CARE: Data and Tools Designed for Road Safety

ALABAMA ROAD SAFETY CONFERENCE

JESSE NORRIS
CENTER FOR ADVANCED PUBLIC SAFETY

A long time ago, in a cubicle far far away….

- I joined UA In 2009 with the deployment eCrash for statewide crash entry.
- The earliest CARE Dataset available at the time went back 1993.
- Legend has it that CARE data goes well into the 1980's.

Crash Data Beginnings

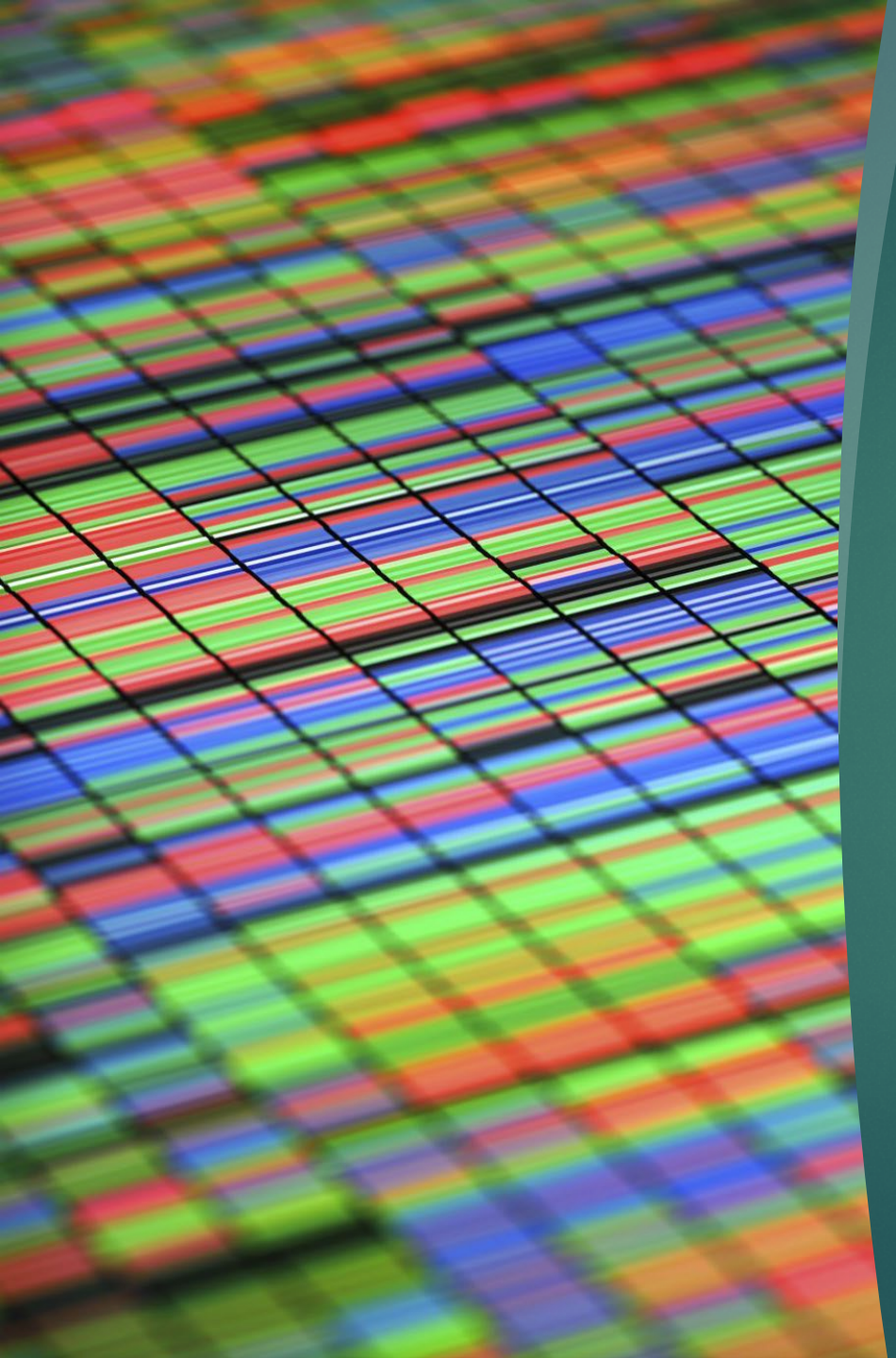
Dr. Dave Brown mentored me into understanding “crash” data.

NOT accidents, those possibly have no cause and aren’t necessarily preventable.

Crashes have a cause, and those causes can be identified and lead to prevention.

Introduction

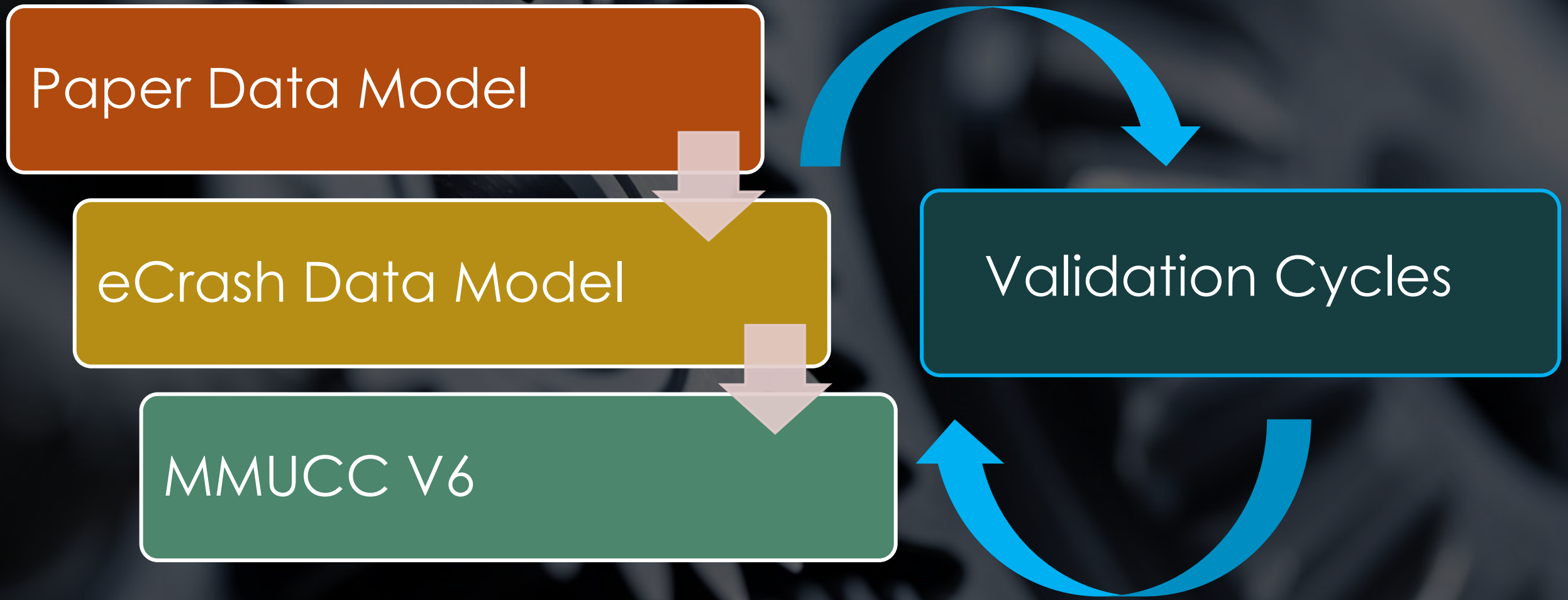
- Crash Data Foundations
- CARE Portal Tools
- CARE Data Evolution
- Next Horizons



Crash Data Foundations

CRASH AND CARE DATA

Crash Data Evolution



Paper Crash Reports

Paper Data Model

- 153 Crash data elements
- No validation
- Requires data entry to convert the paper data into CARE ready data

Electronic Crash Report

eCrash Data Model

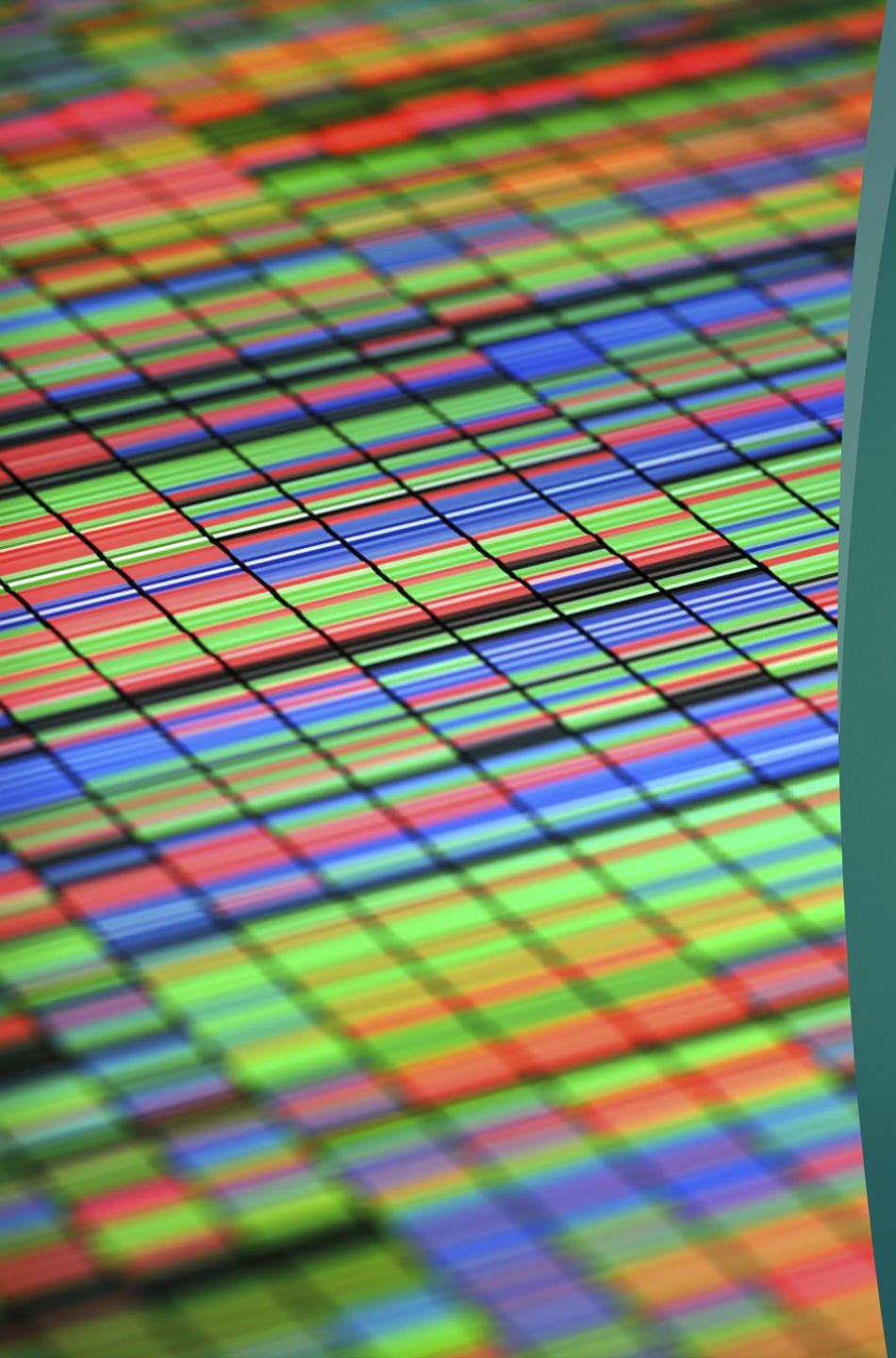
- Over 200 Crash Data Elements (153 in paper)
- Validations
- Increased dataset availability

