

A Data-Oriented Approach to Improve the MIT Shuttle System

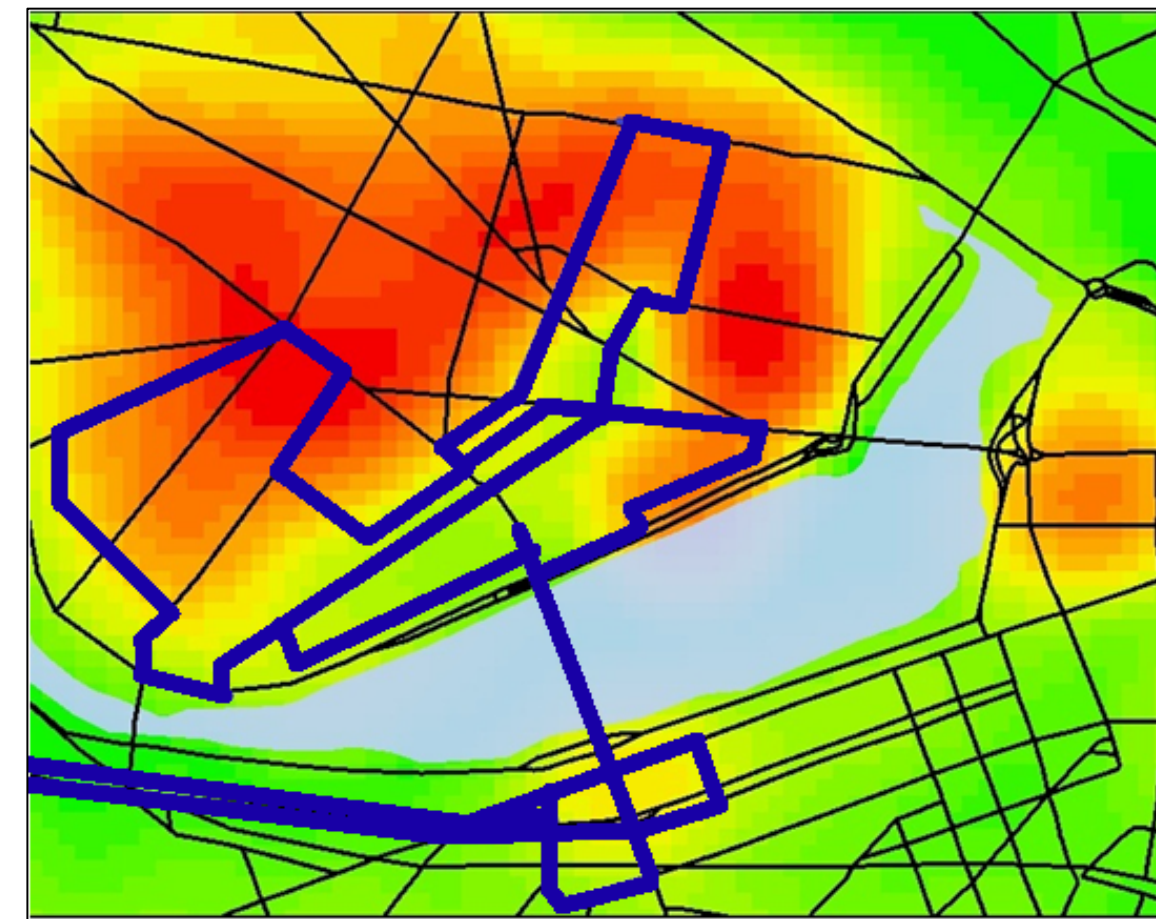
Alexandre Jacquillat, Maite Pena-Alcaraz, Brian Spatocco

