

An aerial photograph of a city, likely Boston, showing a dense urban grid, roads, and green spaces. A large yellow circle is centered over the city, containing the title text.

Participatory
Planning of
Transit Corridors
Using Tangible,
Interactive &
Accessibility-
Based Tools

Christopher Zegras, Anson Stewart, Phil Tinn, Jeffrey Rosenblum
mobil.TUM 2016 “Transforming Urban Mobility”, June 1st & 2nd, 2016



MOBILITY FUTURES
COLLABORATIVE





MBTA is staring down a financial paradox

Transit authority may not be able to afford its relatively average expenditures

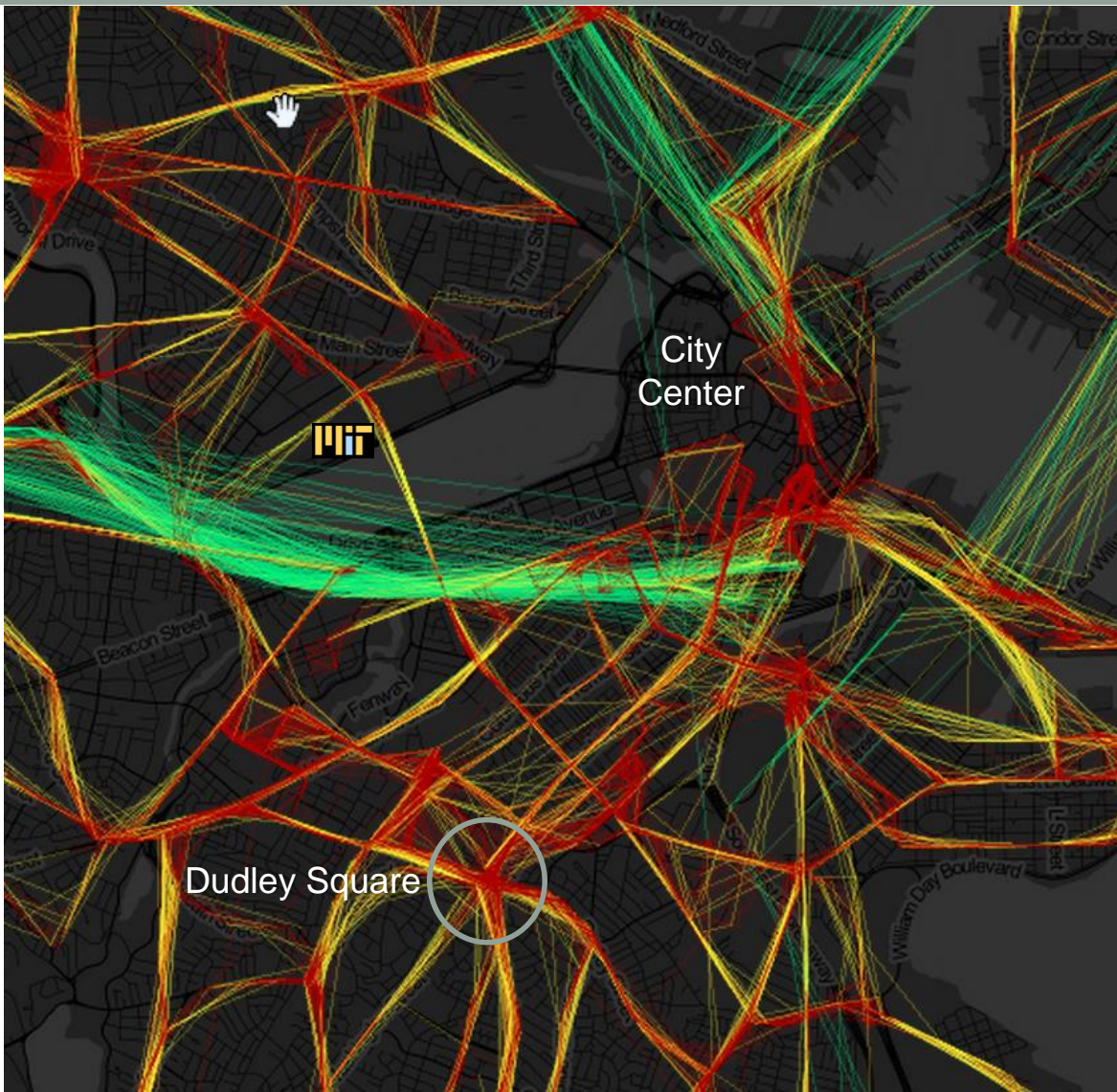


The Boston Globe

DINA RUDICK/GLOBE STAFF

The MBTA's outlays are in line with those of other large public transit systems around the country.

By David Scharfenberg | GLOBE STAFF MARCH 09, 2015



Bus delay

RED: < 10 mph
YELLOW: 10-25 mph
GREEN: > 25 mph



Wednesday
October 7, 2015
8:30 AM

BACKGROUND

Can we do better?



BACKGROUND

Can we do better?



SILVERLINE

WORCESTER SQUARE
OUTBOUND

Transitions
South Block - Miral Ho



Architecture



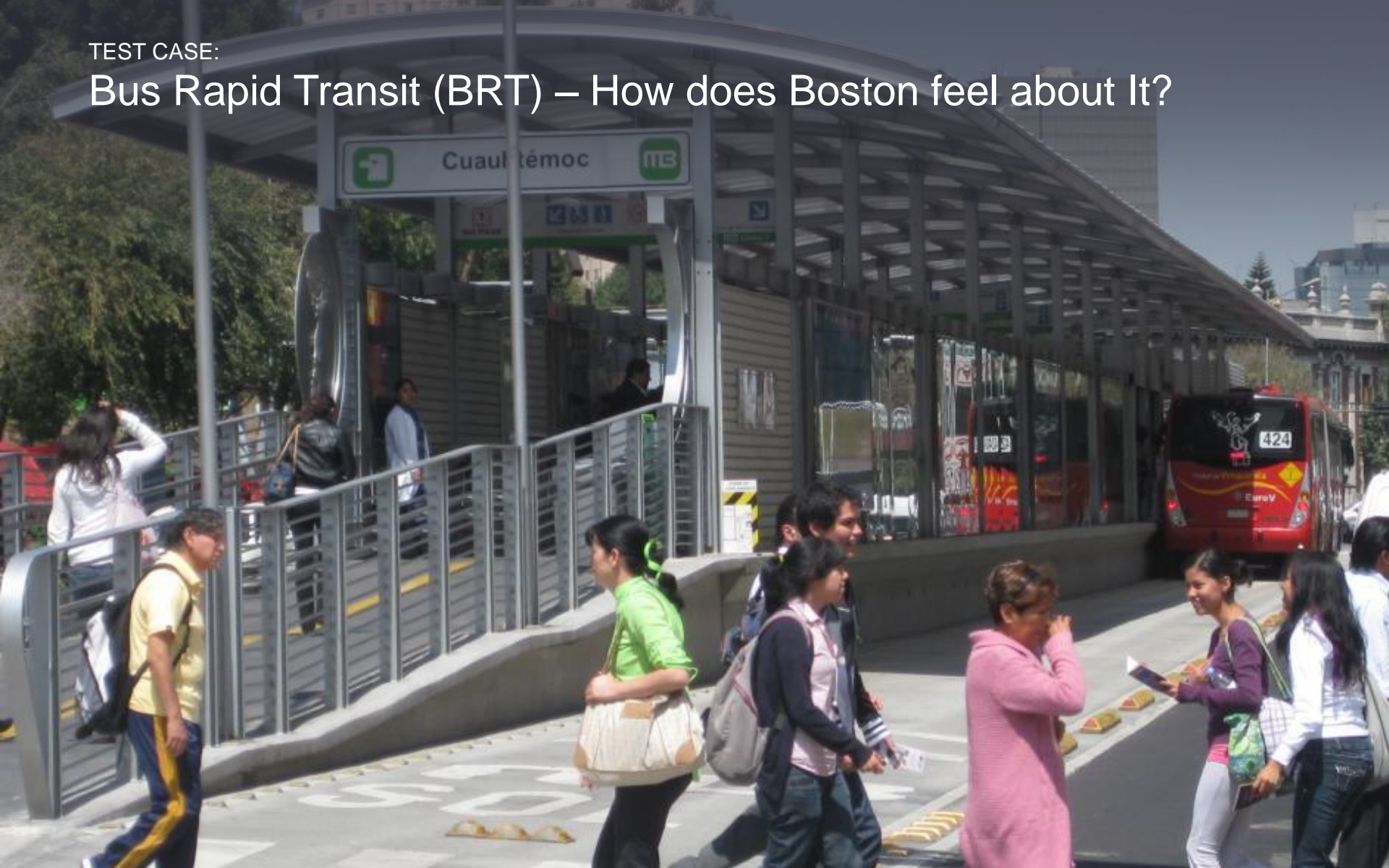


BACKGROUND

Can we do better?

TEST CASE:

Bus Rapid Transit (BRT) – How does Boston feel about It?



TEST CASE:

Bus Rapid Transit (BRT) – How does Boston feel about It?



TEST CASE:

Bus Rapid Transit (BRT) – How does Boston feel about It?



PROBLEM

Local community suspicious & critical



[The T](#) [Boston Store](#) [News by neighborhood](#) [Crime](#) [Development](#) [Fire](#) [Boston English](#)

[Home](#) / [Boston](#) / [Mattapan](#)

State learns again that people don't like having things crammed down their throat

By [adamg](#) on *Fri, 11/20/2009 - 3:51pm*

[And now the state loses out on \\$145 million in federal stimulus funds](#); money was to have gone to a fancy-shmancy Silver Line extension through Roxbury and Mattapan that state officials tried to foist on the neighborhoods as a fait accompli.

[Lawmakers ask state to withdraw 28X proposal](#) (from the Dorchester Reporter a couple weeks ago).

Steve Poftak [is sad](#).