Data Model Comparison

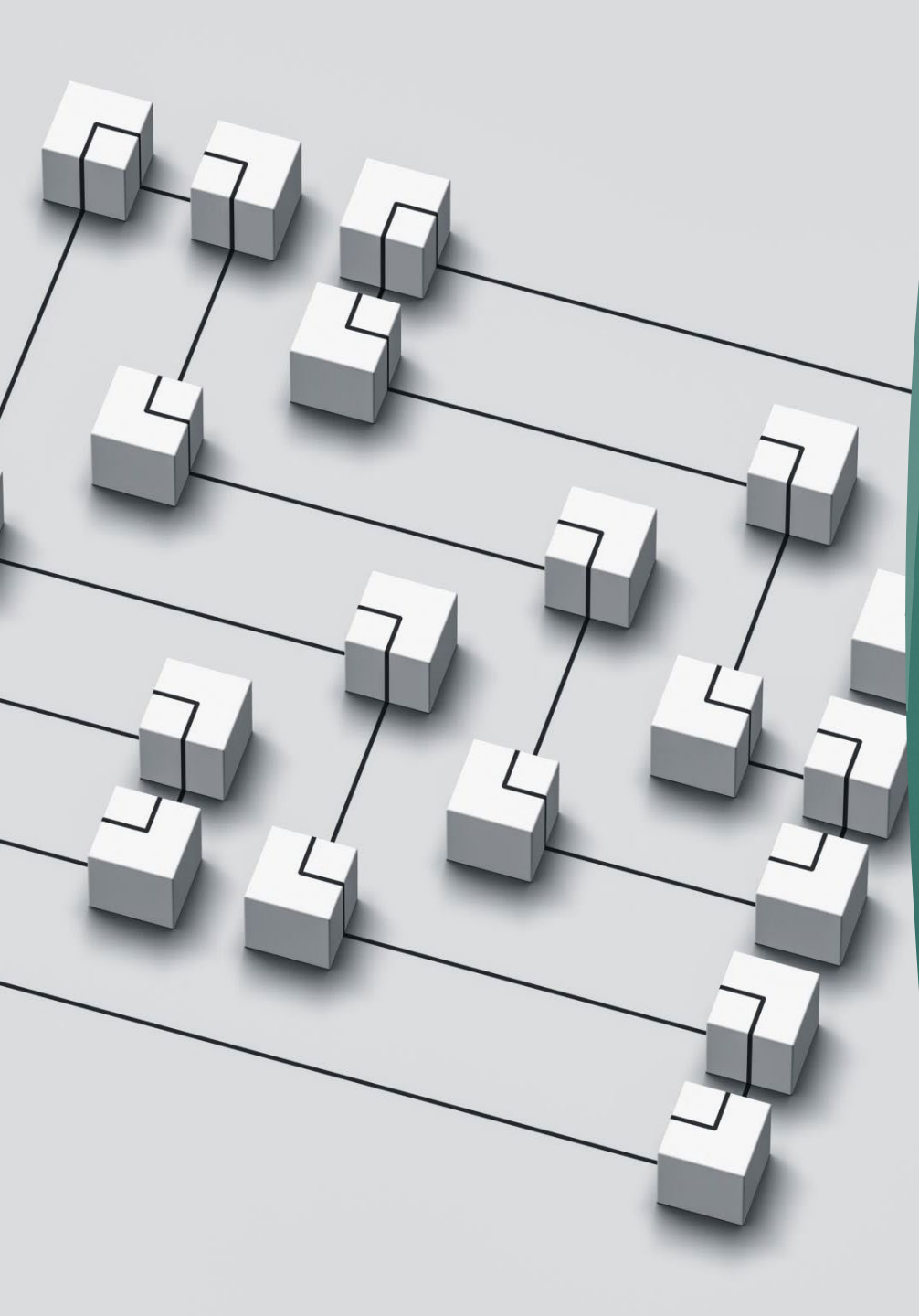
- Contributing Circumstance
  - 40 values in **paper** report
  - 75 values in **eCrash** report
- Event Fields (i.e., Most Harmful)
  - 52 values in **paper** report
  - 82 values in **eCrash** report

What else is being added?

- More law enforcement training
- Field expansion pupose
- Data quality
  - Through the validation cycle



CARE Data Improves Crash Data



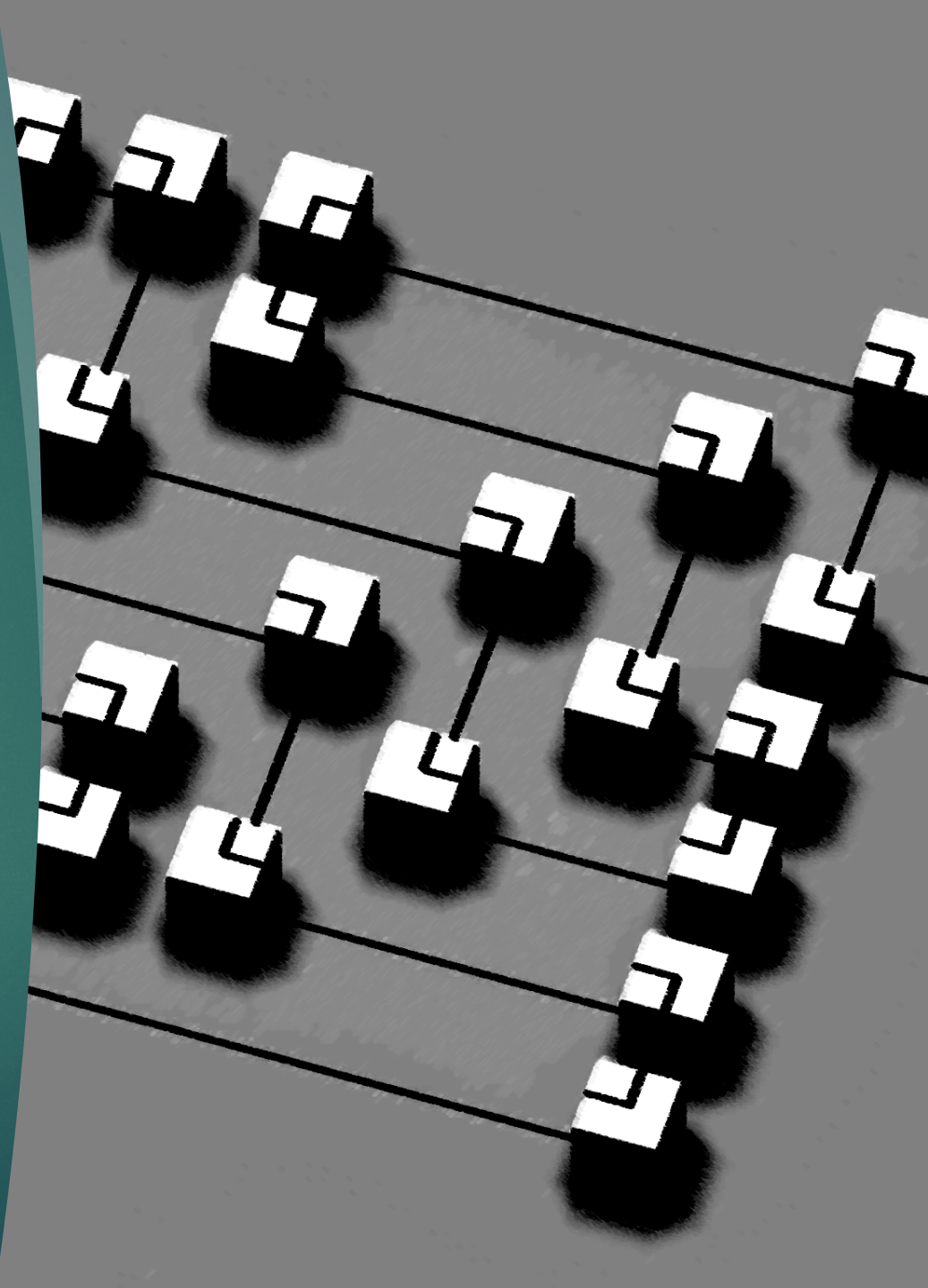
CARE Data improves Crash Data

My introduction to Crash Data was finding inconsistencies using CARE.

- Head-on Collisions example
  - Single-vehicle crashes
  - Narrative: Hit trees or barrier "Head-on"
- This is not what was intended

CARE Data and eCrash: Validations

- New requirements for Head-on Crashes
  - Requires two vehicles
  - Optional validation for vehicle damage areas.
    - Weight the officer's entry experience and data quality gain.



