

BRT AND ACCESSIBILITY: INNOVATIVE, INTERACTIVE TOOLS FOR PARTICIPATORY PLANNING

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Planning

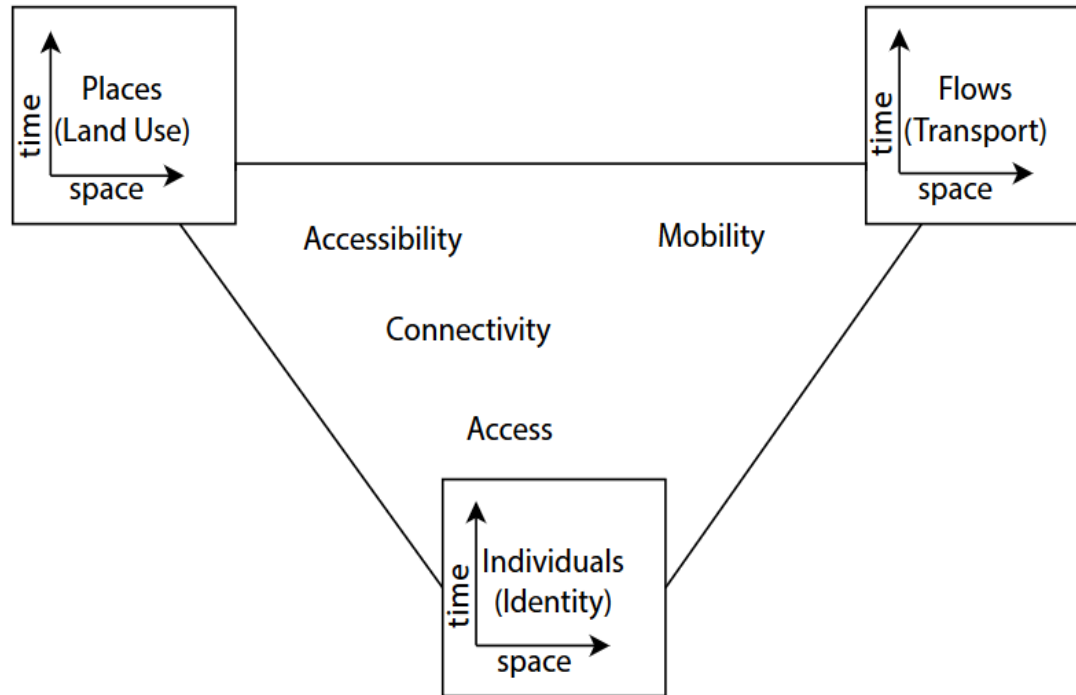
Dept. of Urban Studies and Planning, MIT



Motivations and Enablers

- Accessibility as fundamental concept
- BRT: Potential and polemics
- Need for more meaningful citizen engagement
- Open-data related technologies

Accessibility: Mobility's “end goal”



BRT: Contentious Implementation

- Substance and Process
- Winners, Losers across urban space
- Backlash against pre-conceived solutions....



STOP Ashland Ave. Bus Rapid Transit GO Modern Ashland Bus



**CTA's #9 Ashland bus is slow and ends at Irving Park Rd.
Instead of improving the bus, Mayor Emanuel and CTA want:**

- Eliminate Ashland's northbound & southbound center vehicle lanes and left turns
- Install \$200 million bus rapid transit (BRT) in the center vehicle lanes
- Also continue operating #9 bus with no improvements in single traffic lanes
- Eliminate Ashland Avenue as one of Chicago's few north-south arterial streets

**Ashland-Western Coalition wants a better bus without BRT.
Modern Ashland Bus (MAB) is the best solution:**

- Bus stops every 1/4-mile and traffic-signal transponders for faster buses
- Heated bus shelters for Chicago's weather
- Citywide service past Irving Park Rd. to Clark St. in Andersonville
- Maintain Ashland's current lane configuration & left turns, save millions & millions in taxes

STOP Ashland BRT! GO Ashland MAB!

**Get informed & sign our petition to Mayor Emanuel:
Go to www.SaveAshland.com.**

Ashland-Western Coalition is a citywide advocacy group for better CTA buses on Ashland Avenue, Western Avenue and beyond. Visit www.SaveAshland.com today!

The MBTA's 28X Debacle, aka, Missed Opportunity

By [Steve Poflak](#) | [Boston Daily](#) | August 31, 2011 9:08 a.m.

[f Recommend](#) 0 [t Tweet](#) 0 [s Share](#)

What's the 28X? It was the MBTA's attempt to put a version of bus rapid transit on the [existing 28 bus line](#).

Route 28X would have converted portions of the bus route, particularly on Blue Hill Avenue, into a dedicated bus lane. It would have implemented many of the principles of [bus rapid transit](#), like the dedicated lane and more widely spaced station stops, to allow faster service and greater throughput for one of the system's most heavily used bus lines.

And it would have done it with the help of federal funds and at an incremental cost to the existing system (as opposed to a large greenfield capital expense). As this space has noted before, there's [no money out there for major expansion projects](#) and the [only feasible system improvements take an incremental approach](#).

Bus rapid transit should be part of this toolkit. I'm sure that several readers will bring the flaws of the Silver Line to my attention, that's an important source of lessons for future bus rapid transit (which I'll address in a separate post).

Trending: [Daredevil Dylan Polin Does Flip Over Red Line Tracks](#)

So, what happened to the 28X? In short, the community rejected it. The roll-out was clunky — in their apparent haste to introduce a seemingly can't-miss project with an identified federal funding source — the Administration [announced it at a news conference with community leaders, without informing the community leaders in advance](#).

Spatial Complexities

- Interactions between spatial scales complicate stakeholder engagement
- Benefits, and beneficiaries, sometimes difficult to identify
- Can tools for better spatial understanding help?



Co-Creation

- Producer-customer, direct engagement
- Moving away from the “black box” modeling approach
- Inclusive and authentic dialogue creates shared meaning and joint action possibilities



Buzz Santiago

TransitUC Transportation

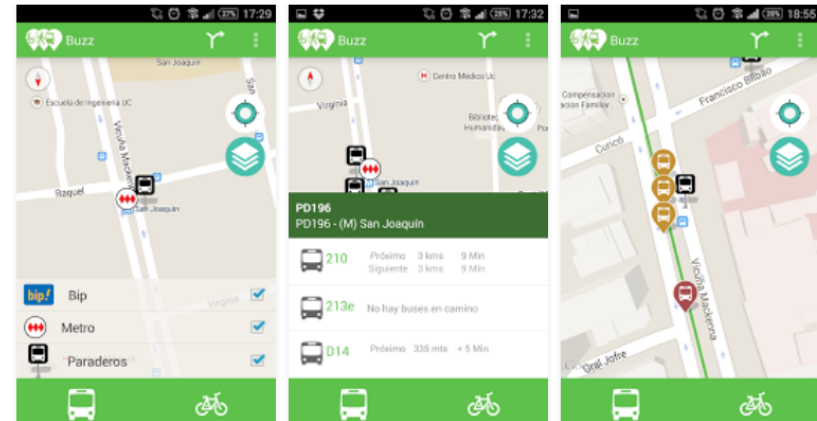
Everyone

Loading device compatibility...

★★★★★ 64

Add to Wishlist

Install



Goal

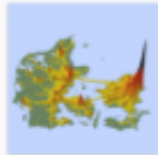
Develop a web-based platform to enable
stakeholder engagement for
mutual learning about
transit corridor planning and
accessibility benefits built on
interactive spatial visualization tools

Existing Tools – Accessibility

Accessibility Instruments list

Showing all 24 results

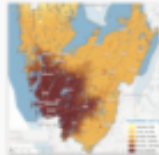
Default sorting



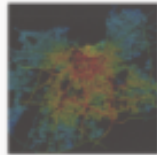
ABICA



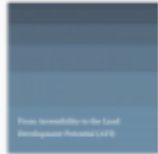
ACCALC



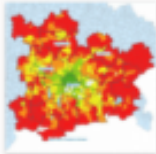
Accessibility Atlas
Västtra Götaland



ASAMeD



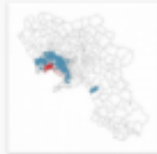
ATI



EMM



GDAI



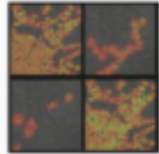
GraBAM



HIMMELI



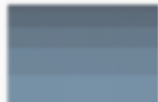
IMaFa



InViTo



JAD



| | |
|-----------------|----|
| Street | 4 |
| Neighbourhood | 9 |
| Municipal | 18 |
| Supra-Municipal | 16 |
| National | 5 |
| Supra-National | 3 |

TRANSPORT MODES

| | |
|------------------|----|
| Other | 2 |
| Metro | 9 |
| Tram | 10 |
| Train | 11 |
| Bus | 11 |
| Any Modes | 3 |
| Walking | 12 |
| Bicycle | 11 |
| Public Transport | 14 |
| Car | 13 |
| Plane | 1 |
| Truck | 2 |

TRIP PURPOSES / OPPORTUNITIES

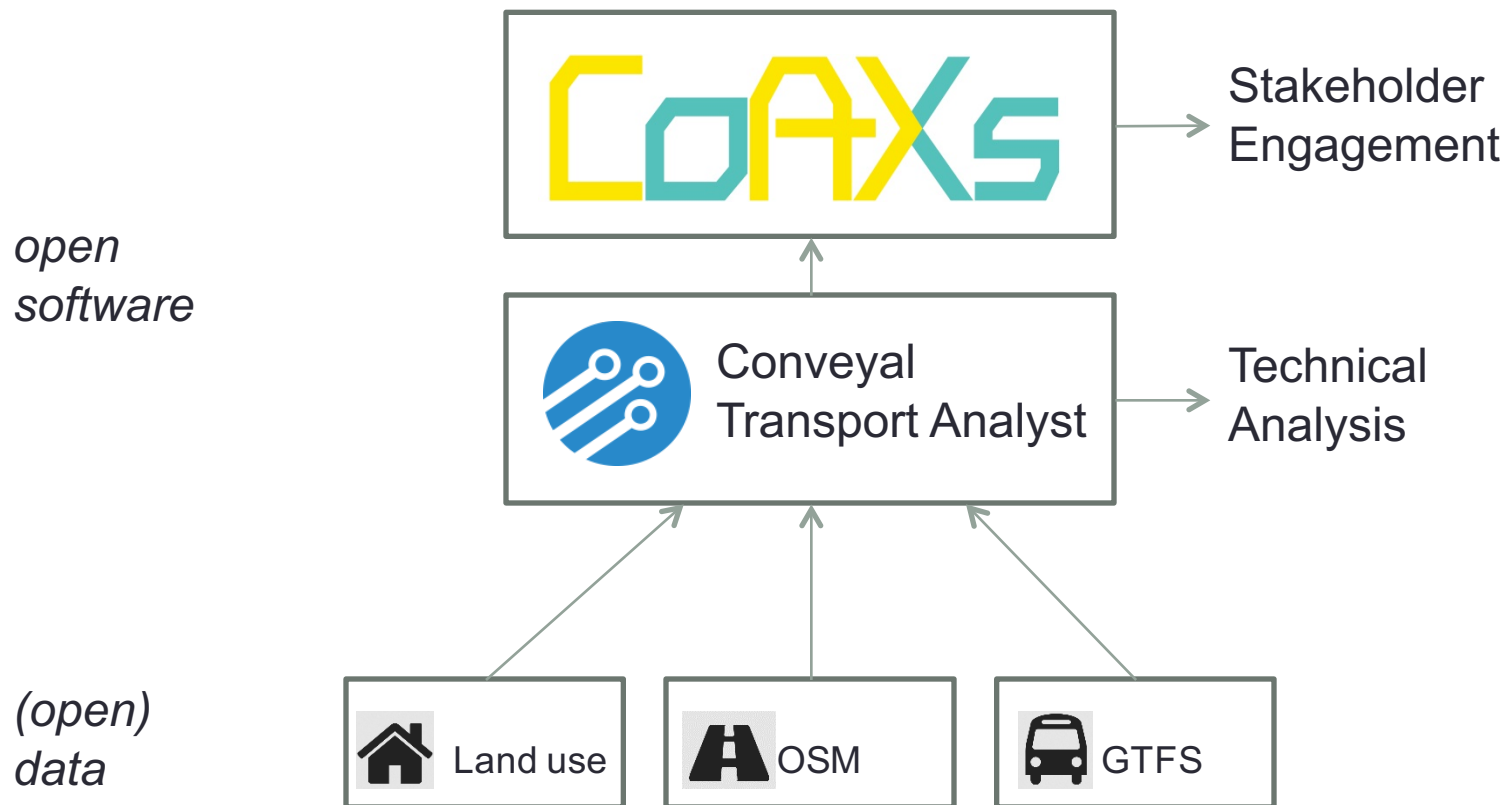
| | |
|----------------------------------|---|
| All purposes (aggregate measure) | 5 |
| Work | 7 |
| Leisure | 5 |
| Healthcare | 4 |
| Shopping | 7 |
| Education | 4 |
| No purpose / not applicable | 4 |

