Developing a Statewide DWI Tracking System
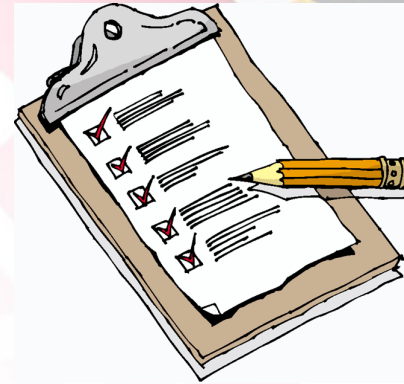
TEXAS IMPAIRED DRIVING ASSESSMENT 2022

- Active TRCC
- Crash and fatality data
  - Crash Records Information System (CRIS)
- Driver and Vehicle files
- Citation reporting systems
  - Texas Highway Patrol
  - Law Enforcement Advanced Data Reporting System
    - 160/1,000 agencies
- Interoperability
- Ignition interlock device x 254

TEXAS IMPAIRED DRIVING ASSESSMENT 2022

- Recommendations
  - Centralize the monitoring and establish a single source of records to evaluate the ignition interlock device program...

  - Evaluate the ignition interlock device program to determine if its current processes are effective…

  - Enact a statute that establishes a driving while intoxicated tracking system…

FIRST LOOK

- Environmental scan
- Survey
- In-state interviews
- Survey of states
  - 16 responses
  - 6 reported DWITS

**DWI Tracking System Feasibility Project
Final Report**

By:

Troy D. Walden, Ph.D., Research Scientist
Cody Stewart, Assistant Transportation Researcher
Cinthya Roberto Soares, Assistant Transportation Researcher
Paige Ericson-Graber, M.S.

Texas Department of Transportation
9/22/2017

TRAFFIC RECORDS

- Broad spectrum of information related to traffic crashes
  - Within your State
  - On the National level

- Details from the crash occurrence through the final outcome of the individuals involved
  - The Big Picture
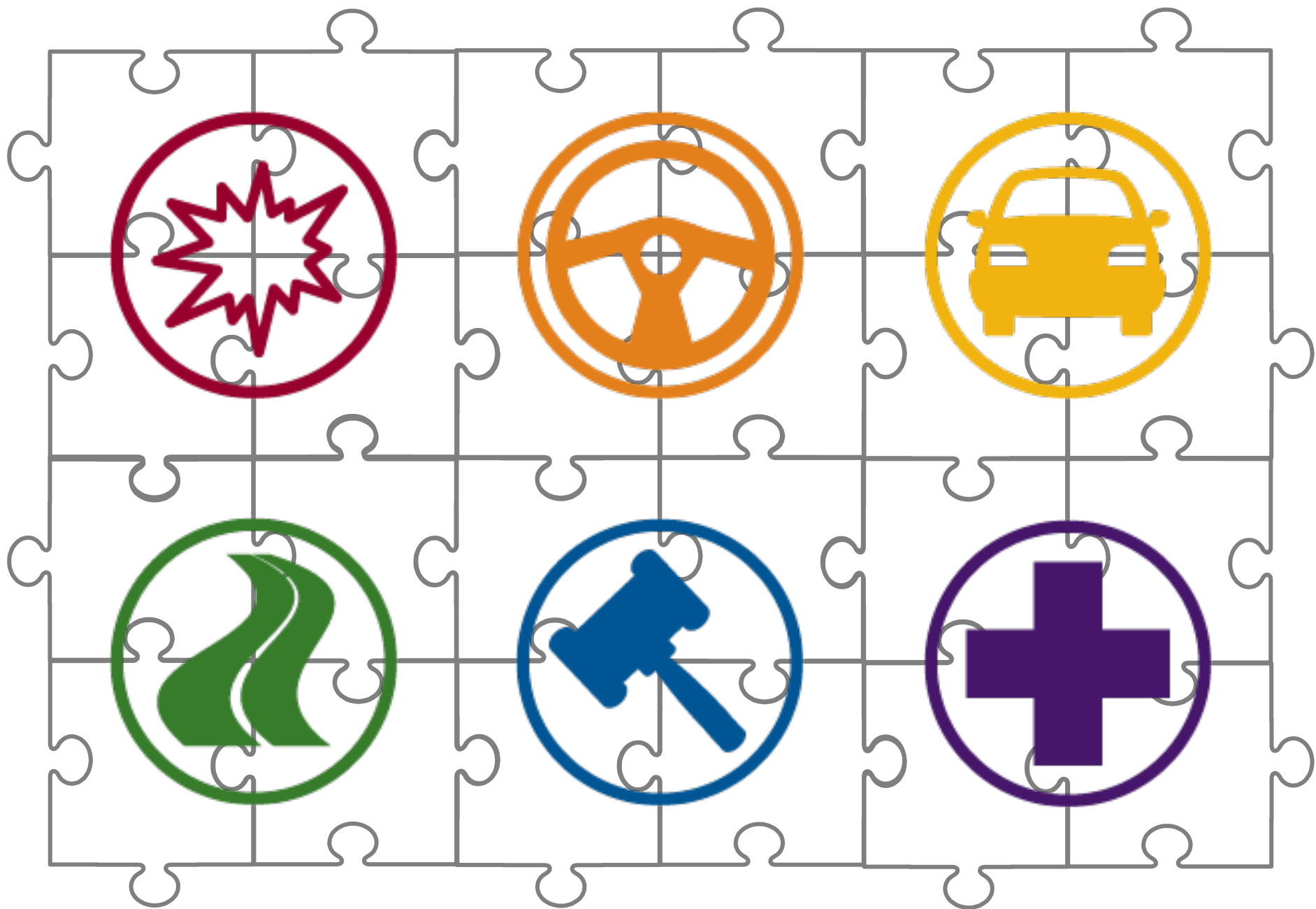
DATA'S ROLE IN DECISION-MAKING

- <u>IDENTIFY</u> the causes and outcomes of crashes

- <u>DEVELOP</u> effective interventions

- <u>IMPLEMENT</u> countermeasures to prevent crashes and improve crash outcomes

- <u>UPDATE</u> traffic safety programs, systems, and policies

- <u>EVALUATE</u> progress in reducing crash frequency and severity

WHY ARE THEY IMPORTANT?

- Quality data from all six component systems may be used together to:
  - Identify problems
    - Further identify countermeasures
    - Garner support for legislative changes
    - Initiate engineering (vehicle & environment) changes
  - Evaluate programs
    - Identify best practices
    - Discontinue ineffective/costly programs
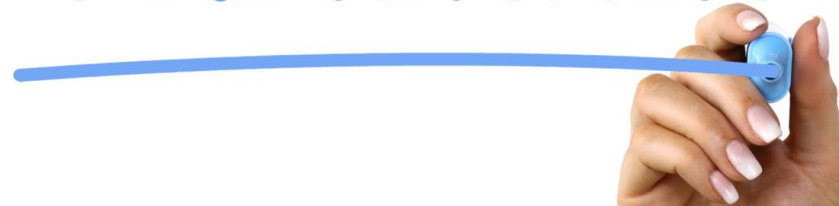
WHAT YOU NEED TO KNOW

- Understand the role of each of the six component systems
- Consider the performance metrics for each system and determine their feasibility
  - Performance measures are suggested and voluntary
- Being data-driven requires quality information from all six sources

Garbage In = Garbage Out
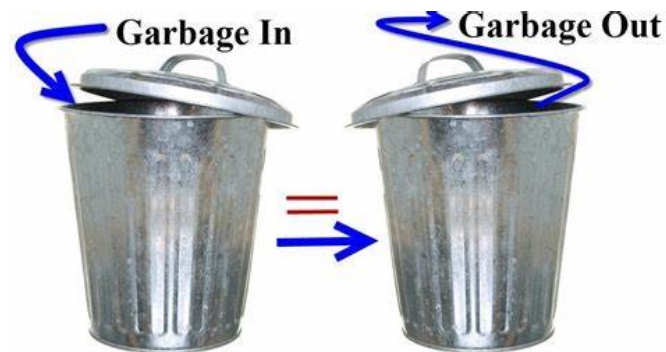
TRAFFIC SAFETY = INJURY PREVENTION

- Ultimate goal is to prevent the crash, thus preventing the injury and fatality
- Data is critical to all prevention, planning and evaluation
- Public Health tenets
    - Four Es – Enforcement, Education, Engineering, EMS
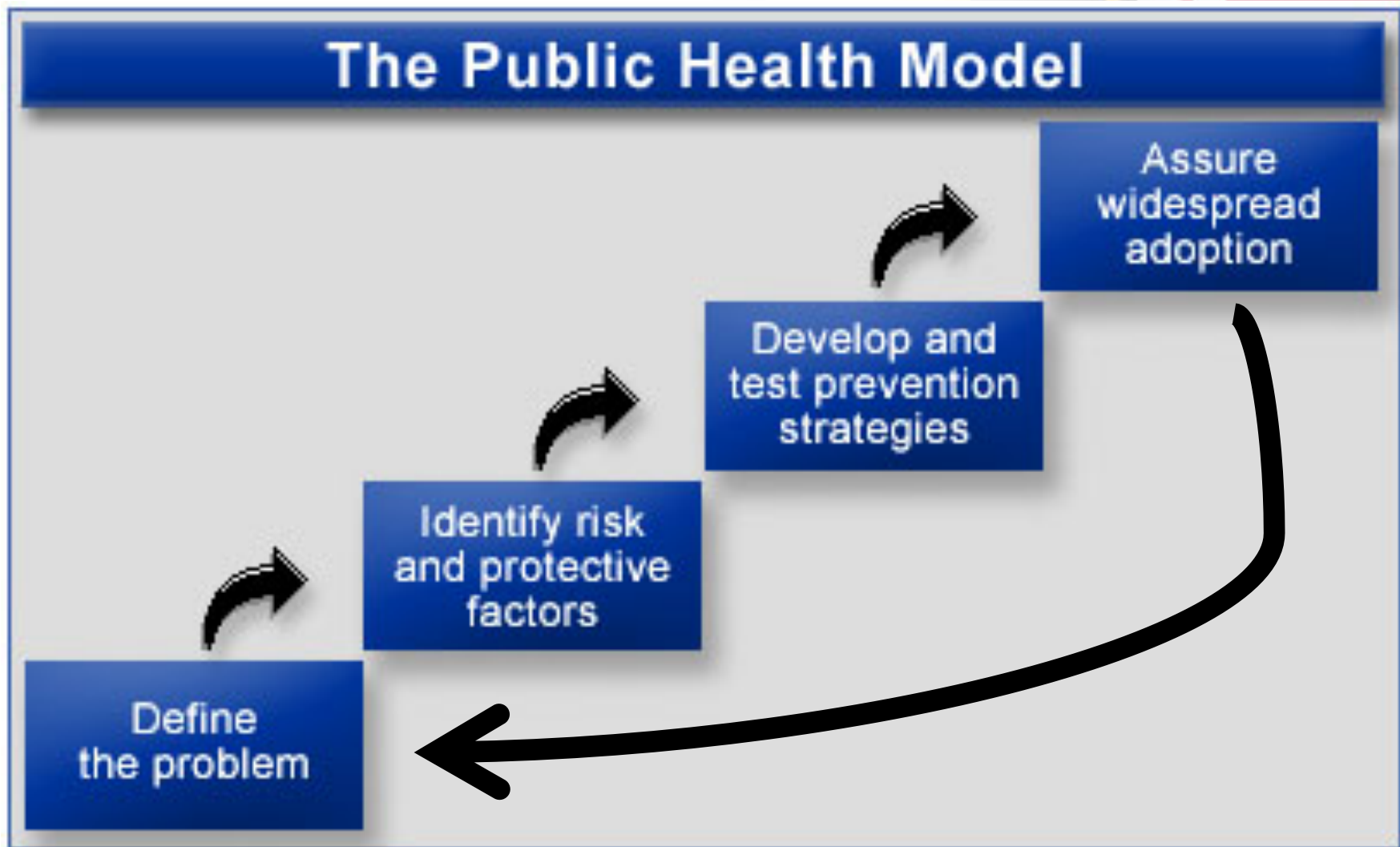   - Classic model for injury prevention is the Haddon Matrix

