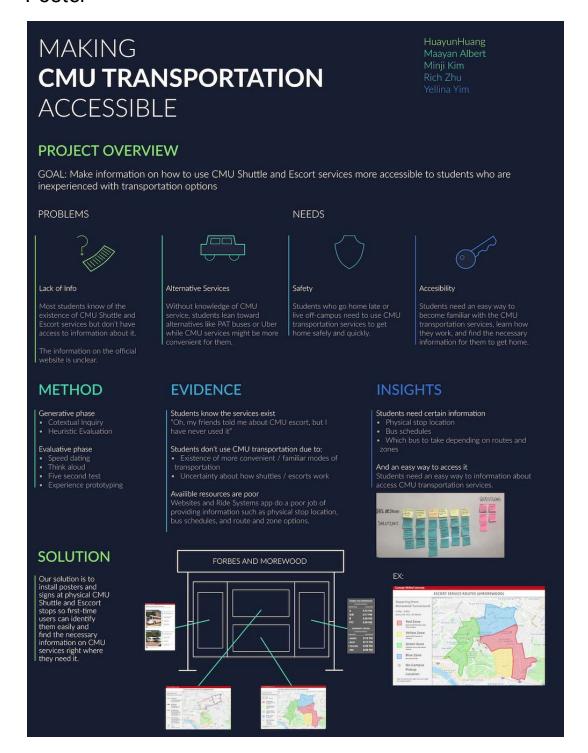
Presentation Poster

Poster



CARNEGIE MELLON UNIVERSITY SHUTTLE AND ESCORT SERVICES ONBOARDING: INFORMATION ACCESSIBILITY

Research Summary Report
User-Centered Research and Evaluation, Section B
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Executive Summary

From our previous studies, we identified that new riders lack an understanding to the CMU transportation system. We would like to address this information accessibility issue and quickly get new riders onboard. From our generative research we learned that there is a huge gap between users' awareness of the system and users being able to use the system, and we decided to investigate how the presence of a physical design artifact, (i.e. posters/flyers as well as a digital display at the bus stop) would increase the motivation and enhance the experience of using CMU transportation services.

Problem Scope

Most students know of the existence of CMU Shuttle and Escort services but don't have access to information about it. Even if they can find the informational resources such as the website and app, the information on them is unclear. Without knowledge of CMU service, students lean toward alternatives like PAT buses or Uber even though CMU services might be more convenient for them.

Research Methods

For the generative phase, we conducted contextual inquiries and heuristic evaluations. For the evaluative phase, we conducted speed dating, think alouds, five second tests, and experience prototyping. We chose these methods because we thought they would best illustrate the information we were trying to get and conducted them in a way that would be most relevant to our problem.

Summary of Evidences and Insights

CMU students mostly know of the existence of CMU transportation services but don't know how to use them. We often received quotes like, "Oh, my friends told me about CMU escort, but I have never used it." And thus we happened upon the insights that students don't use CMU transportation due to two primary reasons: (1) existence of more convenient and familiar modes of transportation and (2) uncertainty about how shuttles and escorts work. In addition, the current website on the service and the Ride Systems app do a poor job of providing information such as physical stop location, bus schedules, and route and zone options. Based on our findings we realized that students absolutely need certain information such as a physical stop location, bus schedules, and which bus to take depending on routes and zones. In addition, they need an easy way to access such information.

Solution

Our solution is to install posters and signs at physical stops of CMU Shuttles and Escorts so that first-time users could identify stops easily and be able to access all the information on CMU services right where they need it and be able to use the service right away.

Problem

How would first-time riders quickly learn and access necessary information about the Carnegie Mellon University's Shuttle and Escort Services (e.g. how it functions, where to find more relevant information, how to get on to the bus, etc.)?

Why we chose to focus on the onboarding of first-time riders

During our early-stage research, we found that although a lot of students had previously heard about the transportation services or often saw CMU buses running around campus, they never knew what they were for, where to find the relevant information on the kind of service they offered, and how to use them. We considered this lack of easy access to the information on the service and the overall onboarding process to be a common problem for both graduate students, who were generally required to live off-campus and needed accessible transportation options at any point in the day, and undergraduate students, who wished to use the service available to them.

