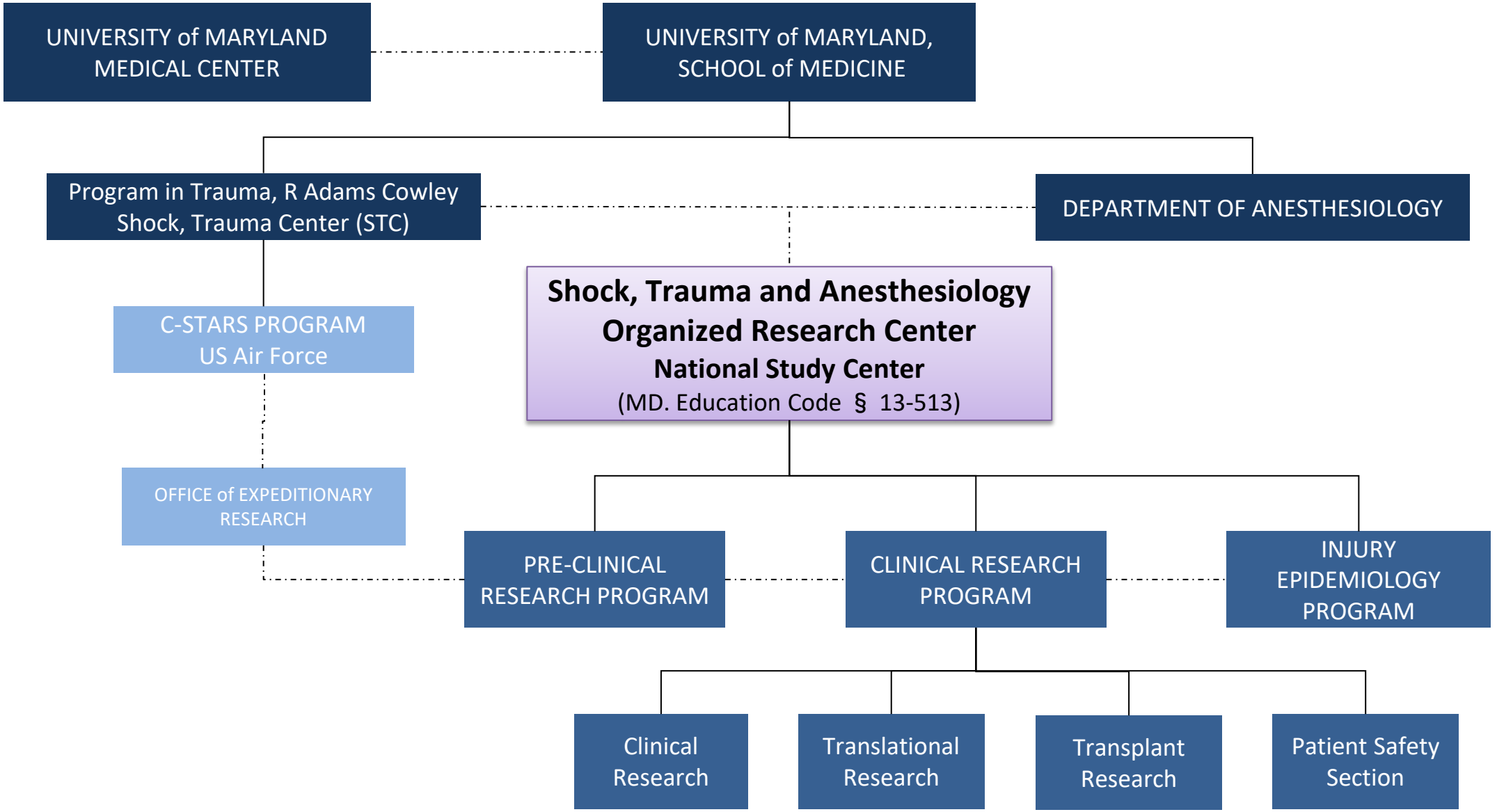
UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE
SHOCK, TRAUMA AND ANESTHESIOLOGY
RESEARCH CENTER
National Study Center for Trauma & Emergency Medical Services

Introducing the National Study Center

Wednesday, December 11, 2024


UNIVERSITY of MARYLAND MEDICAL CENTER
UNIVERSITY of MARYLAND, SCHOOL of MEDICINE
Program in Trauma, R Adams Cowley Shock, Trauma Center (STC)
DEPARTMENT OF ANESTHESIOLOGY
Shock, Trauma and Anesthesiology Organized Research Center
National Study Center
(MD. Education Code § 13-513)
C-STARS PROGRAM US Air Force
OFFICE of EXPEDITIONARY RESEARCH
PRE-CLINICAL RESEARCH PROGRAM
CLINICAL RESEARCH PROGRAM
INJURY EPIDEMIOLOGY PROGRAM
Clinical Research
Translational Research
Transplant Research
Patient Safety Section

Census of Maryland Transportation Health Data

Charles McC. Mathias, Jr. National Study Center for Trauma and Emergency Medical Systems

University of Maryland School of Medicine, Shock, Trauma and Anesthesiology Research Center