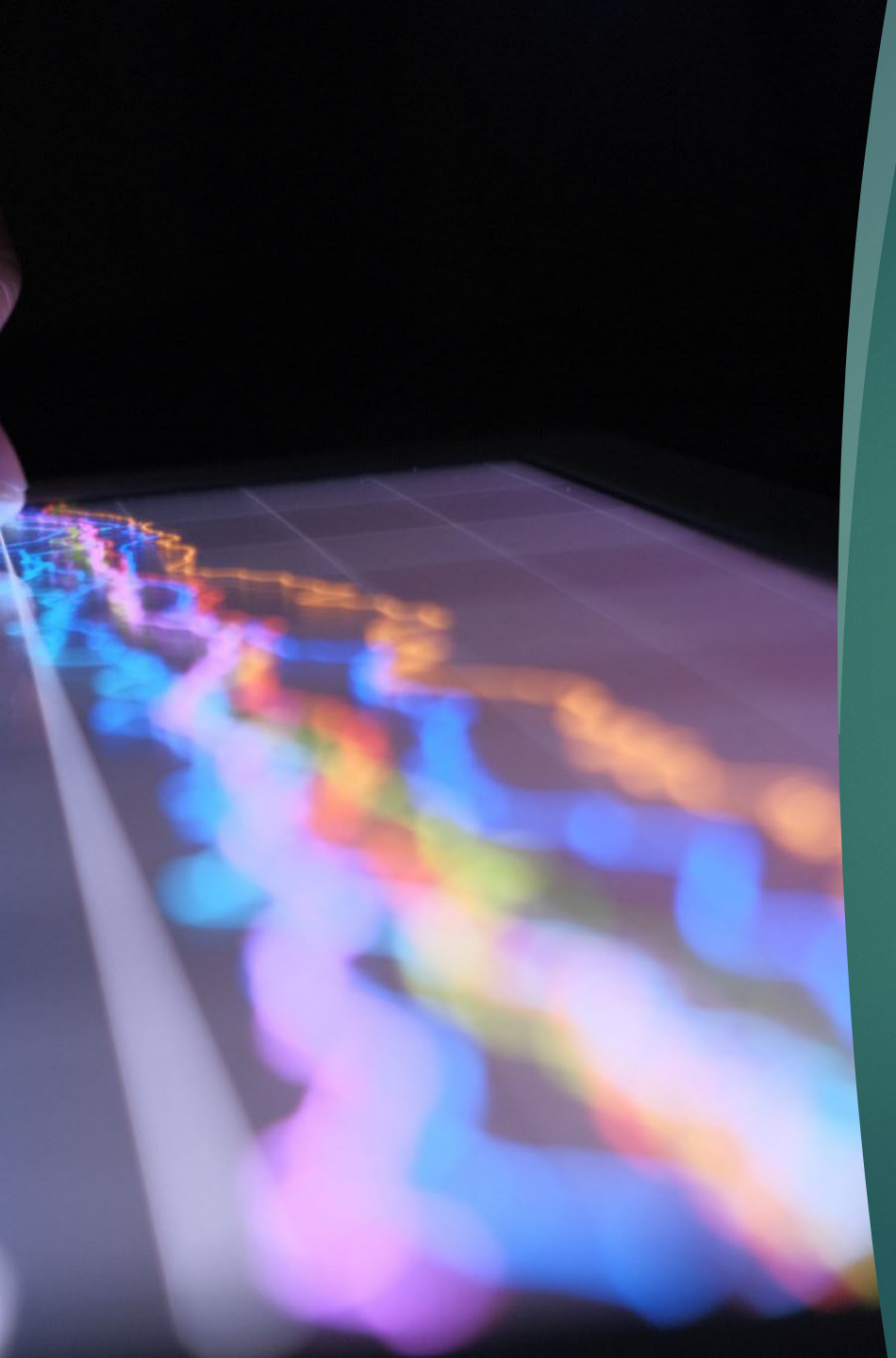
Derived Data: Calculated Fields

- Converting entered data into new data
  - Route and milepost is translated to lat/long
  - Time stamps are calculated into elapsed time for police and EMS arrival delay
  - At Intersection if less than 60ft from Node 1
  - There are many more

Adding Data: Populated Fields

Populated Data

- Data officers aren't required to enter
  - GPS Coordinates
  - Functional Class
  - MPO and RPO
  - Any available data through eGIS
  - Any data we can fill in for the officer



Crash data and CARE data progressively evolves.

eCrash Validation Cycle: Continued

Validation Cycle

eCrash Validation

- Train crashes increased with the launch of eCrash
  - Dropdown selection 99 – Not Applicable
  - Dropdown selection 98 – Not Applicable (Unit is Train)

eCrash Validation

"Proximity Click Error"

- Wrong selection from dropdown
- Validation added if 98 is selected
- A train must be a Unit

Data Availability

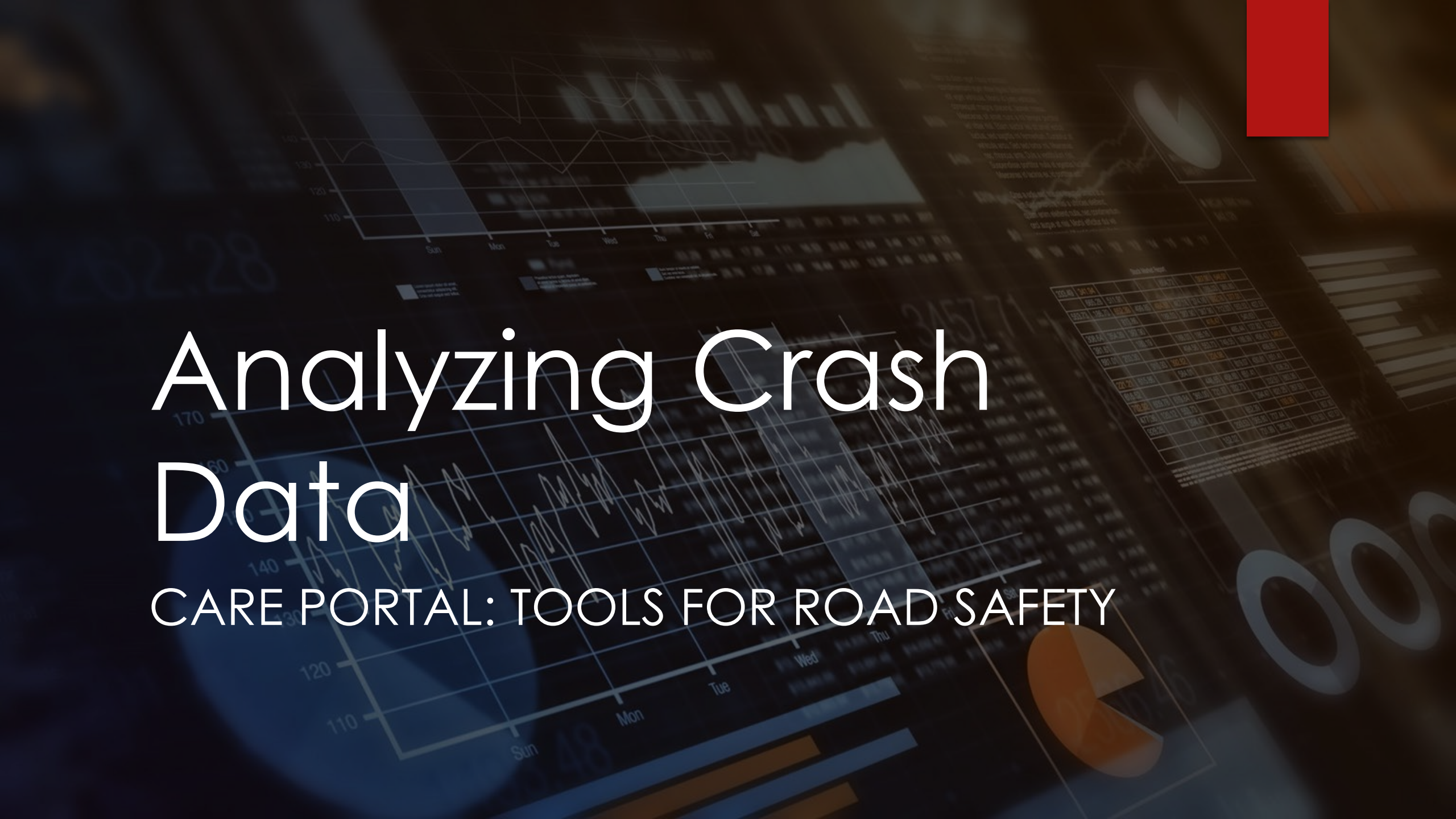
eCrash Data Model

- Increased dataset availability
- Datasets are built daily as new eCrash data becomes available.
  - Crashes within 24hrs
  - Two weeks for near completeness

