



# GIS Operations Dashboards Designing & Building, Strategies & Tips

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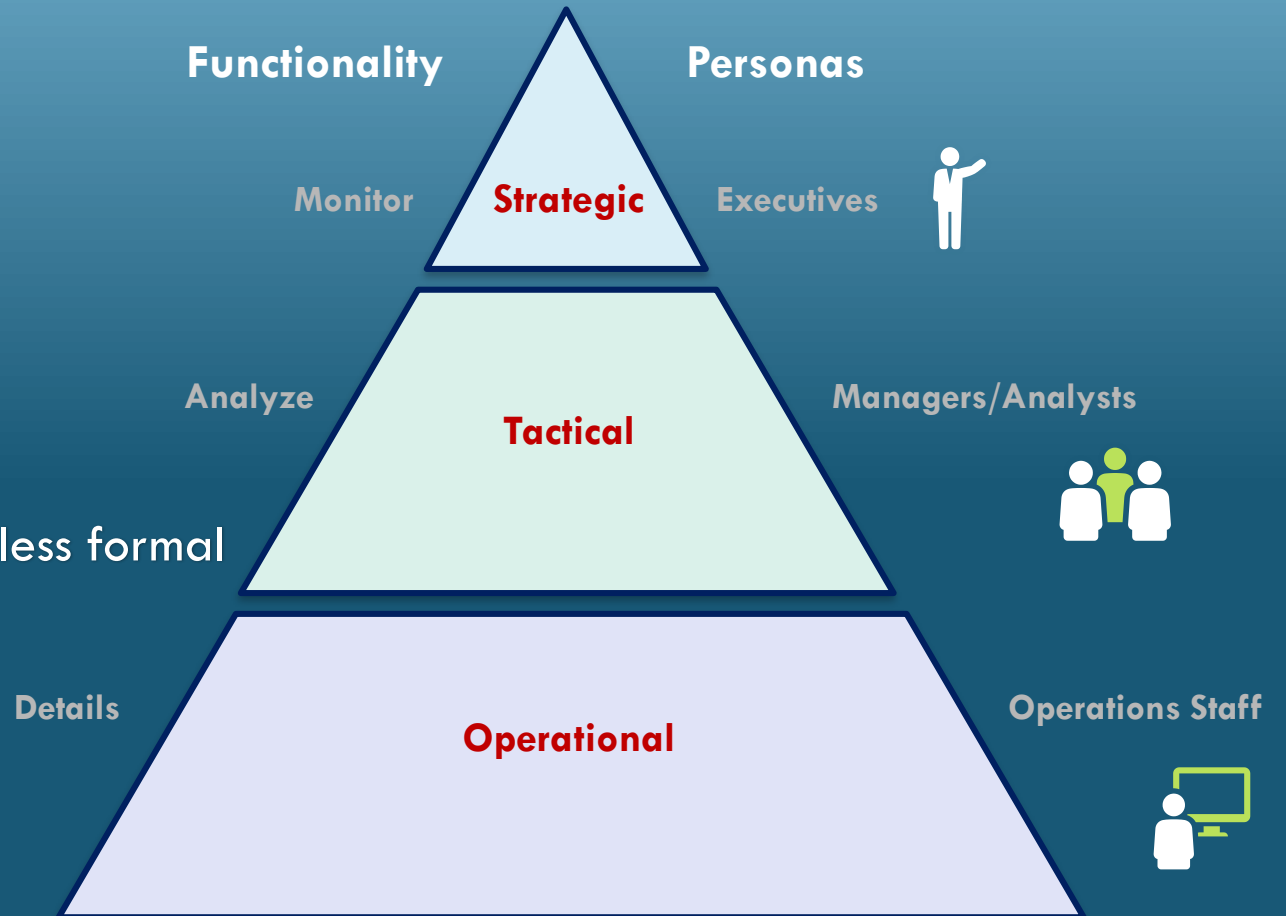
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**NYS GeoCon, 9/24/2019**



# Dashboards - Patterns of Use

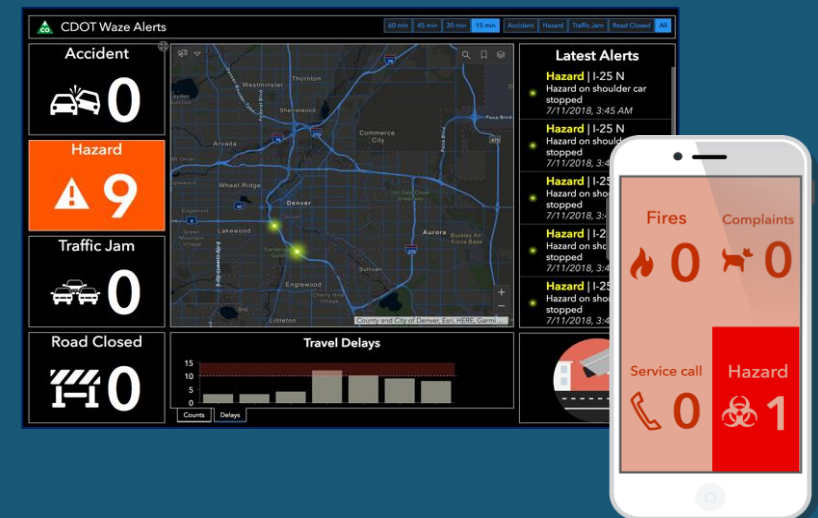
- Strategic
- Tactical / Analytical
- Operational
- Informational
  - Not shown in conceptual diagram, less formal



# Qualities of “Good” Dashboards



- Know your audience:
  - What question(s) are they trying to answer?
  - In what environments are they going to view the dashboard?
  - What is their technical level?
- Express information clearly and accurately, without distraction
- Focus attention to where it is needed



# Start with Web Map

- Which data are most important?
    - Exclude irrelevant data
  - Style your layers to convey meaning
    - Symbology and pop-ups
    - Leverage Arcade
  - Set appropriate refresh interval(s) on layers
  - Basemap that helps to highlight data
- 
- Options:
    - Scale dependent renderers
    - Spatial bookmarks



# Dashboard Layout

- General guideline: Keep it simple
- How will the Dashboard be used?
  - What question(s) does it answer?
  - Unattended display or interactive?
  - Will it be embedded in a web page?
  - Does it need to be mobile ready?

