MARYLAND TRANSPORTATION INSTITUTE

data.covid.umd.edu

An Interactive COVID-19 Impact Analysis Platform for Situational Awareness and Decision Support

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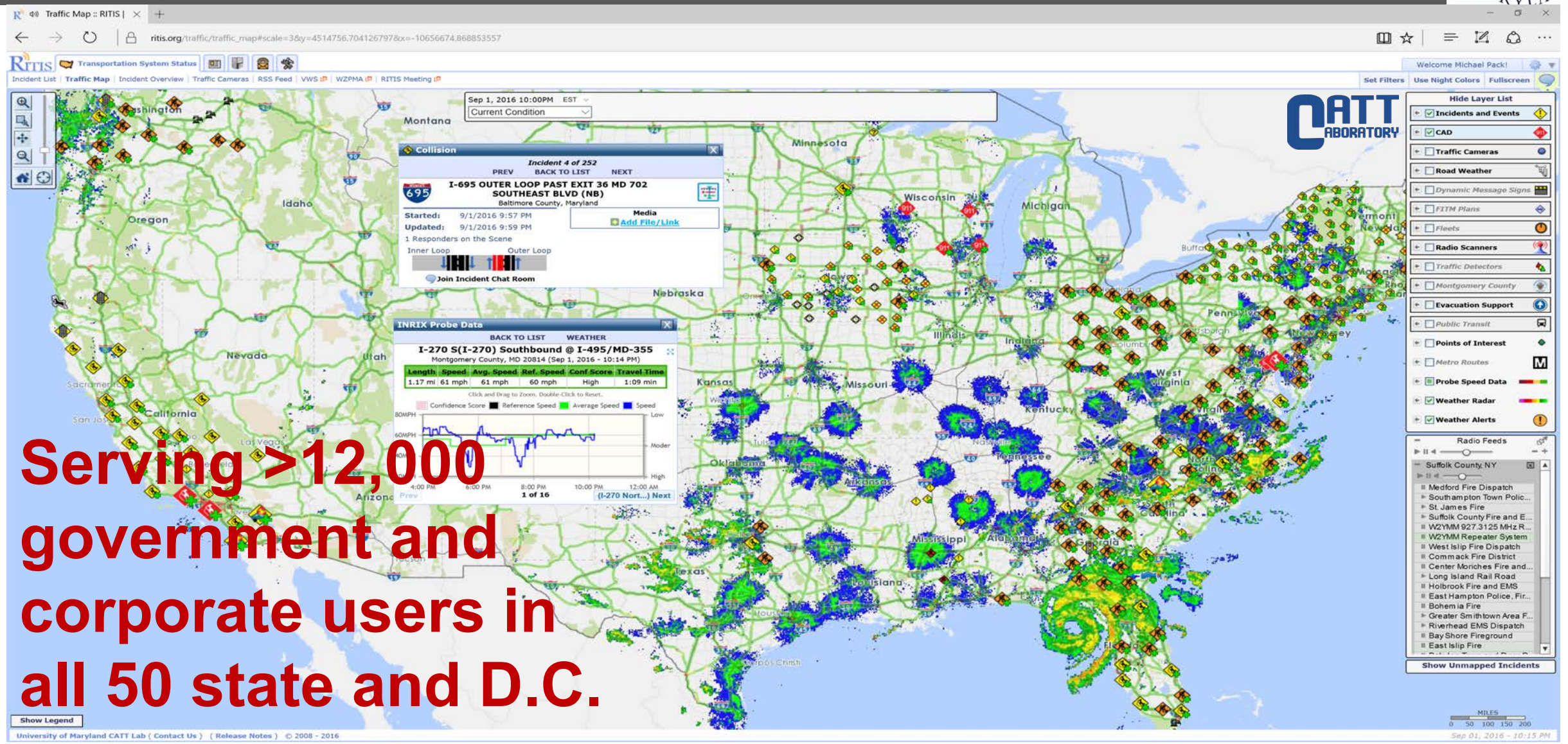
Maryland Transportation Institute, University of Maryland

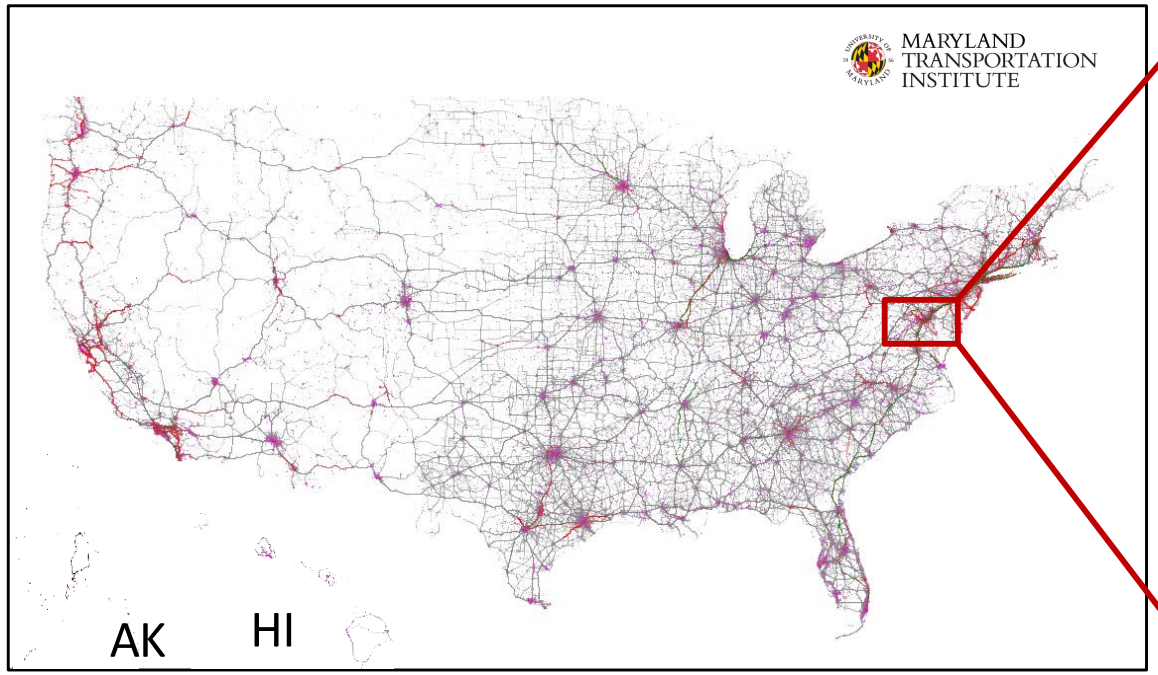
Institute website: mti.umd.edu

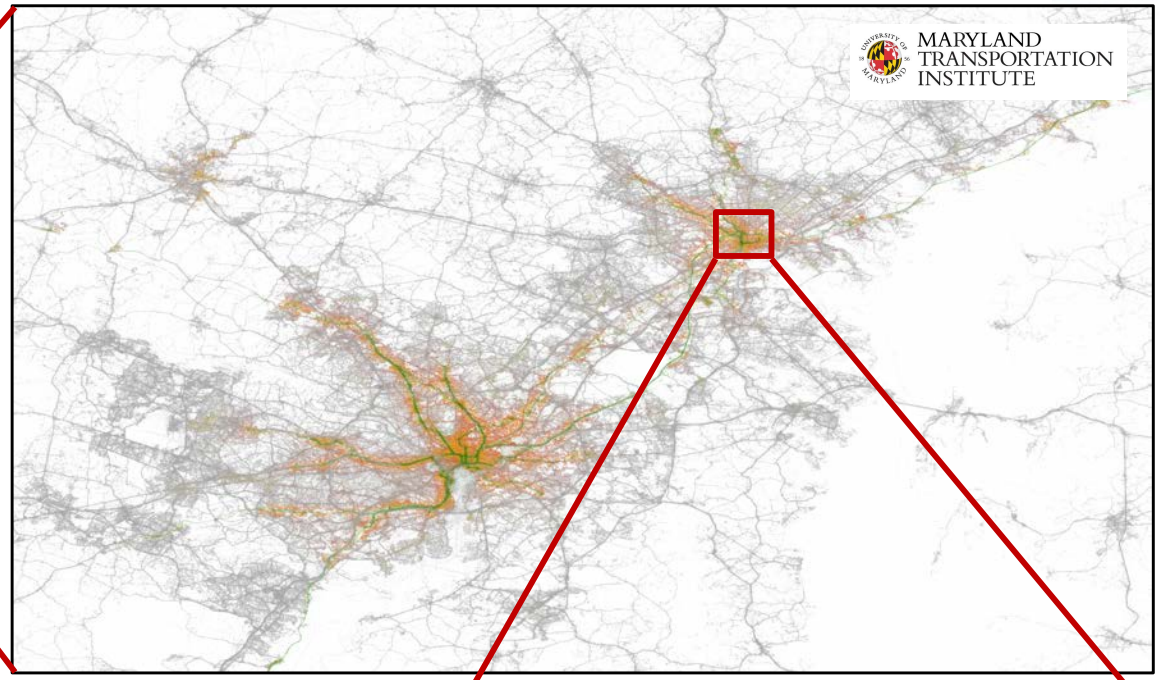
Leader in Transportation and Mobility Data