Improved Data

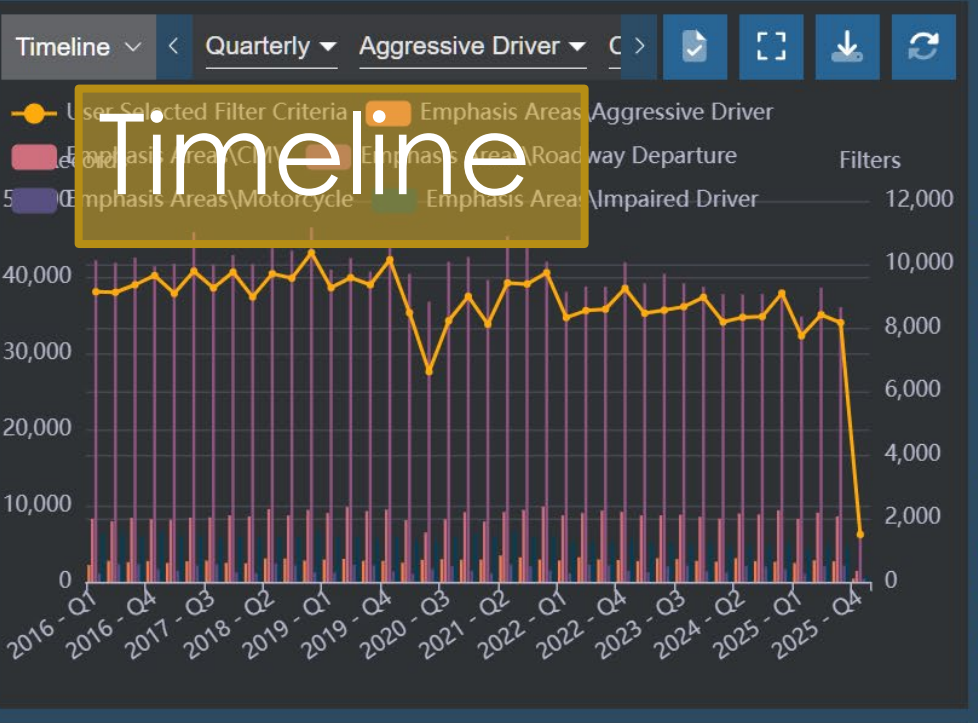
eCrash Data Model

- Better data quality
- Faster data availability
- Data never stops evolving

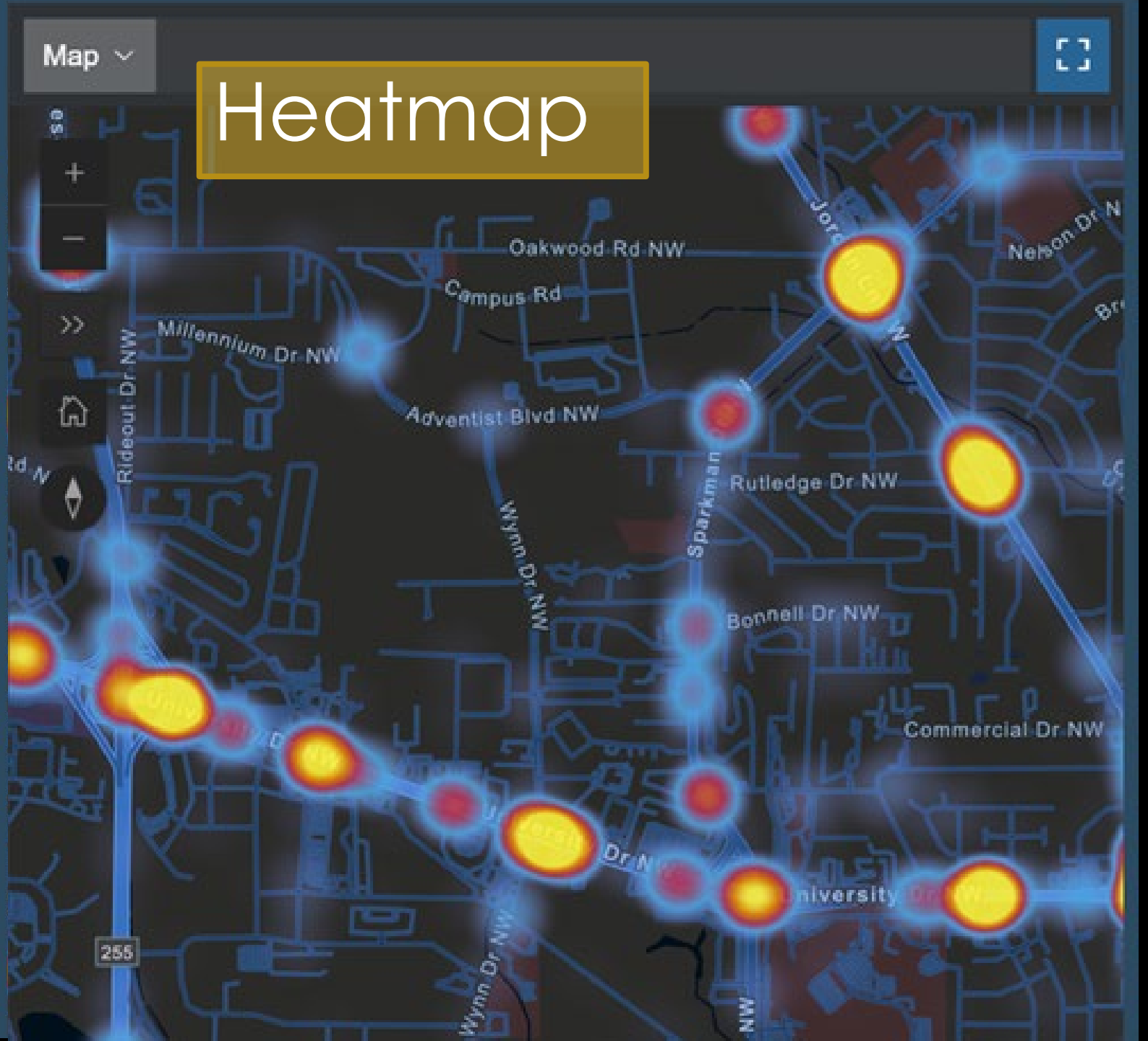


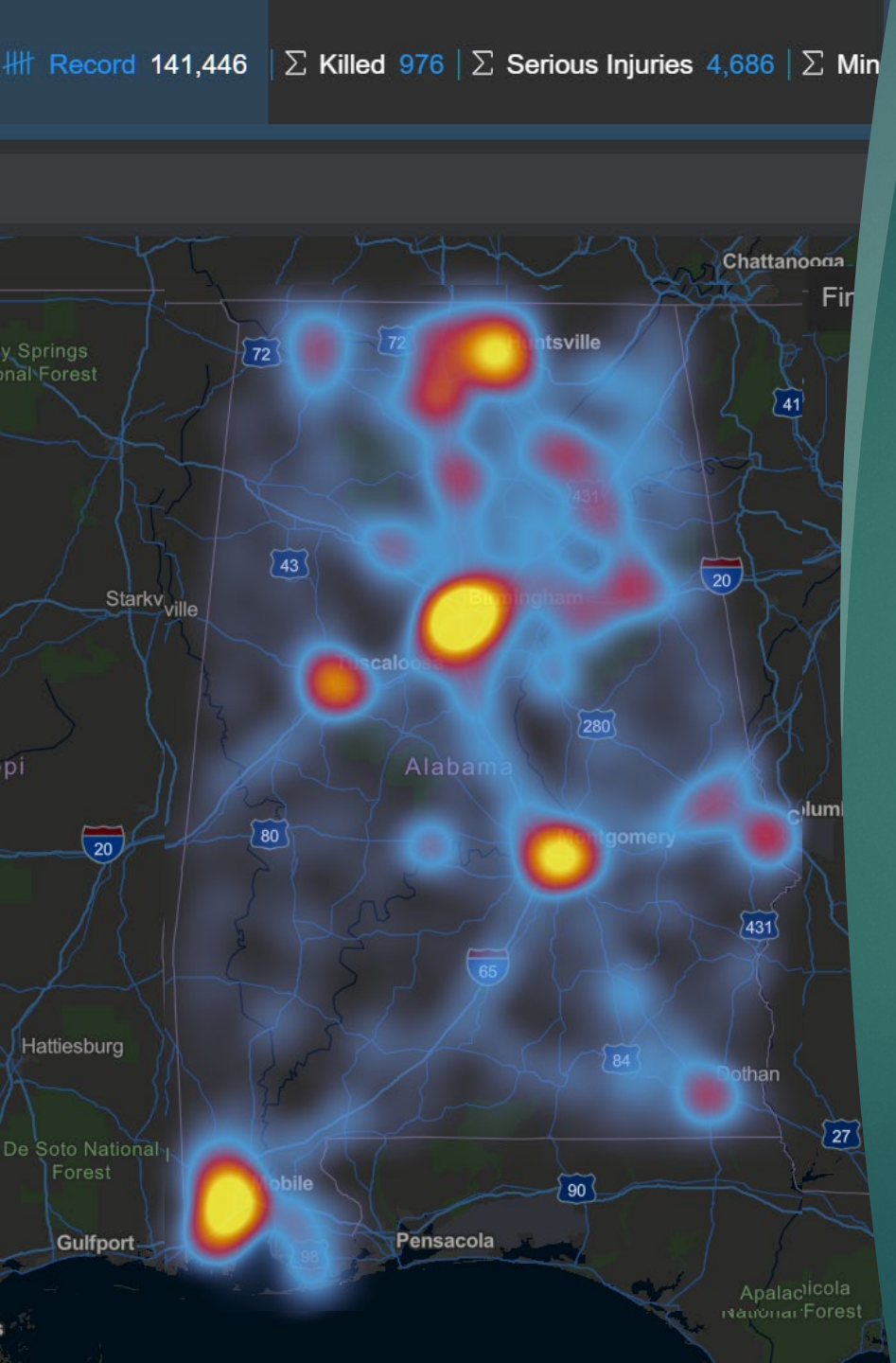
Analyzing Crash Data

CARE PORTAL: TOOLS FOR ROAD SAFETY


Timeline
Quarterly
Aggressive Driver
Emphasis Areas\Aggressive Driver
Emphasis Areas\Road Departure
Emphasis Areas\Motorcycle
Emphasis Areas\Impaired Driver
Filters
40,000
30,000
20,000
10,000
0
12,000
10,000
8,000
6,000
4,000
2,000
0
2016 - Q1
2016 - Q4
2017 - Q3
2018 - Q2
2019 - Q1
2019 - Q4
2020 - Q3
2021 - Q2
2022 - Q1
2022 - Q4
2023 - Q3
2024 - Q2
2025 - Q1
2025 - Q4


Record Level
Crash Number
County
First Harmful Event
6600001
Jefferson
Collision with Vehicle in Traffic
6600004
Houston
Collision with Ditch
6600006
Lauderdale
Collision with Tree
Jefferson
Ran Off Road Right
Items per page:
100
1 – 100 of 1458427


Map
Heatmap
Oakwood Rd NW
Campus Rd
Millennium Dr NW
Adventist Blvd NW
Rideout Dr NW
Wynn Dr NW
Sparkman
Rutledge Dr NW
Bonnell Dr NW
Commercial Dr NW
Nelson Dr N
255



Crash Data: Processing Speed

2024 Statewide Crashes: 1-Year

- 141k crashes
- Less the 6 seconds

2022-2024 Statewide Crashes: 3-Years

- 430k crashes
- 22 seconds

2020-2024 Statewide Crashes: 5-Years

- 717k crashes
- 54 seconds

2016-YTD2025 Statewide Crashes

- 1.5M
- Under 2 minutes

Location, Location, Location

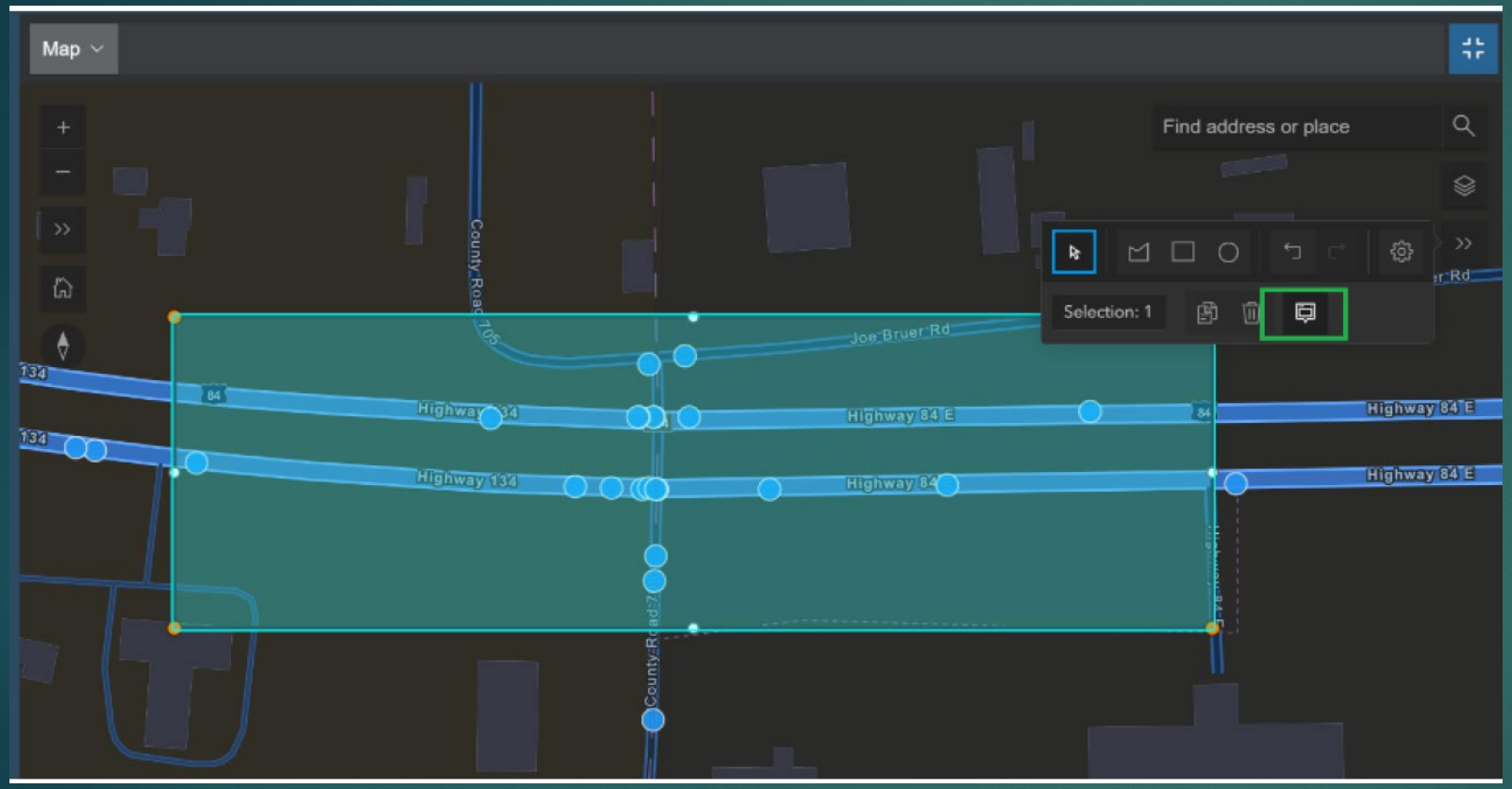
Analyzing Crash Data: Crash Location Dynamics

- Police officers are not engineers
  - They don't always provide the best location data
  - They are also in an environment different than ours
    - A lot is done on their part to get us the information we have
  - They use the crash narrative to help fill in the gaps.