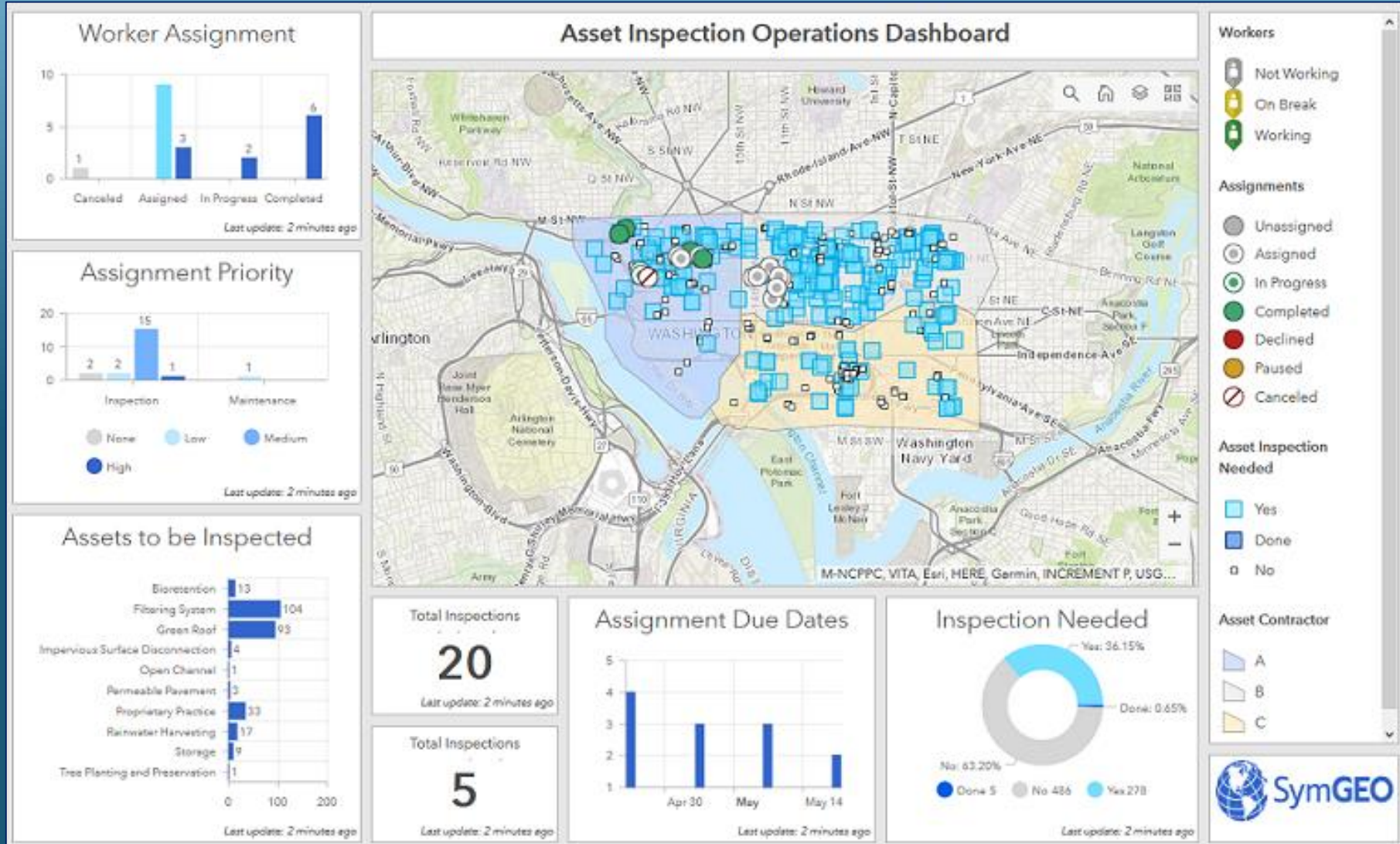


vs

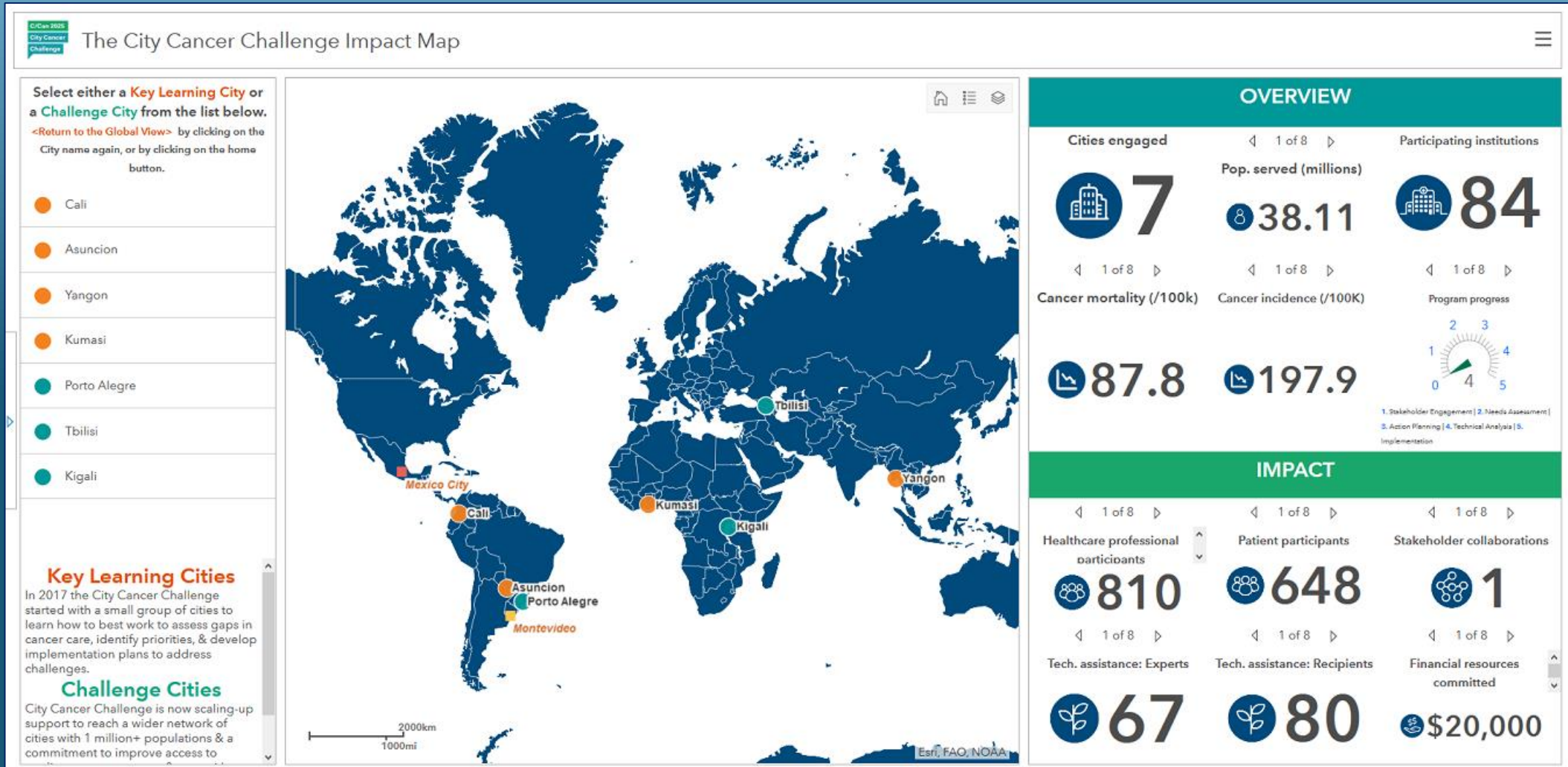




# Dashboard Layout – Some Good Examples

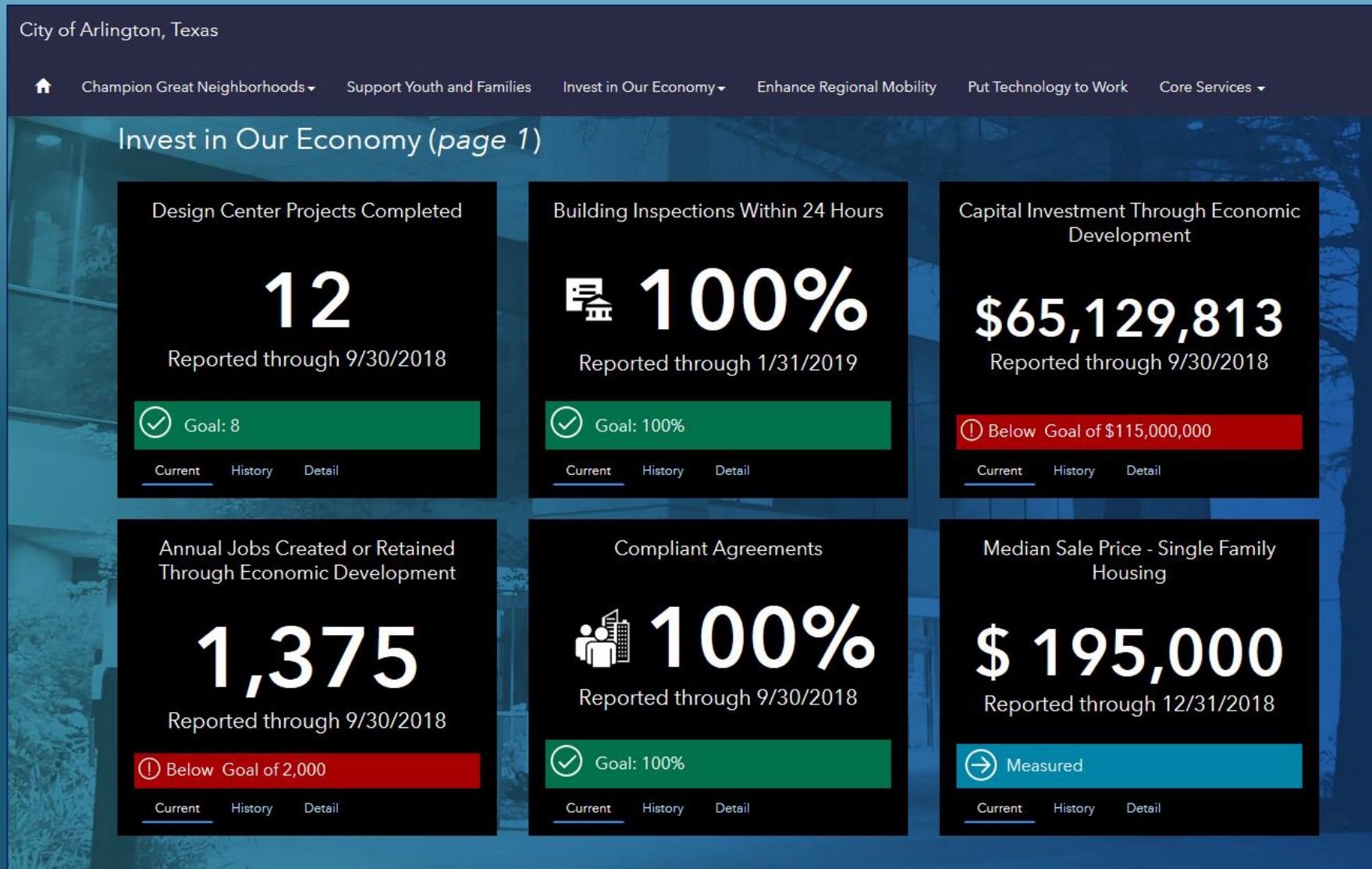


# Dashboard Layout – Some Good Examples





# Dashboard Layout – Some Good Examples



# Dashboard Layout – Contain in a Story Map

AZ ESF/RSF Operations Dashboard
SERRP

Governor's Briefing
CBP Southwest
Weather
ESF 4 - Firefighting DFFM
ESF 5 - Emergency Management DEMA
ESF 6 - Mass Care DEMA
ESF 7 - Logistics DEMA
☰

### Twitter Updates AZ Fires

**Arizona Fire News**  
A Twitter list by @EshreveAZ  
Arizona Fire News

**AZ State Forestry**  
@azstateforestry

If you haven't walked outside yet this morning - it's starting to warm up & fast. Be safe - stay hydrated - & never leave kids or pets in the car! From our friends at @NWSPhoenix an Excessive Heat Warning is in effect through Thursday.

Excessive Heat Warning

**What to do**

- Hydrate before becoming thirsty
- Reduce time in the sun
- Don't leave children and pets in car
- Avoid strenuous activity; postpone outdoor afternoon activities

**What to do**

- Seek air conditioned buildings
- Help elderly, sick, & pets stay cool
- Close blinds during day
- Wear loose fitting light colored clothing

Click a location below for detailed forecast.

Watches, Warnings, & Advisories

Excessive Heat Warning

Excessive Heat Advisory

Air Quality Alert

### WebEOC Fire Reporting

(Click Icon to Zoom)

**Woodbury:** 6/11/2019, 8:23 PM Update Woodbury Fire- A type 1 incident management team will assume command at 0600 6/12. The fire is approximately 6,000+ acres with 0% containment. Expected fire growth to continue to East and South with potential to continue to spread onto State Trust lands to the South. Fire growth to the north into the wilderness has been reduced due to wind shifts.

**Coldwater:** 6/11/2019, 8:19 PM Update Coldwater Fire- The fire continues to burn in an area approximately four miles south of Clints Well and, at its closest point, approximately one mile East of HWY 87. The 24 hour incident strategy is to burn

**Initial Attacks (Click Point to Zoom)**

**Tarzan Valley:**  
0.5 Acres 6/12/2019, 9:33 AM Discovery  
Date Graham County

**Box :** 0.3 Acres 6/11/2019, 10:53 PM Discovery  
Date Gila County

**CROSSWIND:**  
28 Acres 6/11/2019, 8:43 PM Discovery  
Date Gila County

Last update: a few seconds ago

**Prescribe Fires (Click Point to Zoom)**

**FY2019 Kelley West RX:**  
500 Acres  
6/10/2019 Ignitation Date

**Reed: 221 Acres**  
6/10/2019 Ignitation Date

**Sunflower: 1,500 Acres**  
6/10/2019 Ignitation Date

**Four Mile: 3,500 Acres**  
6/10/2019 Ignitation Date

Last update: a few seconds ago

Type 1 Fires (National)

No Fires

Last update: a few seconds ago

Type 2 ICS Fires (National)