IODES

Injury Outcomes Data Evaluation System

Crash Reports
24 hours

Seatbelt Use Survey
Annual

Citations / Adjudication
6 Months

EMS Triage & Transport
30 Days

All OP & IP Encounters
6 Months

Medical Examiner
On Request

All UMMS Patients (14 hospitals)
Realtime

MD Trauma Registry (9 adult / 2 pediatric)
90 Days

Traffic Speeds, Volumes, & OD
On Request – Realtime

Infrastructure
Public Release

Shock Trauma Center
Real-Time

Location, Census, & Socioeconomic Data
Public Release

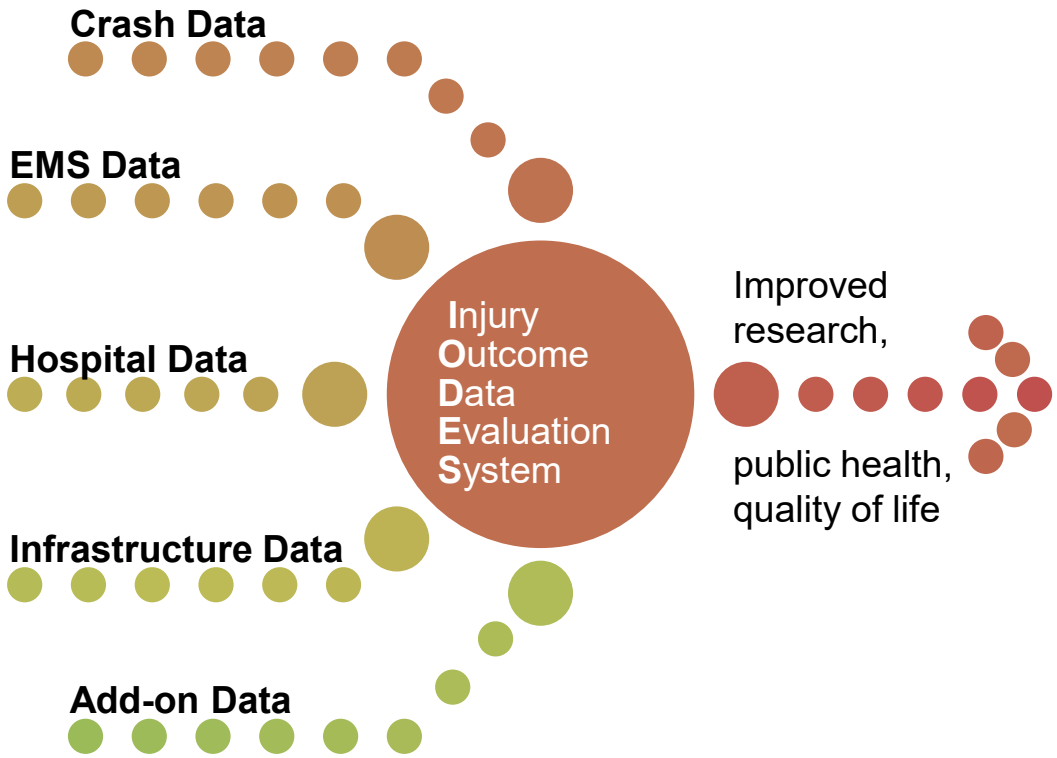
License / Registration
Annual

Drug Recognition Expert Evaluations
Annual/ On Request

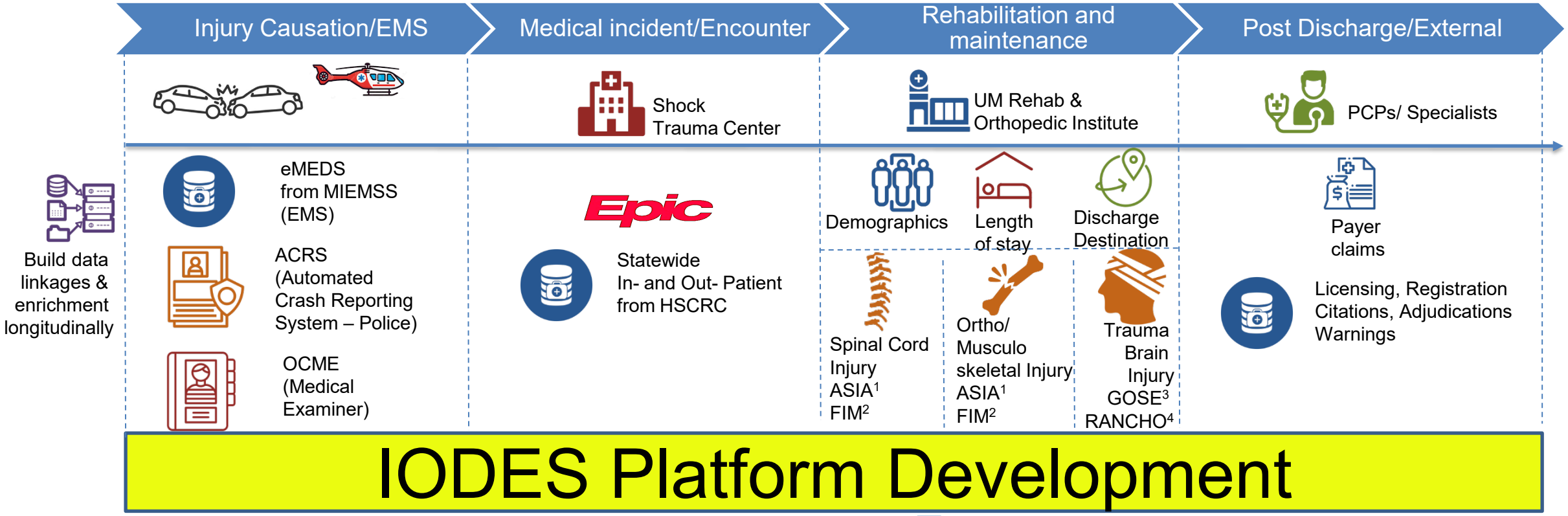
Contact: NSC@som.umaryland.edu

IODES Ideology

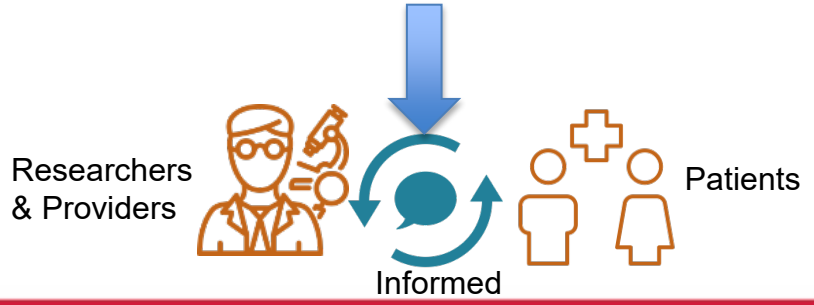
- Integration of multiple datasets
  - Incident, EMS, and Hospital data
  - Infrastructure and built environment at incident location
- IODES maintains data in structured databases
  - Mineable data, integrated together
- Data continuum
  - Patient history, incident, through transport, hospital stay, and beyond hospital discharge



