
GIS FOR LAW ENFORCEMENT: EXAMPLES + TIPS FOR MANAGING DATA

SHELBY ROBERSON, GISP

GIS MANAGER

MONTGOMERY COUNTY MARYLAND POLICE DEPARTMENT

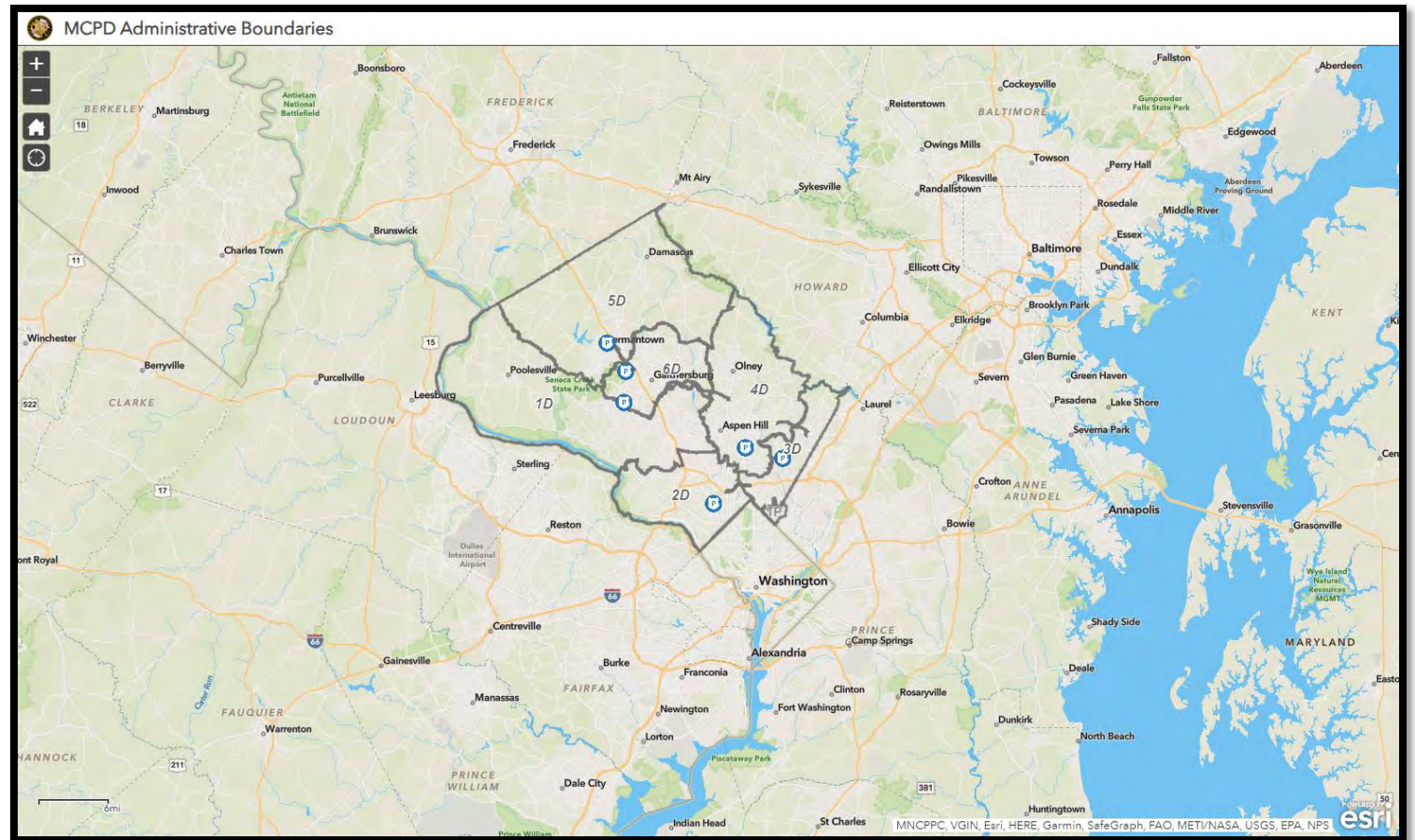


ABOUT ME

- In GIS since 2005, Public Safety GIS since 2013
- Bachelor's and Master's in Geography
- Geographic Information Systems Professional (GISP)
- Fire & Rescue GIS Analyst for 4 years
- Police GIS Manager for 6+ years
- Emergency Management/Public Safety GIS consultant for 9+ years
- Borderline unhealthy obsession with cats and Taylor Swift

ABOUT MCPD

- 1300 sworn
- 650 civilian
- 6 districts/stations
- 507 sq mi
- 1.06 million people



OUTLINE

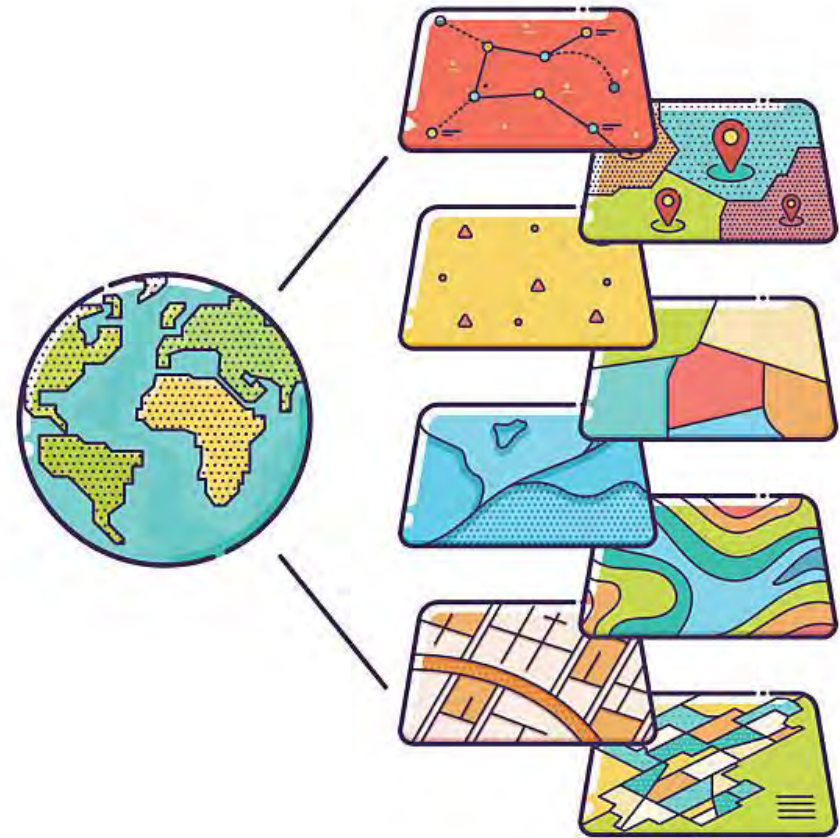
- Why GIS and examples of what we do in MoCo Police
- Importance of data centralization, quality and management
- Caveats and Issues
- Questions

Assumptions

- Decent understanding of Geographic Information Systems and/or relational database management systems or have someone in your org that does
- Using ArcGIS Enterprise, ArcGIS Online, or have the capacity and/or desire to do so

WHY IS GIS/MAPPING SO IMPORTANT?

- Nearly everything has a “where” component
 - CAD data, RMS, addresses, beats/regions, districts, you name it!
 - Take advantage of XY coordinates or addresses
- Identify patterns, trends, and correlations
- Useful for predictive analysis
- Provides data-driven insights for things like resource allocation, understanding populations/communities served



ARCGIS ENTERPRISE (PORTAL)/ONLINE



Static PDF maps become outdated the moment they are created



Online maps allow you to interact – zoom, read-pops, symbolize, control scaling, labels, etc



Give the power to the end user through functional applications



Can connect to your secure, centralized data sources

MCPD EXAMPLES

NOTE:

The following examples are built in ArcGIS Enterprise version 10.9.1
Functionality will vary between ArcGIS Online and Enterprise versions

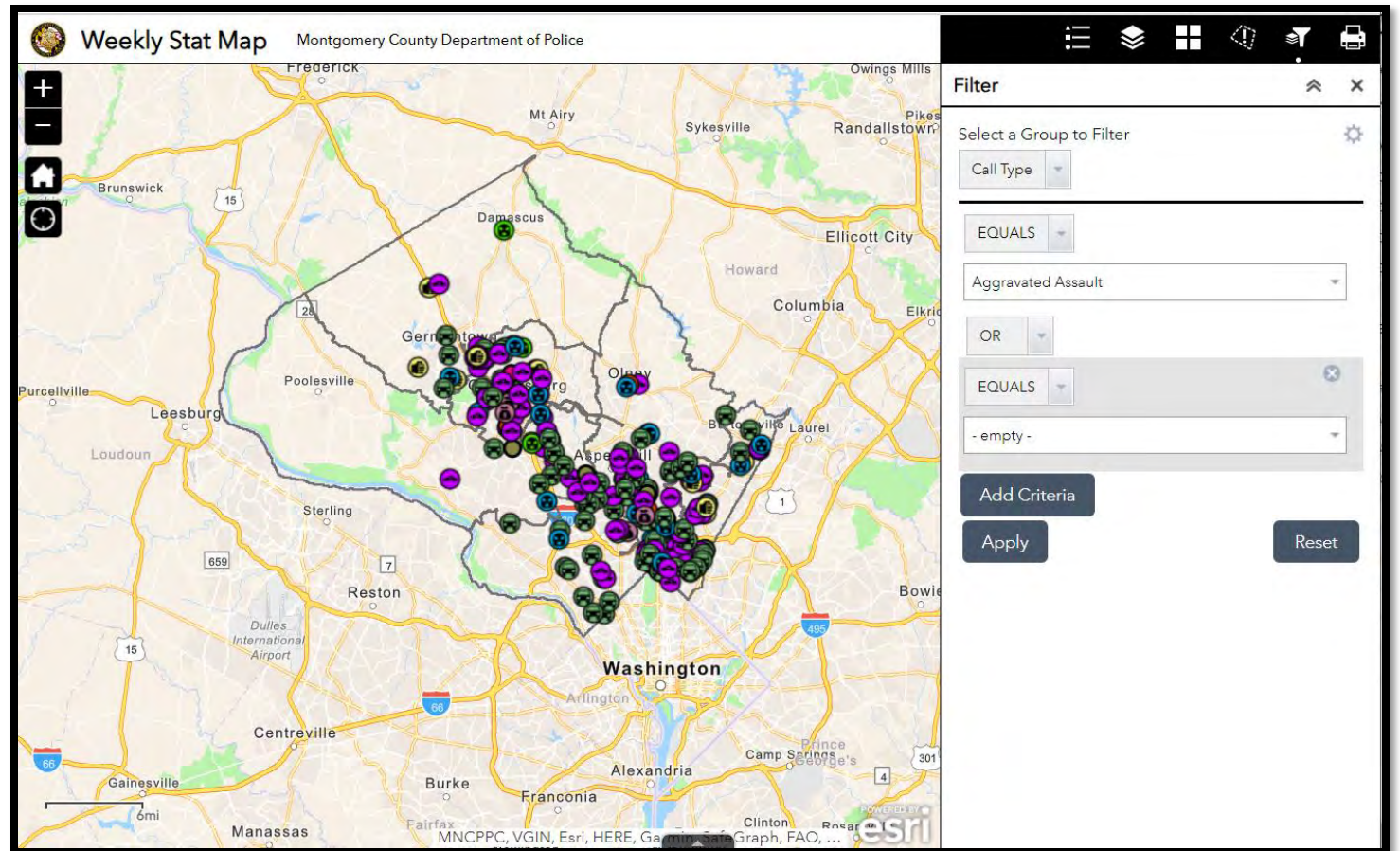
MAPS & GIS SHAREPOINT SITE

- Consider having a common location to access applications
- Portal/AGOL home or use what your agency already uses, like Sharepoint

The screenshot displays a SharePoint site for the Montgomery County, MD Department of Police. The page is titled "Montgomery County, MD Department of Police" and is part of the "Maps & GIS" section. The navigation menu includes "Home", "Desktop", "Phones", "Mobile Systems", "Digital Records", "Telestaff", "Tools", "Maps & GIS", "Crime Analysis Section", "Report Writing", "Technology FAQ", "IMTD Project Management", "Unit Team Sites", "E-Tix Data Search", "Back End Infrastructure", and "Recent". The main content area features a "WELCOME" message, a "WHAT'S NEW" section with a link to "District Demographics", and a "FREQUENTLY USED WEB MAPS" section with icons for various tools like "Tactical Crime Information Center", "MC Stat Map", "Daily Activity Report", "Open Calls for Service Dashboard", "CED CFS Dashboard", "Boundary & Address Search", "Location Lookup", "Theft/Theft Parts from Auto", "Trespass Agent Letter Locations", and "10 Mile Radius Lookup". A "DISTRICT DEMOGRAPHICS" section is also visible at the bottom.

