

Systems Science and Simulation in Implementation Research

Tak Igusa, PhD
Civil & Systems Engineering
Johns Hopkins University



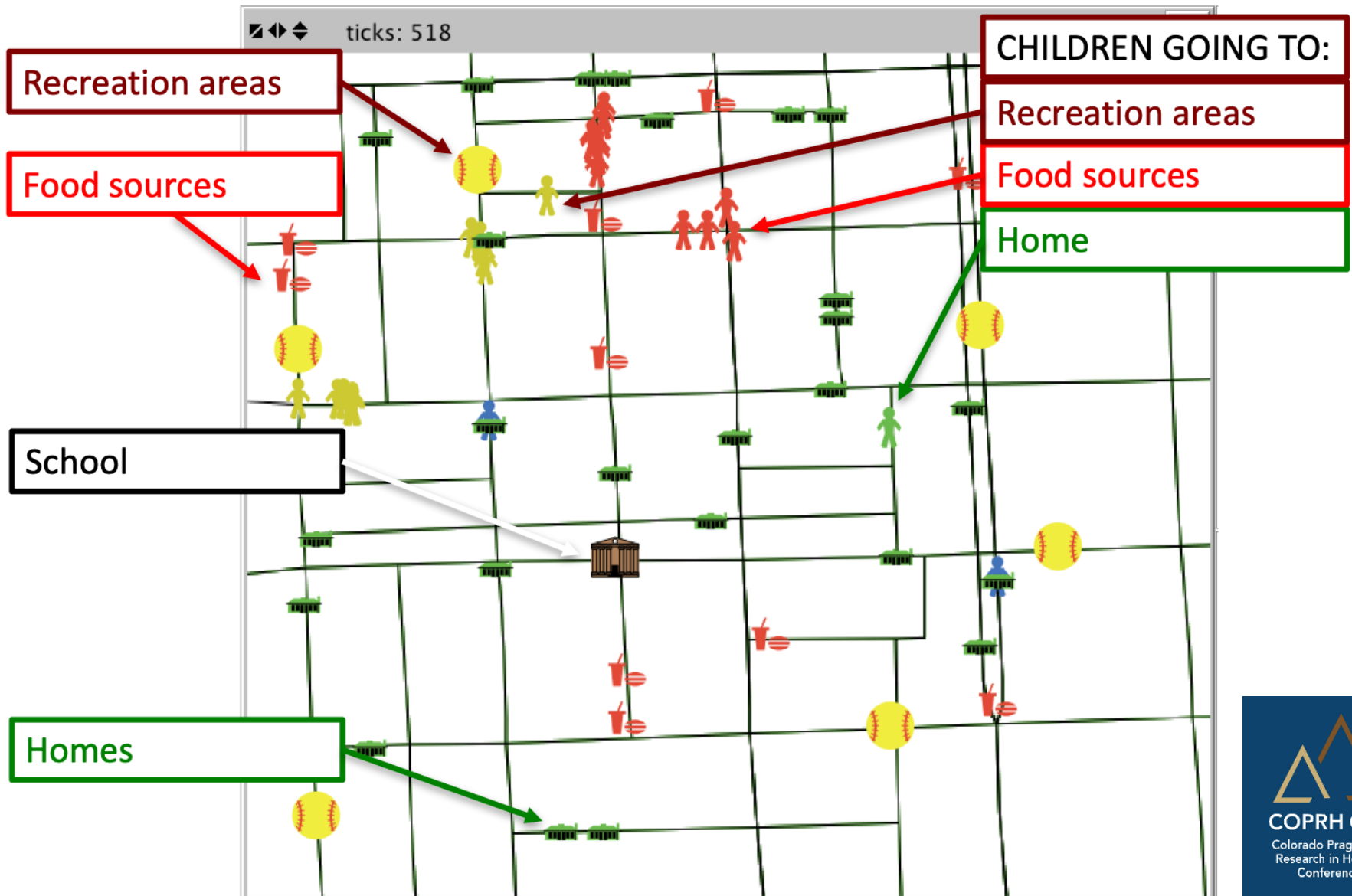
Simulating Interventions to Improve the Built Environment

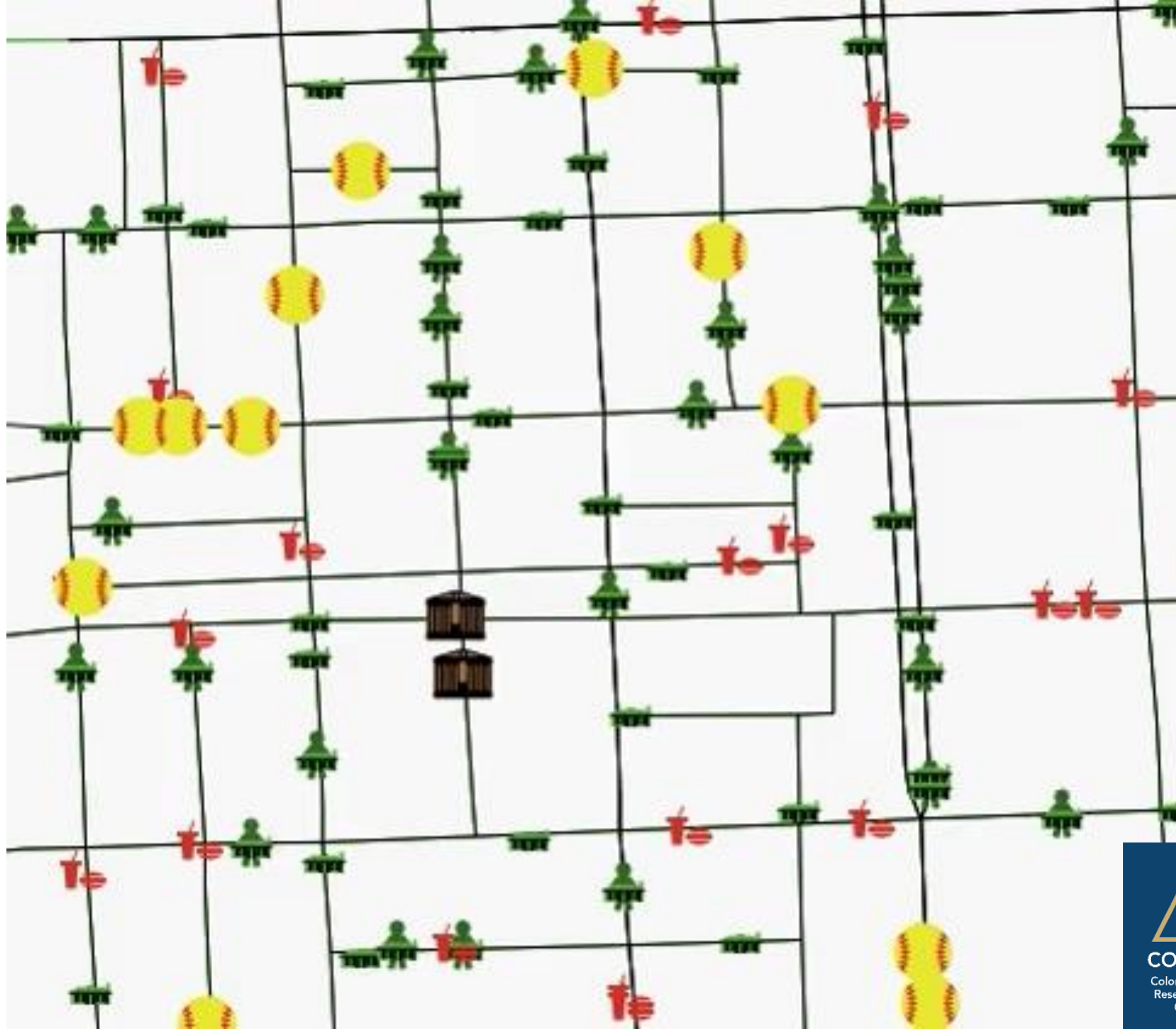
Simulation	Intervention
School-aged children and adolescents in the Baltimore city food environment	Urban farms
Food and employment access in a mobility desert	Ride share and shuttle services
Mobility in rural municipalities	Deployment of connected autonomous vehicles (CAVs)