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The Boston Globe

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No agreement, no \$147m upgrade

State scraps effort to seek US funding for bus line



The median on Blue Hill Avenue where the Silver Line may have been placed. (David L. Ryan/Globe Staff)

By [Meghan E. Irons](#)

[Globe Staff](#) / November 20, 2009

MOST E

1. [Repo](#)
2. [Map](#)
3. [Bostc](#)
[McInl](#)
4. [We T](#)
5. [New](#)
6. [Drink](#)
7. [Lawn](#)

**Can new technologies
help the participatory
planning process?**



Hypothesis

Tangible, interactive planning tools
in public engagement workshops
enhance learning (single and *double loop* learning)



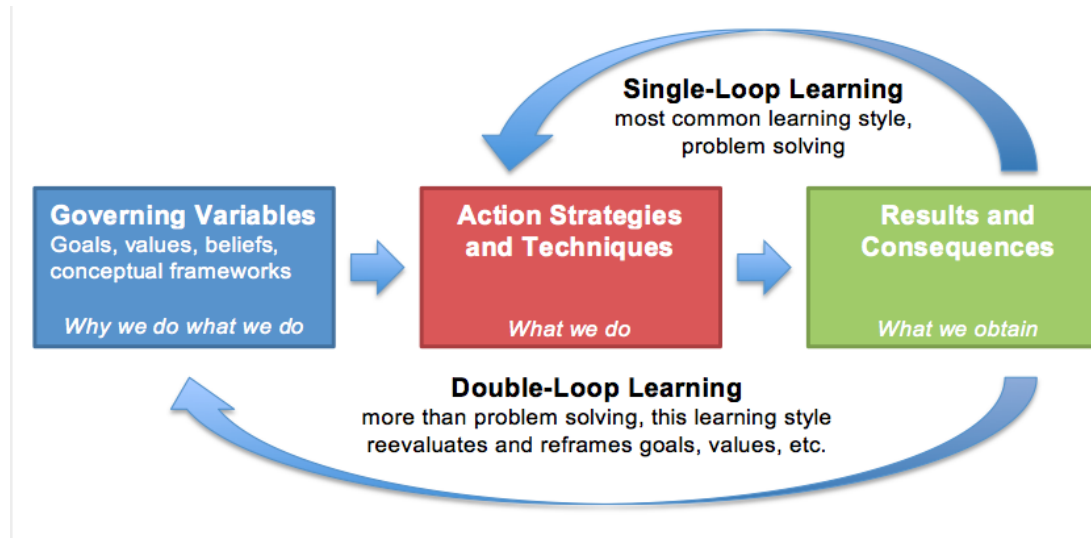
Better planning outcomes

Hypothesis

Tangible, interactive planning tools
in public engagement workshops
enhance learning (single and *double loop* learning)

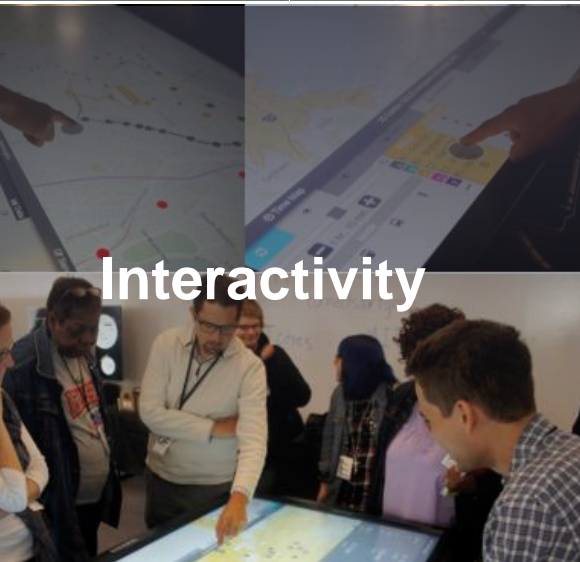


Better planning outcomes





Tangibility



Interactivity

Mechanisms



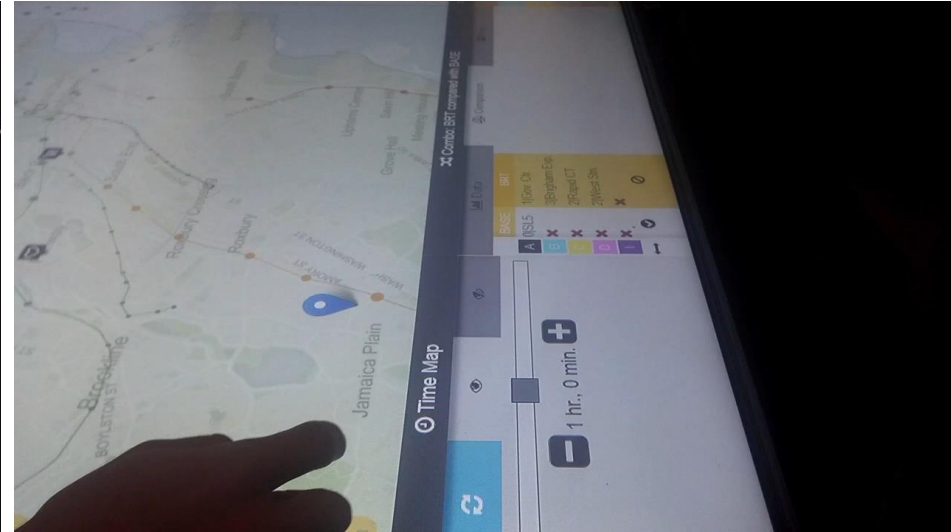
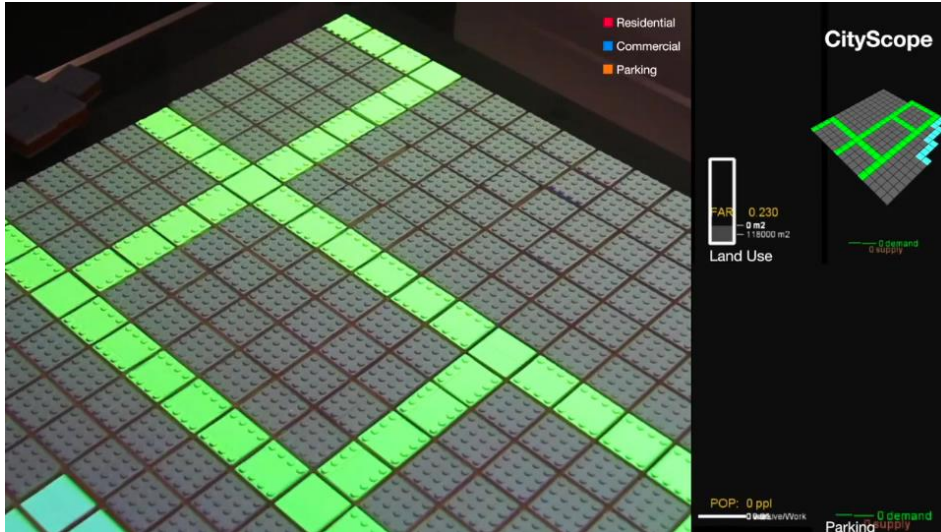
- think more rapidly
- revisit ideas more frequently
- better grasp spatial relations
- make new discoveries & more re-interpretations



- “imagination” (changed perception)
- “alignment” (other perspectives)
- “engagement” (shared views, others listened)
- attitude- and behavior-changing potential

PROCESS

Combine two tools



Tangible User Interface: CityScope

- LEGO Bricks
- Processing
- Webcam



Accessibility Mapping: CoAXs

- GTFS + Open Street Planner
- Open Transport Analyst (Conveyal)
- Open Data (e.g. jobs)

