record others standing around. Others stood around the street sign. There wasn’t a bench here to sit on.

The bus drove off and just behind it another pulled up. Rachel asked out loud what bus this was. I explained I didn’t know. The man whom we talked to earlier, interjected and explained that this was the Route 2 bus. He showed us where we can find the route information on the bus. It’s a marquee on the top right side of the bus. Once again Rachel pointed out that this is of no use to her. The bus driver got off the bus and explained to the waiting riders that the normal bus had broken down. He continued saying that we are using this smaller bus. We followed the crowd onto the bus. In front of us was a mother carrying a baby. She had a paper bus ticket. Past her, a man dropped change into the payment box on the bus. I showed my KUID and got on free. Rachel forgot her ID, but the bus driver let her and her sight dog on free of charge. The passengers quickly find seats. They spread out throughout the bus. Rachel and I chose to sit up front. Unfortunately there wasn’t a spot for handicapped people, so we had to cram her dog between our legs and the front of the seats. The bus driver said that the larger buses have more accessible room. Rachel mentioned that this is very uncomfortable and she could only last sitting in this position for about ten minutes.

During our trip, I noticed some people kept to them self. The bus driver and the man we had approached earlier conversed with us. I noticed that the bus driver didn’t announce every stop. The man explained to use that some of the bus drivers do, but not all. I then searched for signs of routes on the inside bus walls and noticed none. Rachel told the bus driver to tell us when we reached her stop. I asked the bus driver what kind of questions he frequently hears from beginning riders. He explained that most want to know where the bus goes, when will it arrive, and will it go to a particular stop.

After Rachel got off, a couple entered the bus together. They had transfer slips. The lady carried a backpack. They sat down across from me. I asked if they would mind if I recorded them while I asked them questions about their experiences riding the bus. They agreed and explained that they were regular riders. The man rides the bus because he has no other option; his license was suspended. She was a Haskell University Student and rode the bus to and from school. They explained that they learned to use the system through trial and error. They carry pocket routes with them during their rides. The lady explained that she had hard times understanding the routes when she first started riding the bus. She pointed out that on some bus shelters, the large city maps are missing. I asked her if she feels safe riding the bus. She explained that a couple of months ago she was waiting for the bus and a fight broke out among other riders. She was quite scared at that moment. But it hasn’t stopped her from riding the bus. The man enjoys riding the bus. He feels, compared to larger cities, Lawrence is easy to get around. He continued saying that the people on the bus are nice and social. He enjoys that the busses are clean inside. I redirected the conversation back to the shelters and asked them to offer suggestions of improvements that would make their experiences more comfortable and less difficult. They explained that in the summer time, the shelters can get very hot inside. In winter times, the cold air from the openings is very harsh. The lady pointed out that it is difficult to wait in the shelters for times up to an hour when you have to carry heavy books. This prompted her to advise me to go visit Wal-Mart and watch how people sit in the shelters with all of their groceries. Our conversations came to an end when we all got off the bus at the 9th and Massachusetts stop.
**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 | > 33rd and Iowa at Wal-Mart and 6th and Kasold with Transfer |
|-------------------------------|
| Users | > Eric |
| Object | > Bus Shelter |
| > Map |
| Interface | > The Interaction between the user and other objects |
| Tasks | 1. To learn route planning by using the route map |

**September 26, 2008**

**Key Concepts:** Route Planning, Safety, Accessibility, Comfort

I continued my observations the following day. Taking the lady’s advice, I drove to Wal-Mart and found the bus shelter there. My goal was to watch people as they waited for the bus carrying shopping bags. The inside of the bus shelter was very dirty. Trash and food lay on the floor. A lady was waiting for the bus, but was standing outside of the shelter. After awhile the bus pulled up. She got on the bus, but struggled with her bags and her pass. After the bus left, I decided to try and plan a specific destination and record my experience in getting there. I decided that I would try and get to my professor’s house on the north side of town. He was expecting me to come over at some point during the day. I plotted my route using the large city map inside the shelter. I would require a transfer to complete the journey. The bus was to arrive a little after 1:00 and I waited patiently. Minutes later, a bus pulled up and its door opened. I asked if this was the route 8 bus, the driver said no, it will be the next approaching bus. My bus came soon after. I presented my ID and sat down in the first seat. The bus was empty. I took advantage of interviewing the bus driver about his experiences with driving the bus and of his interactions with the riders. We talked for about 45 minutes – that was the time it took me to get to 9th and Massachusetts street where I would transfer buses.

The man explained to me that riding the bus takes a little getting used to. It can be easy if you understand the concept of time points. Time points are the times of arrival posted on the route maps of the major stops. He continued by saying that if you are waiting at a stop that is between time points, you need to know the time stop of the route before. At that point, you just get to your stop a little early and you won’t miss the bus. He mentioned that he has to explain frequently to unfamiliar riders how the system works. But after a while they learn the system. He pointed out that there are some tricks people use to time the routes better. On route 7, the bus will stop once at Wal-Mart and then loop around a couple blocks and stop at the same shelter on its return. It takes about 20 minutes to do the loop. He said that he sees many shoppers time their shopping within those 20 minutes so they won’t miss the bus. The bus driver pointed out that if you aren’t aware of these tricks, you might find yourself waiting an hour for the next bus to pick you up. The bus drivers said that the best way to understand how the system is to understand how it was created. He explained that 7 years ago, the city had two options to design the routes from. One was by coverage area, the other was by frequency of buses on those routes. The city decided to plan the route system with more area covered. He feels the bus system is pretty good about getting people to where they want to go. Especially for people who have to rely on the busses; those that don’t have cars, have DUIs, international students, elderly, and are too young to drive. He sees an increase in ridership with KU students.

He sees some deterrents of the system. He has noticed that there have been problems with vandalism. People will drive around in their cars and shoot the glass with their BB guns. The glass stays broken for awhile because there is a time delay of having those glass walls repaired.
In general the regular riders love the system. He says the bus city adds to the vitality of the city. He sees the bus experiences as being very social. He says that many people still have misconceptions about the city transportation. Some are upset that the system is not turning a profit. He believes the bus system is not here to make a profit but to provide for the good of the community.

I arrived at 9th and Mass. Street around 2:00 pm. I was able to catch the Route 6 bus without much wait. I arrived at 6th and Kasold around 2:15. However, there wasn’t a bus shelter there. This alarmed me because I didn’t know where I was to catch my return bus and when it would arrive. I walked to my professor’s house. He drove me back to my car at Wal-Mart.
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### Location
- > 9th and Massachusetts Bus Shelter to North Lawrence

### Users
- > Eric

### Object
- > Bus Shelter
- > Map

### Interface
- > The interaction between the user and other objects

### Tasks
1. To ride the bus through its complete route
2. To identify areas of improvement on the routes

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**May 21, 2009 9:44am**

**Key Concepts:** Route Combining, Route Restructuring, No Parking Signs, Bus Shelters, Bus Stops, Localized Language

I set out today with the intention of discovering route improvements. I wanted to know if there should be additional stops/shelters along the routes, as well as, any stops that can be removed from the routes. My plan was simple - to take the first bus that arrives at the 9th and Massachusetts Bus Stop. I parked my corner around the corner in the 2 hour lot and walked to the shelter. I saw a bus approaching from the west. I hurried to catch it. As I crossed the street, I took out my KUID to ride free. Just as I reached the shelter, the bus arrived and I was able to read its front digital marquee. The bus was a Route 1 Prairie Park/Downtown.

I presented my ID to Kenny the bus driver. He was a heavyset, white male in his late 30’s. I took a seat directly behind him. The bus only had two other passengers in it. A lady in her 40’s sat directly across from me. A Native American male, 30’s, sat in the middle. The bus quickly left 9th and Mass. I was unfamiliar with this route and so I opened my pocket map to learn where we were headed.