How we defined our target user group and how they will be affected

We mainly targeted both graduate and undergraduate populations that were inexperienced with the Shuttle and Escort Services. First-time riders or riders who were vaguely aware but unfamiliar with this service needed information about the routes and times of the shuttles and escorts to experience what the system was built for. The context of this project lies within the campus of Carnegie Mellon University, or more specifically to the available shuttle and escort stops that are directly on campus or in close vicinity to it.

What we wished to achieve from the project

- 1. Help new riders of the service find available shuttle and escort bus routes that are relevant to them
 - Increase new riders' awareness of the service
 - Educate new riders about how CMU bus works
 - Help new riders identify if the service cover their commutes
 - Guide new riders onto the bus
- 2. Help new / existing users find the respective arrival and departure times / locations of those shuttles and escorts
 - Identify the bus pick-up / drop-off locations
 - Inform the riders about the time schedules

Questions we aimed to answer through our research

1. Awareness about CMU service

- Are students aware of the CMU transportation service?
- How well-known is the CMU service among student groups?

2. Information on CMU service

- What information do expert / inexperienced users desire the most from CMU transportation system?
- What is the priority of information? What information should we present to the users first?

3. Modes of Obtaining Information

- What medium or form should we use to convey CMU transportation information to students? Should we use paper posters, digital boards, modify the CMU website, improve the mobile app, or a combination or multiple approaches?
- What are some channels students currently use to obtain information on CMU service? How effective are those channels? Do students use those channels on a regular basis?

4. Transportation Options and Rationale

- What transportations are students currently using? What are their reasons for using the current service?
- Why are students currently using or not using the CMU transportation services? If so, how often are they using it?

Methods

We conducted the researches in three stages:

- Early-Stage Background Research, which focuses on identifying the potential issues
- **Generative Research**, which focuses on narrowing down the design scope and guides us further into the forms of our design artifacts
- Evaluative Research, which validates our design through iterations.

Early-Stage Background Research Methods

Timeline: September 19 - October 16, 2018

For the early-stage background researches, we conducted contextual inquiries, affinity diagrams, log data analysis, and think-aloud.

From the contextual inquiries and the affinity diagram method, we learned that schedules, including that of their respective transportation services and their own schedules, is the biggest factor in determining their transportation methods. Other factors, such as weather conditions and safety concerns, would also influence people's choice. Besides, people also expressed their need for a better way to track the vehicles. From the log data on the Tiramisu log, we deducted that PAT bus is more popular than the CMU buses, and that 61C and 61D are the most popular routes. The think-aloud on the same app addressed that there are some usability issue with the mobile app.

Generative Research Methods

Timeline: October 24 – November 7, 2018

1. Contextual Inquiry

Participants: N=3

Research Questions/Hypotheses:

- Many students don't know that escort and shuttle services are available as transportation options.
- What information do inexperienced users desire the most from the system? What information do expert users desire the most from the system?
- It's difficult to even know where to start to access the information on the CMU Shuttle and Escort services. Students would like to use escort/shuttle service but are unsure how to get the appropriate information on it.

Rationale: In order to understand the level of difficulty for new users obtaining information about the CMU Shuttle and Escort Services (e.g. finding shuttle routes, estimating shuttle departure times, etc.) and obtain qualitative information of the overall experience that participants have in finding relevant information about the service

Findings:

Interpretation Notes

Affinity Diagram:

Awareness of CMU S/E service	I don't know about the service	I am unsure what the service is
	I know about the service but have other options.	I know the shuttle service but do not need it
		I have other transporation methods I prefer
What info is needed?	I need more general info on the service.	I need more info about how escorts work
	I need more time-related information	I need more info about full schedul
		I need more info about ETA / duration
How easily can the info be accessed	I used the website but it was hard to use	I find CMU website to be hard to use
		I started to try to find info on website
	I used the app but it was hard to use	I had to use external apps to find some info
		I wanted to search for special info, using the app
		I feel Ride Systems app is not providing helpful info
		I prefer to use the app over the website
Application of info to experience	The information I get is inaccurate	I see information that is untrue
		I find estimated time of arrival to be unclear / inaccurate
	I don't know how to differentiate the info I have	I don't know the difference between various routes
		I don't know the relationship between zones and stops
		I don't know when to get off
		I don't know where I am when using CMU service
		·
	I don't know how to apply info to physical world	I find it hard to locate escort stops
		I find escort stops through people waiting there
		I need to know exactly which stop I am going to
		Those to mion orders mion does an going to

Important quotes from participants

- "Oh, my friend told me about the CMU escort service."
- "I wondered why there were so many people standing in front of the new UC."
- "There is a difference between CMU shuttle and escort?"
- "Where do I find information on escort?"
- "What does red zone and green zone mean? What's the difference?"
- "Why isn't the bus here? It should be here 5 minutes ago."