MULTI-SCALE
INTERACTION

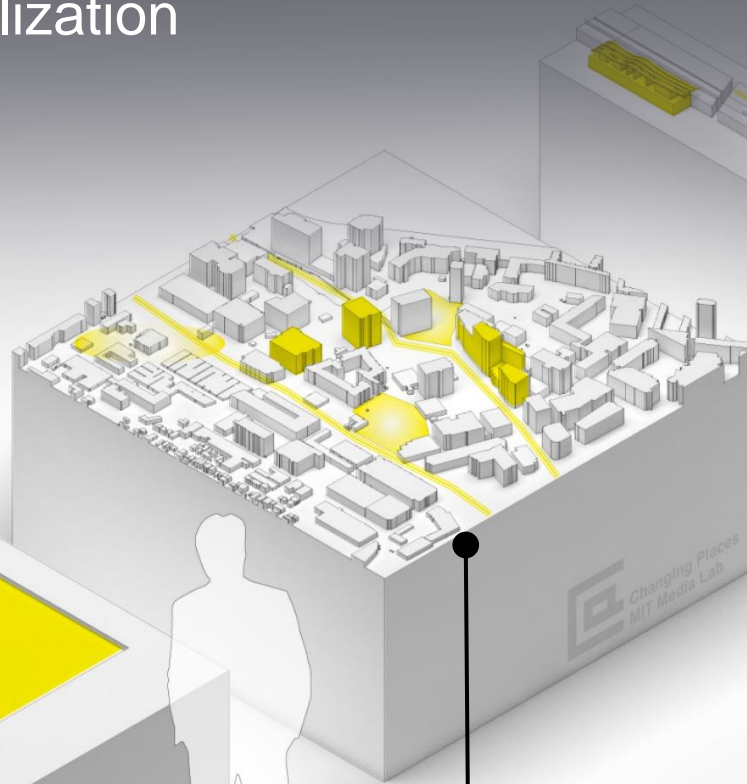
PROCESS

Conceptualization

Regional
Simulation

Streetscape
Simulation

Neighborhood
Simulation



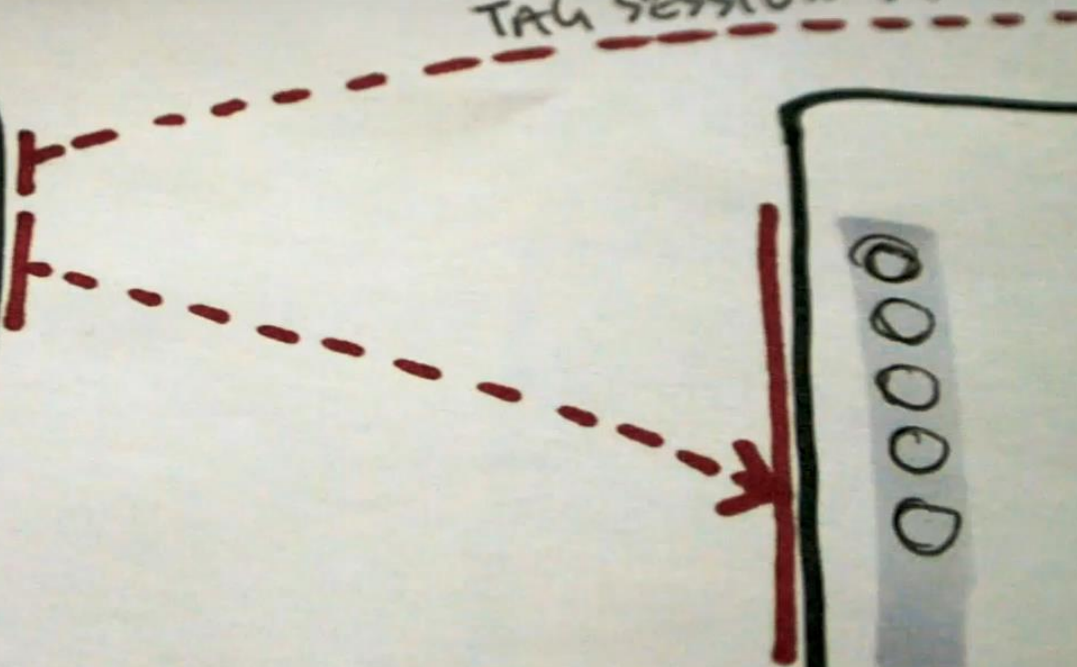
PROCESS

Design & Development

ARRIVAL

SESSI

TAG SESSION BY TIME



PROCESS Pre-Pilot



PROCESS

Student Test Group



PROCESS

Student Test Group



PROCESS

Facilitators Preview



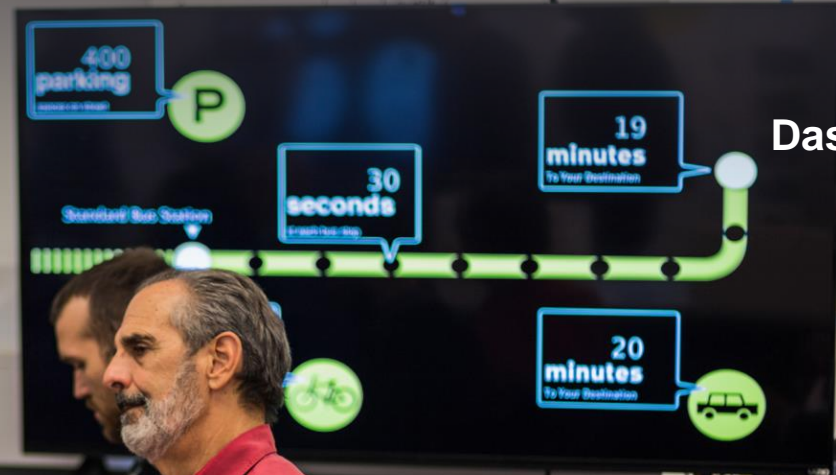
Street Scale



Feature Articulation



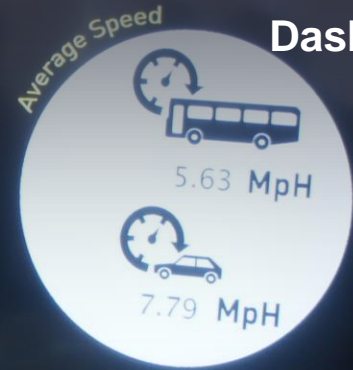
BRT scenario simulation



Live Dashboard



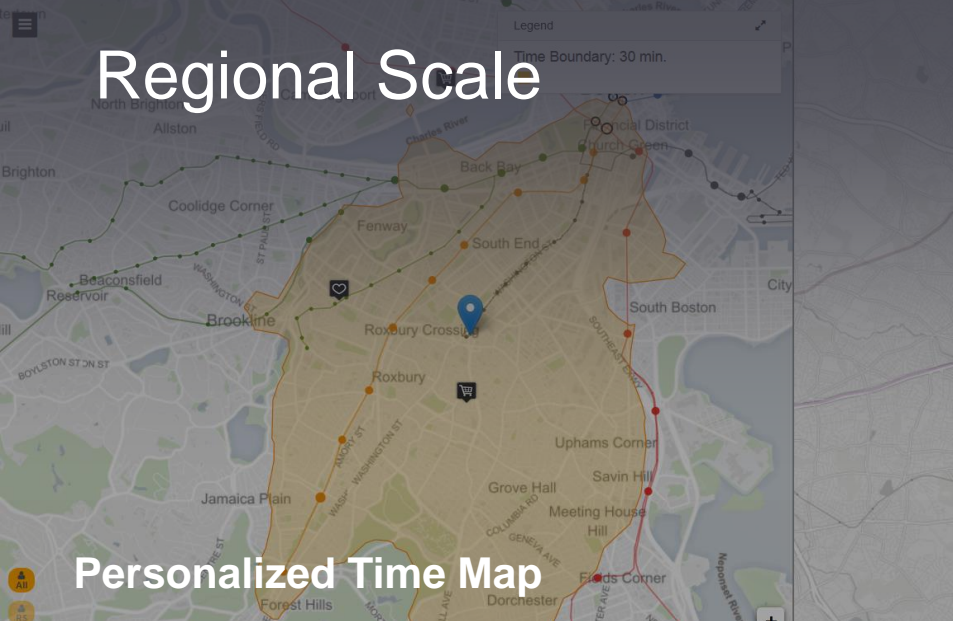
Neighborhood Scale



**Live
Dashboard**



Regional Scale



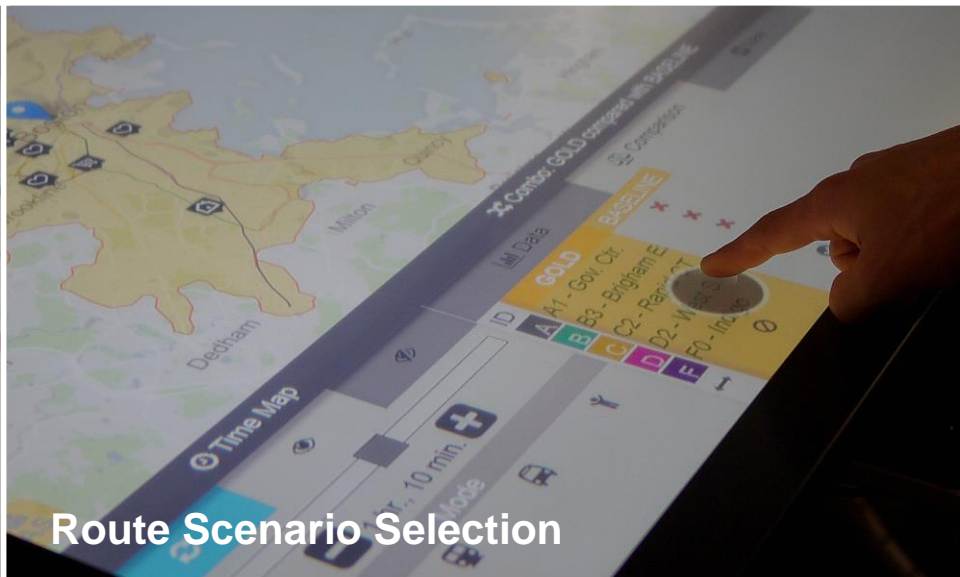
Personalized Time Map



On-demand Dashboard



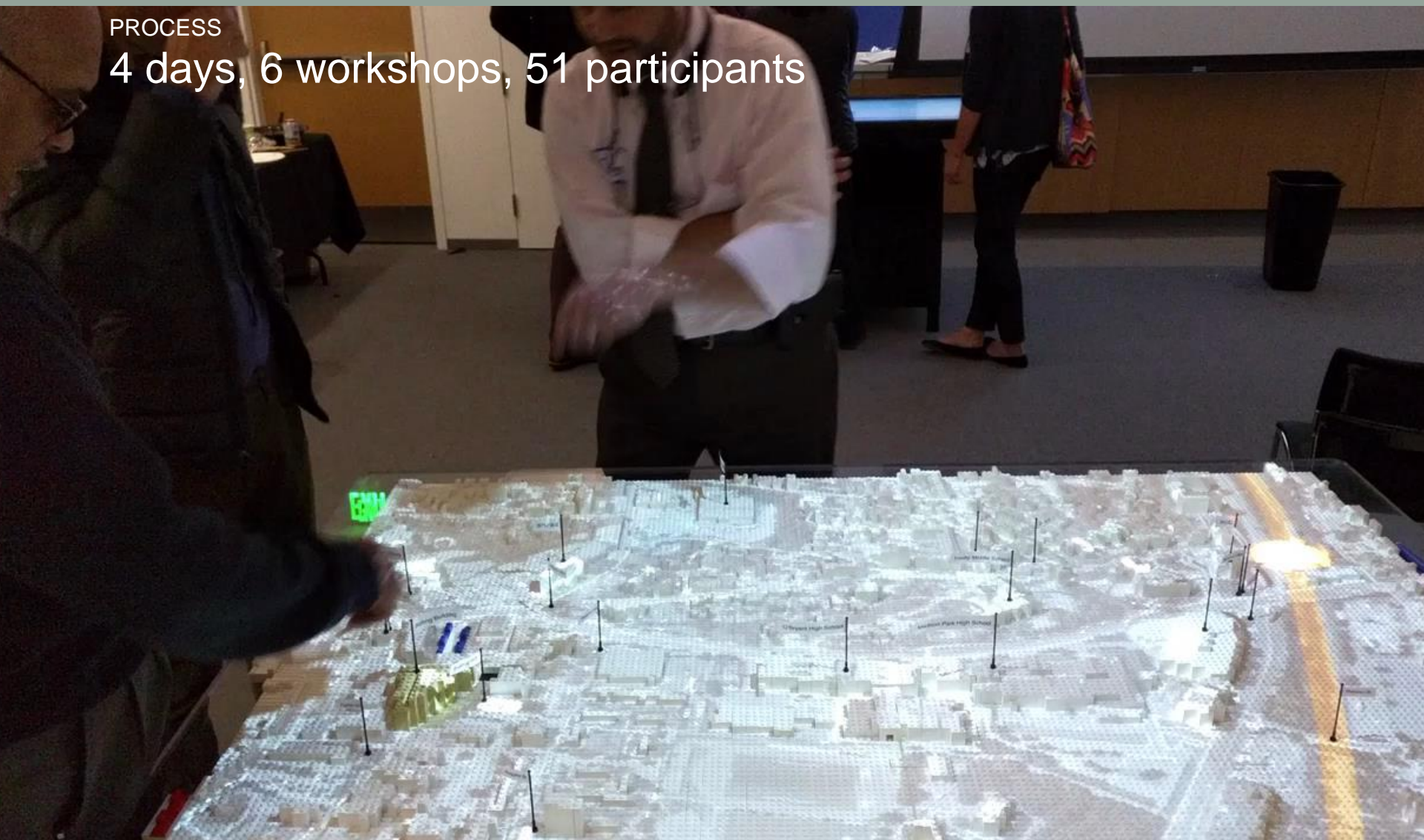
Route Editor



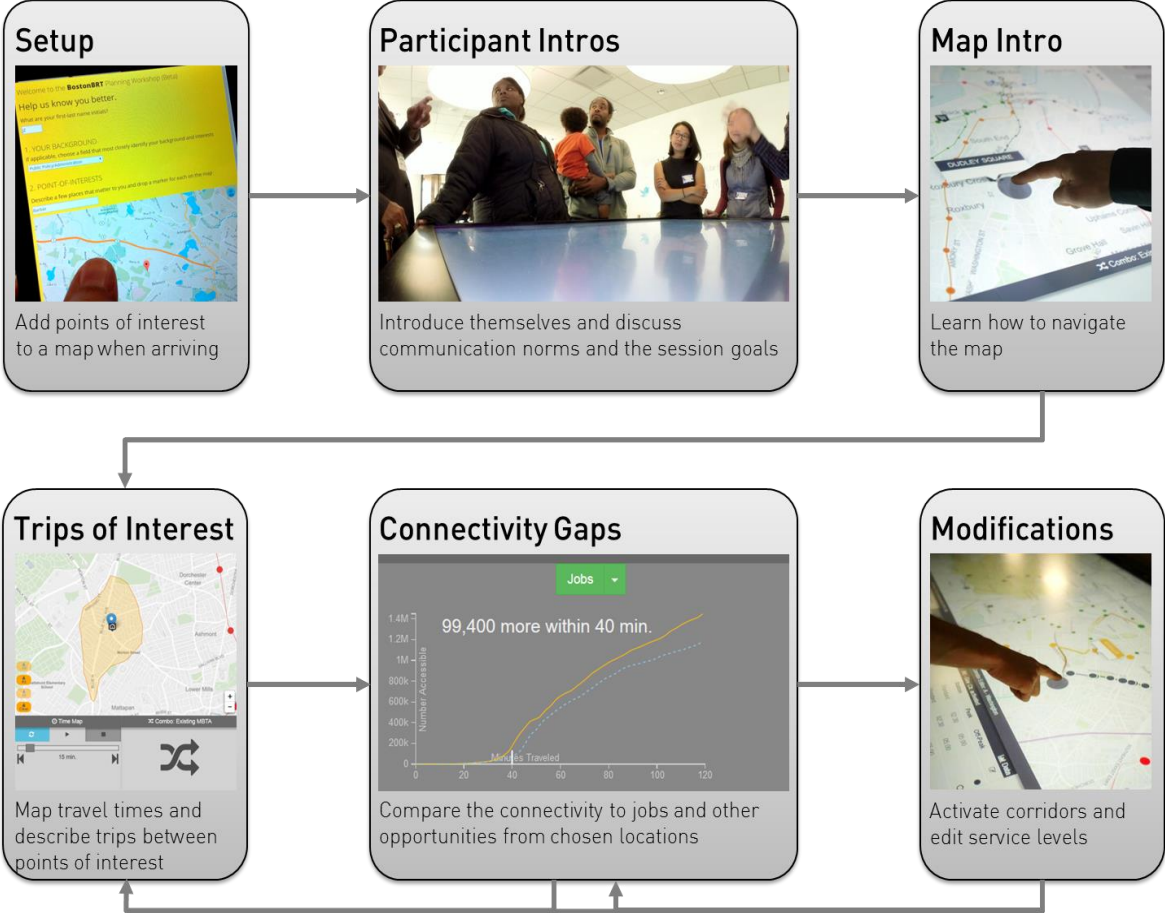
Route Scenario Selection

PROCESS

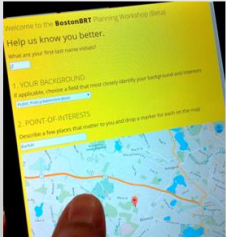
4 days, 6 workshops, 51 participants



Facilitated Workshop Overview



Setup



Add points of interest to a map when arriving

Participant Intros



Introduce themselves and discuss communication norms and the session goals

Map Intro



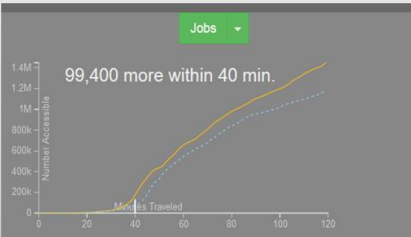
Learn how to navigate the map

Trips of Interest



Map travel times and describe trips between points of interest

Connectivity Gaps



Compare the connectivity to jobs and other opportunities from chosen locations

Modifications



Activate corridors and edit service levels

Compare Different Locations

Create and Test Scenarios

Methods

Better Transit?

PRE-WORKSHOP SURVEY

Username: _____

Welcome! Please help our MIT team evaluate new technologies by answering the following questions:

Age _____

Occupation _____

Please list any community organization(s) you are affiliated with:

Over the past year, how many public planning meetings have you attended?

(circle one option) 0 1-2 3-5 6+

At how many did you make a formal presentation? _____

At how many did you speak and share your opinion? _____

At how many did you learn new things about planned projects? _____

In the last week, how many times did you travel by:

Car? _____ Subway/Train? _____ Bus? _____

Are you familiar with the concept of bus rapid transit (BRT)? Yes | No