MC STAT

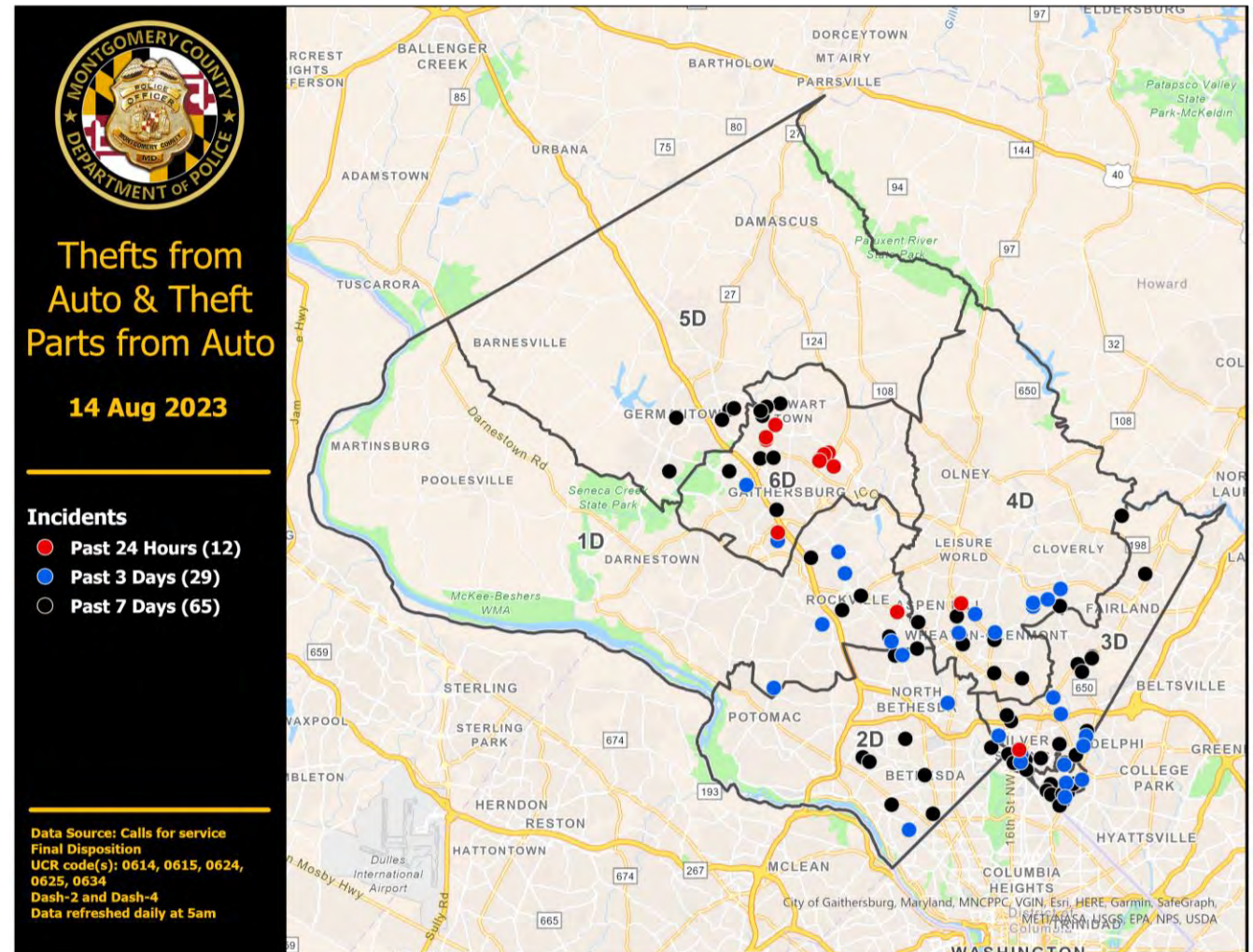
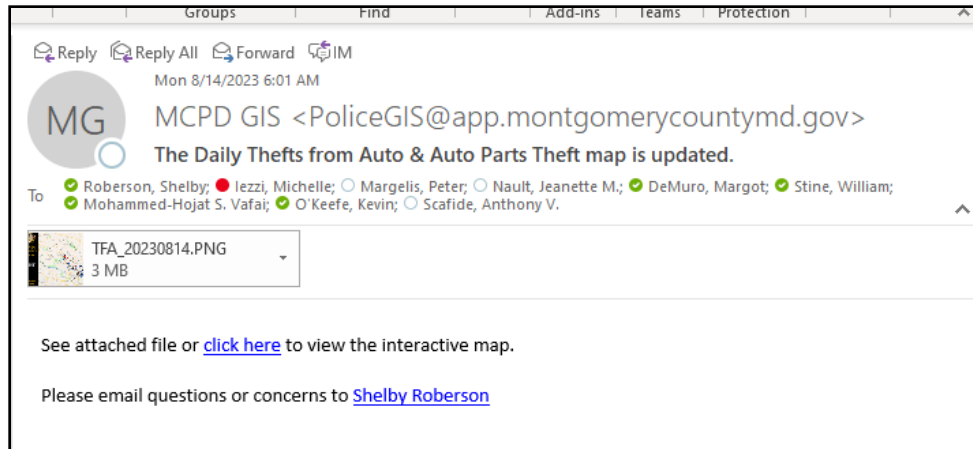
- Interactive map used in weekly comp stat meeting
- ArcGIS WebApp Builder
- Hosted in ArcGIS Online – no PII, publicly-accessible data

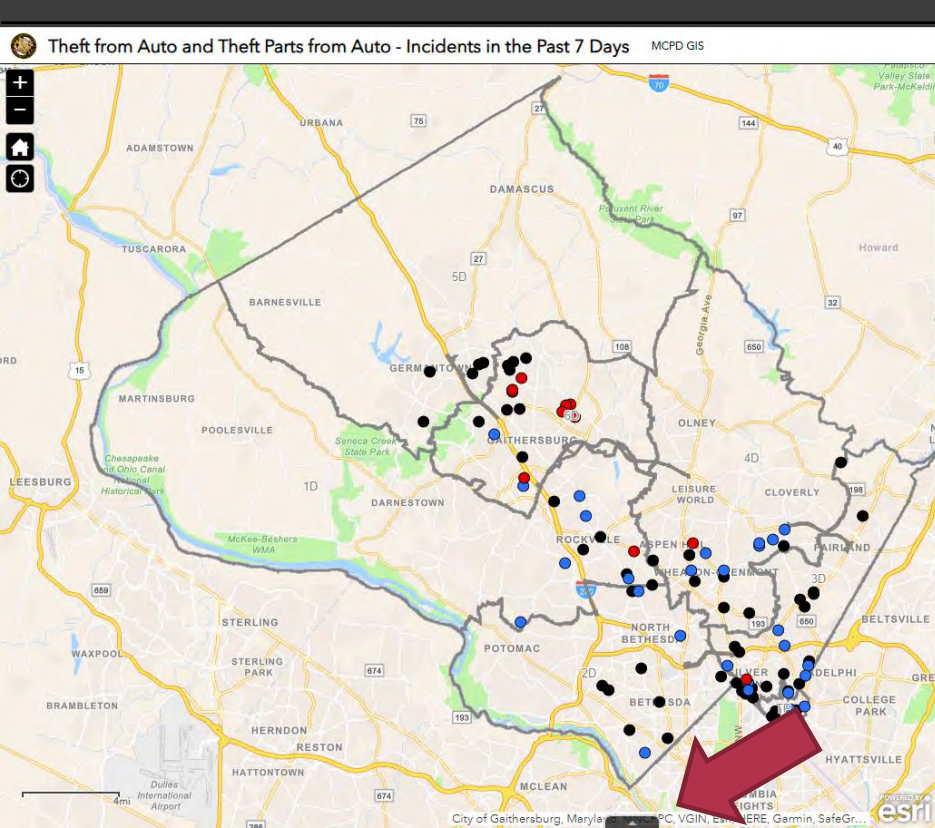


[Link](#)

DAILY THEFTS FROM AUTO

- Updated each morning at 5am
- Interactive Portal map + emailed PDF map





Thfts from Auto and Theft Parts fro...