Borrowing Strengths



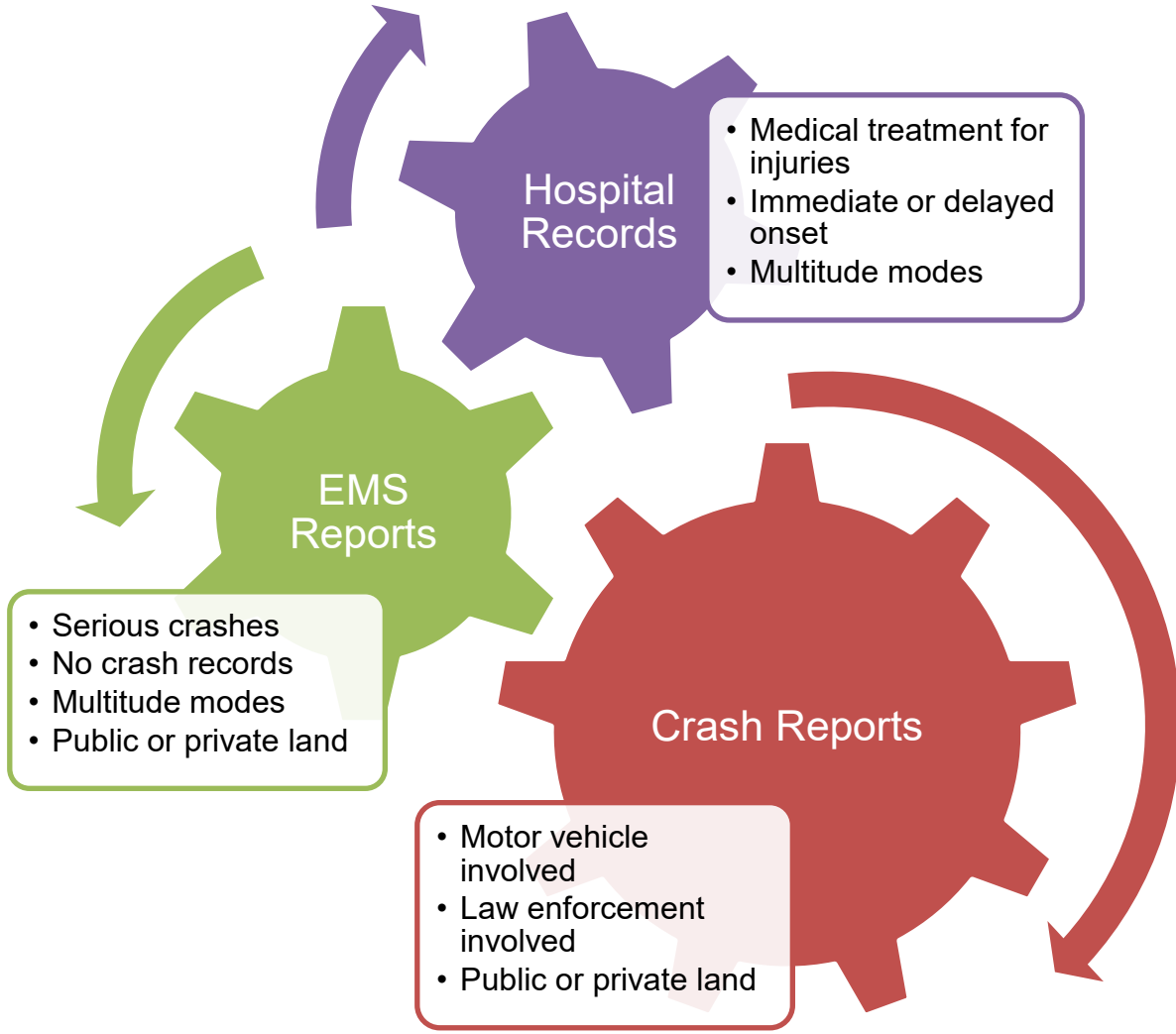
IODES Platform Development



Score Acronym	Full form
1. ASIA	American Spinal Injury Association
2. FIM	Functional Independence Measure
3. GOSE	Glasgow Outcome Scale
4. RANCHO	Rancho Los Amigos Scale

Enabling Multipronged Analytics

- Mobility is changing
  - Pedestrians, bicyclists, e-scooters, etc.
- Unusual crashes/No crash record
  - ADAS assistance and mitigation
  - Falls, ped-bike/scooter collisions, unclear roadway delineation
- Delayed onset of injuries, impact of old injuries
- Require a multi-pronged approach
  - Data mining starts from multiple angles