INJURY PREVENTION

HADDON MATRIX

Phases	Factors			
	Host	**Agent/ Vehicle**	**Physical Environment**	**Social Environment**
Pre-event (*Before the crash occurs*)	• Driver vision • Alcohol impairment • Driver experience/ability **Driver data** **Citation data**	• Maintenance of brakes, tires • Speed of travel • Load characteristics **Vehicle data**	• Adequate roadway markings • Divided highways • Roadway lighting • Hazardous intersections • Road curvature • Adequate roadway shoulders **Roadway data**	• Public attitudes on drinking and driving • Impaired driving laws • Graduated licensing laws • Speed limits • Support for injury prevention efforts
Event (*During the crash*)	• Spread out energy in time and space with seat belt and/or airbag use • Child restraint use **Crash data**	• Vehicle size • Crashworthiness of vehicle—"crush space", integrity of passenger compartment, overall safety rating • Padded dashboards, steering wheels, etc. **Vehicle data**	• Guard rails, median barriers • Presence of fixed objects near roadway • Roadside embankments **Roadway data**	• Adequate seat belt and child restraint laws • Enforcement of occupant restraint laws • Motorcycle helmet laws
Post-event (*After the crash*)	• Crash victim's general health status • Age of victims **Citation data** **EMS/Injury data**	• Gas tanks designed to maintain integrity during a crash to minimize fires	• Availability of effective EMS systems • Distance to quality trauma care • Rehabilitation programs in place **EMS/Injury data**	• Public support for trauma care and rehabilitation • EMS training

Source: Injury Prevention: Meeting the Challenge, AJPM, 1989; Christoffel T, Gallagher S. Injury Prevention and Public Health, Gaithersburg, MD, 1999.

The Public Health Model

- Define the problem
- Identify risk and protective factors
- Develop and test prevention strategies
- Assure widespread adoption

Problem Identification and Program Evaluation

NHTSA 1997

- "An online, real-time DWI Tracking System with statewide, centralized access can close the opportunity for offenders to "fall though the cracks."

DRIVING WHILE INTOXICATED TRACKING SYSTEMS

Volume I:
Design & Operation
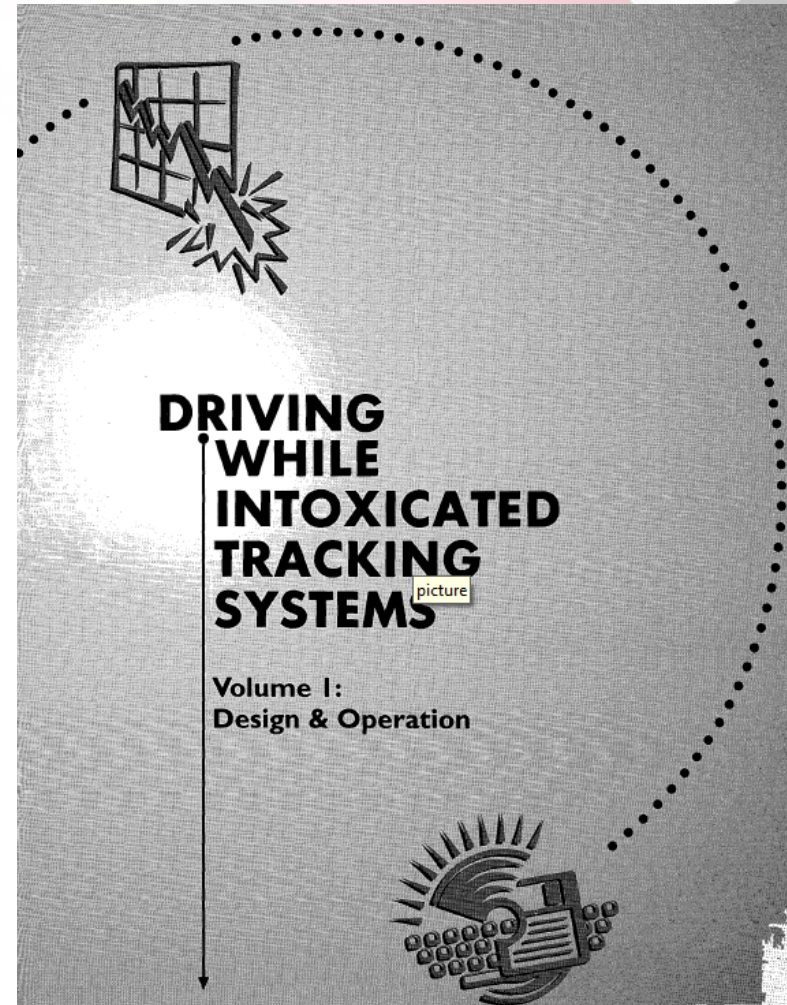
NHTSA 1997

- Core Functions
    - Identify problem drivers
    - Determine appropriate and equitable sanctions
    - Effective evaluation
    - Tracking DWI fines assessed and collected
    - Detect attempts to circumvent the system

DRIVING WHILE INTOXICATED TRACKING SYSTEMS

Volume 2:
State Tracking
System Descriptions
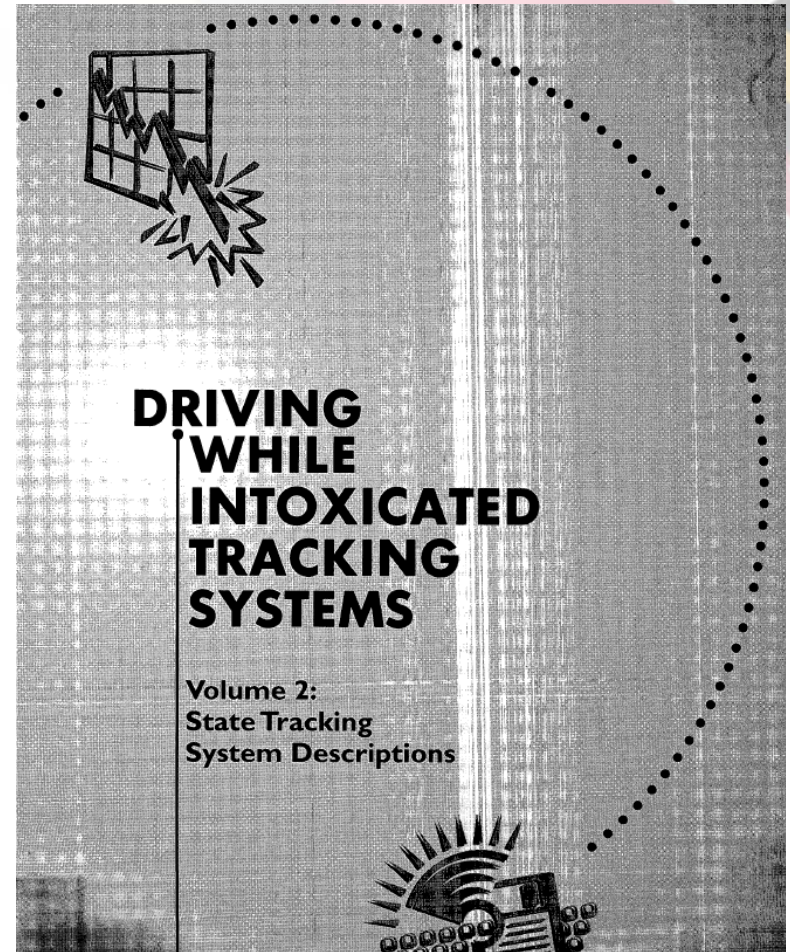
NHTSA 1977

- Monitor the "critical path" of each offender from arrest through dismissal or sentence completion

- Provide aggregate DWI data on various demographic groups…

DRIVING WHILE INTOXICATED TRACKING SYSTEMS

Volume 3:
DWI Estimates
for the United States
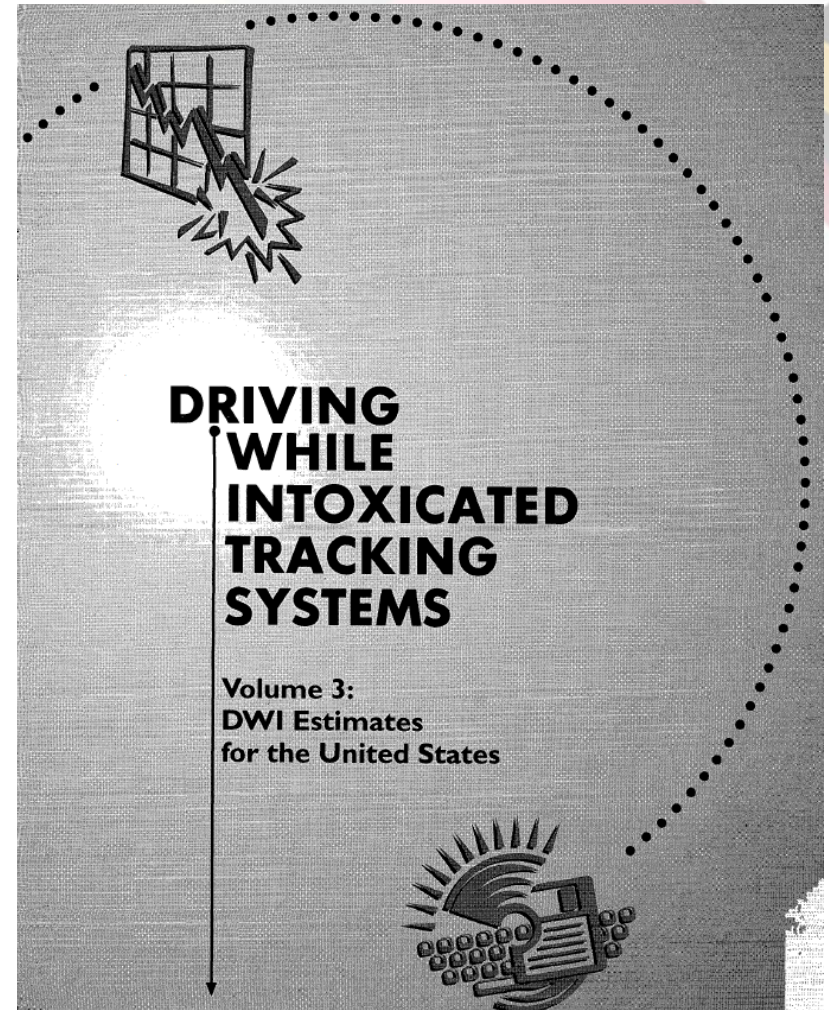
AT A MINIMUM…

- Annual statistics
  - Arrests
  - Convictions
  - Fines assessed and paid
  - Pleas
  - Sanctions
  - Sentences
  - Treatment