Incidents in the Past Week 107

Days since incident: 1 12

Days since incident: 2 13

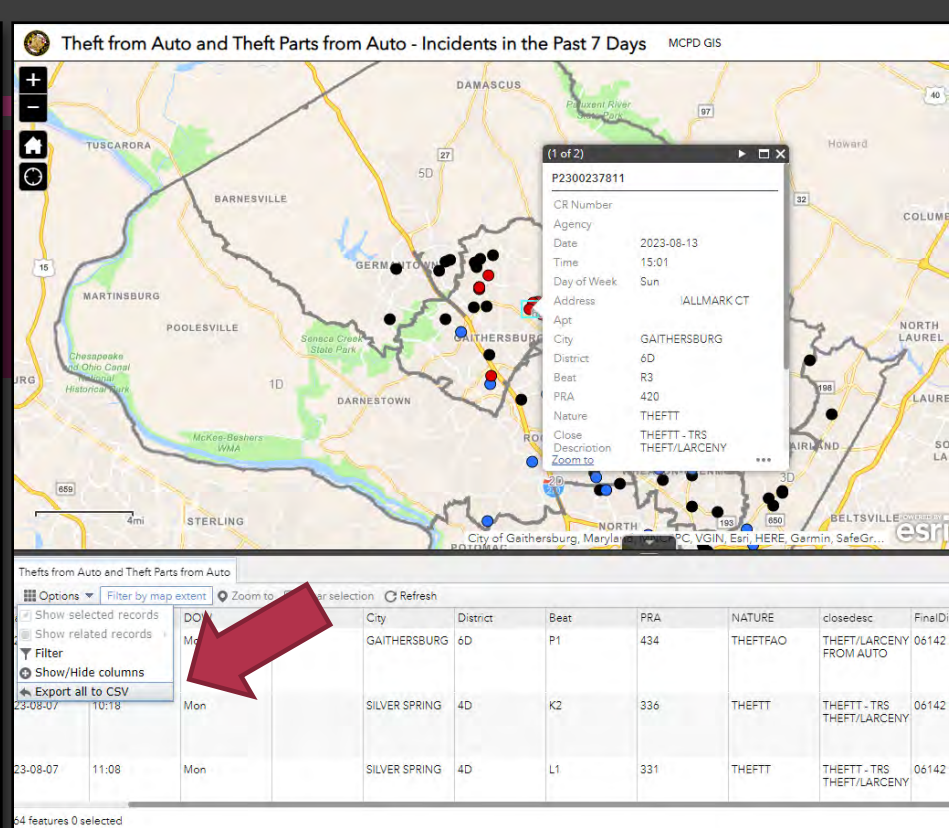
Days since incident: 3 16

Days since incident: 4 12

Days since incident: 5 22

Days since incident: 6 18

Days since incident: 7 14



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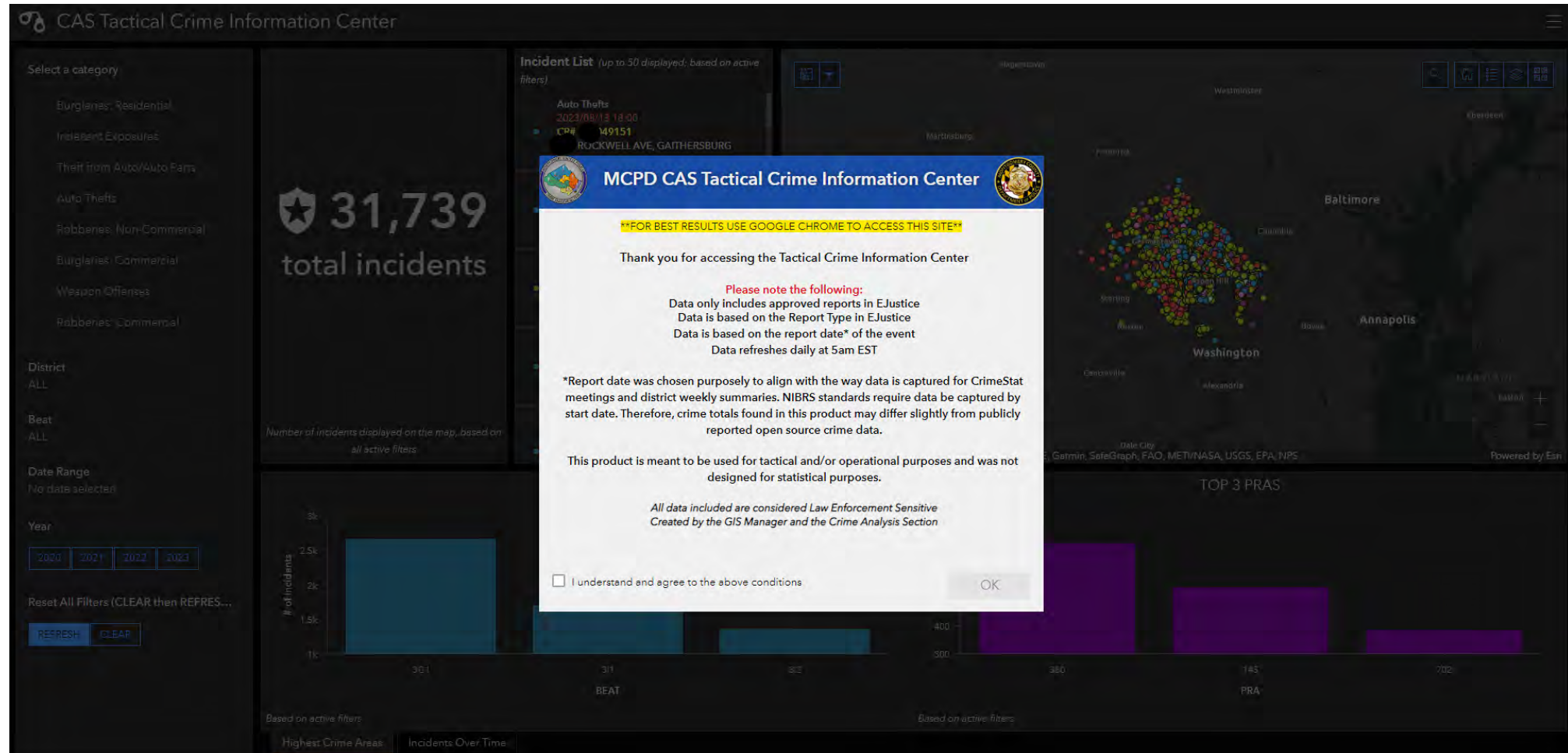
Days since incident: 7 14

DAILY THEFTS FROM AUTO

- Interactive map built in ArcGIS WebApp Builder (*to be retired 2025)
- Can view details about individual incidents
- Can export table
- Can click links directly to CAD or RMS incident page

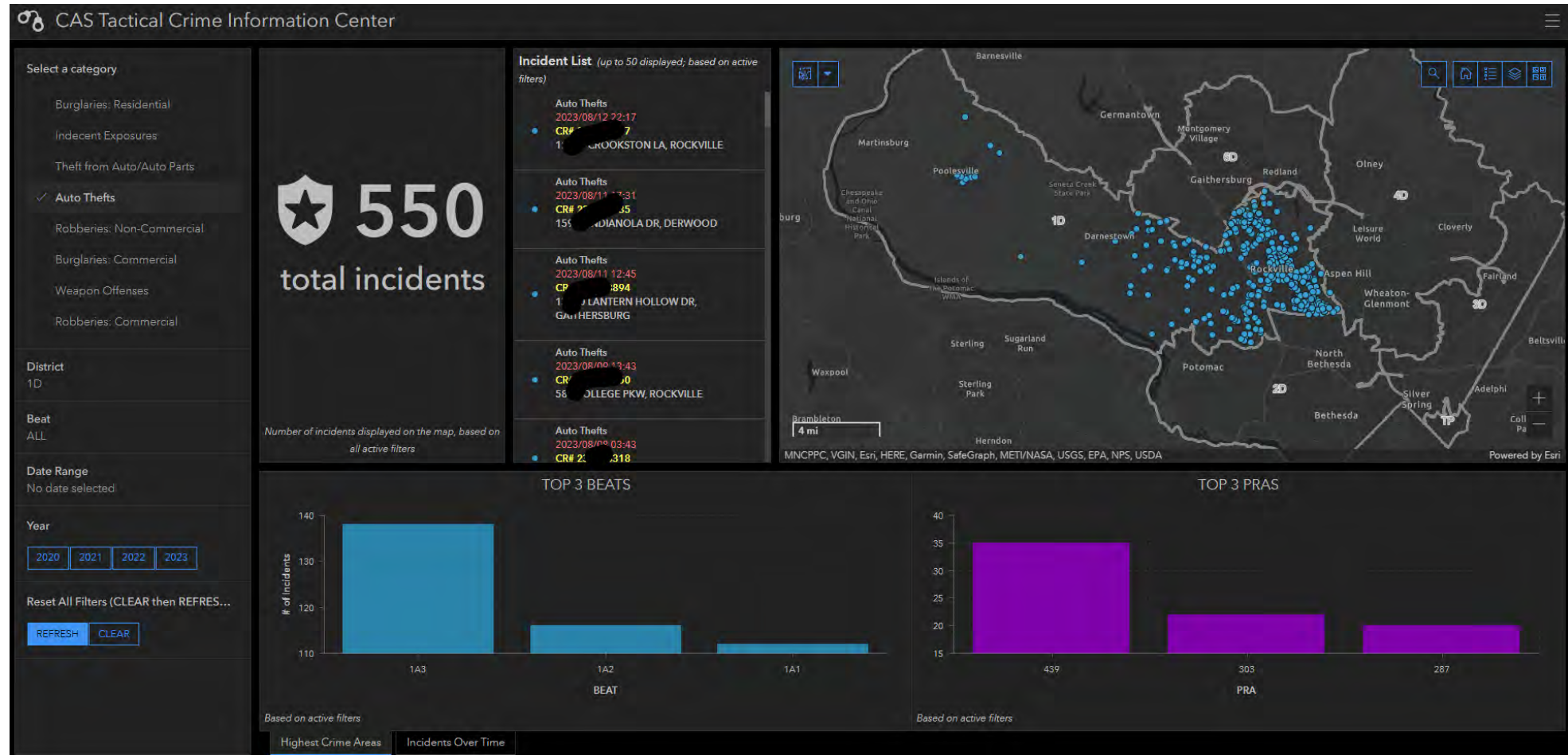
TACTICAL CRIME INFORMATION CENTER (TCIC)

- Built in ArcGIS Dashboards
- Pop-up window uses Experience Builder. User must agree to terms.
- All widgets are interactive with each other
- Allows users to query
- Graphics update based on data
- *Future release will allow CSV export



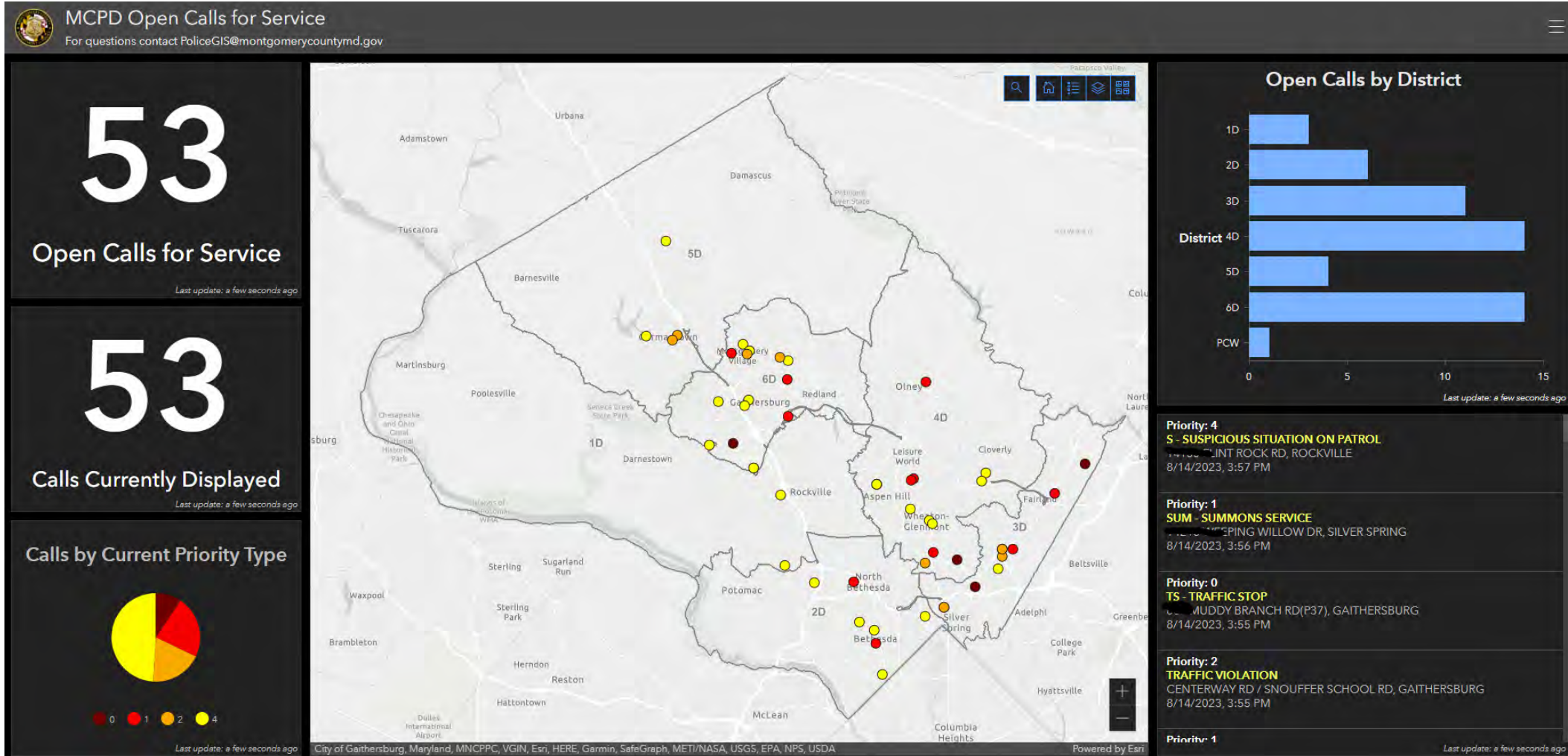
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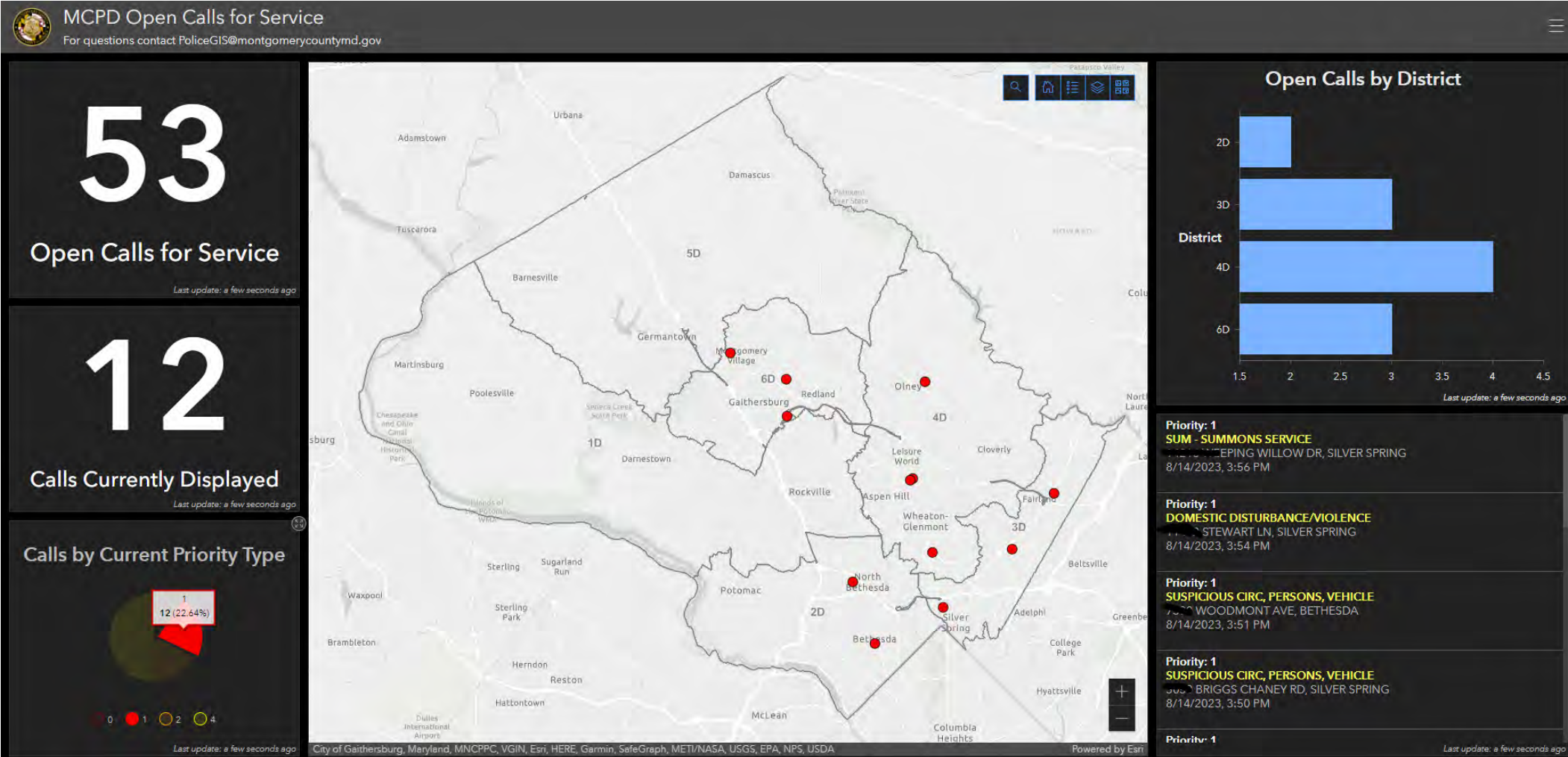
OPEN CALLS FOR SERVICE DASHBOARD