The Need

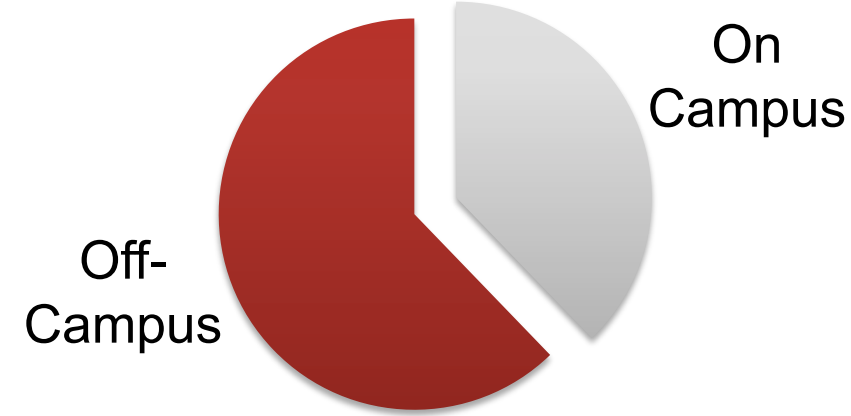
1 – A Service Gap

Use of geocoded anonymized housing data

Heat map with overlaid transportation options



Graduate Student Distribution



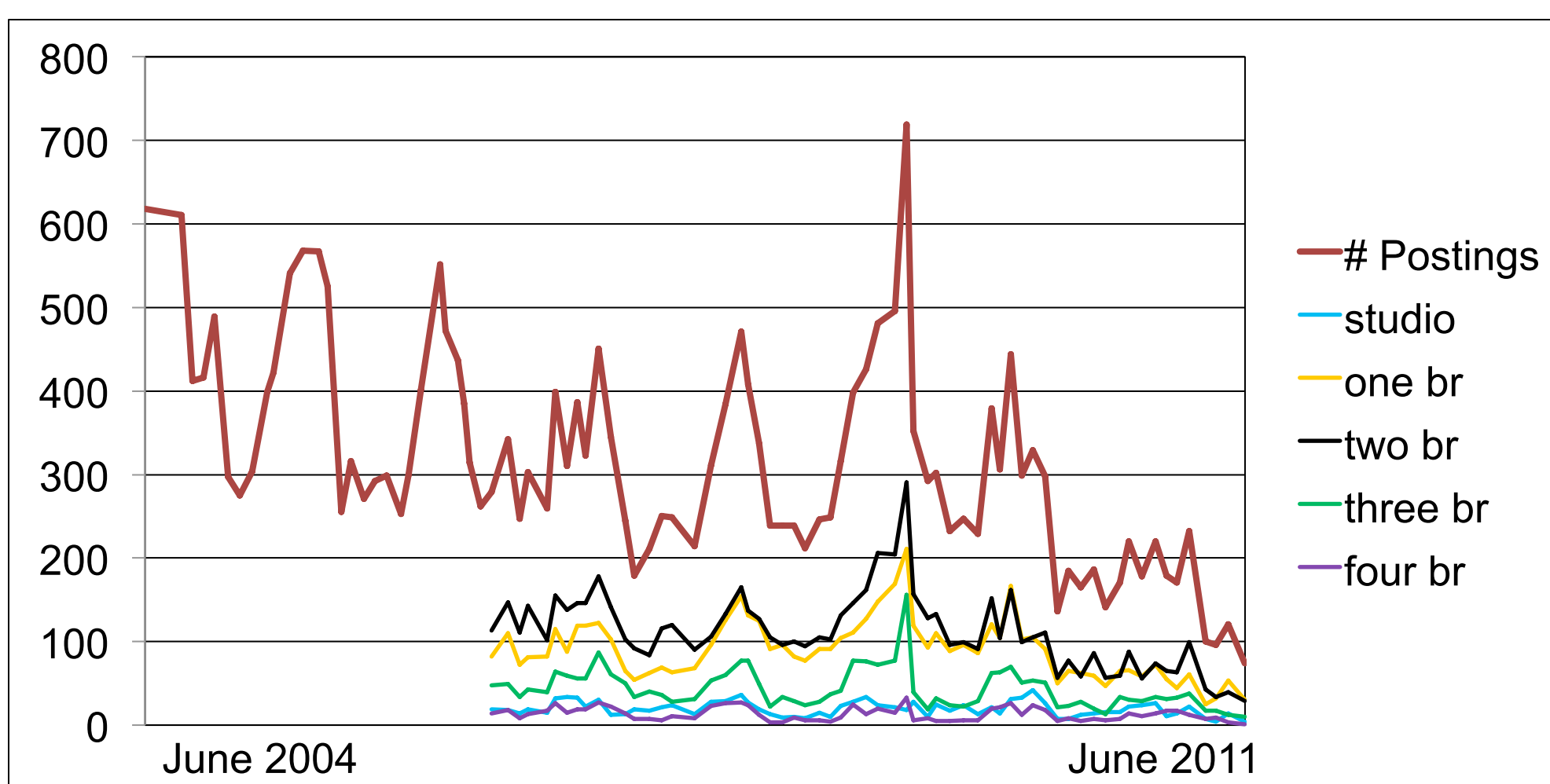
Existing options do *not* meet graduate students' unique needs