DRIVING WHILE INTOXICATED TRACKING SYSTEMS picture

Volume I:
Design & Operation
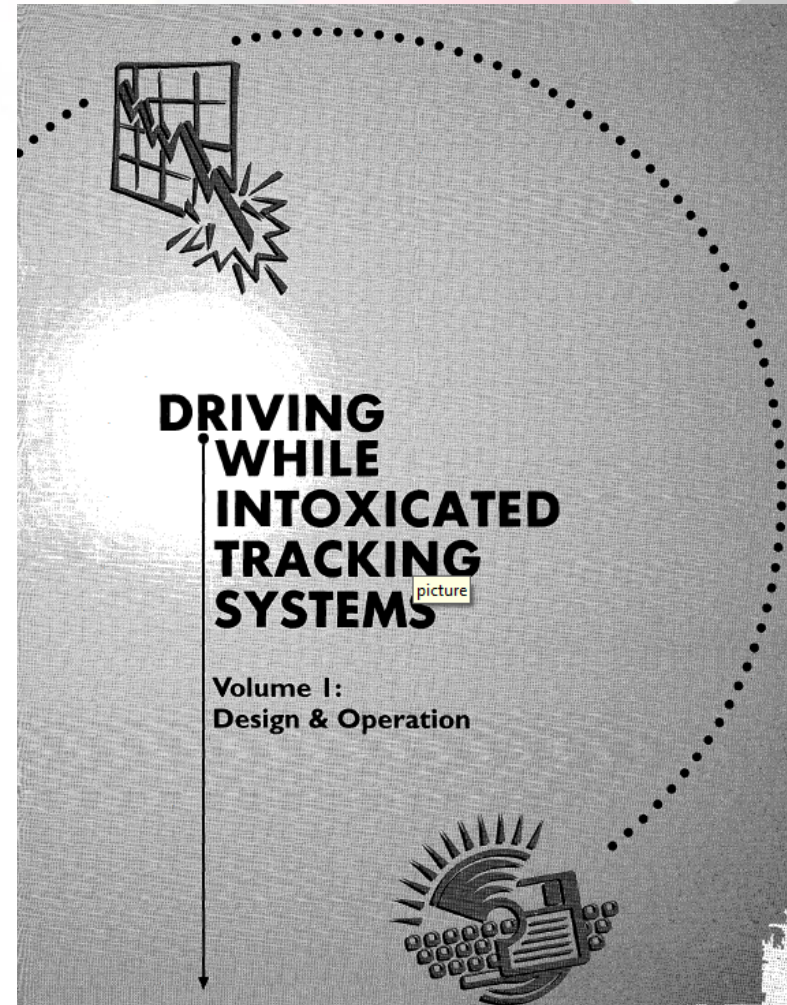
FOUNDATION

- Encompass data beyond DWI
- Input of all stakeholders
- Mission statement
- Environmental assessment
- Conceptual design
- Interagency coalition
- Interagency agreement

- HIPAA

PROCESSES

- On-line/Real-time
- Central access point
- Regular data exchange procedures
- Rights and privileges to data
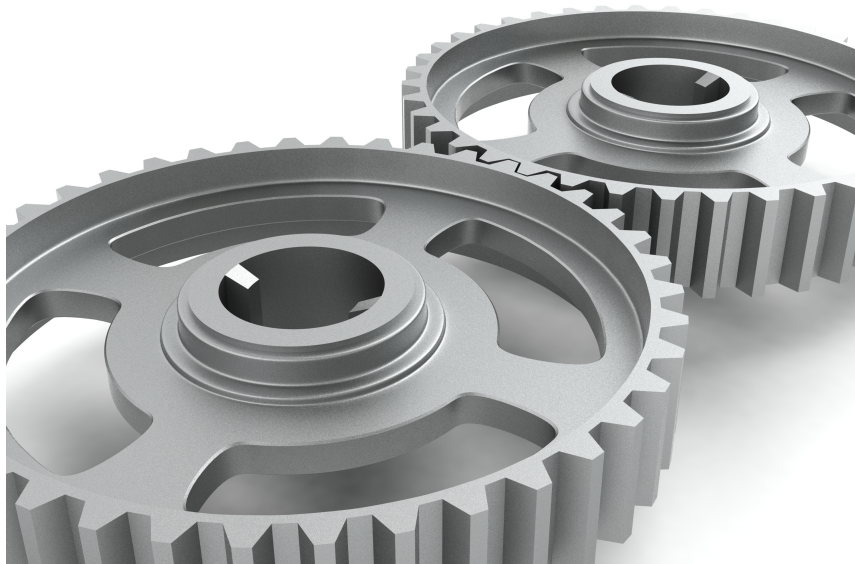
STATISTICAL SYSTEM

- Data provided by disparate systems
- Historical review of DWI activity
- One master database created
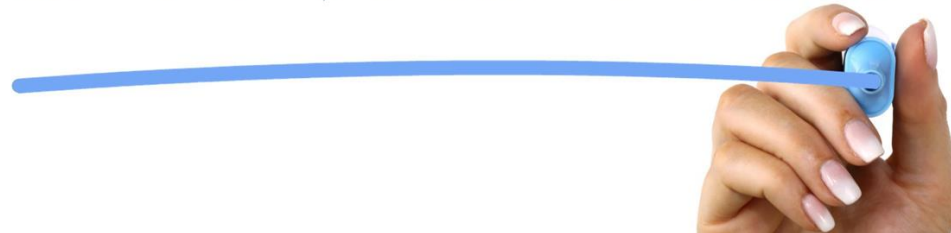
NHTSA 2011

- MIDRIS Components
  - Statewide coverage
  - E-citation and citation tracking
  - Electronic data transmission
  - Electronic reports
  - Information linkage
  - Timely access
  - Flexibility
  - National standards conformity

U.S. Department of Transportation
National Highway Traffic Safety Administration

NHTSA
www.nhtsa.gov

DOT HS 811 489

July 2011

Model Impaired Driving Records Information Systems – Tying Together Data Systems to Manage Impaired Drivers

NHTSA 2011

- Second look
- State examples
- Complete tracking system?

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

NHTSA
www.nhtsa.gov

DOT HS 811 489   July 2011

**Model Impaired Driving Records
Information Systems –
Tying Together Data Systems to
Manage Impaired Drivers**

NHTSA 2011

NHTSA 2011

Citation and Arrest

Probable/Reasonable Cause → Driver/Criminal Vehicle Check → Officer Arrests → Alcohol or Drug Testing → Charge

Administrative

Driving Privilege → No licensing or vehicle action

Driving Privilege → Suspend Driver's License Vehicle Action → Hearing on Driver's License Suspension and Vehicle Action

Adjudication & Sanctioning

Arraignment Plea → Judicial Prosecution → Disposition / Trial → Sentence

Trial → Disposition

Disposition → No licensing or vehicle action

Post Adjudication

License Sanctions
Vehicle Sanctions
Fines
Treatment/Education
Community Service
Probation
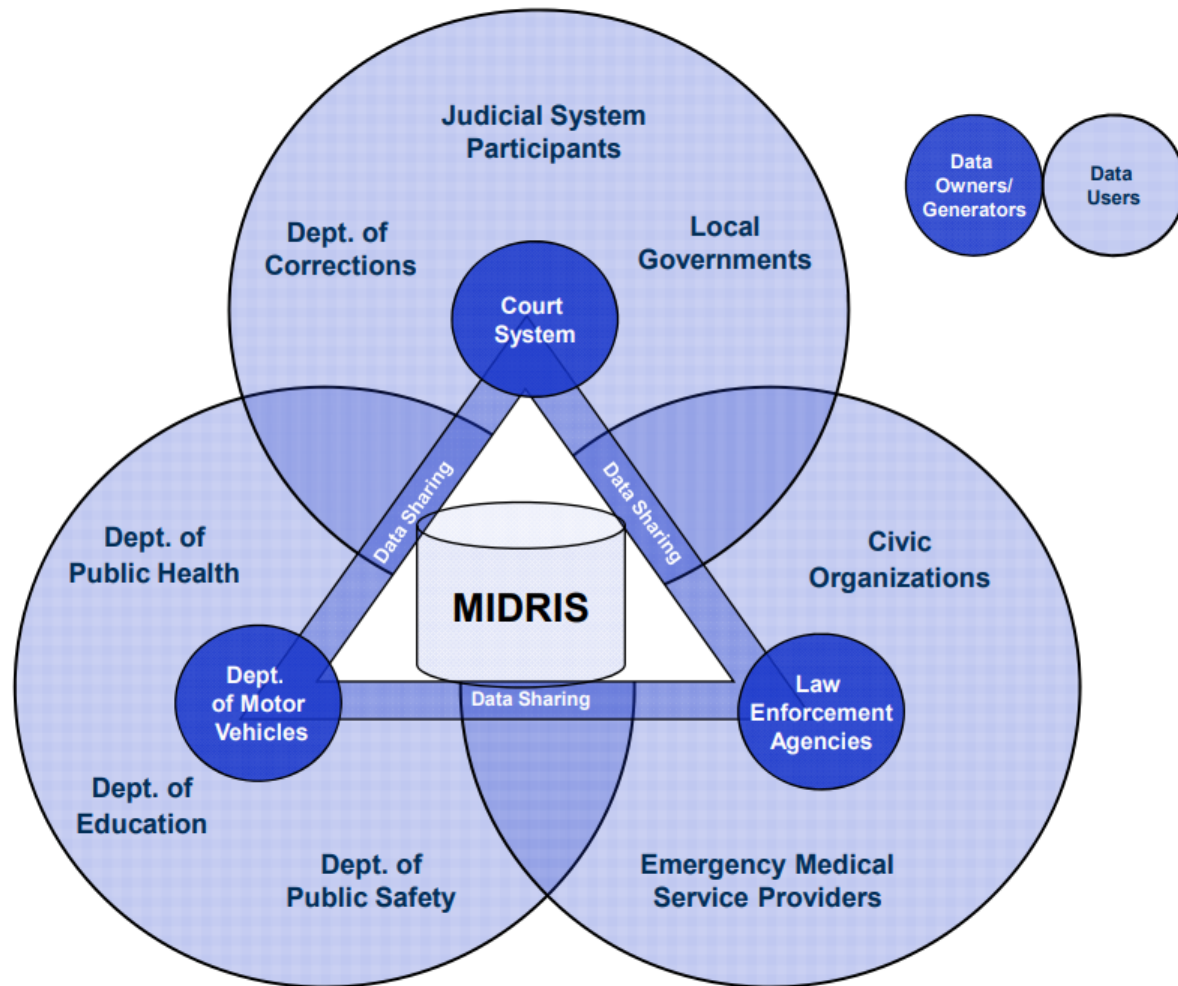
CASE MANAGEMENT

- Are the data systems available?
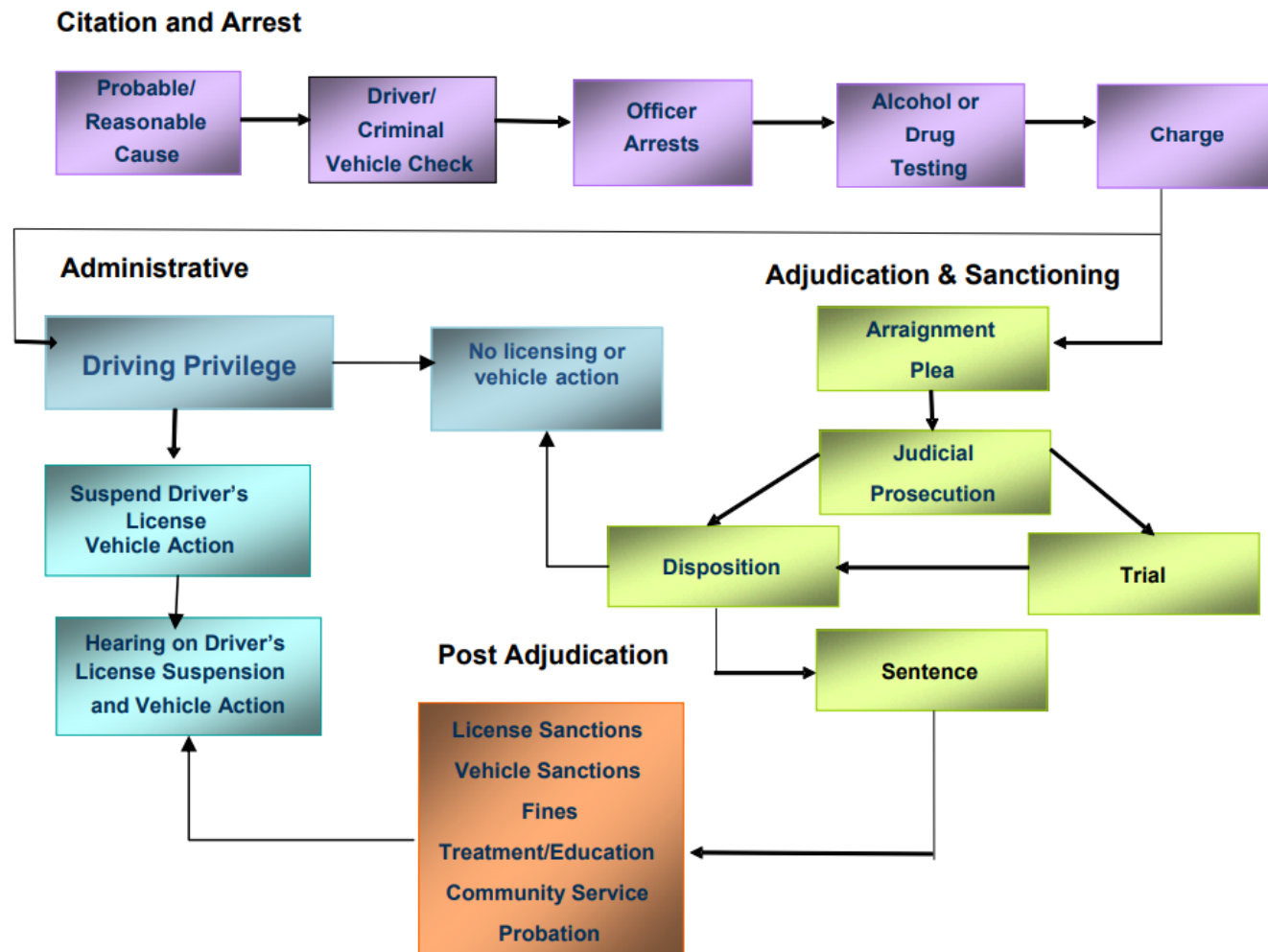- Are statutory changes needed?
- Is funding available?
- Are the technical staff available?

