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## Early Design Research

**Goal:** To Understand the Current System

**Policy A:** Identify the Stakeholders

**Objective 1A:** USERS. To create a profile list of front stage and backstage users
- **Policy a:** Interview Lawrence transit and university KUOW staff and riders. Research evidence in the city transit reports for demographics on ridership.

**Policy B:** Become Familiar with the Using the System

**Objective 1B:** FAMILIARITY. To record my experiences riding the Transit System
- **Policy b:** Using ethnomethodologies as a participant observer, I will video, photograph and compile field notes.

**Policy C:** Identifying Opportunities and User Needs Requirements

**Objective 1C:** USER NEEDS. To generate a needs matrix to identify design requirements
- **Policy c:** Interview and observe riders using the system. Research survey data from city reports. Create a relationship matrix of user needs and then generate categories for design requirements.

## Design Process

**Goal:** To Improve the User Experience of the Bus System

**Policy A:** Improving the Route System

**Objective 1A:** COVERAGE. To design new routes with desired stops.
- **Policy a:** Interview stakeholders and collect data from city reports to determine a sample of most used and requested stops. Assign priority levels and conduct relationship matrices, link analysis, and planar graphs to generate desirable routes. Involve a user-centered and participatory approach with testing during the process of iteration.

**Objective 2A:** CONVENIENCE. To design a route system with improved transfers and travel times.
- **Policy b:** Conduct travel time studies. Conduct frequency studies. Determine effective transfer hubs to minimize travel times.

**Policy B:** Improving the Usability of the Route Map

**Objective 1B:** WAYFINDING. To create a city map that is correctly orientated to the user’s position in the environment.
- **Policy c:** Research evidence on orientation and disorientation. Involve a user-centered and participatory approach to test the user’s knowledge of the environment against their current position while using the map.

**Objective 2B:** ROUTE PLANNING. To create a map that is readable and legible and allows users to easily plan a route trip.
- **Policy d:** Involve a user-centered and participatory approach using methods such as task analysis, observation and interviews to determine the route planning process and find opportunities for improvement in efficiency and satisfaction.

**Objective 3B:** ACCESSIBILITY. To design a visual map display that is accessible to the color-vision impaired.
- **Policy e:** Research color blindness. Apply color schemes and visual elements that can discriminate information easily.
Early Design Research
Goal: To Understand the Current System

1. Research Current System
2. Familiarity
3. Needs and Opportunities
4. Users

Goal: To Understand the Current System and how it impacts Users, Familiarity, Needs and Opportunities.
Goal: To Understand the Current System

Policy A: Identifying the Stakeholders

- Research Current System
- Users
  - Familiarity
  - Needs and Opportunities
Goal: To Understand the Current System
Policy A: Identifying the Stakeholders

**Objective 1A: Users**

**Policy a:**

Interview Lawrence Transit and University KUOW staff and riders.

Research evidence on demographic ridership in the City of Lawrence Transit Reports.
**Project Goal:** To Understand the Current System

**Policy A: Identifying the Stakeholders**

- **Objective 1A:** USERS. To create a list of front stage and backstage users.
- **Policy a:** Interview Lawrence Transit and University KUOW staff and riders. Research demographic evidence in the City of Lawrence transit reports.

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<th>Team</th>
<th>User Types</th>
<th>Situation</th>
<th>Evaluation (frameworks)</th>
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<td>&gt;Eric</td>
<td>&gt;Riders and Staff of the Transit System</td>
<td>&gt;Methods &gt;Observation &gt;Interviewing &gt;Research</td>
<td>&gt;Techniques &gt;Non-participant Observation &gt;Informal Interviewing &gt;Reviews of City Transit and Budget Reports</td>
<td>&gt;Illustrations &gt;percentage graphs / charts &gt;paper &gt;Illustration software</td>
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**<Summary>**

**What I want to determine:**

>Who are the riders of the system?
>Who manages the Lawrence Transit Authority?
>How does the LTA operate?
>How is the LTA funded?