If yes, try to list four important elements of BRT:

How familiar are you with digital graphical representation of information and data?

Not familiar 1 2 3 4 5 Very Familiar

To what extent do you agree with the statements...

"I can play an active role in the planning of the community where I live"

Disagree 1 2 3 4 5 Agree

"Public participation in planning advances the interests of my community"

Disagree 1 2 3 4 5 Agree

Better Transit?

POST-WORKSHOP OVERALL SURVEY

Username: _____

Thanks for coming. Please fill out both sides of this survey before you leave.

| | (Disagree) | | | (Agree) | |
|---|------------|---|---|---------|---|
| I learned a great deal in the workshop | 1 | 2 | 3 | 4 | 5 |
| I learned through observing others using the tools | 1 | 2 | 3 | 4 | 5 |
| I learned through listening and conversing with others | 1 | 2 | 3 | 4 | 5 |
| I helped others learn | 1 | 2 | 3 | 4 | 5 |
| I was able to get answers to the questions I asked | 1 | 2 | 3 | 4 | 5 |
| Workshop participants discussed issues in an open way | 1 | 2 | 3 | 4 | 5 |
| Participants were open to differences in opinion. | 1 | 2 | 3 | 4 | 5 |
| I would support recommendations created by the participants of the workshop | 1 | 2 | 3 | 4 | 5 |
| I feel that I can play an active role in the planning of the community where I live | 1 | 2 | 3 | 4 | 5 |
| I feel that public participation using the tools in this workshop would advance the interests of my community | 1 | 2 | 3 | 4 | 5 |

If corridors like we discussed today are implemented, do you imagine yourself changing the way you travel?

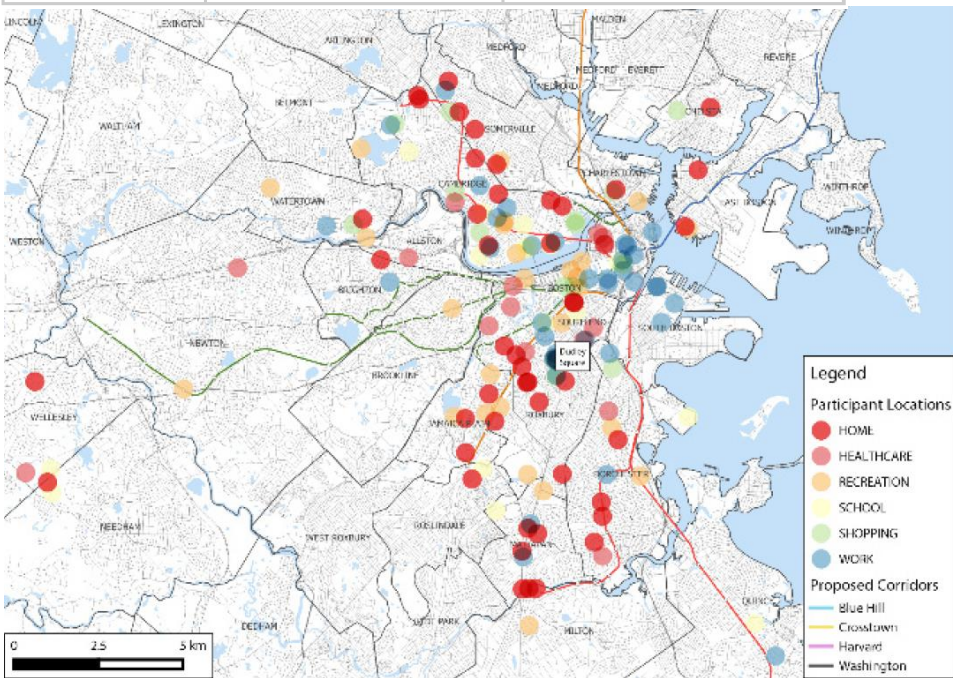
If so, how many times per week would you travel by:

Car? _____ Subway/Train? _____ Bus? _____

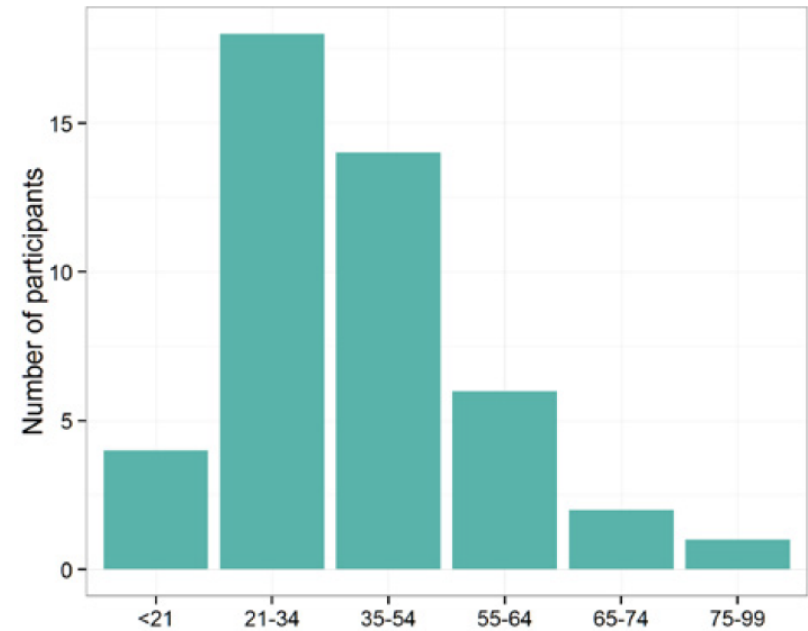
Try to list four important elements of BRT:

- How do you think corridors like those discussed today might impact your travel?
- How do you think corridors like those discussed today might impact others' travel in the region?
- What was the most interesting part of this workshop?

| Workshop | Number of participants | Number of valid responses (completed pre- and post-survey) |
|----------|------------------------|--|
| 1 | 7 | 6 |
| 2 | 10 | 9 |
| 3 | 12 | 12 |
| 4 | 5 | 3 |
| 5 | 10 | 10 |
| 6 | 7 | 5 |
| | TOTAL = 51 | TOTAL = 45 |