- Built with ArcGIS Dashboards
- Connects to CAD Oracle database via a SQL Server view
- Updates near-real time

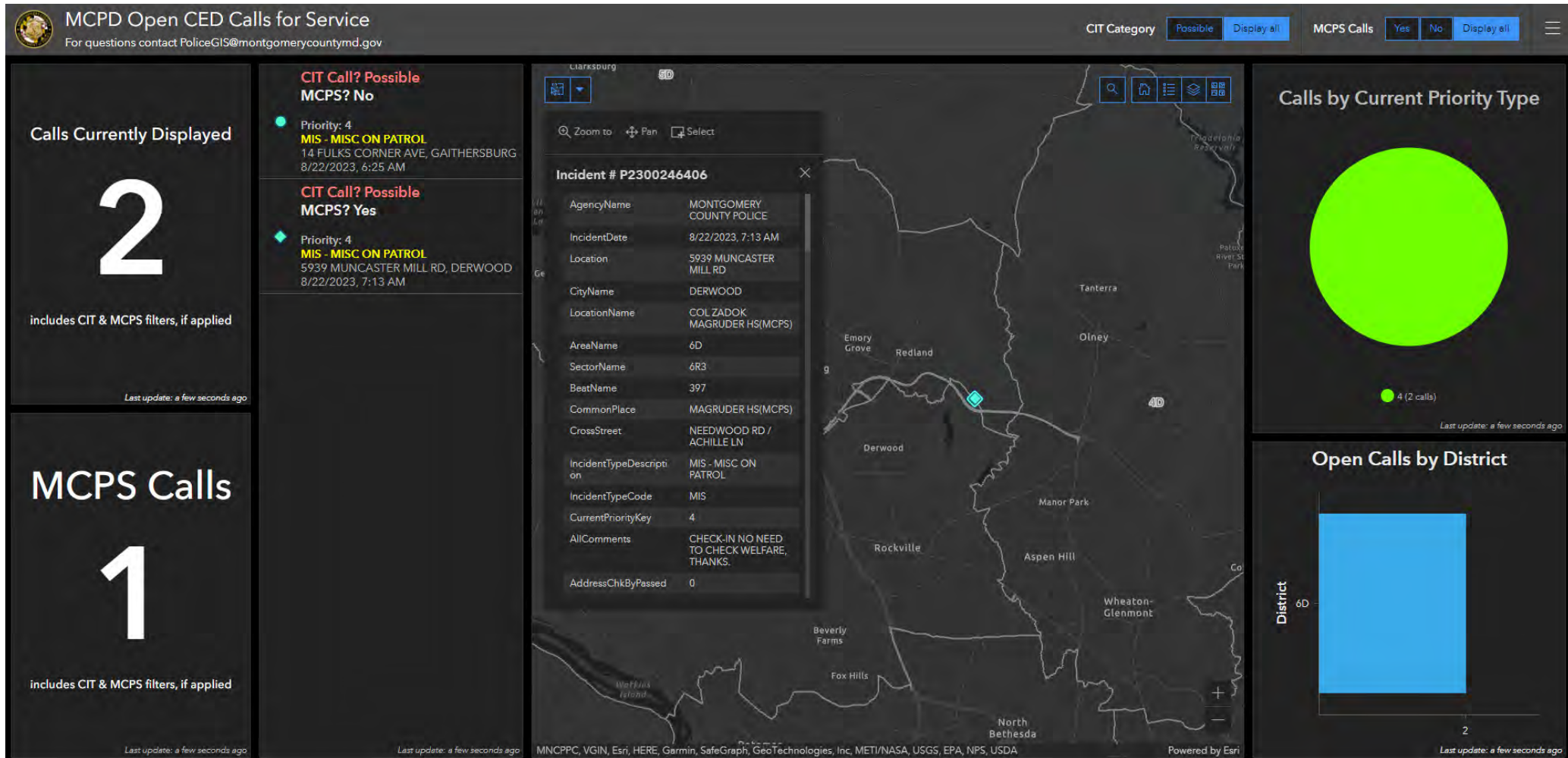


OPEN CALLS FOR SERVICE DASHBOARD

- Widgets connected to each other
- Used heavily by command staff



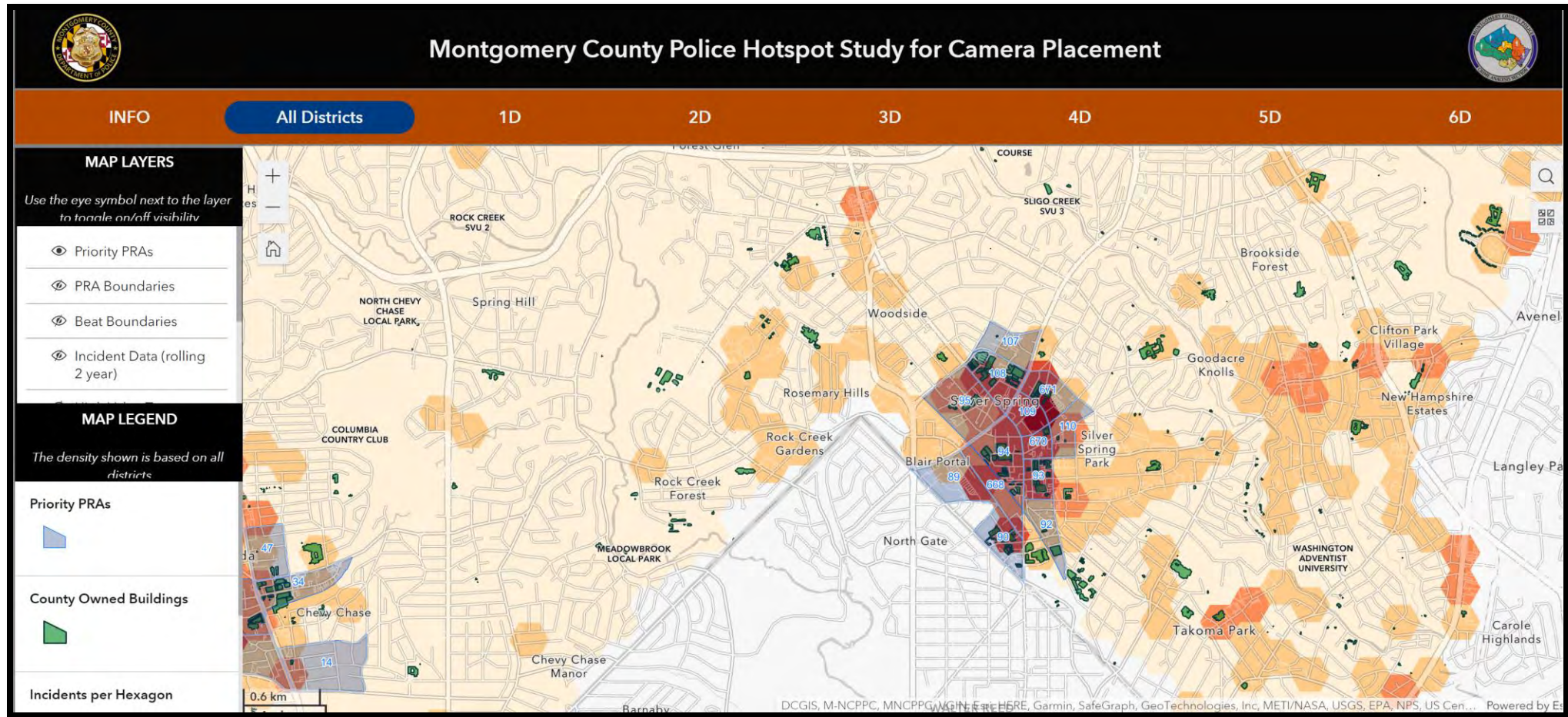
OPEN CALLS FOR SERVICE DASHBOARD – CED VERSION



- For Community Engagement Division
- Focuses on Crisis Intervention Team calls
- School calls

HOTSPOT STUDIES

- Built in ArcGIS Experience Builder
- Looks at rolling 2-year data (updates daily)
- [Live demo](#)



SURVEY I 23: ETCH & CATCH

- Built with Survey I 23 Connect
- [Link](#)



DRONES

- Crash reconstruction – clear traffic quicker
- Large incidents
- Drone as first responder



Image created on 3/3/22 by Montgomery County Department of Police

0 12.5 25 50 Feet



ARCGIS SOLUTIONS FOR LAW ENFORCEMENT

- Helpful if starting from scratch
- If not, use for ideas
- [Link](#)

The screenshot displays the ArcGIS Solutions website interface. At the top, there is a navigation bar with 'ArcGIS Solutions' on the left and 'Overview', 'Resources', and 'View Gallery' on the right. Below this is a purple banner with the text 'Industry-specific configurations for ArcGIS' and several icons. A search bar is located below the banner, with 'Search Solutions' on the left and 'Relevance' and 'Filter' on the right. The main content area shows a list of solutions filtered by 'Industry: Public Safety' and 'Domain: Law Enforcement'. The results are displayed in a grid of four cards, each with a title, a description, and a small icon in the bottom right corner. The cards are: 'Crime Analysis', 'Address Data Management', 'Police Transparency', and 'Homelessness Outreach'.

ArcGIS Solutions

Overview Resources View Gallery

Industry-specific configurations for ArcGIS

Search Solutions

Relevance Filter

Solutions: 13 Filters Industry: Public Safety X Domain: Law Enforcement X Clear filters

Filters

New Release

Industries

- Architecture, Engineering, and Construction (AEC)
- Business
- Conservation
- Defense
- Facilities
- Health and Human Services
- Pipeline
- Public Safety
- Emergency Management
- Fire Service

Crime Analysis

Crime Analysis can be used to enhance public safety, identify emerging trends, organize law enforcement operations, and plan crime-prevention strategies.

Address Data Management

Address Data Management can be used to maintain an authoritative address repository and continuously improve the quality of address data.

