square to take the T in Porter Station	Location: Porter Square to take the T to Central	Location: Porter Station to take the T to Central	Location: Train to Central	Location: Central Station Arriving in Central Station
Trip 3	Location: Central Square to take the bus 91	Location: Central Square to take the bus 91	Location: Bus 91 to Bus Stop to transfer to bus 69	Location: Bus Stop to take the bus 69	Location: Street to take the bus 91	Location: Bus Stop to take the bus 69 to Harvard	Location: Bus 69 to Harvard	Location: Bus Stop at Harvard Square to take the train to Central	Location: Bus Stop at Harvard Square to take the train to Central	Location: Harvard Station To take the train to Central	Location: Train to Central	Location: Central Station Arriving in Central Station

Table breaking down each trip by its actions

Findings Pattern by Frequency:




TRIP 2
The frequency in which each topic was mentioned in the different categories.
Environment
Pay Phones
Escalator
Safety
Noise
Hold on
Sidewalk
Stairs
Gap
Floor
Crosswalk
Platform
Sitting
Weather
Restroom
Doors
Cleanli-ness
Distance
Turnstile
Lighting
Elevator
Bus Shelter
Exits/ Entrances
Trash
Information
Restroom
Signage
Schedule
Way finding
Sitting
Accessi-bility
Maps
Directions
Attitudinal Behavior
Bus Driver
MBTA Staff
Public
User
Communication
Asking to Stop
Charlie Card
Next Stop Station
Announce-ments
Restroom
Policy
Signage
Cleanli-ness
Bus Driver
Weather
+ 20 times
16 - 20 times
11 - 15 times
5 - 10 times
1 - 4 times


TRIP 3
The frequency in which each topic was mentioned in the different categories.
Environment
Sitting
Floor
Crosswalk
Pay Phones
Bus Shelter
Charlie Card
Sidewalk
Noise
Ambience
Stairs
Way finding
Turnstile
Trash
Hold on
Restroom
Accessibility
Safety
Distance
Cleanli-ness
Gap
Lighting
Escalator
Weather
Elevator
Platform
Information
Maps
Restroom
Way finding
Chalie Card
Accessibility
Sitting
Signage
Directions
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Charlie Card
Next Stop/Station
Elevator
Emergency Box
Turnstile
Announcements
Policy
Bus
Special Passes
Bus Driver
Schedule
Charlie Card
MBTA Staff
Accessibility
Bus Stop
+ 20 times
16 - 20 times
11 - 15 times
5 - 10 times
1 - 4 times

The Value of User/Expert Research

IHCD helps clients to understand the usability and impact of their product or service through the lens of universal design. Universal design, also called inclusive design or design-for-all, is the framework for the design of places, things, information, communication and policy that focuses on the user, on the widest range of people operating in the widest range of situations without special or separate design. A key component of universal design is the direct engagement of the user/expert in the design and evaluation process. No matter how committed and experienced the designer, there is no substitute for involving users with a variety of personal experiences with functional limitation and the intersection with their environments. We feel that following a Universal Design approach, one that centers on anticipating the needs of the broadest spectrum of users, as opposed to meeting baseline accessibility standards, leads to more meaningful insights that will work better for all users and help with navigating the "grey areas" of where accessibility standards fail to address or leave up to the designer to determine. The contextual inquiry of user/expert research goes well beyond the 'personas' so popular with designers today that create an imagined set of users with distinguishing characteristics.

Recruitment:

To recruit Cambridge seniors for this project IHCD worked with the City of Cambridge on developing fliers that where posted around the Cambridge senior centers as well as sent out through the City's and IHCD's networks. It was important that we got a diverse group of users with a variety of functional limitations from different backgrounds.