- 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

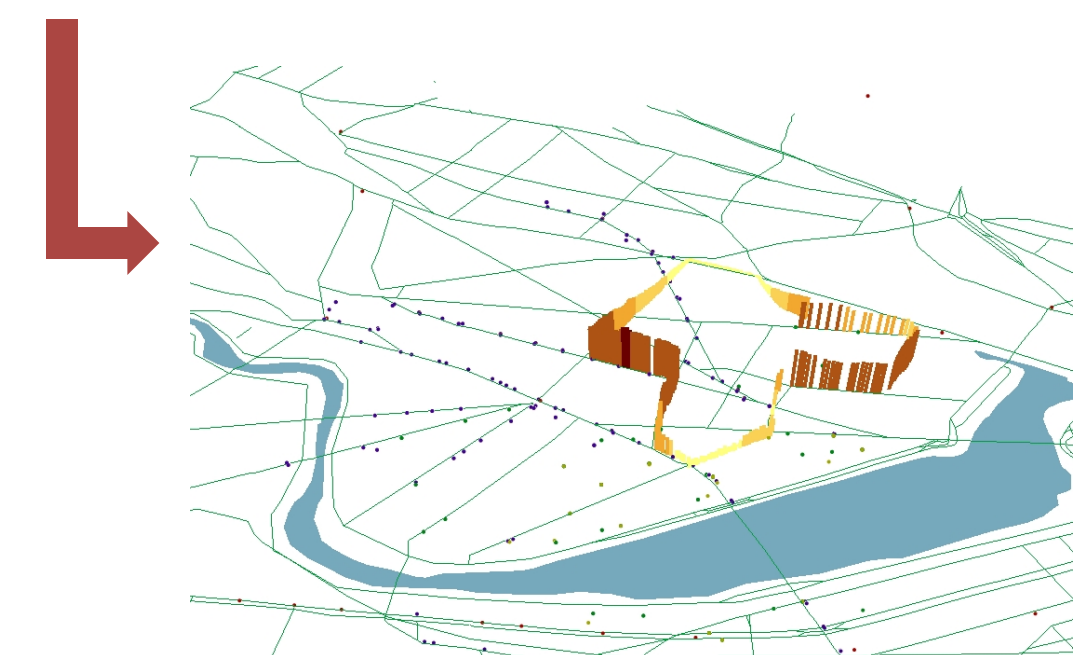


The Proposal

Design of an additional line that:

- Maximizes marginal coverage
- Has high frequency
- Is practical feasible
- Minimizes negative impacts on other communities

Stage 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

Time Period	Route 1	Route 3
8 am – 8 pm	649	646
8 pm – 1 am	837	945
After 1 am	1291	1346

Number of students "served" by each line

May 2012: Recommendation of the creation of a Somerville Shuttle to MIT Transportation & Parking Committee
 Fall 2013: Launch of a Somerville Saferide Shuttle pilot program