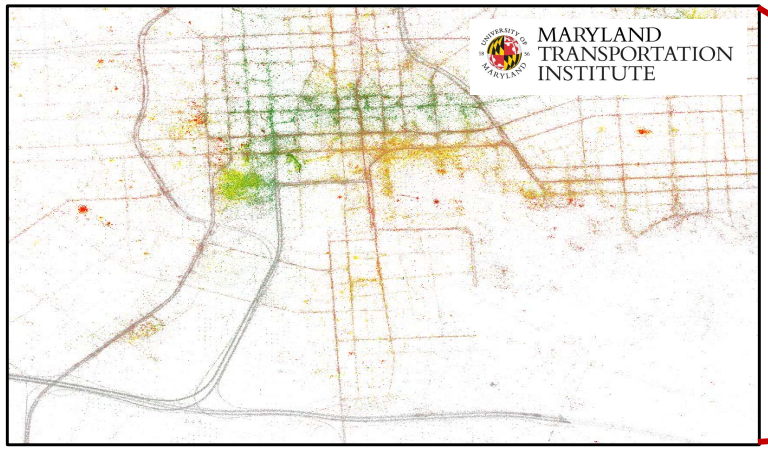


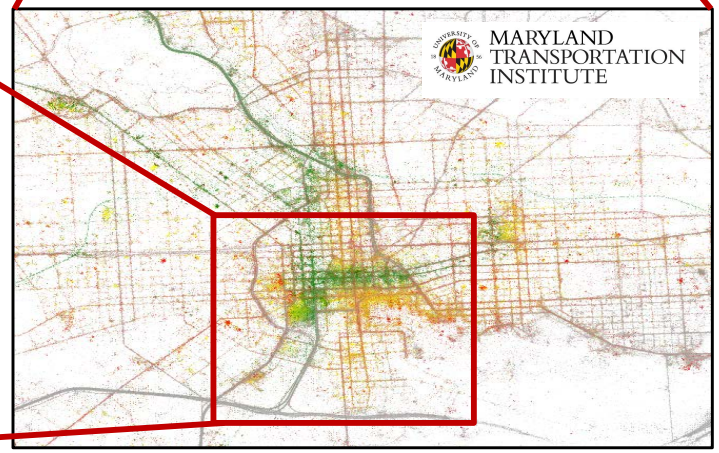
Serving >12,000 government and corporate users in all 50 state and D.C.