While studying the map, Kenny and the Lady began a conversation. She was a frequent rider headed to work and knew Kenny on a name basis. Kenny began talking about how routes 1, 2, 3, 4 are going to get new hybrid buses soon. Lady mentioned something about catching the “5 West”. This sparked my interest. Do locals and frequent riders have their own language they use to name the routes? From my existing knowledge of the routes, I knew that the routes have numbers, a destination name, and on the map are labeled directionally like Westbound or Eastbound. I kindly introduced myself to the lady. I asked her how people identify route names when talking in a conversation. She explained that most people just say the route number rather than the name except for the Route 6. That Route number has two different routes and is confusing. After she got off a couple of stops later, I took her seat. I wanted a better spot to talk with Kenny the bus driver. Along our route, we stopped along the road, not at a bus shelter or bus stop sign, or even an intersection. We stopped in front of a house where a rider was waiting. We picked him up. I had read on the map that a bus driver can pick up a rider at a non-marked stop, if there isn’t a stop nearby and if the driver feels the stop is safe to make. As we continued along, the Native American pulled the stop cord to sound his need to get off at the next stop. At the 19th and Haskell stop, we stopped to pick up riders. There wasn’t a bus shelter. I asked Kenny if it would beneficial to put bus shelters at the main stops. He explained that it’s not always possible because of easement and private property rights. Three teachers and 15 first graders got on the bus. They were headed to a field trip to the Prairie Park Nature Center. We arrived at the Nature Center and the children and teachers got off.

We started up a couple of minutes later after Kenny used the restroom at the Center. Our conversation turned to route improvement and I asked him about any suggestions he would make. As we...
drove around a narrow street in a residential area, Kenny pointed out, "They need to place No Parking" signs on this side of the street. He explained that this street always has cars parked on both sides making it almost impossible to maneuver the bus through this winding stretch. Kenny continued to express his frustration and concern by telling me that as a driver, they have performance ratings. If they hit a car, he believes that would add 2 points to his record. A certain number of points and he will lose his job. Kenny continues to talk next about route improvements. He feels that Route 1 and 4 should be combined as a single number. Route 1 turns into Route 4 anyways on its northbound leg past downtown. He also feels Routes 2 and 3 could be combined because of the same reason. Another suggestion Kenny gave was to improve the route connections for South and West Lawrence. He mentioned his friend who lives off of Crossgate and 23rd Street who likes to go to the gym on 6th street. It takes him 3 buses. He suggests having maybe Route continue north on Kasold past 23rd Street to 6th Street and then back down to Wal-Mart. That would help, or he added, created a separate route. A spot that he would like to have created would be at the Library/Public Pool location. He explains that many of his riders don't have internet at home and go to the library to use the computers. In the summertime, many people will use the bus to go to the pool. Our route now has turned into Route 4 as we head into North Lawrence.

We pick up a new rider. His name is Howard Hill. An older male, in his 70’s. Kenny introduces me to him. Howard is on the Transportation Advisory Board. Howard explains that the Transit Committee is a mess and disorganized. He says, "Whatever I suggest, they do the opposite," he laughs. Howard mentions that I talk to Jeremy Stacey, the Safety and Training Director, who works at 29th and Haskell. He explains he’s very smart and has his own ideas of improving the routes. Howard points out that Jeremy thinks a Grid System would work. I think about that...would a Grid Layout work? The city is organized for the most part in that way. Plus, our culture understands how city grids work. I will ponder this idea more later. We arrive at the I-70 Business Center. It’s a strip mall without any shelter. Kenny says they don’t need a shelter here because of the malls overhang. Kenny gets out to take a quick cell phone break. We head back to downtown. On our way, Kenny mentions that he wishes they put the 5th and Lyons stop back into place. It was a popular spot in the past. It was removed because of some “legal” issues that Kenny wasn’t too sure about. We approach the railroad tracks. We are stopped because workers are doing maintenance repairs on the track. Kenny points out the trains can slow his schedule and make him late for his coming stops. We finally pass through a couple of minutes later and arrive back at the 9th and Mass stop. Howard and I depart and I thank Kenny and him for talking with me. The time is now 11:10. I leave and find my car.
March 13, 2009

Key Concepts: Proximics, Territoriality, Deviants, Socially Dependent and Independent Individuals, Hang-Out Spots

11:00 am.

Andrew, my understudy, and I arrive at the 10 East 9th building. We brought the folding table, two chairs, tripod, camera and timer. We set up everything within the covered entryway making sure not to interfere with building foot traffic. The camera is positioned and focused on the bus shelter across the street. The timer is set to take a photograph every ten seconds. We are positioned well into the shadows. The riders will not see us conduct our observation.

The weather is moderate with a sunny sky. There’s a slight breeze but most people are without jackets. The bus shelter is busy. The eastern bench is occupied by three people. The middle bench has one man on its eastern side. An older man is inside the bus shelter looking at the map. The sound of the camera shutter closing snaps repeatedly.

Video Review:

The total time of the observation lasted about two hours. The time lapse video; however, is approximately ten minutes long. The three people on the eastern bench are talking to each other. Two appear to be young adults, possibly students. The other is an older, bald white male. The student on the east side has his arms crossed. He’s looking ahead. His friend is wearing a blue patterned headband and is talking to Bald Guy. There is another student sitting on the middle bench. He appears to know the other students because he leans to the east and faces the two that are talking. The man that had been in the shelter has left now and is out of the frame. As the frames move forward, the body gestures and postures of the students and bald man are pronounced. Within a minute’s time. Headband Kid and Bald Guy are facing each other. Bald Guy is gesturing with his hands. He appears to be leading the conversation. Middle Bench Student is interested. He rests his elbow on his leg while his hand props up his head as he listens to the conversation. Arm Crossed Student seems left out of the talk and continues to look straight ahead.
Four minutes passed.
A man wearing a workout suit enters the frame and stands just inside the shelter doorway. He looks at the map while his hands are at his waist. He turns around and begins leaning against the door frame as he waits. I wonder why he chooses not to sit inside the shelter. Is he not willing to share a bench with Middle Bench Student?

Five minutes pass.
Workout Suit Man leaves to the west and does not return. Bald Guy and Arm Crossed Student continue their engagement.

Eight minutes pass.
Middle Bench Student stands up, stretches, and walks over to Headband Kid and Bald Guy. He pulls a cigarette out of his jean pocket and lights it. His back is turned towards me, but it appears he is offering a smoke to his friends. His friends don’t take the cigarette, so he stands and smokes by himself.

Twelve minutes pass.
Bald Guy gets up but continues talking. A moment later, Headband Kid stands with his arms crossed and continues with the conversation. Bald Guy walks west and leaves the area. The three kids now are all standing. They leave to the east. I’m not sure why these four people were at the bus shelter. Were they there just to relax and hang out? They never caught any bus. Maybe this shelter is a social hangout place for locals during nice weather. The bus shelter area is now empty.

Eighteen minutes pass.
Two heavy set, white ladies, both smoking, enter from the west. One is wearing a white blouse, the other some red patterned shirt. They head inside the bus shelter. Neither one looks at the map. As they smoke, they stand inside facing the street. They block the shelter’s entryway. I wonder if this will affect other rider’s decisions to wait somewhere else. How will a rider who needs to read the map respond to this human barrier?

Twenty Five minutes pass.
The ladies still block the shelter. Now, there are four new women riders waiting as well. One takes a seat at the farthest bench from the shelter. The other three stand to the east of the shelter. Each lady keeps a public distance from each other, which indicates that they are not friends. One is leaning against the empty bench. Do the other ladies feel that they would intrude upon her space if they sat down on the empty bench?