**What I learned:**

Demographics of Riders
The percentage of male riders is slightly more than women.
The largest group of riders is White, aged between 18-34 years old.
2/3 of all riders use the bus to travel to and from work or school. Work is almost 50% of all purposes.
About 60% of riders use the bus 5 or more times per week.
Backstage Information on the Lawrence Transit Information

The revenue and total cost nets to zero difference.
There are a total of 12 fixed buses, 14 paratransit buses, and 5 Park and Ride.
The service runs from Monday - Saturday, 6am - 8pm.
There are 8 routes.
The City of Lawrence contracts the Bus Service of MV Transportation.
Riders of the Lawrence Transit Bus System

Survey results from the 2006 Coordinated Transportation Plan

**Gender**
- 55% Male
- 45% Female

**Trip Purpose**
- 47% Work
- 18% School
- 14% Other
- 8% Visit/Personal
- 7% Medical
- 6% Shopping

**Age of Riders**
- 4% 65 or older
- 8% 64 to 55
- 13% 54 to 45
- 15% 44 to 35
- 25% 34 to 25
- 24% 24 to 18

**Frequency of Use**
- 59% 5-6 days per week
- 31% 2-4 days per week
- 8% 0-1 days per week
- 2% First Time

**Ethnicity**
- 69% White
- 14% African American
- 6% Hispanic
- 6% Asian
- 5% Native American

**Household Income**
- 45% Under $15,000
- 24% $15,000 - 24,999
- 14% $25,000 - 34,999
- 8% $35,000 - 49,999
- 5% $50,000 - 74,999
- 4% $75,000 - Above
The Lawrence Transit Bus System

Staff
3 City Employees
60 MV Transportation

Number of Buses
12 Fixed Route
14 Paratransit
5 Park and Ride

Hours of Operation
Monday - Saturday
6 am to 8 pm

8 Routes
1. Prairie Park Nature Center
2. HINU / Downtown
3. Iowa and Lakeview
4. North Lawrence
5. 23rd / Clinton Crosstown
6. 6th / Wakarusa / 9th
7. South Iowa
8. KU / South Iowa

Total Riders
37,151 per month
1,420 per day

City Expenditure
$3,188,457

City Revenue
$3,188,457

Information provided from the 2008 Annual Report, Lawrence Transit System
Goal: To Understand the Current System

Policy B: Becoming Familiar with Using the System

- Research Current System
- Determine Top traveled Stops
- Assign Priority Levels to Stops
- Create Route Priority Matrix
- Create Nonplanar graph of link relationships
- Research Current Route Times and Transfers
- Determine New Route Layouts
- Determine new route transfers and times
- Test against scenarios and users

---

1. Research Current System
2. Familiarity
3. Needs and Opportunities
4. Users
Goal: To Understand the Current System
Policy B: Become Familiar with Using the System

**Objective 1B: Familiarity**

**Policy b:**

Using ethnomethodologies as a participant observer, I will record my experiences through video, photographs, and field notes.
### Project Goal: To Understand the Current System

#### Policy B: Become familiar with using the system

Objectives:
- Objective 1B: To record my experiences riding the Transit System

#### Policy b: Using ethnomethodologies as a participant observer, I will video, photograph and compile field notes.

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<th>Situation - creating ideas to understand the interaction between the individual, object, and environment</th>
<th>Evaluation (frameworks) - what are users Doing, Saying, and Making within the situation</th>
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| Eric | >Ages 15 and up   >English Speaking   >No other constraints | >Methods  
   >Observation  
   >Interviewing  
   >Research  
   >Participatory Design | >Lynch Environmental Psychology  
   >E. Hall Behavior Settings and Proximics  
   >J. Altman Crowding and Personal Space | >Audience: Team  
   >prototyping  
   >illustrations  
   >Time lapse Video  
   >Ethnographic Written Journals  
   >Photographs |
| Andrew | >No other constraints | >Techniques  
   >Non-participant Observation  
   >Informal Interviewing  
   >Literature reviews of Transit Reports | |
| Rachel | | >Tools  
   >Time-lapse photography  
   >Video Recording  
   >Library and Internet resources  
   >Current Transit Maps | >procedural and behavior prototypes  
   >low fidelity maps  
   >Field Notes |