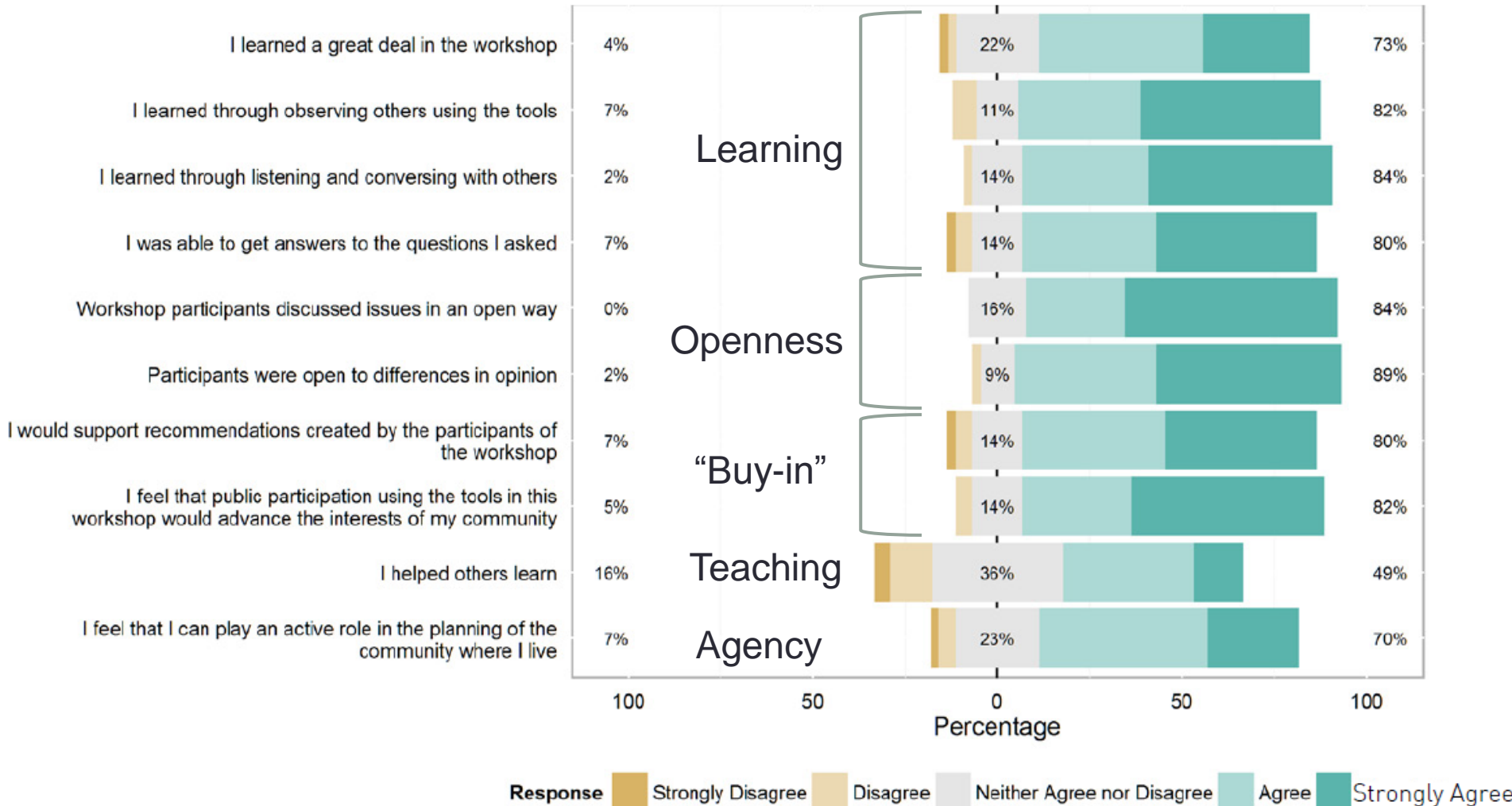


Participants



Age distribution of participants (N=45)

Overall responses: Reasonably positive



Single and Double-Loop Learning

Single-Loop Learning

Double-Loop Learning

I learned a great deal in the workshop 4%

I learned through observing others using the tools 7%

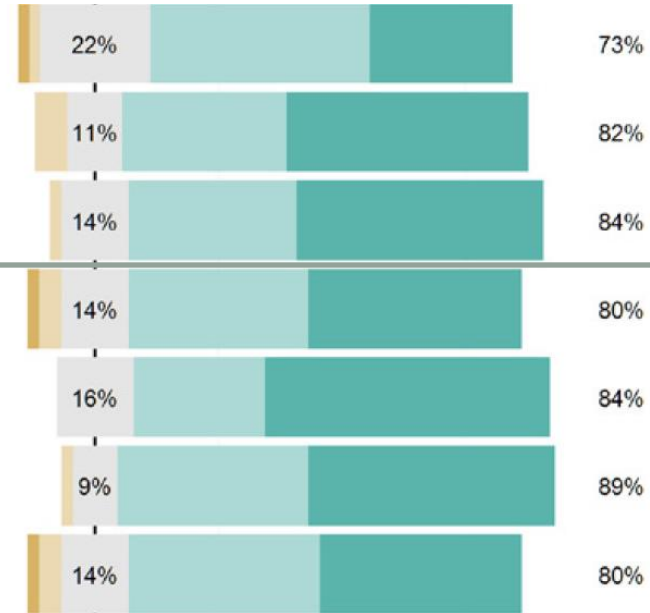
I learned through listening and conversing with others 2%

I was able to get answers to the questions I asked 7%

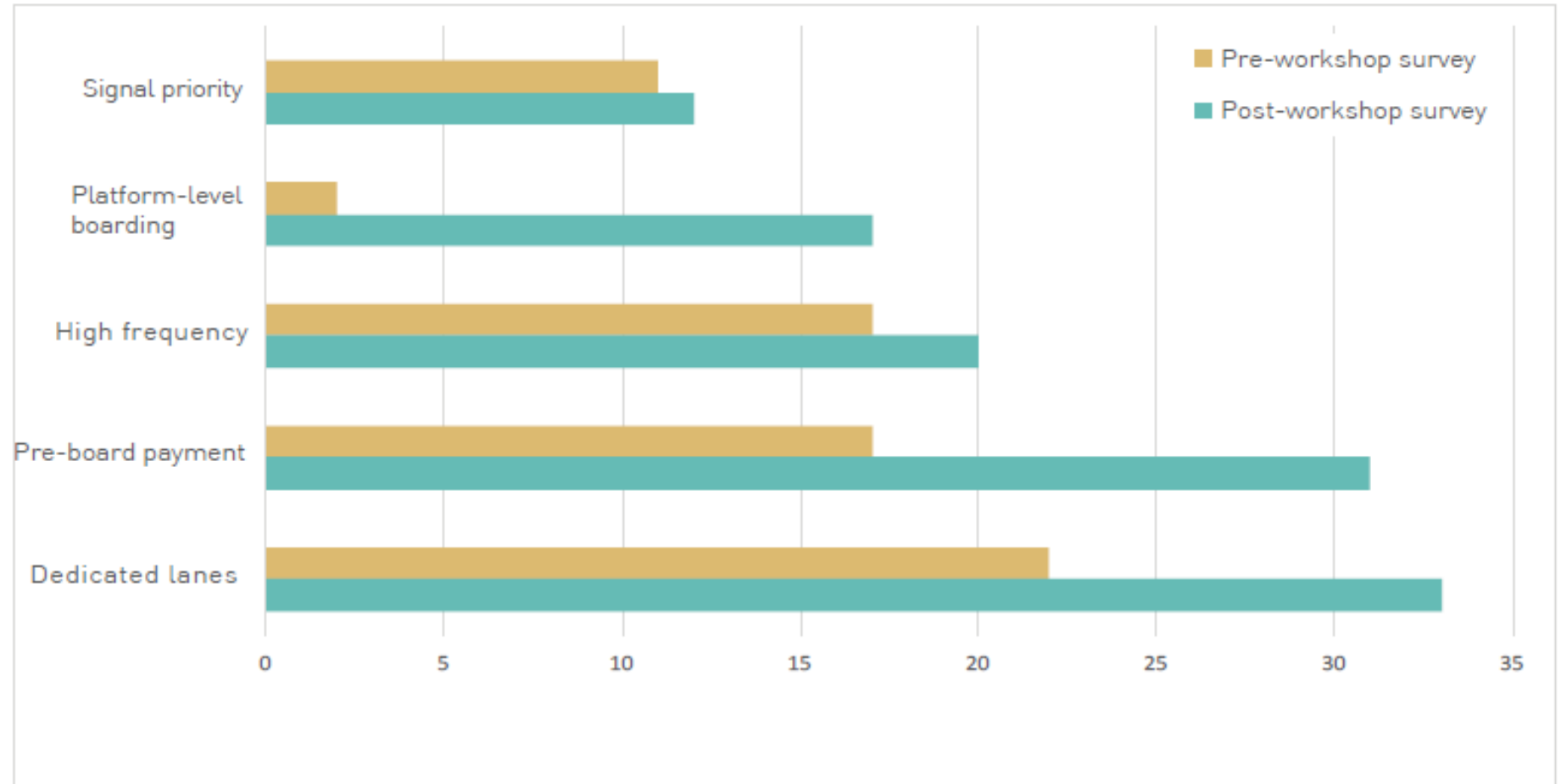
Workshop participants discussed issues in an open way 0%

Participants were open to differences in opinion 2%

I would support recommendations created by the participants of the workshop 7%

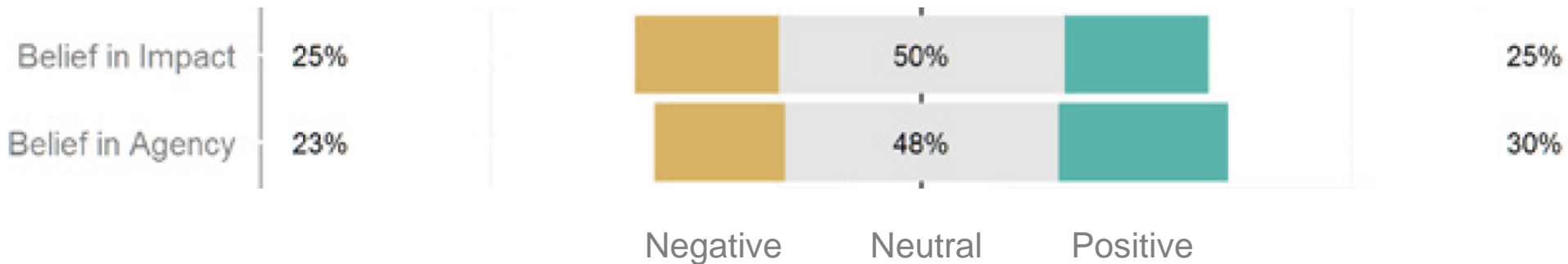


Subject Learning....about BRT (Pre/Post)



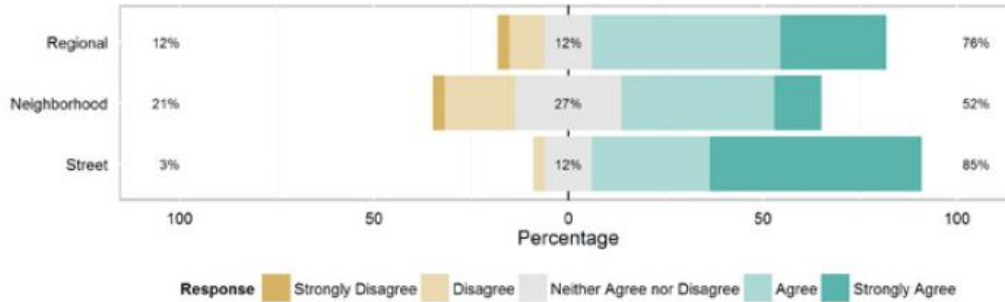
Learning Effects: Pre/Post

- Agency: “I can play an active role in the planning of the community where I live.”
- Impact: “Public participation in planning advances the interests of my community.”