Anonymized Data from 150 million+ Mobile Devices







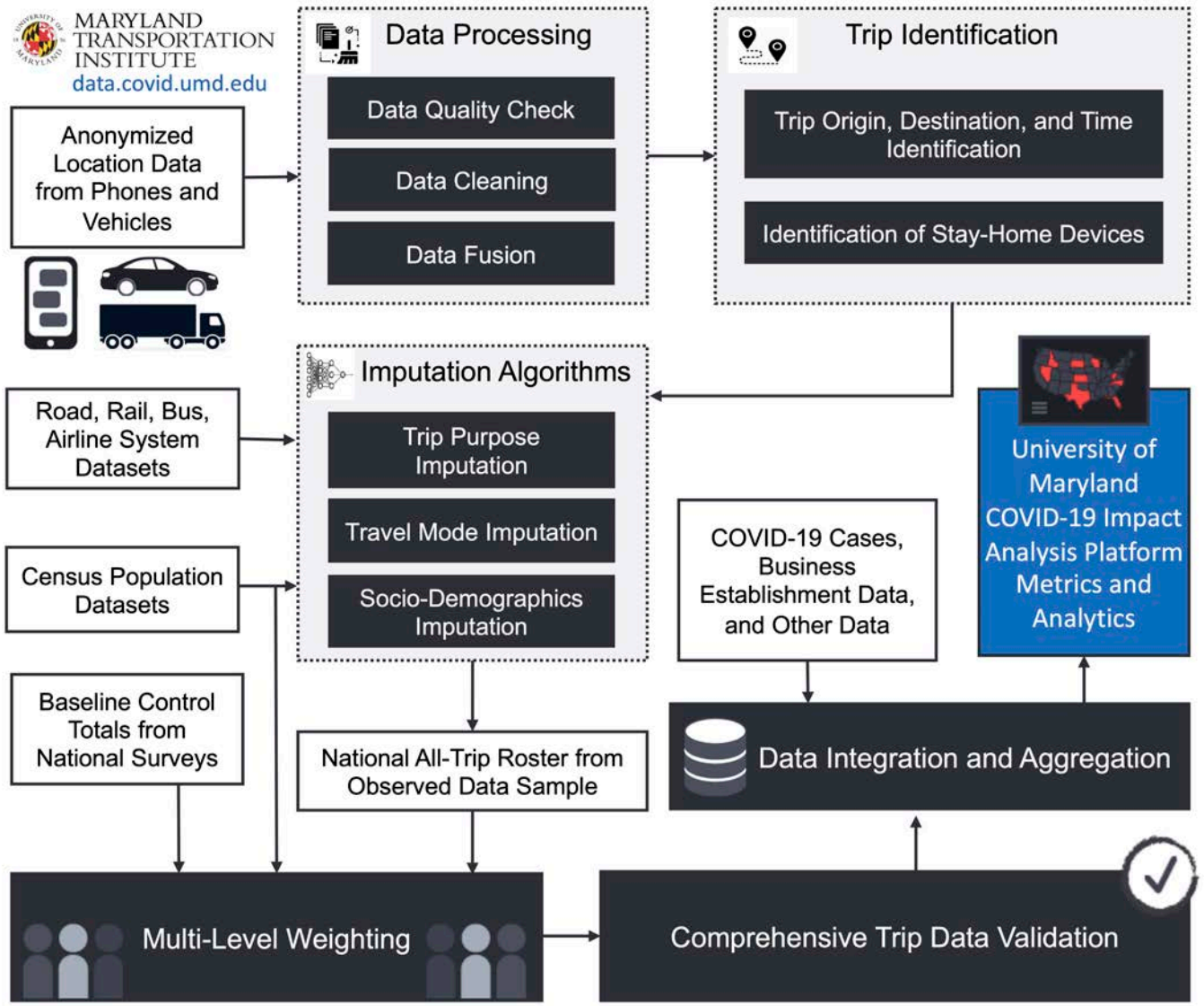


Travel Modes

Gray: Driving
Green: Rail
Purple: Air
Red: Bus
Yellow: Bike/Walk

Methodology

Methodology for Mobile Derive Data Processing, Imputation, and Weighting



Public Platform and Media Coverage

The Washington Post

The New York Times

THE HILL POLITICS & POLICY

CNN

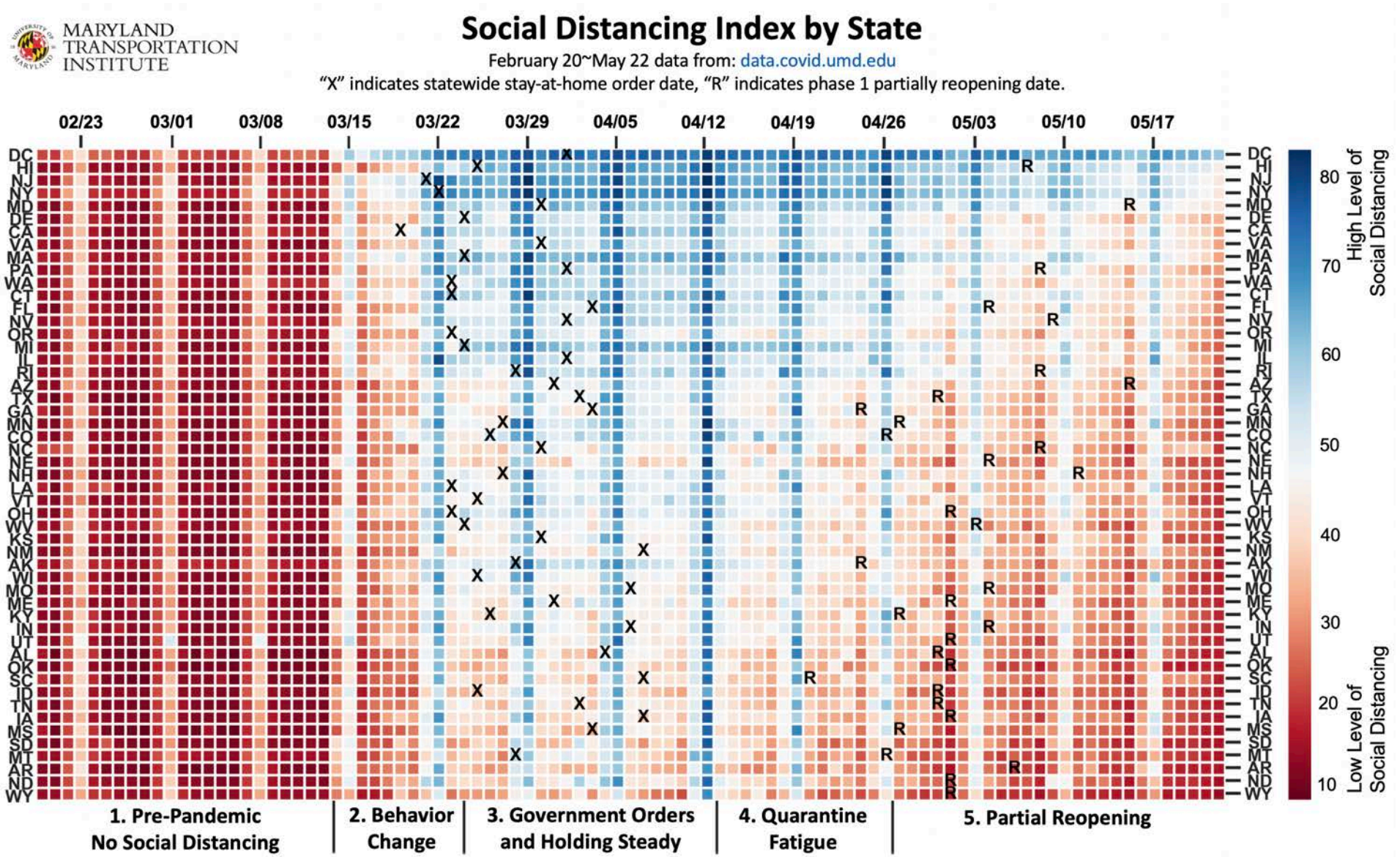
NBC

abc

npr

USA TODAY

Social Distancing Index based on Mobility Metrics



38 Metrics on Mobility, Health, Economy, and More

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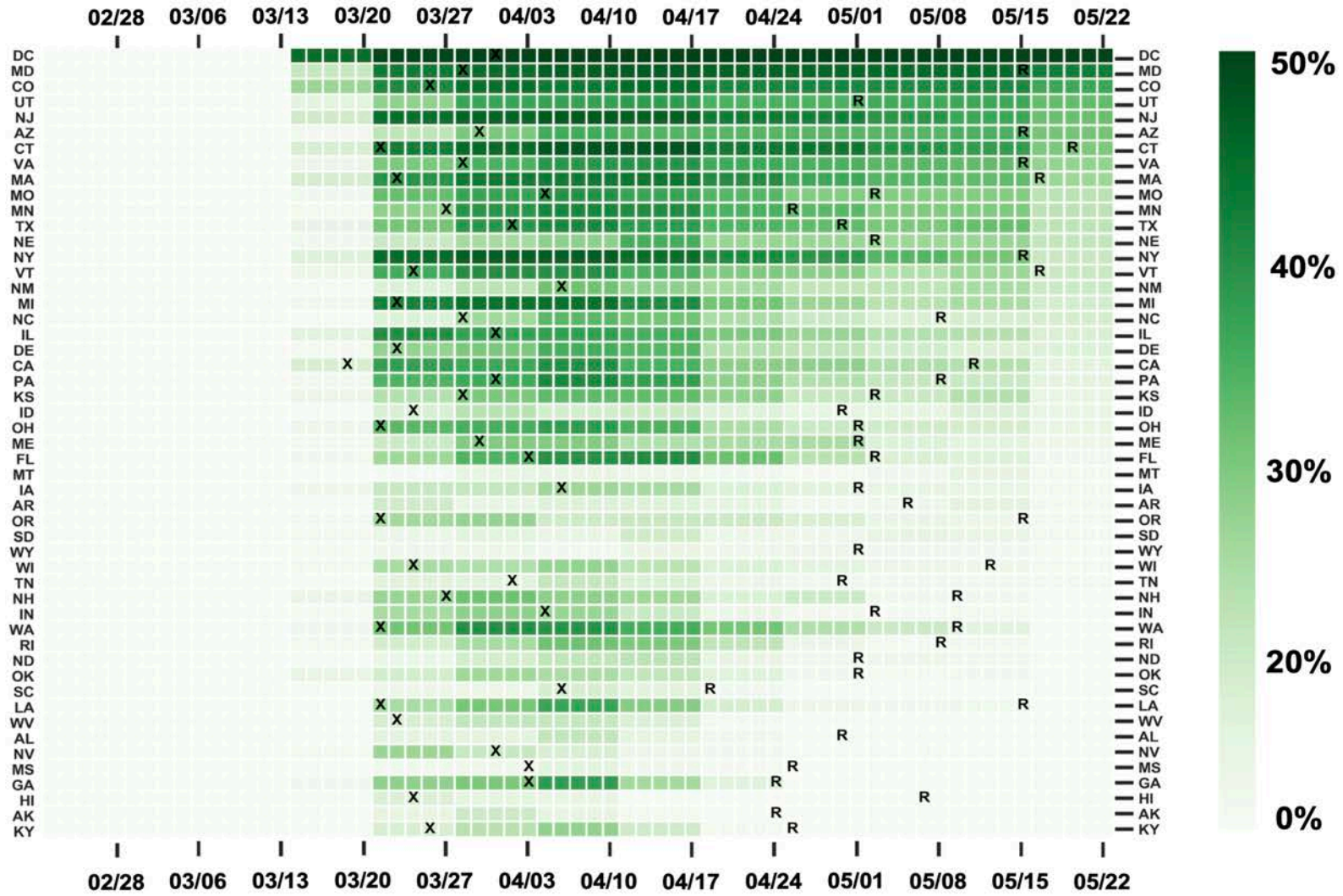
Percent of Workers Working from Home by State

February 24~May 22 data from University of Maryland COVID-19 Impact Analysis Platform
data.covid.umd.edu

Graph displays workday data only for each state daily.

"X"s indicate statewide stay-at-home order dates.

"R"s indicate initial partially reopening dates.



Society and Economy Reopening Assessment (SERA)

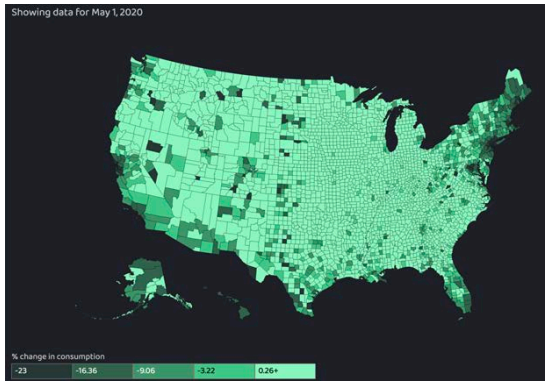
State	% hospital bed utilization	% ICU utilization	Testing capacity	#days: decreasing COVID cases	#days: decreasing ILI cases	# contact tracing workers/1000 people
AL	47.1	8.61	7.8	0	84	0.025
AK	38	3.63	1.8	0	14	NA
AZ	51.4	8.34	10.6	0	35	NA
AR	43.5	7.11	6.7	0	35	0.066
CA	54	11.42	7.7	0	35	NA
CO	46.6	22.08	21.1	0	42	NA
CT	60.8	58.8	28.7	0	42	0.006
DE	67.5	36.74	21.8	3	35	NA
DC	66.1	22.6	22	0	35	0.093
FL	58.6	10.96	8.6	0	49	0.023
GA	54.6	17.18	16.2	0	35	NA
HI	56.7	5.48	2	1	49	0.021
ID	37.1	8.86	6.9	1	7	NA
IL	46	29.58	19.7	0	35	NA
IN	47	17.27	18.7	0	35	NA
IA	30	18.93	17.3	0	0	0.011
KS	38.2	6.67	13.5	0	0	0.003
KY	46.6	5.11	8.3	1	84	NA
LA	49.2	26.57	17.1	0	84	0.015
ME	52.8	7.89	5.4	0	35	0.011
MD	67.5	35.32	19.4	0	35	0.041
MA	66.2	63.63	22.2	0	35	0.05
MI	46	31.74	22.2	1	14	0.013
MN	38.1	7.14	7.7	0	0	0.018
MS	43.4	13.28	10.1	0	0	0.06
MO	49.9	7.1	9.5	0	56	0.002
MT	46.6	2.39	3.2	1	49	0.113
NE	29.3	10.74	15.6	0	112	0.168
NV	55.2	10.09	12	0	21	0.026
NH	58	15.11	9.7	0	70	0.052
NJ	65.9	136.12	47.2	1	35	0.034
NM	42.3	14.32	5	1	42	0.038
NY	63.5	141.57	33.2	0	35	0.029
NC	53.8	8.09	8.2	1	35	NA
ND	36.5	4.01	3.7	4	35	0.329
OH	50.4	9.89	13.3	0	0	0.059
OK	40.6	5.02	5.9	0	0	0.038
OR	48.8	5.97	4.4	0	35	0.024
PA	54.5	23.4	20.7	0	35	0.012
RI	52.8	47.2	13.4	0	84	0.095
SC	53.9	9.22	10.5	0	14	0.039
SD	28	11.56	14.5	0	77	0.102
TN	48.1	9.87	6.4	0	35	0.004
TX	47.7	6.6	8.3	1	35	0.04
UT	41	13.27	4.3	0	35	0.013
VT	61.3	11.26	5.4	0	84	0.077
VA	54.9	16.47	16	0	42	NA
WA	55.8	16.74	7.4	0	49	0.093
WV	46.1	3.21	2.4	1	56	NA
WI	41.3	9.08	9.2	0	42	0.045
WY	37	3.85	5.8	5	0	0.017

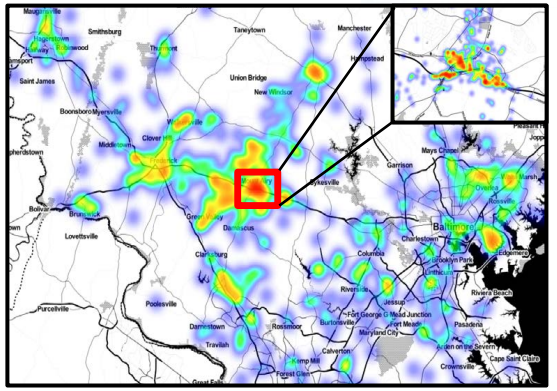
Passed Narrowly passed Failed

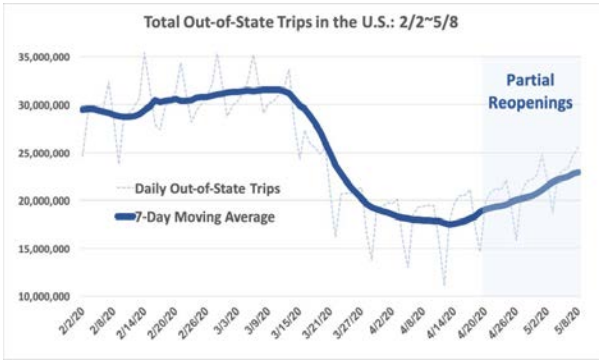
- Recognizes reopening is a political decision that needs decision support;
- Uses 16 metrics to comprehensively evaluate reopening readiness;
- Key health factors are checked against established gating criteria;
- Compares a state or county with the rest of the nation to see if it is more or less ready for reopening;
- Plots daily trend to see if a state or county is doing better or worse over time for each reopening factor.
- Assessment with all data in one place and done within a minute.