### <Summary>

#### What we want to determine:
- What are the steps involved in riding the bus and planning a route?
- What are the existing bus routes and their schedules?
- Where are the bus stops throughout the City?
- How do I read the route map?
- How efficient are the routes?
- Can I successfully get to my destinations?
- How do individuals use the bus shelter and its environment?

#### What I learned:

**Task 1: Understanding the Route Map**

The route map is very confusing to me. The components of the map are: the city map, the route lines, the schedule boxes, the compass, the mile scale, and the key.

1. **City Map:** The city map is an aerial wire frame view of the city of Lawrence. The City boundary is filled white. All of the streets of Lawrence are included, however not all street names. The
map is North orientated. It displays districts such as the University of Kansas, HINU, and Free State High School, as well as popular golf courses. The River and I-70 are also shown as references. There isn’t a map title.

2. Route Lines. There are a total of 8 route lines. The lines are colored, numbered, and also have directional arrows above them. The route lines travel along the streets and may have route stop icons along them. Route 6 has two different routes. Route 1 turns into Route 4, Route 2 turns into Route 3.

3. Schedule Boxes: The schedule boxes include Route Name, Number, Route Direction, Routes Stops, Route Times, and colored transfer spots - which is very unclear to me. Not all stops are labeled. The icon shelters on the map may or may not be included in the schedule box. Also, this is confusing because I have to estimate travel arrival and departure times for these stops. The times are organized from left to right and from up to down.


5. The Mile Scale: 2.375 inches = 1 mile

6. The Key: Symbols for: a) Bus Route  b) Route Number  c) Bus Shelter  d) Transfer Location  e) K-10 Connector Stop  f) School  g) KU Park and Ride Express

Task 2: Identifying the Bus Shelters and Stops.
The map shows a total of 40 Bus Shelters. Park and Ride has 4 Bus Shelters. The Bus Shelters are equipped with a trash can, a 3ft bench, and a 10ft enclosure. The walls are tempered glass.

Task 3: Understand the Signage Systems
The signage systems must be improved. There are three variations of Bus Stop Signs. One that communicates no parking on the street and does not have a route number. These are the most common signs in Lawrence. The second sign resembles the first, but in addition, has a plate with route numbers. The third sign is only at the 9th and Mass stop. It lists the routes and the direction of route 6, I think? The shelters do not have any additional signage that informs the rider of his stop or what bus route he is on.

Task 4: Route planning and riding the bus
Everyone uses the map differently to route plan. But for me, the simple task was made very complicated using the existing system. To arrive at 6th and Kasold from South Iowa, took me 21 processing steps. Many of those steps involved transferring to other routes and calculating times. There is opportunity here for improvement.

Task 5: Studying user behavior at the Bus Shelter.
The following summation is from a paper I wrote called “The Use of Public Space: Social Identification, Territoriality, and Acceptance”, 2009.

I examined the relationship between social identification, territoriality, and acceptance in a fixed public space. During my initial study, I watched the bus shelter as a distant observer taking photographs every 10 seconds. For hours I studied the people waiting there. I paid attention to the cultural diversity, the body language, and proxemic distances involved in social interaction. Reviewing the footage and my fieldnotes allowed me to identify four social identities I label as: Deviant, Independent Individual, Socially Accepted Individual, and Pack Leader. These identities can change. Any of which can morph into a different one based on factors that influence acceptance and territoriality.

