

IMPROVING THE USER EXPERIENCE OF THE LAWRENCE TRANSIT SYSTEM:

A FOCUS ON MAP USABILITY AND ROUTE PLANNING

BY

Eric Berkman

Submitted to the graduate degree program in Design  
and the Graduate Faculty of the University of Kansas  
in partial fulfillment of the requirements for the degree of  
Master of Arts.

---

Chairperson

Committee members

---

---

---

Date defended: July8, 2009

The Thesis Committee for Eric Berkman certifies  
that this is the approved Version of the following Thesis

IMPROVING THE USER EXPERIENCE OF THE LAWRENCE TRANSIT SYSTEM:  
A FOCUS ON MAP USABILITY AND ROUTE PLANNING

Committee:

\_\_\_\_\_  
Chairperson  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date approved: July 8, 2009

Between the Kansas and Wakarusa Rivers, above the prairie low lands, settlers and emigrants navigated along these ridge tops heading westward along the Oregon Trail to claim free land. The terrain not only provided travelers a direct route, but also a safer one that avoided the steep slopes and river crossings.

Today, the City of Lawrence has grown from a small trading post from the 1850's to home of over 90,000 people. As the city continues to develop and expand, its route layout has grown in complexity. Now, an increased need and concern to expand public transportation has become a focus of its diverse population.

In 2000, the Lawrence Transit System, or T, was established to provide an alternative mode of transportation for its citizens. In its first year, the service provided 155,737 one-way trips. By 2004, the T had had over one million riders since its inception. In 2008, the tax payers agreed to continue the service with added resources. Despite the growing success in the increase in ridership of the T each year, many user concerns over poor route coverage and convenience and route planning difficulty have failed to be addressed by the City stakeholders.

The focus of this thesis is to address these user concerns and improve the user experience by improving the route system and map usability. I explored these goals through a user-centered and participatory approach where ideas are generated, analyzed, and synthesized using various frameworks and methods of representation.

The proposed route system is improved by expanding city coverage without adding additional routes. Data from the City of Lawrence Transit System reports as well as stakeholder interviews provided information that developed a sample of the most requested and used stops. These priority stops were used to develop efficient and direct routes with

reduced transfers and travel times. The proposed routes were tested against the original system and have shown a 34% improvement in the amount of required transfers.

The route map is improved by addressing usability standards. According to users and non-users, the original route map is difficult to read, understand and route plan. The new map design has improved legibility, readability, and is accessible for the color-vision impaired. Its route planning attributes now include a correct orientation to reflect the current position in the environment. Studies on orientation and route planning in this thesis have found that: users are able to quickly identify their location with less frustration when the map's orientation is the same as its facing position in the environment; the map should represent the user's mental model of the city; notable paths, nodes, districts, edges, and landmarks found in the environment are referenced on the map; a "You are Here" marker reinforces the user's understanding of their position in the environment.

The details of the thesis are organized and presented in the attached supplemental file. The thesis is organized by its two project goals: Early Design Research: Understanding the Current System; and Design Process: To Improve the User Experience of the System.

The first goal, Early Design Research: Understanding the Current System, details: the users, how I become familiar with the system, and user needs and design requirements. The second goal, Design Process: To Improve the User Experience of the System, details: improving the route system through coverage and convenience, and improving the usability of the map through wayfinding, route planning, and accessibility.

## Bibliography

- Altman, Irwin. The Environment and Social Behavior. Belmont: Wadsworth, 1975.
- Ashcraft, Norman, and Albert E. Scheflen. People Space: The Making and Breaking of Human Boundaries. Garden City: Doubleday, 1976.
- Bailey, Robert W. Human Performance Engineering: Designing High Quality Professional User Interfaces for Computer Products, Applications and Systems. 3rd ed. Upper Saddle River: Prentice-Hall, 1996.
- Boyle, Dan and Associates. City of Lawrence Coordinated Public Transportation Development Plan. Lawrence: City of Lawrence, 2006. Web. 24 March 2009 <<http://www.lawrencetransit.org/news/coodination.shtml>>.
- City of Lawrence. "About Us." City of Lawrence, 2008. Web. 10 July 2009 <<http://www.lawrenceks.org/transit/about.shtml>>.
- Guide to Ride: Your City in Motion. Map. Lawrence: Lawrence Transit System, 2008.
- Hall, Edward T. The Hidden Dimension. New York: Doubleday, 1966.
- "Historic Trails of Douglas County, Kansas." Lawrence: Convention and Visitors Bureau, 1997.
- Jenny, Bernhard, and Nathaniel Vaughn Kelso. "Designing Maps for the Colour-Vision Impaired." Society of Cartographers 41 (2007): 9-12.
- Lynch, Kevin. The Image of the City. Cambridge: M.I.T. Press, 1960.
- National Aeronautics and Space Administration. "Anthropometry and Biomechanics." National Aeronautics and Space Administration, 1995. Web. 12 Jun. 2009 <<http://msis.jsc.nasa.gov/sections/section03.htm>>.
- Norman, Donald A. The Design of Everyday Things. New York: Doubleday, 1988.
- Pruitt, John and Jonathan Grudin. "Personas: Practice and Theory". New York: ACM, 2003.
- Schwartz, Steven H. Visual Perception: A Clinical Orientation. Norwalk: Appleton and Lange, 1994.
- Terry, Evan, and Associates. Pocket Guide to the ADA: Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities. Birmingham: John Wiley and Sons, 1997.