



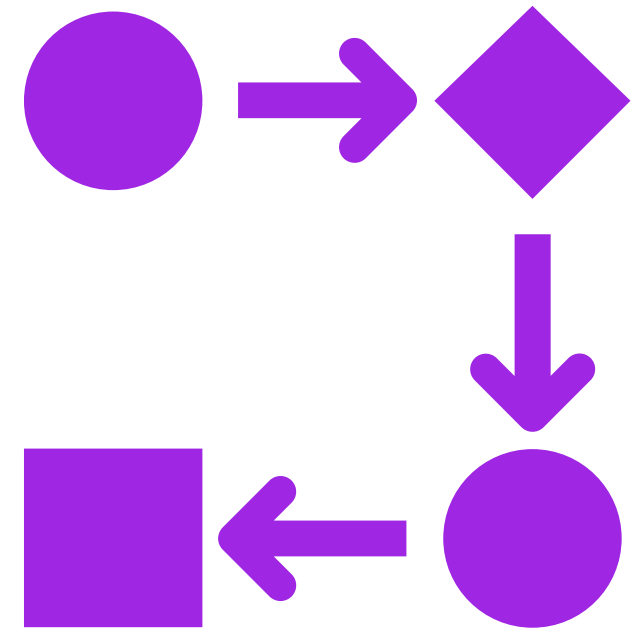
# Fundamentals of Data Analysis

NATIONAL CAPITAL REGION FIRE & EMERGENCY RESPONSE ANALYSTS SYMPOSIUM

FAIRFAX, VA | MAY 3, 2024

# The Plan

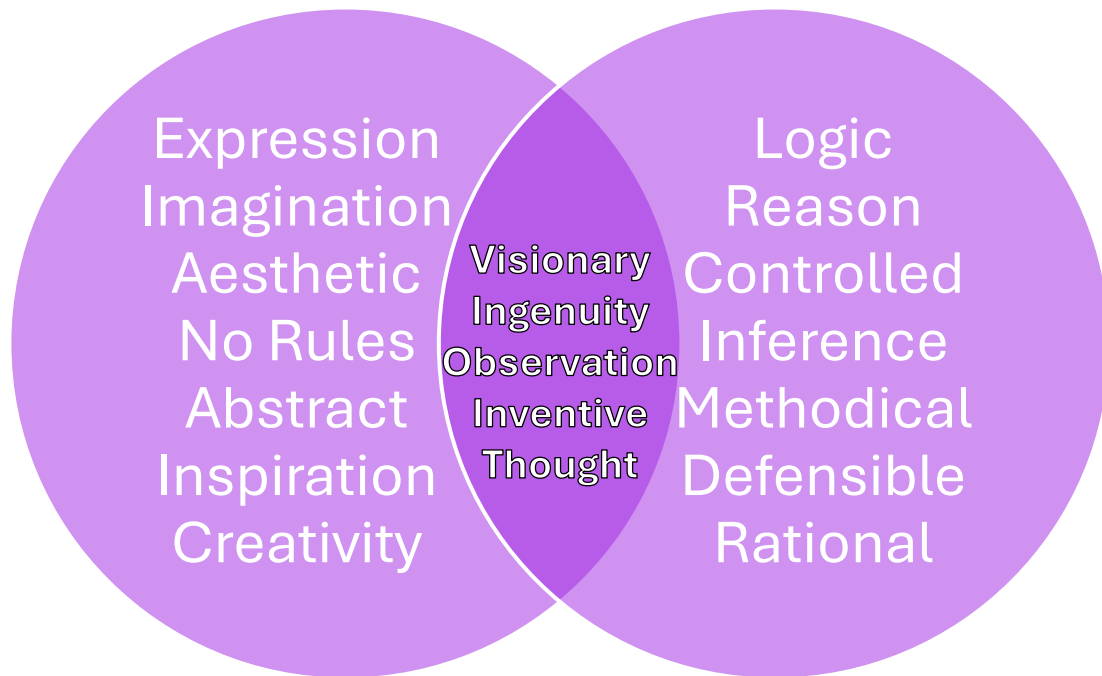
- ▶ Critical Thinking
- ▶ Problem Solving
- ▶ Data Wrangling
- ▶ Data Visualization & Presentation
- ▶ Making Recommendations



# The Overlap

## ART

## SCIENCE



## Critical Thinking

Problem  
Solving

## Data Wrangling

Data Visualization

- Recommendations

# Critical Thinking

[www.criticalthinking.org](http://www.criticalthinking.org)

[www.globalcitizen.org](http://www.globalcitizen.org)

## ► Analyzing and evaluating incorporates:

- Point of View
- Purpose
- Information
- Interpretation & Inference
- Concepts & Theories
- Assumptions
- Implications & Consequence