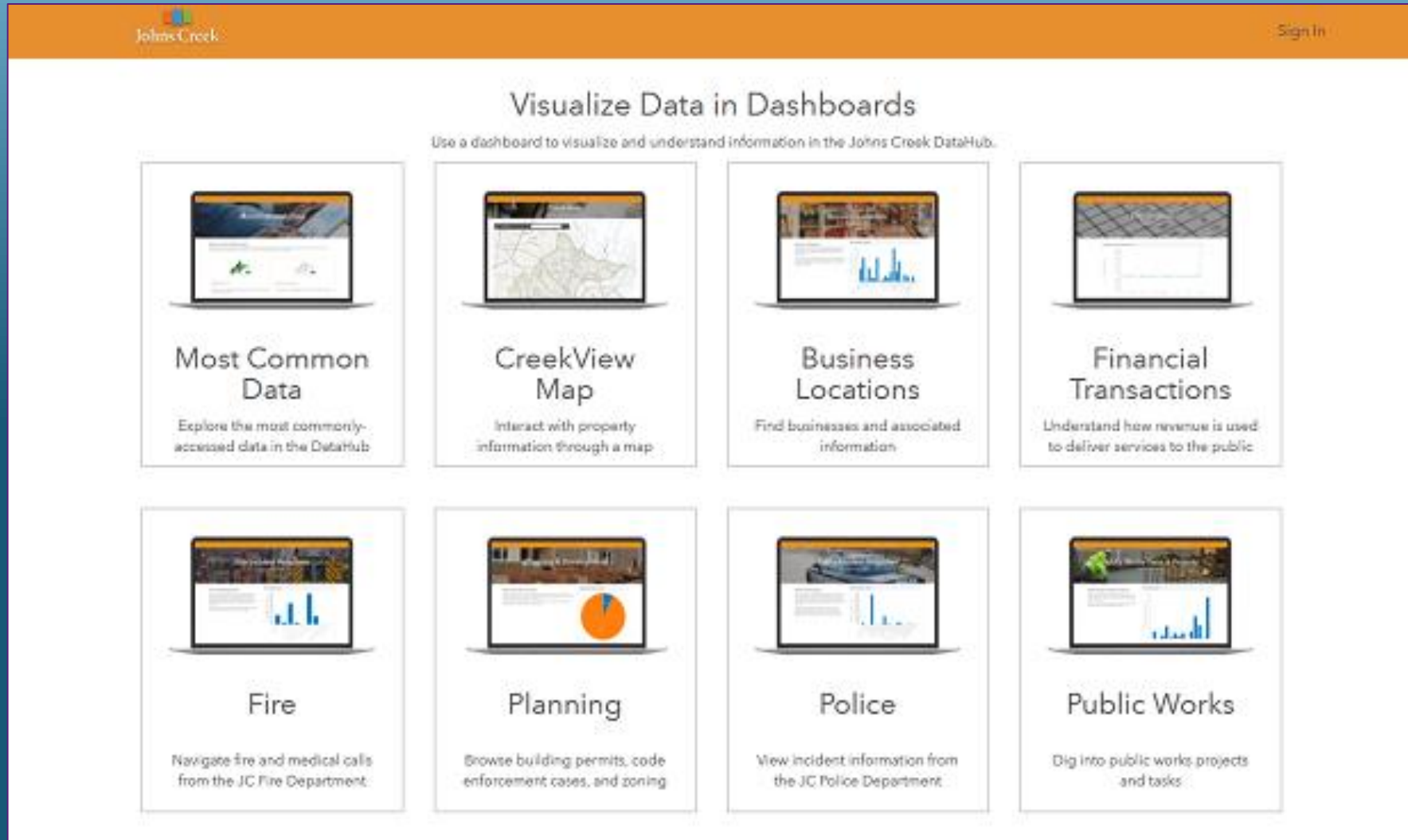
Elk: 660 Acres & 48% Contained

Last update: a few seconds ago

DFFM
Resources
County
Chart

Map
Predictive Services
Drought
Fire Weather Outlook

# Dashboard Layout – Display on a Web Page

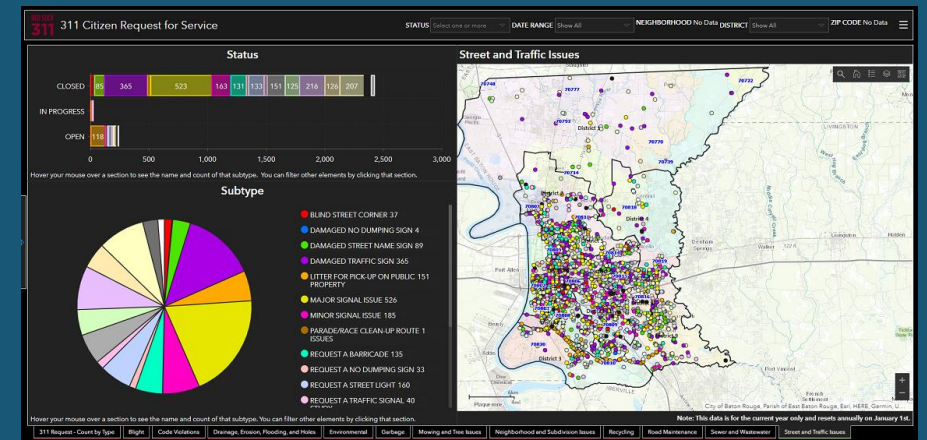
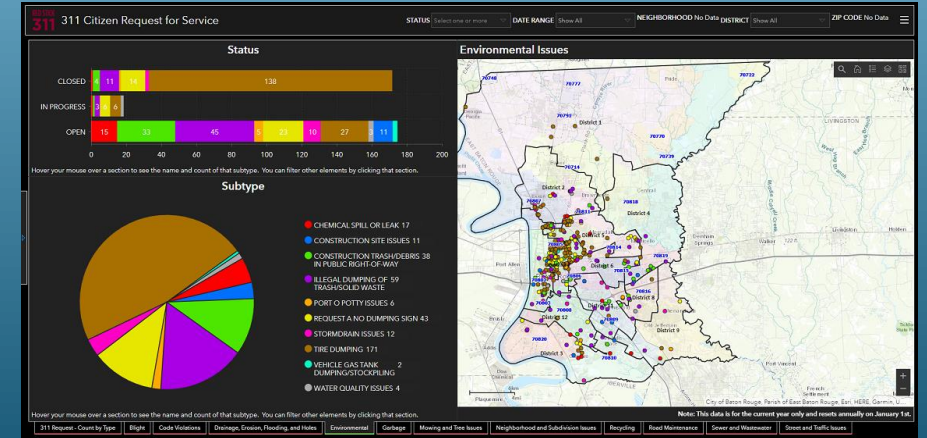
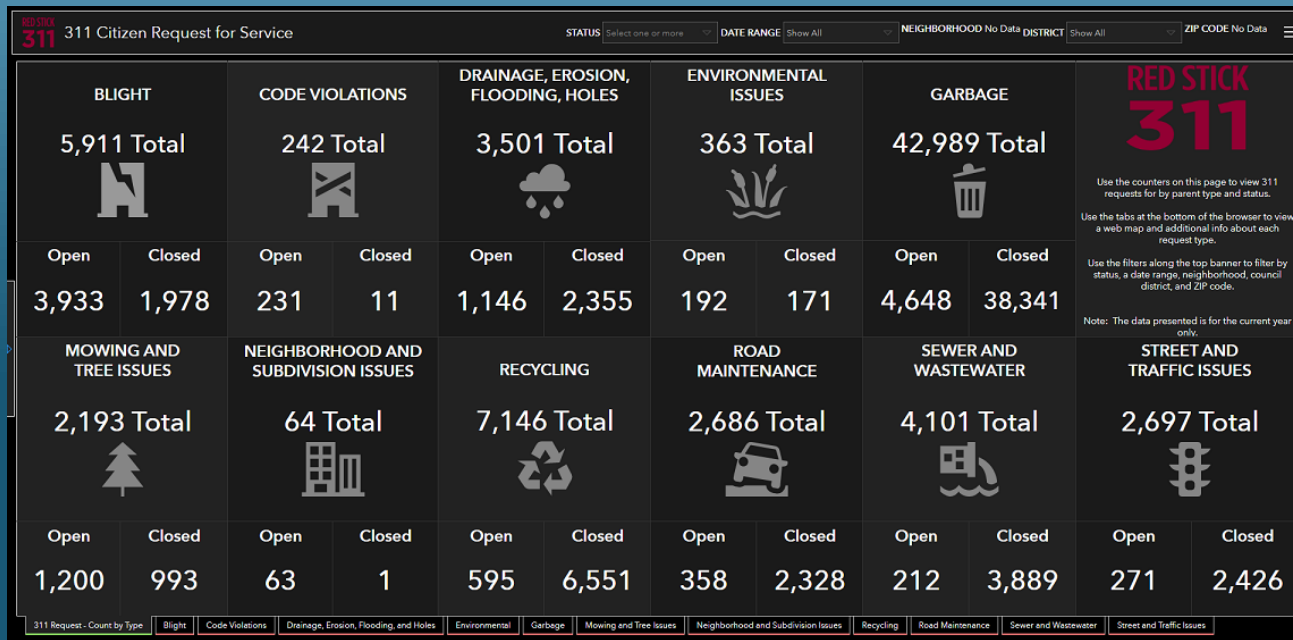


The screenshot displays the John's Creek DataHub dashboard. At the top left is the John's Creek logo, and at the top right is a "Sign In" link. The main heading is "Visualize Data in Dashboards", followed by the instruction: "Use a dashboard to visualize and understand information in the John's Creek DataHub." Below this, there are eight dashboard cards arranged in a 2x4 grid. Each card features a laptop icon showing a preview of the dashboard, a title, and a brief description of the data it provides.

Dashboard Title	Description
Most Common Data	Explore the most commonly-accessed data in the DataHub
CreekView Map	Interact with property information through a map
Business Locations	Find businesses and associated information
Financial Transactions	Understand how revenue is used to deliver services to the public
Fire	Navigate fire and medical calls from the JC Fire Department
Planning	Browse building permits, code enforcement cases, and zoning
Police	View incident information from the JC Police Department
Public Works	Dig into public works projects and tasks

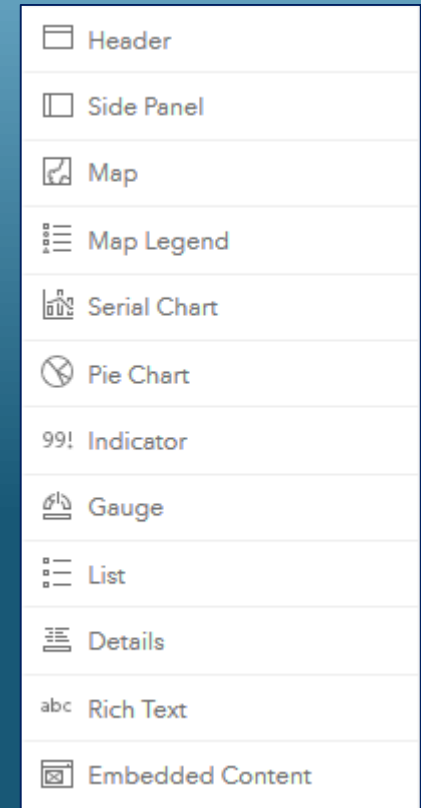


# Dashboard Layout – Stack Embedded Content Elements



# Dashboard Elements

- Header
  - Side Panel
  - Map and Map Legend
  - Serial chart
  - Pie chart
  - Indicator
  - Gauge
  - List
  - Details
  - Rich text
  - Embedded Content
- Does a Dashboard need to have ALL of these elements? NO!



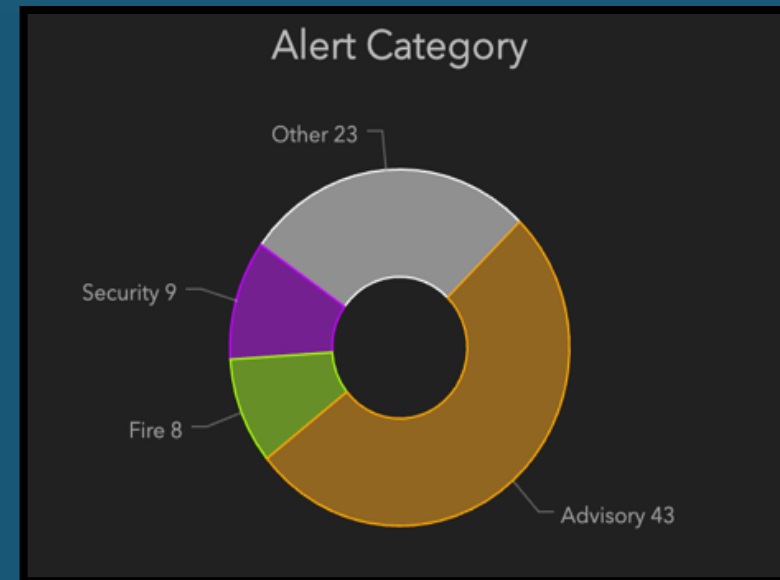
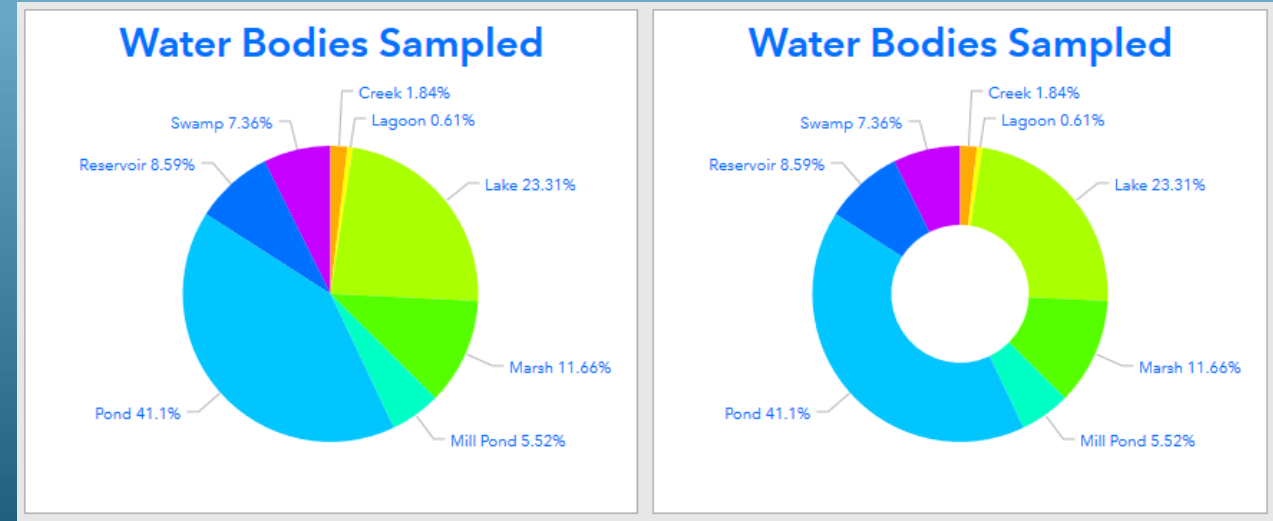