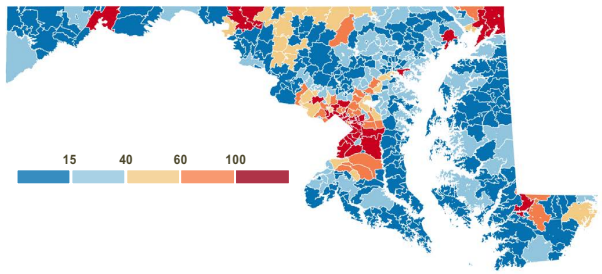
Data and Platform Use Case Summary

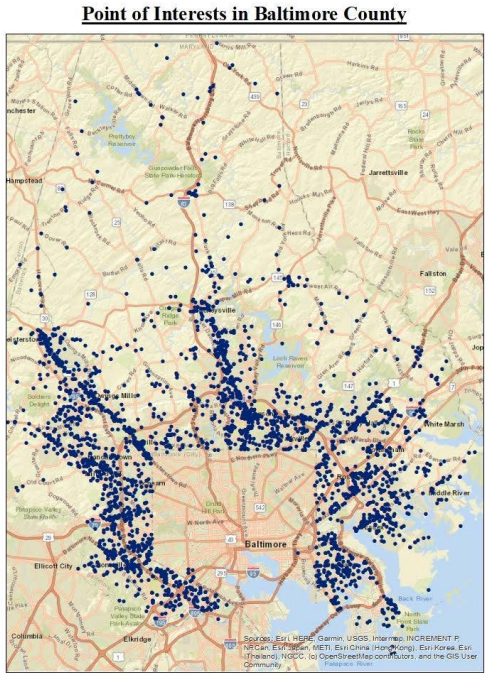
- Reopening decision support
- Traffic and travel behavior monitoring
- Miles traveled and revenue analysis
- POI visit trends
- Input for epidemic modeling
- Hotspot monitoring for all POIs
- Outbreak prediction and early waning
- Real-time community contact tracing
- Local containment strategies
- External trips and imported cases
- Economic and job impact tracking
- Monitor economic recovery progress







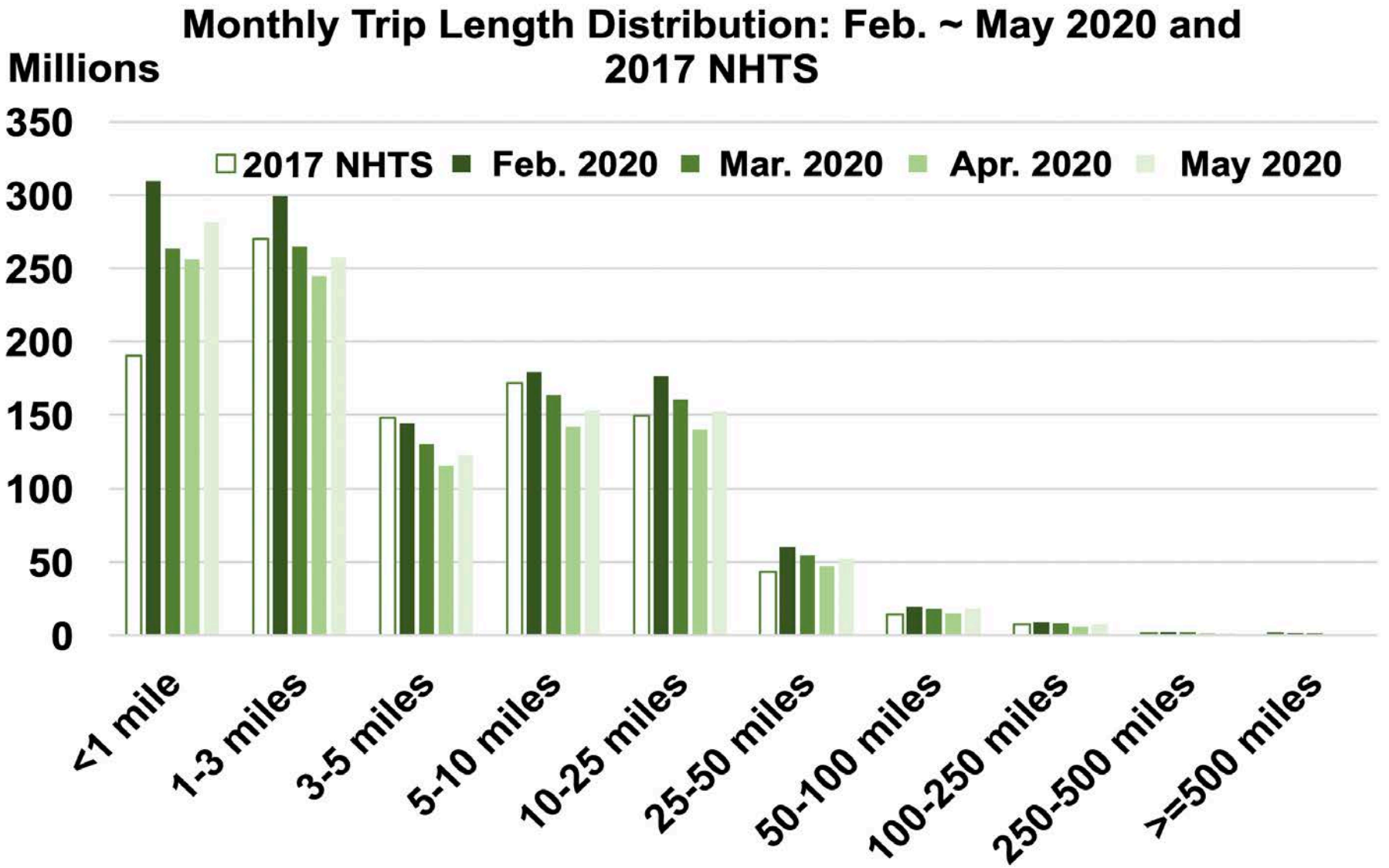




Specific Use Cases at Federal Governments

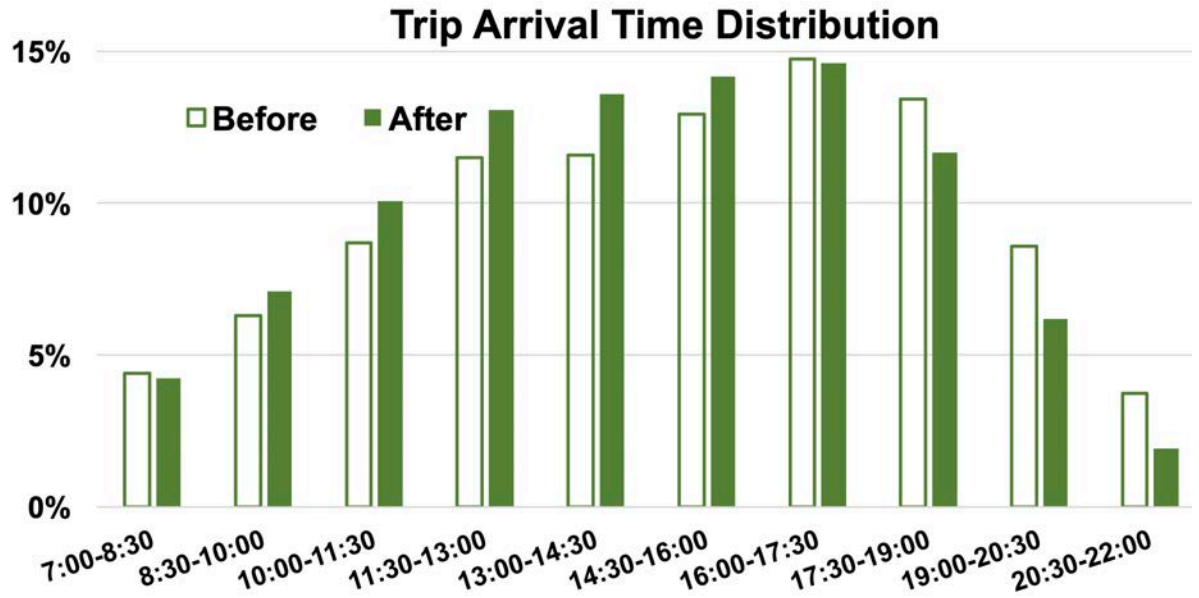
- **Department of Transportation**
  Travel monitoring: daily #trips by distance bands by state and county.
- **Center for Disease Control**
  Integrate mobility and social distancing data into epidemic models for prediction of future cases and death.
- **Department of Veterans Affairs**
  Use SERA tool and its metrics to help determine when to reopen certain VA facilities in specific states and counties.
- **Department of Treasury and Federal Reserve Bank**
  Use mobility and economic metrics on platform for economic and financial impact analysis.