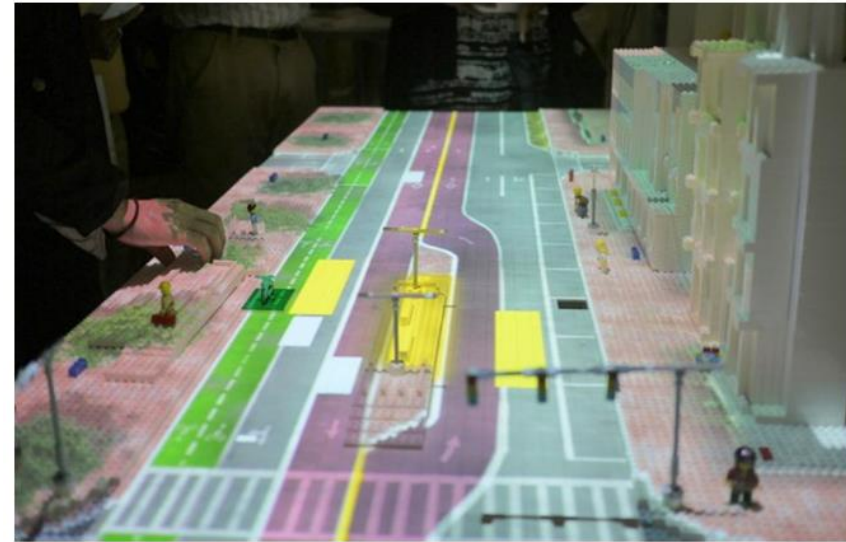


Comparing the Tools

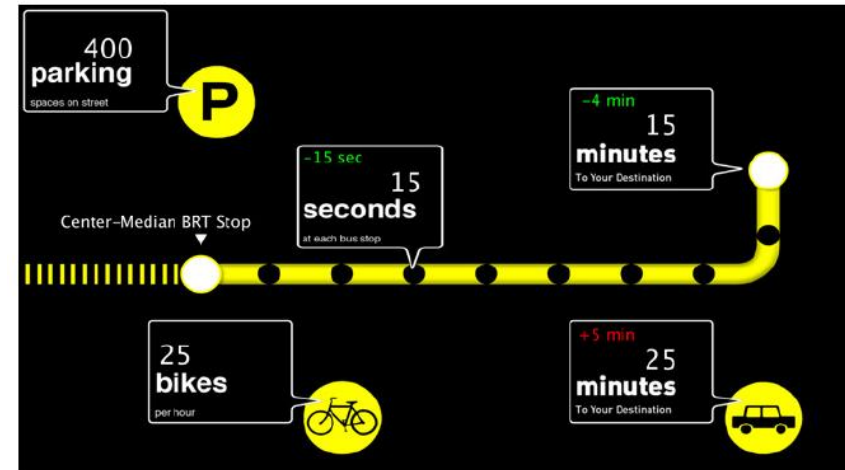
Usability



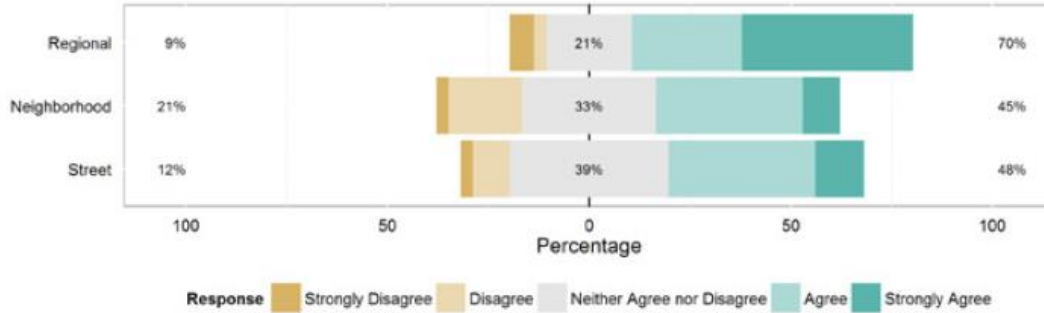
“The tool was easy to understand”. [Usability]



CityScope LEGO model of a street segment and intersection

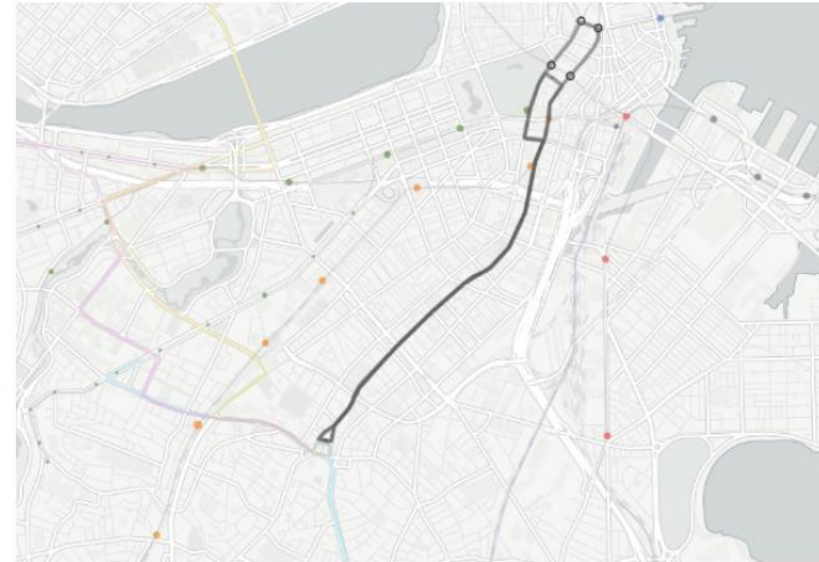
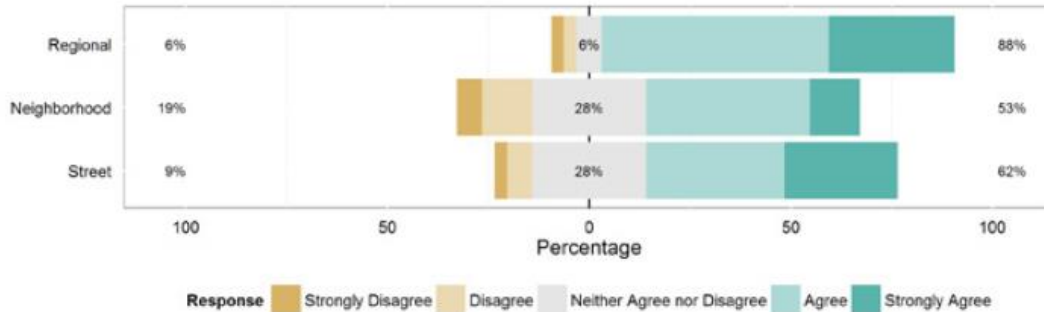


Relevance & Credibility



CoAX's interactive touchscreen

“The tool reflected my unique issues and concerns.” [Relevance]

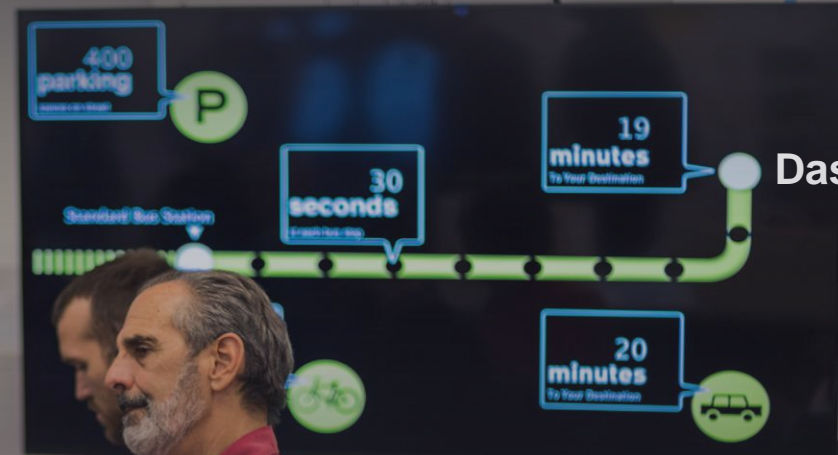


“The tool used data and simulations that seemed credible.” [Credibility]

Design Lessons



Street Scale



Live Dashboard

“can see changes as you go”

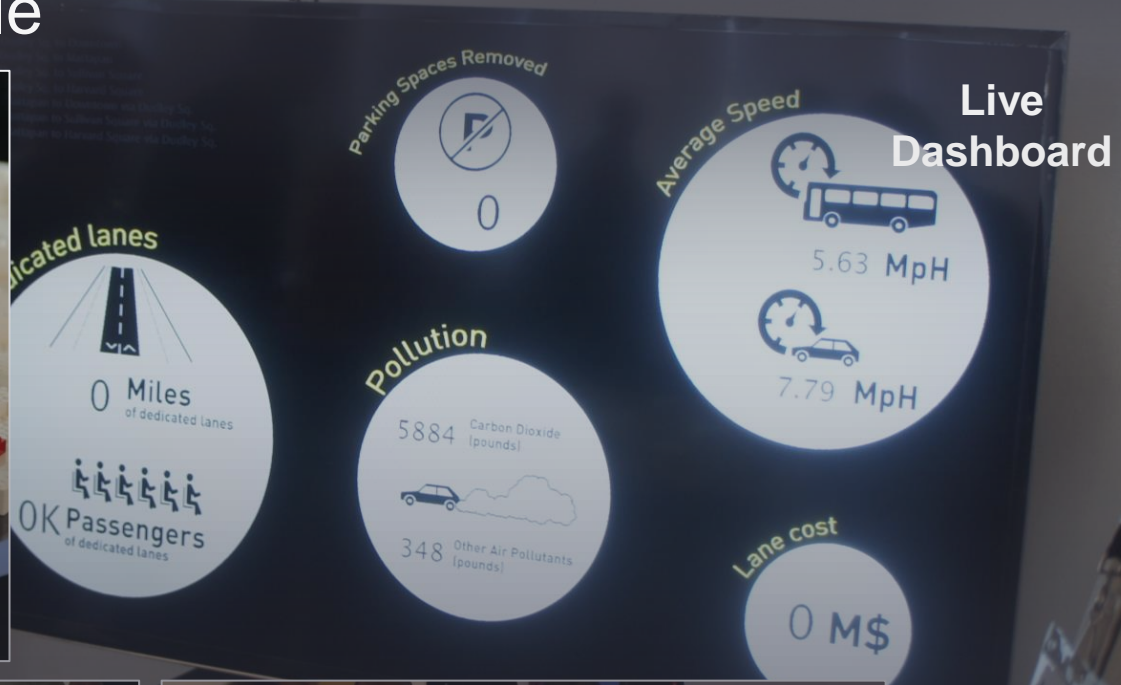
“It won’t work on my street,”

“what made up the numbers?”