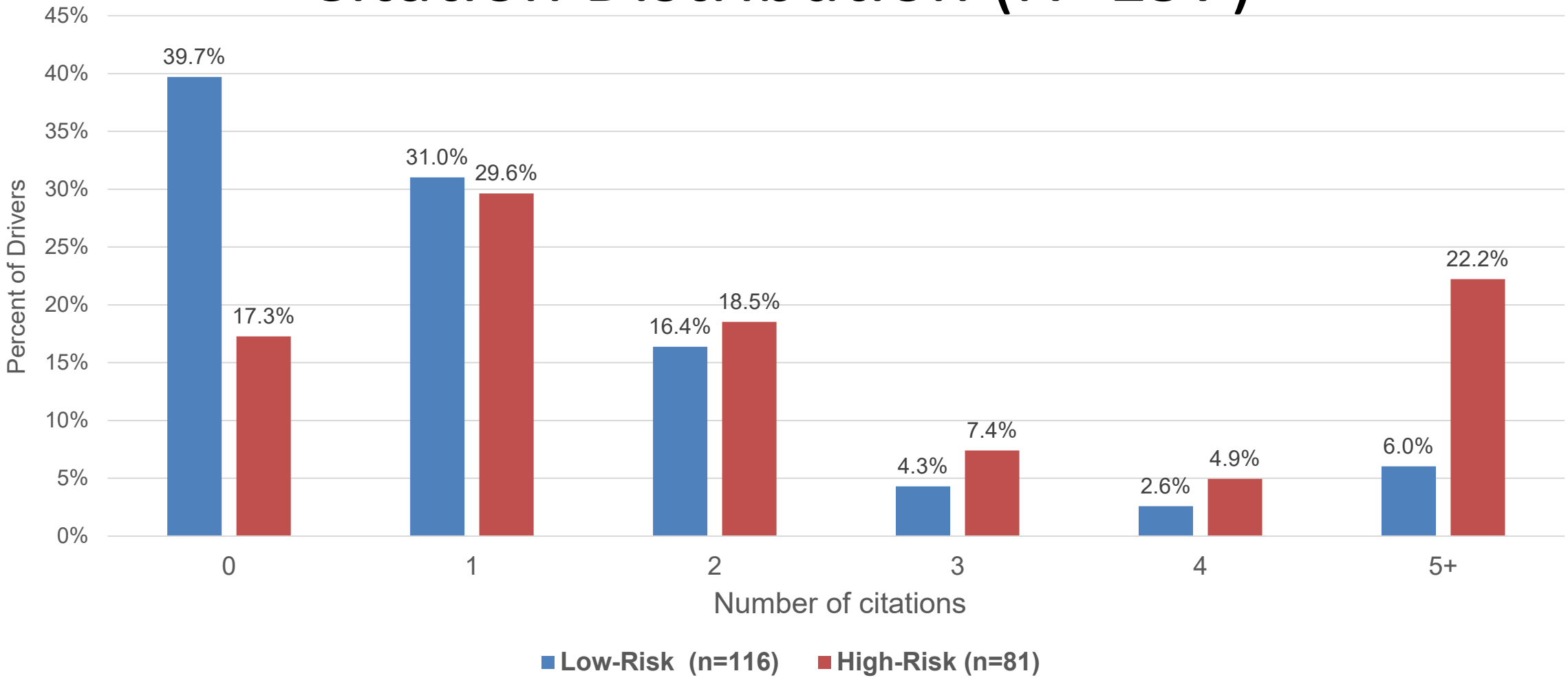
Transportation & Health Analysis

Results from Selected Projects

DriveCam® Study

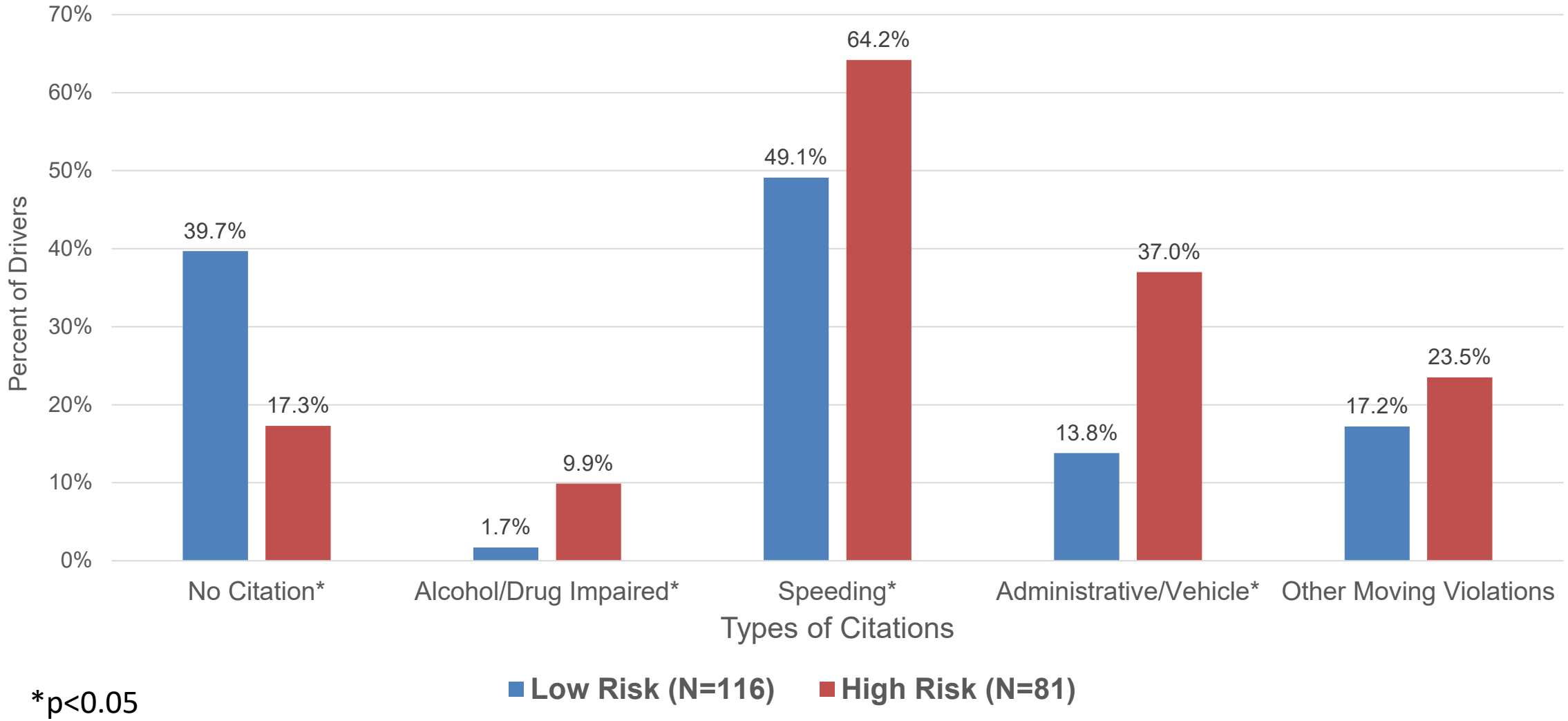
- 221, 16-20 years old drivers and parents participated in the study
  - Data collected during 2008 – 2009
- Cameras, accelerometers, and other sensors fitted in cars
- Events during driving classified as low and high risk
  - Three double-blind groups, with varied levels of feedback on risky events
- Study classified drivers as low and high risk based on frequency of risky events
- How have these drivers performed over the intervening 13 years?

Citation Distribution (N=197)



83% of high-risk drivers received at least one citation, compared to 60% of the low-risk drivers; p<0.001