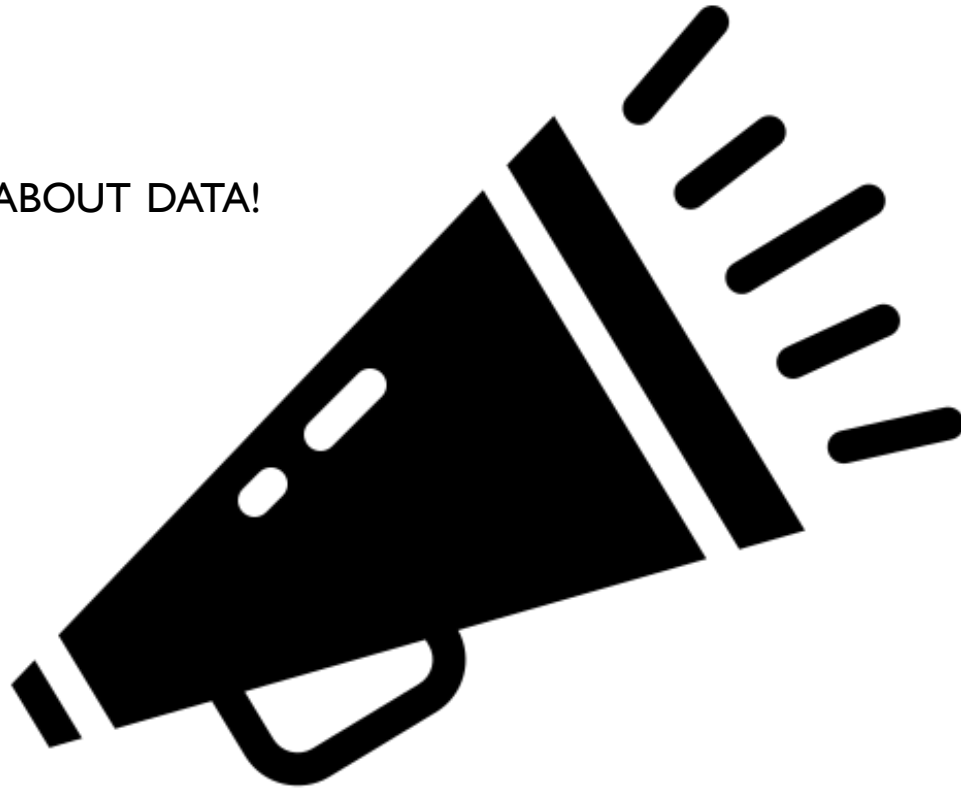
Police Transparency

Police Transparency can be used to share authoritative information and communicate engagement efforts that build trust with the general public and community stakeholders.

Homelessness Outreach

Homelessness Outreach can be used to educate the public and help individuals experiencing homelessness find available resources.

LET'S TALK ABOUT DATA!



HIGH QUALITY DATA
LEADSTO
ACCURATE END USER
PRODUCTS &
ANALYSIS

LET'S TALK ABOUT DATA



Garbage in, garbage out



As GIS analysts (or first responders!) we have the power to control what is coming in

- Reduce human error
- Make it nearly impossible to input mistakes
- Streamline workflows
- Security

DITCH THE SPREADSHEETS

- Sheets/tables aren't linked by relationships
 - Easy to make errors – overwrite functions, calculations, delete data.
 - Cannot handle large amounts of data
 - Sharing and multi-user editing is hard and leads to copies and copies and copies of data. What is authoritative??
- *Excel can still be useful for personal, quick analysis but don't make it a large part of your business processes*



CENTRALIZE YOUR DATA!



- Leverage your existing CAD & RMS databases
- Link to an enterprise geodatabase
- Every example you've seen today is pulling source data from a central database
- Databases provide structured storage and easy access to vast amounts of data
- You can leverage native spatial data types with your XY data
- Officers/users can quickly retrieve and query accurate and timely information

KNOW YOUR DATA

- Absolutely critical to understand your data (existing OR data you create!)
 - What tables and fields do you have available? Look at schemas, get familiar.
 - Create/ask for a database diagram. What is related to what?
 - Understand field types. Date/time (time zone!), integer, text? This matters when you are displaying data and doing analysis.
 - Document anything that you filter out.
 - Didn't include X type of incidents? Fine, but make sure it is communicated to your end user(s).

SPATIAL DATA IN SQL SERVER (AND OTHER RDBMS)

- If you have XY data in your database, you can make a map. Even if your data isn't "GIS data".
- SQL Server has a native spatial data type – geography or geometry (depending on projected vs geographic coordinate system)
- You can easily transform XY data into a geography/geometry data column
- Mappable in ArcGIS

SQLQuery2.sql - mcg-b664.AnalystData (MCGOV,Zelons01 (56)) - Microsoft SQL Server Management Studio

Object Explorer

- dbo.FIR
- dbo.G3s_G5s_List_0726_2022
- dbo.Incident_Type_Codes
- dbo.IncidentComments
- dbo.Incidents
 - Columns
 - AB_Also (bit, null)
 - APPROVAL_DATE (nvarchar(10), null)
 - APPROVAL_DATE_DT (Computed, datetime, null)
 - APPROVAL_TIME (nvarchar(8), null)
 - AT_Also (bit, null)
 - AT_Recovery (bit, null)
 - Address (nvarchar(50), null)
 - Agency (nvarchar(4), null)
 - Agency_desc (nvarchar(64), null)
 - Alcohol (bit, null)
 - Apt (nvarchar(25), null)
 - Bias (nvarchar(10), null)
 - Bias_desc (nvarchar(94), null)
 - BusinessName (nvarchar(634), null)
 - CADEmpID (numeric(38,0), null)
 - CCR (nvarchar(20), null)
 - Canvass (bit, null)
 - Case_Status (nvarchar(100), null)
 - Case_Status_Desc (nvarchar(1024), null)
 - CauLevel (int, null)
 - CauOffenseDesc (nvarchar(50), null)
 - City (nvarchar(40), null)
 - DOW (Computed, nvarchar(3), null)
 - District (nvarchar(25), null)
 - District_desc (nvarchar(40), null)
 - Division (nvarchar(25), null)
 - Domestic (bit, null)

```
/****** Script for SelectTopNRows command from SSMS *****/
SELECT TOP (1000) [AB_Also]
, [APPROVAL_DATE]
, [APPROVAL_DATE_DT]
, [APPROVAL_TIME]
, [AT_Also]
, [AT_Recovery]
, [Address]
, [Agency]
, [Agency_desc]
, [Alcohol]
, [Apt]
, [Bias]
, [Bias_desc]
, [BusinessName]
, [CADEmpID]
```

	X	Y	YearMth	Year	Zip	date_from	date_rept	date_to	lwmainid	sDate2	sDate	sTime2	sTime	Geo_Location
1	-77.189257	39.0990138	201905	2019	20850	NULL	NULL	NULL	201238478	NULL	2019-05-08	NULL	04:13	0xE6100000010C256DF47BAC8C4340806264C91C4C53C0
2	-76.95374	39.0544825	201905	2019	20904	NULL	NULL	NULL	201238543	NULL	2019-05-08	NULL	17:12	0xE6100000010C27DA5548F9864340C5387F130A3D53C0
3	-76.958178	39.0517342	201809	2018	20904	NULL	NULL	NULL	201207450	2018-09-24	2018-09-23	05:00	14:00	0xE6100000010CD88AEC399F864340CA6FD1C9523D53C0
4	-76.99727	38.9991191	201812	2018	20901	NULL	NULL	NULL	201217279	NULL	2018-12-04	NULL	01:32	0xE6100000010C8CA77922E37F43400BD28C45D33F53C0
5	-77.025577	38.9937612	201902	2019	20910	NULL	NULL	NULL	201227123	2019-02-15	2019-02-15	03:50	03:50	0xE6100000010C51042791337F4340E8A1B60DA34153C0
6	-77.228464	39.1410371	201903	2019	20878	NULL	NULL	NULL	201232899	NULL	2019-03-30	NULL	01:10	0xE6100000010CE702F2800D9243400E1478279F4E53C0
7	-77.200055	39.0970135	201902	2019	20850	NULL	NULL	NULL	201228037	NULL	2019-02-22	NULL	16:30	0xE6100000010CADE238F06A8C4340AF997C83CD4C53C0
8	-77.164144	39.151444	201904	2019	20877	NULL	NULL	NULL	201236949	NULL	2019-04-26	NULL	14:53	0xE6100000010C74965984629343406AF5D555814A53C0
9	-77.052534	39.0119453	201905	2019	20910	NULL	NULL	NULL	201237800	2019-05-02	2019-05-02	06:30	17:00	0xE6100000010CA36B706C8781434065FB90B75C4353C0
10	-77.205595	39.1472747	201905	2019	20877	NULL	NULL	NULL	201238558	NULL	2019-05-08	NULL	15:09	0xE6100000010C9C03BAE5D9924340274EEE77284D53C0
11	-76.984758	39.041314	201905	2019	20904	NULL	NULL	NULL	201238928	2019-05-10	2019-05-10	15:00	15:00	0xE6100000010CF86EF3C6498543405C1E6B46063F53C0
12	-77.18269	39.1430159	201905	2019	20877	NULL	NULL	NULL	201239180	2019-05-10	2019-05-09	15:00	04:30	0xE6100000010C6DA752584E92434099D36531B14B53C0

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- You can easily transform XY data into a geography/geometry data column
- Mappable in ArcGIS

The screenshot displays the Microsoft SQL Server Enterprise Manager interface. On the left, the Object Explorer shows the 'AnalystData' database with a list of tables and columns. The central query window contains a SQL script for a 'SelectTopNRows' command, listing various columns including 'Geo_Location'. A red arrow points to the 'Geo_Location' column in the query. Below the query window, a spatial map visualization is shown, displaying a scatter plot of data points on a grid. The map includes latitude and longitude coordinates (e.g., 39.3, 39.2, 39.1, 39.0 and -77.3, -77.2, -77.1, -77.0, -76.9). The status bar at the bottom indicates 'Query executed successfully.' and '1000 rows'.

CREATING/COLLECTING DATA

- Reduce human error – don't let error be an option
 - Make use of Domain values (pick lists)
 - Use geocoding services for addresses
- Streamline processes
 - Smart forms
 - Only collect relevant data

AUTOMATE AS MUCH AS YOU CAN

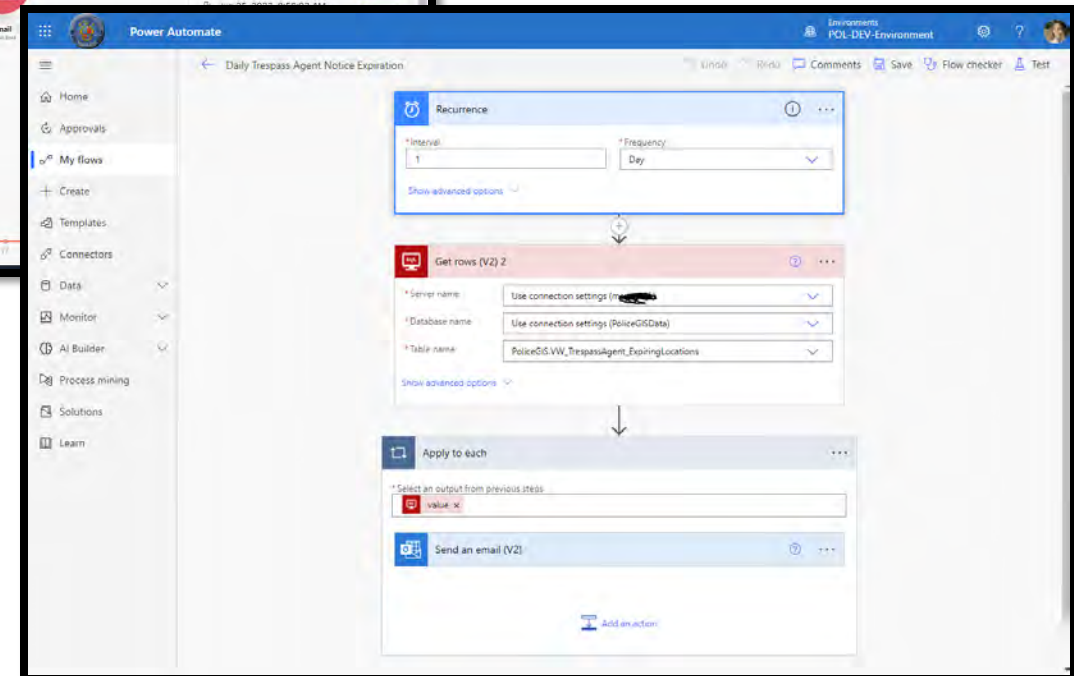
- No reason to do the same tasks manually over and over
 - Can you link directly to the source?
 - If using Enterprise GIS, choose to publish your data as registered with the database server or use GeoEvent Server
 - If using ArcGIS Online, schedule updates or explore ArcGIS Velocity
 - Explore ModelBuilder, Python
 - Schedule jobs
 - ArcGIS Pro tools can now be scheduled
 - SQL server
 - Windows task scheduler
 - Power Automate or Make for emails

The image displays two screenshots illustrating automation in a database environment. The top screenshot shows the SQL Server Enterprise Manager interface, with the 'Jobs' folder expanded to show a list of scheduled tasks such as 'DatabaseBackup - SYSTEM_DATABASES - FULL' and 'Update CrimeAnalysis_DAR'. The bottom screenshot shows the Windows Task Scheduler interface, displaying a list of scheduled tasks with columns for Name, Status, Triggers, and Next Run Time. The 'Crime Analysis DAR Map' task is selected, and its properties are shown in the 'General' tab, including the Name, Location, Author, and Description. The 'Triggers' tab shows the task is scheduled to run at 1:33 PM every Monday, Tuesday, Wednesday, Thursday, and Friday of every week, starting on 9/25/2019. The 'Security options' tab shows the task is configured to run as the user 'MCGOV\svc-gis' and to run whether the user is logged on or not.