<http://accessibilityplanning.eu>

Open Planning Tools

- Core tool: Open Trip Planner
 - Travel planning (multi-path)
 - Analysis (isochrones and cumulative measures)
 - Scenario management
- Emerging interoperability with other tools
 - Conveyal Transport Analyst
 - SUMO – Traffic microsimulation
 - Media Lab CityScope – Augmented tangible models
- Common use of Open Street Maps, GTFS

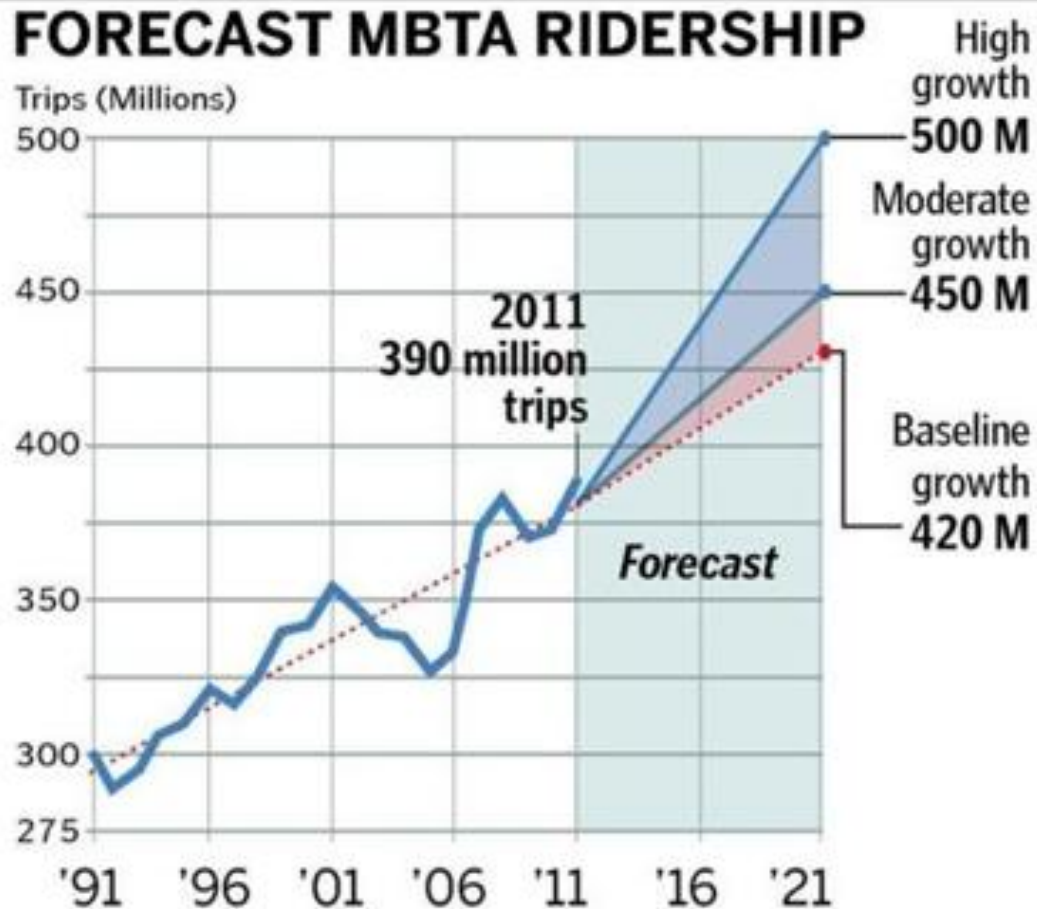
Open Planning Tools



CONTEXT

Greater Boston

Demand is Growing



The Boston Globe

Funding is tight

▸ MBTA is staring down a financial paradox

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



DINA RUDICK/GLOBE STAFF

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

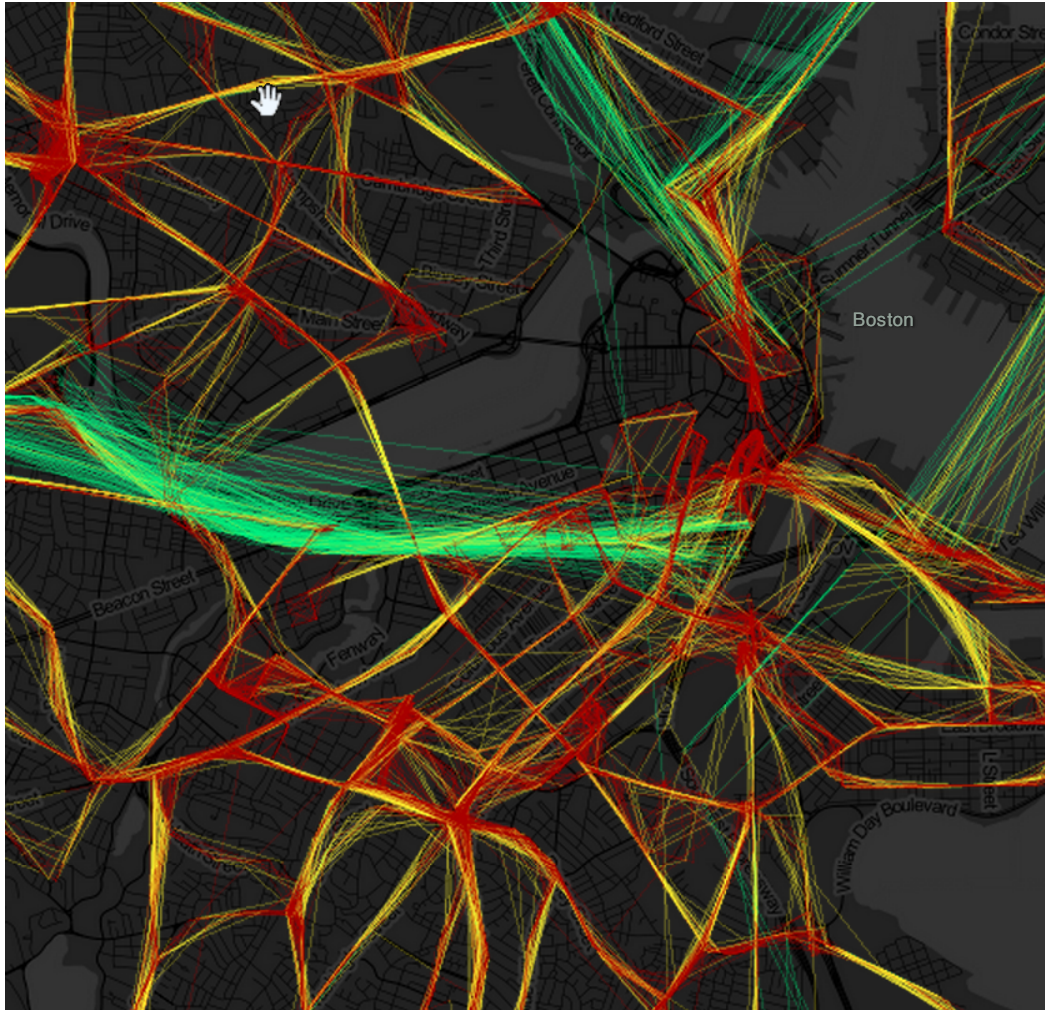
By David Scharfenberg | GLOBE STAFF MARCH 09, 2015

The Boston Globe

What about buses?



Buses experience a lot of delay



Tuesday
September 22,
2015
8:30 AM

Can we do better?



Can we do better?



Can we do better?

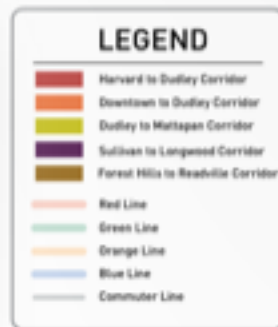


BOSTONBRT

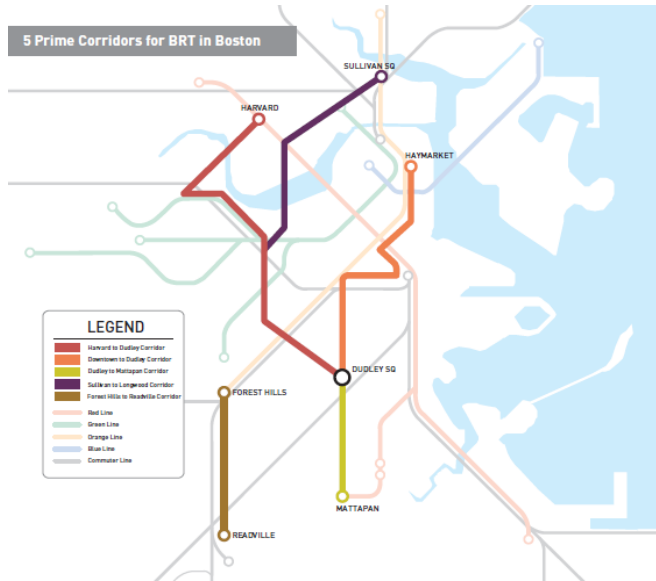
IMAGINE A MORE MODERN,
EFFICIENT & FASTER BOSTON.

Bus Rapid Transit: An innovative transit system that will
improve mobility in Greater Boston.