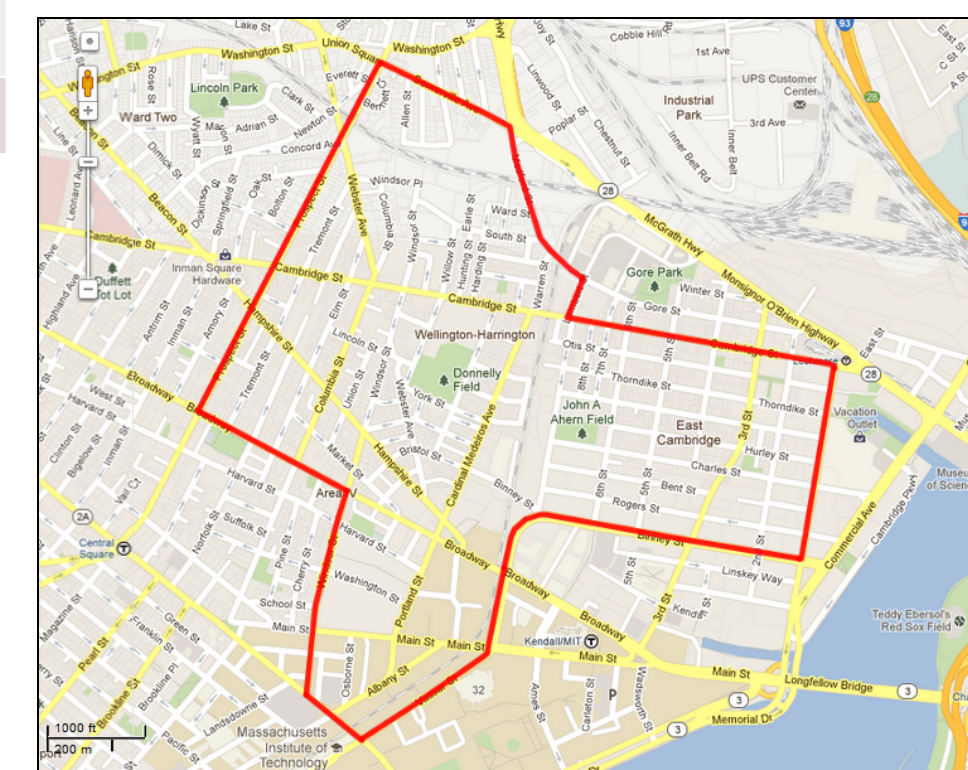
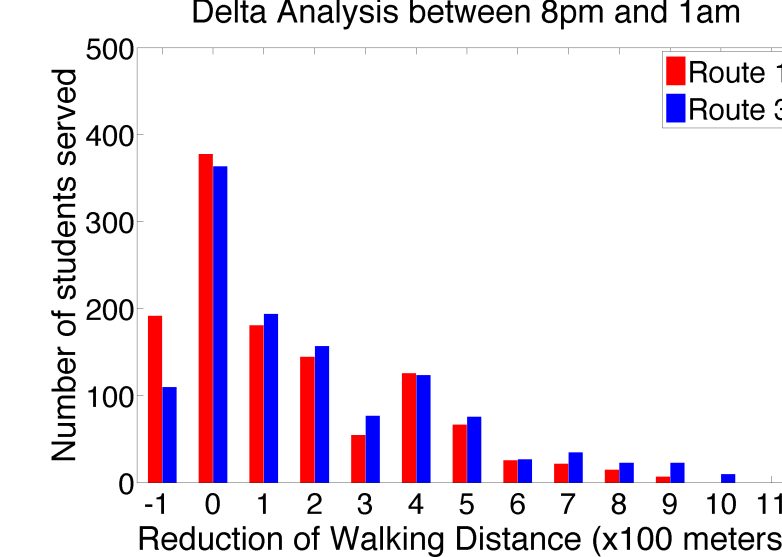
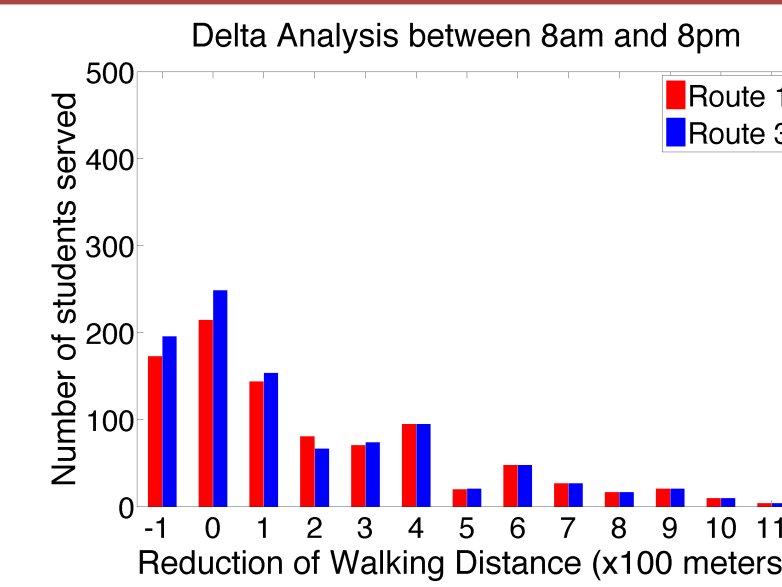
1 - Proposed four potential lines based on practical constraints