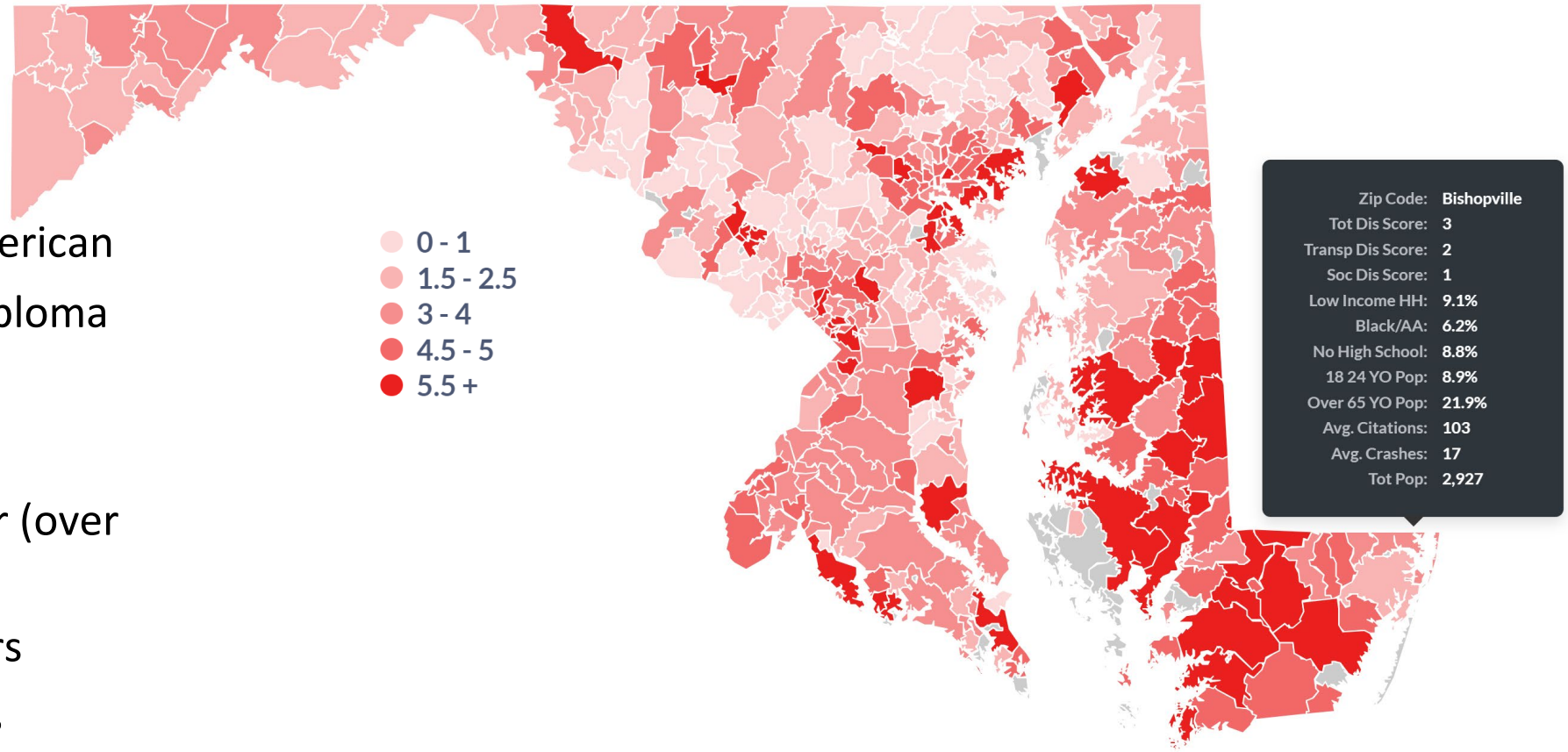
Citation Type Distribution (N=197)



*p<0.05

Transportation Safety Disadvantage Indicator

- 3 socioeconomic factors:
  - Household income
  - Percent Black/African American
  - Percent no high school diploma holders
- 3 transportation factors:
  - Younger (18-24) and older (over 65) drivers
  - Total citations over 5 years
  - Total crashes over 5 years
- Zip code level analysis
  - Score = +1 if zip code over state median



KABCO vs Injury Severity Score (ISS)

KABCO	ISS						
	Minor	Moderate	Serious	Severe	Critical	Maximal	Total
None	78	64	33	17	16	0	208
Possible	740	528	275	118	49	2	1,712
Moderate	851	703	454	154	56	0	2,218
Serious	703	927	1,259	854	623	8	4,374
Fatal	9	6	35	68	192	17	327
Total	2,381	2,228	2,056	1,211	936	27	8,839

Linked STC Admissions to ACRS Crash Reports, 2016 – 2021

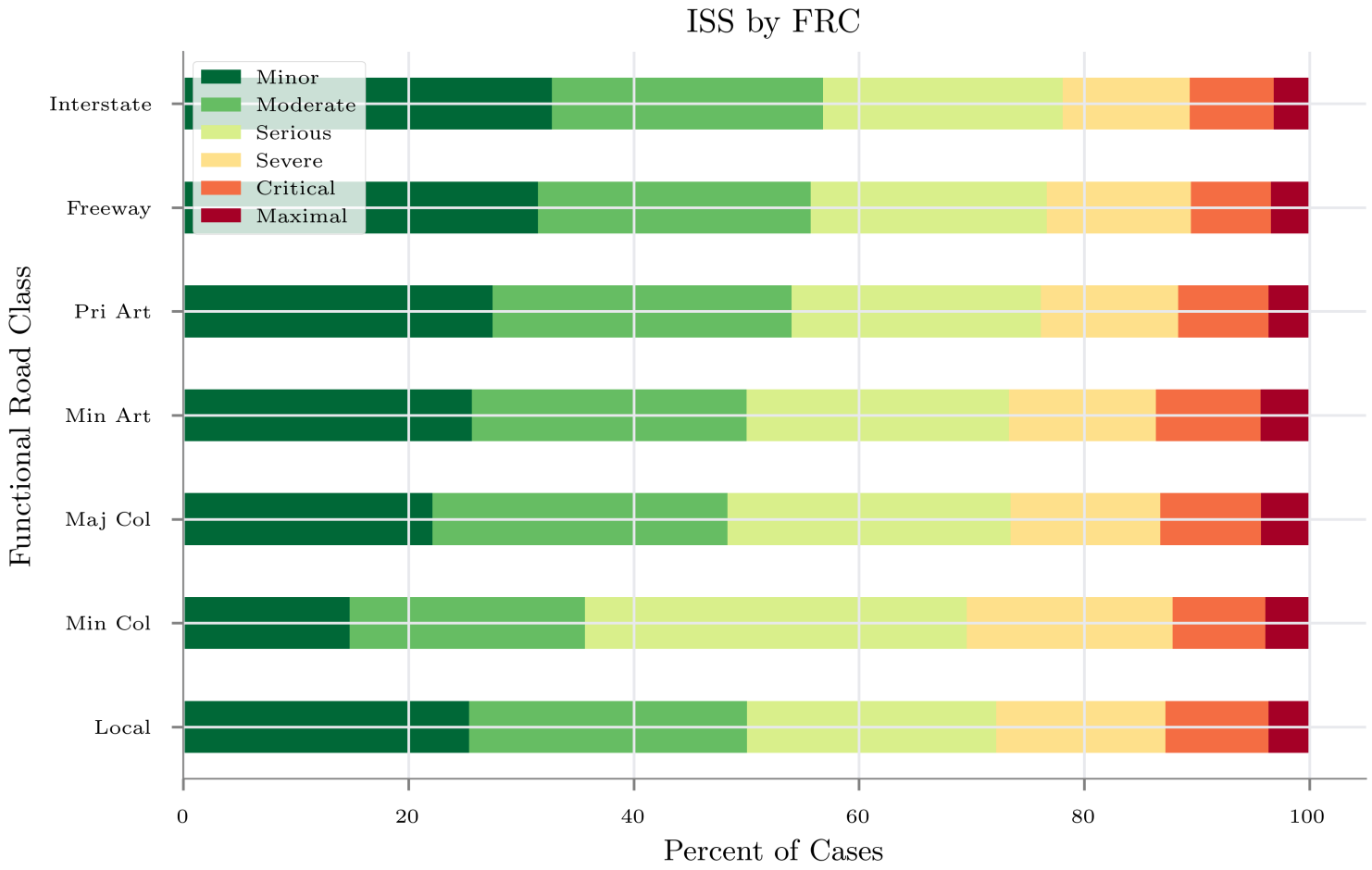
Match

Mismatch, high frequency

Mismatch, low frequency

Injury Severity and Road Class

- Data from 2016 – 2021
- Road class from SHA
- ISS from STC
- 21.8* odds of severe injury on more local roads
- Person type not significant