Name	Status	Triggers	Next Run Time
Crime Analysis DAR Map	Ready	At 1:33 PM every Monday, Tuesday, Wednesday, Thursday, Friday of every week, starting 9/25/2019	8/15/2023 1:33:00 PM
Crime Analysis Survey Results	Disabled	At 11:54 AM on 8/30/2018 - After triggered, repeat every 10 minutes indefinitely.	8/14/2023 2:04:00 PM
FIR Daily Geocoding	Disabled	Multiple triggers defined	8/15/2023 4:00:00 AM
MC Stat Update AGOL with Pro	Ready	At 10:40 AM every Sunday of every week, starting 9/9/2019	8/20/2023 10:40:00 AM
MC_Stat_PNGS_2WeekData	Ready	At 9:00 AM every Sunday of every week, starting 4/24/2022	8/20/2023 9:00:00 AM
MC_Stat_PNGS_AutoDate	Ready	At 10:30 AM every Sunday of every week, starting 11/21/2017	8/20/2023 10:30:00 AM
TheftsFromAutos	Ready	At 6:00 AM every Monday, Tuesday, Wednesday, Thursday, Friday of every week, starting 11/21/2017	8/15/2023 6:00:00 AM

MS POWER AUTOMATE & MAKE.COM

- Awesome tools for automation that link to ArcGIS
- Automate report creation and send emails based on Survey123 responses



...BUT YOU DON'T HAVE THE STAFF/TIME/RESOURCES

Advocate,
advocate, advocate

Reach out to
whoever does
your IT & GIS

Show the art of
the possible

Bring in Esri

Ask around your
region to see what
others are doing.
Make connections!

Training and
keeping up-to-date
is critical

CAVEATS/CHALLENGES

- Esri licensing
- Network security/firewalls
 - Must carefully consider how this is set up
 - CJIS compliance
- Training

QUESTIONS

Thank you!

Shelby.Roberson@montgomerycountymd.gov

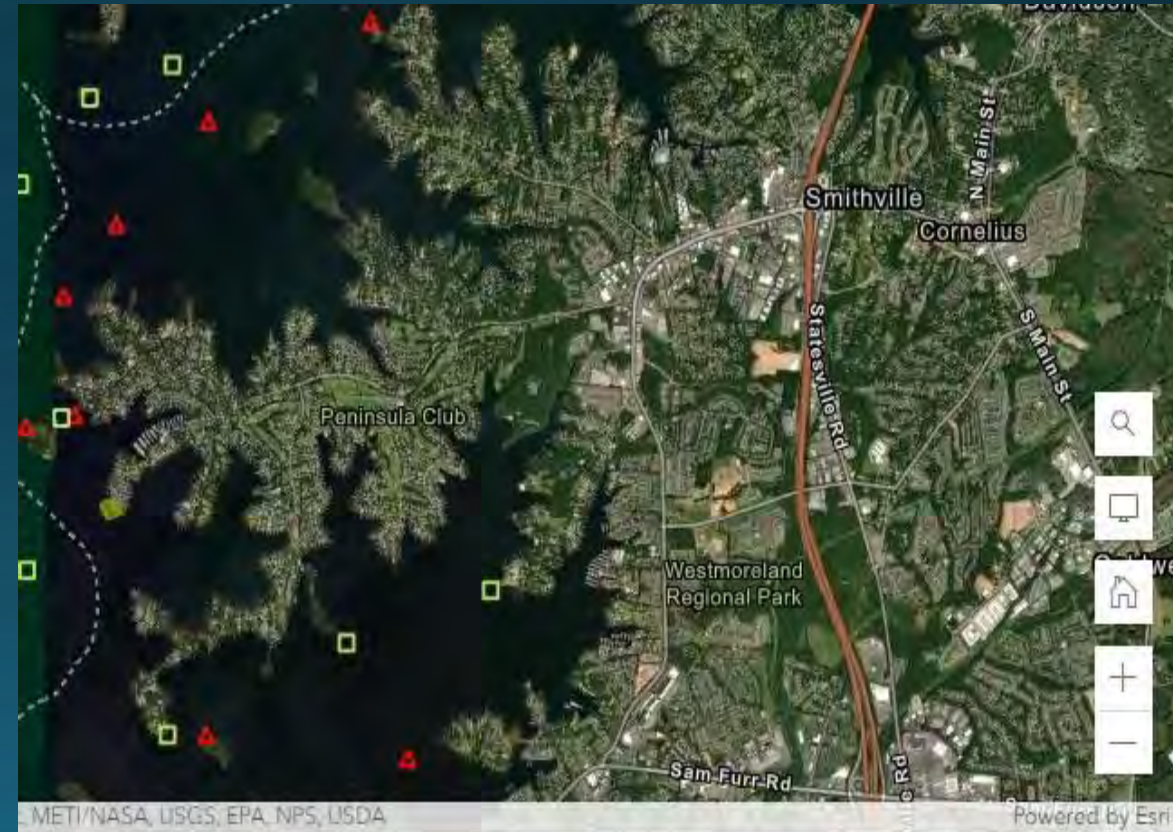
Field Maps In The Field



EJ McCormick
Cornelius Fire Department
George Brinzey
Cornelius Police Department

Cornelius, NC

- Located 30 minutes outside Charlotte, NC
- Home of Lake Norman
- 31,000 residents
- 15 Square miles
- Mixed use of residential, commercial, and educational



The Cornelius Fire Department

- Two firehouses
- 90 Active members
- All hazards department
- Mix of full and part time staffing
- 3,500 calls a year
- Three staffed companies daily



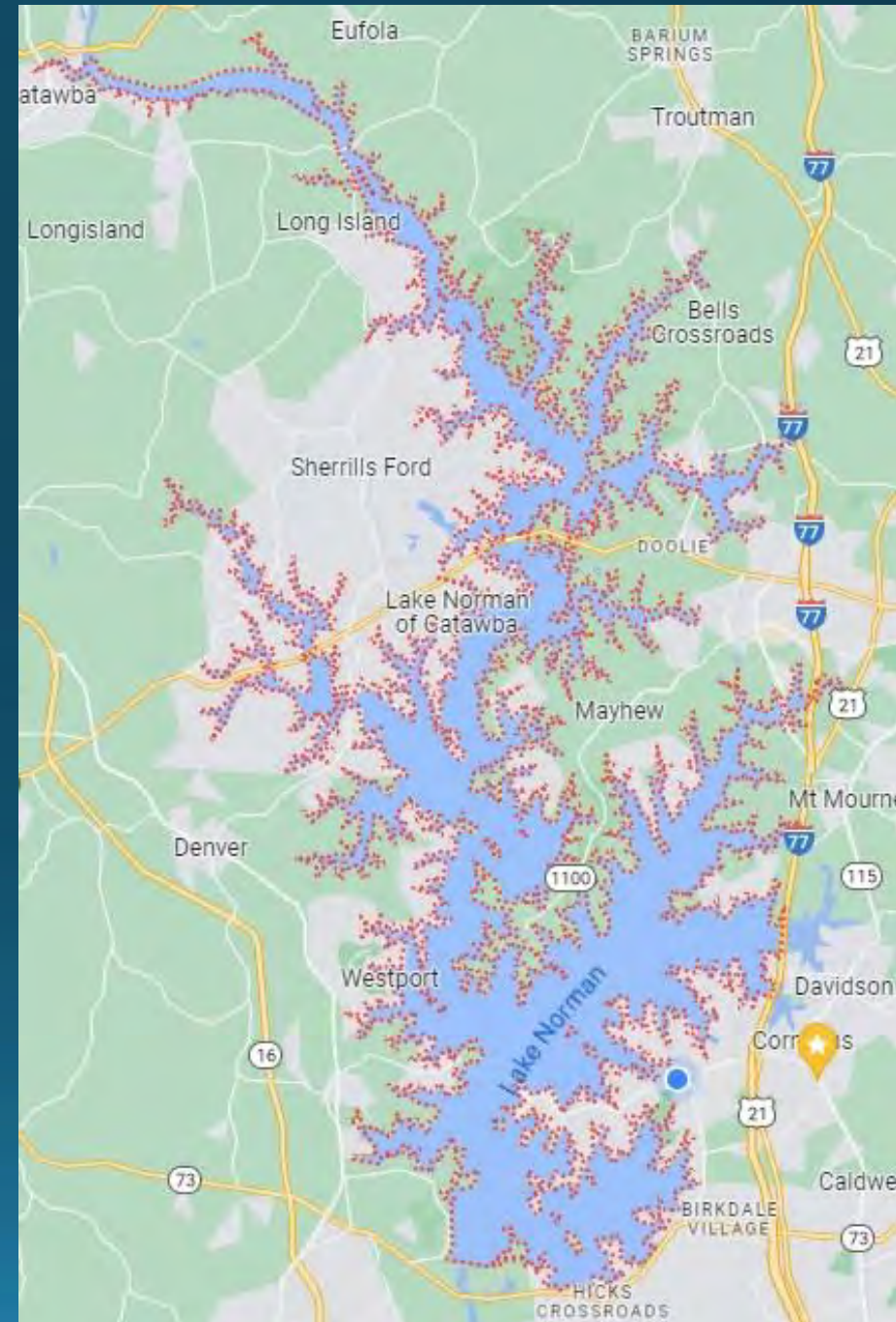
How Did We Get Here?

- Group effort with local EM
- Explanation of issues and proposed solutions
- Field testing prior to “busy season”
- Multi agency approach



Our Issues

- Large lake, large problems
 - 50 sq mi – 32,510 acres
- Need to track resources
- Real time data
- Command post vs. incident location
- How to implement
- Deployable



Where Are They!?