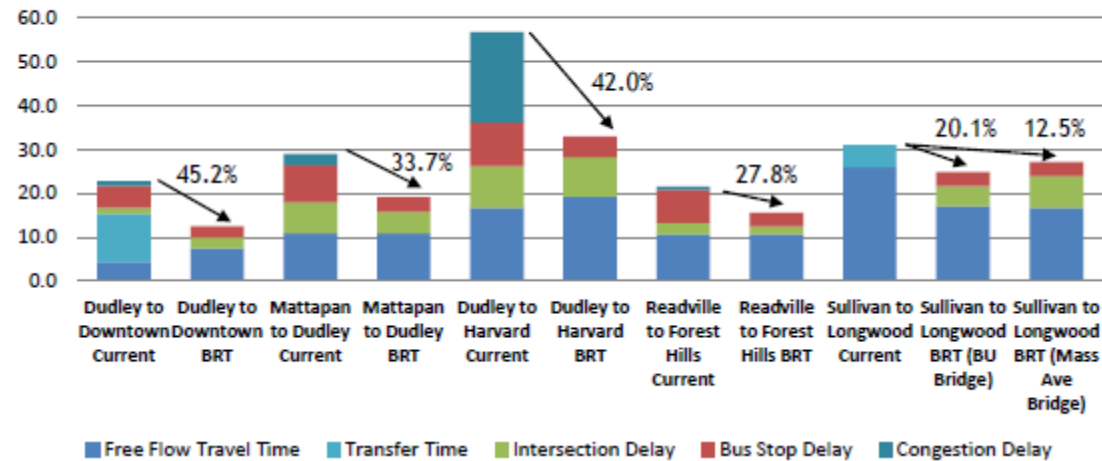
BETTER RAPID TRANSIT FOR GREATER BOSTON



Abstract Space



Travel Times With and Without Gold-Standard BRT



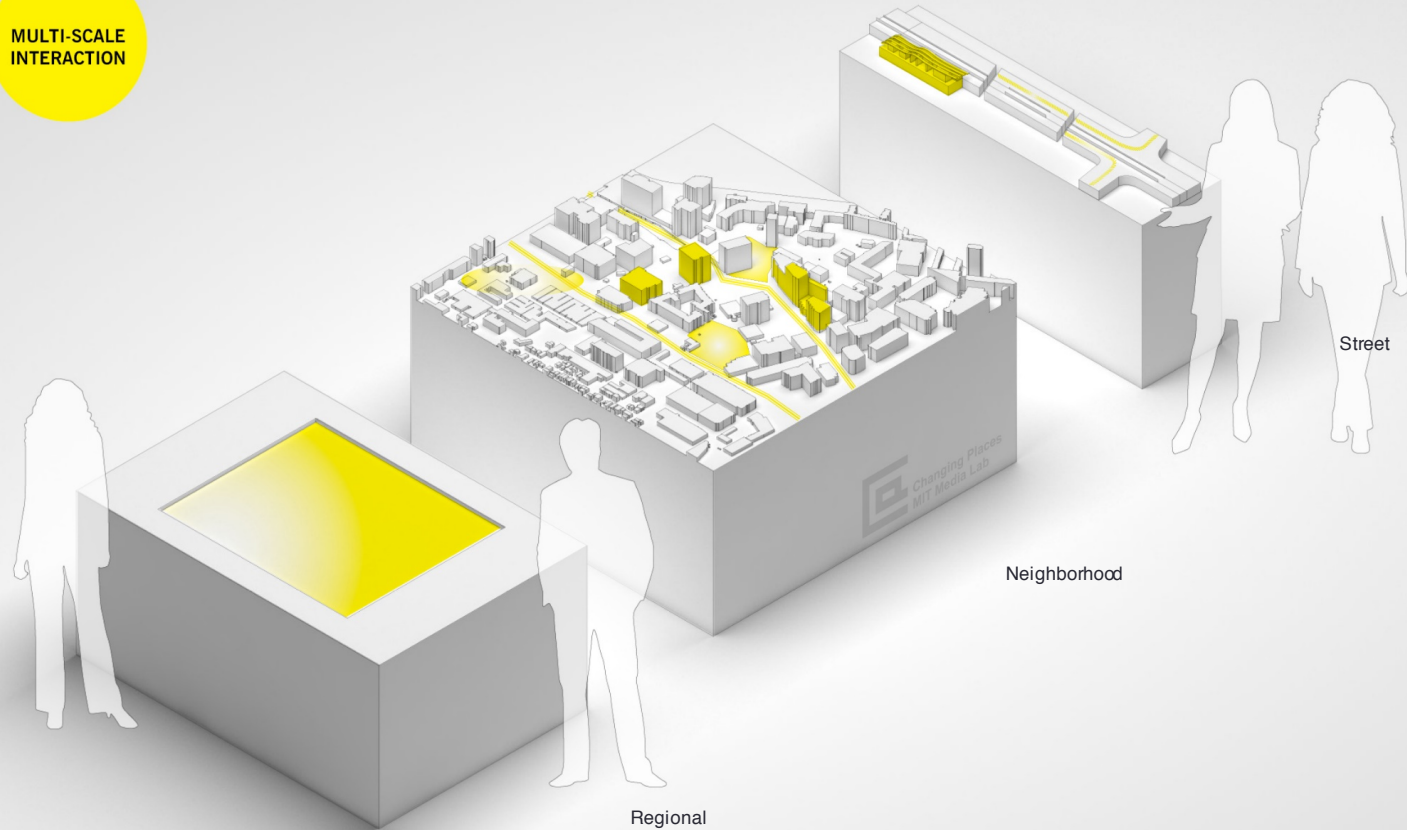
From BostonBRT Study Group Report

CAN NEW TOOLS HELP?

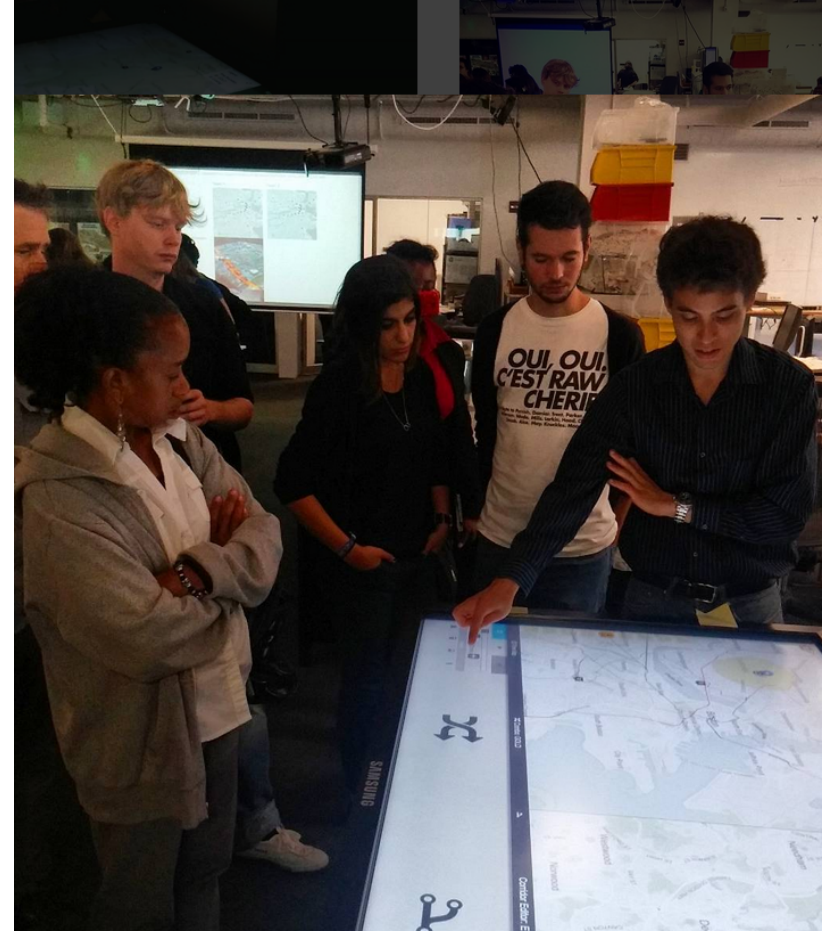
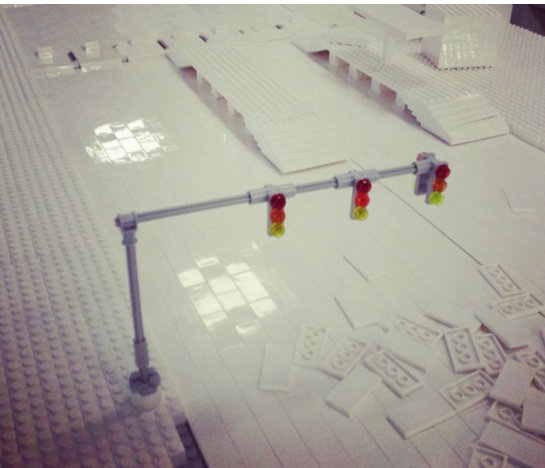
Experimental Public Workshops

At multiple scales

MULTI-SCALE
INTERACTION

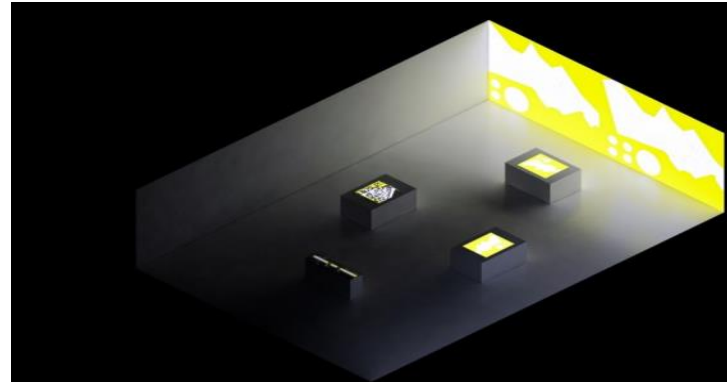


Suite of Tools



Pilot Testing

- Four potential BRT corridors in Boston
- Initial testing: June, 2015; Sept. 2015
- Public workshops: October, 2015
- Evaluation: extent to which different stakeholder groups
 - Engage with the different scales/tools and each other (**interaction and imagination**)
 - Learn about projects and potential impacts (**substantive/reported learning**)
 - Trust the mapping tools (**perceived accuracy**)
 - Trust the engagement process built around the mapping tools (**double loop learning**)