The deviant is an individual who is ignored by others despite his action to engage with them. The Independent Individual chooses to disengage from any prolonged social exchange. The Socially Accepted Individual actively engages in social interaction with others over a period of time. The Pack Leader mediates the social exchange and determines who may participate. Each social identity is developed and maintained by three action categories: the use of proxemics, behavior to mark one’s territory, and the ability to become socially accepted. Edward T. Hall defines the dynamism of space as having four distance zones: Intimate Distance, Personal Distance, Social Distance, and Public Distance. Each space is culturally determined and influences the type of behavior people use in social situations. I used his categories as a framework to my research.

Everyone, regardless of culture, has a social identity. That identity is dynamic, fluid, and constantly changing based on the behavior exchanged within the environment. A person’s identity establishes social norms or rules within an interaction. If the social group can identify similarly with one’s identity, social acceptance is granted. One who has acceptance within a social group is entitled to possess or claim territoriality over someone who is less accepted and has a lower social identity. As Altman suggests “territories serve the purpose of soothing out social interaction and stabilizing social systems” (Altman:209).
My Route Planning Process Using the Current Map

1. Have a destination goal.
2. Find my location in the environment (landmarks, paths, districts, nodes, edges).
3. Find my location on the map referencing the objects in the environment.
4. Locate my destination on the map.
5. Look to see what route color is at or closest to my location stop.
6. Identify what route color and number is at my destination.
7. Determine if I need to transfer.
8. If so, locate transfer point.
9. Check and remember actual time.
10. Find location route schedule box by color/number.
11. Determine direction I need to take the bus.
12. Look for my location stop in schedule.
13. If not there, look for the location before and after my stop and calculate time.
14. Find departure time closest to actual time.
15. If transferring, determine my arrival time to transfer point.
16. Find transfer stop’s route schedule box.
17. Look for my transfer stop in schedule.
18. Determine direction I need to take the bus.
19. Confirm that my destination stop is on that same route.
20. Find a departure time that occurs after my arrival time.
21. If not there, look for the location before and after my stop and calculate time.
22. Confirm arrival time at my destination on the schedule box.
Goal: To Take the Bus from Wal-Mart to 6th and Kasold

1. Destination Goal
   - 6th and Kasold

2. Find Location in Environment
   - I'm across from Wal-Mart. I see that I am off of 33rd st.

3. Find Location on Map
   - I look South on the map due to my prior knowledge.
   - I identify 31st and Iowa streets.
   - I locate 33rd and Iowa and see the icon of a bus stop.

4. Find Destination on Map
   - I look North on the map due to my prior knowledge.
   - I identify 6th and Iowa streets.
   - I look West to find Kasold.
   - I see the intersection of 6th and Kasold.
Goal: To Take the Bus from Wal-Mart to 6th and Kasold

Identify Closest Route to my Location

5

I see three colored routes run through my stop: Blue, Brown, and Green.

Identify Closest Route to my Destination

6

I see only one route color run through my destination. It is the Blue 6 route. There is no bus icon (stop) at my destination.

Do I need a transfer?

7

Yes. My location and destination are not on the same route.

Locate Transfer Point

8

I notice the Brown and the Green routes lead to downtown. The Blue 6 also goes to downtown.
Goal: To Take the Bus from Wal-Mart to 6th and Kasold

Check Actual Time

9

Luckily I have a watch on. The time is around 12:45 pm.

Find Route Schedule Box

10

I look first at the green route 7 box. I also find the Brown route 8 box. Both routes go downtown.

Determine Bus Direction

11

Both routes 7 and 8 either go Northbound or Southbound. Downtown is north of my current location. I need to go Northbound.

Look for My Location in Schedules

12

I look under Northbound on both routes. My location of 33rd and Iowa is not listed on either one.
Goal: To Take the Bus from Wal-Mart to 6th and Kasold

I need to calculate a stop time

The closest stop to my location is 31st and Iowa and is on both routes.