Analyzing Crash Data: Crash Location Example

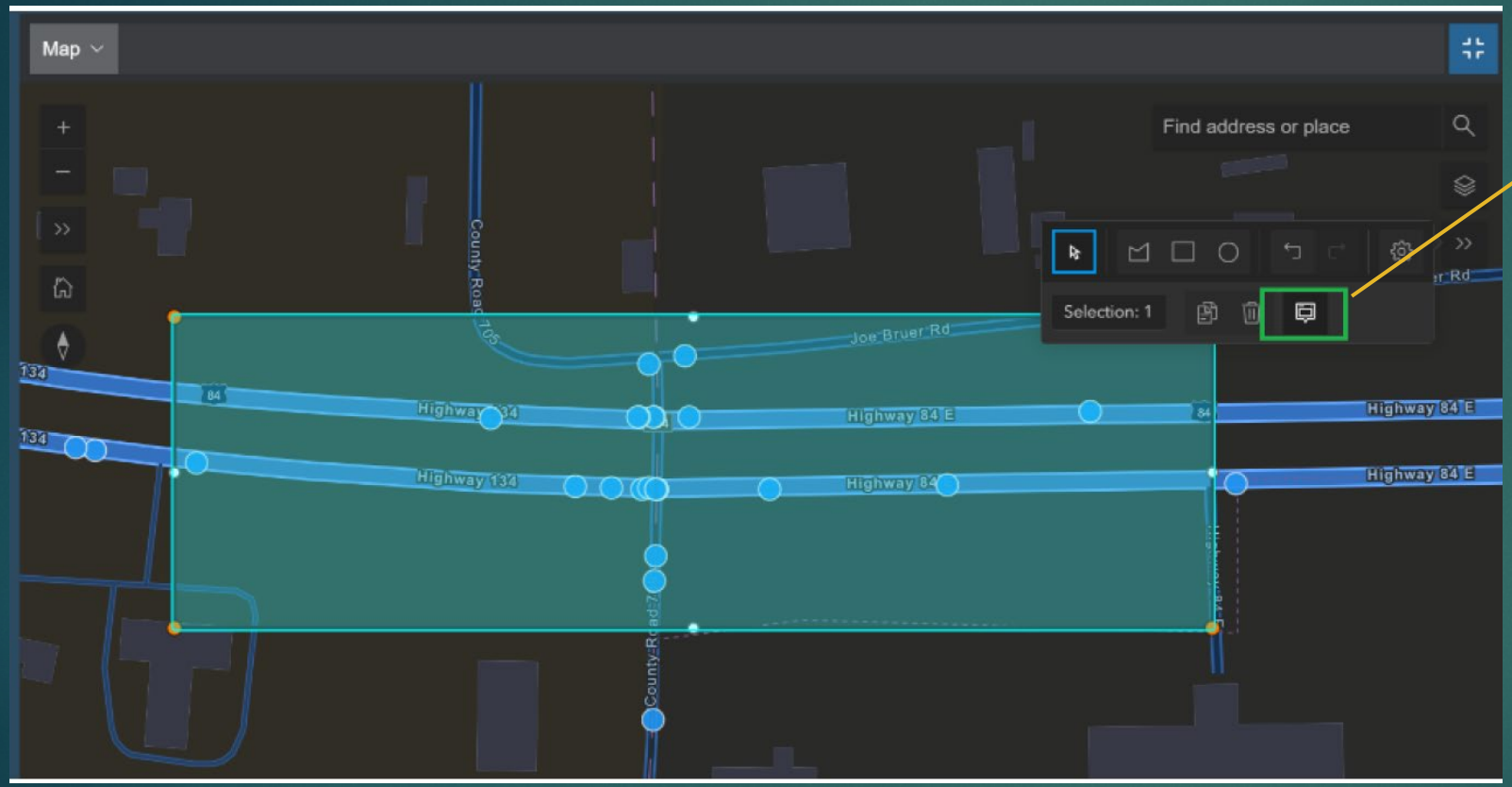
- Let's look at a work example to find crashes at an intersection without the best location data.
  - To complicate things, this location is exactly on the county line

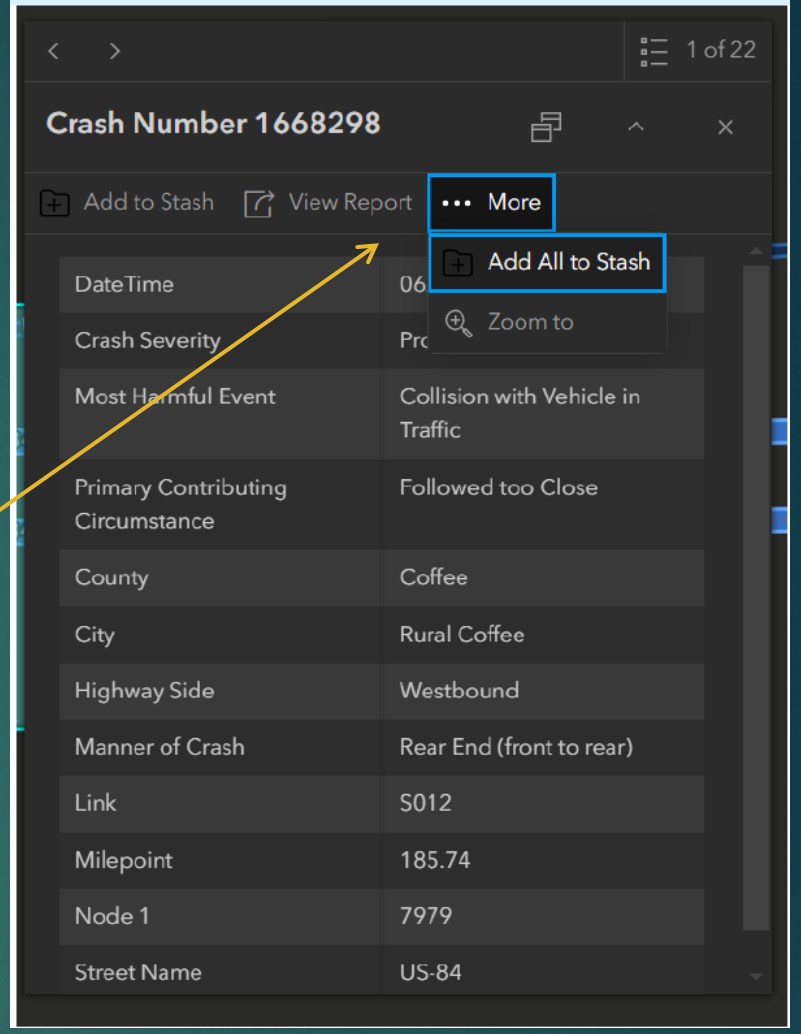
Analyzing Crash Data: Tools at work



Zoom into area and create a boundary at the target intersection to select crashes mapped to the location.