# Tips for Visual Elements

- Design for the technical level of your audience
- Design for your display environment – Desktop vs Mobile
- They should have a purpose in the dashboard – Less is More
- Ensure they are legible, and provide context

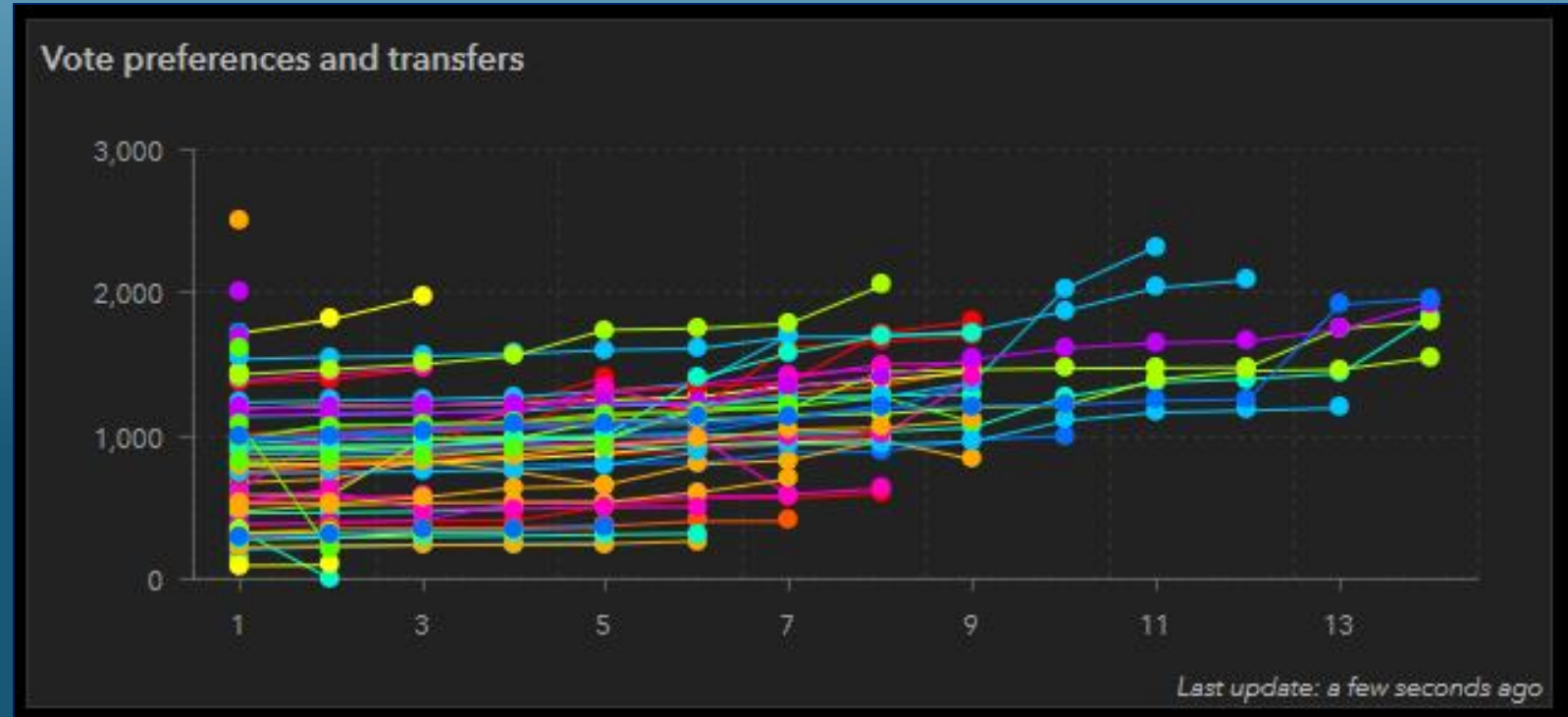
# Pie Chart element

- Use 'donut' style over 'pie slices' style
  - Comparing lengths of arcs vs. angles & areas more complex for the eye to judge
- Limit to 6 categories or less
  - Too many small categories not useful
- Use labels or legend, not both

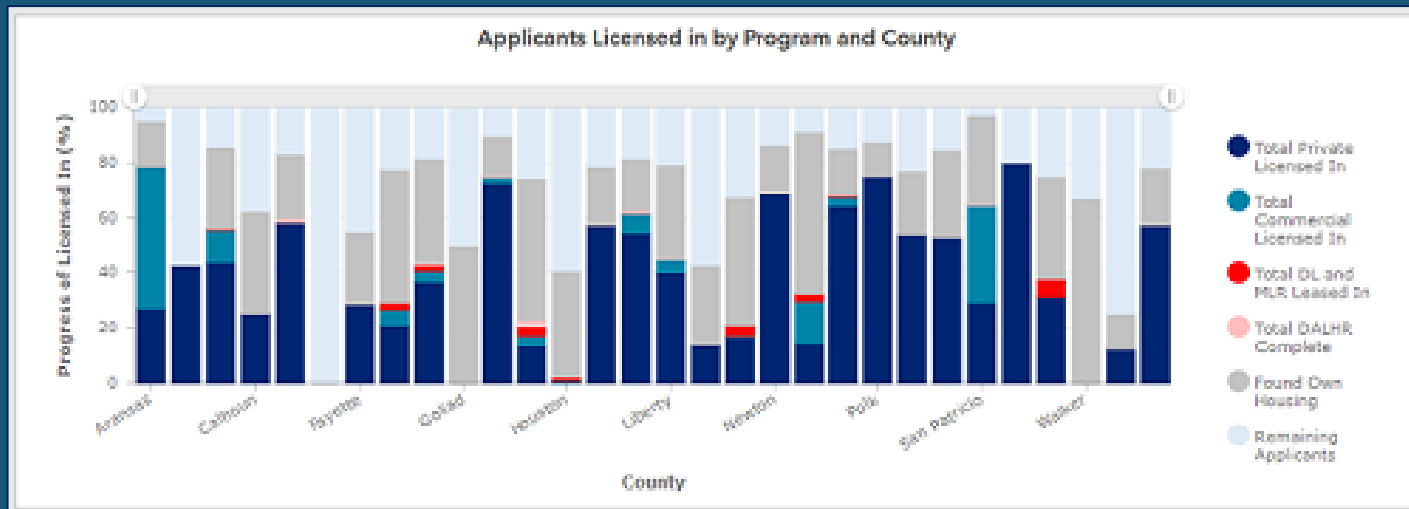
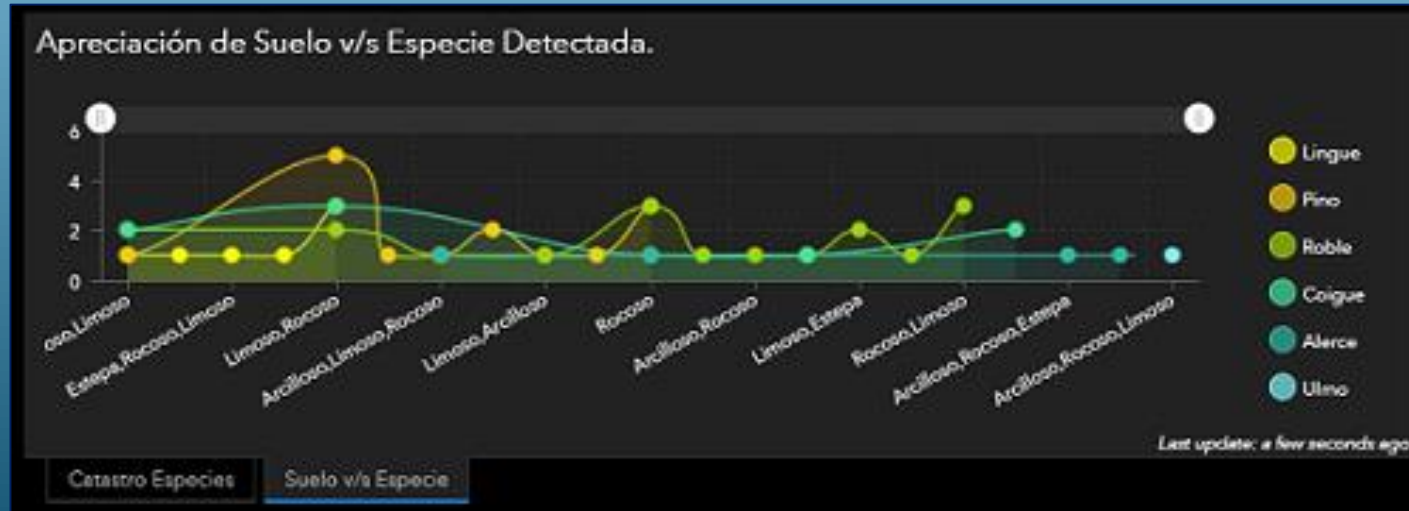


# Serial Chart element

- Start from '0' value, especially when there are many categories
- Use 5-7 lines at most
- Remove gridlines
- Use scalebar when applicable