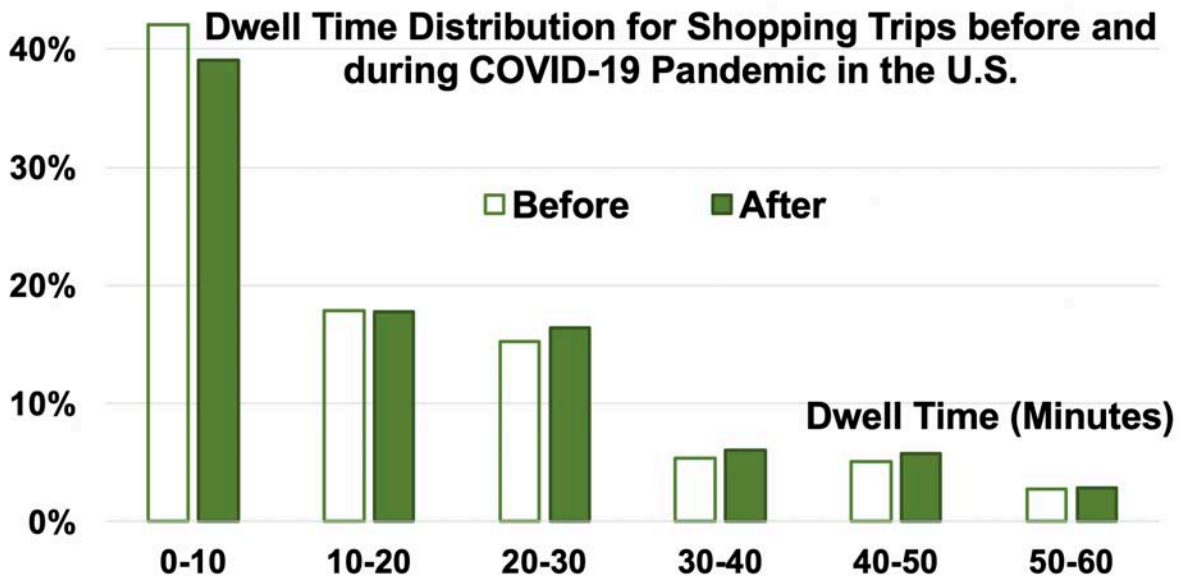
Trip and Travel Distance Trends



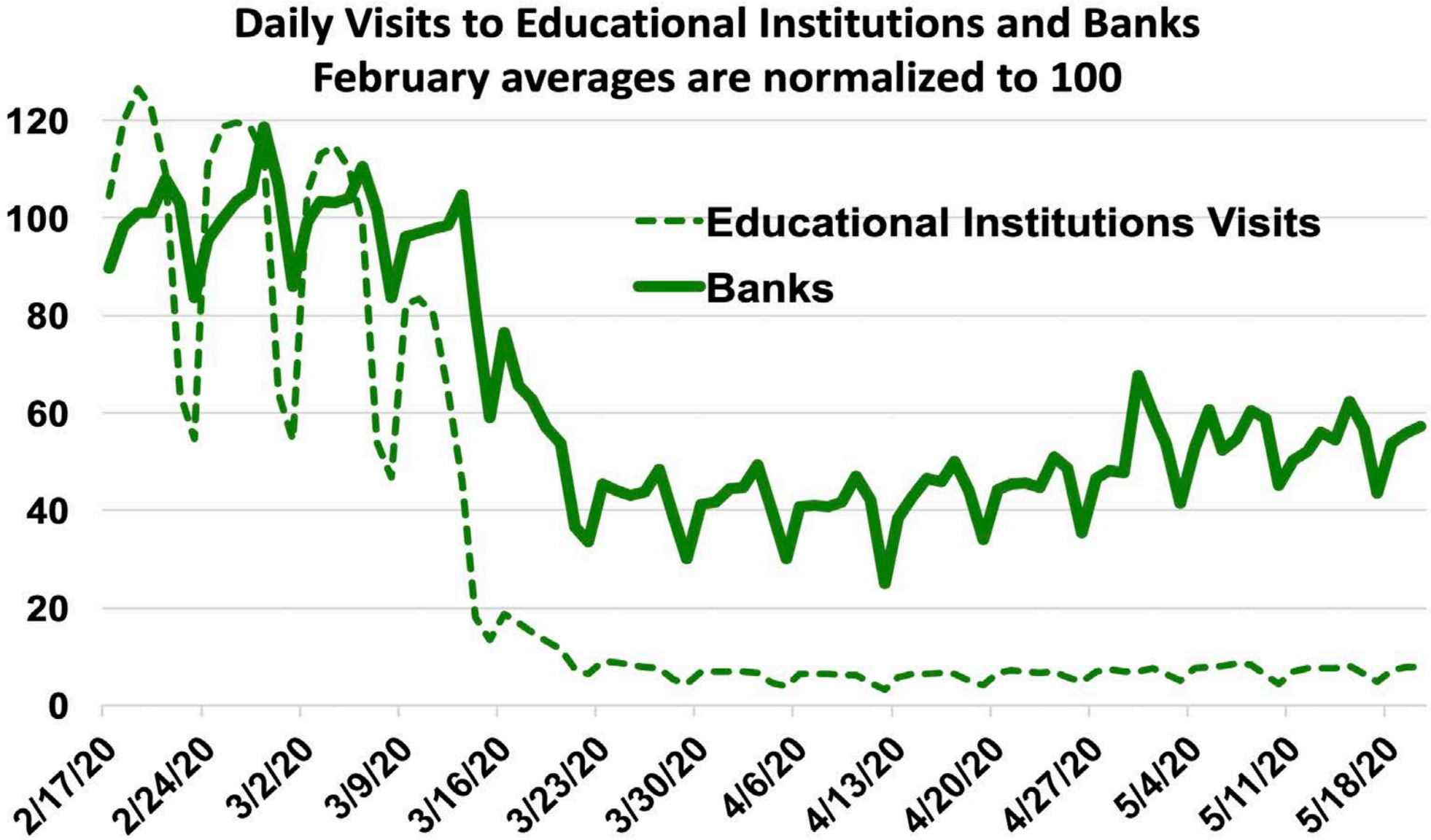
Activity Duration and Time Use Trends

- **Arrival time and activity duration distributions for shopping trips**





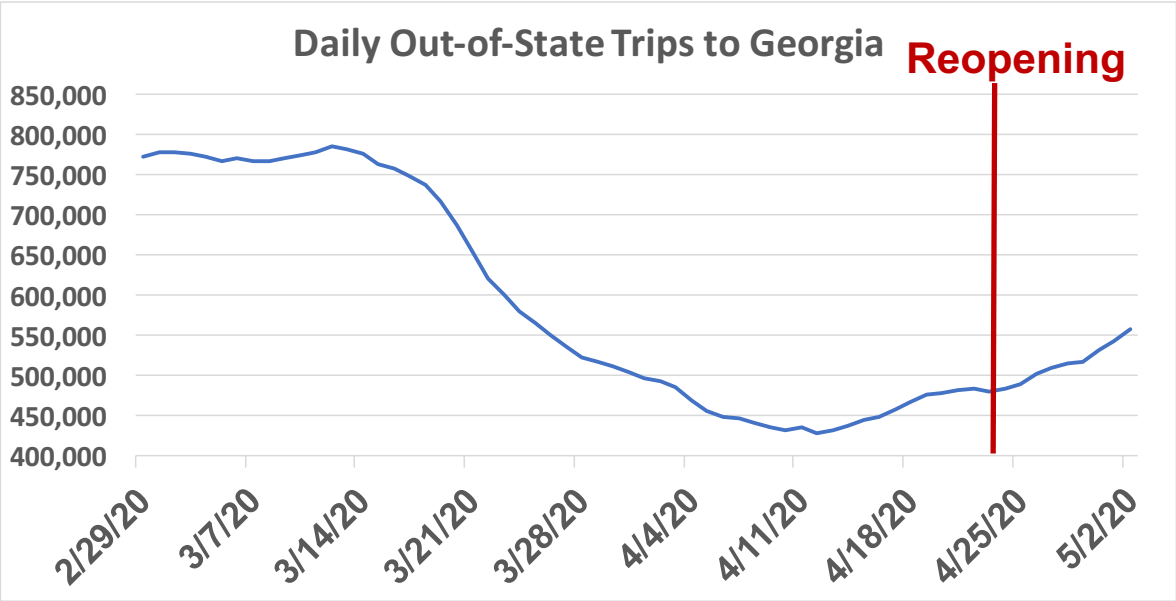
Point of Visit Trends by POI Category and Location



24/7/365 Monitoring of Travel Trends

Example: Following 4/24 partial reopening in Georgia

% staying home: down by 32%.
Distance traveled/person: up by 19%.
non-work trips: up by 24%.
Out-of-state trips to GA: up by 13%.