Public Workshops

Public Workshops

October 7-14



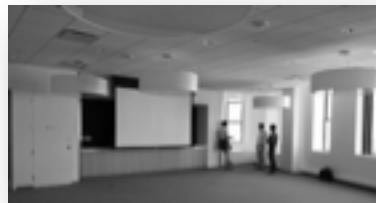
DUDLEY SQUARE

Key node in BRT Study Group Report



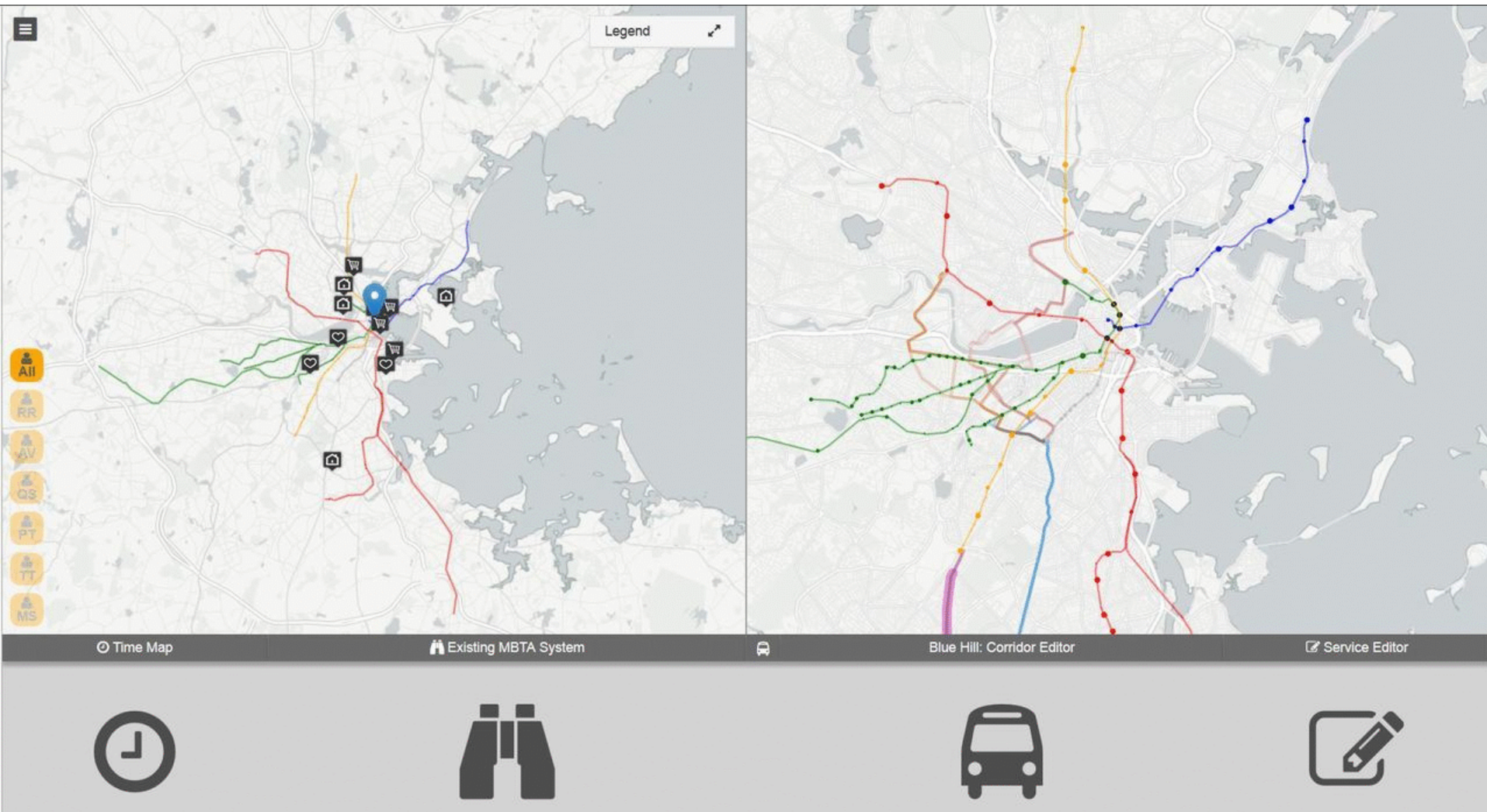
BOLLING BUILDING

Neighborhood icon

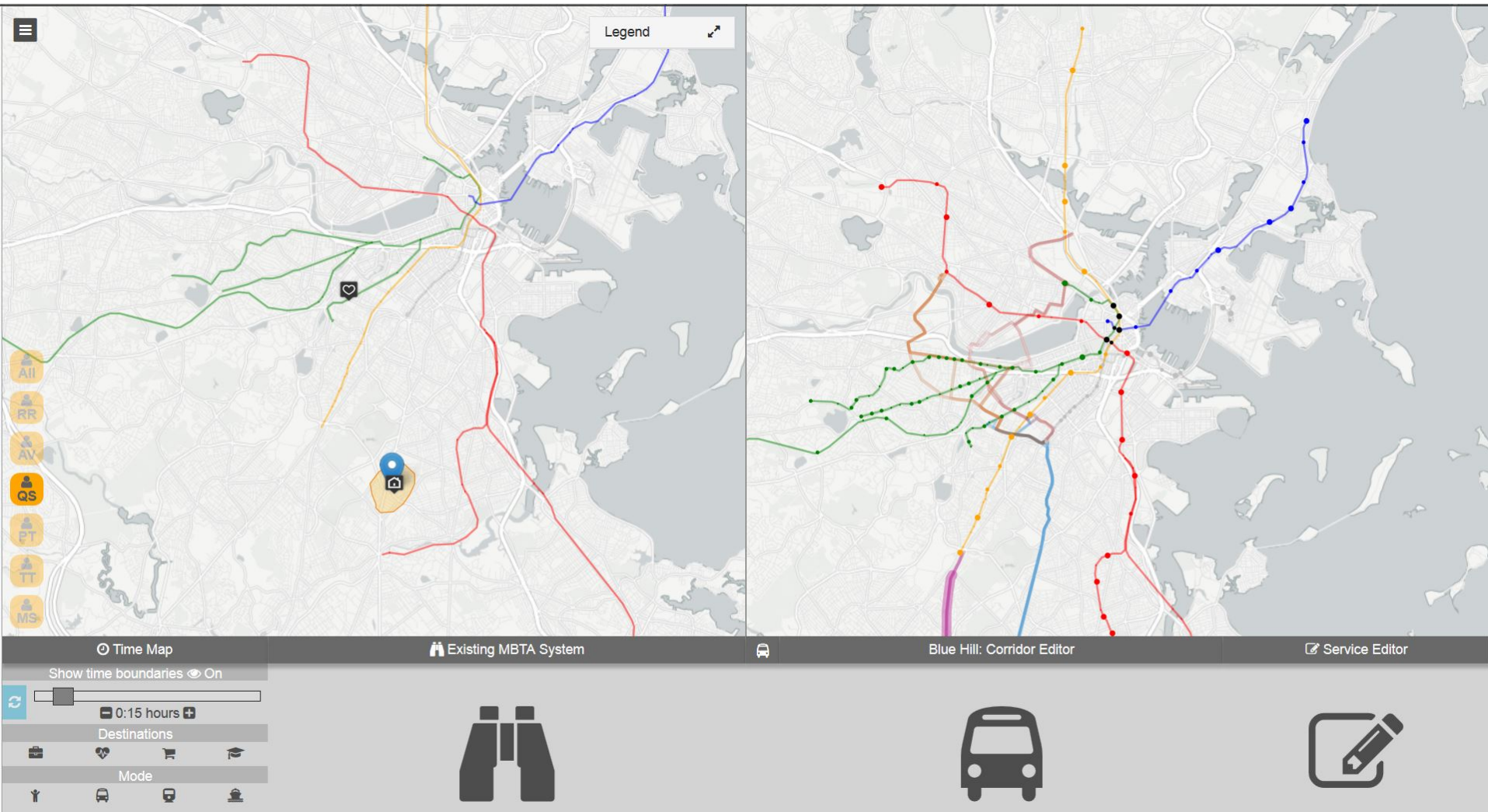


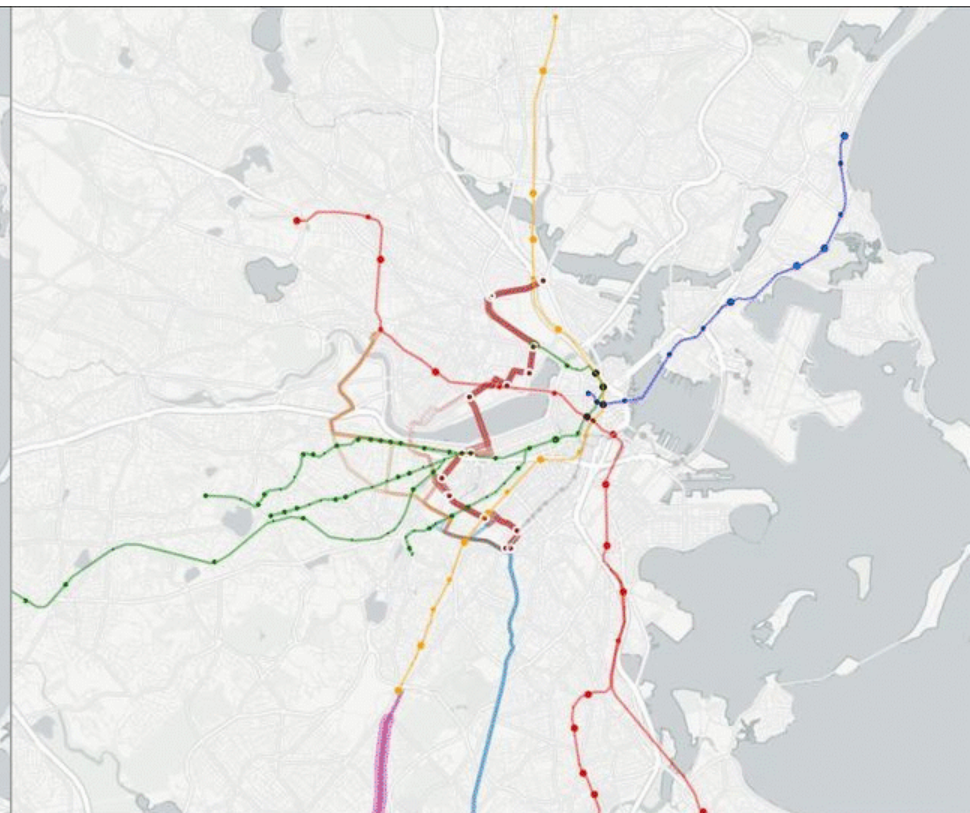
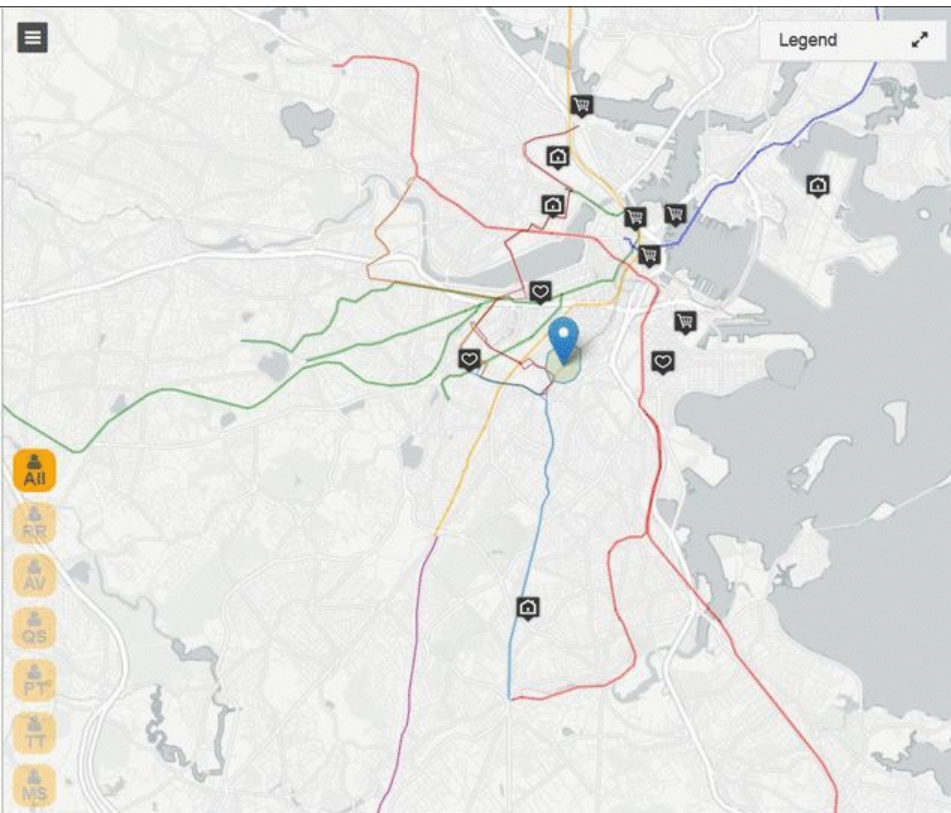
ROXBURY INNOVATION CENTER

Active new community space



WHERE DOES TRANSIT
PROVIDE ACCESS TODAY?





Time Map

Show time boundaries ☒ On

0:10 hours

Destinations

Mode

Scenario BenchmarkBRT Compared with Baseline

| ID | Baseline | BenchmarkBRT |
|----|---------------|----------------|
| BH | ✓ Blue Hill 0 | ✓ Blue Hill 3 |
| HP | ✓ Hyde Park 0 | ✓ Hyde Park 2 |
| HD | ✗ None | ✓ Harvard-Dud |
| CT | ✗ None | ✓ Sullivan-Dud |

Sullivan-Dudley: Corridor Editor

Sullivan-Dudley 2B selected.

View Scorecard

| Name | Station | Peak | Off-Peak | Modifying |
|--|-------------|-------|----------|-----------|
| <input type="checkbox"/> Sullivan-Dudley 1 | Standard | 02:30 | 05:00 | |
| <input type="checkbox"/> Sullivan-Dudley 2 | Standard | 02:30 | 05:00 | |
| <input checked="" type="checkbox"/> Sullivan-Dudley 2B | BRT Station | 02:30 | 05:00 | |

Service Editor

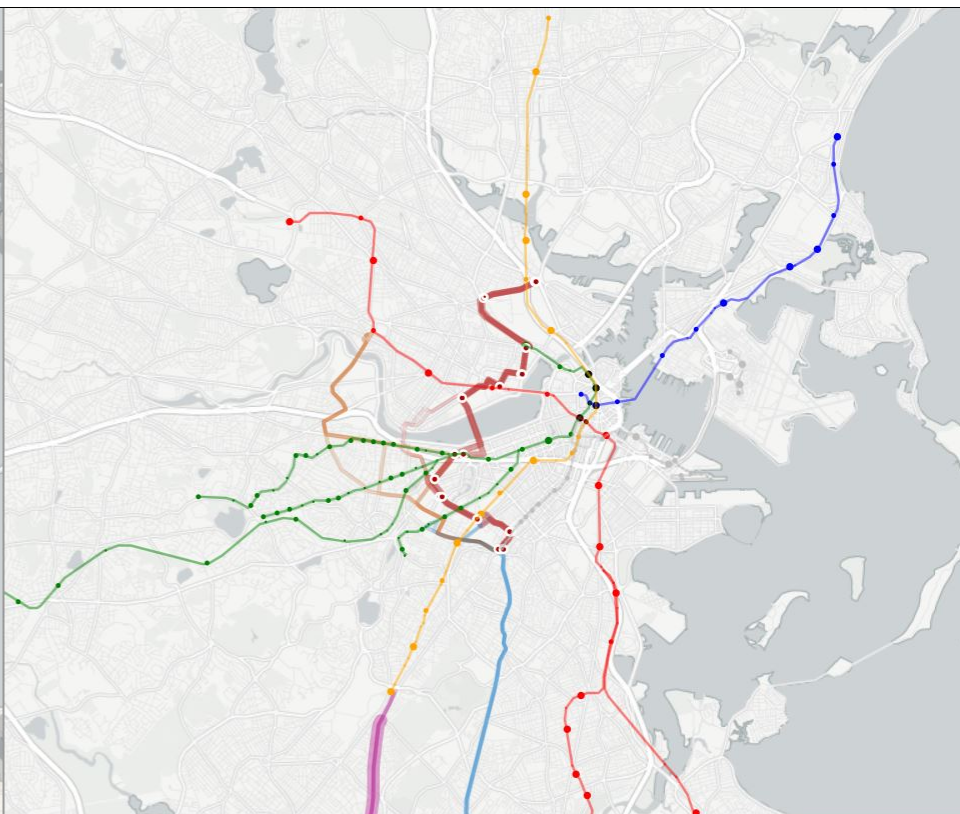
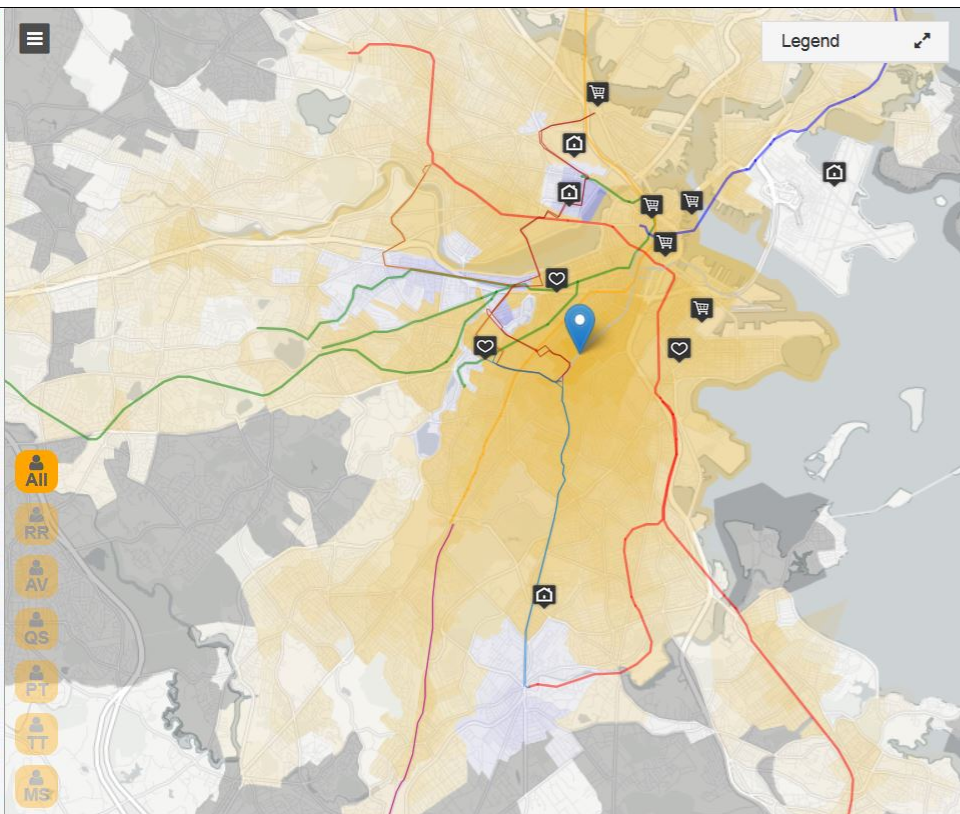
Set Average Wait Times

02:30 Peak

05:00 Off-Peak

Station Type

HOW COULD IMPROVED CORRIDORS IMPACT ACCESS?