2 - Mapped and timed proposed lines

3 - Determined best stops on each line

4 - Compared levels of service and numbers of students served

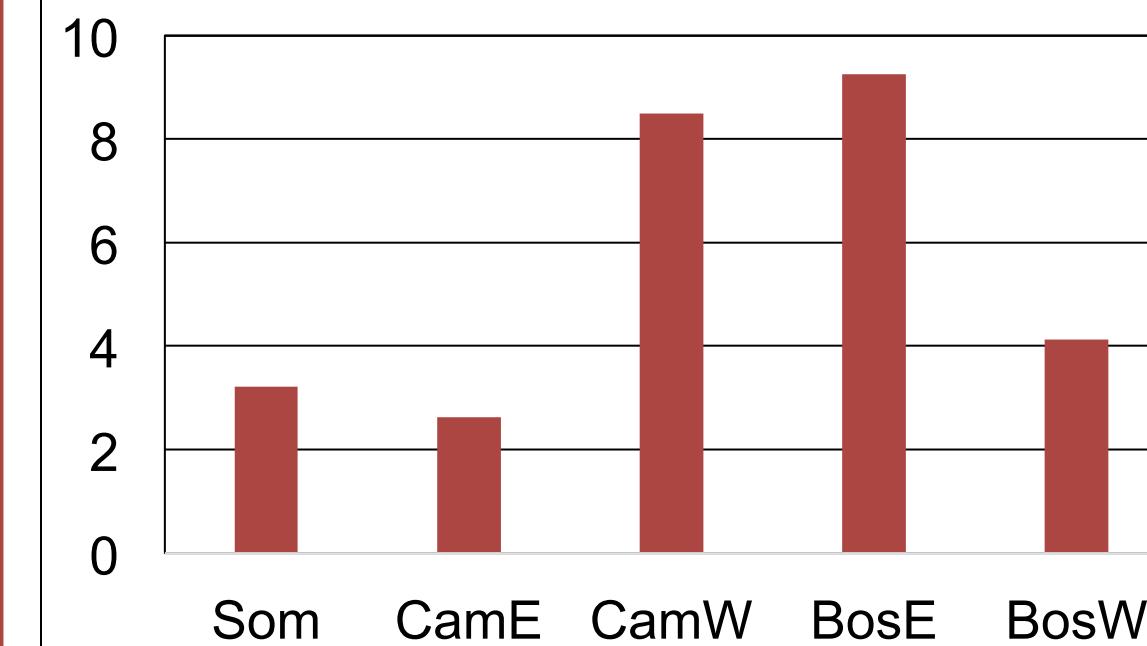
5 - Chose optimal line and assessed cost effectiveness