A LITTLE HISTORY...

Figure 1 - Motorcycle Study Linked Database

Ambulance-Helicopter Runsheet (MAIS)
Emergency Department Log
Maryland Trauma Registry (MTR)
Hospital Discharge Data (HSCRC)
Driver's History
Autopsy
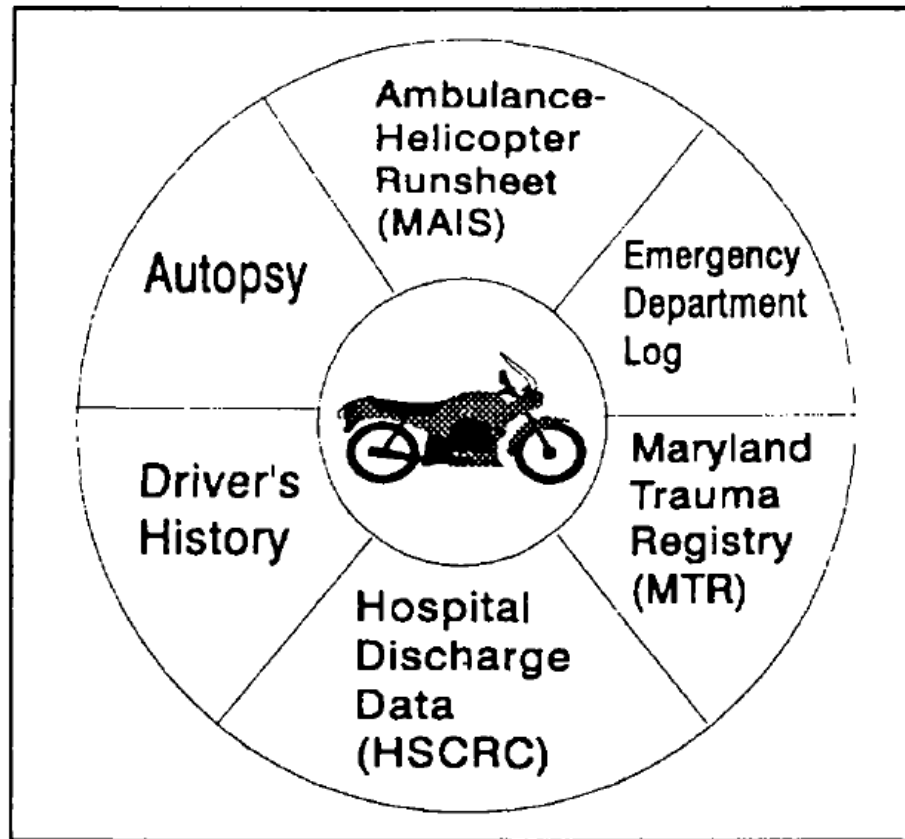
Papers presented at the International Symposium on Injury Statistics, May 18-24, 1994, Bethesda, Maryland. March 1995. 329 pp.

ZERØ DEATHS
MARYLAND

MARYLAND CODES - 1996

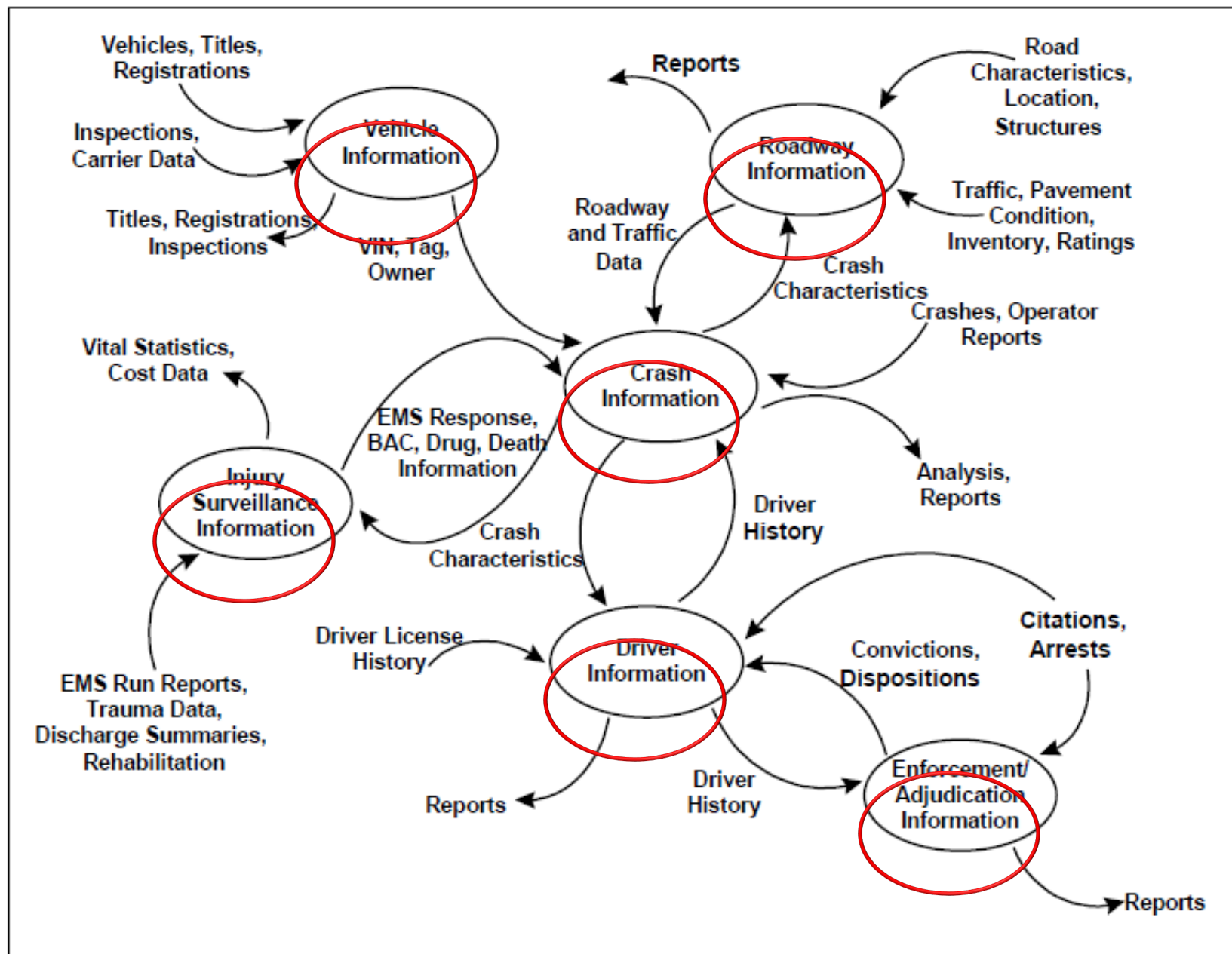Police Crash Reports

LINK

Hospital Records

Ambulance & EMS Logs

Vehicle Information ← Vehicles, Titles, Registrations; Inspections, Carrier Data
Vehicle Information → Titles, Registrations, Inspections
Vehicle Information → VIN, Tag, Owner

Roadway Information → Reports
Roadway Information ← Road Characteristics, Location, Structures
Roadway Information ← Traffic, Pavement Condition, Inventory, Ratings
Roadway and Traffic Data
Crash Characteristics

Crash Information ← Crashes, Operator Reports
Crash Information → Analysis, Reports
Driver History

Injury Surveillance Information → Vital Statistics, Cost Data
Injury Surveillance Information ← EMS Run Reports, Trauma Data, Discharge Summaries, Rehabilitation
EMS Response, BAC, Drug, Death Information
Crash Characteristics

Driver Information ← Driver License History
Driver Information → Reports
Driver History

Enforcement/Adjudication Information ← Citations, Arrests
Enforcement/Adjudication Information → Reports
Convictions, Dispositions
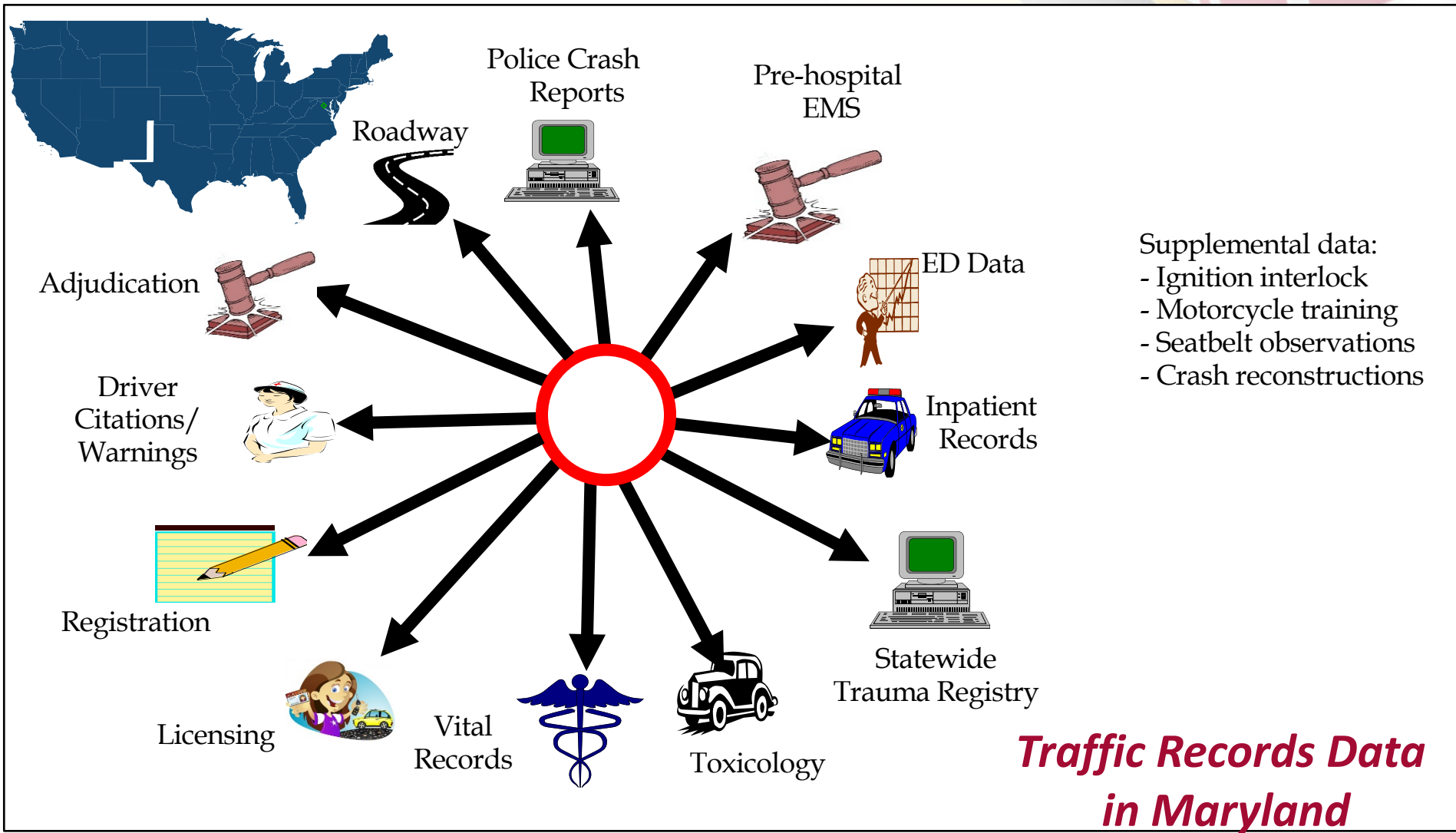
FIRST LOOK

- Environmental scan
- Survey
- In-state interviews
- Survey of states
  - 16 responses
  - 6 reported DWITS

**DWI Tracking System Feasibility Project
Final Report**

By:

Troy D. Walden, Ph.D., Research Scientist
Cody Stewart, Assistant Transportation Researcher
Cinthya Roberto Soares, Assistant Transportation Researcher
Paige Ericson-Graber, M.S.