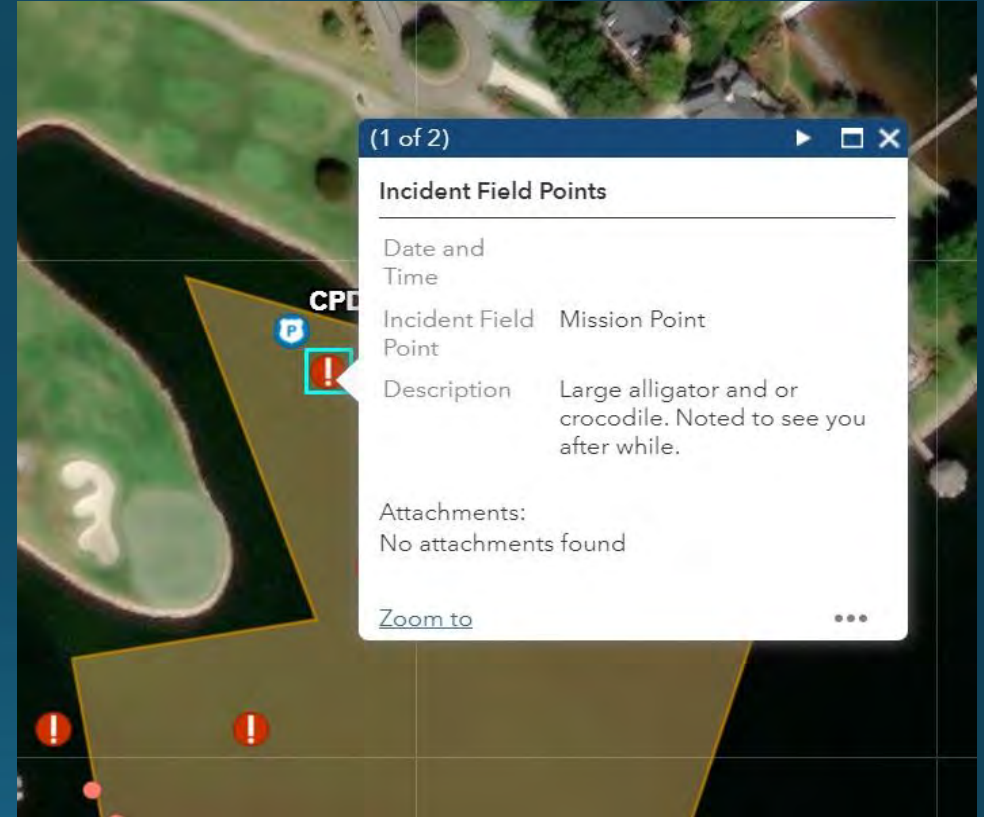
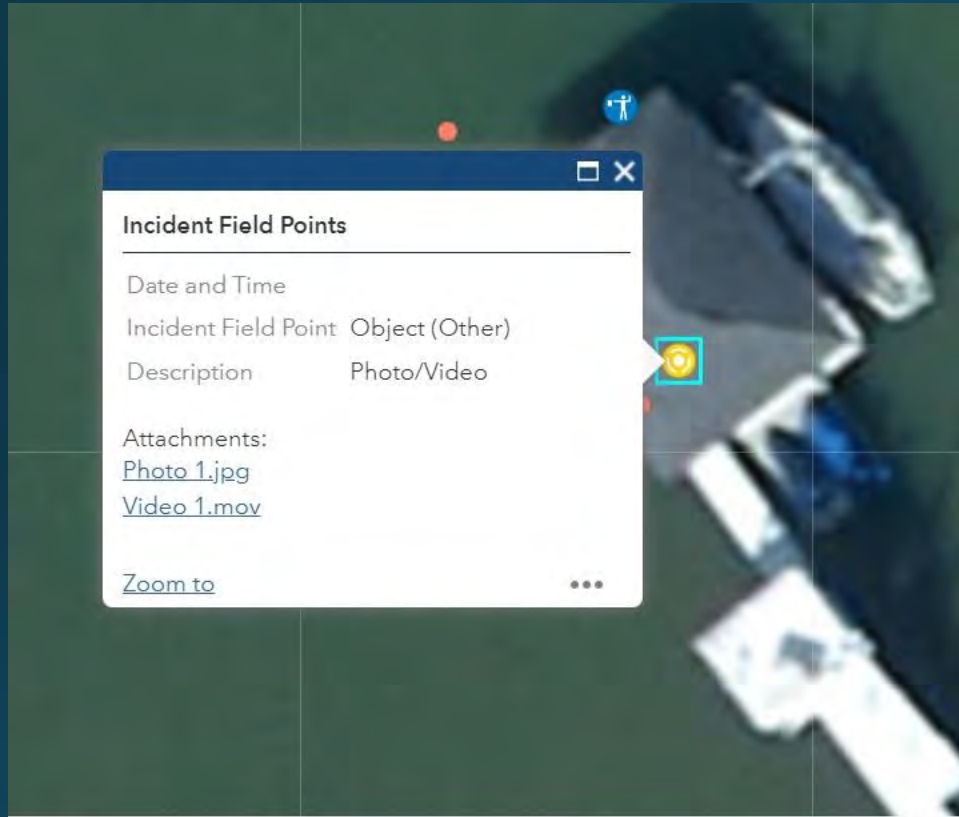
- Resource tracking
- Real time data entry
- Continuity
- Harmonizes with existing technology
- Multiple feature layers
- USER FRIENDLY



- Custom grid developed by Lake Norman public safety agencies.
- This will show up as users zoom out and disappear as they zoom in.
- Grid is available to telecommunicators and given to first responders at time of dispatch.
- Members very used to this grid and we didn't want to lose capability.