Simulating Interventions to Improve the Built Environment

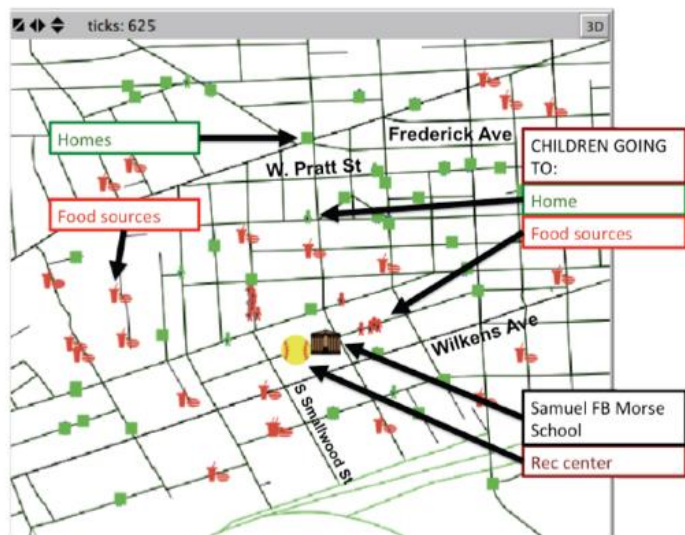
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The food environment surrounding a school in Baltimore City