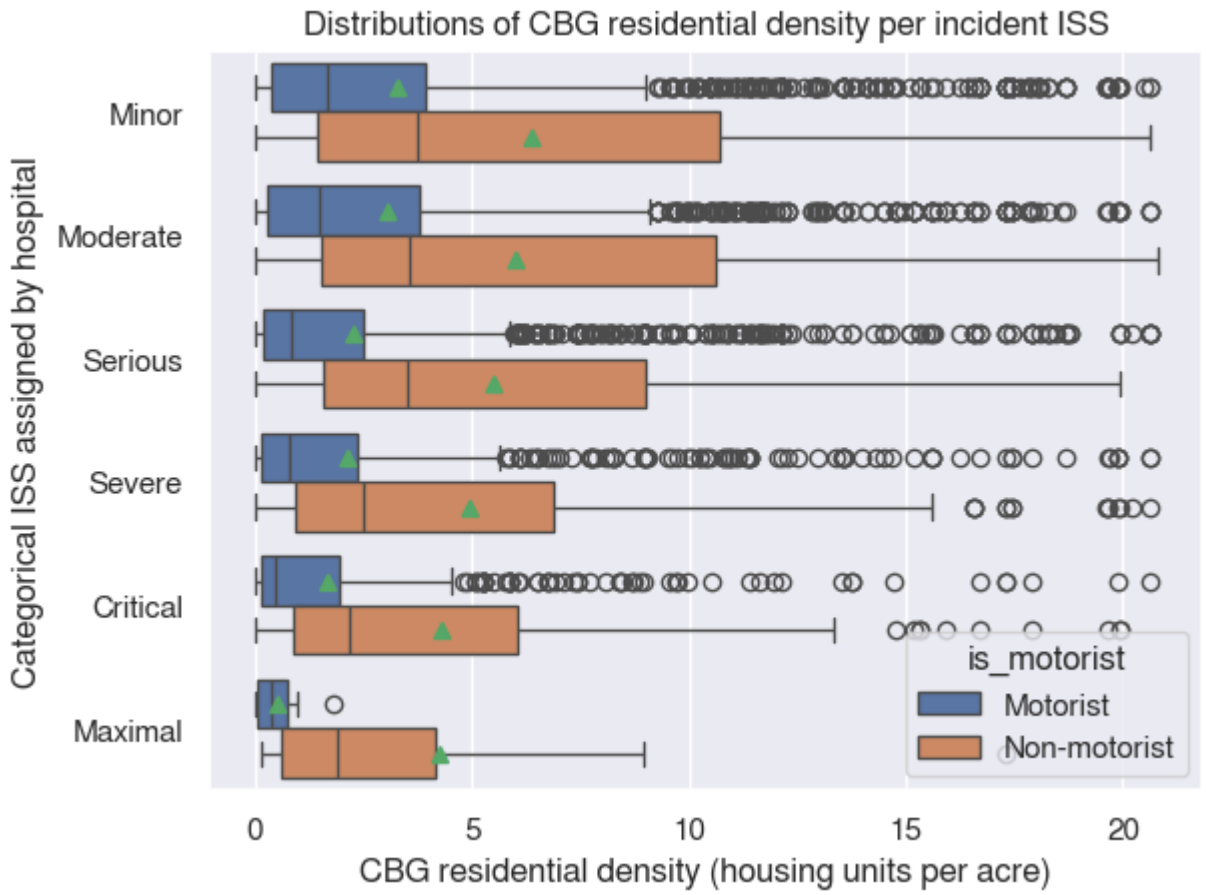


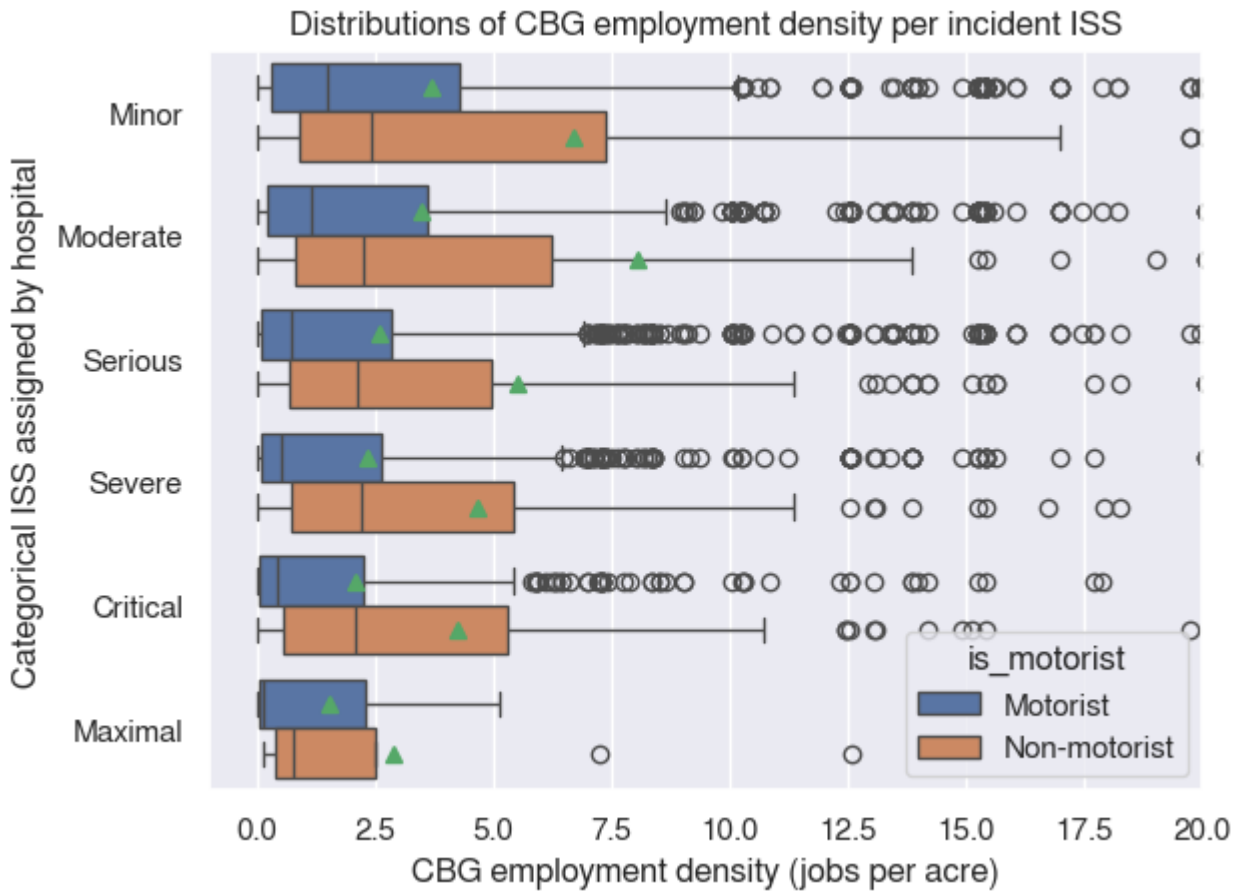
Ordered Logistic Regression Analysis

Parameter	Category	ISS Group	Odds Ratio	95% Wald Conf. Int.	
Functional Road Class	Interstate		-	-	-
	Freeway		1.035	0.856	1.252
	Primary Arterials		1.067	0.928	1.226
	Minor Arterials		1.288	1.115	1.489
	Major Collectors		1.311	1.114	1.542