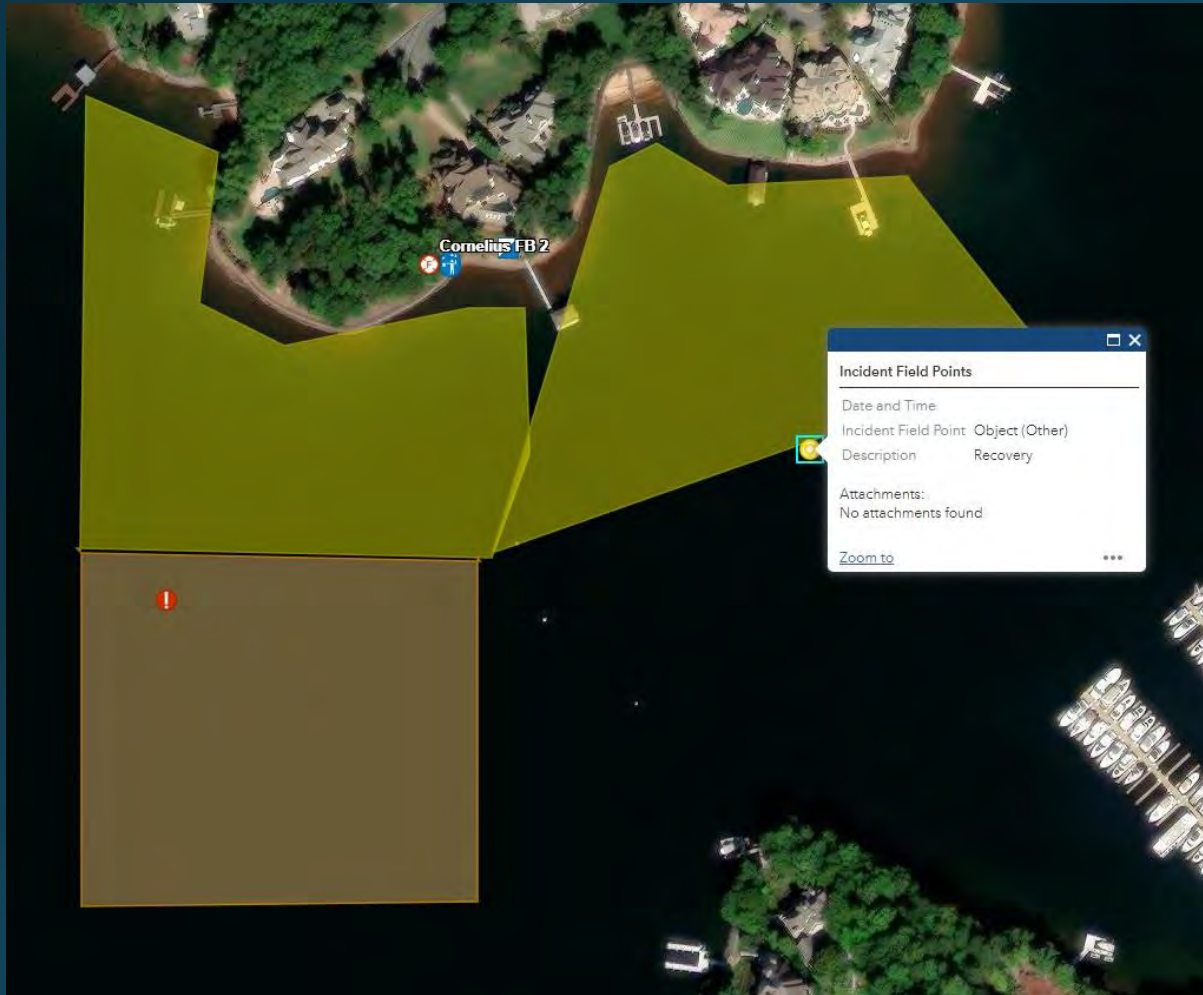


User Features



Data input for command to review in real time
and make tactical decisions

Clear Directions

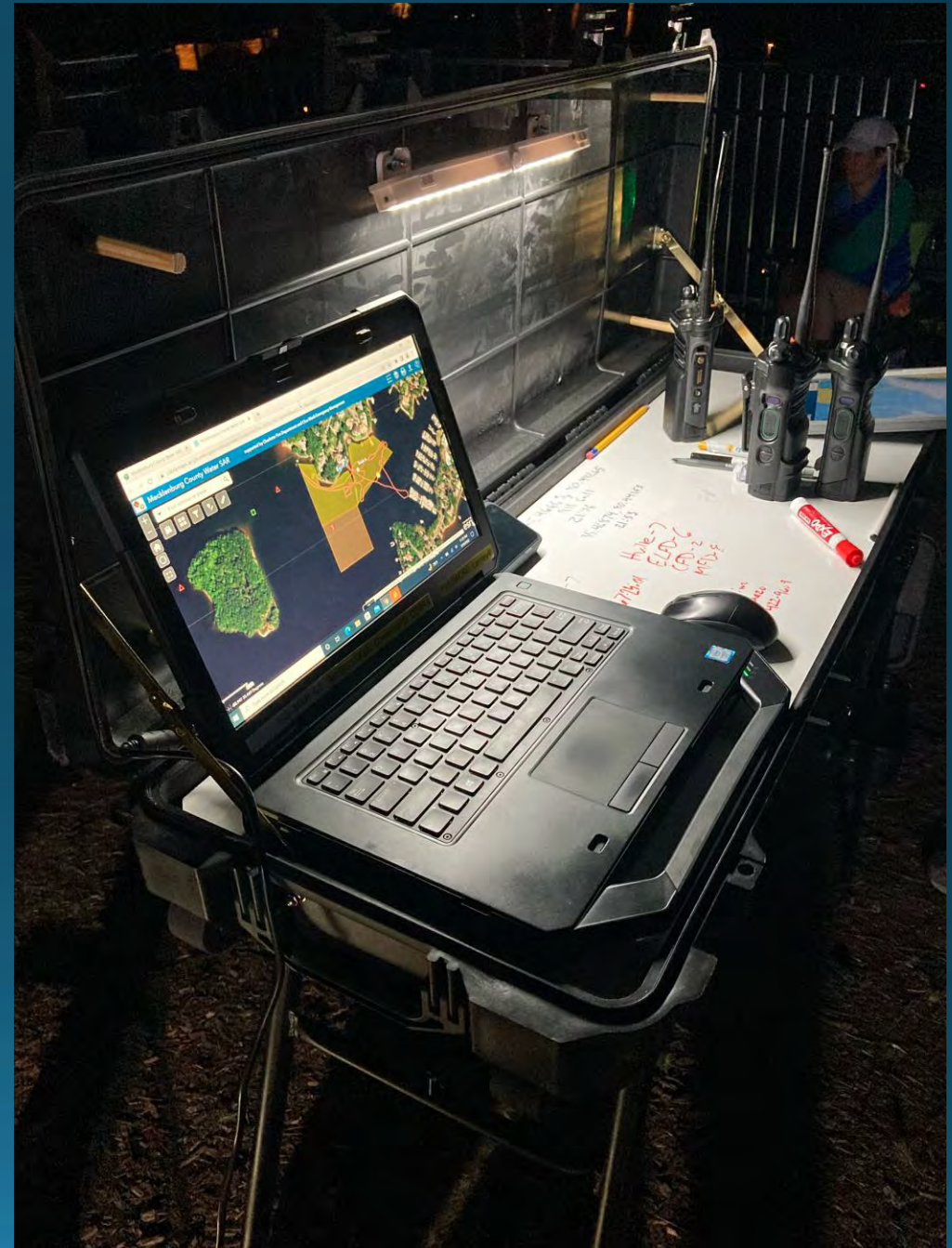


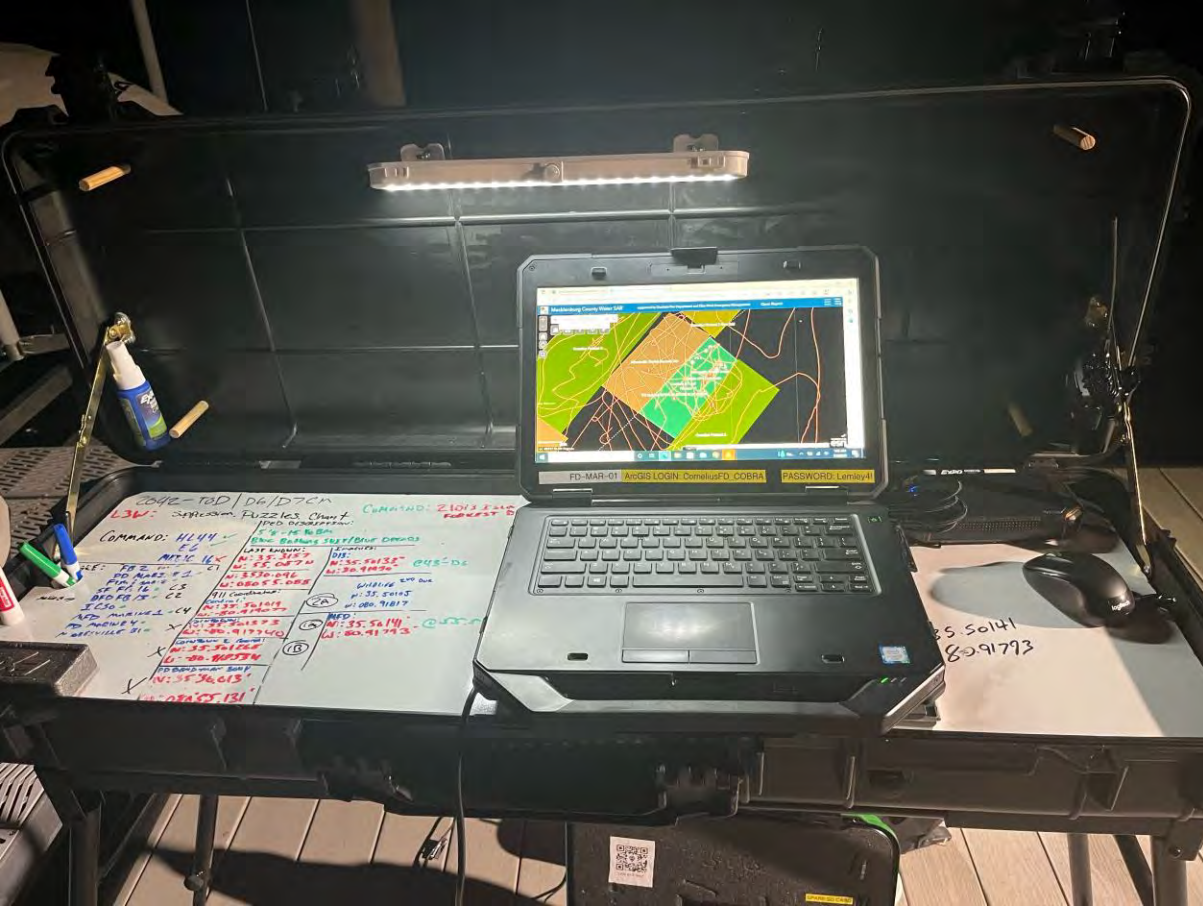
Post incident documentation



Actively engaged resource organization

- Night responses present unique challenges
- Using Field Maps we are able to see and assist responders rapidly
- Screen sharing has been hugely successful





July 1 2023
Three agencies working together until 3am

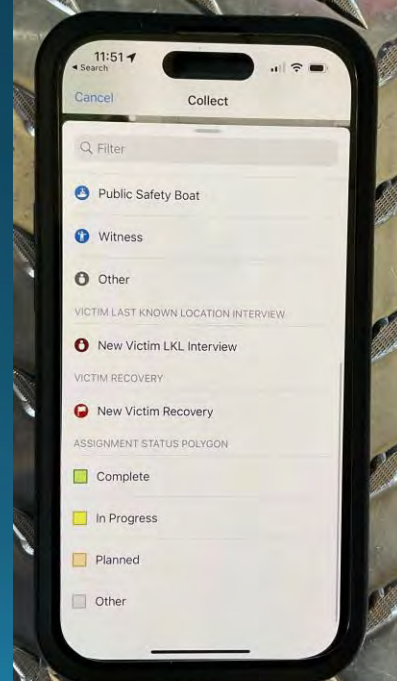
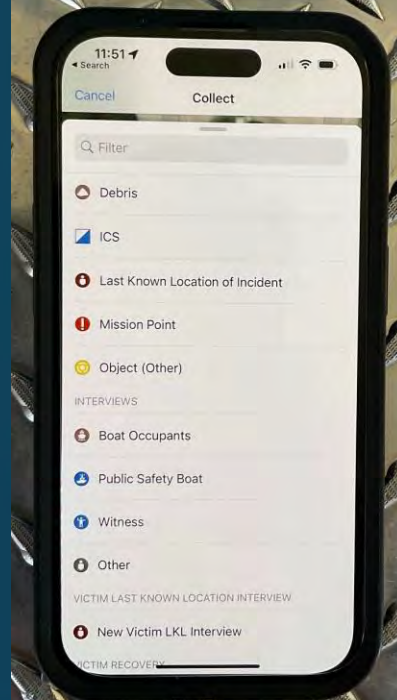
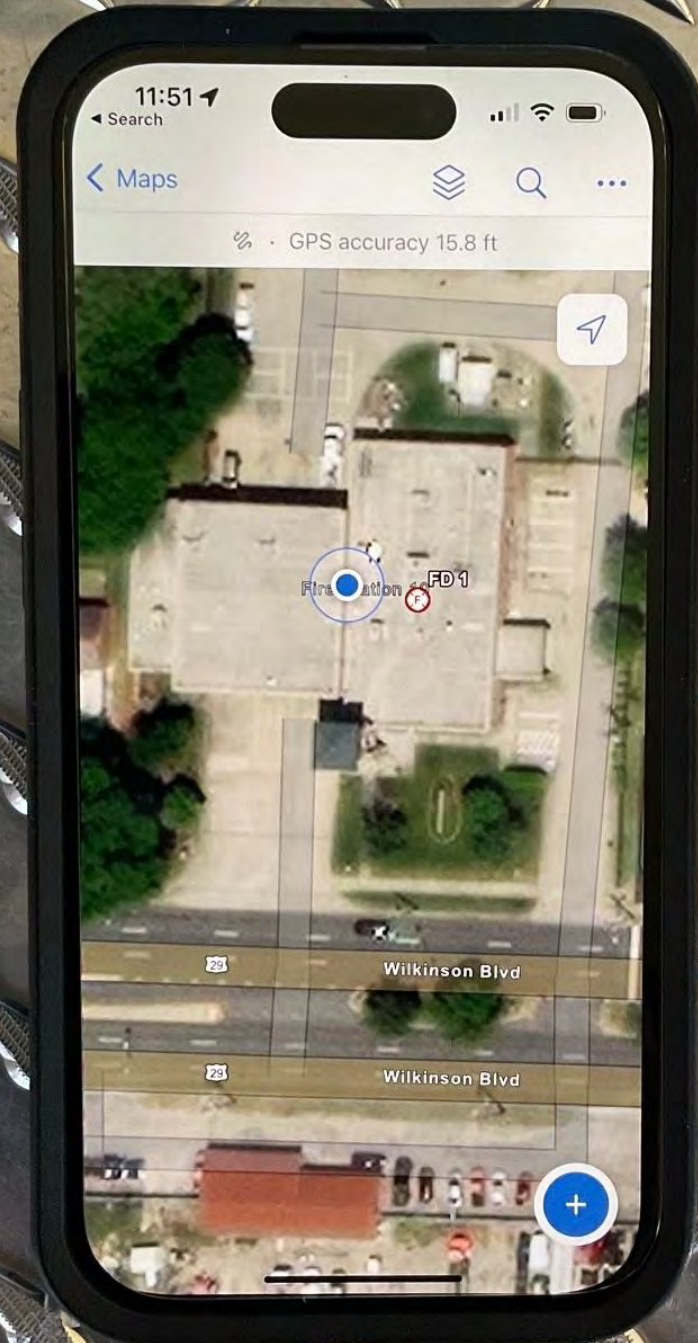


Multi day command post



Get To Work!

- 20 generic logins and passwords
- One sheet laminated card
- Quickly get to work
- Easy to choose selections
- Never let the tech hinder the mission!



Lake Norman SAR Map & Tracking

- 1) Download ArcGIS Field Maps



ArcGIS Field Maps
Productivity
★★★★☆ 39

OPEN

- 2) Open Field Maps and select **Sign In With ArcGIS Online**
- 3) Enter credentials on the front of this card
- 4) Click slider button to turn tracking on
 - a. Set duration to **Until Switched Off**
- 5) Select Mecklenburg County Water SAR Map

You are now ready to work. Use the (+) at the bottom of the map to input points of interest.

Waterproof cards with clear instructions and login credentials

LOGIN: MeckPhone1

PASSWORD:

ArcGIS Football

- Dubbed "The Football"
- Although not as cool as the presidents it does help us get set up!
- Designed for grab and go missions
- Can be used in the field or the command post
- Limited by computer battery life while on the water



The Cornelius Police Department

- 8 full time officers and 2 supervisors and reserve officers
- Conduct proactive patrols, marina checks, safety events, training and community events
- 3 Vessels- 29ft SAFE Boat, 27 & 25 ft Life Proof Boats
- The unit handles preventative maintenance on vessels. (oil changes, major service, etc.)
- In conjunction with North-Mecklenburg SWAT team, we have formed a MOAT team which specializes on Maritime operations



Benefits to LEO

1. **Real-Time Situational Awareness:**
2. **Navigation and Location Tracking:**
3. **Data Collection and Incident Documentation:**
4. **Collaboration with Other Responders:**
5. **Offline Capabilities:**
6. **Layer Support:**
7. **Forms and Workflows:**



Situational Awareness

- Field Maps provides real-time access to maps, allowing law enforcement and emergency responders to visualize the current situation in the maritime environment.
- Layers can include nautical charts, vessel traffic data, weather conditions, and any relevant GIS information.





Navigation and Tracking

- Field Maps supports GPS-based navigation, helping law enforcement navigate to specific locations efficiently.
- The app can enable location tracking for personnel and vessels, facilitating coordination and ensuring everyone is aware of each other's positions.



Data & Incident Documentation

- Law enforcement officers can use Field Maps to collect data on the search and rescue mission, such as marking areas already searched, recording locations of interest, and documenting any findings.
- Custom forms can be created to gather specific information, such as details about the missing boater, vessel information, and observed conditions and witness statements along with picture of scene.

Collaboration with Other Responders

- Field Maps allows seamless collaboration with other emergency responders. For example, the app can be used to share real-time updates with Coast Guard, maritime rescue teams, and other law enforcement agencies involved in the operation.
- Information collected in the field is instantly shared, enhancing overall coordination.



Offline Capabilities

- In maritime settings, connectivity can be a challenge. Field Maps' offline capabilities ensure that law enforcement can still access critical maps and data even in areas with limited or no network coverage.





Layer Support

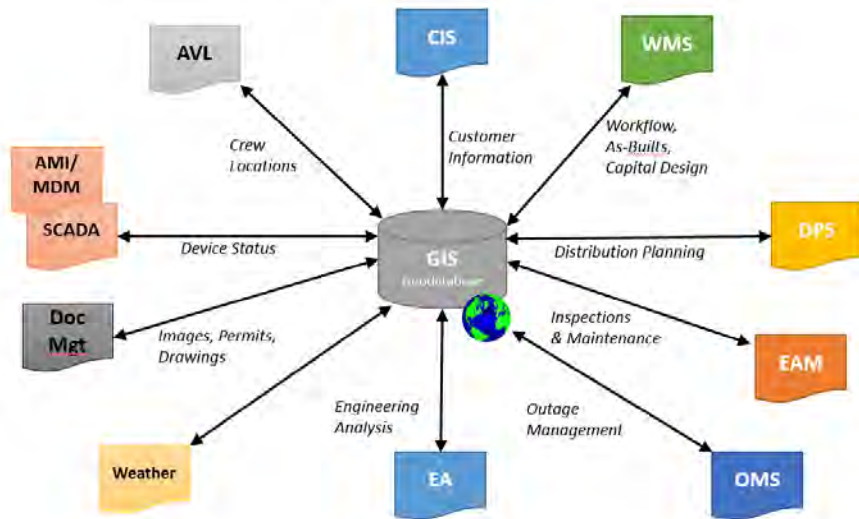
- Incorporating dynamic layers, such as real-time weather updates or vessel tracking information, can enhance decision-making during the search and rescue mission.

Forms and Workflows

- Forms that capture essential details about the missing boater, the last known location, and any other relevant information. This ensures that responders gather consistent and valuable data.



Integration with Systems



In app forms that capture essential details about the missing boater, the last known location, and any other relevant information. This ensures that responders gather consistent and valuable data.

- Field Maps integrates with management systems, allowing law enforcement to share information seamlessly with emergency management teams and other stakeholders involved in the response.
- By leveraging these features, Field Maps can significantly improve the efficiency, coordination, and data management aspects of search and rescue operations in a maritime setting. It provides a comprehensive solution for law enforcement to collaborate with other responders and make informed decisions during critical incidents.



2022 Results

- More effective
- More organized
- Less downtime
- Real time data
- Better documentation
- Safety
- Multiple uses outside lake
- Gen Z
- ESRI Support