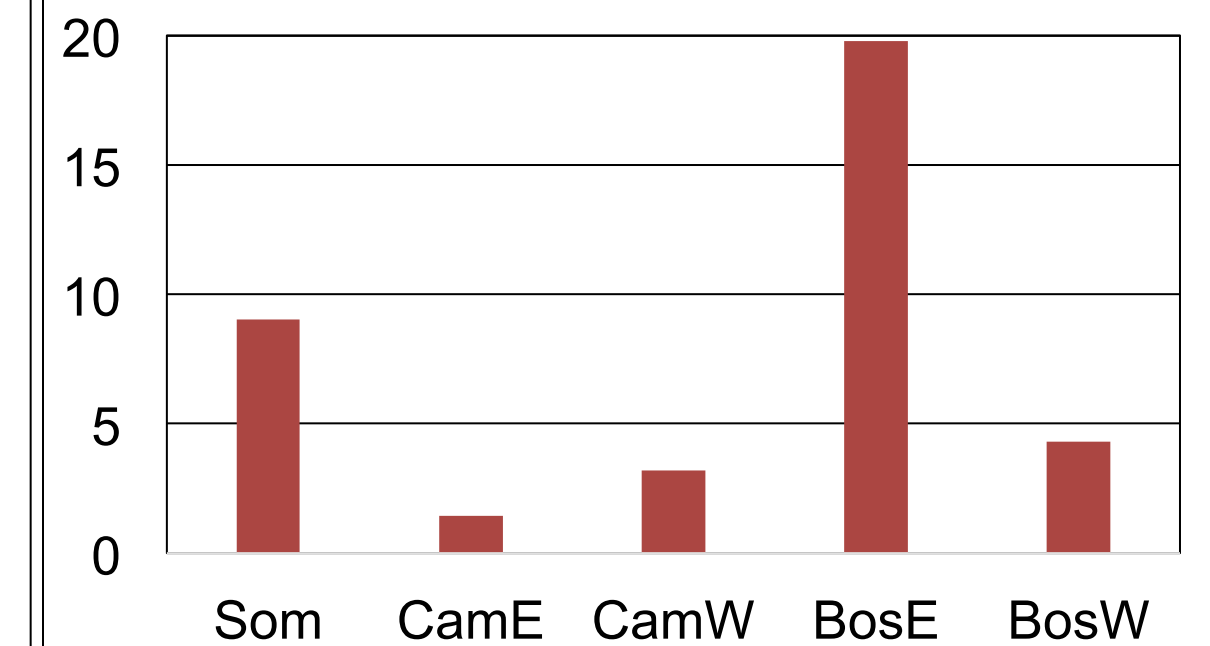
The Assessment

1 – Ridership Analysis

Total Boardings Per Shuttle

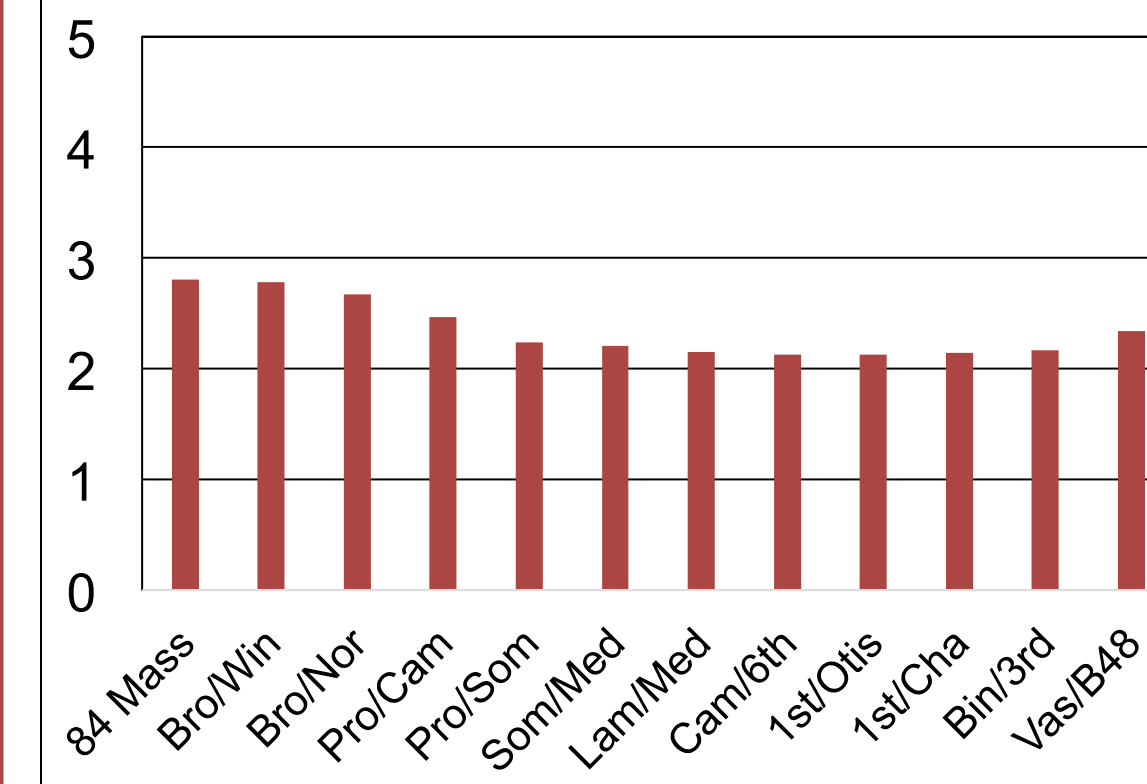


PAX-Miles per Shuttle

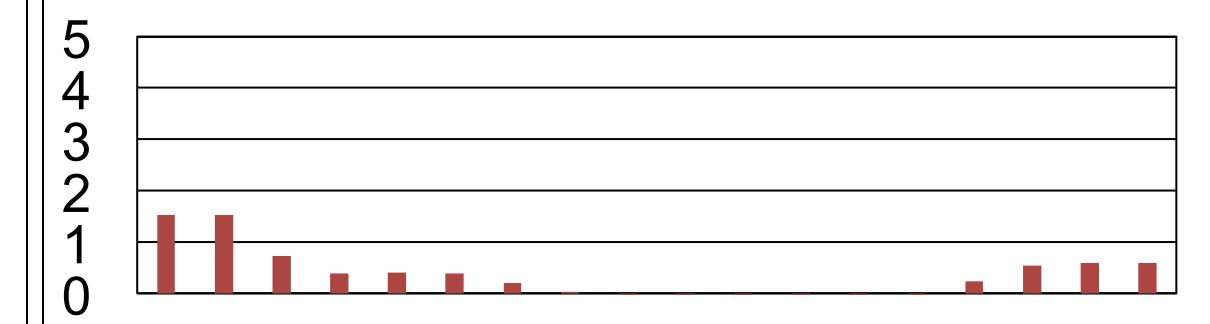