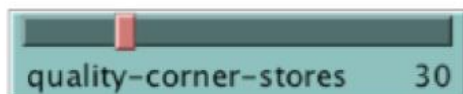


Collaboration with nutrition interventionist, Dr. Joel Gittelsohn



“Testing” Policy Solutions

Agent-Based Modeling Demonstration



QUALITY of foods at corner stores
target: 100



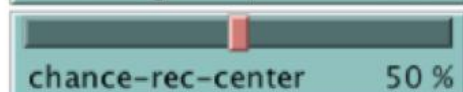
CALORIES BURNED at rec center



CALORIES BURNED for walking

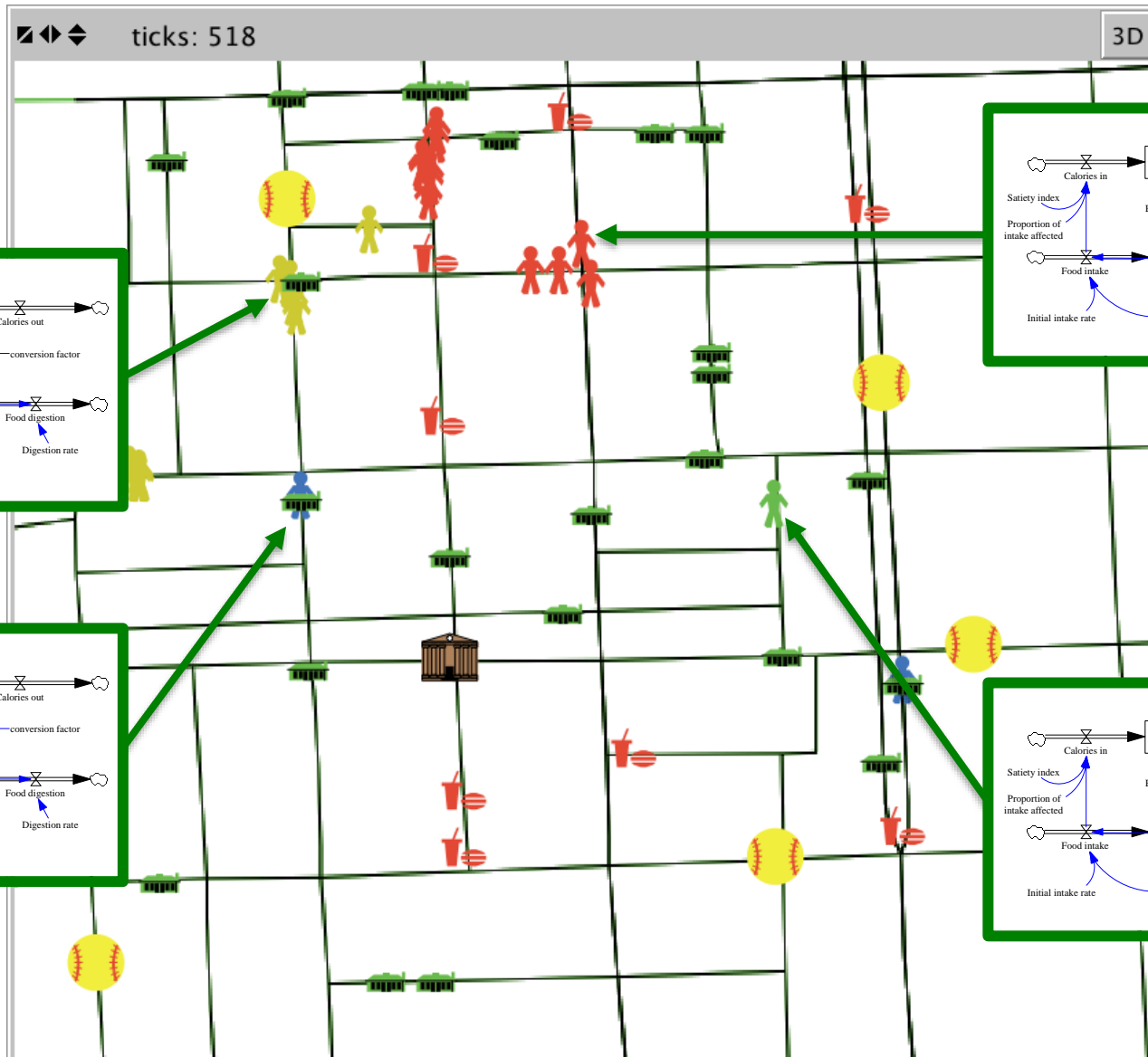


CHANCE of going to the grocer



CHANCE of going to the rec center

Agent-based simulation using individual metabolic models



Research participation with Baltimore City policy makers



**POLICY MEETING:
JULY 22, 2013**

Baltimore City Council
Health Department
Planning Department
Family League

Meeting date:

July 22, 2013

Location:

Bloomberg School
of Public Health

Hosted by:

Johns Hopkins
Global Center on
Childhood Obesity

Meeting Participants:

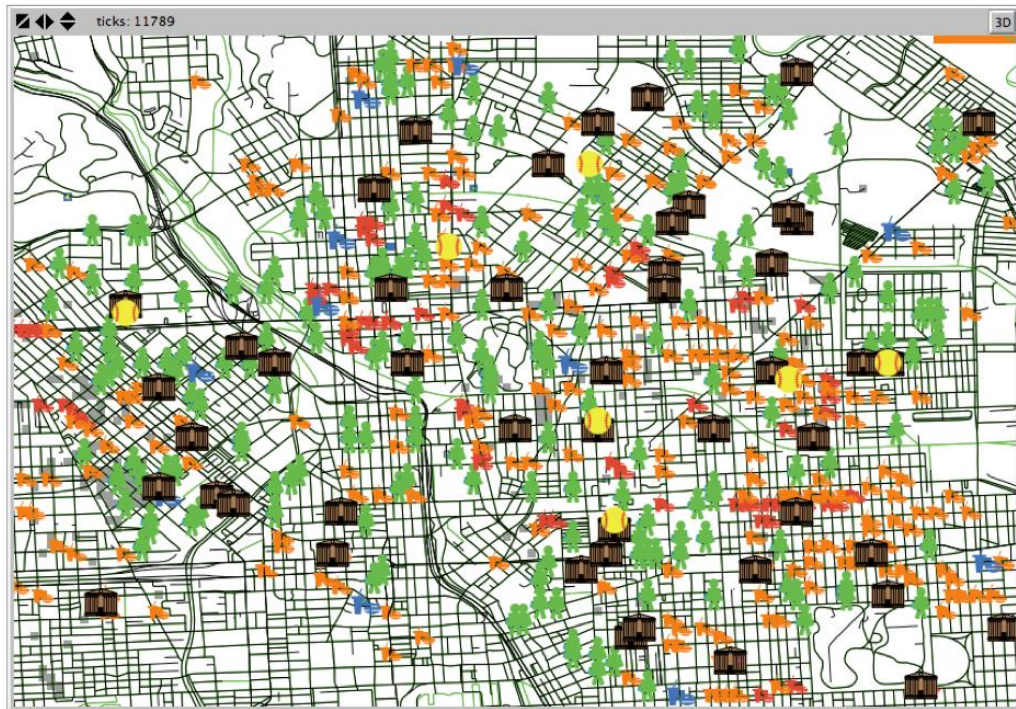
Regina Boyce
Benjamin Caballero
Laura Cobb
Laura Fox
Joel Gittelsohn
Ashley Harris
Keiristin Harrison
Councilman Bill Henry
Laura Hopkins

Tak Igusa
Anna Kharmats
Michael Klag
Katherine Klosek
Justin Lane
Yeeli Mui
Maggie Porter
Robin Truitt-Theodorson
Councilman William "Pete" Welch
Rachel Yong



COPRH Con
Colorado Pragmatic
Research in Health
Conference

Revised model with intervention levers



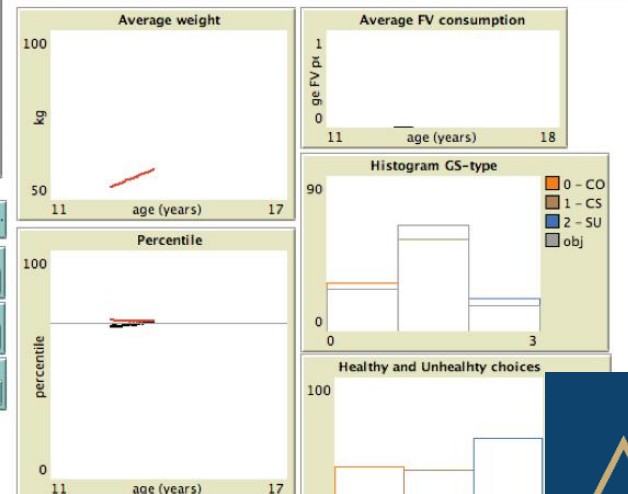
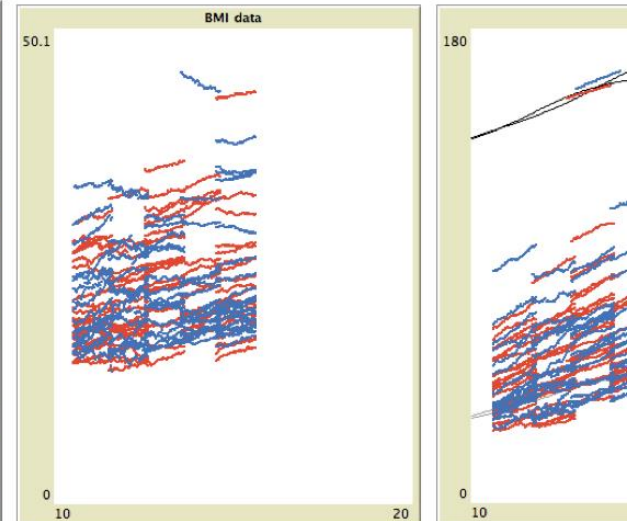
reset for ... no UF setup setup GIS setup locations no promotion with promotions On Off staple_food_policy...