Thirty minutes pass.
A police car approaches from the west. The older lady who was leaning against the empty bench now decides to walk away and head east. I wonder if the police car influenced her decision to leave. An older woman who was standing, now moves to sit down on the eastern bench which is occupied by another woman. I am surprised to see that the lady did not sit down on the empty bench to the west. The lady who was already sitting there puts her head down and avoids social interaction.

Thirty-two minutes pass.
The bus arrives. The ladies blocking the shelter and three other ladies board the bus. The bus leaves. The lady that was standing furthest east now walks into the bus shelter. She stands there looking through the western glass wall. Periodically she looks at the map. It seems this helps pass the time.

Forty-five minutes pass.
A bus arrives from the west and idles in front of the shelter for about ten minutes. It leaves with the lady on board. The shelter is now empty.

Sixty-five minutes pass.
A white lady with blonde hair carrying a grocery bag in each hand walks west and out of frame. A heavysset black man wearing a Cowboys jersey enters from the west and takes a seat on the far eastern bench. He leans back and put his arms behind his neck to relax as he waits. A skinny yet tall old man walks slowly from the west and sits down on the middle empty bench. Soon after, an overweight white woman with blonde hair and a black shirt sits and joins Cowboy Jersey Man. At first she sits to the far eastern side of the bench. Her head faces west and does not seem to be paying attention to the man. Cowboy Jersey Man turns and talks to her and a conversation develops. Now, the lady moves over a bit and is sits within personal space of Jersey Man. Jersey Man rests his arm on the back rest behind her neck while the two continue talking.

Seventy minutes pass.
Grocery Bag Woman has returned to the shelter. She walks back and forth from one side of the shelter to the other. Maybe she is hesitant to sit next someone else. She repeats this movement until the bus arrives minutes later.

Ninety minutes pass.
A man from the west hops off his bike and leans it against the bike rack. He takes a seat on the middle bench, slouches and waits. Soon after, a young student sits down on the eastern bench. The student and Bicycle Guy begin talking to each other within a social distance. A bus arrives and idles in front of the shelter obscuring my view. The bus is there for over fifteen minutes. The bus driver departs the bus and
heads west. A shift change occurs and a new driver gets inside of the bus. The bus leaves but Bicycle Guy and the student remain talking.

Ninety-six minutes pass. The student stands up and heads east. His backpack is left on the ground next to the bench. An older man approaches from the east and sits in the student’s old spot. He seems oblivious to the backpack that was left behind. The student returns, grabs his backpack and stands in front of Bicycle Guy. The two continue talking until Bicycle Guy leaves and rides his bike off to the west. The student sits in Bicycle Guy’s spot and begins to smoke a cigarette.

One hundred and five minutes pass. Andrew, my understudy, and I have to go to class. We turn off the camera and pack up our gear. As we pack up, we discuss how surprised we are to see the amount of people who come to hang out rather than to catch the buses.
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### March 30, 2009

**Key Concepts:** Proximics, Territoriality, Deviants, Socially Dependent and Independent Individuals, Hang-Out Spots

#### 9:30 am.

The sun is out and the clouds are faint in the sky. The temperature is around 65 degrees. As I sit on the bench to the far right, I feel the warmth of the sun on my neck. The trees sway back and forth from the gusty winds. The strong smell of cigarette smokes is in the air. The smell is sweet and familiar. The middle-age man sitting on the bench to my left is smoking while talking to another man who is sitting next to him. The men appear to be construction workers. They are wearing worker boots and jeans. Sharing my bench is a white mother. She’s quite plain and heavyset. Her little boy is playing on the sidewalk in front of us. He picks up a cigarette butt and traces the contour of a jagged crack on the pavement. His mom is not paying attention to him. She sits, legs crossed, and texts on her cell phone. The boy finishes his amusement with the crack and walks over to the shelter. He enters and begins jumping around on the bench. The mom finally notices her boy and shouts at him to get out. “Not in there, it’s too hot!” she screams. She gets off of the bench and heads toward her son. She stops and sits down at the bench to my left. The boy remains playing inside the shelter.

#### 9:50 am.

A man passing by flicks his finished cigarette on the ground and continues west. Soon afterwards, a bus pulls up and parks in front of the shelter. The mom shouts at the kid to follow her. They board the bus.

#### 10:10 am.

I have to leave now so I can work in studio. My time here today was short. I unfortunately did not observe as many people as I would have liked to.
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### Key Concepts:
- Proximics, Territoriality, Deviants, Socially Dependent and Independent Individuals, Hang-Out Spots

### April 3, 2009

2:15 pm.
I’m sitting here at the 9th and Mass Bus Shelter in the afternoon. At the moment, no other person is waiting here at this bus stop. I have taken a seat on the left side of this wooden bench which is to the right of the bus shelter. A white male, aged 25-30, approaches the bus shelter. He appears to be a student. He’s wearing a backpack and headphones. His focus is not on me but the map inside the shelter. He approaches the inside and looks intently on the route information on the map. After he finds what he was looking for, he stands to the left side of the bus shelter frame. He seems out of place because he is pacing slightly. He heads into the bus shelter and sits on the bench inside. He pulls out a course book and begins studying to pass the time. I wonder if other bus riders who may come later will avoid the bus shelter because he is in it. Will his presence in the small space affect their decision to sit there?

About a minute later, a bald, white male wearing a blue KU football jersey walks by the shelter from the west. Jersey man passes by and doesn’t acknowledge me. He carries a backpack and sits down on an empty bench to my right. He’s very talkative to himself. He looks back and forth, surveying the cars and people passing by. At this point, all seating fixtures are occupied by a person. Each outside bench probably can fit a total of three adults; the shelter bench can sit two. Will future bus riders elect to stand? Or will they sit next to another rider? Will conversation take place? A bus arrives. I check my watch. It is 2:30 in the afternoon. I’ve been here approximately 15 minutes. The bus idles and its exhaust creates a dark plume of smoke which smells foul. The bus leaves 5 minutes later.

2:38 pm.
A bald, stocky, white male wearing khaki shorts and a white tank top sits on my bench. He sits all the way over to the right leaving a small space between us. I look over to him, but his head is down.

He says nothing to me. He appears to want to avoid a social exchange.

2:42 pm.
An older, white woman, maybe 65, with gray hair covered with a tan baseball cap walks by me carrying two white plastic shopping bags. As she passes me, I immediately recognize her as my downstairs apartment neighbor. She’s a very sweet woman who lives alone. I’m surprised to see her here at the bus stop. She owns a car, but I always see her riding her bike to stores. She doesn’t see me right away. She heads east to the furthest bench with jersey man who still is sitting there. Jersey man says something to her. She smiles and talks back and has a seat next to his right. The two are talking a lot. It appears that they know each other. I look at her and she recognizes me. She waves and smiles but doesn’t say anything. She continues talking to jersey man. Soon their conversation ends. My neighbor pulls a magazine out of her bag and reads it. Jersey man is again looking around at the street.

2:48 pm.
The meter maid whom I’ve seen ticketing cars across the street, now approaches the bus shelter. She heads east passing me and says hello to John, the man sitting next to me. She passes jersey man and she asks how he’s been and heads down the street. Now I’ve learn that John and jersey man are regular riders at this stop. John didn’t decide to sit next to jersey man when he arrived. I wonder if John knows jersey man. They haven’t acknowledged each other at all. Maybe John’s just not as social.

2:50 pm.
A bus arrives from the west. Its front sign indicates that it is the South Iowa bus. John, studying guy, and my neighbor get up and catch the bus. Neither one says goodbye to me; however, my neighbor says goodbye to jersey man. While the bus is parked here, a raggedy man wearing dirty and worn clothes with a cigarette in his hand approaches from the east. He stops at jersey man and says something. Raggedy man continues talking to jersey man but jersey man puts his head down and is not saying anything back. Raggedy man heads towards me. I feel awkward and am not willing to start a conversation. I pick up my notebook and read my notes. Raggedy man ignores me but mumbles out loud and heads west past the bus shelter.