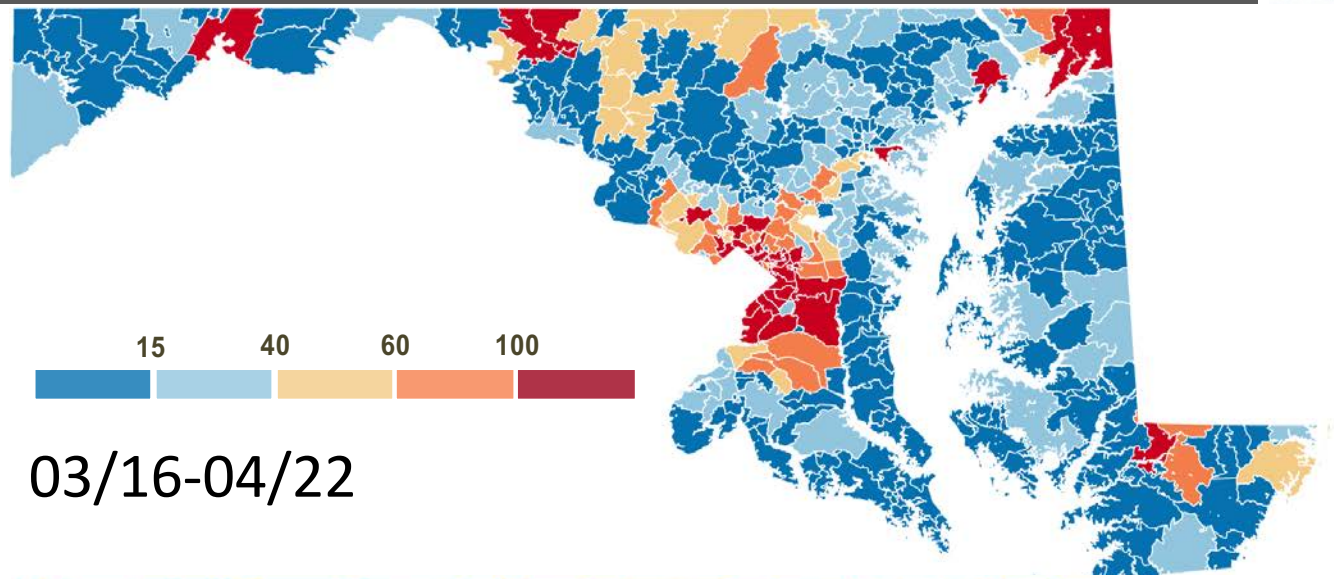
Travel to Georgia by State: Top 10 States		
State	Daily Trips After Reopening	% change
AL	140,910	14%
SC	135,707	12%
TN	118,606	11%
FL	97,483	17%
NC	27,748	11%
KY	5,217	10%
MS	3,962	10%
VA	2,768	11%
TX	1,599	10%
IL	1,446	-4%
All States	546,159	13%

Correlation b/w Imported Cases and COVID Cases

Number of Imported Cases by Out-of-State Travel to Maryland

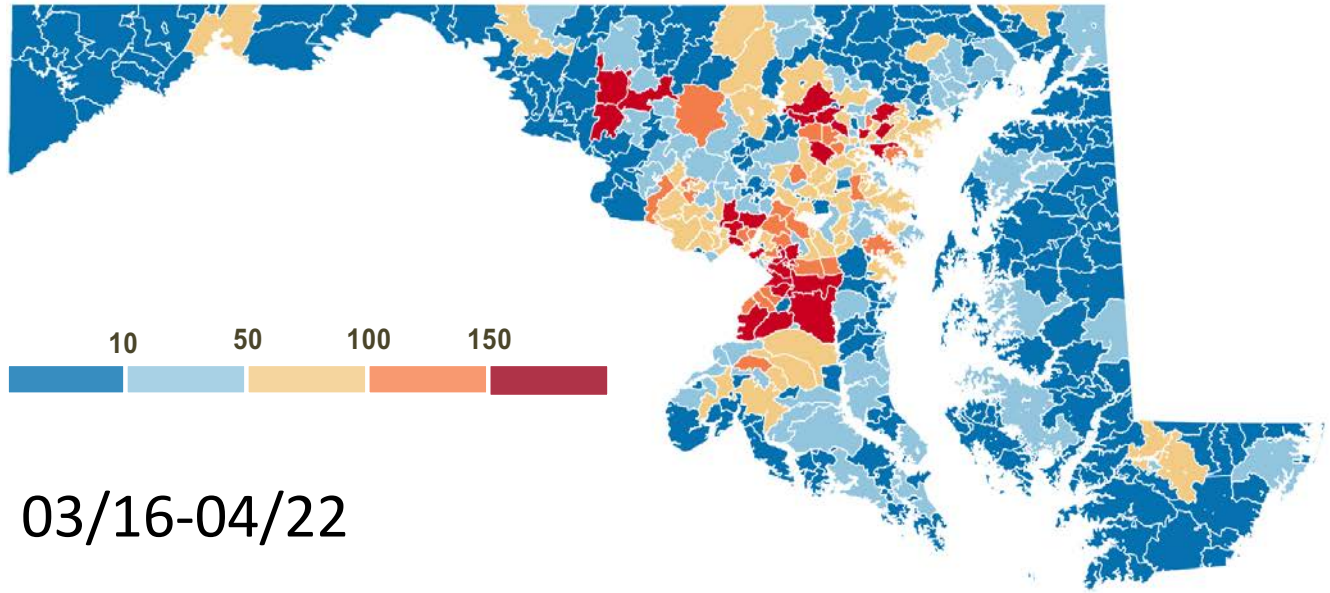
Prince George's County

County	Imported COVID cases
Prince George's County, Maryland	22,635
Baltimore County, Maryland	16,551
Baltimore city, Maryland	12,989
Montgomery County, Maryland	11,702
Anne Arundel County, Maryland	10,256
Howard County, Maryland	7,133
Harford County, Maryland	4,056
Frederick County, Maryland	3,956
Cecil County, Maryland	3,285
Carroll County, Maryland	3,242
Charles County, Maryland	2,998
Washington County, Maryland	2,724
Wicomico County, Maryland	1,778
Calvert County, Maryland	1,490
St. Mary's County, Maryland	1,263
Queen Anne's County, Maryland	1,198
Worcester County, Maryland	1,111
Caroline County, Maryland	946
Talbot County, Maryland	850
Dorchester County, Maryland	769
Allegany County, Maryland	679
Somerset County, Maryland	518
Kent County, Maryland	513
Garrett County, Maryland	401



03/16-04/22

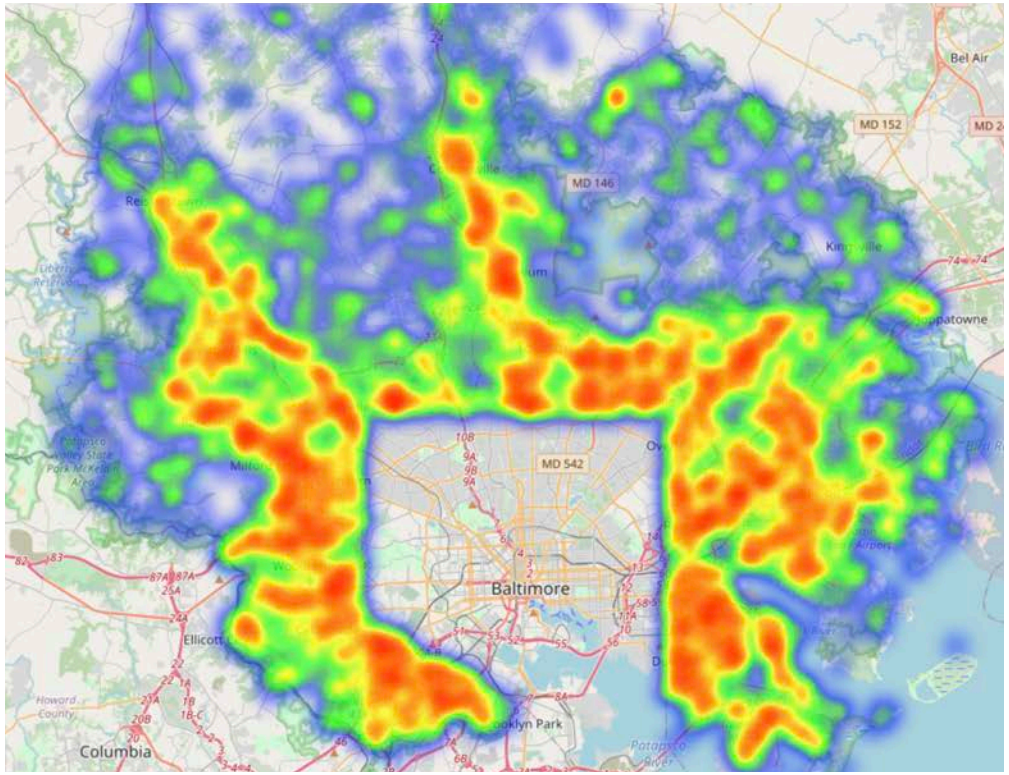
Number of Confirmed COVID-19 Cases in Maryland