Analyzing Crash Data: Tools at work

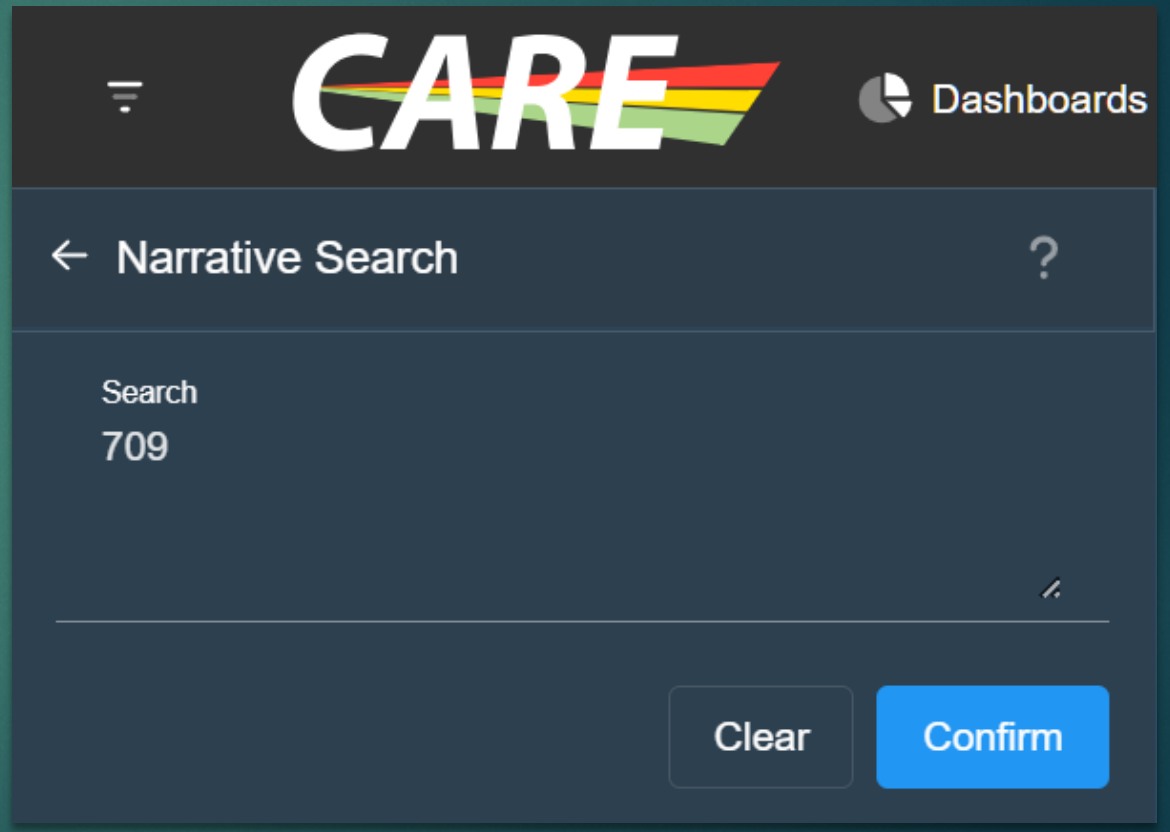




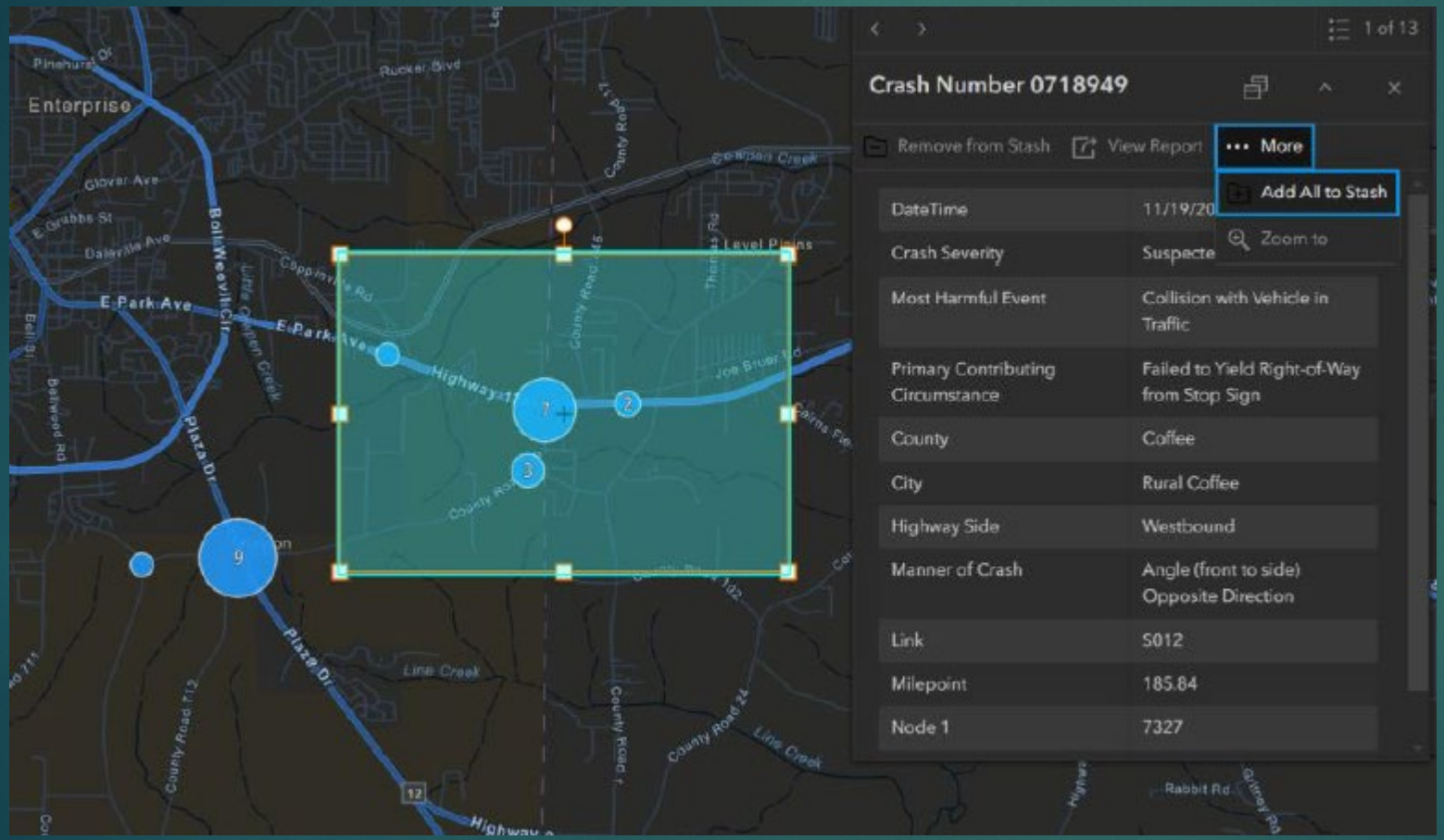
Add the selected crashes to your stash.

Analyzing Crash Data: Tools at work

- The suspected crashes not at the intersection, for this example, are along CR-709
- Use the narrative search to find “709” for the two counties



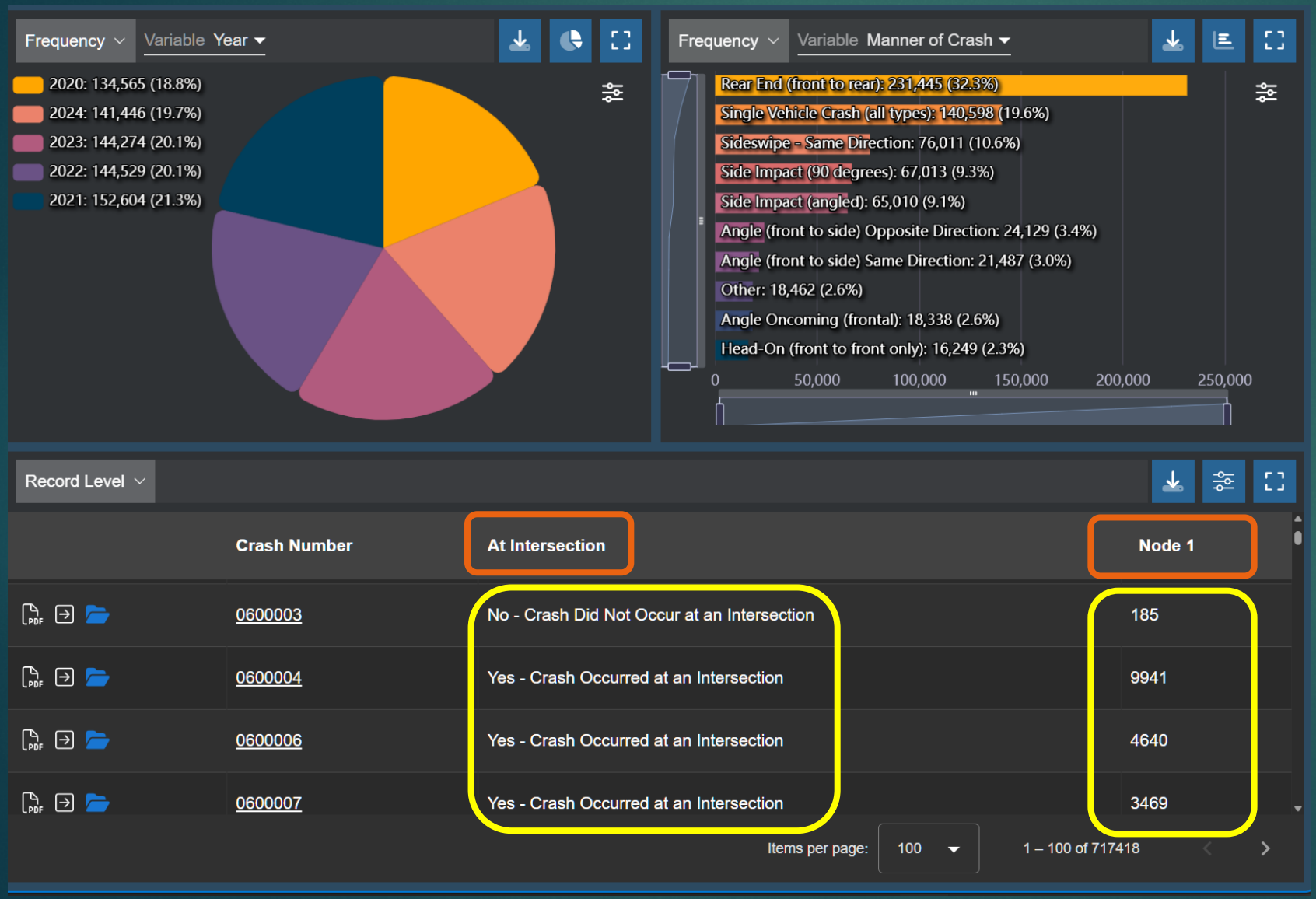
Analyzing Crash Data: Tools at work



Select a larger area around the target intersection and add these to you stash.

These are added to the previous stash to show all selected crashes.

Analyzing Crash Data: Tools at work



Use the Record Level to show fields "At Intersection" and "Node 1"

Or batch PDFs

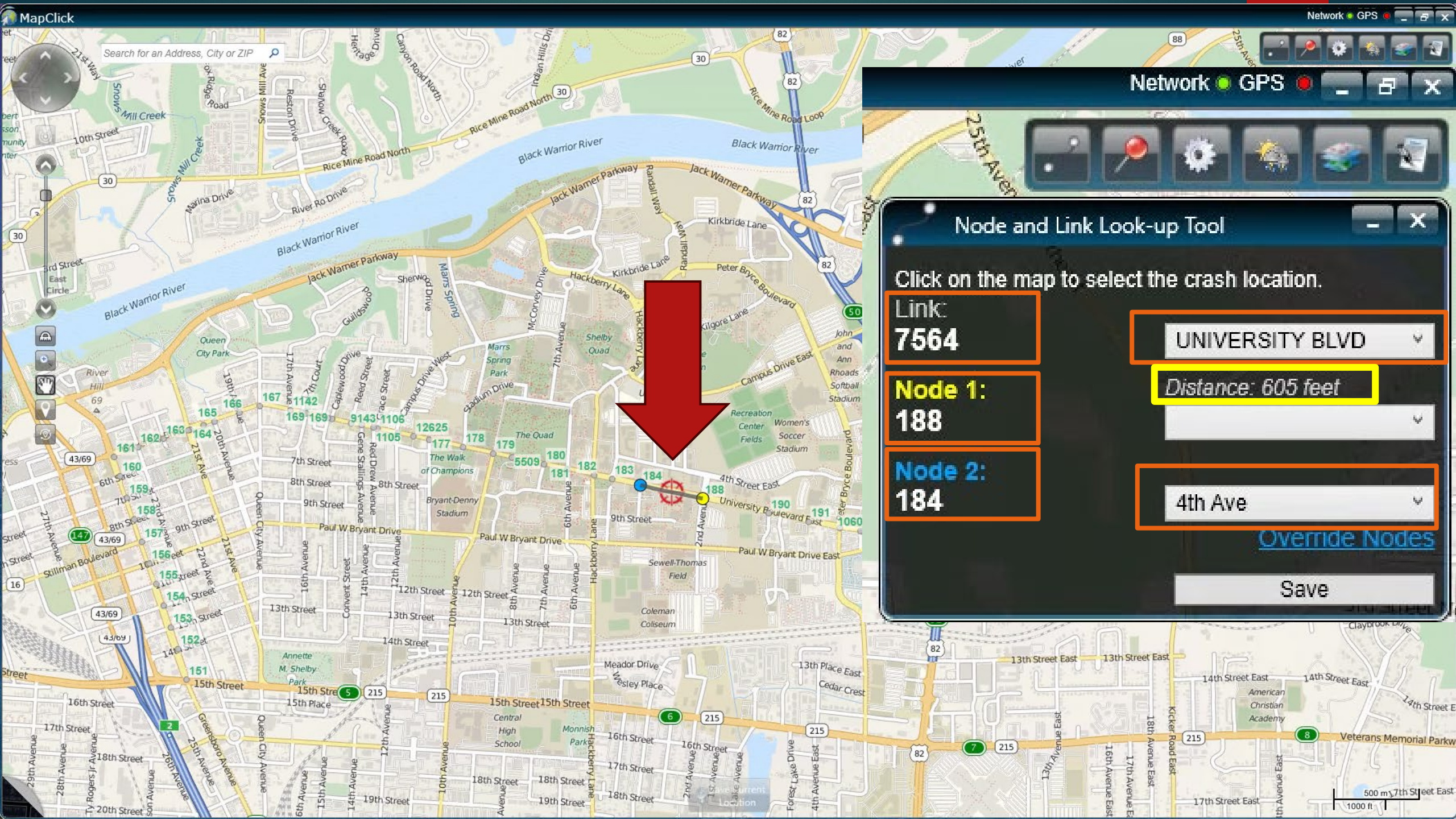
Confirm crashes to be included

Tools at work: Delivering results

“Heck yea, that’s legit man! We are going to start using this sketch and narrative feature more widely. I think this will allow us to cast a large net and then weed through the crashes at a rapid pace. Thank you for working through this with us.”