Texas Department of Transportation
9/22/2017

Police Crash Reports

Pre-hospital EMS

Roadway

Adjudication

ED Data

Driver Citations/ Warnings

Inpatient Records

Registration

Statewide Trauma Registry

Licensing

Vital Records

Toxicology

Supplemental data:
- Ignition interlock
- Motorcycle training
- Seatbelt observations
- Crash reconstructions

Traffic Records Data in Maryland

EFFECTIVENESS OF AN IGNITION INTERLOCK DEVICE IN REDUCING ALCOHOL IMPAIRED DRIVING RECIDIVISM AND ALCOHOL IMPAIRED MOTOR VEHICLE CRASHES IN MARYLAND.

Department of Epidemiology and Public Health

April 17, 2017

ZERØ DEATHS MARYLAND

RESEARCH QUESTION

How effective are ignition interlock devices in reducing the rate of subsequent alcohol impaired driving citations and alcohol impaired driving- related motor vehicle crashes both while they are installed on the vehicle and once they are removed?

AIM 1

To compare the interlock group and the control group with respect to age, gender, race, blood alcohol content at time of arrest, prior citation history, median income in the driver's zip code of residence, and county of offense.

HYPOTHESIS 1

Participants in the interlock group are younger, have a higher blood alcohol level, have a history of receiving multiple citations, reside in counties with a higher median income, and were more likely to have received their OS in a rural area of the State than those in the control group.
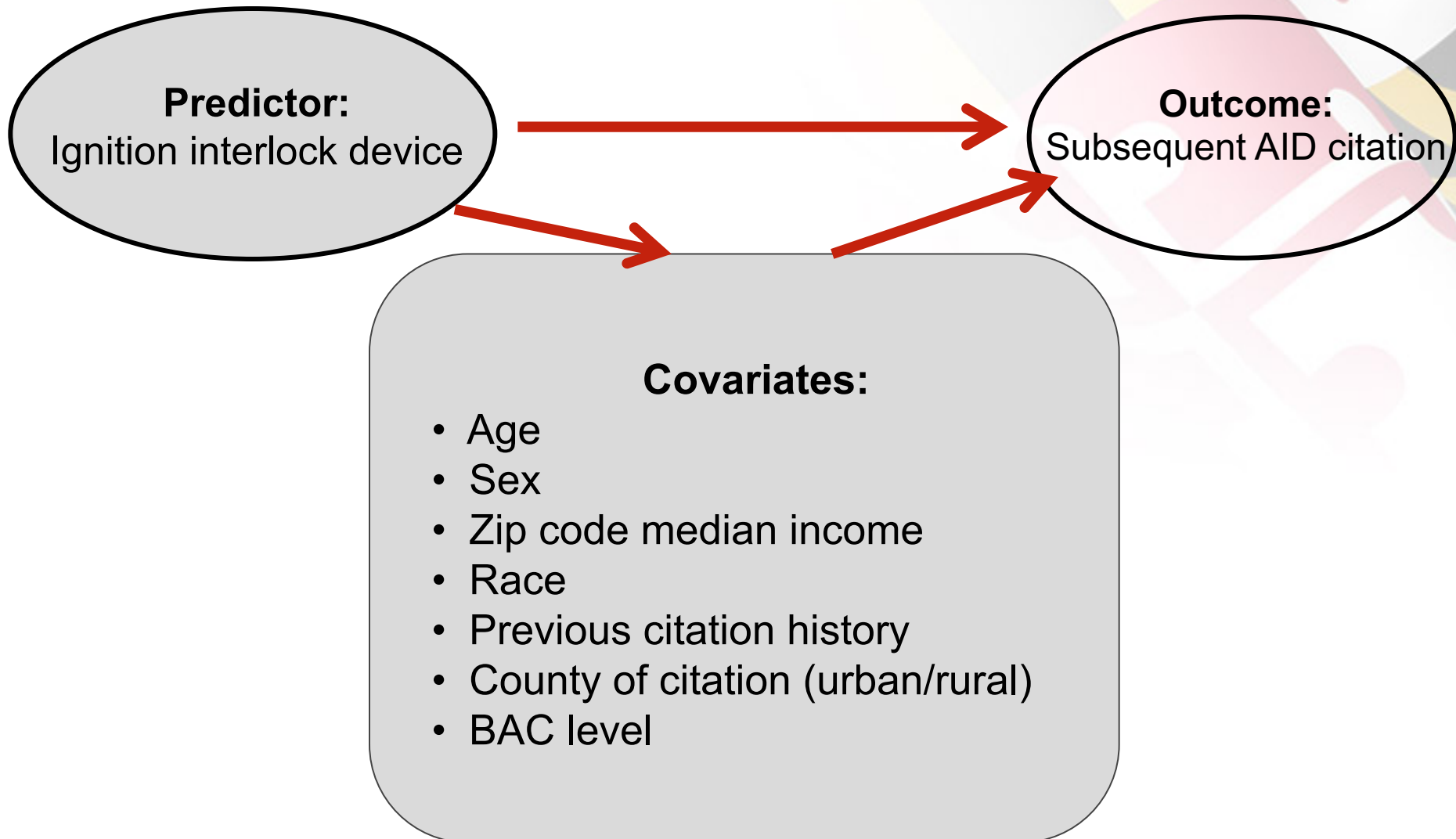
AIM 2

To compare the interlock group and the control group with respect to risk of receiving a subsequent AID citation while controlling for potential confounding variables (age, gender, race, blood alcohol content at time of arrest, prior citation history, median income in the driver's zip code of residence, and county of offense).

HYPOTHESIS 2

The risk of a subsequent AID citation is lower in the interlock group as compared to the control group.

Covariates
Specific Aim 2

Predictor:
Ignition interlock device

Outcome:
Subsequent AID citation

Covariates:
- Age
- Sex
- Zip code median income
- Race
- Previous citation history
- County of citation (urban/rural)
- BAC level

AIM 2A

To estimate the risk of a subsequent AID citation in the time during which the device was installed on the vehicle and to compare this risk to the risk while there was no device installed while controlling for the same set of variables.

HYPOTHESIS 2A

The risk of a subsequent AID citation is lower in the time during which the device was installed on the vehicle as compared to when it was not.

AIM 2B

To estimate the risk of a subsequent AID citation in the interlock group in the time after the device had been removed from the vehicle and to compare this risk to the risk in the control group for a comparable time and while controlling for the same set of variables.

HYPOTHESIS 2B

The risk of a subsequent AID citation is higher in the interlock group after the device has been removed than in the control group.
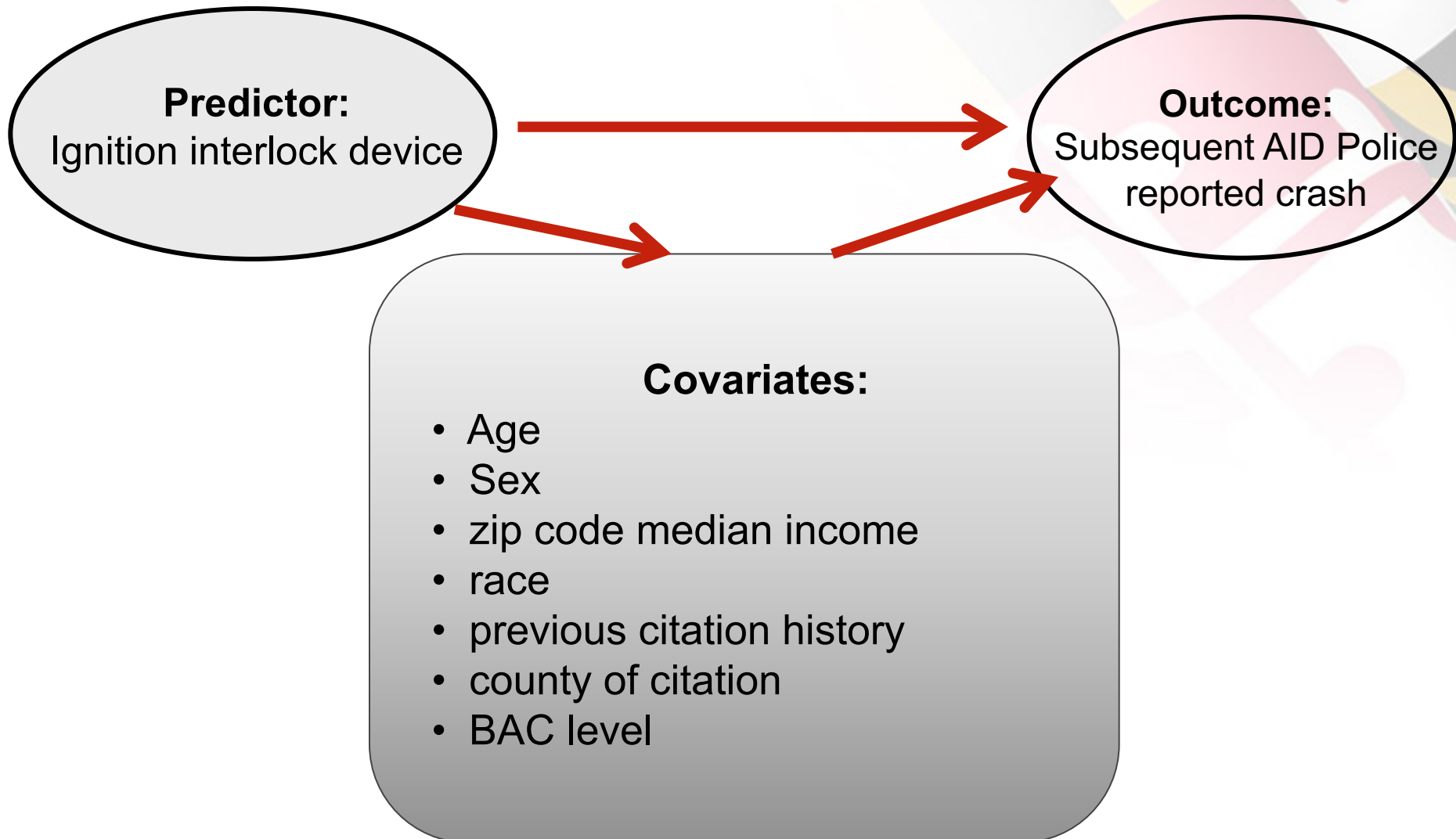
AIM 3

To compare the interlock group and the control group with respect to the risk of a subsequent AID-related motor vehicle crash while controlling for potential confounding variables.

HYPOTHESIS 3

The risk of a subsequent AID-related motor vehicle crash is lower in the interlock group as compared to the control group.