Time Map

Show time boundaries ☐ Off

0:30 hours +

Destinations

Mode

Scenario BenchmarkBRT Compared with Baseline

| ID | Baseline | BenchmarkBRT |
|----|---------------|----------------|
| BL | ✓ Blue Hill 0 | ✓ Blue Hill 3 |
| HP | ✓ Hyde Park 0 | ✓ Hyde Park 2 |
| HC | ✗ None | ✓ Harvard-Dud |
| SD | ✗ None | ✓ Sullivan-Dud |

Scorecard Compare Scenarios ☐ New Scenario

Sullivan-Dudley: Corridor Editor

Sullivan-Dudley 2B selected. View Scorecard

| Name | Station | Peak | Off-Peak | Modifying |
|--|-------------|-------|----------|----------------------------------|
| <input type="checkbox"/> Sullivan-Dudley 1 | Standard | 02:30 | 05:00 | <input type="radio"/> |
| <input type="checkbox"/> Sullivan-Dudley 2 | Standard | 02:30 | 05:00 | <input checked="" type="radio"/> |
| <input checked="" type="checkbox"/> Sullivan-Dudley 2B | BRT Station | 02:30 | 05:00 | <input checked="" type="radio"/> |
| <input checked="" type="checkbox"/> Current | BRT Station | 02:30 | 05:00 | <input checked="" type="radio"/> |

Service Editor

Set Average Wait Times

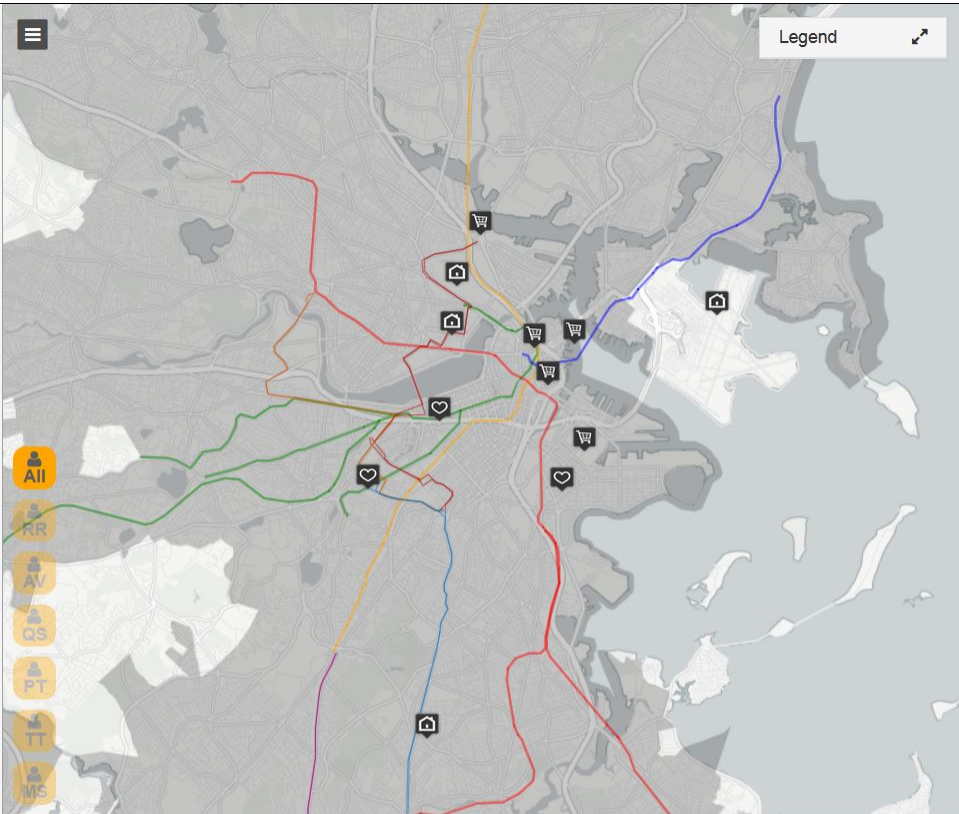
02:30 Peak

05:00 Off-Peak

Station Type

Normal Platform BRT ☒ Save

WHAT ARE ALTERNATIVES AND TRADEOFFS?



Route Scorecard

23

Bus Stops

14.0

Miles Round-Trip

1:11

Peak Round-Trip

6

Vehicles

Standard: 0%

Platform: 0%

BRT Station: 100%

Non-dedicated: 100%

Dedicated: 0%

Moving: 92%

Loading: 8%

\$ 23,000,000

Cost of stations construction

\$ 0

Dedicated lane construction

\$ 4,241,840

Annual Cost of Operations

Time Map

Show time boundaries Off

0:30 hours

Destinations

Mode

Scenario BenchmarkBRT Compared with Baseline

| ID | Baseline | BenchmarkBRT |
|----|---------------|----------------|
| BH | ✓ Blue Hill 0 | ✓ Blue Hill 3 |
| HP | ✓ Hyde Park 0 | ✓ Hyde Park 2 |
| HD | ✗ None | ✓ Harvard-Dud |
| CT | ✗ None | ✓ Sullivan-Dud |

Scorecard

Compare Scenarios

New Scenario

Sullivan-Dudley: Corridor Editor

Sullivan-Dudley 2B selected. View Scorecard

| | Name | Station | Peak | Off-Peak | Modifying |
|-------------------------------------|--------------------|-------------|-------|----------|-----------|
| <input type="checkbox"/> | Sullivan-Dudley 1 | Standard | 02:30 | 05:00 | |
| <input type="checkbox"/> | Sullivan-Dudley 2 | Standard | 02:30 | 05:00 | |
| <input checked="" type="checkbox"/> | Sullivan-Dudley 2B | BRT Station | 02:30 | 05:00 | |
| <input checked="" type="checkbox"/> | Current | BRT Station | 06:00 | 06:00 | |

Service Editor

Set Average Wait Times

06:00 Peak

06:00 Off-Peak

Station Type

Normal Platform BRT

Save

Aggregate Benefits

O = {all residents, car-free households};

D = all jobs;

M = {existing transit service, existing transit augmented with proposed BRT};

T = 7 to 9 AM;

C = {30 minutes, 60 minutes}.

| | | Baseline | | BRT Scenario | | Percent Change | |
|----------------------------|---------------------|----------|---------|--------------|---------|----------------|--------|
| | | 30 min | 60 min | 30 min | 60 min | 30 min | 60 min |
| Average Resident | Number | 24,787 | 157,632 | 25,047 | 158,112 | 1.05% | 0.30% |
| | % of Regional Total | 1.08% | 6.84% | 1.09% | 6.86% | | |
| Average Car-Free Household | Number | 83,111 | 368,890 | 83,975 | 369,963 | 1.04% | 0.29% |
| | % of Regional Total | 3.61% | 16.01% | 3.64% | 16.06% | | |

Aggregate Benefits

O = {all residents, car-free households};

D = healthcare jobs;

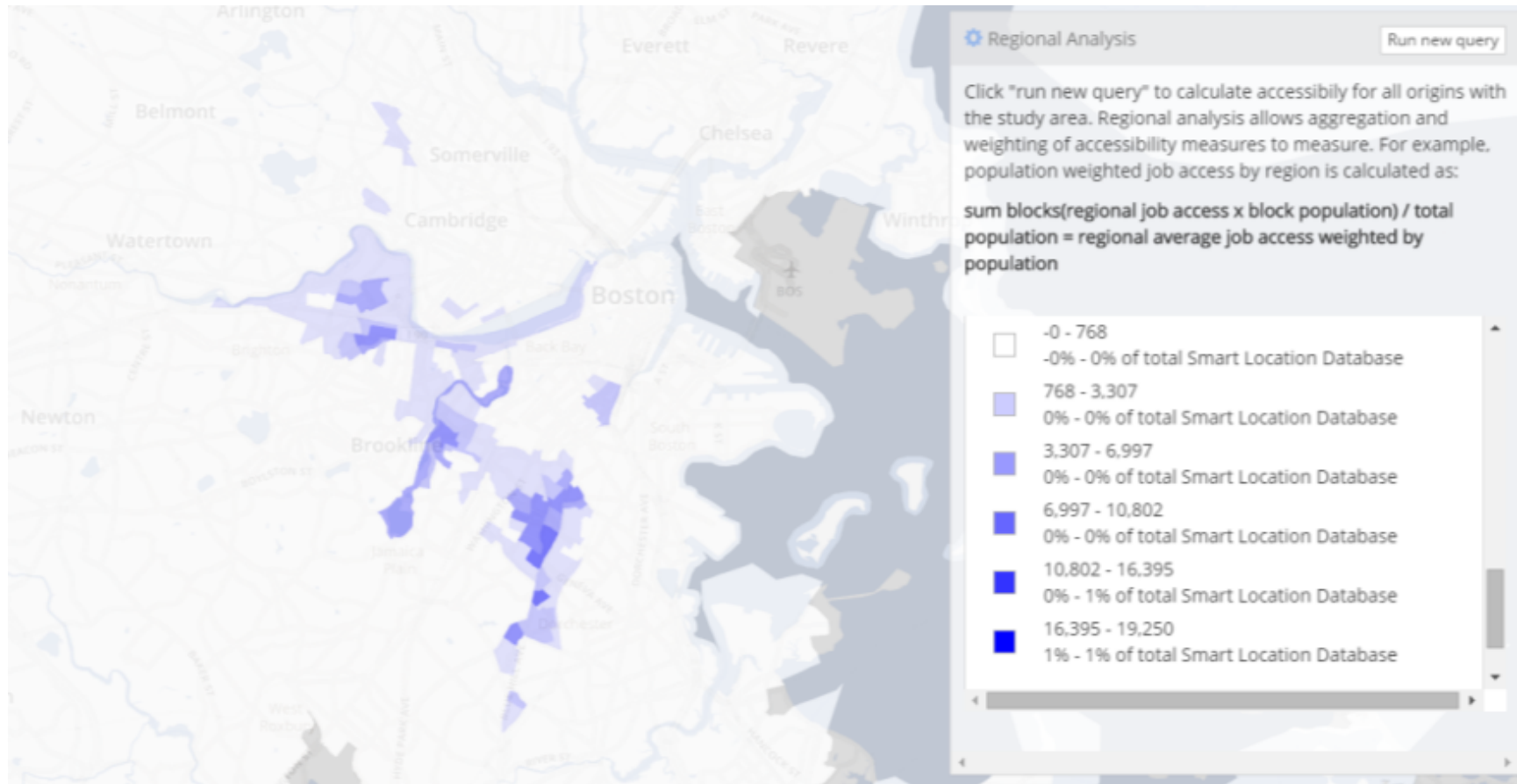
M = {existing transit service, existing transit augmented with proposed BRT};

T = 7 to 9 AM;

C = {30 minutes, 60 minutes}.

| | | Baseline | | BRT Scenario | | Percent Change | |
|----------------------------|---------------------|----------|--------|--------------|--------|----------------|--------|
| | | 30 min | 60 min | 30 min | 60 min | 30 min | 60 min |
| Average Resident | Number | 2,552 | 16,372 | 2,658 | 16,482 | 4.15% | 0.67% |
| | % of Regional Total | 0.90% | 5.77% | 0.94% | 5.80% | | |
| Average Car-Free Household | Number | 7,758 | 39,697 | 8,121 | 39,905 | 4.68% | 0.52% |
| | % of Regional Total | 2.73% | 13.98% | 2.86% | 14.05% | | |