	Minor Collectors		1.794	1.387	2.322
	Local Roads		1.278	1.081	1.51
Gender	Male		-	-	-
	Female		0.821	0.75	0.899
Natural Log of Age		Maximal	2.759	2.066	3.685
		Severe	1.407	1.205	1.643
		Serious	1.573	1.4	1.768
		Moderate	1.54	1.389	1.709

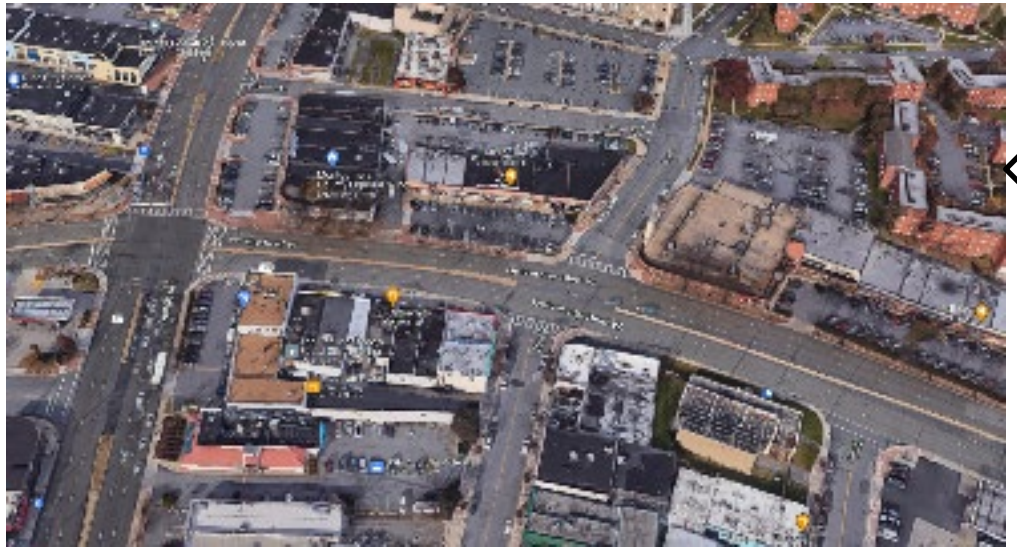
All displayed values are statistically significant; selected variables presented