2:55 pm.
A white male in his mid twenties enters from the west. He probably works out a lot. He’s very built, wearing work-out clothes, running shoes and ear buds. He briefly enters the bus shelter but doesn’t sit down. He confidently looks at the map and then backs out. He stands to the left of the shelter listening to his music. I am wondering why the inside of the bus shelter is not attracting many people. The weather is nice, partly cloudy. But it is a bit cold. I would think the bus shelter would provide a barrier to the strong winds. Is the condition of the shelter a factor? It looks untidy from where I am sitting. The glass walls are smeared with dirt and smudge. Trash is scattered around as well.

3:08 pm.
A Haskell Indian Nations University bus approaches from the west. It stops at the shelter before this one. Jersey man leaves his spot and heads down to the bus. Halfway there, he looks back at his bench and checks his backpack. He left it there but obviously plans on coming back to get it. He’s quite trusting of me. I guess I don’t appear to be a thief to him. He approaches the bus and climbs up the bus steps. He is halfway inside, but I can see that he is just talking to the bus driver. A couple of minutes later the bus leaves and jersey man heads back toward his seat. I was waiting for him to say something to me. Maybe “Hey, thanks for not taking my bag” or “Thanks for watching my stuff,” but he passes me without saying anything. I wonder why he doesn’t say anything to me. Maybe he only talks to regular riders?

3:15 pm.
I notice the winds getting stronger. I am getting colder. Jersey man puts on his coat. At what point will people use the shelter? Will the winds cause people to seek refuge?

3:20 pm.
An older African American woman, probably in her mid 50’s, walks out from Z’s Coffee House. She has a coffee cup in her hand. I see her cough and she crosses the street and approaches the shelter. She enters the shelter, sits on the right side of the bench where the glass wall is. She never looks at the map which tells me she knows the route times. She’s probably a frequent rider. She immediately takes out her cell phone from her purse, flips it open and wipes the screen on her pant leg twice. She looks quickly at the screen and then folds her phone. It appears that she was checking the time. She sips her coffee and waits.

3:27 pm. A white male, mid 40’s with a beard and glasses comes by and sits on my bench to my right. He avoids eye contact. He seems very reserved. His arms are crossed and he just stares straight ahead.

3:30 pm.
The coffee lady in the shelter gets up and heads to the west bus shelter. There a bus is parked. She gets on. Maybe she chose to wait in this shelter because she was cold, or maybe she was sick and needed to be protected from the winds.

3:35 pm.
The Downtown bus arrives at the bus shelter. Jersey man, work-out guy, and reserved guy all get on. I’m alone again. I wait ten more minutes. No other riders come by. I am cold and decide to leave.
<table>
<thead>
<tr>
<th>Procedure Details</th>
<th>Methods of Generation</th>
<th>Frameworks (frameworks)</th>
<th>Representation - Represent synthesis of ideas</th>
</tr>
</thead>
</table>
| **Situation** - creating ideas to understand the interaction between the individual, object, and environment | &gt;Informal Interviewing  
&gt;Participant Observations | &gt;E. Hall Behavior Settings  
&gt;I. Altman Crowding and Personal Space | &gt;Written Ethnographic Journals |
| **Location**  
&gt; 9th and Massachusetts Bus Shelter  
Users  
&gt; People waiting at the bus shelter | | | |
| **Object**  
&gt;Bus Shelter  
&gt;Map  
&gt;Benches  
&gt;Other people | | | |
| **Interface**  
&gt;The Interaction between the user and other objects | | | |
| **Tasks**  
1. To learn about proximics and use of socio petal/fugal spaces  
2. To identify behavior user types  
3. To understand territoriality | | | |

April 4, 2009  
**Key Concepts:** Proximics, Territoriality, Deviants, Socially Dependent and Independent Individuals, Hang-Out Spots

Saturday, 11:30 am.

It's very windy today. The winds are even stronger than yesterday. The sky is overcast. Rain is expected throughout the day. The forecast says 70 degrees. I don't believe it. It feels around 50 degrees outside. I sit on the wooden bench to the immediate right of the bus shelter. I sit on the left side of the bench allowing for other riders to join me. I hope it rains. I would like to observe how rain affects the behavior of the riders waiting at this stop. If it rains, will the riders crowd together inside the small shelter? Will crowding cause discomfort? Sitting on the bench to my right is an older man in a camouflage jacket. His legs are crossed while he waits.

11:40 am.
The Prairie Park bus arrives and Camouflage Man gets on. A couple minutes later three people approach from the west. Two white men and a female, probably in their early 20s, head into the shelter. The two guys light up cigarettes and begin smoking inside the shelter. The girl is clinging to the guy with a tattoo on his neck and buzzed hair. The three appear to be close friends. Tattoo Guy and girl are probably a couple. Both of them are leaning against the glass feeling each other. The single guy is standing with one leg perched on the bench. He hacks spit out the shelter opening. I'm wondering if their crude behavior will deter riders from entering the shelter. As I watch them, I grow even colder. I don't have a jacket. I really want to go into the shelter. I feel that I would be invading their territory if I did. I stay on the bench.

11:46 am.
A bus arrives at the west stop. The three kids leave the shelter and board the bus. I get up and head into the shelter for warmth. As I get inside, I immediately feel a bit dirty. The cigarette smoke strongly lingers inside. The floor is littered with dirt, cigarette butts, and trash. I see wet spit by the door. The left side of the bench has remnants of graffiti. I sit all the way to the right away from the doorway. The wind still penetrates but not as bad. However, my ankles are getting blasted by the cold air that comes in from the four inch gap between the ground and metal frame.

11:50 am.
A stocky, mid 40s African American woman approaches from the west and sits down at the farthest bench to my right. She talks on her cell phone while she waits. Did my presence inside the bus
11:55 am.
Two teenage Asian girls come from the west. In their hands are bags of leftovers. They walk past me and stand by the bench to my right. One girl with blue nail polish examines the top of the bench and seems concerned. She wipes something off with her hand. Now satisfied, they both sit down and begin talking.

12:05 pm.
A KU bus arrives. Everybody gets on. I am alone now. I am really bothered by the cold air, the cigarette smell, the cold bench chilling my bottom, and the uncomfortable metal back rest. I wait another five minutes before I leave to go home. I was discouraged that the rain never came.
Goal: To Understand the Current System

Policy C: Identifying Opportunities and User Needs

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

PERT Chart
Goal: To Understand the Current System
Policy C Identifying Opportunities and User Needs Requirements

Objective 1C: User Needs

Policy c:

Interview and observe riders using the system.
Research survey data from City reports.
Create a user needs cluster matrix and then generate categories of design requirements.
**Project Goal:** To Understand the Current System

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

**Objective 1C:** USER NEEDS. To generate a needs cluster 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.

<table>
<thead>
<tr>
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| >Eric | >Riders / Non-riders, and Staff of the Transit System | >Methods
>Observation
>Interviewing
>Research
>Grounded Theory | >Techniques
>Non-participant Observation
>Informal Interviewing
>Reviews of City Transit Surveys
>Coding and Categorizing
>Sampling | >Illustrations
>Relation Matrices
>Needs Cluster Matrix
>Planning Chart
>paper
>Illustration software |

>Tools
>Internet
>City reports and Surveys

### <Summary

**What I want to determine:**
>How do the stakeholders feel about the current system?
>What suggestions to they propose?
>What design requirements will form from analyzing user needs?

### What I learned:

**User Needs**

Riders of the system are concerned with: the conditions of the Bus Shelter Environments, the difficulty of using the route map, the coverage of the routes, the long travel times and limited frequency, the lack of accessibility of the signage and the shelters, and the number of covered stops.