Cambridge User/Experts Table:

Cambridge User/Experts Table:

User/Expert	Age	Review Date & Time	Functional Limitation	Trip
Don	64	June 18th 4pm	- Traumatic Brain injury with mobility issues - Cane User	2
Sue	72	June 19th 9am	- Some hearing loss - Hearing aid user - Strabismus	3
Betty	70	June 19th 2pm	- Some slight hearing and sight loss	2
Aurora	61	June 20th 3pm	- Environmental Illness - Epilepsy - Ddyslexia	1
Joan	77	June 23rd 2pm	- Significant mobility issues - uses a walker - Some vision and hearing loss	3
Paul	64	June 25th 4pm	- Some mobility issues - Uses a cane on most days	1
Cynthia	81	June 26th 10am	- Some mobility impairments - Has a hard time on stairs.	3
Jeffrey	67	June 26th 5:30pm	- Fully blind due to degenerative eye condition.	3
Steve	81	June 27th 9am	- Mobility impairments due to too two knee replacements and 3 strokes.	1
Christen	60	June 30th 5pm	- Traumatic brain injury - Mobility impairments - Legally blind	2
Ona	62	July 18th 2pm	- Fully deaf and blind	2

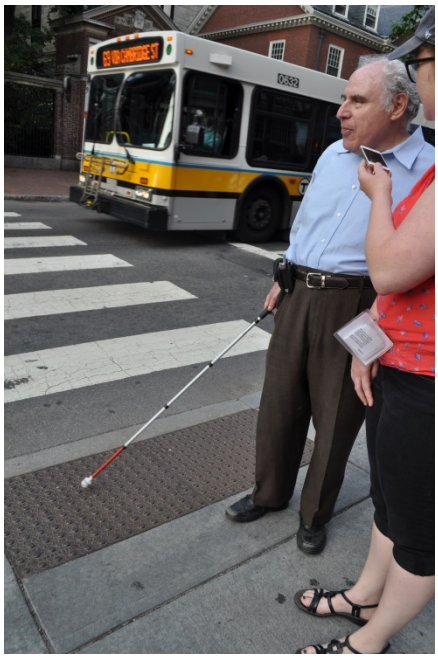
Key Findings

Physical Environment:

- Bus Seating: It was brought up that the plastic seats on the buses are very slippery. The user's preferred having upholstery like on the T heavy rail. Also, on the bus the seats that are not facing forward, the seat is higher above the finish floor. This potentially uncomfortable height and that fact that you can't easily see out the window were mentioned as reasons why people don't like to sit there.
- Stairs: The grates at the top and bottom of the stairs are coming up at both the Harvard and Central Square T stations. This was pointed out by several users as potential tripping hazards. Our senior users seemed to be very aware of material changes in their walking surfaces. "That is where the cracks happen." (Paul)

- Elevators: The elevators in Central and Harvard are very dark inside, because of this and because the lights behind the buttons don't work, this made using the elevators difficult. Also, the "Call for Help" button is right next to the "Call" button for the elevator at both the Harvard and Central Square stations. In general the elevators where hard to locate at all of the stations and the doors didn't stay open long enough for the people on the elevator to unload and board comfortably and safely.
- Brick sidewalks: All of our users reported walking on brick as hard for them.
- Outside Benches: Most of the users expressed a clear preferred for benches with backs. It was better support and, for those who are visually impaired, it helped them to know where the street was in

relation to it. It was brought up by a couple of users that they are nervous that the bus drivers won't not see them so any cues they can get as to where the street is and where they should stand is greatly appreciated.



- Truncated domes (tactile markers at crosswalks): In Harvard Square the truncated domes are made of metal, which means they are too heavy to noise when a cane user uses them. When our user is coming to an intersection he is listening for the sound the "rumble" the domes make when he runs his cane over it. He will not notice the difference tactilely between the truncated domes or just another bumpy sidewalk.
- Escalator: It was recommended that there should be railings that lead the hand to the moving railing of the escalator. "It would be like a landing strip for your hand, and that way the first thing you touch wouldn't be moving."
- Bus Shelters: The majority of users preferred bus shelters that have three sides to better protect them from the weather. Also the users with vision and Traumatic Brain Injury liked having something they could lean on to reassure them that no one would come up on them from behind.

- Baby Carriages: it was noted that people with baby carriages take up a lot of space on buses and in elevators.
- Grab bars: Having bars placed around the bus is very important. In particular, when someone is getting on and off the bus and in the priority seating areas of both bus and trains. Having one hand on something solid seems to lesson anxiety about drivers taking off too suddenly.