Neighborhood Scale

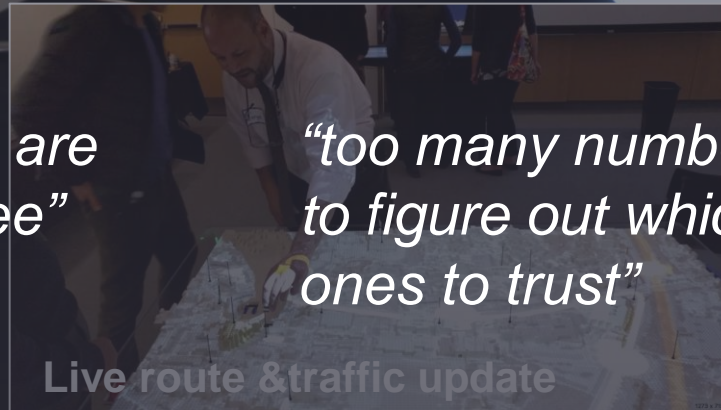


Station upgrade



Landmarks

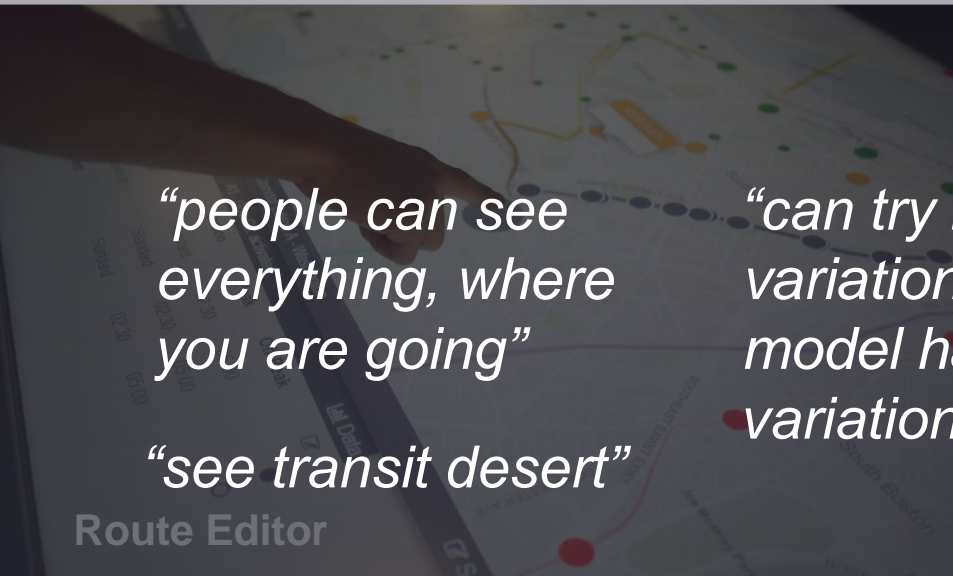
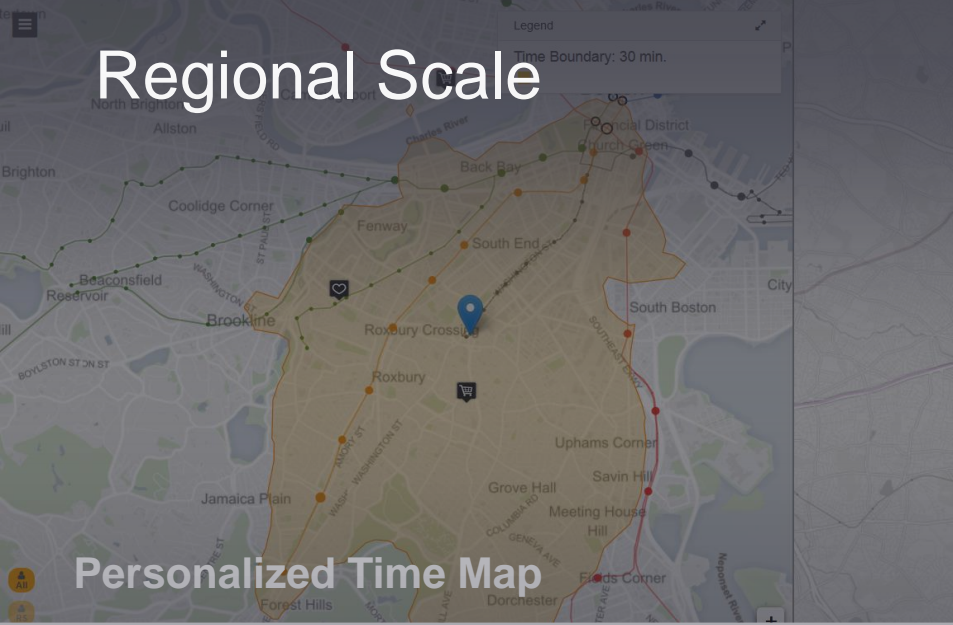
"tradeoffs are hard to see"



Live route & traffic update

"too many numbers to figure out which ones to trust"

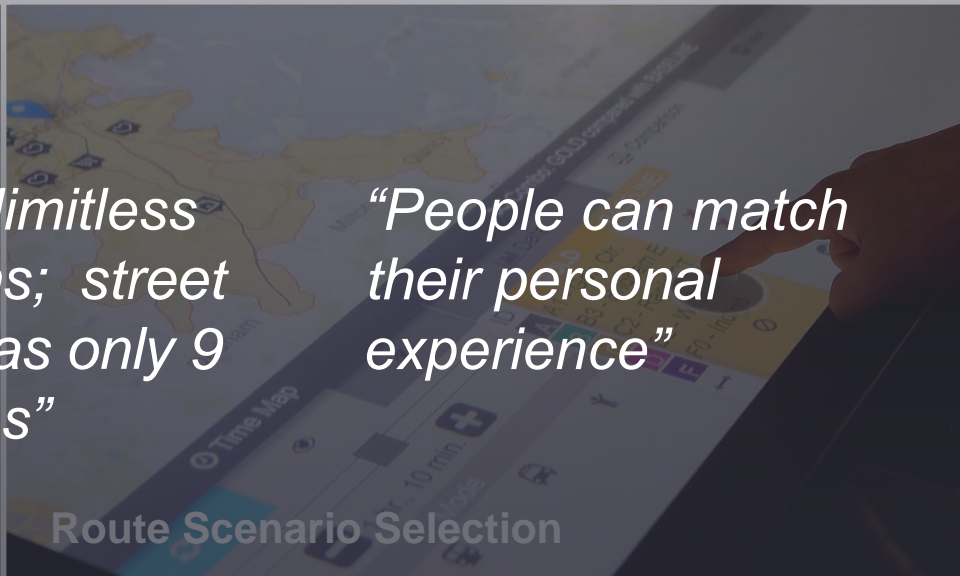
Regional Scale



“people can see everything, where you are going”

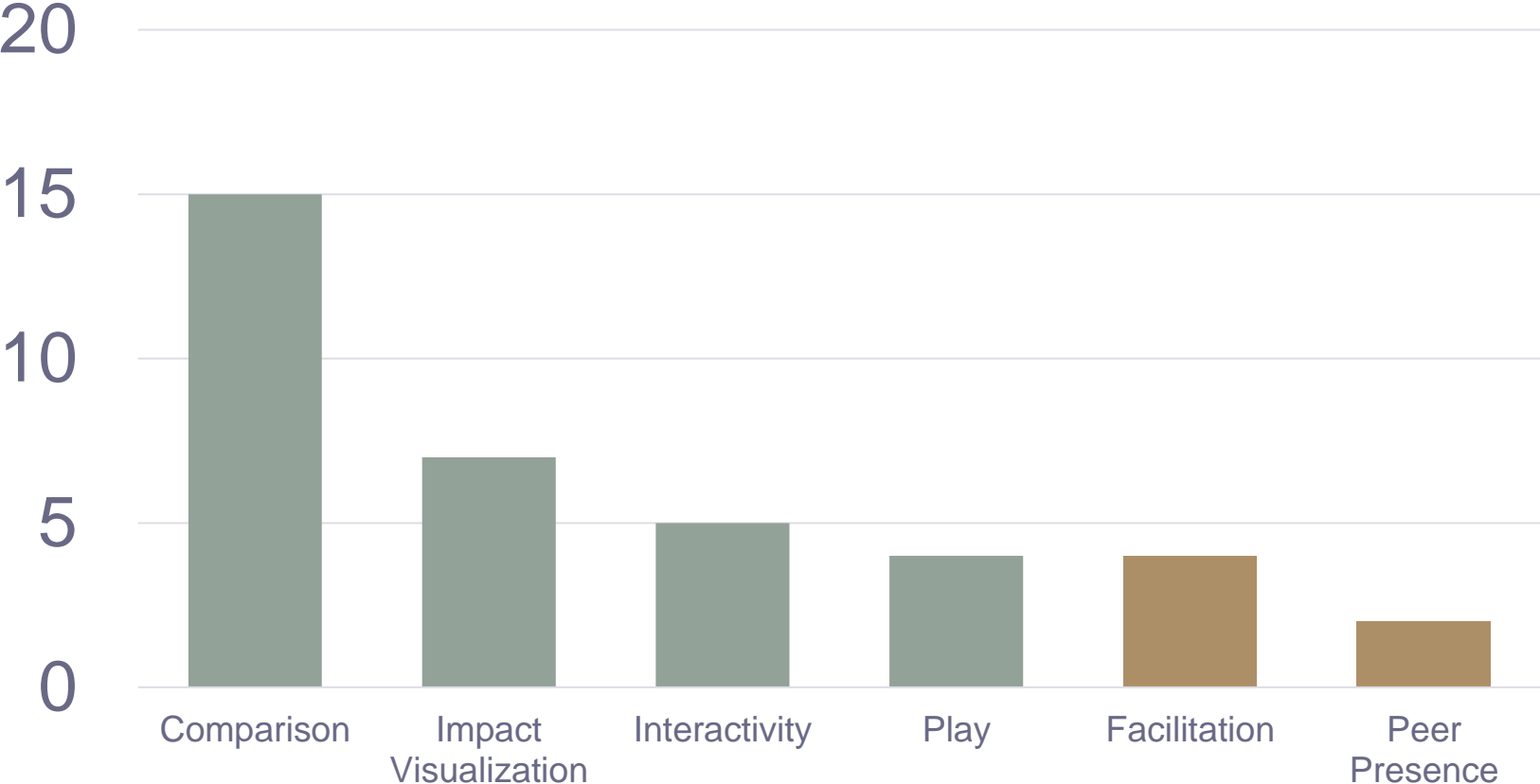
“see transit desert”