Covariates
Specific Aim 3

Predictor:
Ignition interlock device

Outcome:
Subsequent AID Police reported crash

Covariates:
- Age
- Sex
- zip code median income
- race
- previous citation history
- county of citation
- BAC level

METHODS

STUDY POPULATION

- All drivers possessing a Maryland driver's license who received an order of suspension in conjunction with a citation for alcohol impaired driving in the State between   January 1, 2008 and December 31, 2015.

STUDY DESIGN

- Retrospective Cohort
  - Impractical to randomize participants into study groups
- Accrual and follow-up period
  - January 1, 2008 through December 31, 2015
- Orders of suspension identified for CY2007 to allow association with all interlock installations
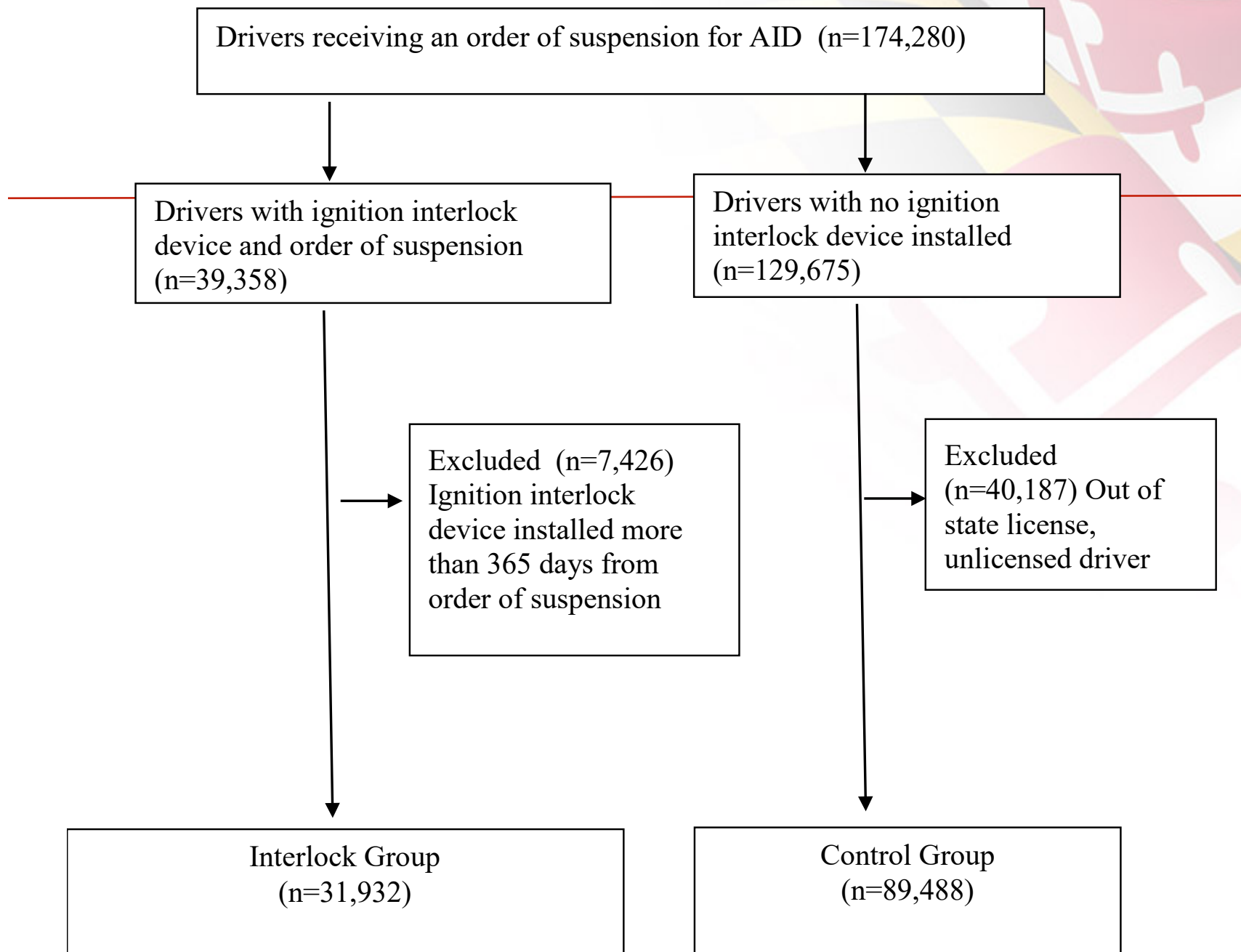
STUDY GROUPS - INTERLOCK

- All drivers with an order of suspension as the result of an AID citation who had an interlock device installed on their vehicle between January 1, 2008 and December 31, 2015
  - Initial order of suspension is index time, interlock installation follows within one year.

STUDY GROUPS - CONTROL

- All drivers issued an order of suspension between January 1, 2008 and December 31, 2015 in association with an AID citation who did not have an interlock device installed on their vehicle

SAMPLE TIMELINE

Order of suspension   Interlock installation   Interlock removal   End of follow-up

Interlock Group

Order of suspension   End of follow-up

Control Group

Drivers receiving an order of suspension for AID (n=174,280)

Drivers with ignition interlock device and order of suspension (n=39,358)

Drivers with no ignition interlock device installed (n=129,675)

Excluded (n=7,426) Ignition interlock device installed more than 365 days from order of suspension

Excluded (n=40,187) Out of state license, unlicensed driver

Interlock Group (n=31,932)

Control Group (n=89,488)

DATA SOURCES

- Licensing records
- Order of suspension data
- Ignition interlock data
- Citation data
- Crash data
- Census data

OUTCOMES

1. Subsequent alcohol impaired driving citation (Citation)

2. Subsequent alcohol impaired driving related motor vehicle crash (Crash)

COVARIABLES

- Age – age as of OS issue date (Licensing)
- Blood alcohol content (Order of Suspension)
  - 0.00-0.07
  - 0.08-0.14
  - 0.15+
  - Refused
- Race (Licensing)
  - White
  - Black
  - Other
- Sex (Licensing)
  - Male
  - Female

COVARIABLES

- County of initial AID offense (Citation)
  - Urban
  - Rural
- Prior citations (Citation)
  - 0
  - 1-2
  - 3 or more
- Median income of zip code of residence (Census)
  - Less than $50,000
  - $50,000 - $99,999
  - $100,000 - $149,999
  - $150,000 or more

DATA LINKAGE

Ignition interlock data

DL#

Citation data   DL# OS DL#   Licensing data

DL#

Crash data

Zip code

Census data
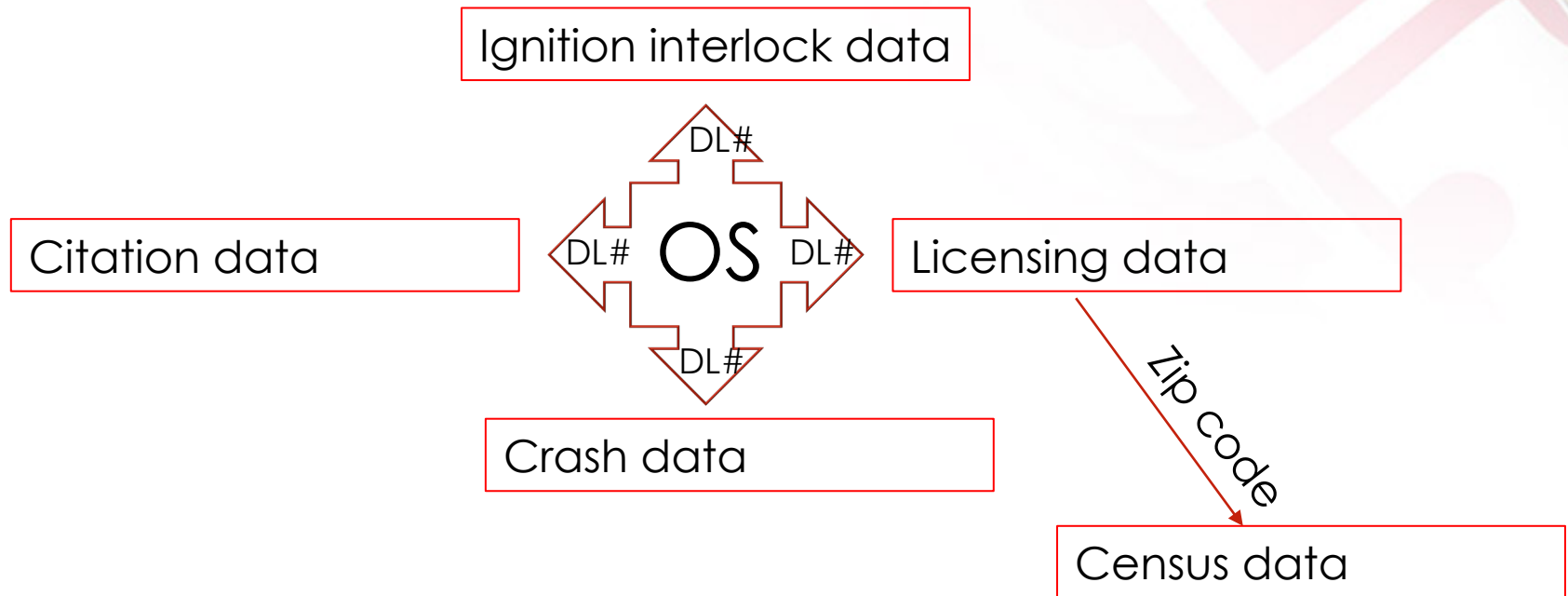
MISSING VALUES

- 94.5% of observations had complete data
- Fewer than 1% of drivers did not have indication of BAC test result or refusal
- 3.2% missing county of initial alcohol impaired driving citation
  - Invalid driver license numbers

STATISTICAL ANALYSIS

- Comparative Analysis
  - T-test for continuous variables
  - Chi-square test for categorical variables
- Cox proportional hazards model
- Propensity scores

a) Positive correlation   c) Negative correlation   b) Zero correlation
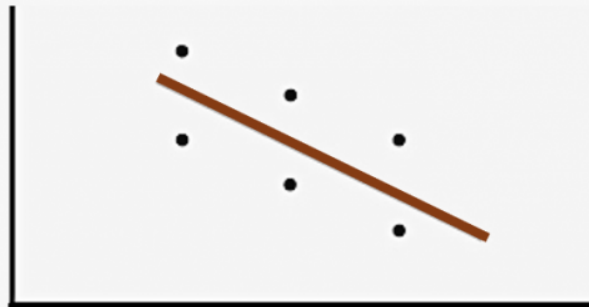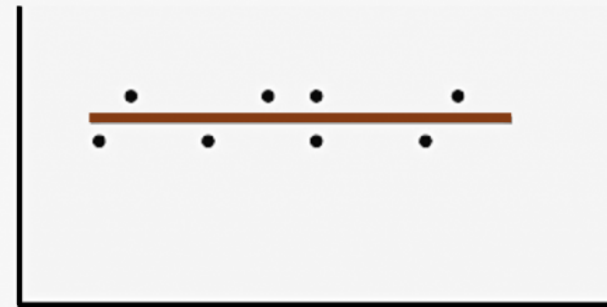
RESULTS

CHARACTERISTICS BY STUDY GROUP

Characteristic	Interlock (n=31,932)	%	Control (n=89,488)	%
Prior Citations				
0	7,145	22.4	25,096	28.0
1-2	10,462	32.8	29,764	33.3
3 or more	13,714	43.0	31,325	35.0
Missing	611	1.9	3,303	3.7
BAC level				
0.00-0.07	66	<0.1	6	0.1
0.08-0.14	3,965	12.4	36,834	41.2
0.15 or	14,481	45.4	22,537	25.2
greater	12,975	40.6	29,423	32.9
Refused	505	1.6	628	0.7
Missing				
Race				
Black	30,734	25.3	5,230	16.4
White	70,807	58.3	21,448	67.2
Other	19,122	15.8	4,553	14.3
Missing	757	0.6	701	2.2

ZERØ DEATHS
MARYLAND

CHARACTERISTICS BY STUDY GROUP

Characteristic	Interlock (n=31,932)	%	Control (n=89,488)	%
Age Groups				
<21 years	7,517	6.2	1,563	4.9
21-34 years	60,623	49.9	14,208	44.5
35-49 years	34,963	28.8	10,152	31.8
50-64 years	15,717	12.9	4,824	15.1
$\geq$65 years	1,908	1.6	501	1.6
Missing	692	0.6	684	2.1