n-children 200	group-size 1	chance-grocery 40%	rUF 0.00 miles	file-name OSC Workshop foraging v8 med
cal-intake-coef 25	max-steps 36	chance-rec-center 7%	pUF_year 0.000	window [-76.64 -76.57 39.285 39.33 ...]
kcal-per-mile 65		preference-weight 1.1	qUF_CS 0.0	output-file-name LOG.txt
calories-burned 200 kcal	school-radius 10	calories-FV-conver... 120	qUF_CO 0.00	
percent-BMR-effect 50	healthy-preference 36			
speed 10 (days)	unhealthy-preference 89			
calorie-substitution 70	GS-preference 2.0			

duration 5.00
time-start 1.0
seed-k 2

Use GS-preference (2.0) and calorie-substitution (70%). Neutral GS-score-scale (2.0) gives reasonable H and UNH choices.

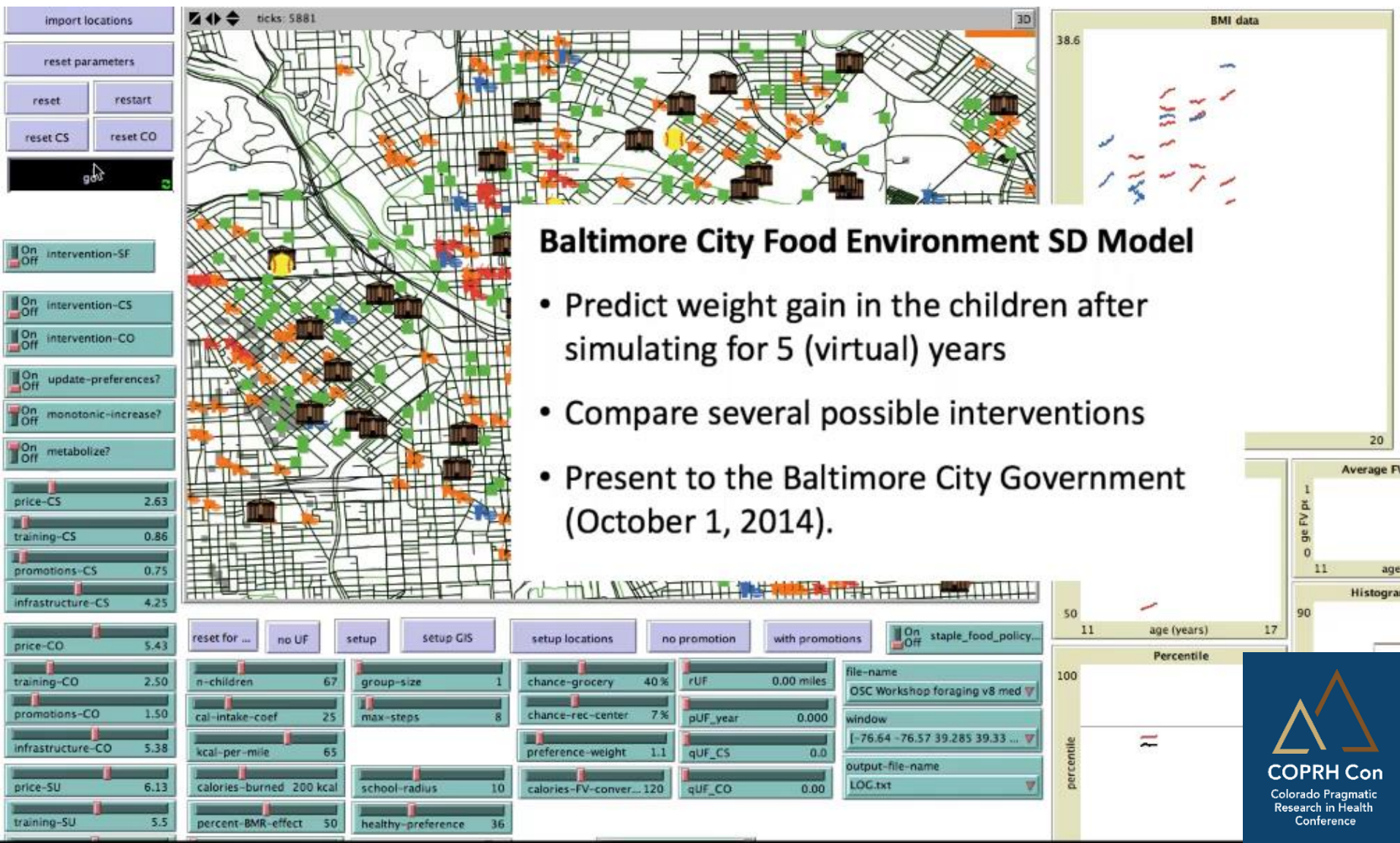
GS-preference = 2 makes the kids walk further. The BMI percentile is more stable if they always eat healthy.



TOS abstract, start at 70%, end at 77%

no intervention: 76.0% (82.3%, 84.9%, 83.9%)
both: 71.9% (75.5%)

Revised model with intervention levers



Urban Agriculture Bill signed by the Mayor of Baltimore

RULES AND REGULATIONS - PROPERTY TAX CREDITS URBAN AGRICULTURAL PROPERTY

Background

These rules and regulations are issued pursuant to the authority granted to the Director of Finance by Ordinance 15-350, effective June 7, 2015, and codified in Section 10-19 of Article 28 of the City Code, which provides for property tax credits on qualified urban agricultural property; as authorized by Section 9-253 of the Tax-Property Article of the Maryland Code.

Goal

The goal of this tax credit is to encourage the continuous agricultural use of otherwise vacant land in the City of Baltimore for the production of agricultural products and the continued maintenance of such property.