Summary and Insights: Through the contextual inquiries and observations of our general user population, we found that CMU students are mostly aware of the existence of the CMU transportation service; however, they do not use the service due to the existence of more convenient and familiar modes of transportation and the uncertainty when it comes to understanding how the system of CMU shuttles and escorts operates. Generally, the users were more aware of the Pittsburgh Port Authority buses compared to the CMU transportation services.

2. Heuristic Evaluation

Participants: N=0

Research Questions/Hypotheses:

- How can the information on the CMU Shuttle and Escort Services be communicated in a clear way to users?
- The Ride Systems mobile app/website is hard to use.
- The CMU Shuttle and Escort Services website is confusing. There is a lot of information that may overwhelm users.

Rationale: A heuristic evaluation is known to be a cheap and fast method for finding problems within a user interface. We as the experts would review the user interfaces in the Ride Systems mobile application and the CMU Shuttle and Escort Services website

and comparing each screen against a list of set heuristics, we sought to figure out which violations highlighted a severe usability problem that hindered users in accessing the relevant information needed to use the transportation services on campus successfully.

Summary and Insights: Through the heuristic evaluations, we learned that the mobile app has generally a very narrow span of audiences, and does not go well with the current common design languages of map mobile apps (especially Google Maps); on the other hand the CMU transportation website is generally well-designed, but the naming schemes can be quite confusing to new riders, and the boundary between escort service and the shuttle service is not well-emphasized. This led us to focus all the more on informational hierarchy and much more intentional information design for our solution.

3. Think Aloud

Participants: N=5

Research Questions/Hypotheses:

- The Ride Systems mobile app/website is hard to use.
- The CMU Shuttle and Escort Services website is confusing. There is a lot of information that may overwhelm users.
- Students mostly use Google Maps for navigation information (especially with starting points and destinations).

Usability Questions/Hypotheses:

- Understand how users find information on the website and Ride Systems app and how accessible those informations are:
 - Does the app lead users to need external applications to complete any of the tasks, if so for what purpose?
 - Is the search function clear and easy to use?
 - Are all the relevant information provided through the website / app? (time, location, routes etc.)
- Understand how people apply the information provided in the website and Ride Systems app
 - Does the platform provide which most optimal route to take to reach their desired locations?
 - Does the platform provide the estimated time of arrival of the shuttles?
 - Does the platform clearly show the destination and the arrival stops?
 - Does the platform provide clear explanations about the shuttle and the escort services, specifically the difference between zones and stops?

Rationale: After our initial observations and contextual inquiries on the ways users can access information on the CMU Shuttle and Escort services, we wanted to see how easily and efficiently users can find the most relevant information to them in both the Ride Systems mobile application and the CMU Shuttle and Escort Services website. The Ride Systems app is the only app currently available for people to track the escort and

shuttles that run from the CMU service; and the website is one of the main platforms that users are led to (by Google or other search engines) so that they can find the necessary transportation schedules and routes. From both these platforms, our purpose was to clearly identify how we can take what information is already available and design it so that accessibility is increased for users from all backgrounds/experiences with the service. In particular for this study, we wanted accessibility to be increased for users who have never used the service before.