Aggregate Benefits

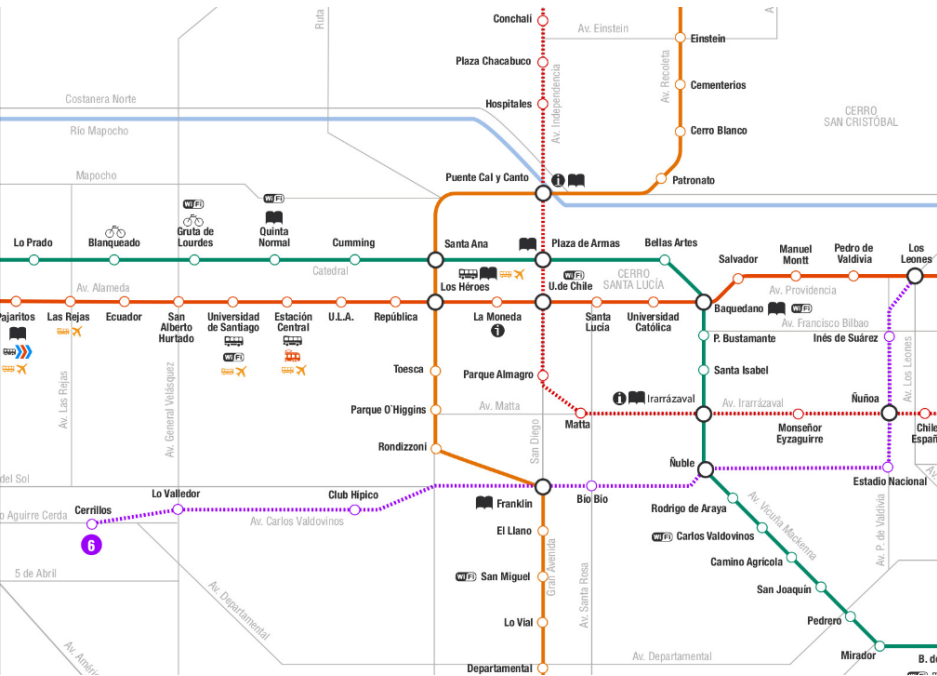


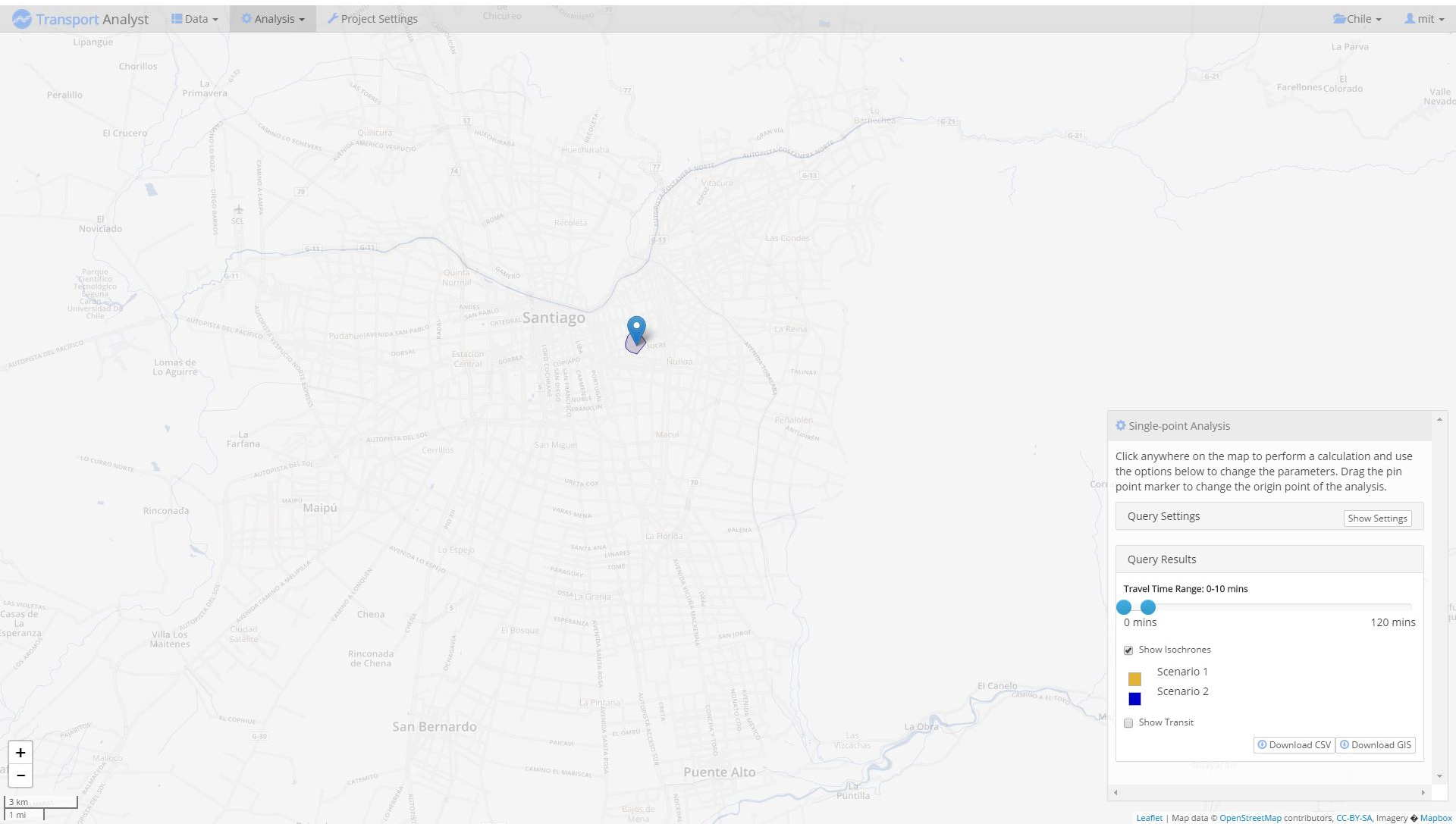
TRIAL VERSION

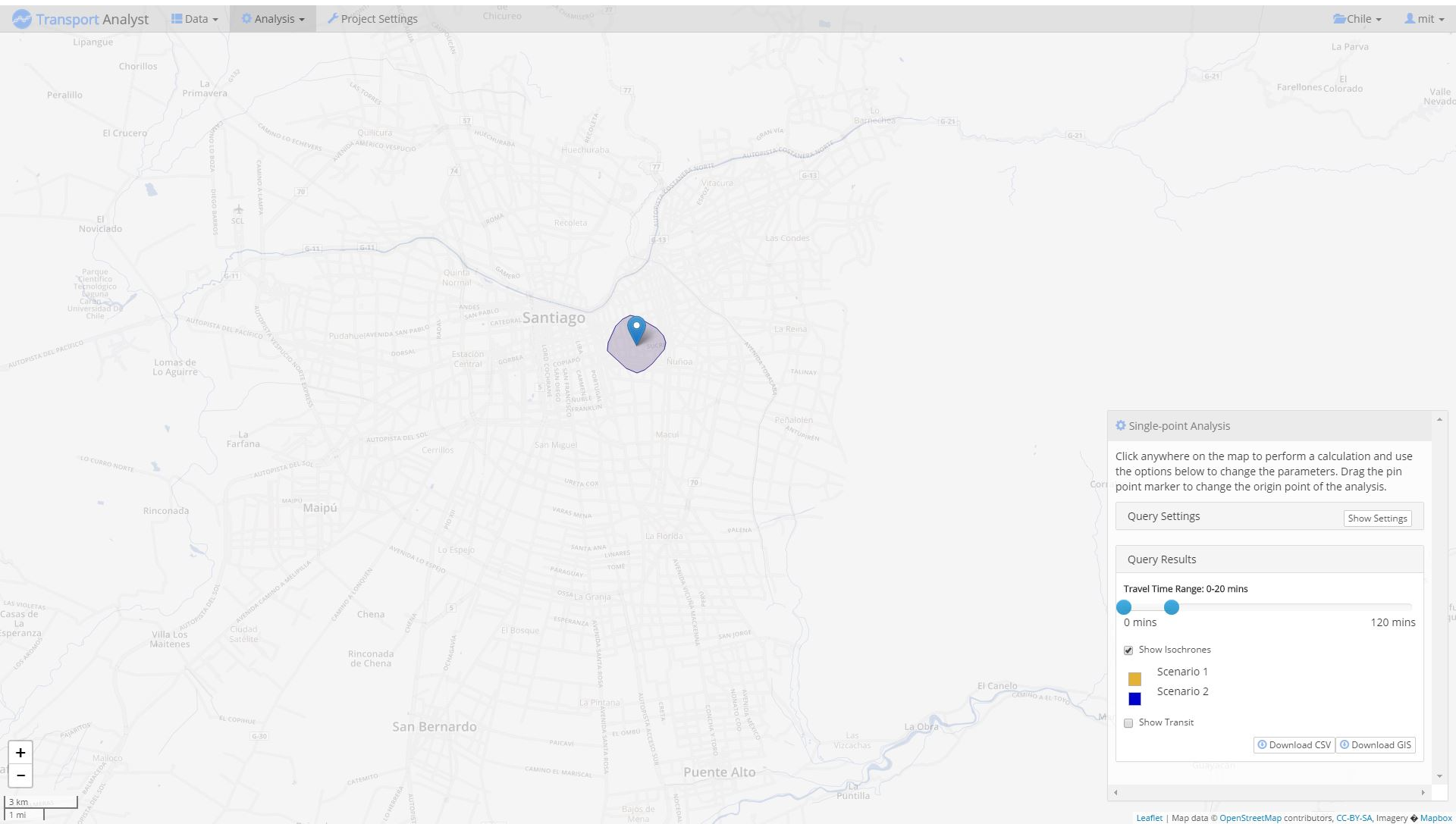
Santiago

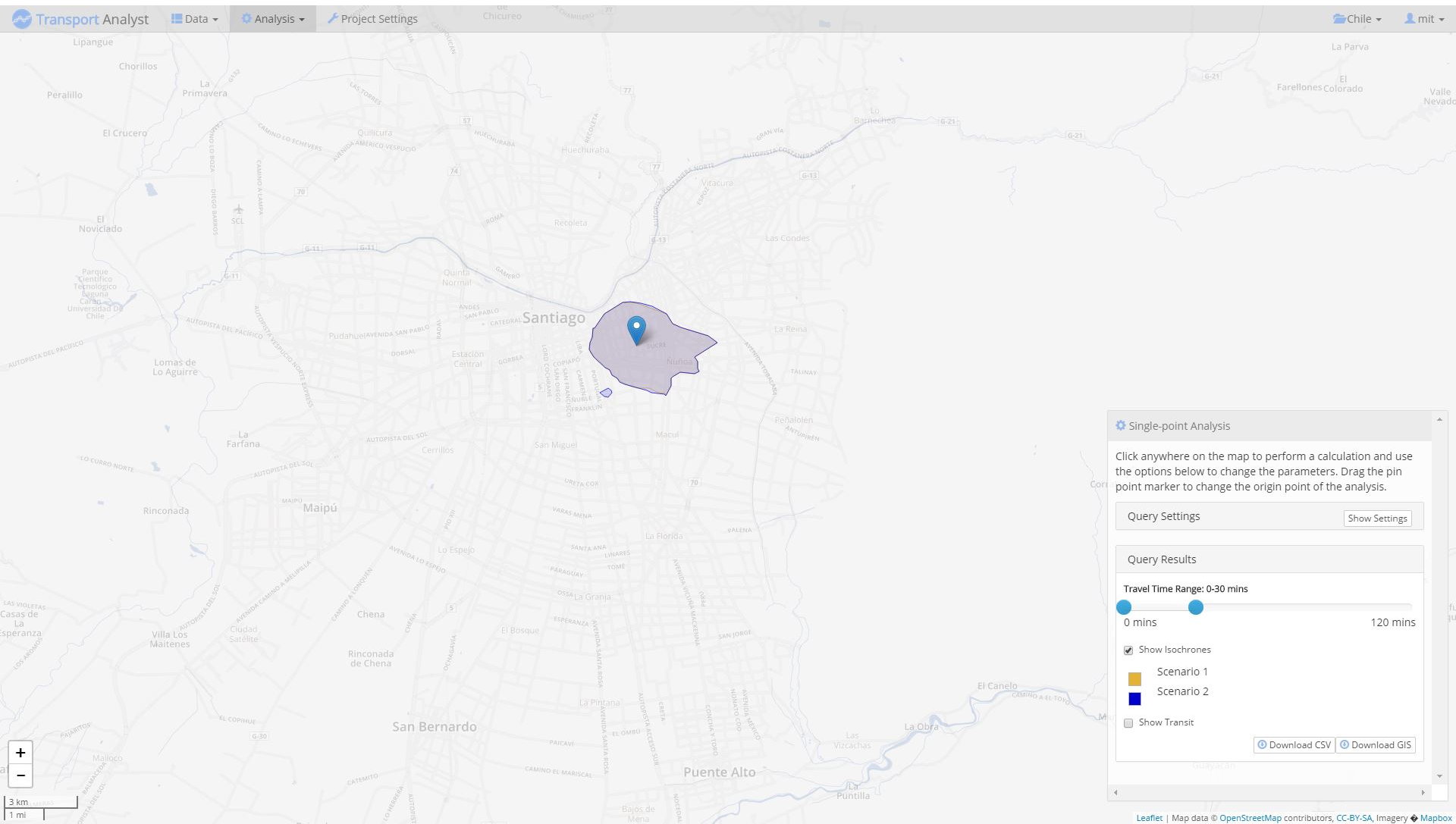
Metro Line 6

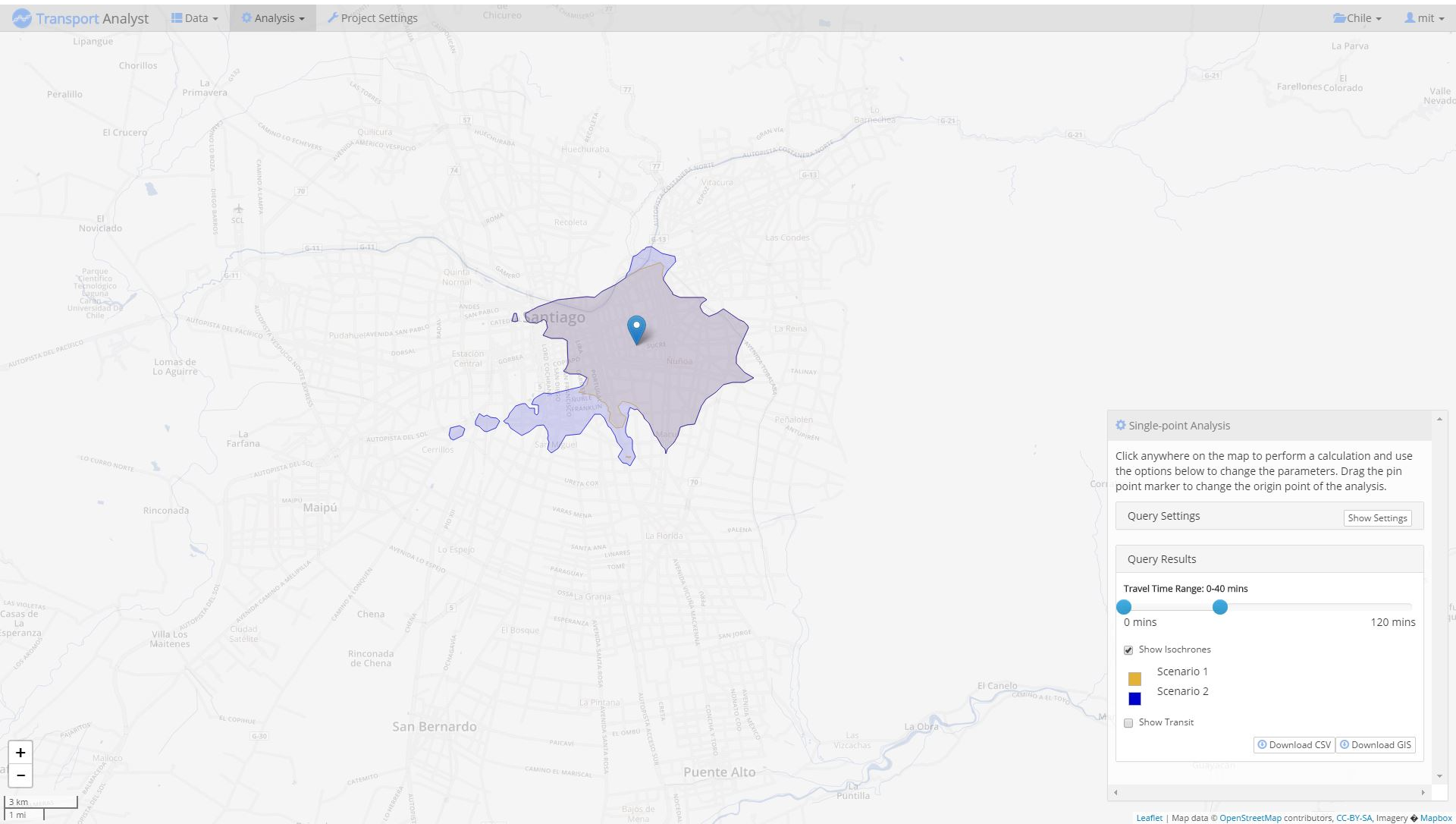
Metro Line 6