“can try limitless variations; street model has only 9 variations”



“People can match their personal experience”

Data comparison & visualization most compelling



DESIGN FEATURES
Personalization



Sam

SUBMIT

you're done:

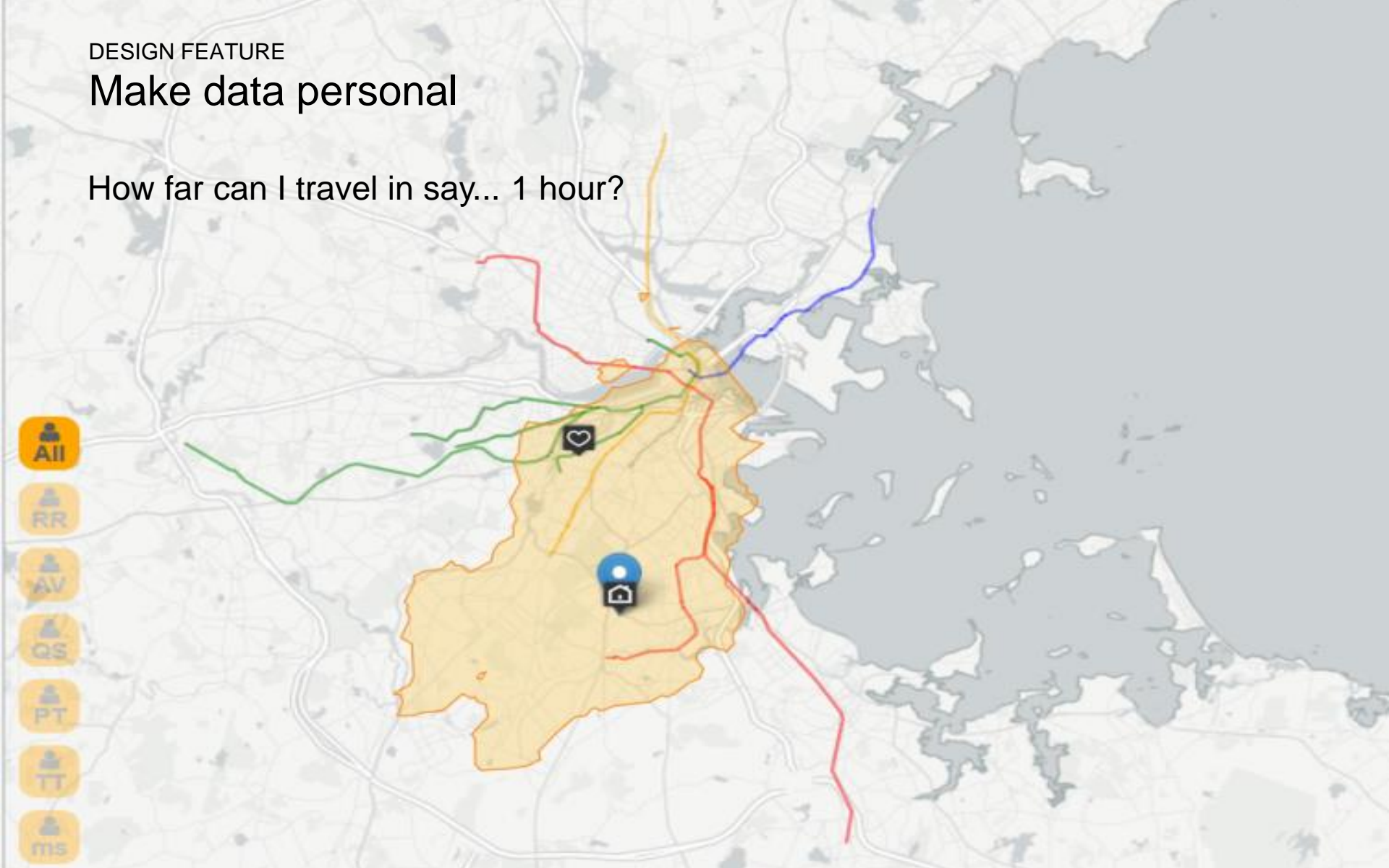
Google

Map interface showing streets (e.g., Squire Rd, Park Rd, Recreation Rd, Golf Course, School, Home, Work, Shopping, Recreation) and a vertical menu of categories: HOME, WORK, SHOPPING, SCHOOL, RECREATION.

DESIGN FEATURE

Make data personal

How far can I travel in say... 1 hour?



DESIGN FEATURE

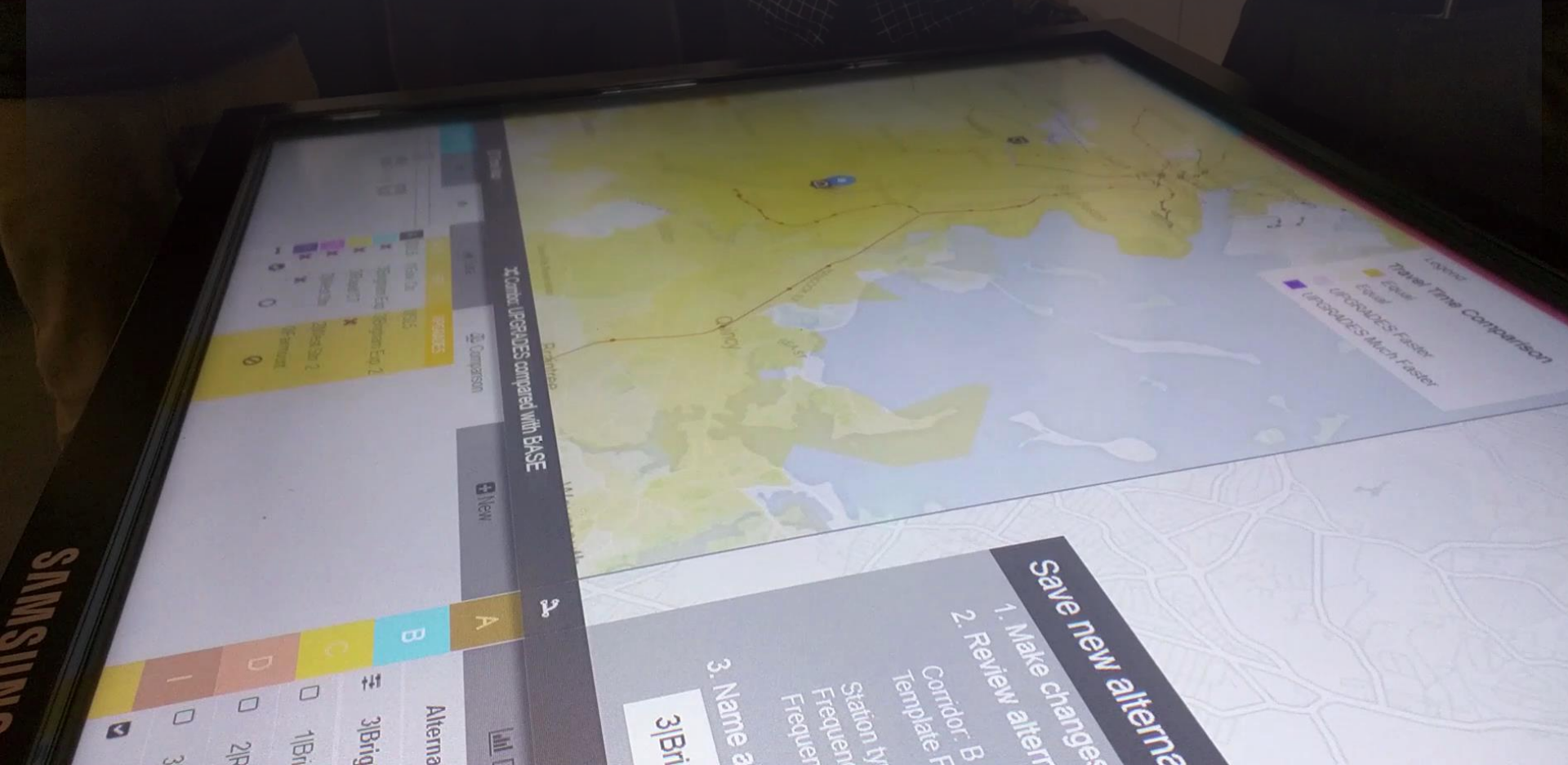
Make data personal

1 hour 15min?



DESIGN FEATURES

Instant, Comparable Output



Limitations

- Representativeness of participants and sample size....
- Cross-workshop variation...
- No control group
- Technical glitches
- Limited “interactivity”, block-box-“ness” remains
- Not enough time: 2-hour workshop windows (30 mins per tool)



Conclusions

- Some evidence of learning: individual and double-loop
- Learning mechanisms:
 - interaction with the tools
 - conversing with others and relating to their points of view
 - questioning of the tools and their assumptions, and
- Street-scale tool: easiest to use
- Regional-scale tool: most relevant and credible
- Findings indicative....

Partners:



Sponsor:



Thanks to:

- Ryan Chin (co-PI), Ariel Noyman, Ira Winder, Kuan Butts, Allentza Michel, Deborah Perrotta, Marcos Paulo Schlickmann
- Conveyal: Matt Conway, Trevor Gerhardt, and Kevin Webb

CoAXs

Inputs and Analysis Modules