Building Better Tools: MapClick

- The ultimate solution for better crash location is MapClick
- Simply clicking on the map adds the location details for law enforcement


MapClick
Network
GPS
Search for an Address, City or ZIP
Node and Link Look-up Tool
Click on the map to select the crash location.
Link:
7564
Node 1:
188
Node 2:
184
UNIVERSITY BLVD
Distance: 605 feet
4th Ave
Override Nodes
Save
Black Warrior River
Jack Warner Parkway
Rice Mine Road North
Paul W Bryant Drive
University Boulevard East
4th Street East
Paul W Bryant Drive East
Campus Drive East
Peter Bryce Boulevard
Hackberry Lane
Kirkbride Lane
Stillman Boulevard
15th Street
Veterans Memorial Parkway

Building Better Tools: MapClick

- Simply clicking the map adds the location details for law enforcement
  - Route
  - Nodes
  - Distance to Node 1
  - Street names
  - MPO and RPO
  - Census Tract
  - Any eGIS details can be added

Crash and CARE Data Evolution

CONTINUED

The only certainty is change

Paper to electronic (MMUCC v3):

150 to 200 fields

MMUCC v3 to MMUCC v6:

200 to 220 fields

MMUCC v6 as early as 2026

Data Evolution

- CARE has many functions.
  - It is a safety tool used to find trends and identify areas for potential improvements.
  - CARE adds necessary data beyond what is entered by law enforcement.
  - CARE also analyses data quality to improve how law enforcement enters crash data.

Traffic Safety's Next Horizon

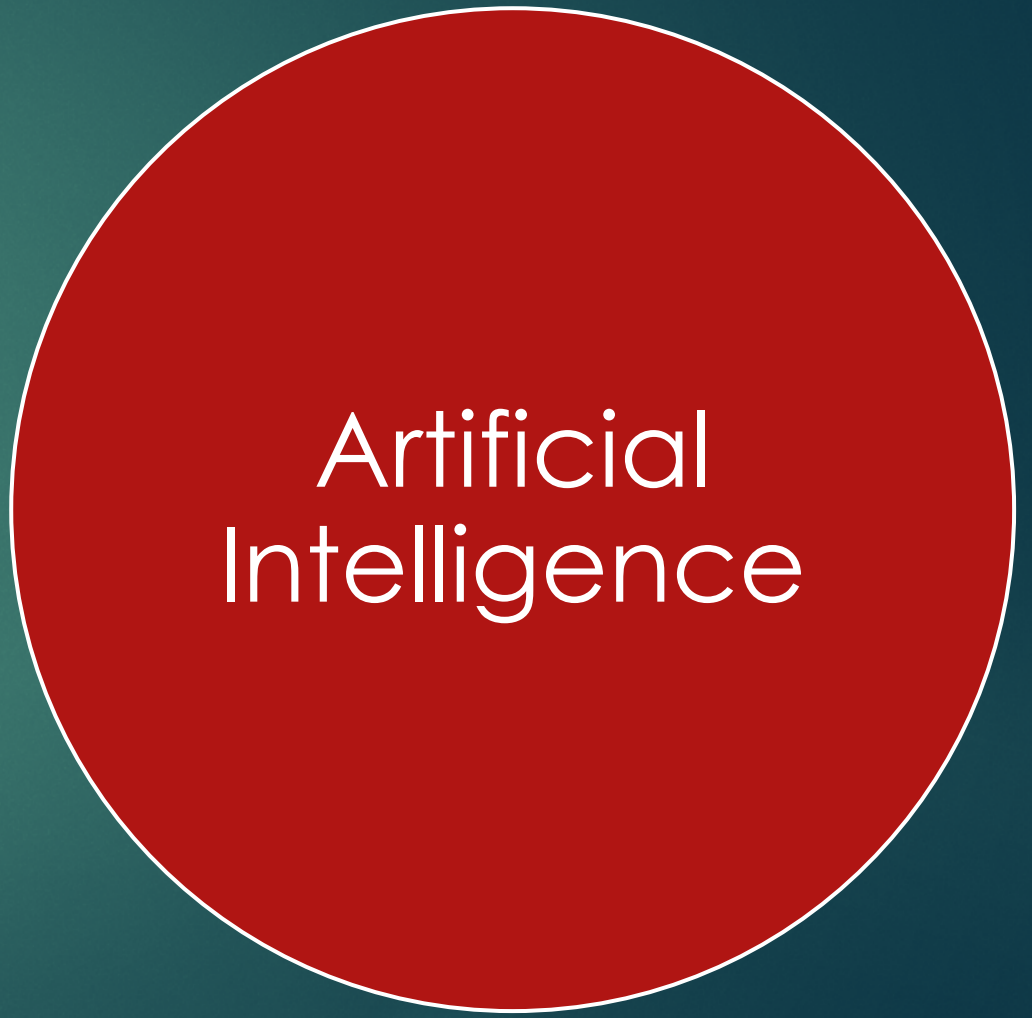
AI/ML “101”

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING:

IT’S NOT JUST HANDWAVING…

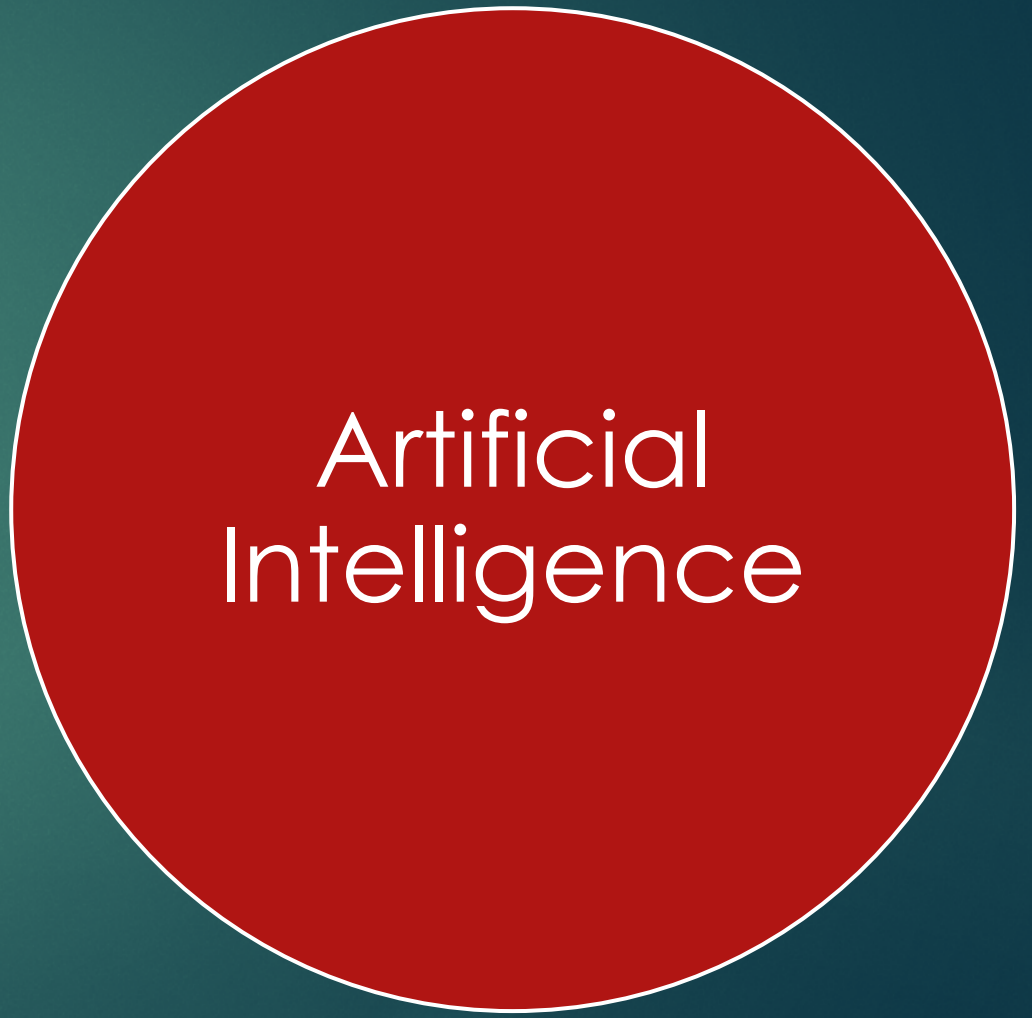
Artificial Intelligence (AI)

- Technique for building systems that **mimic human behavior or decision-making**.
- Used in many industries, such as health care, finance, transportation, and much more.



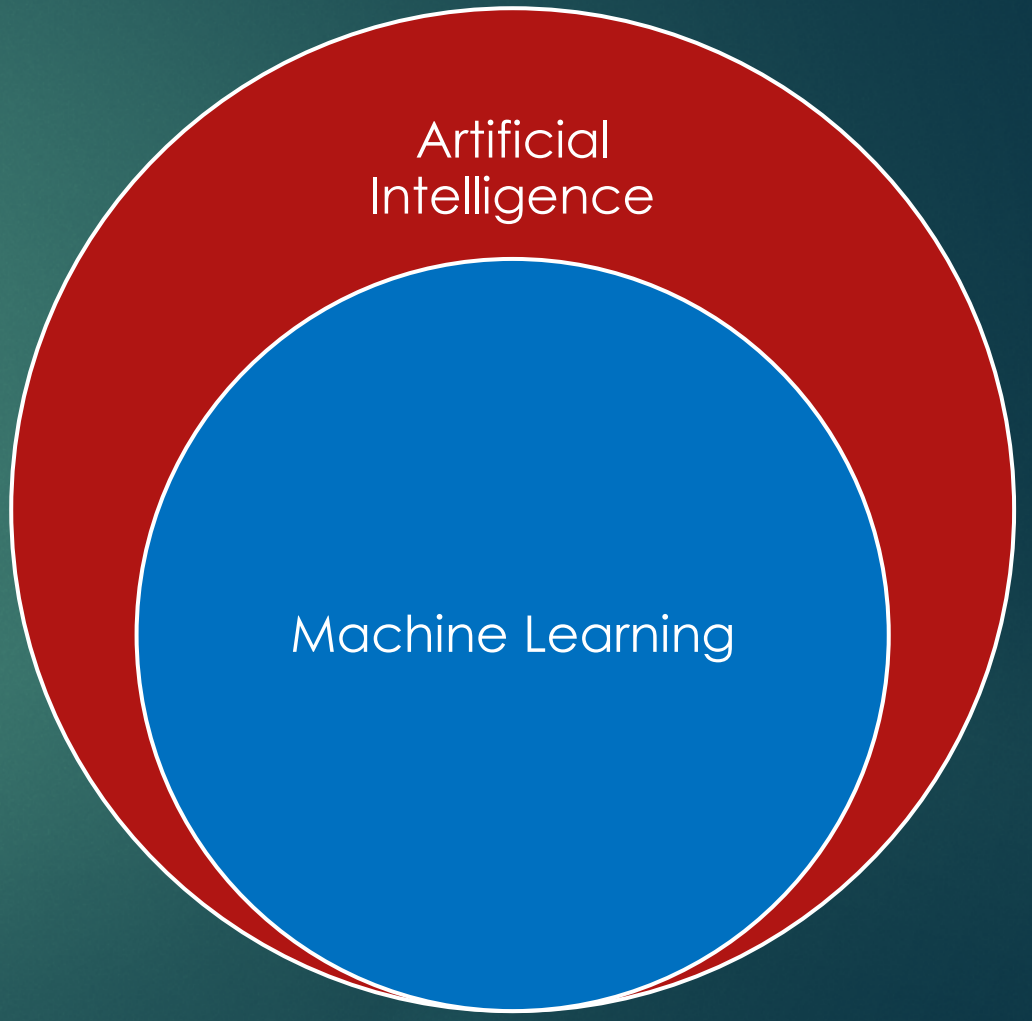
Artificial Intelligence (AI)