1. Bus Shelter Environments: Riders and nonriders have voiced concern that the shelter environment is in poor condition. The trash flows inside, people smoke inside, the benches are small and...
uncomfortable, the lighting at night is limited and broken glass walls are often found because many people go around shooting them out with BB guns. During the winter or summer extreme temperatures, the inside can be very cold, or very hot. In some shelters, maps are torn or missing.

2. Poor Map Design: The route map has been described as a disaster. Many seem to avoid its complications. The information is illegible and unreadable. The process of route planning is disorganized and confusing. The font size is very small and is hard to read for those with poor vision. Calculating route times is a challenging task as well as planning transfers.

3. Route Coverage: Riders and nonriders are concerned with limited coverage of the route system. Many riders feel that the buses do not come close to their location. Those that live in West Lawrence feel cut off from the other sides of the city. Shoppers would prefer to have a direct North/South route that can stop along Iowa street.

4. Frequency of buses: Some routes can take over an hour and is deterring ridership. Not only can travel time be long, but waiting for a bus to arrive can be over 30 minutes. People are interested in increasing the frequency of buses - some suggest to do so on main routes. Others have proposed that buses should adhere to the school start and dismissal times - especially on route 6 that goes to Free State High School.

5. Accessibility: The shelters are not accessible for the visually impaired. There isn’t any Braille or audio feedback to inform bus routes or approaching buses. The map is not designed for color vision impairments. The shelters are also not accessible to over-sized wheel chair users. The wheel chair cannot turn around and when it enters the shelter, it blocks the only exit.

6. More Shelters. A very common request is to have more covered stops along the routes. Inclement weather makes waiting for a bus a challenge.

User Needs Cluster
The suggestions were categorized into design requirements.
1. To create a map that is usable. This will address usability standards including readability and legibility.
2. To improve the coverage and frequency of the routes. I will explore new routes with new coverage and times.
3. To improve the bus shelter environments. This would address safety, comfort, signage, accessibility, and feedback.

Strategic Planning
The research of my thesis will involve Numbers 1 and 2 Design Requirements. These goals can be worked on simultaneously. The 3rd goal would be transitioned into during a later phase. Originally, my thesis was to focus on Goal number 3. However, I underestimated the importance of wayfinding early on. Now I continue to focus on map usability.
User Needs and Suggestions

A Sample:

1. Add shelters for city bus stops or off campus KU bus stops
2. My concern is adequate lighting for safety purposes.
3. Of course, if money were no object, every stop should have a bench.
4. I'd like to see a companion stop to the Bob Billings/Lawrence Ave stop.
5. Bus stops are not lit and are tiny.
6. A direct route from North to South Iowa.
7. Very confusing bus map. I feel like a cartographer when I try and read it.
8. There is a shortage of North and South routes.
9. Need to connect SW Lawrence (Clinton Prky and Wakarusa) to Park and Ride.
10. More shelters with maps would be nice.
11. Benches! Could be a public art program.
12. Not all stops have booths.
13. I need a place to sit while waiting.
14. Travel times to my work take too long.
15. More shelters in North Lawrence.
16. Increase frequency on major routes.
17. There should be strategically placed hubs around the University.
18. Routes are not predictable for new riders.
19. The map and bus signs are really confusing.
20. Increase the frequency of routes during school hours.
22. Headways should be reduced to 30 minutes.
23. The stops are not accessible to blind people.
24. Trash is always in the shelter.
25. I heater would be nice in the winter.
26. Broken glass is dangerous.
27. I had to make my own map to understand the routes.
28. Not enough shelters and they need to be bigger.
29. Waiting times need to be less.
30. Shelters could have improved lighting and comfort.
User Needs and Suggestions

A Sample:

1. Add shelters for city bus stops or off campus KU bus stops.
2. My concern is adequate lighting for safety purposes.
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User Needs and Suggestions

Coding
- more shelters
- lighting, safety
- seating
- more stops
- lighting, comfort
- improved route
- improved map
- improved route
- improved route
- more shelters
- seating
- more shelters
- seating
- frequency
- more shelters
- frequency
- transfer points
- improved route
- improved map, signs
- frequency
- improved route
- frequency
- accessibility
- cleanliness
- comfort
- safety
- improved map
- shelters, comfort
- frequency
- lighting, comfort

Categories
- More Shelters
- More Seating
- Improved Lighting
- Safety
- Improved Routes
- Improved Maps
- Improved Frequency
- Added Hubs
- Improved Cleanliness
- Accessibility

Refined Categories
- More Shelters
- Improved Shelter Environment
- Safety
- Improved Coverage
- Improved Map Design
- Improved Frequency
- Accessibility
### Needs Cluster Matrix

<table>
<thead>
<tr>
<th></th>
<th>Accessibility</th>
<th>Environment</th>
<th>Map Design</th>
<th>Coverage</th>
<th>Frequency</th>
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<tbody>
<tr>
<td>More Shelters</td>
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<td>Improved Frequency</td>
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<td>Improved Coverage</td>
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<tr>
<td>Improved Map Design</td>
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<tr>
<td>Improved Shelter Environment</td>
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</table>

- **Strong Relationship**
- **Weak Relationship**

E. Berkman
Design Requirements

1. To Create a Map that is Usable
2. To Improve the Bus Shelter Environments
3. To Improve the Coverage and Frequency of the Routes
Strategic Planning

Current Plan
- To Create a Map that is Usable
- To Improve the Coverage and Frequency of the Routes

Future Plan
- To Improve the Bus Shelter Environments

August 2008 - June 2009

Unscheduled
Design Process
Goal: To Improve the User Experience of the Bus System

1. Research Current System
2. New Route Stops
3. New Travel Times / Transfers
4. Map Design

Test

PERT Chart

E. Berkman
Goal: To Improve the User Experience of the Bus System

Policy A: Improving the Route System

1. Research Current System
2. New Route Stops
3. New Travel Times / Transfers
4. Test
5. Map Design

PERT Chart
Goal: To Improve the User Experience of the Bus System

Policy A: Improving the Route System

Objective 1A: Route Coverage

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.
# Project 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 iteration process.

<table>
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<tbody>
<tr>
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<td>Riders / Non-riders, and Staff of the Transit System</td>
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<td>- what are users Doing, Saying, and Making within the situation.</td>
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<td>&gt; Illustrations</td>
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<td>&gt; paper</td>
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</tbody>
</table>

**Methods**
- Sequential Analysis
- Comparisons
- Research
- Participatory Design

**Techniques**
- Think alouds
- Walkthroughs

**Tools**
- Internet
- City reports and Surveys
- City map
- Compass

**<Summary>**

**What I want to determine:**
- How can I design a system that has complete coverage with no more than 1 transfer?
- Can I reduce travel times to under an hour?
- How can I place transfer locations to maximize travel efficiency?
- How can I maximize the frequency of buses to reduce headway?
What I learned:
Priority Stops:
Combining my research from the City of Lawrence Transit Survey Reports and interviewing, I generated a list of the most requested and used bus stops. They are the following:
1. Downtown
2. KU Union
3. High Schools
4. Hospital
5. South Iowa (Wal-Mart)
6. I-70 Business Center
7. HINU
8. 23rd and Louisiana (Checkers)
9. Prairie Park Nature Center
10. Library
11. Visitor Center
12. 6th and Wakarusa
13. West Campus

I then researched the relationship between each stop. Do they need to be on the same route? Is a transfer acceptable? I put each stop in scenarios, and along with user feedback, I generated a priority relationship matrix based on the findings.

The map evolved with each iteration. I tested the map with users and nonusers in the field.
Significant improvements:
1. The new map connects the major stops in 1 or fewer transfers.
2. The downtown Westbound shelter is no longer used. The Library and 9th and Mass. Street Bus stop will be the main hubs.
3. A North/South Route on Iowa allows riders to have access to the numerous business and shops.
4. West Lawrence now is represented with routes going along Kasold and Wakarusa.
5. 8 routes are used. No increase in buses needed – in this phase.
6. The hospital has more route connections.