Definitions

The terms defined in Section 10-19 of Article 28 of the City Code have the

Project sponsor: **National Institutes of Health**, Grant: U54HD070725

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Community meeting on improving mobility in a Baltimore City neighborhood

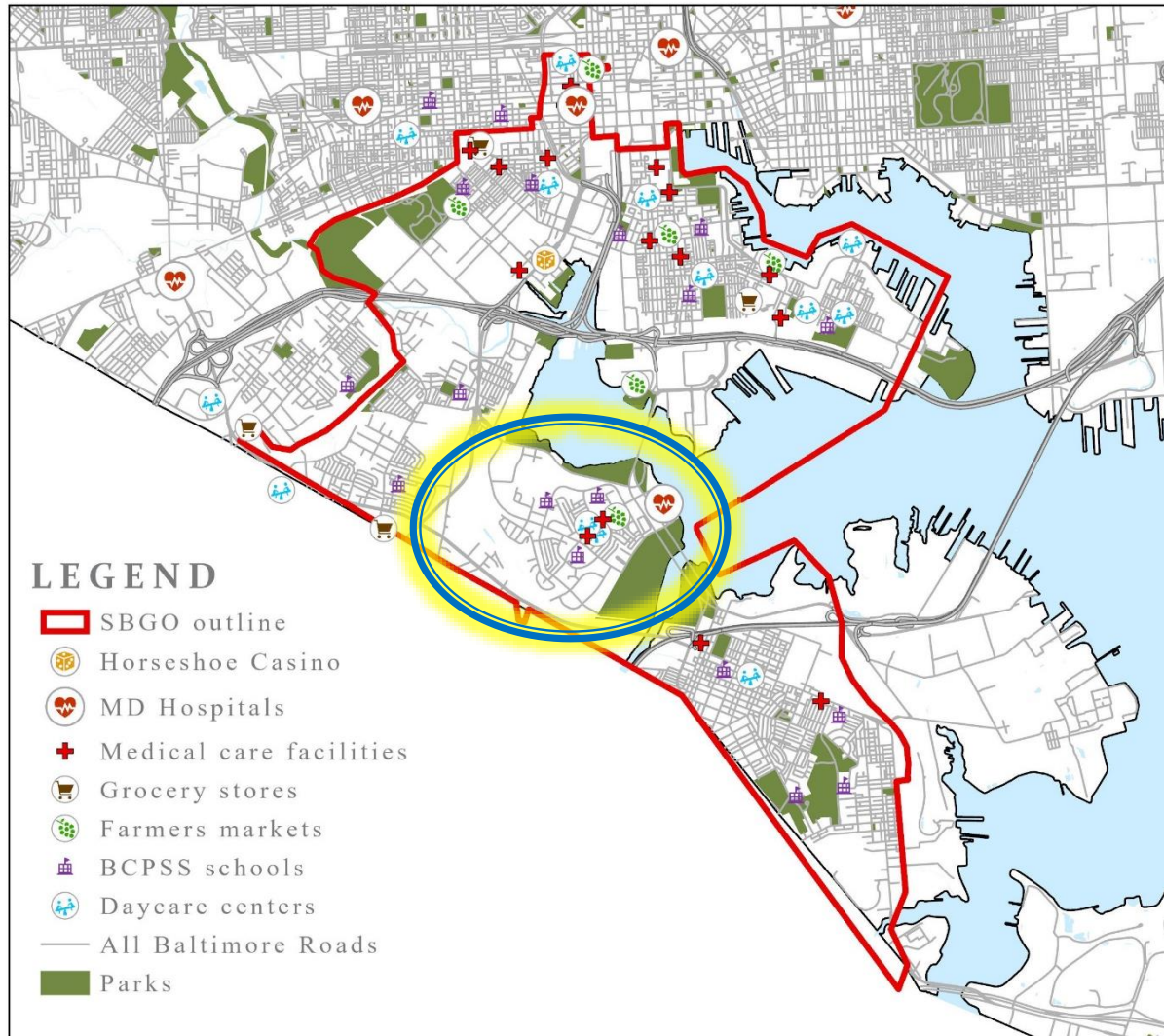
Johns Hopkins PhD student, Todd Chang, presenting