Find closest departure time

The 7 route departs 31st and Iowa at 1:32. But I am south of that stop. So I have to guess maybe it will arrive a couple of minutes later? The 8 route departs at 2:13pm. I will take the 7 route because it arrives much earlier.

Locate arrival time to transfer point

I notice in the schedule box that I will arrive at downtown, which is 9th and Mass, at 2:00pm.

Find transfer route schedule box

I look for the Blue 6 route box. I see two different route 6 schedule boxes! One is titled Wakarusa via 6th Street. The other is titled Wakarusa via 9th Street. I know that I need to go to 6th Street and chose the appropriate box.
Goal: To Take the Bus from Wal-Mart to 6th and Kasold

17 Determine bus direction
   I need to go Westbound from downtown.

18 Locate transfer stop in the schedule
   I find 9th and Mass departure stop going westbound.

19 Confirm my destination stop on transfer route
   6th and Kasold is on the route and is a scheduled stop.

20 Find a departure time after my arrival time
   I arrive at 9th and Mass at 2:13pm. The closest departure time is 2:43 pm.

21 Confirm my arrival time to the destination
   Route 6 will arrive at 6th and Kasold at 2:52 pm.
City Bus Shelters
40 Total Shelters in Lawrence

City of Lawrence Bus Shelter
Elevation View

Notes: All beams are 2.75” wide unless noted.
Park and Ride Shelters
4 Total Shelters in West Campus
Bus Stop Signs
Throughout Lawrence
**Situation** - creating ideas to understand the interaction between the individual, object, and environment

**Methods of Generation**
- Informal Interviewing
- Participant Observation

**Evaluation (frameworks)**

**Representation** - Represent synthesis of ideas

**Location**
- 9th and Massachusetts Bus Shelter

**Users**
- Rachel and I

**Object**
- Bus Shelter
- Map

**Interface**
- The interaction between the user and other objects

**Tasks**
1. To learn route planning by using the route map
2. To take a bus with a visually impaired person with sight dog
3. To identify Bus Shelter and Map problems relating to accessibility

---

**September 25, 2008**  
Key Concepts: Route Planning, Safety, Accessibility, Comfort

After looking over the routes on the map, I decided to begin my observation on the 9th and Massachusetts route. I chose this route because according to the map, different bus routes intersected at this point. I felt that this location would contain a high volume and variety of bus riders. I called my friend, Rachel to join me on my investigation. I felt she would be a valid resource on gaining more information on the bus system’s accessibility. She has been legally blind since age 6, requires a sight dog, and hasn’t ridden the bus before.

At this time my goal was to record talking to people waiting at the bus shelter and those on the bus. Rachel and I decided to ride a bus that would stop by her house so she could get home. I would continue staying on that bus until it looped back to 9th and Massachussets. Having never rode the bus system before, I walked into the shelter and observed the large city map on the wall. I found my location and Rachel’s street and decided that Route 2 would be the best route to get her home. At the bus shelter, a man and women sat together on the outside bench. They were having a conversation while they waited for the bus. It appeared as if they knew each other well. While I recorded their movements, a bus arrived. However, it did not stop at this shelter. It stopped about 20 yards to the west of me on the same side of the street. I mentioned to Rachel that the bus stopped before the shelter and together we walked towards it.

While we approached, passengers got off. One of them, a man, stopped and stood waiting. I recorded his movements. He stood confidently and patiently and seemed aware of the procedures of getting on and off the bus. I inferred he was a regular rider. I approached him and recorded our interactions. I mentioned to him that we were first time users and I asked if this is where we could catch the route 2 bus. He mentioned that this was the actual picking up point for that route 2. I asked him why this bus did not stop at the shelter just down the street. He mentioned that he didn’t know the reason; however, he rides the bus frequently and knows the route spots along this street. Rachel mentioned that this is very confusing to her. She would have no way of knowing where to correctly stand to catch the right bus. He explained that it took him awhile to figure out the routes and stops, but over time and frequent use, he learned the system. We thanked the man and continued to...