- Steps in the bus: None of the users would go up the stairs inside the bus to the higher sections. Also when the busses are full the crowd in the isle will not go up the stairs of their own volition unless the driver demands it.
- Harvard station: Due to the openness of the Harvard station and the materials, noise levels are a problem for users with brain-based conditions and people who are blind. At the main entrance to Harvard Station, some users suggested that there should be more hand rails to help navigate the first couple of steps down to the escalator. Also in the Harvard Station Bus way, the curb is low so that even the kneeling bus at the lowest level is still a big step for people in a dark environment.

Information Environment:

- Signage in trains: A lot of users had a hard time seeing the T map above the doors on the train. Also for the majority of the trains that map was the only map available to them inside the cars.
- Signage in T Stations: In general the signage in the stations were not clear or consistent enough. This, combined with of bad audio announcements and lack of signage in the train, made it very hard for users to know what station they were in.
- Signage in general: While the users themselves didn't have a hard time with the inbound/outbound system having lived in Boston for so long, they all talked about having to help people to understand what it meant. Also, it seems that the signage in general is much more focused on the trains with little thought toward the buses. This is a particular problem because the senior user/experts we worked with seemed to prefer to take buses.

- Buying tickets: Most of our users talked about having a hard time with the interface of buying tickets ether in the station or on the

bus. In particular, no one knew the difference between a Charlie Card or paper tickets and that they had different fares. Many were frustrated that the fare machines would time out before our users could get through the transaction process.

- Signage at bus stops: Majority of our users requested that there should be schedules and maps available at all bus stops. Our blind and low vision users recommended that those round plastic map holders should be on the bus stop poles so they can tacitly determine that they are at a bus stop and not just standing next to a pole on the street. A key frustration expressed by seniors was about the signs at the bus stop – they face the street and can only be read from one side. It makes it hard for pedestrians to read the signs without getting in the street or if they approach from the side of the sign that's blank.
- Braille: The MBTA uses Grade 2 Braille on their signs as is required by ADA but our blind user what who was not blind from birth had a hard time reading it due to limited Braille literacy. Very few people with acquired blindness know how to read Braille at all.
- MBTA website: Most of our users wished there was more practical information available to them. For example: they wanted to know where the bus shelters are, where the public restrooms are located (a lot of users had no idea there where public restrooms). Most of the users never use the MBTA site but choose to use Google maps, call the MBTA, or use other apps instead.

- Bus schedules: The majority of our users said the print was really small and hard if not impossible to read.
- Priority seating: Most of our users sat in the priority seating sections whether they knew it was that or not because of the convenient locations. The reasoning for this was that they where afraid that the bus or train would start moving before they where seated. We recommend making the signage pointing out priority seating clearer and higher so people can see it even in a full vehicle. It would also be valuable that the information about priority seating be noted as policy on the website and in the stations. No one among our user/experts knew how to raise or lower the priority seats, and when asked if they would ask for help the majority said 'no'.

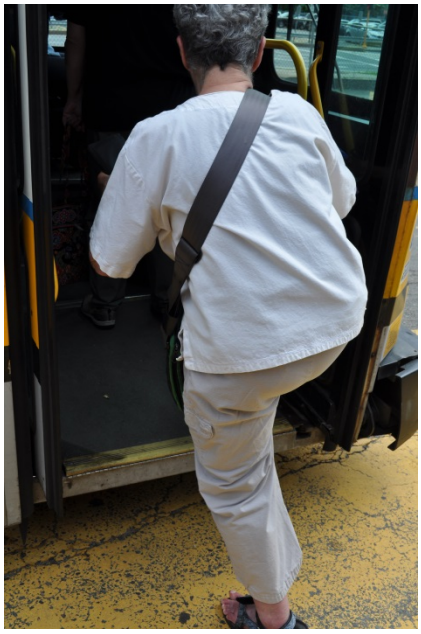
- Turnstile: In the T stations the turnstiles that are wide enough for wheel chair users are always marked Priority Pass. The users thought that it was the only turnstile they could use with a senior or disability pass, resulting in occasional delays. Also most of the users were not sure which way they should put the Charlie ticket in the machine or which side they should tap their Charlie card to get their door to open.

Communication Environment:

- Audio announcement on trains: The majority of our users had a hard time hearing and understanding the announcements on the trains. The quality of the audio was hard to hear or was announcing for the wrong stop.