Mean Age
Interlock (years $\pm$ SD)   36.5 $\pm$ 12.6
Control (years $\pm$ SD)   34.3 $\pm$ 12.3

CUMULATIVE RECIDIVISM RATES
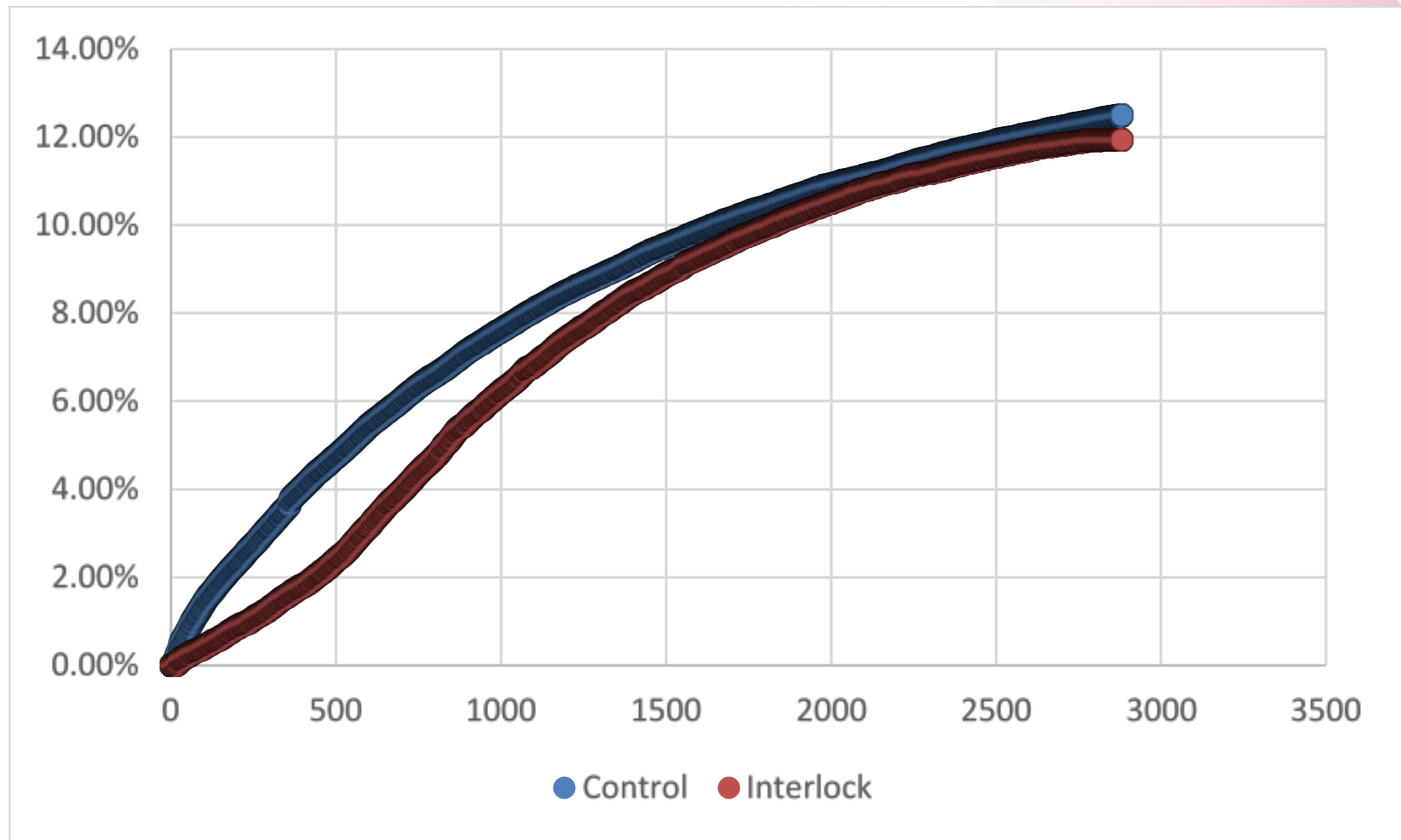
CONCLUSIONS

- Interlock group more likely to be:
    - Older
    - White
    - More prior citations
    - Higher BAC / Refused test

CONCLUSIONS – AIM 2

- AID citation
  - Over entire study period, slightly more likely for interlock group as compared to controls
  - 15% less likely while device is installed as compared to not installed
  - 34% more likely than controls when device is removed

CONCLUSIONS

- AID-related crash
  - Over entire study period, slightly less likely for interlock group as compared to controls
  - 27% less likely while device is installed as compared to not installed
  - No difference between groups after device is removed

ONE.....

DUI Summary Statistics: 1980 - 2019

DUI Arrests and Convictions, 1980-2019

Legend: Arrests, Convictions
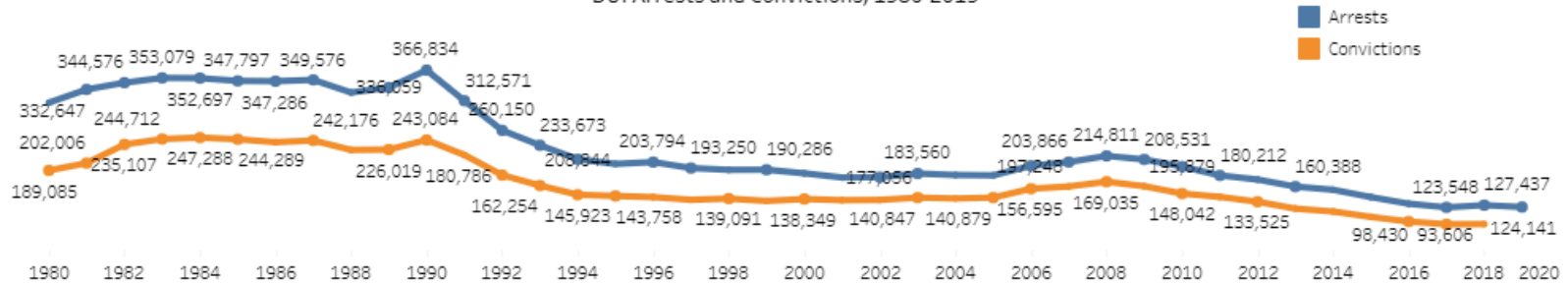
Total vs Alcohol Crash Fatalities, 1980-2019

Legend: Not Alcohol-Involved, Alcohol-Involved, Total
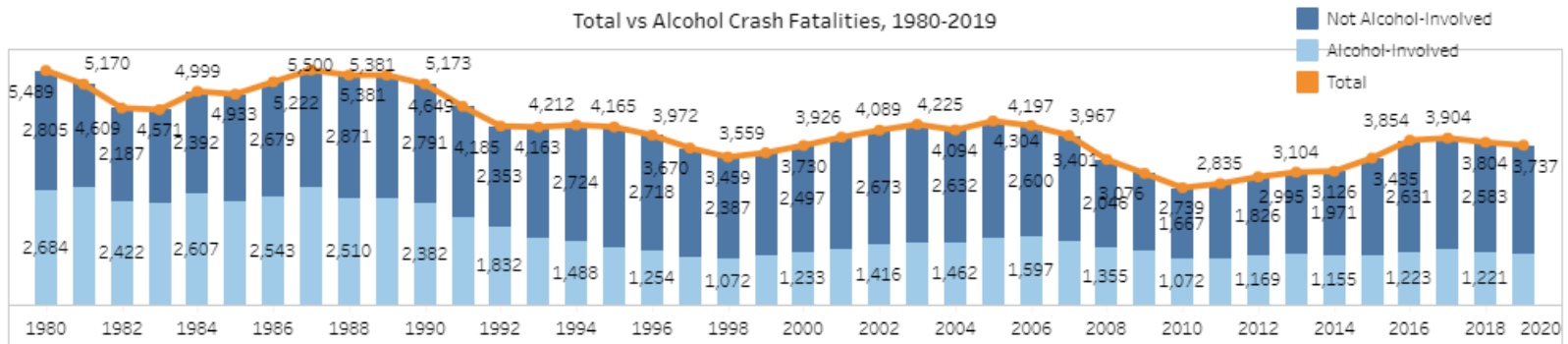
Alcohol- and Drug-Involved Crash Fatalities, 1995-2019

Legend: Drugs Only, Alcohol & Drugs, Alcohol Only
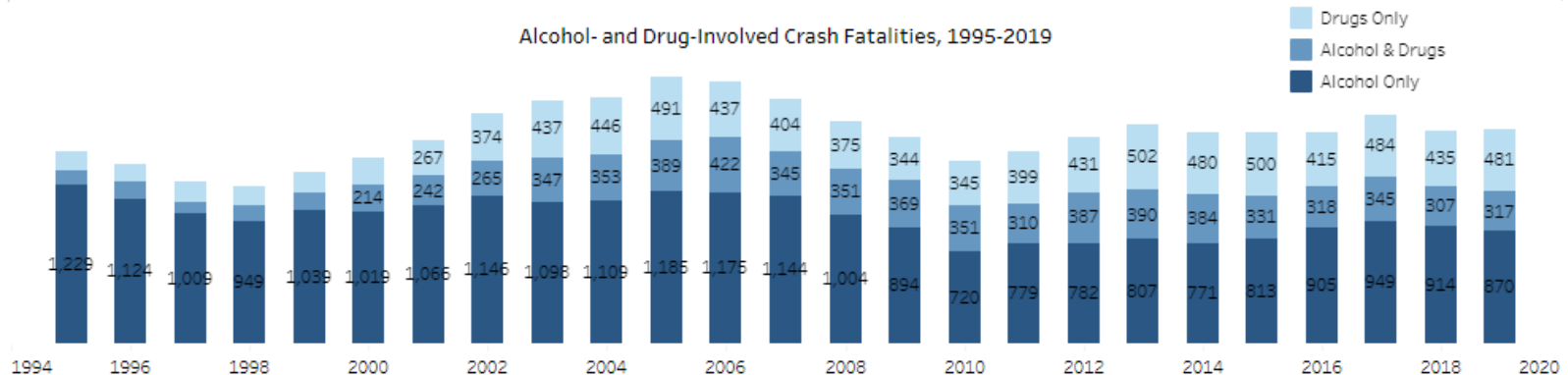
Source: 1992-2021 Annual Reports of the California DUI Management Information System and CHP SWITRS Annual Reports of Fatal and Injury Motor Vehicle Traffic Collisions for years 1980-2019.