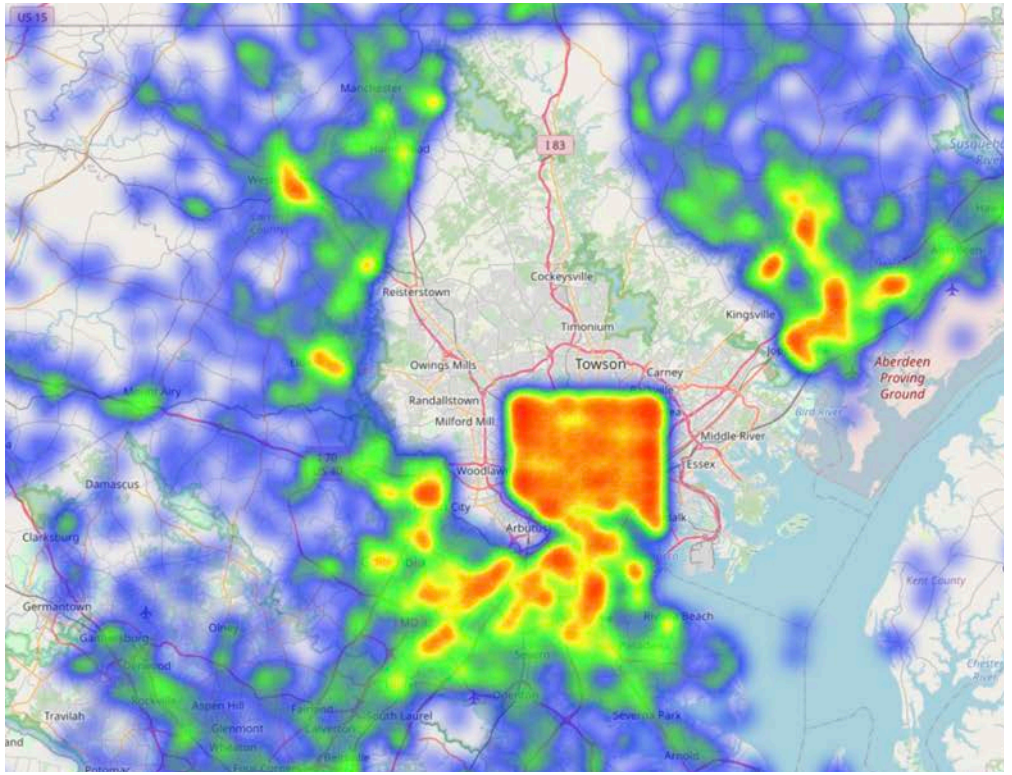
03/16-04/22

External Trip Hotspots

- **Out of County trip end hotspots for Baltimore County**



Trip Destinations



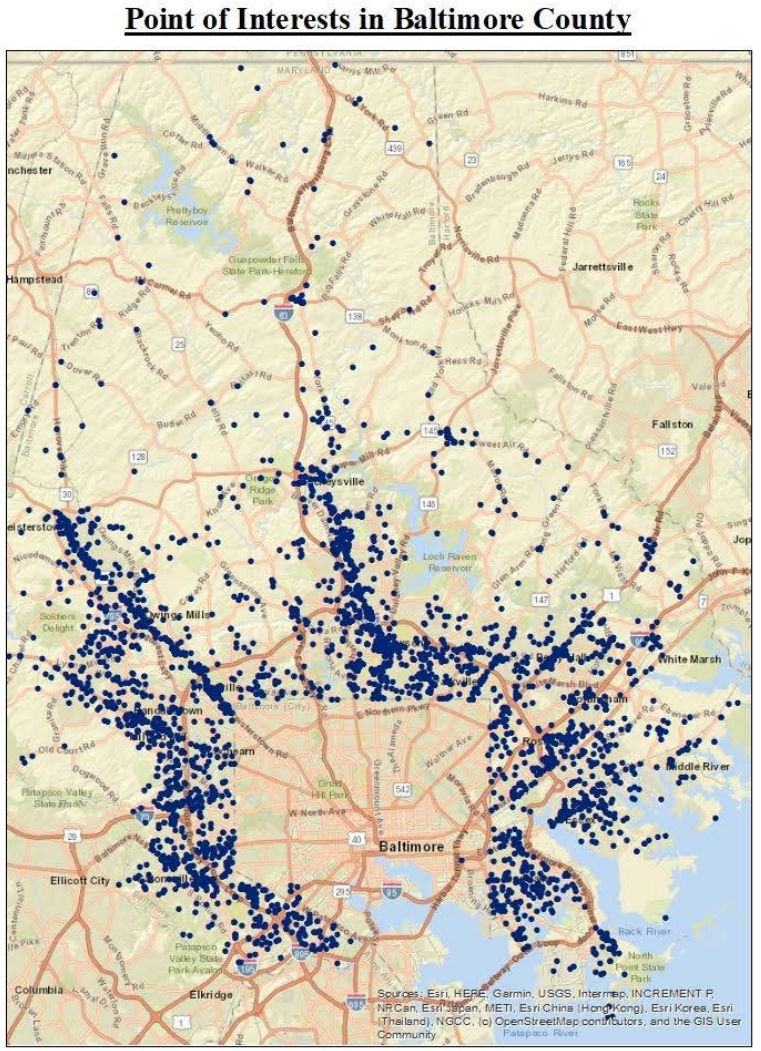
Trip Origins

Hotspot Monitoring and Outbreak Warning

Baltimore County, MD

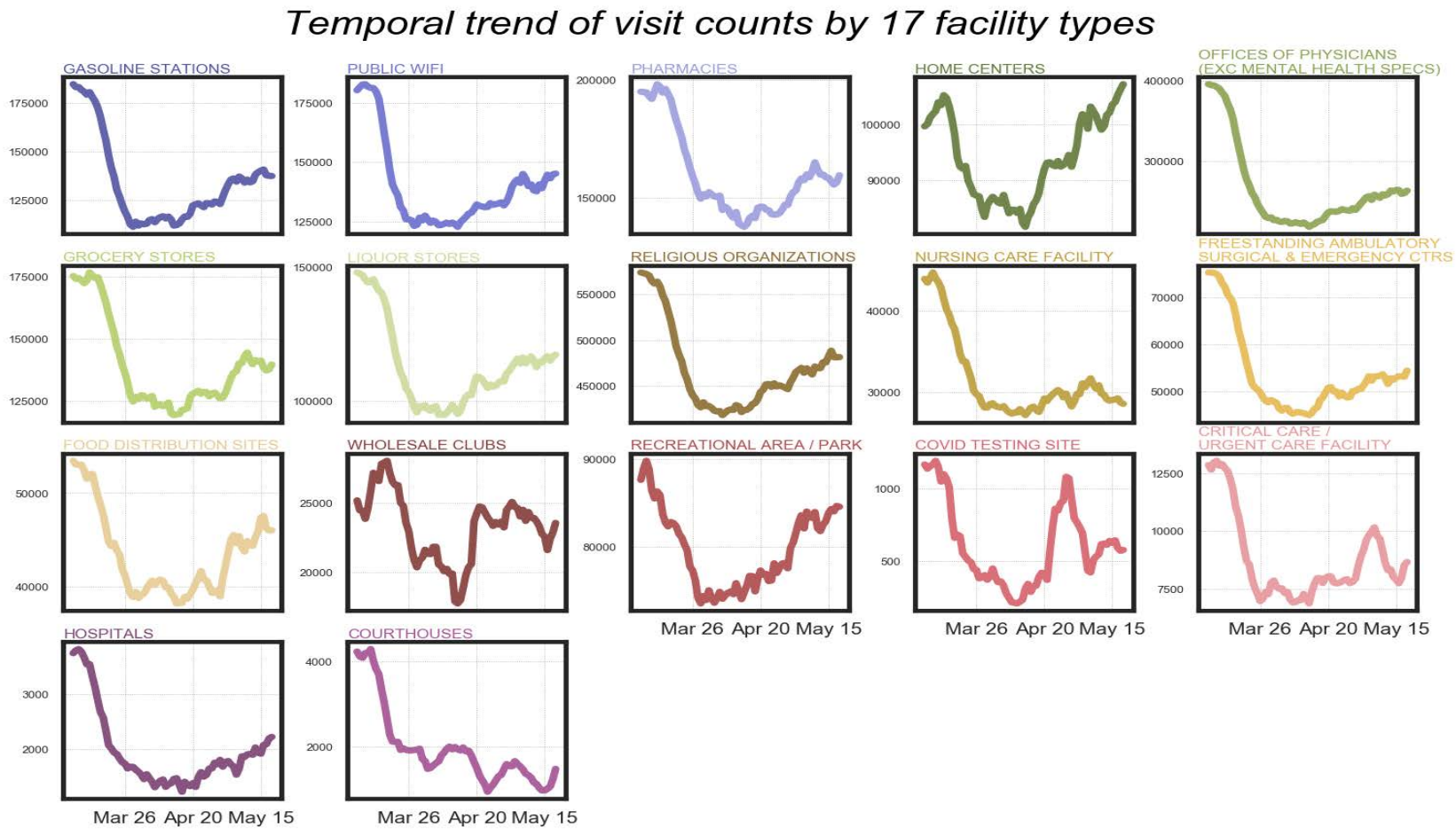
- For hotspot monitoring, the platform uses anonymized data to automatically monitor daily visits to more than 6,000 locations.

- For outbreak risk prediction, the platform uses number of visits, origins of visits, and COVID infection rates at origins together to predict high-risk locations for new outbreaks and suggest preventative measures.