- Audible cross walk signs: Most of the users liked or didn't mind the audio crosswalk signals but our blind user mentioned that if the sound box making the noise isn't located right on the street corner it can be very confusing for him. He not only uses the audible signals to know when it's safe to cross but as a guide for him to walk towards it to get to the other street corner.
- Elevators: The elevators in Central, Alewife, and Harvard had buttons that didn't light up when you hit them. None of our users were confident if they where working or not.
- Stop request buttons: The majority of the users prefer to use the buttons on the bus to request a stop because they felt that the strips don't work.
- Reporting to MBTA: A couple of our users who talked about having to report problems to the MBTA talked about never getting responses back from the T that their complaint was heard by anyone or that anyone was doing anything about it.

Attitudinal Environment:



- Bus drivers: For most of our trips the bus driver ether didn't or couldn't pull up to the curb or they pulled up at an angle. It became clear that most of our users would never ask for the bus to pull up closer or kneel but we witnessed a couple of incidents of our users tripping trying to board.
- Public hostility: Users with non-apparent disabilities reported experiencing harassment from fellow passages when they asked to sit down in priority seating. This seems to be a particular problem on the buses.
- Depending on traffic, the bus driver will not always stop at the bus stops but will stop before or after. This inconsistency is particularly hard for people with vision impairments.
- Majority of our users have had negative experiences with bus drivers. As examples, they cited these circumstances: when asking for the driver to kneel the bus, pull up to the curb, or asking for directions.

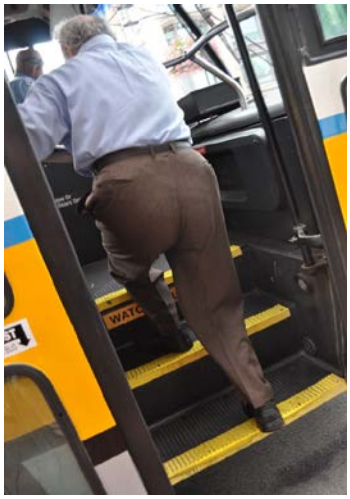
Policy Environment:

- Kneeling the Bus: All of our users talked about whether the bus drivers choose to kneel the bus for them or not. Most of the time if the user had a non-apparent limitation, the bus driver would not kneel the bus. That meant that the user would have to ask and most acknowledged they would not ask. We recommend that there should be a change to the policy so that at every stop every driver must kneel the bus for all users. This would be the universal solution and would alleviate the problem.

- Elevators: Our users who used the elevators during the evaluation had to wait a while because so many people were using them. This may argue for more redundant elevators in major stations.
- Winter Clearing: For the most part the users said that the T stations where kept clear but that bus stops where badly cleared in winter.
- Busy Intersection: On busy intersections such as Inman Square and crossing Massachusetts Ave and Prospect Street, several of our users reported feeling unsafe due to turning traffic. They prefer the cross walks where all traffic stops for pedestrians at once.

- Bus Route #1: The majority of our users requested there be more busses on Route #1. Waits are long and buses are very crowded.
- Different Charlie Cards: It was brought up that the transit system wasn't really set up for people with chronic illness. For example, people with chronic health conditions have episodic increases in functional limitation, not a consistent patter. For those users whose health and ability to ride the T varies, they would like the opportunity to sign up for both the RIDE and have an MBTA disability pass.

- Staffing: Most of the users said it's very hard finding someone they can ask for help in most stations.
- Air quality: While sitting at major bus stops such as Harvard or Central Square, buses will idle with their exhaust blowing into the bus shelter.
- Old style buses: The old step-up buses should be taken out of commission; they are hard for all of the users.



Beginning and Closing Questions

At the beginning and end of each trip the team would sit down with each user/expert and ask them some closing questions about their experience on public transit. The questions and their responses are below.

Beginning Questions:

- How would you describe your usage of public transit?
- Do you have a Charlie Card?
- How do you plan you trips?

Closing Questions & Individual Responses:

- Which station in Cambridge is your favorite? Why? Which bus line?
- Can you think of a time when you where in a station of a particular transit system you wore less familiar with that worked really well for you?