See New Routes in Appendix for individual route details.
### Procedure Details

<table>
<thead>
<tr>
<th>Situation</th>
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</tbody>
</table>

#### Users

- Riders and Drivers of the Bus System

#### Activity

Understanding the relationship between the routes and their priority stops. The information is derived from talking to users of the system.

### Task 1

**Priority Transfer Matrix**

The Priority Route Transfer Matrix is used to generate a visual representation of the relationships between the priority level and the route stop. Each location was evaluated with each other to determine a level of connection or priority to be on the same route. A relationship value of 1 was assigned if the two stops had a strong connection to be on the same route. A value of 2 was assigned if the two stops had a connection to be on the same route, but a direct, express travel time may not be necessary. A value of 3 was assigned if the two stops had a weaker connection. These stops are not required to be on the same route. A bus transfer may be necessary to travel to them.

This information will be used to generate a non-planar graph that shows these connections topologically which will then be used to generate paths on a map.

### Relationship Matrix Diagram

![Relationship Matrix Diagram](image-url)
The information represented in the Priority Route Matrix is now converted into a nonplanar graph. The nonplanar graph is used to show how the nodes (stops) are related to each other in space using connecting links or paths. The varying characteristic of each link represents the strength of the relationship between each stop. A dark blue, weighted line connects stops that have a direct route relationship, or number 1, from the matrix. The green dashed line is used to connect stops that have a number 2 priority, or a relationship requiring the stops to be on the same route. The thin gray line is used to connect stops that have a priority 3 relationship, or the possibility of using a transfer to connect routes. For example, West Campus and KU Union are connected by a blue, priority 1 level, line. That means that these two stops will be on the same bus route in a fairly direct path.

The locations of the nodes on this graph are placed according to their position on the map of Lawrence.

The next step is to create routes from these links. The links can become, flexible and dynamic to create the paths of routes along the streets of Lawrence.
<table>
<thead>
<tr>
<th>Procedure Details</th>
<th>Task 3 Individual Stop with Priority Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation</strong> – creating ideas to understand the interaction between the individual, object, and environment</td>
<td><strong>Evaluation (frameworks)</strong> – what are users Doing, Saying, and Making within the situation.</td>
</tr>
<tr>
<td>Users &gt;Riders and Drivers of the Bus System &gt;Activity Understanding the relationship between the routes and their priority stops and acceptable transfers. This information is used in developing the new route system.</td>
<td><strong>Representation</strong> – Represent synthesis of ideas</td>
</tr>
</tbody>
</table>

The information represented in the Priority Route Matrix as well as the nonplanar graph is used to represent each specific stop in detail. This representation shows how each stop is related to HINU based on the level of priority. This particular example shows that HINU and Checkers must be on a direct route. However, the visitor center, west campus, hospital, 6th and Wakarusa and Free State High School may not be on the same route and a transfer could be used. All stops details are presented in the appendix.
### Task 4
Route Layouts based on Priority

<table>
<thead>
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<td>- Represent synthesis of ideas</td>
</tr>
</tbody>
</table>
| Users  
> Riders and Drivers of the Bus System  
> Activity  
Creating route layouts from nonplanar graphs. | | |

The information from the nonplanar graph is overlaid with the map of Lawrence. The paths connecting the stops have begun to transform into routes that follow the directions of the main streets. The priority relationships remain intact. The new routes will be tested in a matrix against the initial priority goals as well as by users of the system.
<table>
<thead>
<tr>
<th>Procedure Details</th>
<th>Task 5</th>
<th>Route Layout Early Versions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Situation</strong></td>
<td><strong>Evaluation (frameworks)</strong> – what are users Doing, Saying, and Making within the situation.</td>
<td><strong>Representation</strong> - Represent synthesis of ideas</td>
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<td>Creating ideas to understand the interaction between the individual, object, and environment</td>
<td>Preliminary Route Layouts early versions 1-5</td>
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</tr>
<tr>
<td>Users</td>
<td>Users</td>
<td></td>
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<tr>
<td>‣ Riders and Drivers of the Bus System</td>
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<td></td>
</tr>
<tr>
<td>‣ Activity</td>
<td>Activity</td>
<td></td>
</tr>
<tr>
<td>Creating route layouts from testing and feedback.</td>
<td>Creating route layouts from testing and feedback.</td>
<td></td>
</tr>
</tbody>
</table>

Through an iterative process of user feedback and testing against the relationship matrices, versions of the city map became further refined. This is an early version of the Bus Route Map. More testing followed.
### Task 6
Priority Transfer Matrix tested with Map v.1-5

<table>
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<th>Representation</th>
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<td>what are users Doing, Saying, and Making within the situation.</td>
<td>Represent synthesis of ideas</td>
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</table>

- **Users**
  - Riders and Drivers of the Bus System
- **Activity**
  - Understanding the relationship between the routes and their priority stops.
  - The information is tested against a version of an improved route design.

---

The Priority Route Transfer Matrix here has been tested against initial versions (1-5) of the new route map design. The matrix is representing the route priority goals with the actual designed routes. If the goals match for each stop, the cell is colored green. If a Route Priority Connection strengthens with the new route (from 3 to 2, or 2 to 1, or 3 to 1), the goal is improved. Its cell is shaded blue. If there was a weaker change, the goal was unachieved (1 to 2, 2 to 3, 1 to 3). The cell is shaded red.

This version of the map had 63% of its goals achieved, 30% were improved, and 7% were not met.

I was concerned by the lack of direct connections on routes along 23rd Street running East and West, even though they weren’t required to be on the same route. Route restructuring needed to follow.
<table>
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<td><strong>Situation</strong></td>
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<tr>
<td>- creating ideas to understand the interaction between the individual, object, and environment</td>
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</tbody>
</table>

| **Evaluation (frameworks)** |
| - what are users Doing, Saying, and Making within the situation. |

| **Representation** |
| - Represent synthesis of ideas |

Through an iterative process of user feedback and testing against the relationship matrices, versions of the city map became further refined. This is an advanced version of the Bus Route Map. Refinements to the North/South and East/West main routes were made.
<table>
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</tr>
<tr>
<td><strong>Users</strong></td>
<td><strong>Users</strong> &gt;Riders and Drivers of the Bus System &gt;Activity Understanding the relationship between the routes and their priority stops. The information is tested against a version of an improved route design.</td>
<td></td>
</tr>
</tbody>
</table>

**Relationship Matrix Diagram**

The Priority Route Transfer Matrix here has been tested against a version of the new route map design. The matrix is representing the route priority goals with the actual designed routes. If the goals match for each stop, the cell is colored green. If a Route Priority Connection strengthens with the new route (from 3 to 2, or 2 to 1, or 3 to 1), the goal is improved. Its cell is shaded blue. If there was a weaker change, the goal was unachieved (1 to 2, 2 to 3, 1 to 3). The cell is shaded red.

This version of the map had 64% of its goals achieved, 34% were improved, and 2% were not met. This information will be used in the final route planning design.
Goal: To Improve the User Experience of the Bus System
Policy A: Improving the Route System

Objective 2A: Route Convenience

Policy b:
Conduct travel time and frequency studies along the routes.
Determine the strategic placement of transfer hubs along the routes.
Tasks 1,2

1. User Needs Matrix
2. Strategic Planning

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

**Policy A: Improving the Route System**
- **Objective 2A:** CONVENIENCE. To design a route system with improved transfers and travel times.
- **Policy b:** Conduct travel time and frequency studies along the routes. Determine strategic placements of transfer hubs along the routes.