Findings:

Usability Aspect Reports

Summary and Insights: The most frequent problems we found for the CMU Shuttle and Escort Services website according to our usability aspect reports were that the differences between the shuttle routes and escort zones were unclear on the bus tracking application, the bus tracking application (Andysbuses) was not prominently prioritized as available for users to use directly on the CMU Shuttles and Escort Services website, and overall, the information hierarchy on the website did not cater to searching by destinations, barring users from that functionality. Through the think-alouds conducted for Ride Systems, we found that estimated arrival times listed next to the route names persistently confused users, shuttle stop locations listed on the digital medium were unable to be linked to map directly on the screen, and finding a route to users' destinations was their main priority but the functionality within Ride Systems did not support that need. Ultimately, we determined that a redesign is needed not only in the context of visual and information hierarchy but also in the context of alignment with common design patterns and principles today's users are most familiar with (e.g. Google Map APIs, transportation application standards, etc.).

4. Speed Dating

Participants: N=6

Research Questions/Hypotheses:

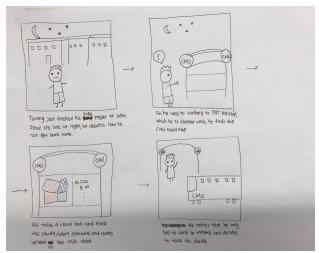
- Through what kinds of mediums (digital vs. physical) do users want to access this information? How often would they access the info?
- What is / are the most preferred method of getting informed about the transportation services?
- What part of the CMU shuttle/escort service are users most confused about?
- How do people learn about other transportation services like Port Authority or Uber?
- What are the biggest pain points for how users currently get around?

Rationale: Before diving into the design process, speed dating was a great way to explore wide variety of potential design solutions and quickly test them out with users. From various generative research methods, we had insights about the high level needs of the

users and the pain points of the current system, but were still expanding on all the potential solutions that can address those pain points. As we were evaluating the effectiveness of the solution

Findings:

Speed dating notes



Summary and Insights: After speed dating through multiple storyboards, we narrowed the solution to our problem space to focusing on improvements at the physical stops and the respective information about the service that can be available at those stops. The centralized source of information would reduce confusion among new users, and the information available to them can significantly improve users' ride experience. Furthermore, the current state of information on CMU transportation service is unclear and overwhelming for users to understand; on the other hand, at the other end of the spectrum, users who pass the initial learning curve on the information pertaining to the service may also not need the new information constantly repeated to them to get what they need.

Evaluative Research Methods

Timeline: November 14 - November 30, 2018

1. Five-Second Testing

Participants: N=12

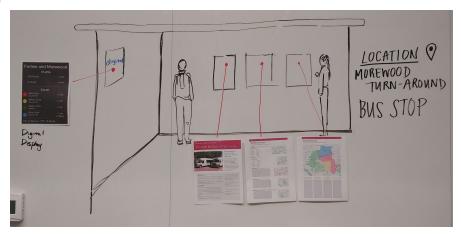
Research Questions/Hypotheses:

- How can the information on the Shuttle and Escort Services be communicated in a clear way to users?
- What is the optimal amount of information that can be displayed at the stop?
- Would it be helpful to have both non-digital information (static information, such as routes) and digital information (dynamic information, such as real time arrival) at the stop?

• Where should the information be displayed specifically in the physical stop and how should it be presented?

Rationale: Because the goals of our usability test mainly centered around defining what information needs to be displayed at the physical stop, we decided to use five-second tests to help us measure what information users take away and what impression they get within the first five seconds of viewing a certain design. Because our design involves information-heavy content, through five-second testing, we wanted to test the overall informational hierarchy and the layout of the design, and tell if the users are able to form a good mental model within the first few seconds. Ultimately, we wanted to see whether or not the users' mental models aligned with the information model we intended to have within our designs. We also want to see what content is important to users and how effectively the design artifacts can communicate that. Additionally, through quick and easy testing, we were able to gather rich and expansive set of data from a large group of people about the general direction of the design with the mid-fi prototypes before we dove into specifics of the design artifact.

Findings:



Physical Posters

General Information

- The advertisement-feeling of the second poster makes the user feel the poster is less trustworthy.
- One of the posters is informative and has a very clear text hierarchy, but the information is overwhelming and a bit too text-heavy.
- Another poster's CMU ID is very eyeball-catchy, but its advertisement-feeling makes the user feel the poster is less trustworthy.

Shuttle Poster

• The integrated regions on the first poster serves as a reference point with each other.