- How would you describe the T system to someone not from around here?
- Based on today's trip is there a particular problem we ran into that you really recommend needs to be fixed first?
- Is there anything we didn't discuss that you'd like to add?
- Would you mind if we contacted you again to ask about your experience today with us?

Don

- He uses the T everyday.
- He has a disability pass and found that process pretty easy.
- He doesn't use the MBTA website but uses other apps on his phone.
- He has a hard time finding the elevators.
- He doesn't really use the seating at bus stops.
- If there's one thing he'd like the City to work on it would be the way finding of the system. He thinks that there needs to be more work on proper signage and information made available to him.

Sue

- She has a senior card and takes the T all the time.
- She prefers to take the Green or Red lines because the buses are not as regular even though buses are more convenient.
- She uses apps on her phone to plan a trip.
- The process to get the senior Charlie card was hard for her, she didn't like that you had to go all the way to Copley. She wishes she could update the card at her house online.
- She likes the transit system in DC because of the lights on the floor and the information about when the next train is arriving is accurate.

Betty

- She has lived over 30 years in Cambridge.
- She has a senior pass and uses the T at least a couple times a day.

- For the most part she thought the process of getting the pass was fine.
- The one thing she would really want is more buses on the bus route line #1.
- She does not have a smart phone so she has to plan in advances or call.
- She had noticed that the signage in the London Tube was much more intuitive.
- She wishes that there where bus schedules inside the busses.
- In Germany on every bus stop there was a schedule wrapped around the pull (WC – wrapped around the "pull?") and the busses always came on time.

Aurora

- The Charlie card system is very confusing to her.
- It took her 2 ½ years to figure out the Paratransit system.
- She rarely takes the T
- San Francisco BART system works pretty well for her. The platforms are all in different colors so it's easy for her to know where she is, and the ticket process is a million times easier then the Charlie Card system.
- Her biggest problem on the T is fragrance. With environmental illness she is vulnerable is someone walking by her wearing too much perfume that can cause a seizure.
- Her priorities for corrective action are making the ticket buying process easier. Second, she wishes they would improve the lighting in the stations and on the buses.
- "This has been nice, I actually feel like maybe I could take the T if I needed too."

Joan

- She has been in Cambridge for 30 years.
- She uses the buses primarily.
- She has a senior pass and finds the process of recharging the card hard.
- She will use Google maps to plan her trip or call the MBTA.
- She has used a walker for two years before that she had a cane and ran into a lot more problems when she just used the cane.
- She has used the RIDE before but it is always her last option.

- If there is one thing she would wish the City to do it would be to make the information clearer about what is available to her. “Pretend that I don’t know anything, now tell me what you have to offer!”

Paul

- He was born in Boston and has taken the T his whole life.
- He uses Google maps to plan his trip; he will not use the MBTA site.
- If there was one thing he could ask for it would be more #1 buses. Then maybe he’d like to see more buses on Route # 69.

Cynthia

- She usually uses the #1 bus route the most.
- She does have a smart phone with the apps but she will usually choose to talk to someone instead.
- She thinks the San Francisco system is great because it tells you when the next bus is coming on the major bus lines not just the trains.

Jeffrey

- He doesn’t have a smart phone so he has to plan his trip ahead of time or call the MBTA
- He has the Charlie Card for people with disabilities.
- He would want the city to get rid of the florescent lighting on public transit and install little speakers above the doors of the T that would indicate to him where to walk toward to get on the T.
- He also would like Cambridge to make sure that if you have sound indicators to cross busy streets that they make sure that they are located on the actual street corner so he can use them for navigation and not just to know he can walk.

Steve

- Getting the card was not very easy for him. Ideally he would want to mail a form in and get the card.
- Steve usually plans his trip prior to leaving using Google maps, rather the going on the MBTA website.
- He really wants the MBTA to look at their signage. "There is to much information, and it's not consistent".
- "In a ideal world there would be a button I could push that would let people know I needed a seat. It's weird having to ask people all the time to get up."
- The Harvard station is his favorite because of the great sight lines.

Part II - Qualitative Data from Interviews

We have provided you with the qualitative data (organized by location) from our conversations with senior users of the public transit system, however due to the large file size; we created a separate document so that sharing of this core report would be simplified. See the document labeled Part II if you are interested in this additional material.