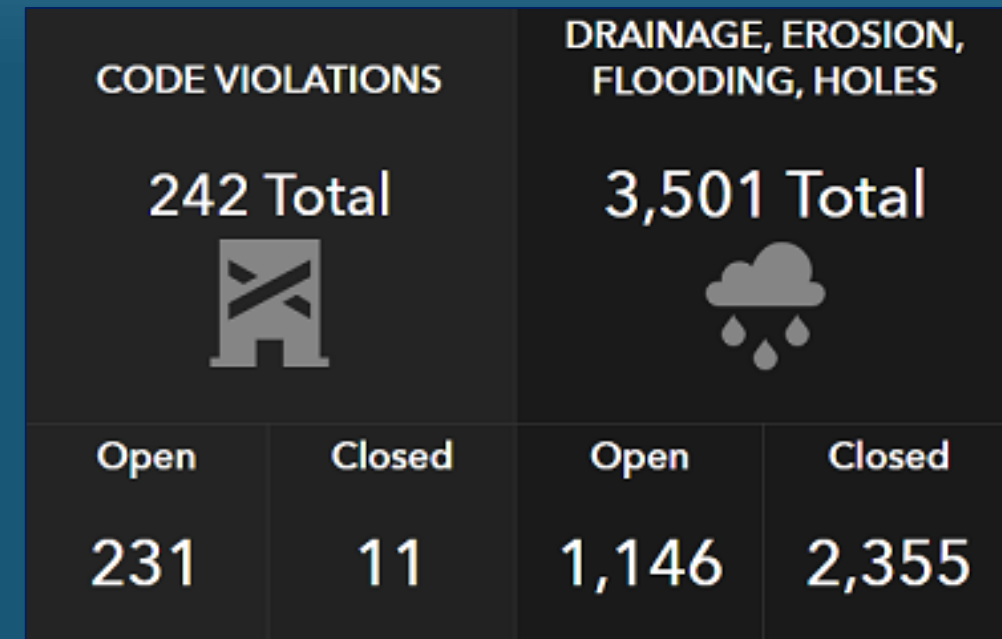
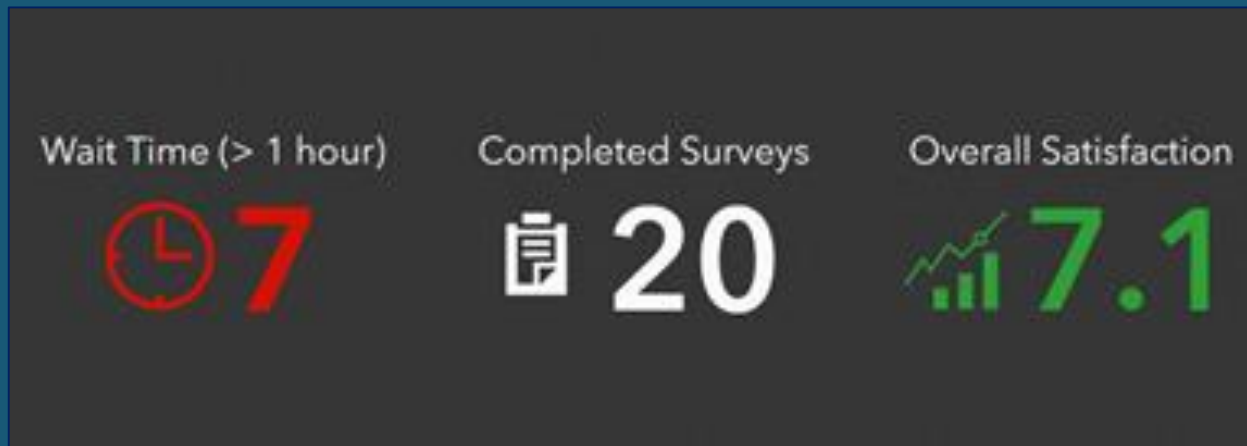
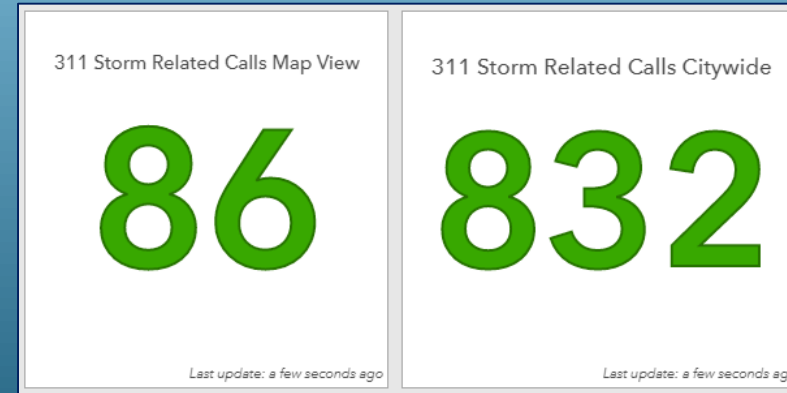


# Serial Chart - Good Examples



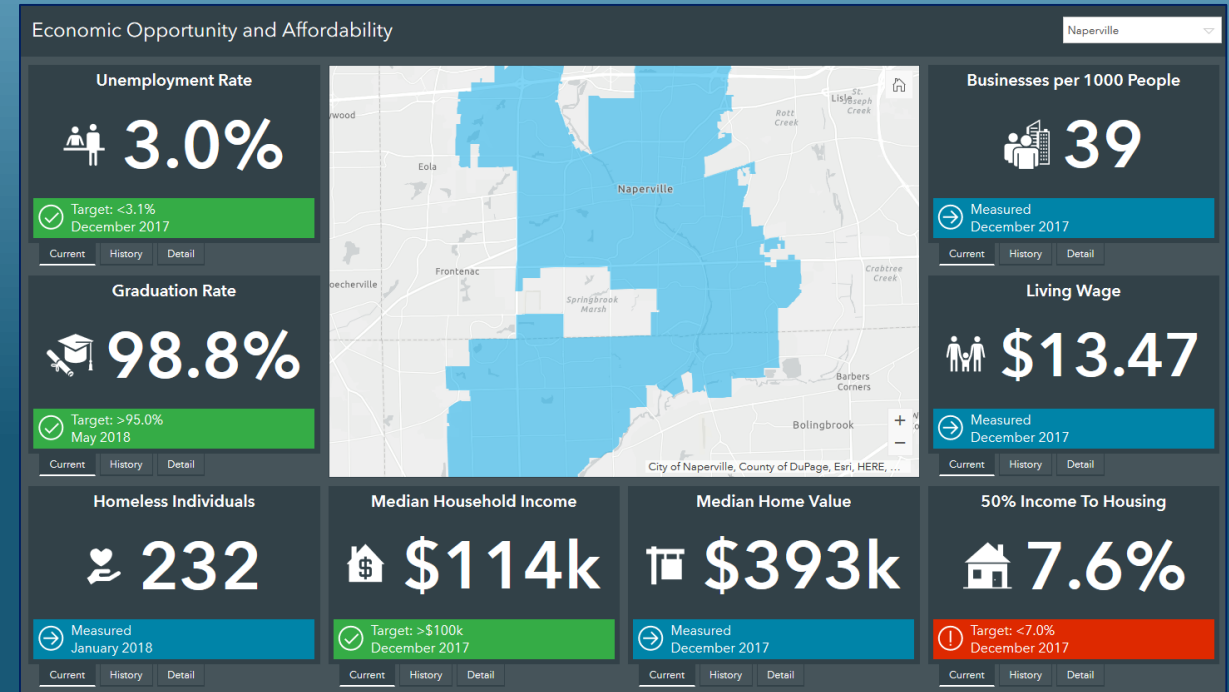
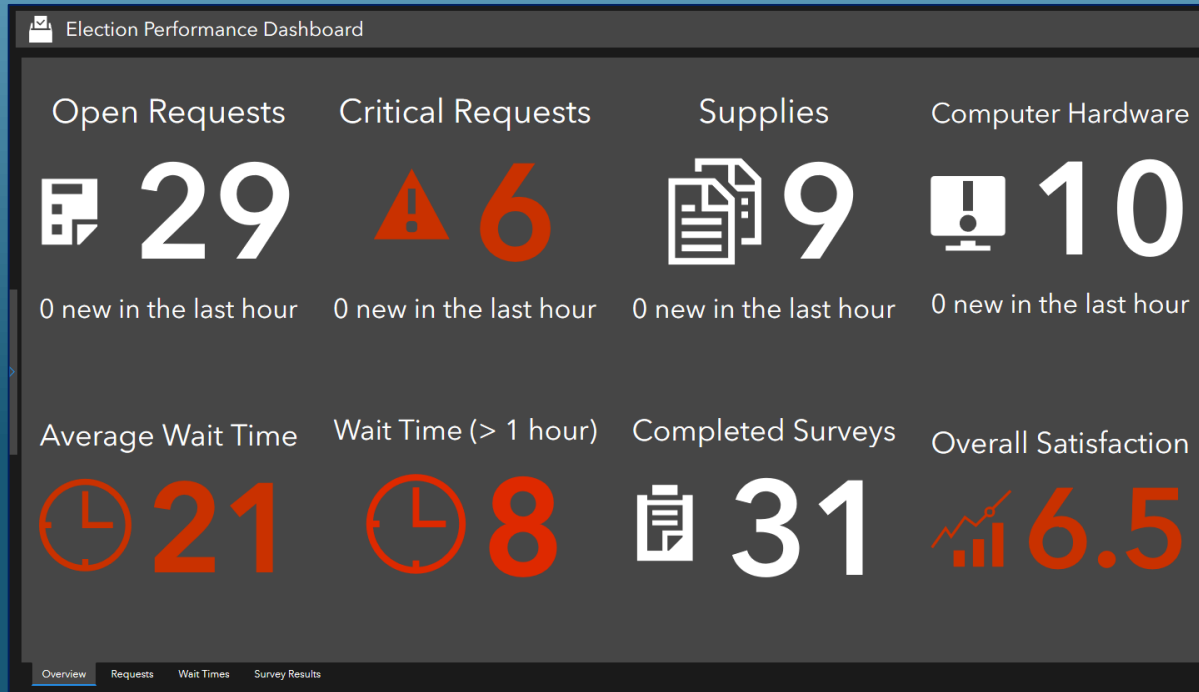
# Indicator element

- Great performance indicator
  - Simple, easy to interpret
- Leverage other properties
  - Icon
  - Supporting text
  - Colors





# Indicator - Good Examples



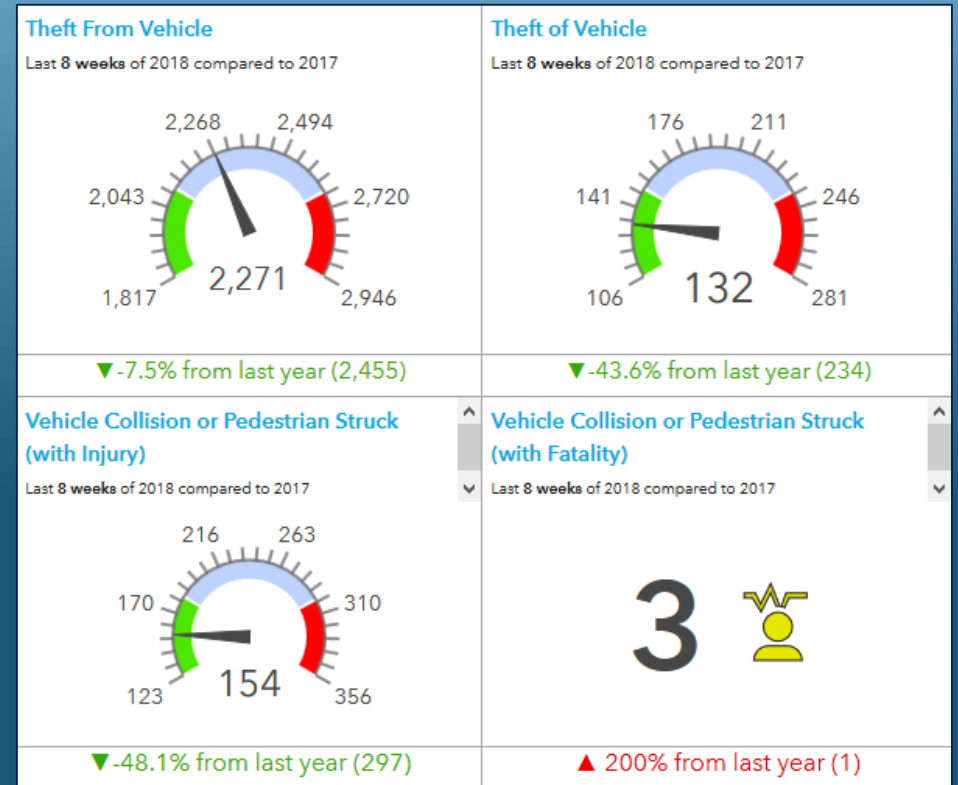
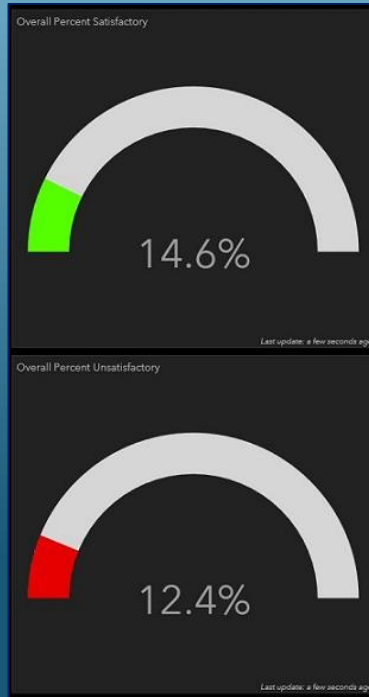
# List element

- Only display relevant information
  - Purpose of the list
- Considerations:
  - Which attributes are needed?
    - In what order?
  - How many features?