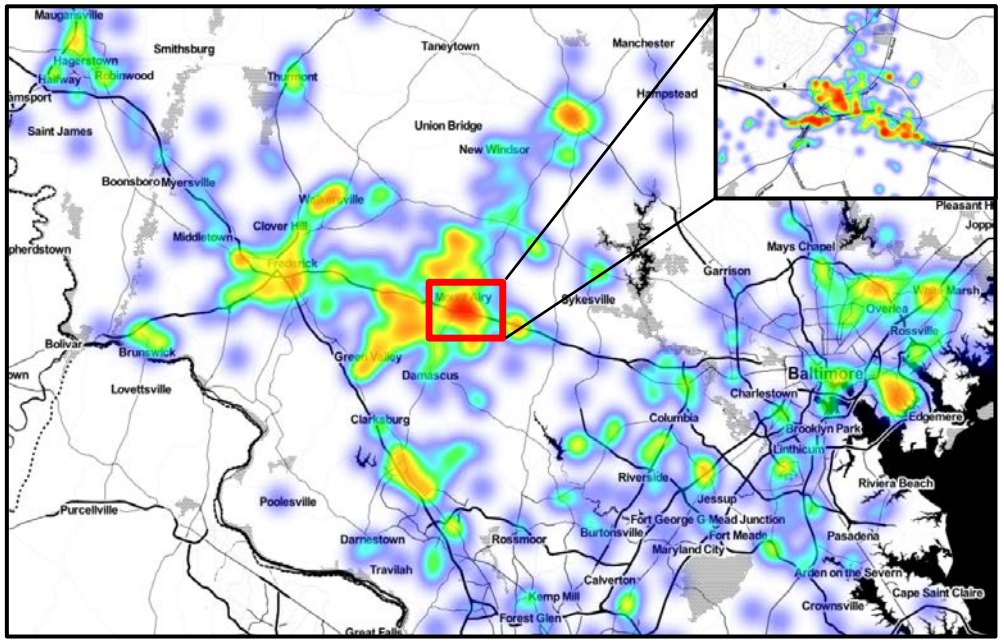
POI Visit Trends for Outbreak Risk Prediction

- **Daily visits to selected POI types in the Baltimore County**



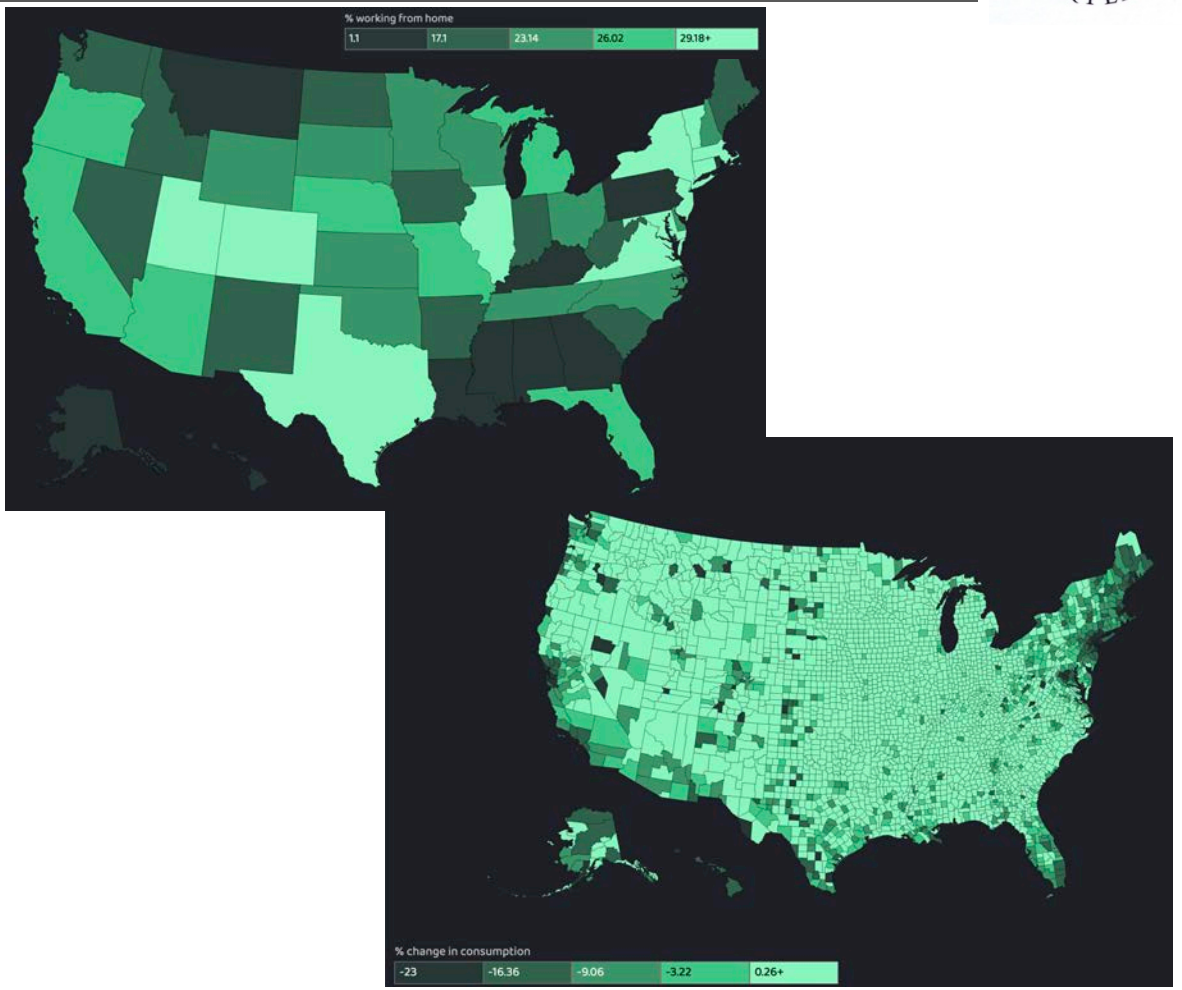
Contact Tracing and Local Containment

- Minutes after a new outbreak, we can use privacy-protected mobile device data to conduct aggregate, community-level contact tracing and recommends localized quarantine areas. This complements traditional, individual-level contact tracing that takes much longer to complete.
- For instance, the pleasant view nursing home outbreak appeared to be correlated with non-employee visits 10 days before the outbreak.



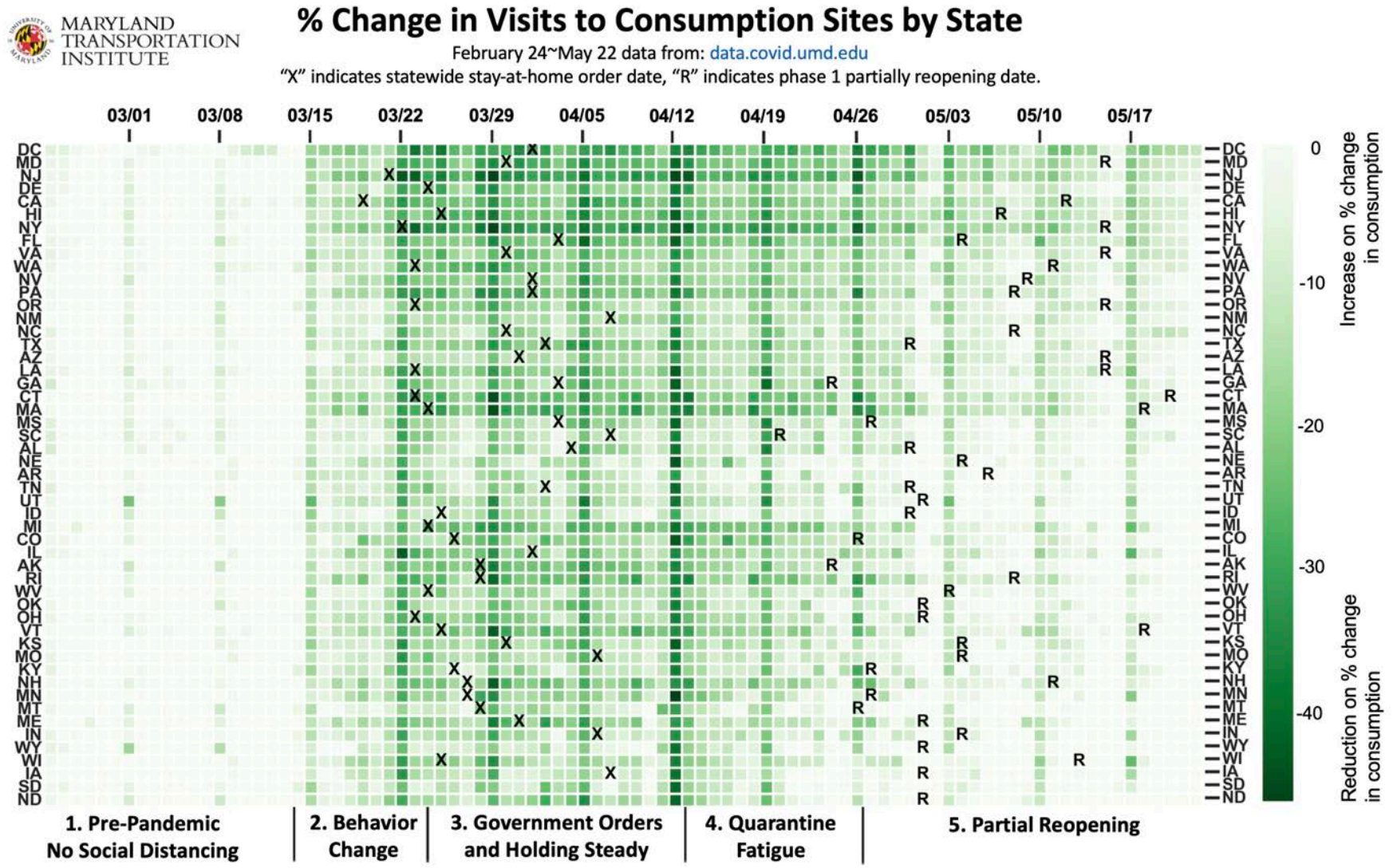
Economic/Job Impact and Policy Decision Support

- Change in consumption, % working from home, and number of visits to individual business types.
- Monitor economic recovery progress and provide decision support.
- Guide the design and implementation of economic stimulus policies for effectiveness.



% working from home by state and county-level impact of COVID-10 on retail trade, hotel, food and drink, entertainment, and recreation businesses.

Changes in Visits to Consumption Sites



Next Steps

- Trips by travel modes (air, rail, bus, driving, walk, bike, and other)
- Origin destination travel patterns
- Daily/weekly updates on economic and job impact for each county by economic sector including job loss/gain by sector
- Integration of mobility data, travel model, and epidemic model for public health policy scenario analysis, reopening scenario analysis, optimization, and decision support