<table>
<thead>
<tr>
<th>Team</th>
<th>User Types</th>
<th>Situation</th>
<th>Evaluation (frameworks)</th>
<th>Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric</td>
<td>&gt;Riders / Non-riders,</td>
<td>- creating ideas to understand the interaction between the individual, object, and environment</td>
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<td>- Represent synthesis of ideas</td>
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<td>and Staff of the Transit System</td>
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</tbody>
</table>

<Summary>

**What I want to determine:**
- >How do the stakeholders feel about the current system?
- >What suggestions do they propose?
- >What design requirements will form from analyzing user needs?

**What I learned:**
User Needs
Riders of the system are concerned with: the conditions of the Bus Shelter Environments, the difficulty of using the route map, the coverage of the routes, the long travel times and limited...
### Task 1
Current Systems Transfer Matrix

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>creating ideas to understand the interaction between the individual, object, and environment</td>
<td>what are users Doing, Saying, and Making within the situation.</td>
<td>Represent synthesis of ideas</td>
</tr>
</tbody>
</table>

**Users**
- Riders and Drivers of the Bus System
- Activity
  - Understanding the relationship between the current route stop transfers and travel times.
  - The information is derived from using the current Lawrence Transit Map.

The Current Route Systems Matrix was used to generate a visual representation of the relationships between route transfers and the total travel time for each bus stop. The matrix diagram is organized by relating the From Stops to the Destination Stops. The total number of transfers and travel times for each were recorded. That data was collected by using the current 2008 Lawrence Transit Map.

The matrix shows that the number of transfers to travel around Lawrence is from 0-2 per trip. Total trip times range from 2 minutes to 88 minutes. Riders have shown concern over numerous transfers and lengthy trips.

My next step is to improve the transfer and travel times by decreasing them without sacrificing coverage. I will examine which stops should have direct routes and which ones can have acceptable transfers.
### Procedure Details

<table>
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<tbody>
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<td>- Represent synthesis of ideas</td>
</tr>
</tbody>
</table>

**Users**
- Riders and Drivers of the Bus System
- Activity
  Comparing the current system’s transfers to the proposed plan.

---

#### Task 1

**Current Systems Transfer Matrix**

This representation compares the current transfer system to the proposed plan. The total number of transfers for each stop is displayed. In this example, the stop of origin analyzed is the Visitor Center. All stops can be traveled from the visitor center - though some stops require transfers. The Blue Line indicates that these stops can be traveled to on the same route from the visitor center. The Yellow Line indicates 1 transfer is required from the visitor center. The Red Line indicates that 2 transfers are needed to travel to that stop from the visitor center.

In the current system, Downtown, I-70 Business Center and the Library are all on the same route. However, every remaining stop on the yellow and ride lines indicate a transfer is required. In the current system, it takes two transfers to travel to East Hills Business Park from the Visitor Center. In the proposed plan, all stops can be traveled to from the visitor center in 1 or less transfers.

All stops were analyzed. The remaining representations of these stops can be found in the appendix.
### Proposed System Transfer Matrix

**Total Transfers**

<table>
<thead>
<tr>
<th>Destination</th>
<th>Downtown</th>
<th>KU Union</th>
<th>HINU</th>
<th>East Hills Business</th>
<th>Lawrence H.S.</th>
<th>I-70 Business</th>
<th>Free State H.S.</th>
<th>Library</th>
<th>Wal-Mart</th>
<th>6th Wakarusa</th>
<th>Nature Center</th>
<th>Hospital</th>
<th>West Campus</th>
<th>Visitor Center</th>
<th>Checkers</th>
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<tr>
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<table>
<thead>
<tr>
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<th>No Change</th>
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<tr>
<td></td>
<td>65%</td>
<td>127/196</td>
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</table>
Goal: To Improve the User Experience of the Bus System

Policy B: Improving the Usability of the Route Map

1. Research Current System
2. New Route Stops
3. New Travel Times / Transfers
4. Map Design

PERT Chart
Goal: To Improve the User Experience of the Bus System
Policy B: Improving the Usability of the Route Map

Objective 1B: Wayfinding

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 route map.
Project Goal: To Improve the User Experience of the Bus System

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 users’ knowledge of the environment against their current position while using the map.

Team
> Eric
> Andrew
> Rebecca
> Ilka

User Types
> Ages 15 and up
> English Speaking
> No other constraints

Situation - creating ideas to understand the interaction between the individual, object, and environment

Evaluation (frameworks) – what are users Doing, Saying, and Making within the situation.

> Lynch Environmental Psychology
> Others?

Representation - Represent synthesis of ideas

> Audience: Team

> Prototyping
> Illustrations
> Task analysis
> Scenario

> Procedural and behavior prototypes
> Low fidelity maps

> Paper
> Foam core
> Markers
> Illustration software
> Flow chart

<Summary>

What we want to determine:
> Will individual mental models and prior knowledge of map reading conflict with a correctly orientated map positioned in the environment?
> Will prompts (landmarks, nodes, paths, districts, edges) be used to identify a person’s position in the environment?
> How do individuals understand their position (“You are here”) on a map?
> What will determine to have individuals correctly identify their location on a map?

What we learned:

EAST
People Look for recognizable street names and intersections to identify their location on the map. Most shown no difficulty with the East Orientation because it is correctly positioned.
NORTH
An incorrect North orientated map Increased time and number of attempts. Common error is to position the arrow up. More time spent visualizing mental models and comparing to the map. Increased Frustration.

SOUTH
Experienced Users were able to locate their general position based on path and node knowledge. But finding the direction they were facing influenced their gesturing. Tilting heads and pointing were noticed. Inexperienced users assumed map was North Orientated and struggled.

WEST
Experienced Users locate intersections quickly, though many are still thinking the map is East Orientated because of the direction it is facing.

EAST with LANDMARK
The East orientated map was very easy to these users. Users familiar with the area relied mostly on their knowledge of paths and nodes. But to some the landmark provided additional prompting to correctly orient the marker.

NEW ROUTE MAP
The new route map was successful. The user preferred to have the map’s orientation reflect her position in the environment.

ANGLE Testing
The user found an angle of 45 degrees most desirable. She still preferred to look the map at 90 degrees perpendicular to the ground. She felt that the map at a 45 degree angle would be better suited for people unfamiliar with where they were standing.
### Procedure Details

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<td>Represent synthesis of ideas</td>
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</table>

#### Location
- > 9th Street between Mass and New Hampshire

#### Users
- > Walkers passing by (6 testers)

#### Object
- > Map Stand facing East
- > Map Orientation Used: EAST

#### Interface
- > The Interaction between the display of the map and the control of the marker

#### Tasks
- > To locate their actual position on the map
- > To position the arrow to the direction their facing in the environment

<table>
<thead>
<tr>
<th>Lynch Wayfinding Model</th>
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<tbody>
<tr>
<td>Check list</td>
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<tr>
<td>&gt; Paths</td>
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<tr>
<td>&gt; Nodes</td>
</tr>
<tr>
<td>&gt; Landmarks</td>
</tr>
<tr>
<td>&gt; Districts</td>
</tr>
<tr>
<td>&gt; Edges</td>
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</tbody>
</table>

All Subjects were timed to locate their position.

See Excel Sheet for results.

---

Rachel and I set up the map stand between Massachusetts and New Hampshire street on 9th Street. Specifically, we were on the west end of Z’s Coffee shop on the North side of 9th street. The map stand was placed facing East. The map stand remained facing this direction throughout the entire test. The test began using the East orientated map. **We asked testers to 1) find their location on the map, and 2) position the arrow on the magnet to face the direction in which they were facing.** Each test was timed. The timer began when the tester faced the map, and stopped when they correctly placed the magnet on the map, or when they gave up. The testers were randomly selected off the streets. Those that participated received a coupon for $1.50 off at Z’s Coffee Shop. The time was approximately 3:00pm. We tested until 4:30 pm. The day was Monday. We tested 6 people with the East orientated map. The entire procedure was photographed - shots were timed at 2 second intervals.