Top 10 Calls   Longest Response Time	
● Psych / Suicide Attempt (L1)   Level 1 Medical Station 19   Response Time: <b>2,308 sec</b> <i>3/23/2015, 12:10 PM</i>	
● Psych / Suicide Attempt (L1)   Level 1 Medical Station 16   Response Time: <b>1,559 sec</b> <i>3/22/2015, 8:19 PM</i>	
● Unc/Fainting (Non Trauma)(L1)   Level 1 Medical Station 45   Response Time: <b>1,460 sec</b> <i>3/24/2015, 12:22 PM</i>	
● Psych / Suicide Attempt (L1)   Level 1 Medical Station 12   Response Time: <b>1,387 sec</b> <i>3/26/2015, 3:47 AM</i>	
● Breathing Problems (L1)   Level 1 Medical Station 39   Response Time: <b>1,338 sec</b> <i>3/24/2015, 12:23 PM</i>	

# Gauge element

- Provide context
- Unit of measure







# Embedded Content element

- Include web pages, video, and apps

The image shows a screenshot of a Facebook dashboard titled "City of Lakeland Facebook Dashboard Communications Department". It displays ten embedded social media posts arranged in two rows of five. Each post is a preview of a Facebook page for a different Lakeland organization, including LakelandGov, My Lakeland Electric, Lakeland CRA, Lakeland Linder Airport, Lakeland Fire, Lakeland Police, Lakeland Library, Lakeland Parks and Rec, Lakeland Flying Tigers, and RP Funding Center. Each preview includes the organization's profile picture, name, and a featured image or video thumbnail. Below each preview is a "Like Page" button and a prompt: "Be the first of your friends to like this". The posts are interactive, with scroll arrows at the bottom of each preview.



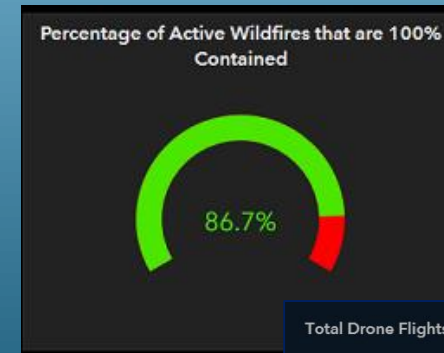
# Embedded Content element – ArcGIS Content

- Survey123 web forms
  - Support data collection workflows
- Web AppBuilder apps
  - Enable editing workflows
  - Incorporate custom widget functionality
- 3D web scenes
  - 3D visualizations



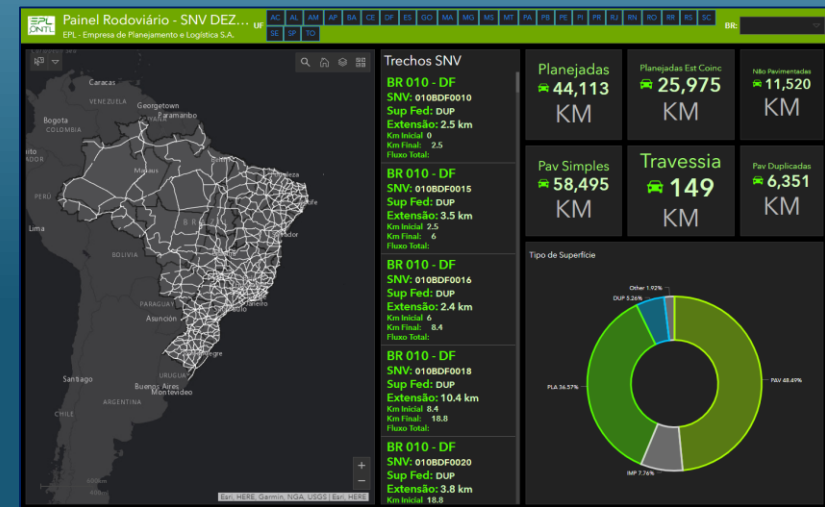
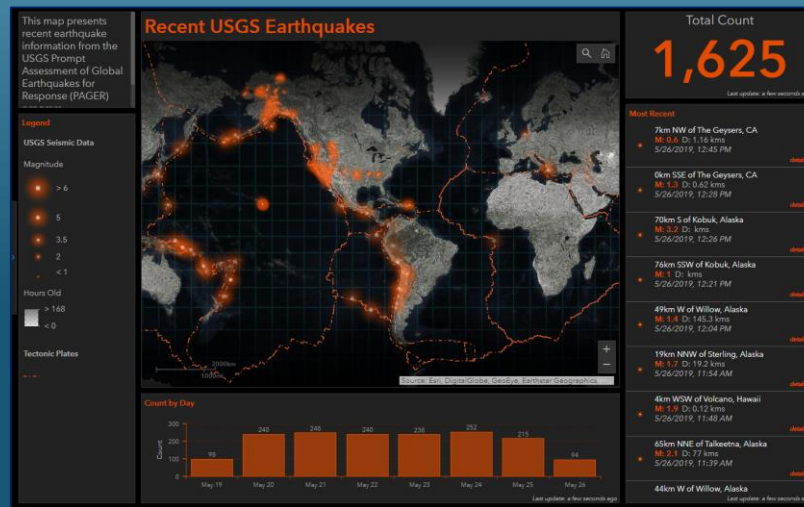
# Using Color in Data Visualizations

- If you need more than 7 colors in a chart, consider
  - Use another chart type
  - Group categories together
- Use same color for the same variables
  - Across different elements
- Apply appropriate contrast
- Use intuitive colors
- Light colors for low values, dark colors for high values