**SOUTH BALTIMORE
GATEWAY PARTNERSHIP**



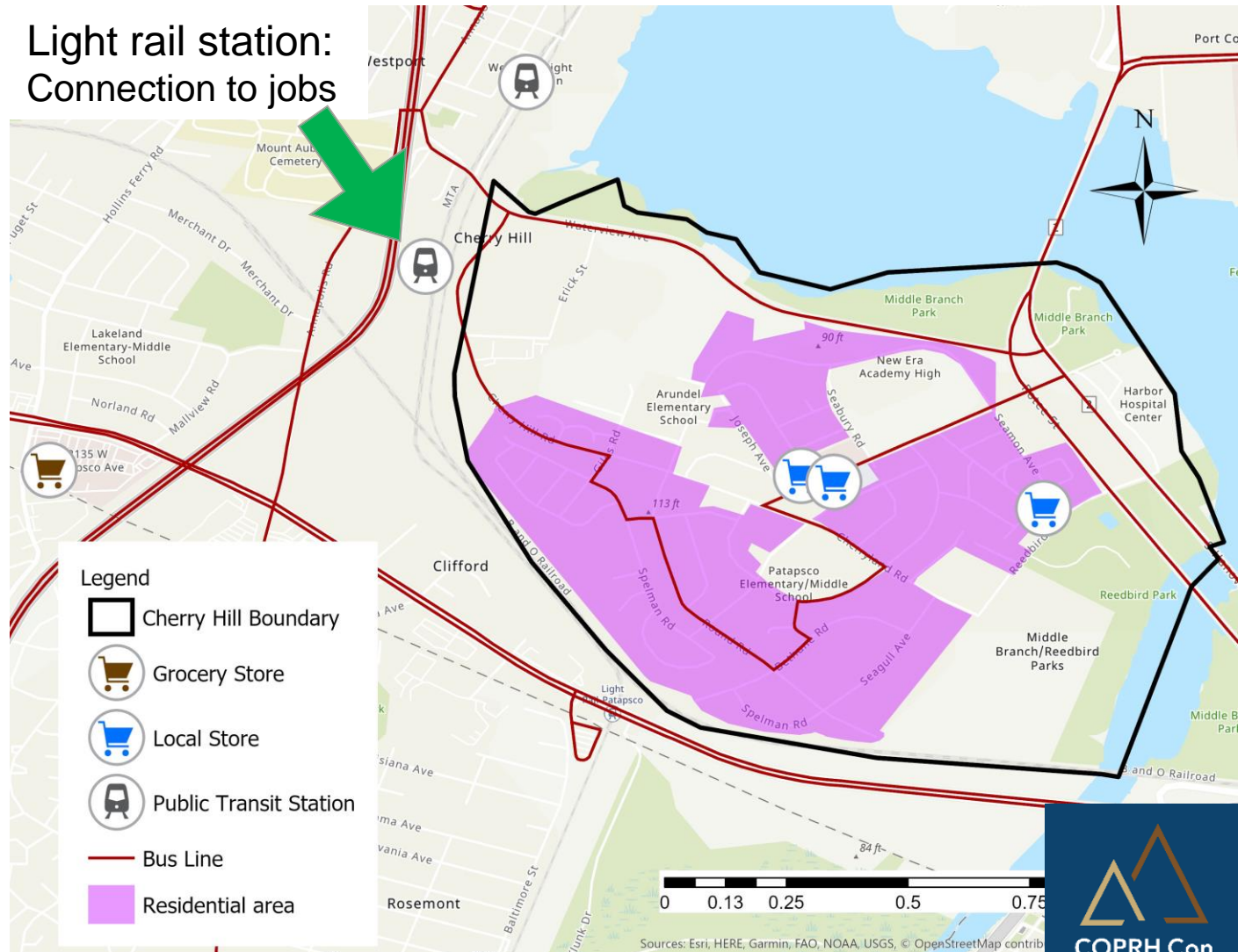
Mobility desert study area



Cherry Hill, South Baltimore

Light rail station:
Connection to jobs

Food Desert:
Closest grocery store



COPRH Con
Colorado Pragmatic
Research in Health
Conference

Cherry Hill, South Baltimore

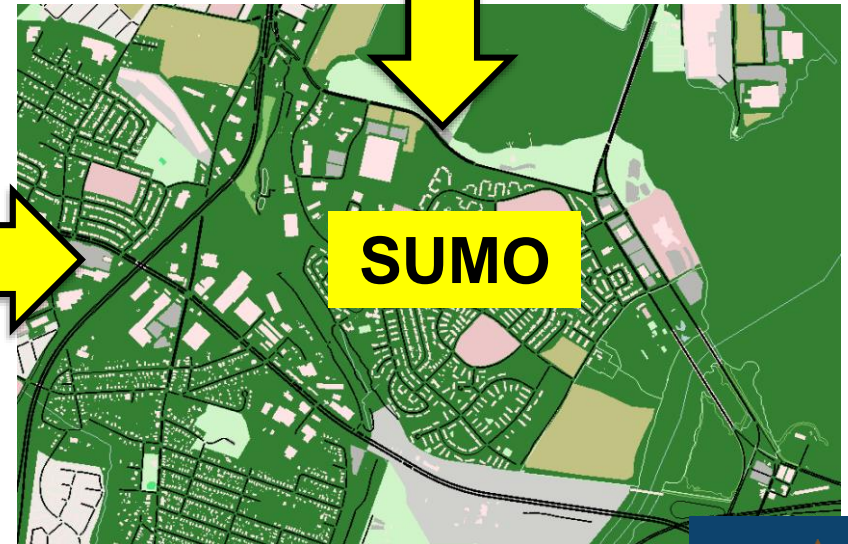
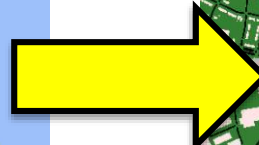
- Most residents do not have a car.
- Bus service is limited.
- Low accessibility to **healthy food** and **employment**.

TABLE 2: Transportation trends among respondents, Cherry Hill Needs Assessment Survey, 2015.

CHARACTERISTIC	NUMBER	PERCENT
How often do you travel to other parts of Baltimore City?		
Daily	10	24.4
Every other day	6	14.6
As and when needed	25	61.0
Type of transportation used most often		
Drive car	20	43.5
Take bus	24	52.2
Take taxi	2	4.3
What is the frequency of the bus? (among those using public transportation)		
Every hour	8	30.8
Irregular	2	7.7
Other	16	61.5
Purpose of travel (multiple selections allowed)		
For work	5	8.5
For shopping	6	10.2
For health services	4	6.8
For other business	5	8.5
To buy groceries	7	11.9
To visiting friends or to attend church	1	1.7
All of the above	31	52.4

Simulation of Urban MObility (SUMO)