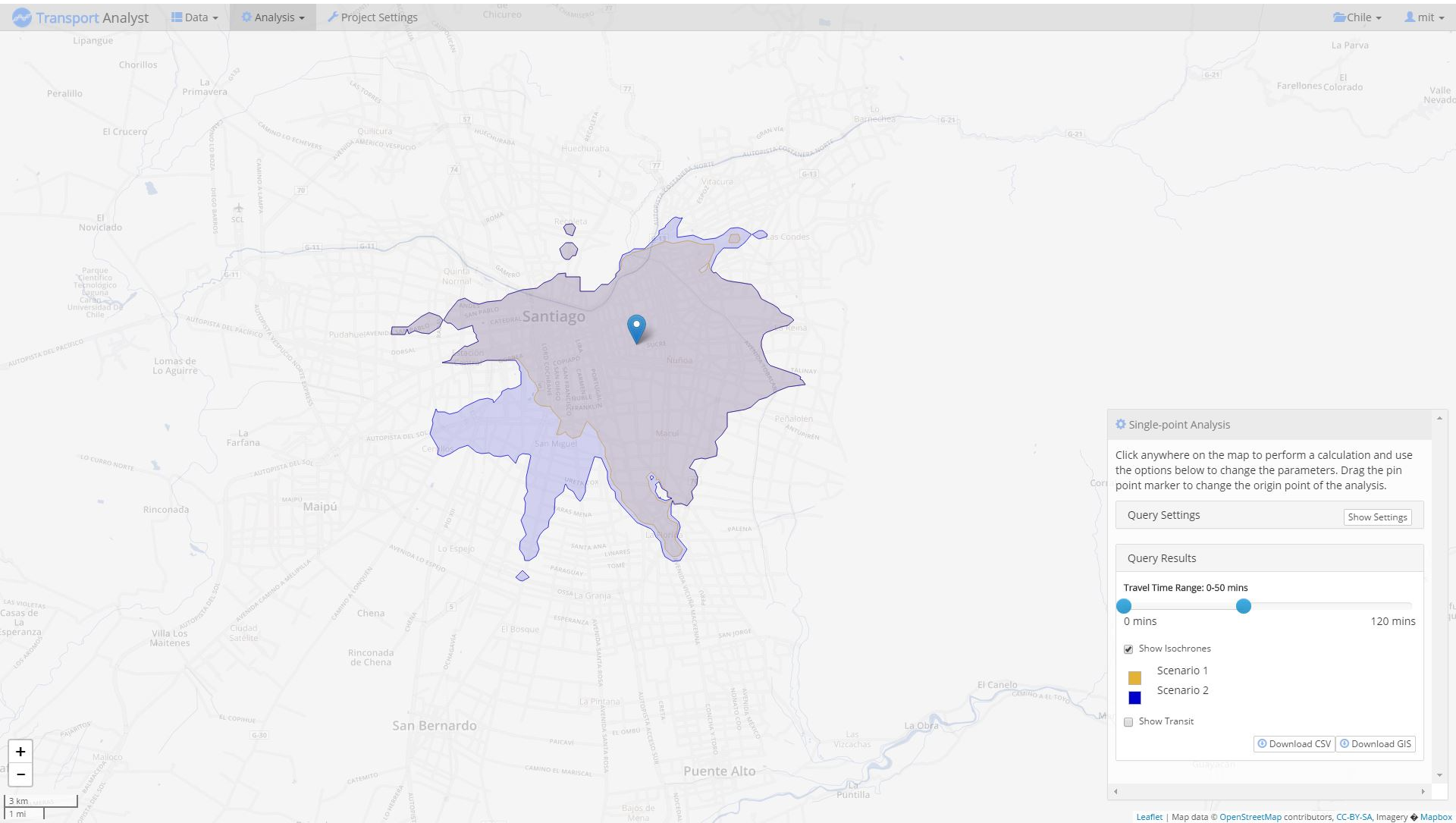


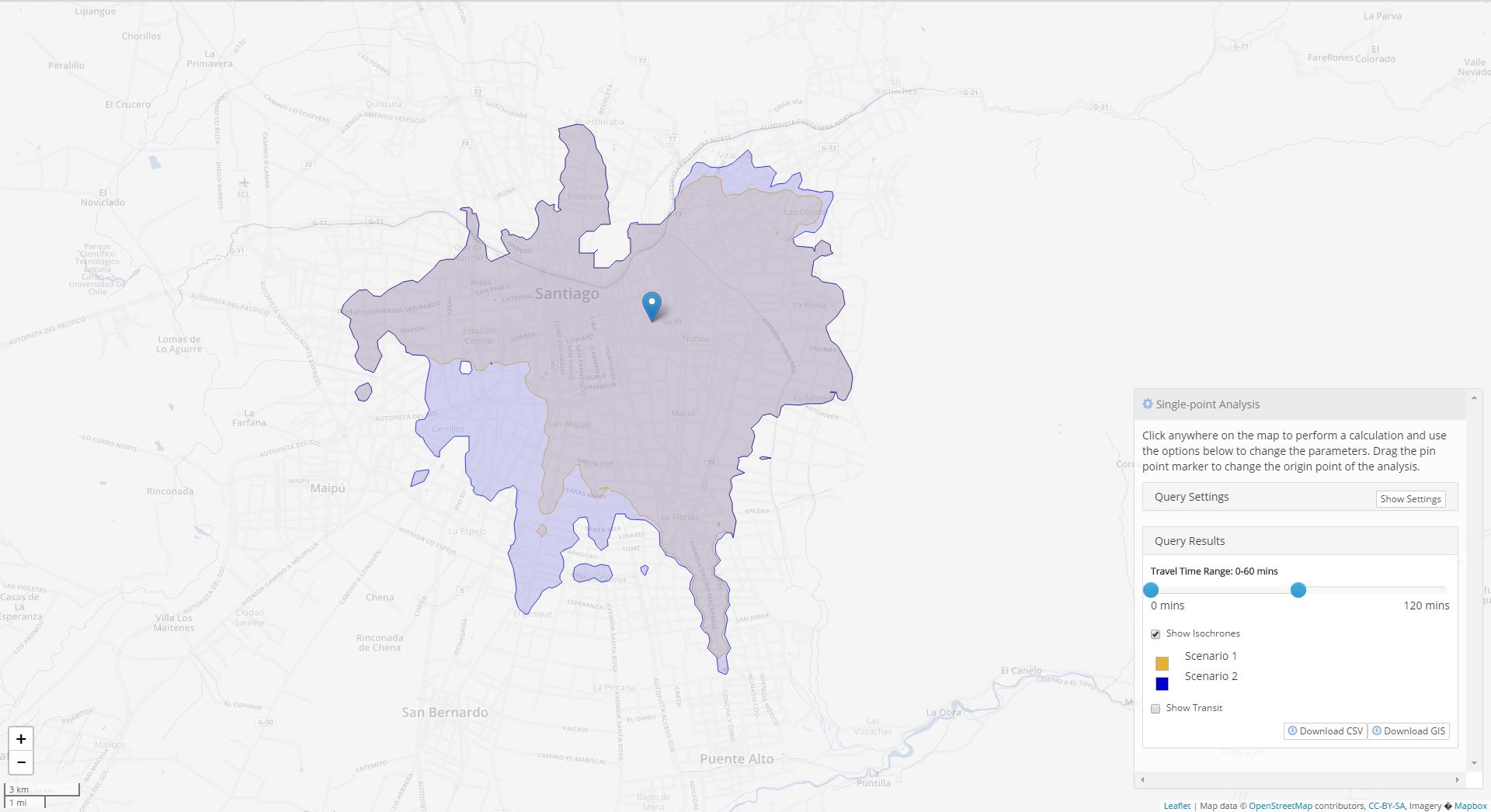













 Single-point Analysis


Click anywhere on the map to perform a calculation and use the options below to change the parameters. Drag the pin point marker to change the origin point of the analysis.

