Not All Hotspots Are Created Equal: Are you letting someone else define your hotspots?

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INTRODUCTIONS

- Jesse Norris
  - Started at CAPS in 2009
    - Support rollout of eCrash in Alabama
  - Data and analytical background
    - Mainframe and data processing
  - Began running the analytics for Alabama’s yearly Crash Facts Book in 2011.
  - Current teach, train, and routinely produce data for federal programs.
HOTSPOTS

- What are hotspots?
  - Concentrations of linear events
  - Characterized by:
    - Crash Elements
      - Run-off-road (ROR)
      - Speed, DUI, congestion
    - Environmental Elements
      - Infrastructure
      - Weather
      - Time and Location

HEATMAPS: THE VISUAL TECHNOLOGY TODAY
VISUAL DISPLAY OF YESTER-YEAR

FISH FINDER VS HEATMAPS

- Fish Finder
  - Hard to read
  - Requires training to interpret data
  - Information directly controlled by boat captain
    - Relevant info guides the captain’s actions

- Heatmaps
  - Easily conveys details
  - Mostly controlled by algorithms
  - Looks great on digital displays
DISTANCE BETWEEN VISUAL TECH AND ENGINEER

- Displaying a heatmap can be simple
- Getting relevant details out, not so much
  - Could you read a heatmap and be able to go to that heatmap area?
  - What information does an engineer need?
- The distance between the digital displays and analytics may create differences in field notes given to the engineer.

DISTANCE IS ACCEPTABLE

- Engineers needs
- Analytical needs
- Geo-location specialists
- Federal guidelines
- Let the experts in each field help along the way
THE DATA CYCLE

- Crash Event
  - Officer’s ability
  - Input process ability (crash form coverage)

- Data Collection
  - Participation
  - Central or siloed warehouse

THE DATA CYCLE

- Data Analytics
  - Raw data
  - ETL’d data
    - Process
    - Other integration

- GIS Data
  - Integration and data availability
  - Working knowledge of ESRI
THE DATA CYCLE

- Dissemination of data
  - Determine locations
    - Available location details
    - Criteria required
  - Relevant crash details
- Funding
  - You’ve made it!

HOTSPOTS

[Diagram showing hotspots and mileposts]
HOTSPOT GRANT

- Alabama Department of Public Safety
  - Speeding
  - Impaired Driving
  - Seat Belt

- New data structure
  - eCrash
    - Daily uploads of data
  - New hotspot criteria

HOTSPOT CRITERIA

- Not too many
  - Resource limitation

- Not too little
  - Maximize area coverage

- Criteria
  - Length
  - Severity or other conditions
  - Number of events
ANALYTICS PLUS ESRI

- CARE Analytics
  - Hotspots – Linear
    - Control of criteria
  - Events – Points
- Send to ESRI for Heatmaps
  - ESRI working knowledge

ANY QUESTIONS SO FAR?
REFRESH

- Fish finder printed lines
- Visual displays
- Distance between visual and engineer
- Data cycle
- Hotspot
- Heatmaps

HEATMAPS ARE BEAUTIFUL

- Simply turning the a heatmap layer on-and-off is an attention getter.
- Euclidian Algorithm
  - Distance regardless of roadway relationship
  - Uses grid or net concept to group and make any number if calculations
HEATMAP PROBLEMS

- Complicated jump going from display down to the road.

- Reporting can get complicated
  - SQL Server Reporting Services
  - Impacts processing time

- Variable distances
  - One area could be .1 miles and another 2 miles

SIMPLY LINEAR

- CARE linear hotspot simple
  - Go to crash
  - Go forward hotspot length
  - Count events back to first crash
  - Flag qualifying locations
SIMPLY LINEAR

1. Go to first crash location
2. Advance to hotspot distance
3. Count back to first crash
4. Flag qualifying area

ALASKA PARTNERSHIP

- Crash Spot
  - Similar to CARE Hotspot
  - Added midpoint of “spot” for closer perspective
    - Would you rather look ahead 3 miles or look midpoint and get a perspective looking forward and backwards?
ALASKA PREPARATION

- 1964 Quake
  - Building code updates
  - Tsunami prep
  - Over 130 fatalities
- 2019 May Earthquake
  - 0 fatalities

ALASKA APPROACH

- In a couple days all bridges inspected
- Completed major repairs in days
  - Asphalt plants already closed
  - The weather in Anchorage is not friendly
    - Hot asphalt and cold earth
- Incredibly respectable
VALIDATION

- Seeing that Alaska used a similar approach to our method helped confirm its practicality and use.

HOTSPOT VS AK CRASH SPOT

- Pros
  - Moves up entire route
  - Accounts for every crash
  - Quickly package into report
  - Easy to explain qualifying area
HOTSPOT VS AK CRASH SPOT

- **Cons**
  - Only crashes with locations are considered
    - Unable to predict location without crash history
  - Data overload
  - Too much data
    - Historical trends not relevant to current roadway
    - Everything location can become an outlier

CONSIDERATIONS

- The need for complex algorithms
  - Gets complicated
- Manage your information from start to finish
- Get the best information to those in the field
- Be able to answer how each event and location qualified
THANK YOU

Any questions or comments?

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