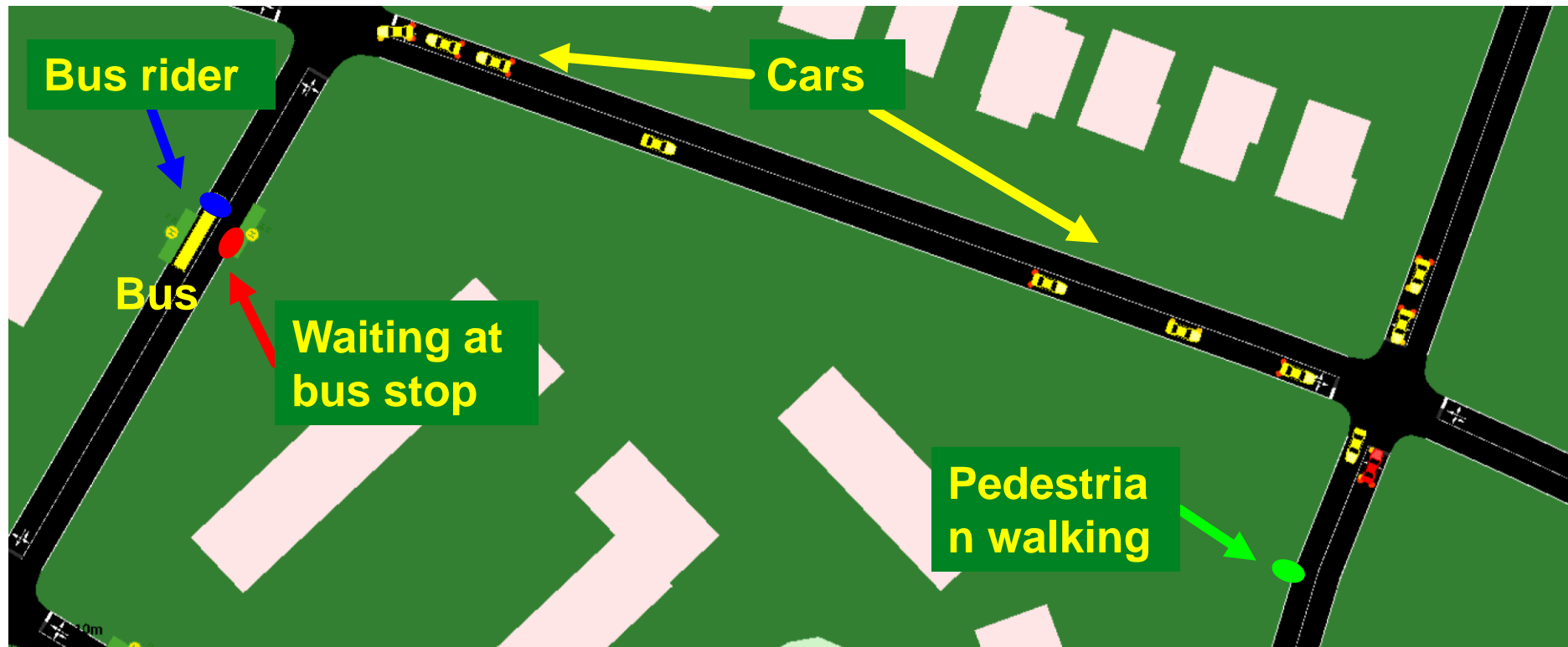
- ▶ Commercial, open-source code for simulating traffic
- ▶ Detailed, individual travel behaviors



Demographics + traffic data



Visualization of traffic simulation



Simulation of the AV ridesharing intervention

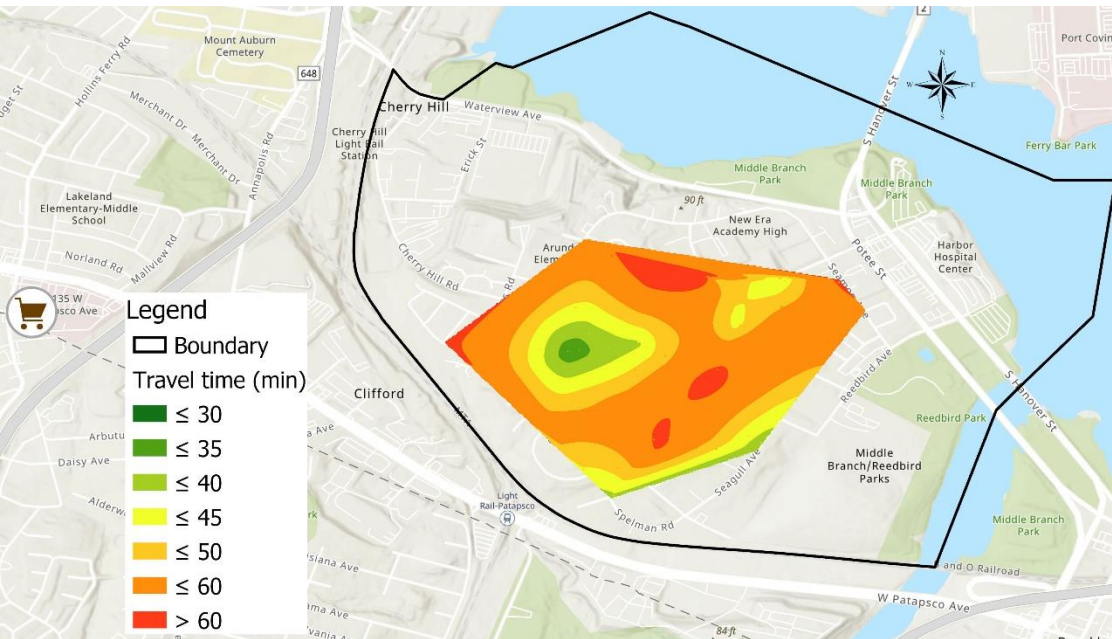


Simulation of the AV loop shuttle intervention

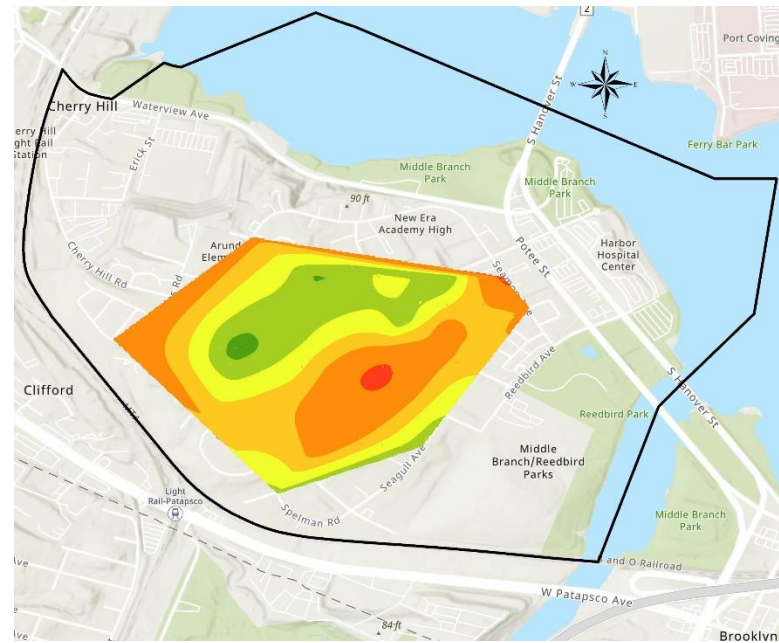


Simulation results: travel time comparison

Baseline (public transit)