Query Settings

Show Settings


Query Results


Travel Time Range: 0-60 mins




0 mins 120 mins


☒ Show Isochrones

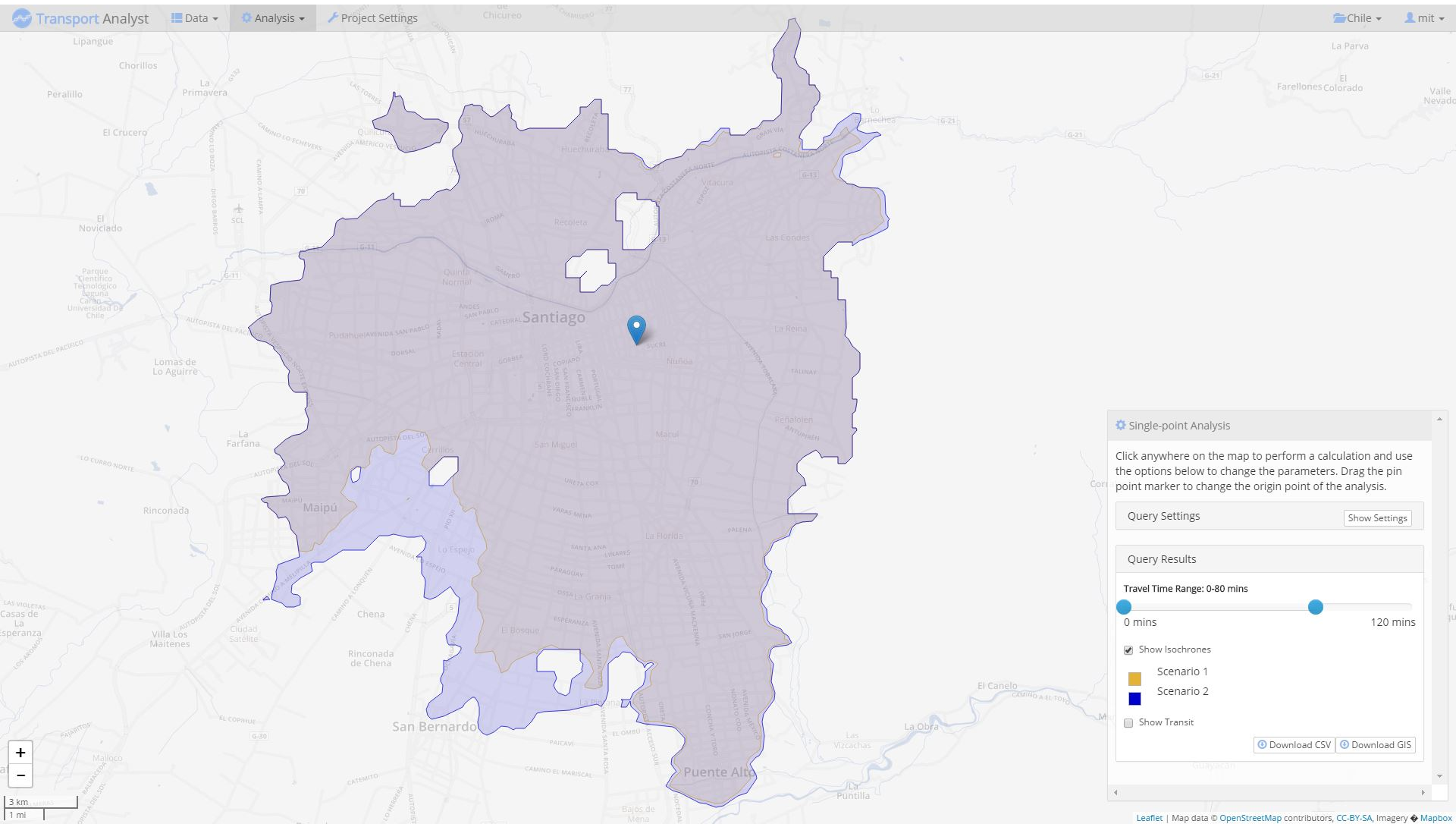
 Scenario 1

 Scenario 2

☐ Show Transit

 Download CSV

 Download GIS



TRIAL VERSION

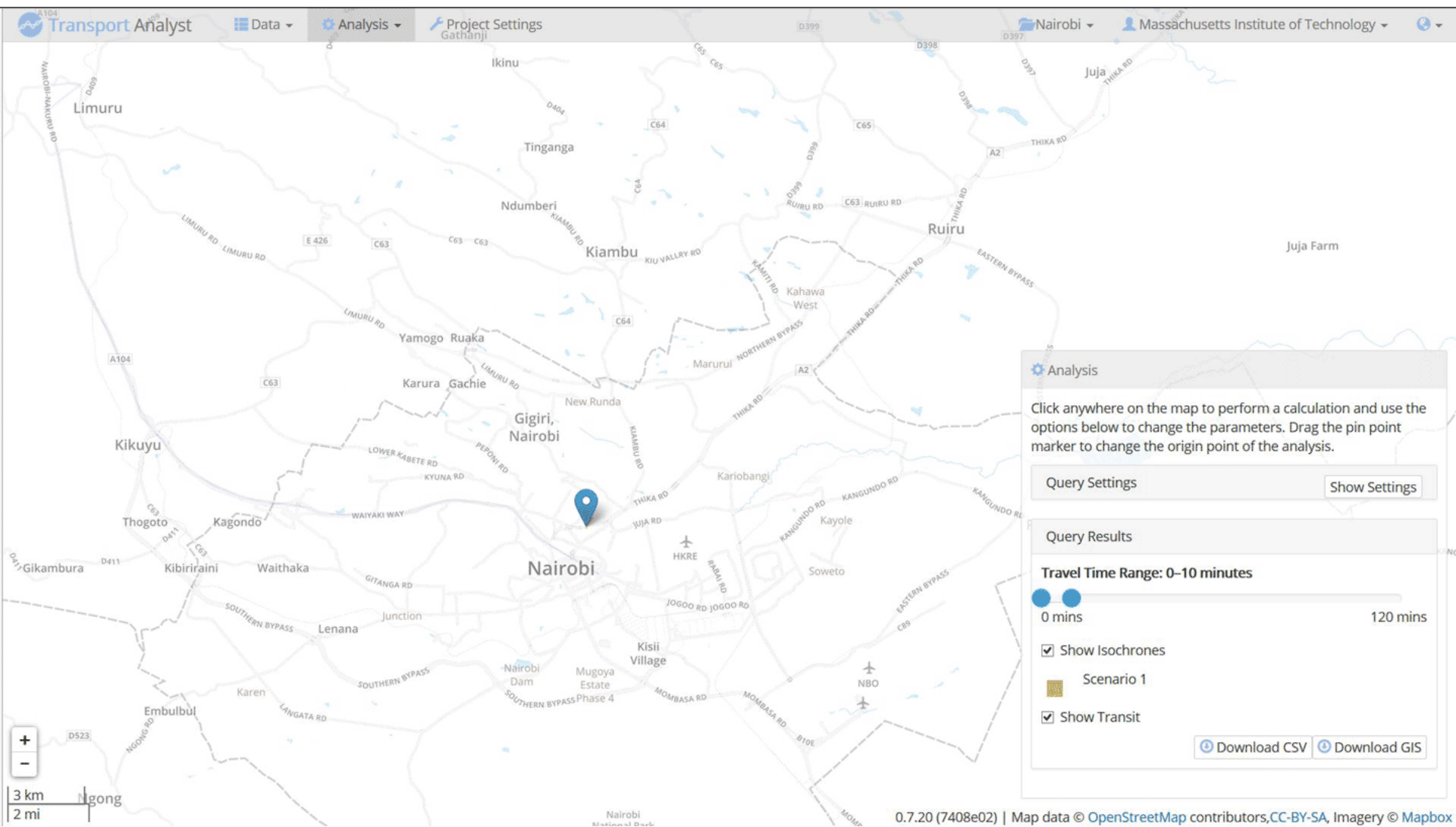
Nairobi

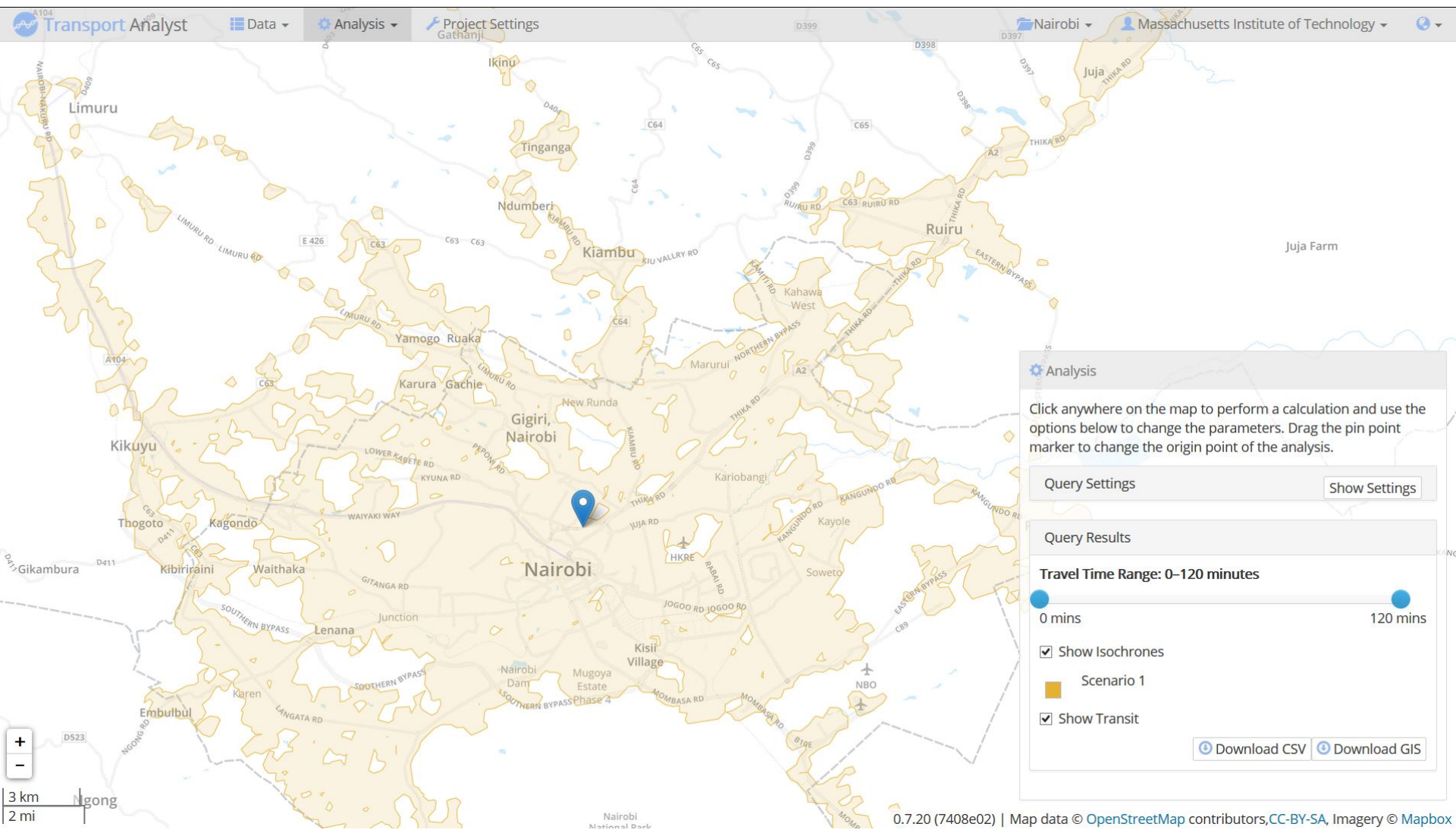
Digital Matatus



TOOLS FOR PLANNING

The City of Nairobi has recognized the transit map. The data and map provide the first comprehensive visualization of the matatu system and create a new planning tool for the city. For example the map is currently being used by UN HABITAT to help guide the Bus Rapid Transit (BRT) they are developing for Nairobi.





NEXT STEPS

Extensions

- Feedback loops
 - Mode shift
 - Induced demand
 - Land use interaction
- Other contexts
- Other impacts

Constrained Accessibility

Accessibility Limits

- Cumulative Opportunities – Maximum potential
- Competition – Rival opportunities
 - Economic and spatial methods
 - Shen (1998), Harris (2001), Williams (1976), Martinez (1995), Martinez and Araya (2000), and Ha et al. (2011)
- Capacity – Vehicle and roadway crowding
 - Queuing and simulation approaches
 - Tuttle (2014), Shen and Zhao (2015)
- Congestion – Network effects