Designing a Light Rail for the People

by Angela Nguyen, Itsumi Niiyama, Nick Beine, TJ Gascho, Tj Marchello, Zack Oakley

Introduction

Background
Sound Transit’s Link Light Rail, established in 2009, will undergo massive expansion between now and 2041.

<table>
<thead>
<tr>
<th>Current</th>
<th>Planned</th>
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</thead>
<tbody>
<tr>
<td>• 32 kilometers</td>
<td>• 187 kilometers</td>
</tr>
<tr>
<td>• 22 stations</td>
<td>• 70 stations</td>
</tr>
<tr>
<td>• 80k daily riders</td>
<td>• 550k-700k daily riders</td>
</tr>
</tbody>
</table>

Problem
The Link Light Rail expansion will dramatically increase ridership. Because of this, the light rail needs to adapt to support existing riders travelling farther and new riders unfamiliar with the system.

Goal
1. Identify what riders value & need adjusted the most.
2. Evaluate and design for current and new riders’ values.
3. Recommend light rail changes to better support riders.

Research

Observations
We observed four light rail stations, taking notes on interactions with each station.

Results
• Riders with baggage, bicycles, or limited mobility struggled with navigating the station most often.

Surveys
We surveyed 69 light rail riders to identify customer values, needs, and frustrations.

Results
• Riders want less fare enforcement and more frequent trains.
• Speed and convenience were the most important values to riders struggling with navigating the station most often.

Interviews
We interviewed a variety of riders and observed their navigation of the light rail.

Results
• New riders struggled in all of the journey.
• Frequent riders tuned out many on-train voice announcements and signs

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Evaluation

Steps
1. Model the current SeaTac Airport station in peak conditions.
2. Create recommendations from testing the model.
3. Design and compare an “improved” station model.

Findings
Our changes’ impact on the average time spent in system:

<table>
<thead>
<tr>
<th>Throughput Time</th>
<th>Ticket Purchasers</th>
<th>ORCA Tappers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Station</td>
<td>6.65 min</td>
<td>5.67 min</td>
</tr>
<tr>
<td>One-Way Isolated</td>
<td>6.20 min</td>
<td>5.68 min</td>
</tr>
<tr>
<td>People Mover Isolated</td>
<td>4.18 min</td>
<td>3.10 min</td>
</tr>
<tr>
<td>Recommended Model</td>
<td>4.11 min</td>
<td>3.22 min</td>
</tr>
</tbody>
</table>

Our analysis could save Sound Transit money by more effectively using $50k Ticket Vending Machines.

Findings

Recommendations

Airport
Based on observation results and the coming Paine Field Airport station, Nick and Zack explored airport foot traffic.

Seating
Based on survey results and observed interactions on the train, Angela and Itsumi designed for better seating.

Findings

Recommendations

Airport
Sound Transit can calculate the exact number of required ticket vending machines to meet their throughput constraints to save money.

Seating
The cognitive load of travelers is lowered when boarding the train, making transitions smoother, especially during peak travel times.

Future Considerations

Escalator Maintenance
Many riders indicated accessibility concerns and dissatisfaction with how frequently escalators are broken.

Flow Guidance
Markings on the ground to guide flow and traffic should be implemented. So should more railings on trains.

Auditory Signals
Sound effects can increase the ease of identifying each station which benefits frequent riders.

Acknowledgments
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Impact

Airport: Sound Transit can calculate the exact number of required ticket vending machines to meet their throughput constraints to save money.

Seating: The cognitive load of travelers is lowered when boarding the train, making transitions smoother, especially during peak travel times.

Signage: Information is communicated clearly, so that first time riders can immediately understand the system, and experienced riders can ride with ease.

Findings

Recommendations

Airport
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• 22 stations
• 32 kilometers

Seating
• 550k-700k daily riders
• 70 stations
• 187 kilometers

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