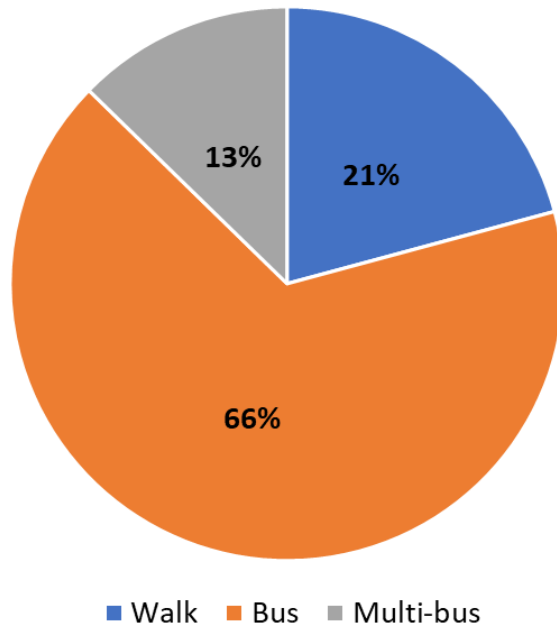
AV loop shuttle



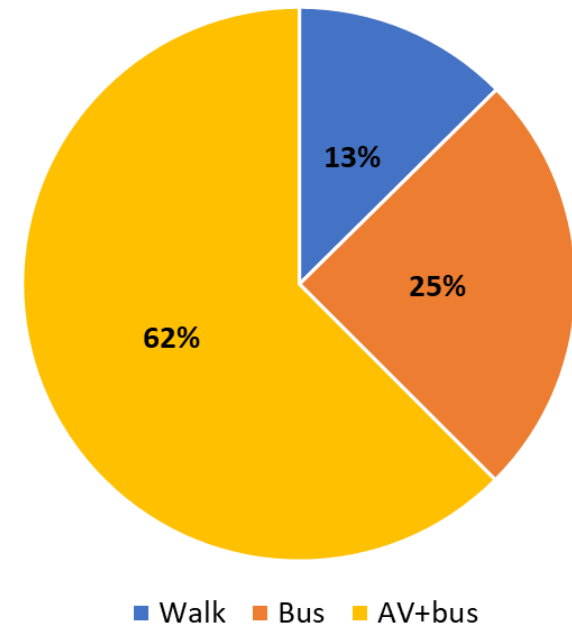
Simulation result: change of travel behaviors

Proportion of travel time of different behaviors.

Baseline (public transit)



Strategy 2: AV loop shuttle



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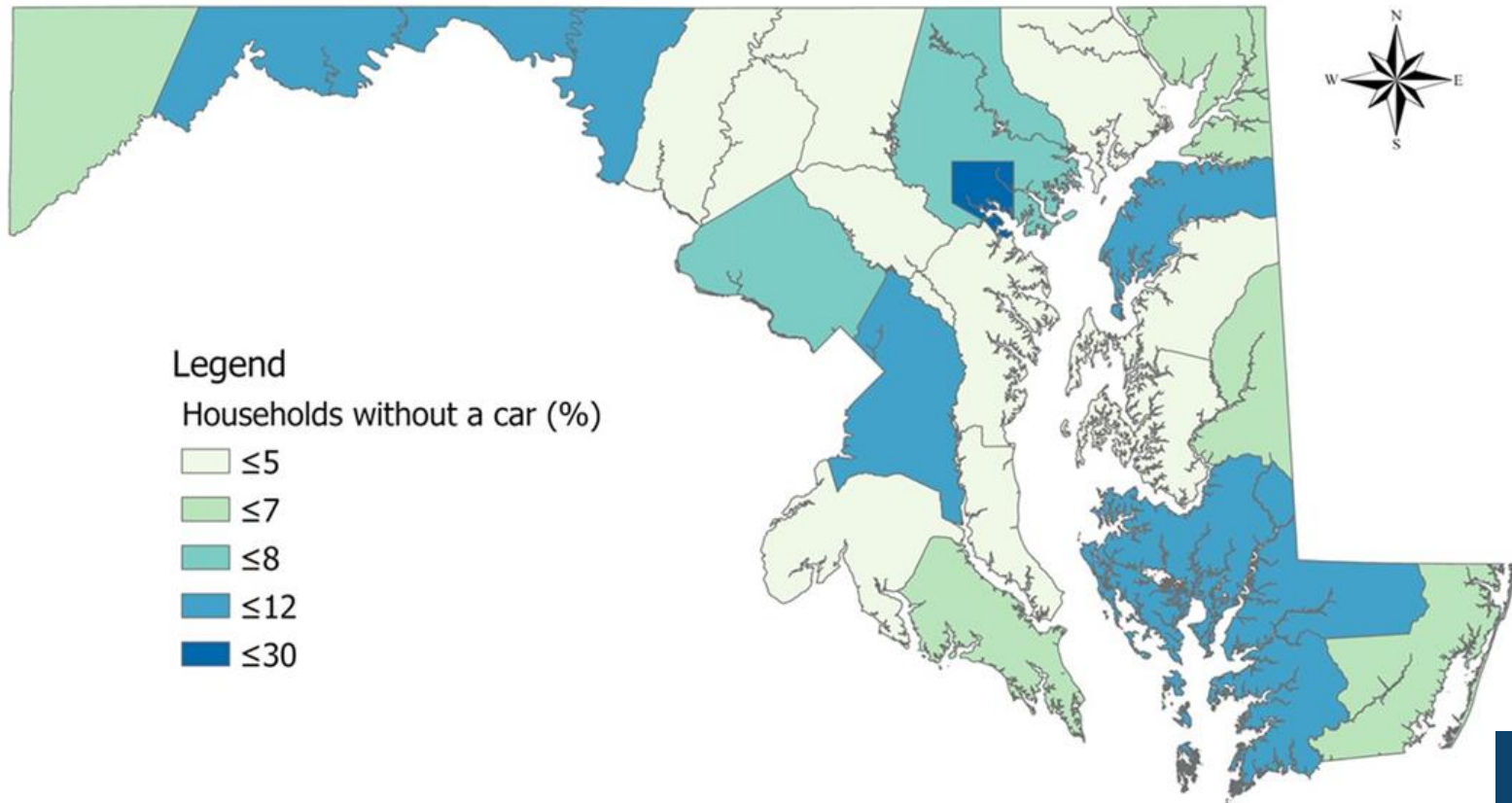
Public health impacts of CAVs

- ▶ Improving access to health care, nutritious food sources, education, and employment
- ▶ Reducing negative consequences of conventional traffic.
- ▶ Serving the needs of underserved communities and populations in the State of Maryland.



Preparing for community outreach: Assessing mobility gaps

► Example metric: households without a car



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