- Applications:
  - Autonomous Vehicles
  - Recommendation Systems
  - Medical Imaging and Diagnostics
  - Customer service – Chatbots
  - Marketing – Tailored advertisements



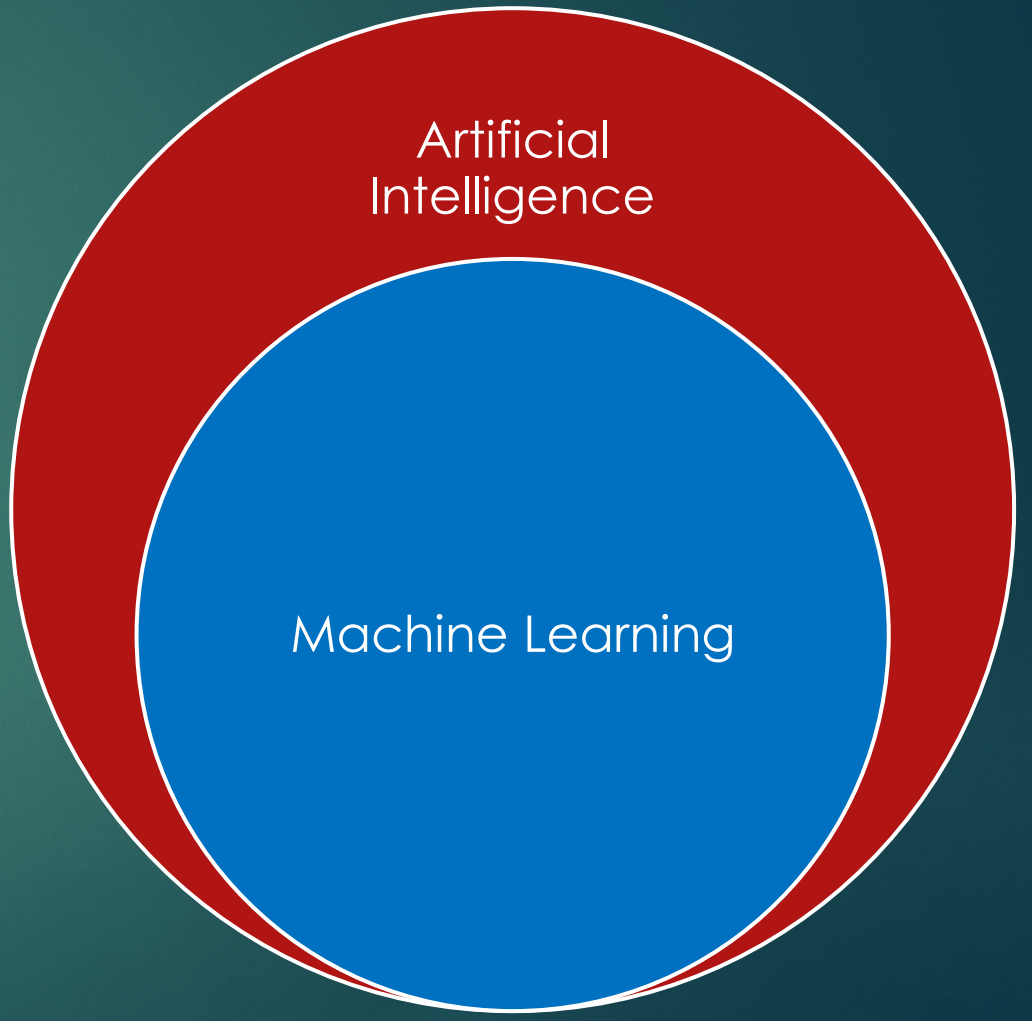
Machine Learning (ML)

- Subset of Artificial Intelligence (AI)
- Field of study that gives computers the capability to learn without being explicitly programmed



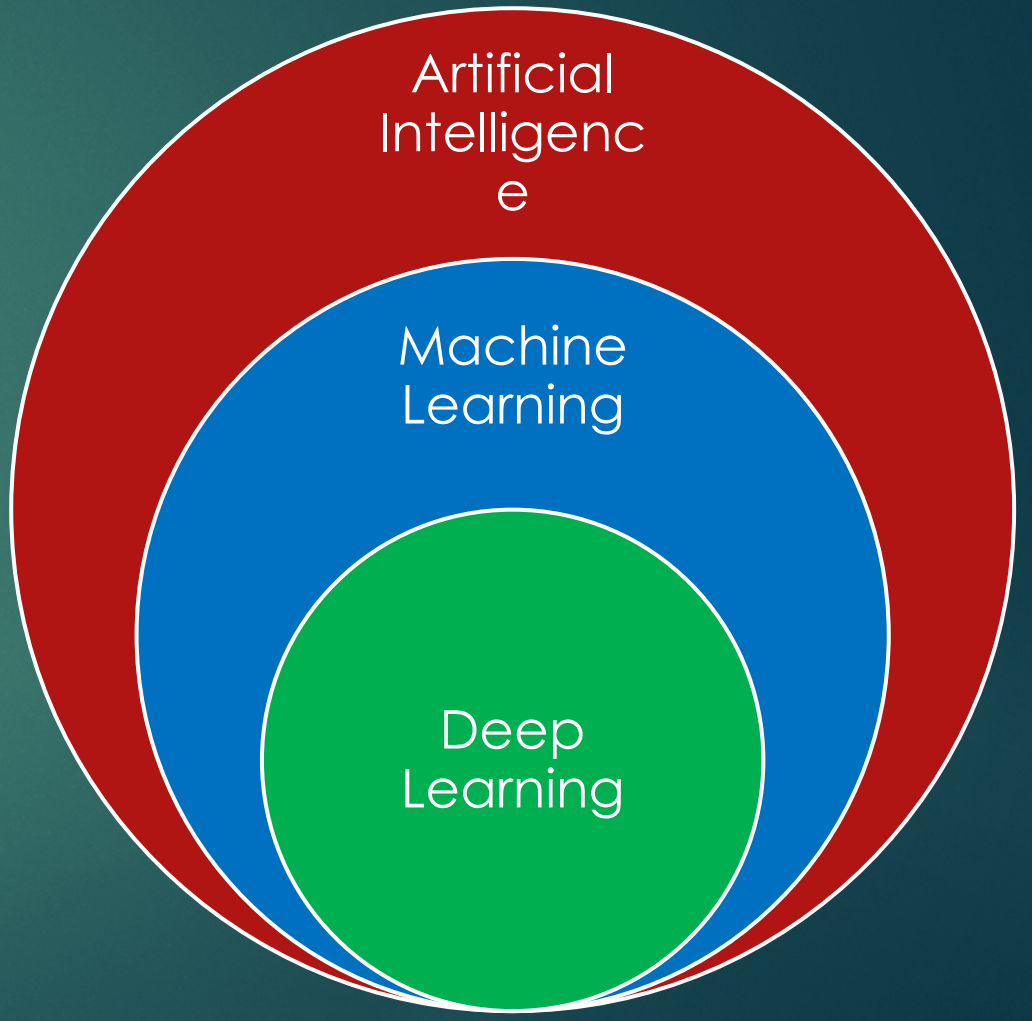
Machine Learning (ML)

- Study of algorithms that:
  - improve their performance at some task with experience.
- Has applications in various domains such as finance, healthcare, robotics.



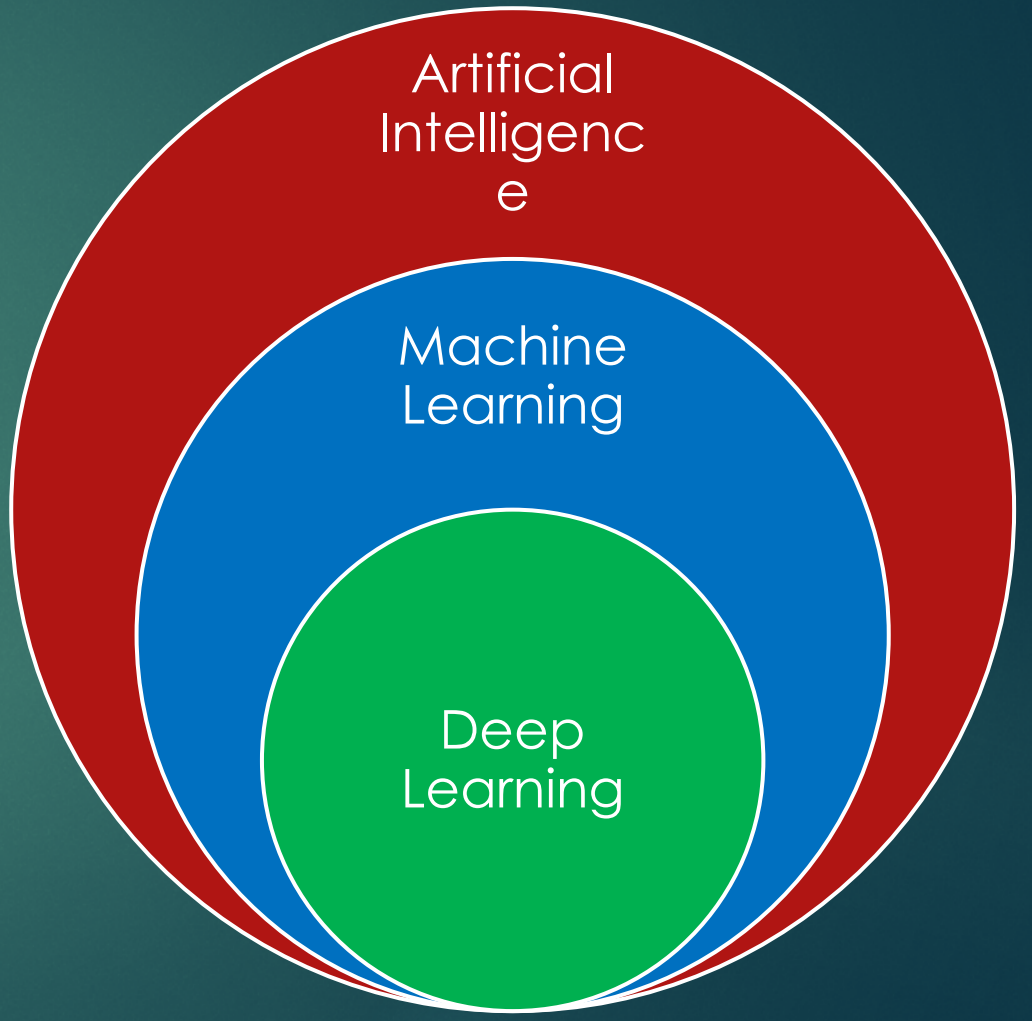
Deep Learning

- Subset of Machine Learning
- Uses neural networks with many layers (hence the term "deep") to model and solve complex problems.



Deep Learning

- Subset of Machine Learning
- Uses neural networks with many layers (hence the term "deep") to model and solve complex problems.
- Inspired by the human brain
- Applications:
  - Image Recognition: Google Photos
  - Speech Recognition: Siri, Alexa
  - Natural Language Processing (NLP): Text analysis, chatbots



Take care and be safe.

WE ARE ALL HERE TO MAKE A DIFFERENCE