ZERO DEATHS MARYLAND

DUI Arrests by County, 2015-2019 and Annual Percentage Change, 2018-2019

DUI Arrests by County

County	Year				
	2015	2016	2017	2018	2019
STATEWIDE	141,372	130,054	123,548	127,437	124,141
ALAMEDA	5,319	5,478	4,820	5,172	5,123
ALPINE	17	20	17	19	10
AMADOR	188	178	176	175	164
BUTTE	1,266	1,285	1,126	1,062	961
CALAVERAS	255	246	237	168	158
COLUSA	182	174	136	148	125
CONTRA COSTA	3,173	2,910	2,639	2,725	2,717
DEL NORTE	118	152	185	316	261
EL DORADO	734	817	720	762	684
FRESNO	4,566	3,307	3,414	4,873	5,354
GLENN	156	180	168	165	143
HUMBOLDT	1,178	1,131	1,088	1,113	1,038
IMPERIAL	737	769	674	866	764

Annual Percentage Change, 2018-2019

County	
STATEWIDE	-2.6
ALAMEDA	-0.9
ALPINE	-47.4
AMADOR	-6.3
BUTTE	-9.5
CALAVERAS	-6.0
COLUSA	-15.5
CONTRA COSTA	-0.3
DEL NORTE	-17.4
EL DORADO	-10.2
FRESNO	9.9
GLENN	-13.3
HUMBOLDT	-6.7
IMPERIAL	-11.8
INYO	11.1

DUI Arrests by County, 2015-2019
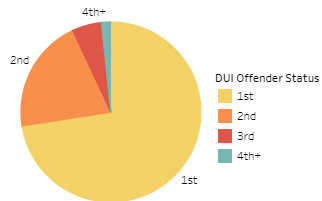
Year: 2019

© 2023 Mapbox © OpenStreetMap
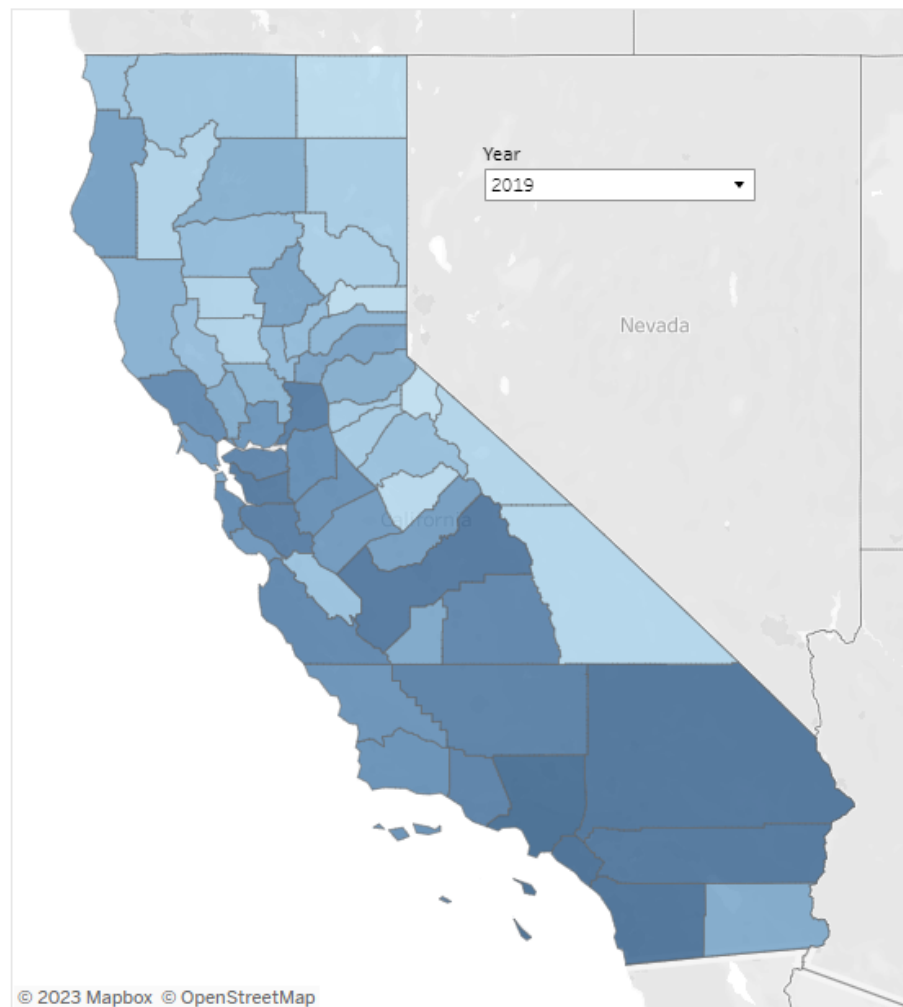
Source: 2019-2021 Annual Report of the California DUI Management Information System - Table 1
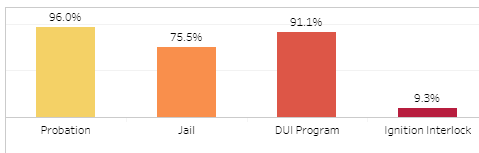Link: https://www.dmv.ca.gov/portal/file/2021-annual-report-of-the-california-dui-management-information-system-pdf/

ZERO DEATHS MARYLAND

Court Sanctions for DUI and DUID Offenders

Court Sanctions for DUI Offenders Arrested in 2018
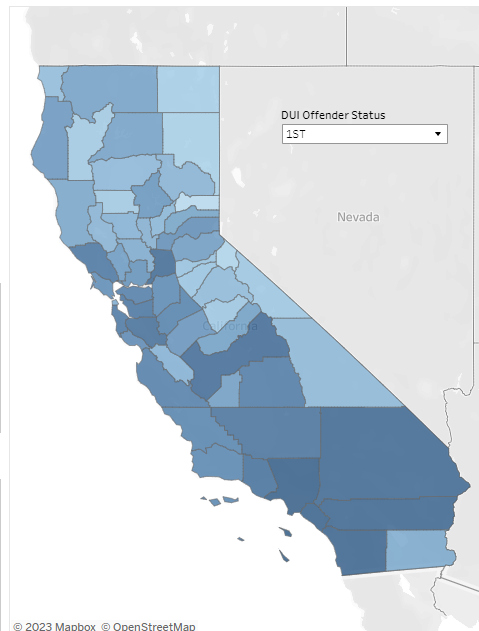
DUI Offenders by DUI Offender Status

4th+
2nd
1st

DUI Offender Status
- 1st
- 2nd
- 3rd
- 4th+

Court Sanctions by County and DUI Offender Status

DUI Offender Status
1ST

Nevada

© 2023 Mapbox © OpenStreetMap

Court Sanctions for DUI Offenders

Probation	Jail	DUI Program	Ignition Interlock
96.0%	75.5%	91.1%	9.3%

Court Sanctions for DUID Offenders

Probation	Jail	DUI Program	Ignition Interlock
88.2%	78.4%	79.1%	4.9%

Source: 2021 Annual Report of the California DUI Management Information System - Table 9a, 9b, and 10a
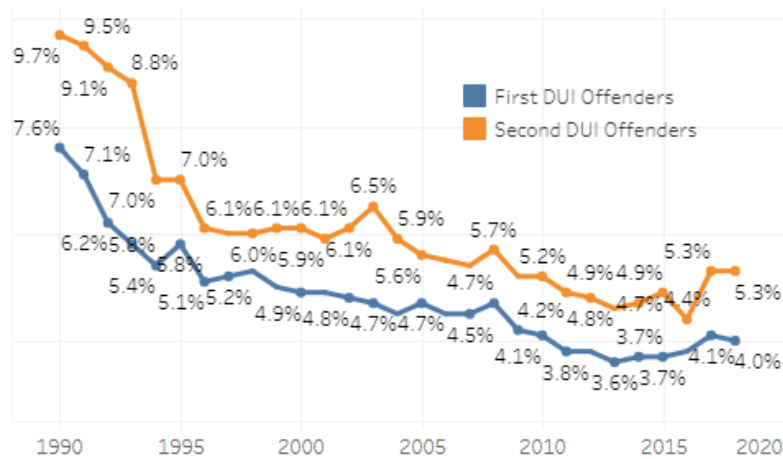Link: https://www.dmv.ca.gov/portal/file/2021-annual-report-of-the-california-dui-management-information-system-pdf/
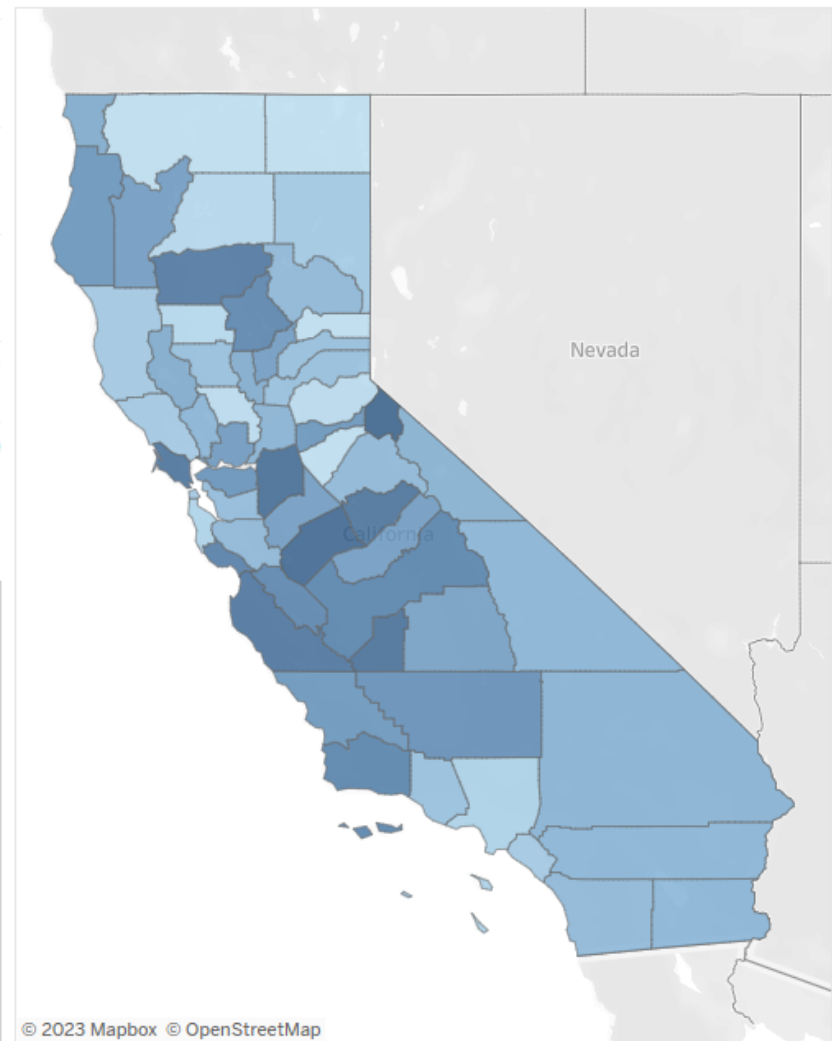Note: The map does not display counties information if there are missing data by DUI offender status.

Ask DMV

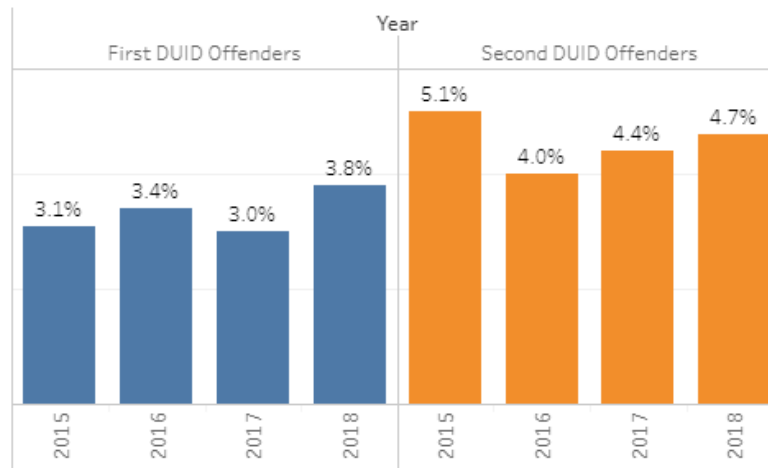# DUI Recidivism Rates for First and Second DUI and DUID Offenders

% 1st and 2nd DUI Offenders With DUI Incident Within 1-Year After Conviction (Arrested 1990-2018)

First DUI Offenders
Second DUI Offenders

1-Year DUI Recidivism Rates for 1st and 2nd DUID Offenders, 2015-2018

First DUID Offenders — 3.1% (2015), 3.4% (2016), 3.0% (2017), 3.8% (2018)
Second DUID Offenders — 5.1% (2015), 4.0% (2016), 4.4% (2017), 4.7% (2018)

1-Year DUI Recidivism Rates by County for 1st and 2nd DUI Offenders Arrested in 2018

© 2023 Mapbox © OpenStreetMap

ZERO DEATHS
MARYLAND

WHAT'S NEXT

- Start small

- Follow the steps provided in NHTSA guidance
  - Build consensus
  - Identify data sources
  - Identify technical support
  - Generate research question
  - Get started

Questions?

Dr. Tim Kerns
Director, MDOT MVA Highway
Safety Office
Tkerns@mdot.Maryland.gov