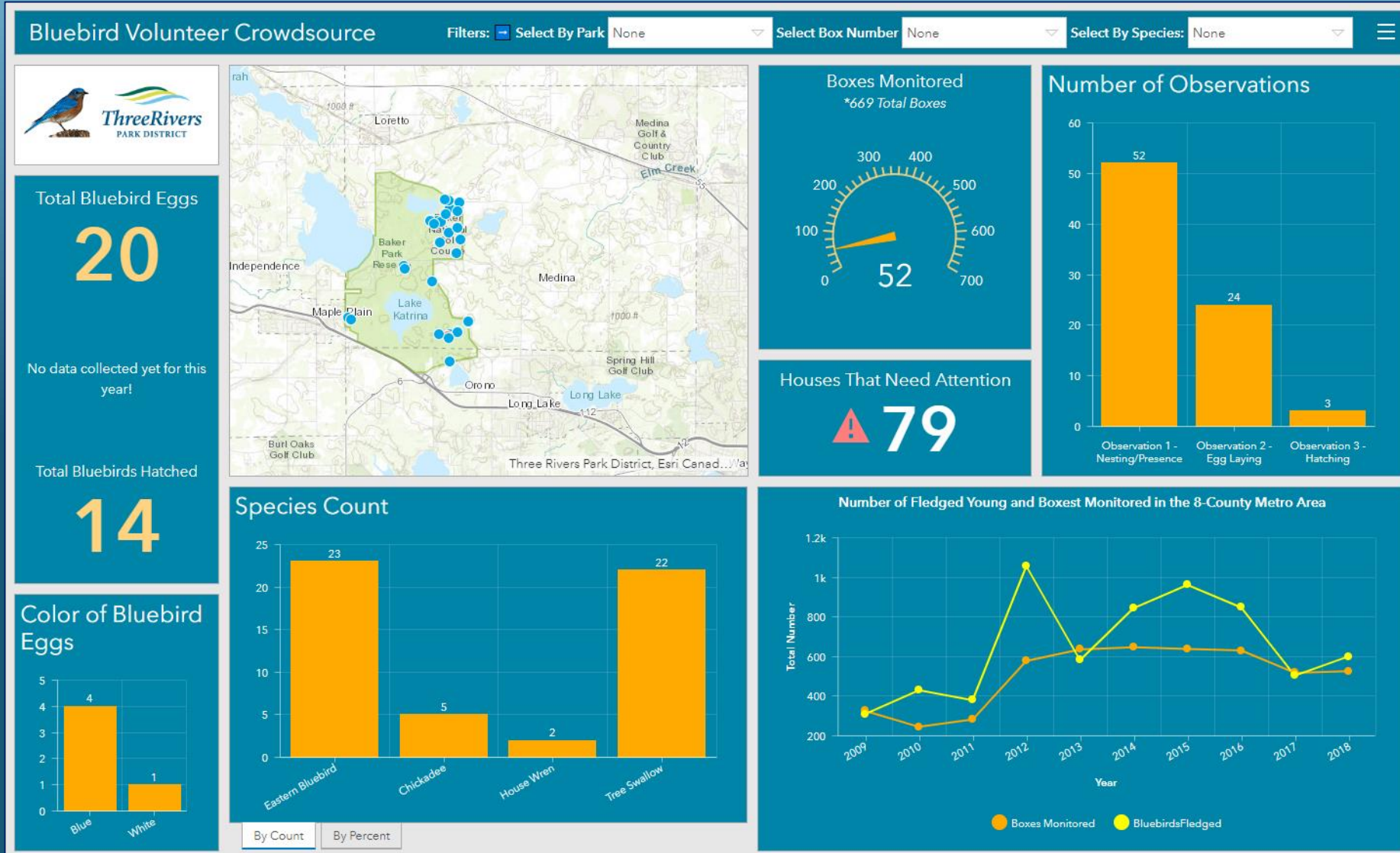


# Colors – Some Good Examples

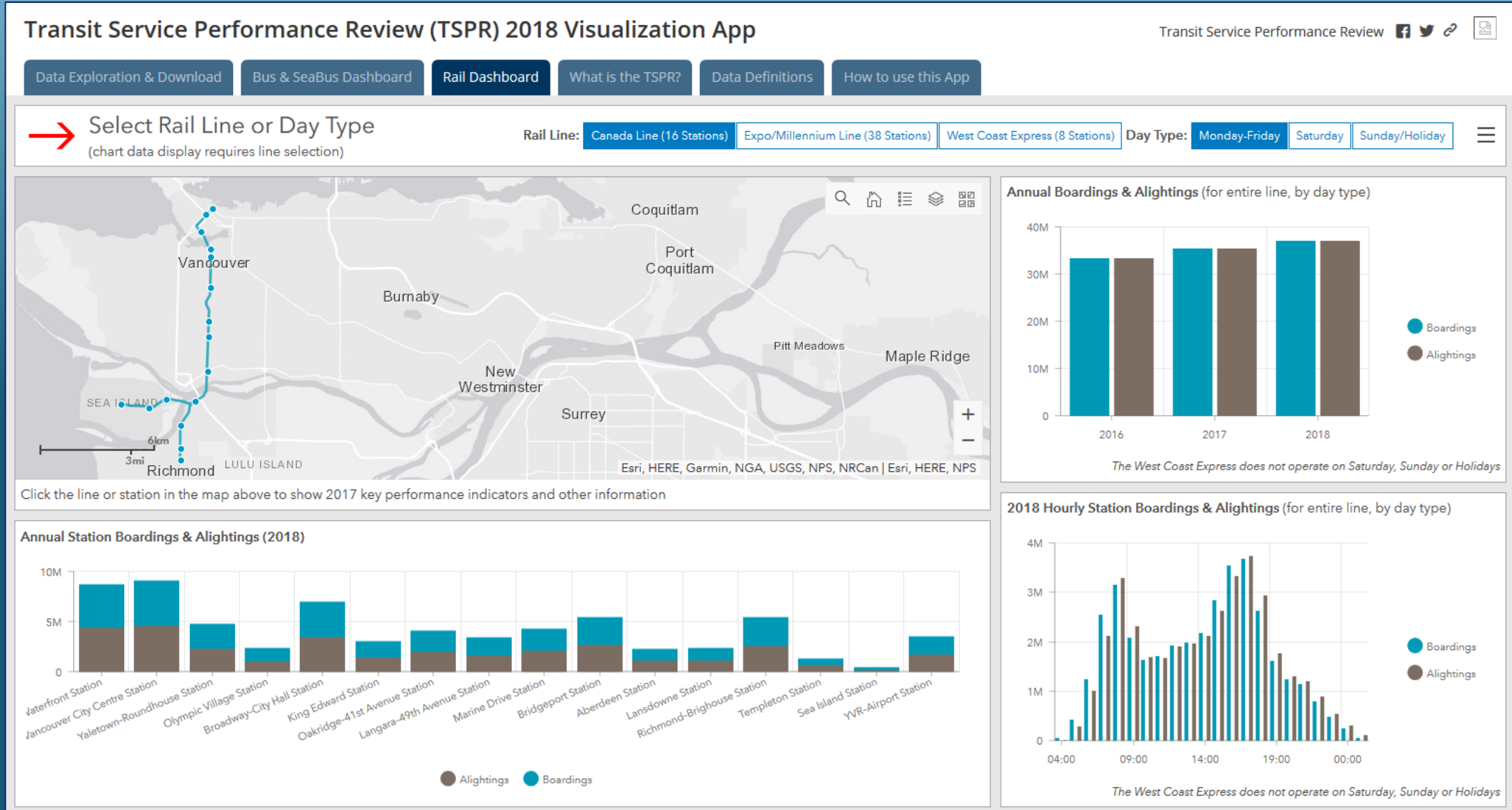
- Select colors to contrast with the background



# Colors – Crowdsource Dashboard

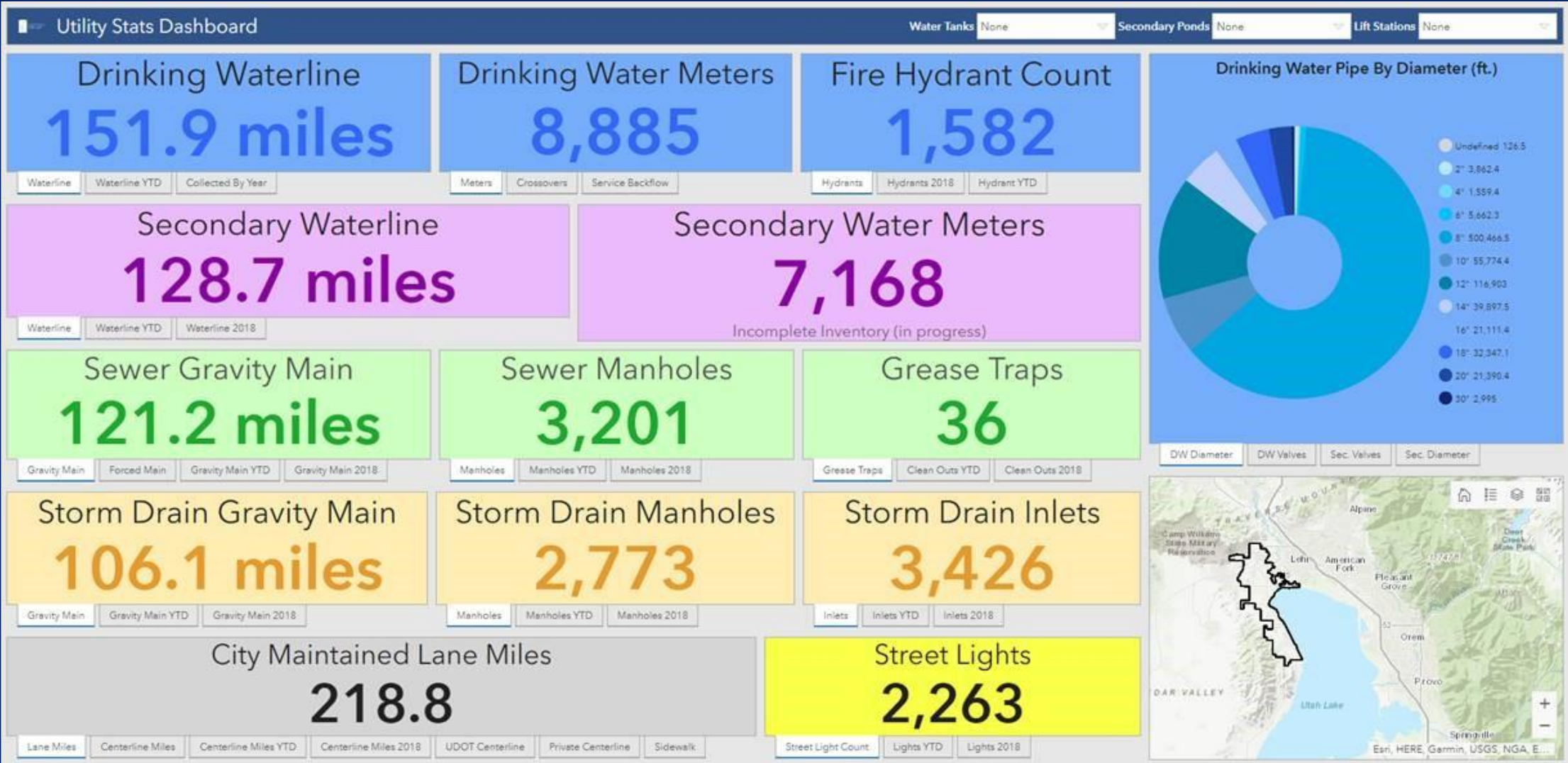


# Colors – Real-Time Transit Example





# Colors – Water Example



# Interactive Dashboards



- An interactive dashboard involves:
  1. Events: map extent change or selection change (triggered by user)
  2. Actions: spatial/attribute-based filtering or map actions
  3. Defined at source elements, applied to target elements
- Configure and apply multiple filters to drill down on data
- Set up attribute-based filters to show related records
- Flexibility-usability tradeoff: *As the flexibility of a system increases, the usability of the system decreases*

# Selectors and Filters

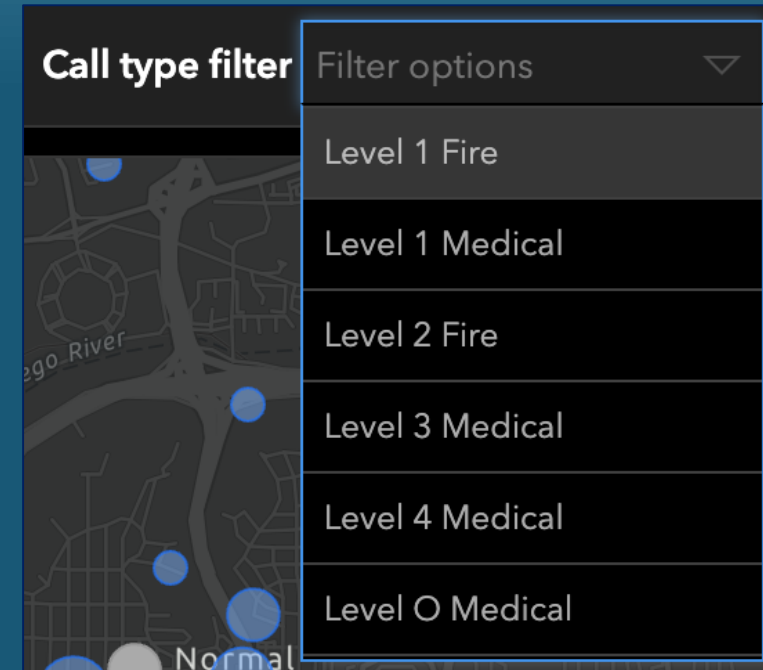
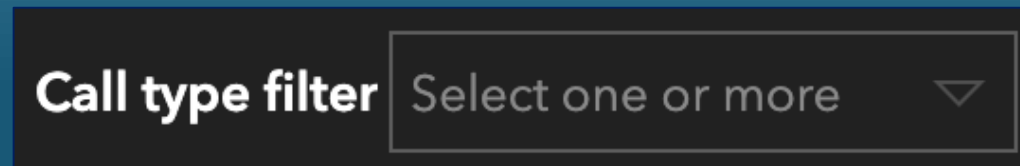
- Header or Side Panel?

- Header → minimal choices
- Side Panel → more choices



- Filters

- How many?
- Buttons or Dropdown?
- Configure actions
  - Spatial or attribute?