Distributed ridership vs. Service concentration:

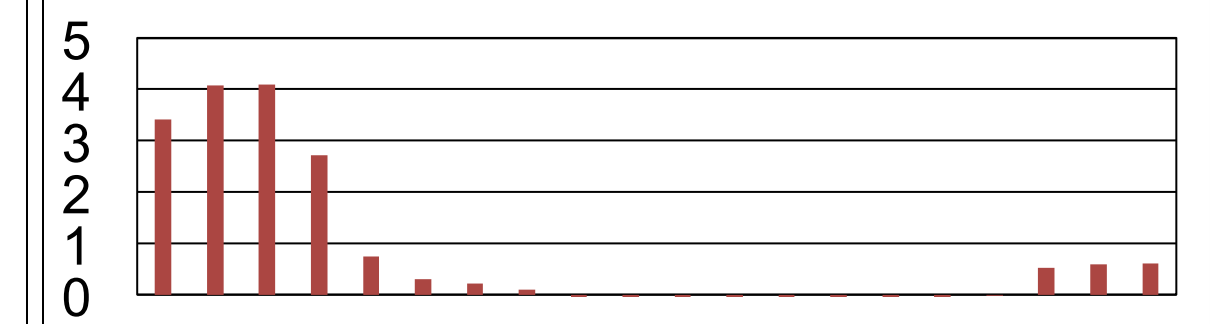
PAX in Shuttle (Somerville)



PAX in Shuttle (Camb. East)



PAX in Shuttle (Camb. West)



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