**Subject 1.** The first tester was Maryam M. A colleague and friend whom we’ve known from a previous class. She was sitting in the coffee shop working and was happy to help us out. Maryam is a PHD student at KU who is 26 years old. She is from Iran studying Engineering and AI Systems. When Maryam approached the stand, she was quite disoriented. The map was East orientated and faced East. Maryam looks backwards to identify where Mass Street is. She seems confused and hesitates to put the marker on the board. She looks to the South and identifies she is next to 9th street. She mistakenly puts the marker between Mass and Vermont which is one block to the West of where she really is. I prompted her by asking her if she was sure. She realizes that she was wrong and puts her head down upset. She then identifies that New Hampshire is directly in front of her and she then places the marker on the correct spot. Total Time: 43 seconds.

**Subject 2.** Next, A white male aged between 40-45 years is tested. He looks immediately for Mass. Street on map. Next identifies 9th Street and where they intersect on the map. Faces the arrow in West direction. I prompted him to consider his choice. He quickly fixes the arrow to facing East. It took him a total of 2 attempts. His total time 9.8 seconds.

**Subject 3.** Next tester was a boy student aged from 15-17 years old. He was texting on a cell phone when he approached the stand. He seemed more concerned with the phone than attention to the map. I believe he rushed his choice because of his divided attention. He immediately puts the marker in the center of the map on Mass. Street. Seems automatic response. I prompted him to think again. He looks behind him to identify street. Next he looks in front to identify street. Finally he correctly positions the marker. It took him two attempts. Total time 25.8 seconds.

**Subject 4.** Next tester is a female student. She is white aged between 21-25 years. She is quick to place marker. Her eyes are looking at the center area of the map. She processes streets and intersections internally. She immediately puts the marker in the correct position. It took one attempt. Her total time was 8.2 seconds.

**Subject 5.** Next tester was a white female aged 30-35. She looks on the map for New Hampshire and Mass. Streets. She is able to locate 9th street on the map. She places the marker correctly, but
Subject 5. Continued
reconsider. She changes the marker and correctly faces it to the East. It took her two attempts. Her total time was 15.2 seconds.

Subject 6. The last tester was a white male aged between 25 and 30 years. He immediately points to 9th street on the map. Next he looks for Mass. Street and New Hampshire Streets on map. Correctly places marker on map. It took him 1 attempt. His total time was 13 seconds.
<table>
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<tr>
<td><strong>Location</strong></td>
<td>Lynch Wayfinding Model</td>
<td><strong>Task 2</strong>&lt;br&gt;Testing Orientation: NORTH</td>
</tr>
<tr>
<td>&gt; 9th Street between Mass and New Hampshire</td>
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<td>Users</td>
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<td>&gt; Walkers passing by (8 testers)</td>
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<td>Object</td>
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<td>&gt; Map Stand facing East</td>
<td>&gt; Districts</td>
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<td>&gt; Edges</td>
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<td>Interface</td>
<td>All Subjects were timed to locate their position</td>
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<td>&gt; The interaction between the display of the map and the control of the marker</td>
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<tr>
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Rachel and I set up the map stand between Massachusetts and New Hampshire street on 9th Street. Specifically, we were on the west end of Z’s Coffee shop on the North side of 9th street. The map stand was placed facing East. The map stand remained facing this direction throughout the entire test. This test began using the North orientated map. **We asked testers to 1) find their location on the map, and 2) position the arrow on the magnet to face the direction in which they were facing.** Each test was timed. The timer began when the tester faced the map, and stopped when they correctly placed the magnet on the map, or when they gave up. The testers were randomly selected off the streets. Those that participated received a coupon for $1.50 off at Z’s Coffee Shop. The time was approximately 1:00 pm. We tested until 2 pm. The day was Friday. We tested 8 people with the North orientated map. The entire procedure was photographed - shots were timed at 2 second intervals.

**Subject 7.** The first tester was a white female student aged between 25-30 years old. She looks at the center of the map. She easily identifies the location surrounding 9th and Mass and New Hampshire Streets on map because she is familiar with the area. She then correctly places marker. It took her 1 attempt. Total Time: 8 seconds.

**Subject 8.** Next, a white female student aged between 18-21 years is tested. She looks at the center of map and sees Mass and 9th Streets. She places marker correctly, but the arrow is pointing up or (east). I prompt her to reconsider and she turns the arrow pointing down (West). I prompt her again and she moves the arrow correctly pointing East (right). It took her 3 attempts. Her total time was 29 seconds.

**Subject 9.** Next tester was a man aged between 40-45 years old. He scans left to right the cross streets on the map. Looks down and sees 9th street on map. Places the marker incorrectly on the intersection of New Hampshire and 9th Streets. The marker faces up (North). *He leaves without fixing it. He probably faces up because he’s prior knowledge assumes that the direction he faces is up. Total time it took him was 24.5 seconds.

**Subject 10.** Next tester is a female student. She is white, aged between 25-30 years. She looks at the top of the map to see the cross street. She looks at the marker in her hand and positions the arrow to face up (North). Next, she finds Mass Street and retracts her hand before she was about to place it on the map. She turns the marker to face down (south) and then places the marker on the intersection of 9th and Mass. Streets. I prompt her to reconsider. She looks to face 9th Street in environment. Moves the marker up and down Mass Street while she thinks. Become frustrated and confused. Needs direct instruction and prompting. I end up showing her the correctly position. She feels deflated. She attempted 7 times. Her total time was 75 seconds.
Subject 11. Next tester was a white female aged 30-35. Stares at the bottom left corner of the map. Finds 9th Street. Attempts to place marker below (South) 9th street and to the right (East) of Kentucky. The marker falls to the ground because of no magnetic attraction in that spot. Attempts the same spot again. I prompt her. She points to Vermont and 9th Street. Points then at Mass and 9th Streets. Places marker between Mass street and Vermont on North side of 9th Street. The arrow points up (north) The magnet sticks. She responds by celebrating with her hands up. I prompt her to reconsider. She quickly gets frustrated and turns the marker facing down (south) without really thinking. I prompt her again. She still assumes she’s at the intersection of 9th and Mass. She looks at 9th street in the environment and turns the arrow to the right (east). More prompting to suggest what two streets she really is standing between. She correctly positions it and celebrates again. She attempted 7 times. Her total time was 88 seconds.

Subject 12. The next tester was a white female aged between 40 and 45 years old. She looks methodically at the map for quite some time processing her understanding of the map and her position in the environment in her head. She looks at top and bottom cross streets. Focuses on Mass and New Hampshire Streets on map. Gestures her own mental model on her palm of her hand. Carefully while processing her position puts marker correctly on map. She wished there were pictures of landmarks at that location on the map. She attempted 1 time and got it correct. Her total time was 105 seconds.

Subject 13. The next tester was a white female aged between 25-30 years old. She identifies 9th street on the bottom left corner of the map. Places marker facing up (north) between Vermont and Mass. Street. Prompt her to reconsider. She gets frustrated. Looks and sees she’s facing New Hampshire Street in the environment. Points to the intersection of 9th and New Hampshire on the map. Places the marker on 9th between Mass and New Hampshire, but incorrectly has the arrow facing up (north). Prompt her again. She’s in disbelief. Stares at the map, gestures a thumb behind her, to indicate she knows that Mass Street is behind her. Points to Mass Street on the map. Turns marker arrow facing right (east) correctly. She wished there was a picture of the B.Pig coffee shop because she frequently visits there. She visualized a map in her head, but gets confused at times where streets are correctly positioned. She took 3 attempts. Her total time was 76 seconds.

Subject 14. The next tester was a white male aged between 25-30 years old. He has lived in Lawrence for 8 years. He immediately identifies 9th and Mass and New Hampshire on the map. Then he correctly positions the marker on the map. He says he looks at maps all of the time. It took him 1 attempt. His total time was 8 seconds.