# Selectors and Filters – Public Safety Example

## Schenectady Dispatch Data Viewer

Created with Web AppBuilder for ArcGIS

Data generated from Pulsium SafetyNet CAD | Schenectady Police Department | City of Schenectady Home Page

Crime Filter Main

**Crime Filter** ☑

NIBRS Desc is

Crime Class Desc is

Hour of Call (integer) is between  
  
Enter whole numbers only, like 8 or 16

Date is between

Address contains

**Crimes by Type**

Incident No.	16,028,784
Agency	SPD
Agency Case No.	SPD*16028784
ocbeg_dt	1/19/2016, 12:00 AM
ocen_dt	1/19/2016, 12:00 AM
occbegi	19:26
Hour of Call	19
Time of Call	19:26
rep_stam	1/19/2016, 12:00 AM
rep_tm	19:26
Call Type Code	19
Call Type Desc	DOMESTIC CALL
long_id	1201401AM2
<a href="#">Zoom to</a>	

Infographic\_2

NIBRS Desc

NIBRS Desc	Count
AGGRAVATED ASSAULT	32
INTIMIDATION	5

Expand/Collapse the chart with the icons in the top right of the chart window

Info Summary

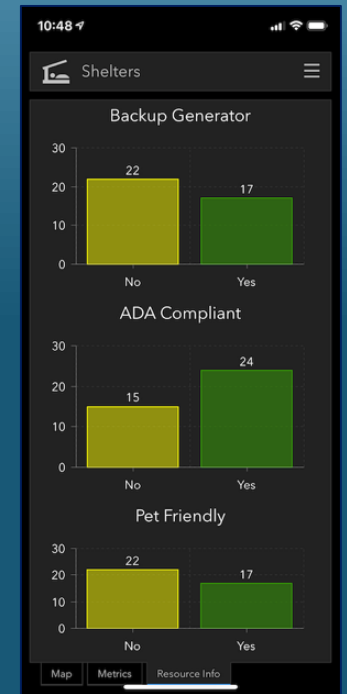
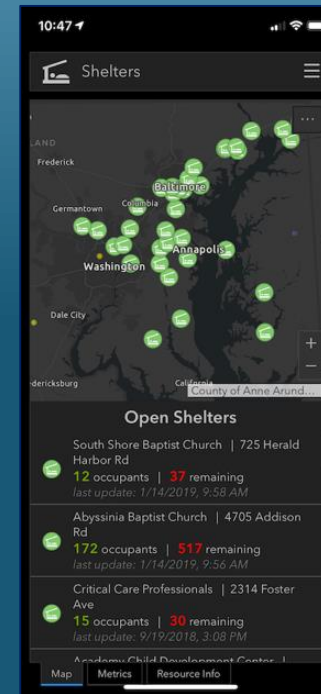
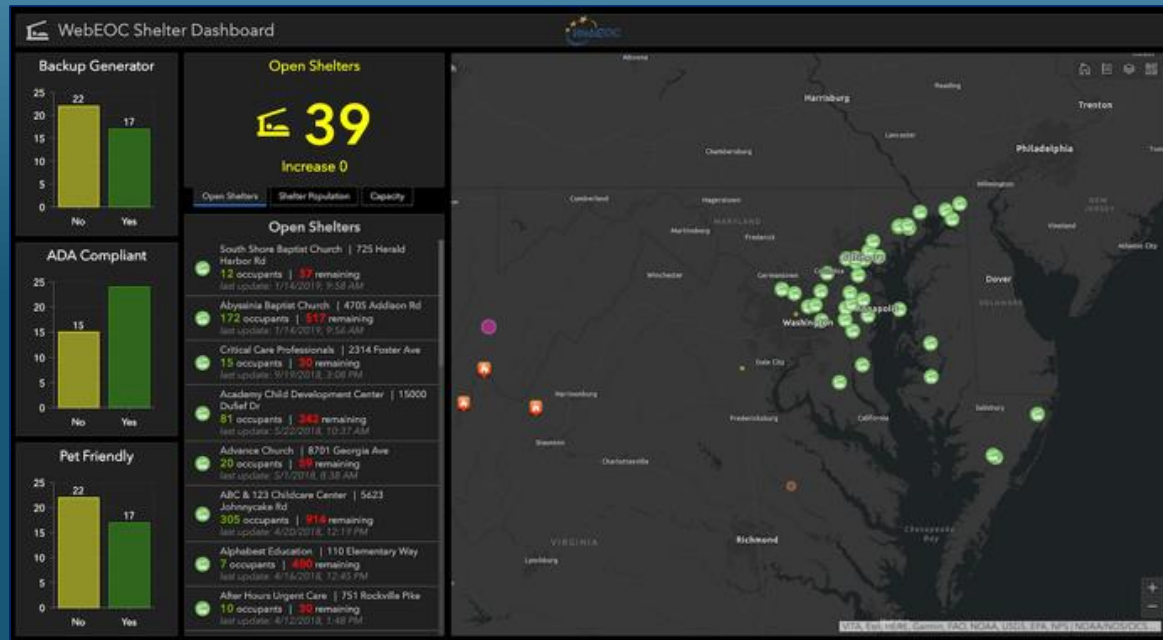
Incident Count

38

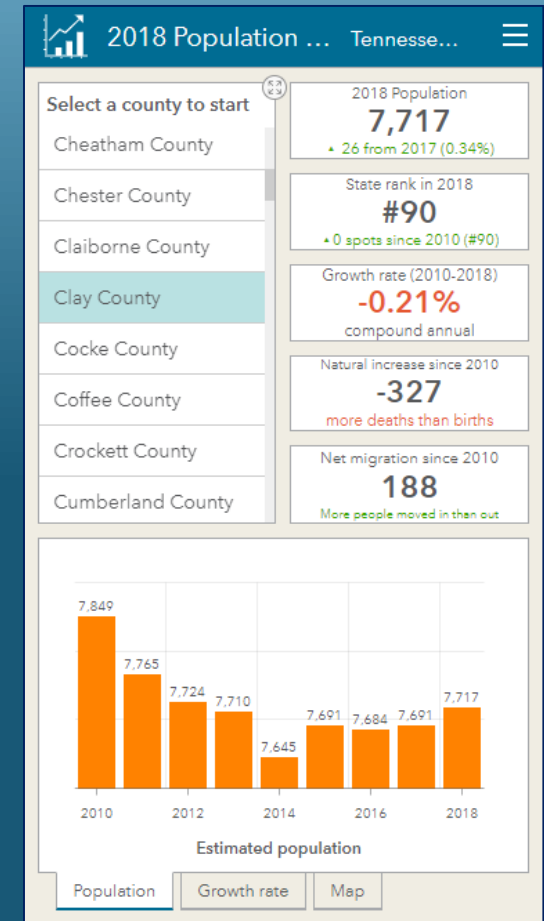
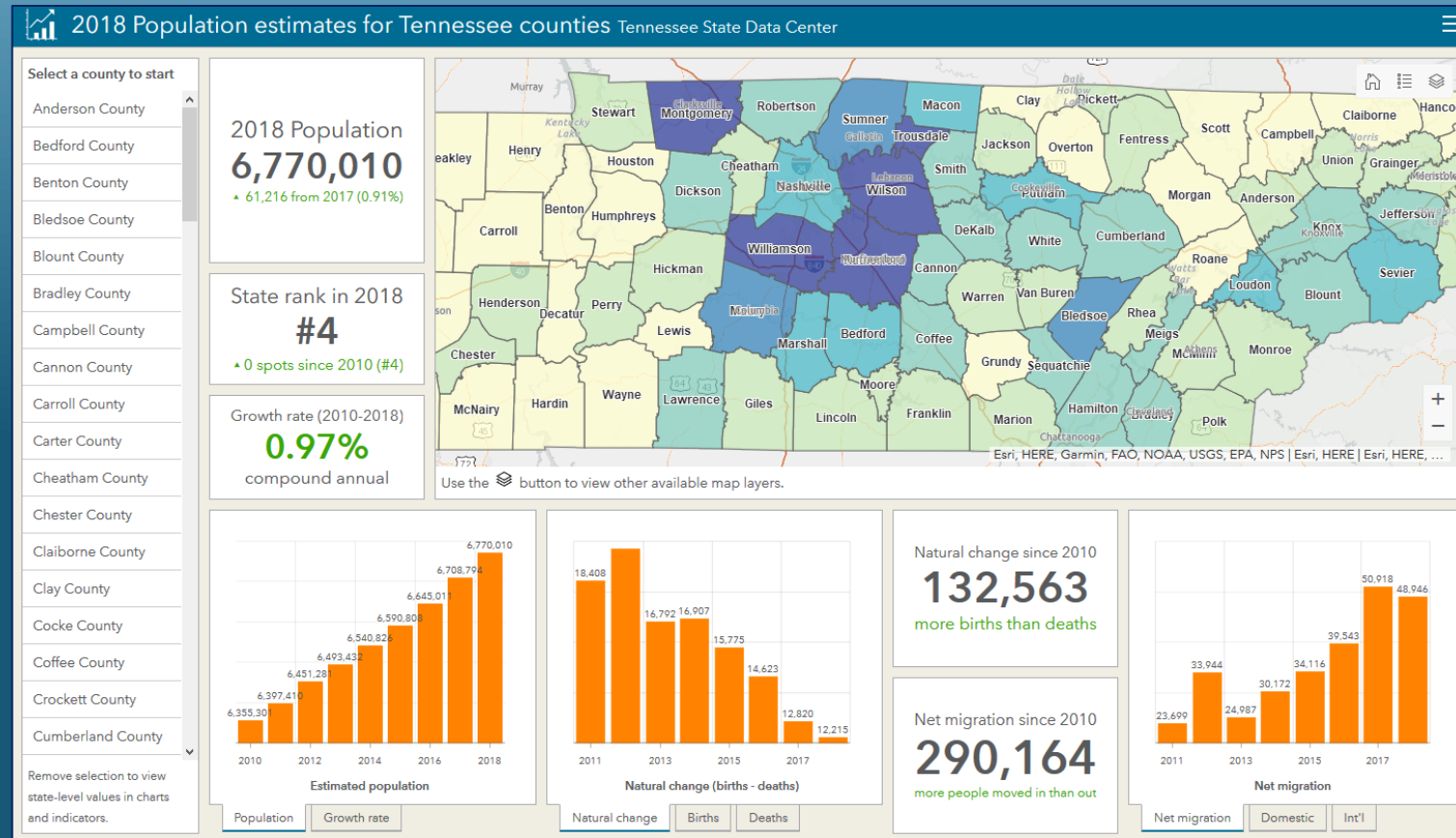
- Incident: 16,028,784 - Type: DOMESTIC CALL - Date/Time: 1/19/2016, 12:00 AM
- Incident: 16,040,091 - Type: DOMESTIC CALL - Date/Time: 1/27/2016, 12:00 AM
- Incident: 16,047,562 - Type: NEIGHBOR TROUBLE - Date/Time: 1/31/2016, 12:00 AM
- Incident: 16,068,999 - Type: DOMESTIC CALL - Date/Time: 2/14/2016, 12:00 AM
- Incident: 16,076,693 - Type: DOMESTIC CALL - Date/Time: 2/18/2016, 12:00 AM
- Incident: 16,085,722 - Type: DOMESTIC CALL - Date/Time: 2/24/2016, 12:00 AM

# Designing Mobile Dashboards

- Need to refactor the layout for mobile devices



# Mobile Dashboard Example







# Demonstration

## Building a Police Dispatch Dashboard

# Links

- [Asset Inspection Operations Dashboard - SymGeo](#)
- [The City Cancer Challenge Impact Map](#)
- [City of Arlington, Texas](#)
- [Arizona ESF/RSF Operations Dashboard](#)
- [Johns Creek DataHub](#)
- [Red Stick 311 Citizen Requests](#)
- [Michigan Bridge Conditions](#)
- [Actividades | Ayuntamiento de Madrid](#)
- [Recent USGS Earthquakes](#)
- [Painel Rodoviário](#)



# Resources

## ArcGIS Solutions

Contains links to many example Dashboards and Templates

- [Operations Dashboard product page](#)
- [Operations Dashboard help documentation](#)
- [Operations Dashboard – Useful Links blog](#)
  - Contains links to many example Dashboards
- Blog: [Strategies & Best Practices for using Dashboards on your Smartphone](#)
- Blog: [How Did They Make That Dashboard?](#)
- Blog: [Make your Dashboards more Dynamic using URL Parameters](#)



Summary

Questions?

[mscott@esri.com](mailto:mscott@esri.com)





**esri**

**THE  
SCIENCE  
OF  
WHERE**