Injury Severity and Housing and Job Density



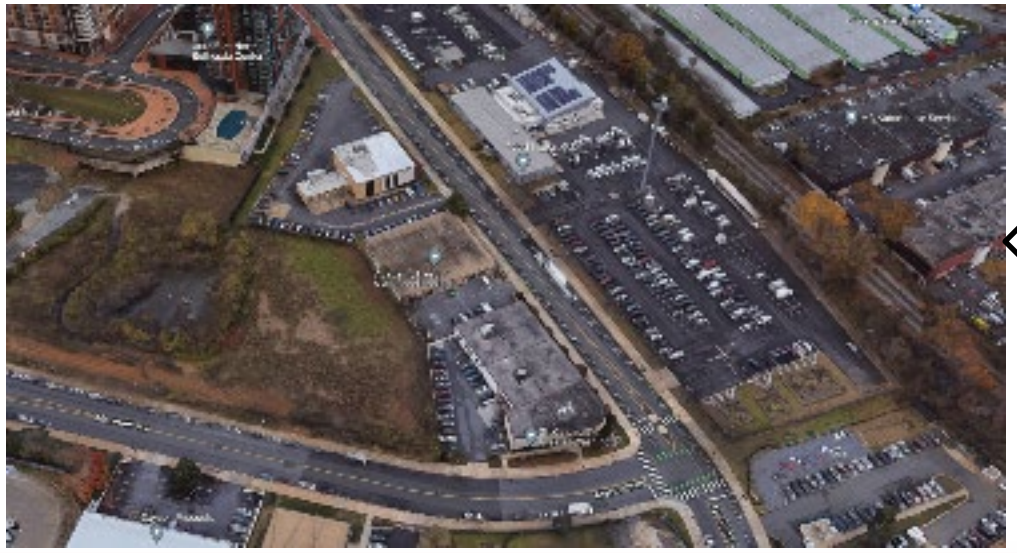


Solutions: Better Infra, ADAS, Better Land Use



Class 4

Class 5

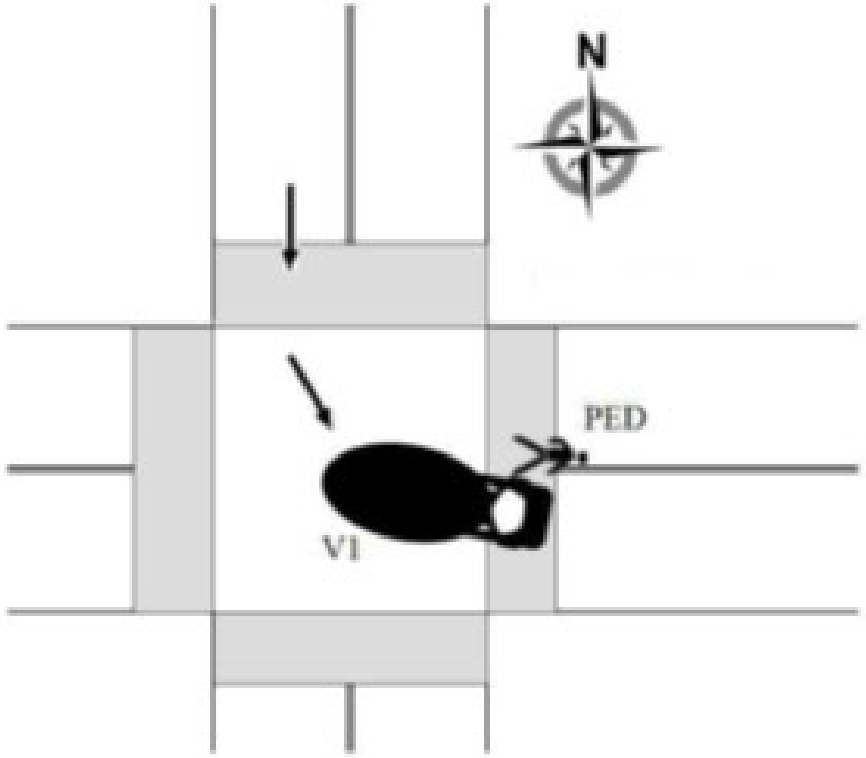


Class 6

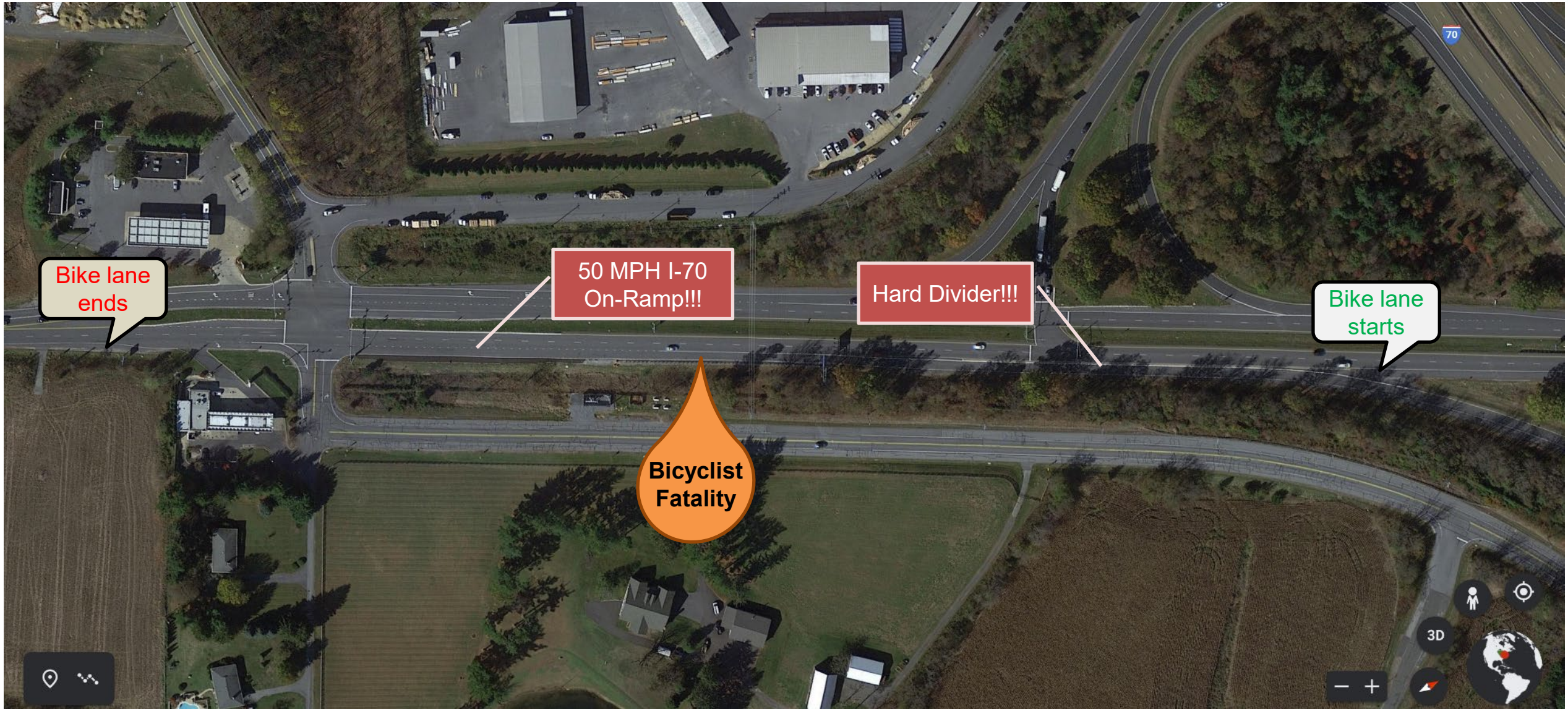
Class 7

Pedestrian/Bike Fatality Review

- Key contributing factors of ped/bike fatalities: lighting, visibility, distraction, impairment, infrastructure insufficiencies



Infrastructure Insufficiency (ADAS application)


Bike lane ends
50 MPH I-70 On-Ramp!!!
Hard Divider!!!
Bike lane starts
Bicyclist Fatality
70
3D

Crash Risk and Substance Use

- NHTSA sponsored project
- Prevalence of drugged/drunk driving
  - Compare with risk of serious injury/death
- Blood analysis of crash patients
  - From hospital and ME's office
  - Linked for Johns Hopkins (ME data)
- All crash and transport data
  - Case-controlled study
- Assess COVID-19 impact and prevalence

The NSC Team and Advantage

- Experienced NSC team
  - 30+ years of diverse traffic safety analytics
  - Crash, biomechanical, toxicology, behavioral
- Staffed with epidemiologists, statisticians, data analysts
  - NHTSA trained crash investigators
  - Clinical investigators and data scientists
- Robust and comprehensive datasets
  - Census of all injuries across the state

Thank You

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