A Data-Oriented Approach to Improve the MIT Shuttle System

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The Need

1 – A Service Gap
Use of geocoded anonymized housing data

Heat map with overlaid transportation options

Graduate Student Distribution

On-Campus

Off-Campus

Existing options do not meet graduate students’ unique needs
- Coverage gap: No service to Inman Square and Somerville
- Schedule gap
  - Low evening service frequency
  - No transportation option after 8PM in Inman/Union

2 – Significant Safety Concerns
- Safety is a significantly more important concern for off-campus students than for on-campus students
- There is a connection between transportation options, transportation behaviors and safety

3 – Lack of Housing Availability

The Proposal

Design of an additional line that:
- Maximizes marginal coverage
- Has high frequency
- Is practical feasible
- Minimizes negative impacts on other communities

Stage 1: Use of residential data to determine where student housing is concentrated along each line

Stage 3: Use of residential data to determine where student housing is concentrated along each line

Stage 4: Use of residential data to determine the marginal benefits of each of the lines considered

1 - Proposed four potential lines based on practical constraints
2 - Mapped and timed proposed lines
3 - Determined best stops on each line
4 - Compared levels of service and numbers of students served
5 - Chose optimal line and assessed cost effectiveness

The Assessment

1 – Ridership Analysis

2 – Impact Assessment

The Somerville Shuttle exhibits good ridership and is valued by users
- Higher usage could be unlocked through easy improvements. Iterations between decision-makers, analysts and users are recommended.
- The Somerville Shuttle is a high-impact line:
  - It provides significant added service, compared to existing transportation options
  - It addresses an important safety issue in the area
- The line can act as a strategic tool to address the broader housing issue

Conclusions

- A data-driven approach to improve the MIT Shuttle System that leverages: (i) residential data, (ii) ridership data and (iii) user feedback
- Assessing performance is not an easy task and is subject to qualitative stakeholder-specific judgments
- Future work: Improving the MIT Shuttle System as a whole, instead of focusing on the creation of an additional line
- Transportation is not a stand-alone problem: Need for broader integration of transportation, housing and parking