- Expect the grey boxes to be schedules.
- Point of entry was the maps for both versions.
- The separations on the second poster make it easier to distinguish different routes

Escort Poster

- Point of entry is the maps for both
- The separation of information more easily seen on the second poster, but referential purpose of map is lost in second poster
- Text too small for the first poster
- First poster: the information feels too abstract and segregated.
- Expect the grey boxes to be for the bus arrival times
- White space on the first poster is rather confusing.

Digital Display

- Color is the most salient information
- Too many words / too much info in general in one screen
- Stop name is the most salient
- Estimated wait time was easier to digest than the estimated arrival time
- Different icons are already suggesting the difference between shuttles and escort, so the section seems unnecessary
- Since it wasn't in chronological order, it was confusing, chronological regardless of shuttles/escort might be helpful

Summary and Insights: After the five-second testing, for the next iteration of our design artifact for our problem space, we focused on two important insights: (1) information and cognitive overload and (2) readability. Users still focused on the need to access the information; however, they were overwhelmed by the concentrated presentation of the information in our design artifacts. Utilizing visual points of entry, information hierarchy, and images drove us to prioritize minimizing the cognitive load of users. Furthermore, because there is very limited interaction involved with physical posters, the layout and legibility of information and text also became a prioritized factor in our design artifact.

2. Experience Prototyping

Participants: N=4

Research Questions/Hypotheses:

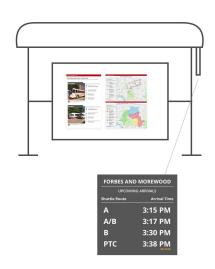
- How were the users' overall experience interacting with information available at the bus stop?
- How appropriate is the information that is being displayed? Is it too overwhelming? Is anything missing or unclear?
- How does this design boost/hinder the users' understanding and the motivation to use the CMU transportation system?

Rationale: As we are envisioning the implementation of our design artifact at the physical bus stop locations, we are also interested in the experience of interacting with the design in the more relevant real-world context. The goal of experience prototyping is to evoke active participation of the users with the design, and explore potential design opportunities that arise from the interaction between the users and the design. This evaluative method will help us discover critical feedback of the our initial design research: Does our design provide the desired experience for the user, when placed in its appropriate context?

Findings:

Experience Prototyping Notes

- People think the shuttle services and escort services should be split up with a greater margin.
- The colors on the shuttle routes map created confusions (especially for the bus stops).
- Half of the testers find the maps to be informative in an appropriate way, while the others find the information overwhelming.



- All the testers believe that this would encourage people to try out the CMU transportation services.
- Half of the testers consider the little mark at the university center is too ambiguous. University center is a big area, and the map does not specify the exact pick-up spot to the bus service.

Summary and Insights: There were mainly two different kinds of feedback that we have incorporated in developing our final iteration of the design. (1) Most users in our study have found the **information to be very relevant and helpful**, and they have found most of the necessary information to be able to use the transportation system. (2) However, the users have found the information to be somewhat overwhelming and **hard to take in at the first sight**. These two pieces of feedback have suggested us to look into the overall presentation of the posters, while keeping the content in the poster. These were reflected in our final design, by scaling some of the posters, while giving more clear white space and separation between the posters to give users clearer guidance on taking in the information by pieces.

Summary of Insights

Generative Method Insights

Lack of awareness about CMU service

- CMU students are mostly aware of the existence of the CMU transportation services
- People are more aware of PAT buses than CMU services
- Users obtain awareness of transportation options through word of mouth

• Lack of information on CMU service

- Information provided on the app and website is unclear and users don't know the difference between various routes and face challenges in making decisions
- The information on estimated time of arrival is sometimes inaccurate as escorts and shuttles come in late
- Physical stops are hard to locate and their locations are usually inferred through people waiting at the stops
- Even after knowing the information about the time and location, students still seek for information of where they currently are, and when they can get off

Modes of obtaining information

- Websites and Ride Systems app are the two main ways people use to obtain CMU transportation information
- The website and the app are hard to use and not user-friendly
- Users rely on external apps like Google Map to find out where they are and where to get off

• Transportation options and rationale

- Students don't use CMU transportation services for mainly two reasons:
 - Existence of more convenient / familiar modes of transportation
 - Uncertainty about how shuttles / escorts work

• Unclarity in information presentation: App

- Estimated arrival times listed next to the route names confuse users.
- Shuttle stop locations listed on the digital medium is unable to be linked to map directly on the screen.
- Finding a route to users' destinations is their main priority but the functionality within Ride Systems does not support that need.

• Unclarity in information presentation: Website

- Lacking information on the difference between shuttles and escorts
- Lacking of a link to the bus tracker interface.
- Bus tracking application (Andysbuses) is not prominently prioritized as available for users to use directly on the CMU Shuttles and Escort Services website.
- The information hierarchy on the website does not cater to searching by destinations, barring users from that functionality.

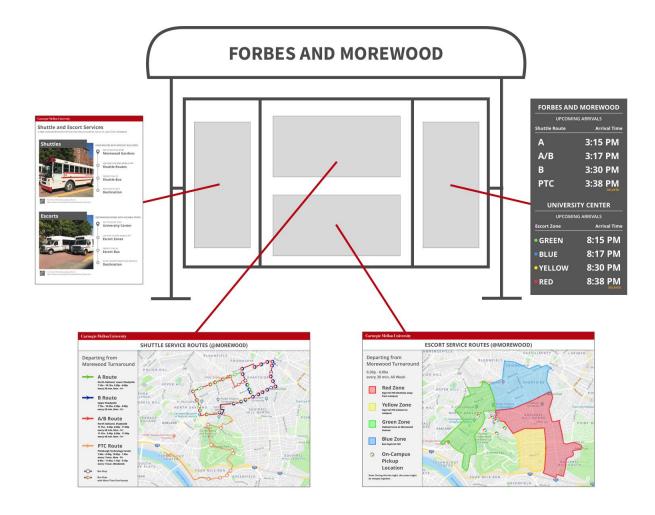
Potential Solutions

- Improvements on physical stops and the information available at those stops would significantly improve the ride experience:
- Centralized source of information would reduce the confusion among the new users
- Purely information focused solutions will mainly only benefit the new users using the service.
- Stronger physical presence of the shuttles and escort stops will both raise the awareness and motivation for the new users to use the service.

Evaluative Method Insights

- **Information Overload:** Users still find the need for the access to the information, but they are overwhelmed by the concentrated presentation of the information in a poster
 - Utilizing point of entry: For most users, distinct colors stood out the most, which can be further utilized to emphasize certain parts over the others
 - Need for Information Hierarchy: To minimize the information overload, should put clear emphasis on few parts of the poster
 - Image over text: Appropriate use of image can help the users digest the information better
- **Readability**: Since there isn't much interaction involved with the posters, readability became the most important factor in the information convey
 - Layout of the poster: This was one of the biggest factor that affected readability (whether it's vertical/horizontal, one map vs. multiple maps). Most users found it comfortable to read clearly vertically mapped out information
- Relevant information: Overall, the information presented at the bus stops were very
 relevant to the types of information the new users were looking for. Thus, the design
 motivated the users to explore more about the CMU transportation services, influenced
 their decision to use CMU transportation as their mode of transportation.
- Need for clear point of entry: Although most people found the information to be helpful, at the first sight, they had trouble spotting exact pieces of information they needed to be able to use the service. This suggested that there were no clear point of entry where users can start finding information from our design. More usage of appropriate white space or minimal color schemes to emphasize the important points would help getting the information across.
- Need for accessibility of information outside of bus stops: Some of our users have
 pointed out the disconnection between the information available at the physical stops
 and information available online. It leaves us with potential design opportunities with
 Ride Systems app and the CMU transportation website to carry on the same set of
 information that is displayed at the bus stops, so that the users can continue to access
 these information through online channels.

Solution



Users who are unfamiliar with what the CMU Shuttle and Escort Services are either approach the Forbes and Morewood stop trying to figure out when and how they can reach their respective destinations, if at all possible, or they simply just bypass it. This design artifact is meant to directly help alleviate the initial burden of becoming more familiar with the service and guide users to access this service more efficiently and flexibly. Being able to be as simple as an advertisement and as complex as an infographic (up to the user), the design artifact we placed in the context of the bus stops ultimately will help "onboard" users into a new system that has a lot of components. Ideally, the guidelines we pave for users at the stop makes their journey from that stop to their respective destination as easy as possible.