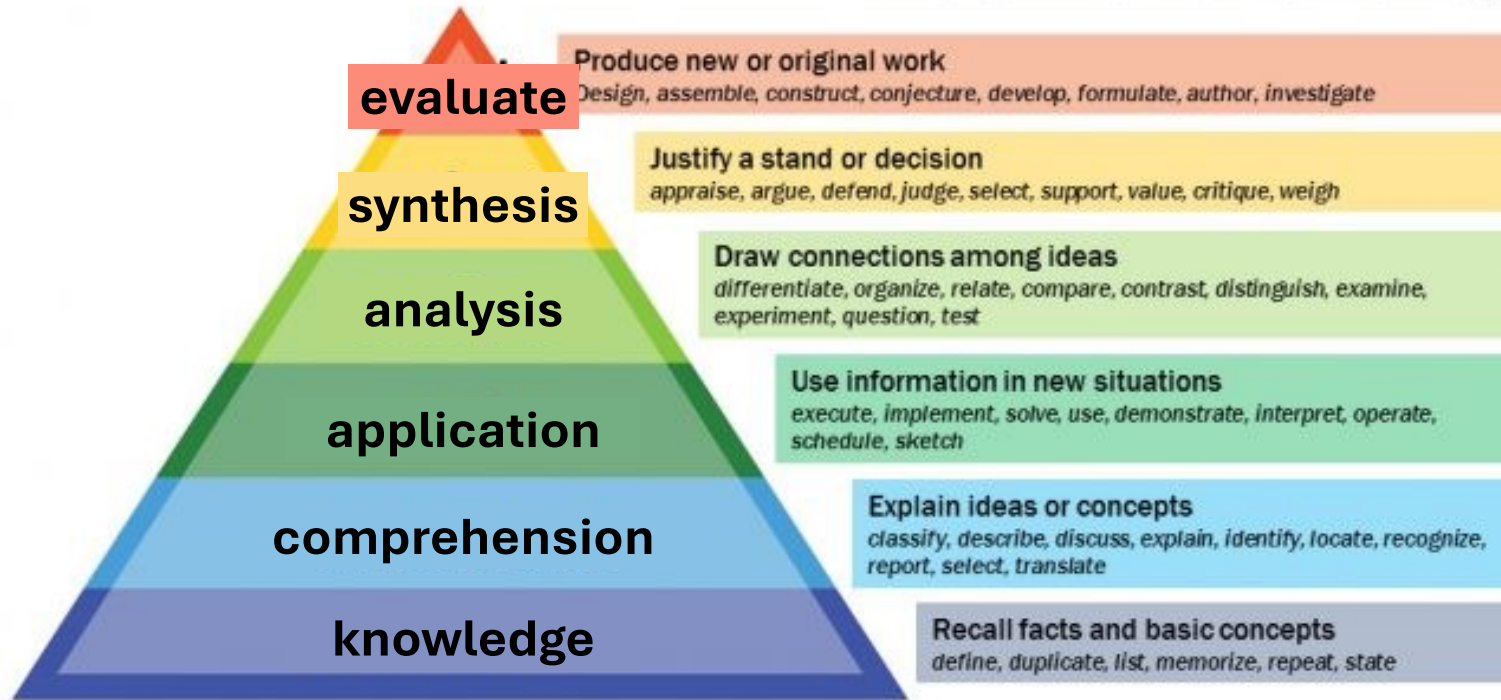
## The Ultimate Cheatsheet for Critical Thinking

Want to exercise critical thinking skills? Ask these questions whenever you discover or discuss new information. These are broad and versatile questions that have limitless applications!



<b>Who</b>	... benefits from this? ... is this harmful to? ... makes decisions about this? ... is most directly affected?	... have you also heard discuss this? ... would be the best person to consult? ... will be the key people in this? ... deserves recognition for this?
<b>What</b>	... are the strengths/weaknesses? ... is another perspective? ... is another alternative? ... would be a counter-argument?	... is the best/worst case scenario? ... is most/least important? ... can we do to make a positive change? ... is getting in the way of our action?
<b>Where</b>	... would we see this in the real world? ... are there similar concepts/situations? ... is there the most need for this? ... in the world would this be a problem?	... can we get more information? ... do we go for help with this? ... will this idea take us? ... are the areas for improvement?
<b>When</b>	... is this acceptable/unacceptable? ... would this benefit our society? ... would this cause a problem? ... is the best time to take action?	... will we know we've succeeded? ... has this played a part in our history? ... can we expect this to change? ... should we ask for help with this?
<b>Why</b>	... is this a problem/challenge? ... is it relevant to me/others? ... is this the best/worst scenario? ... are people influenced by this?	... should people know about this? ... has it been this way for so long? ... have we allowed this to happen? ... is there a need for this today?
<b>How</b>	... is this similar to _____? ... does this disrupt things? ... do we know the truth about this? ... will we approach this safely?	... does this benefit us/others? ... does this harm us/others? ... do we see this in the future? ... can we change this for our good?

# Bloom's Taxonomy



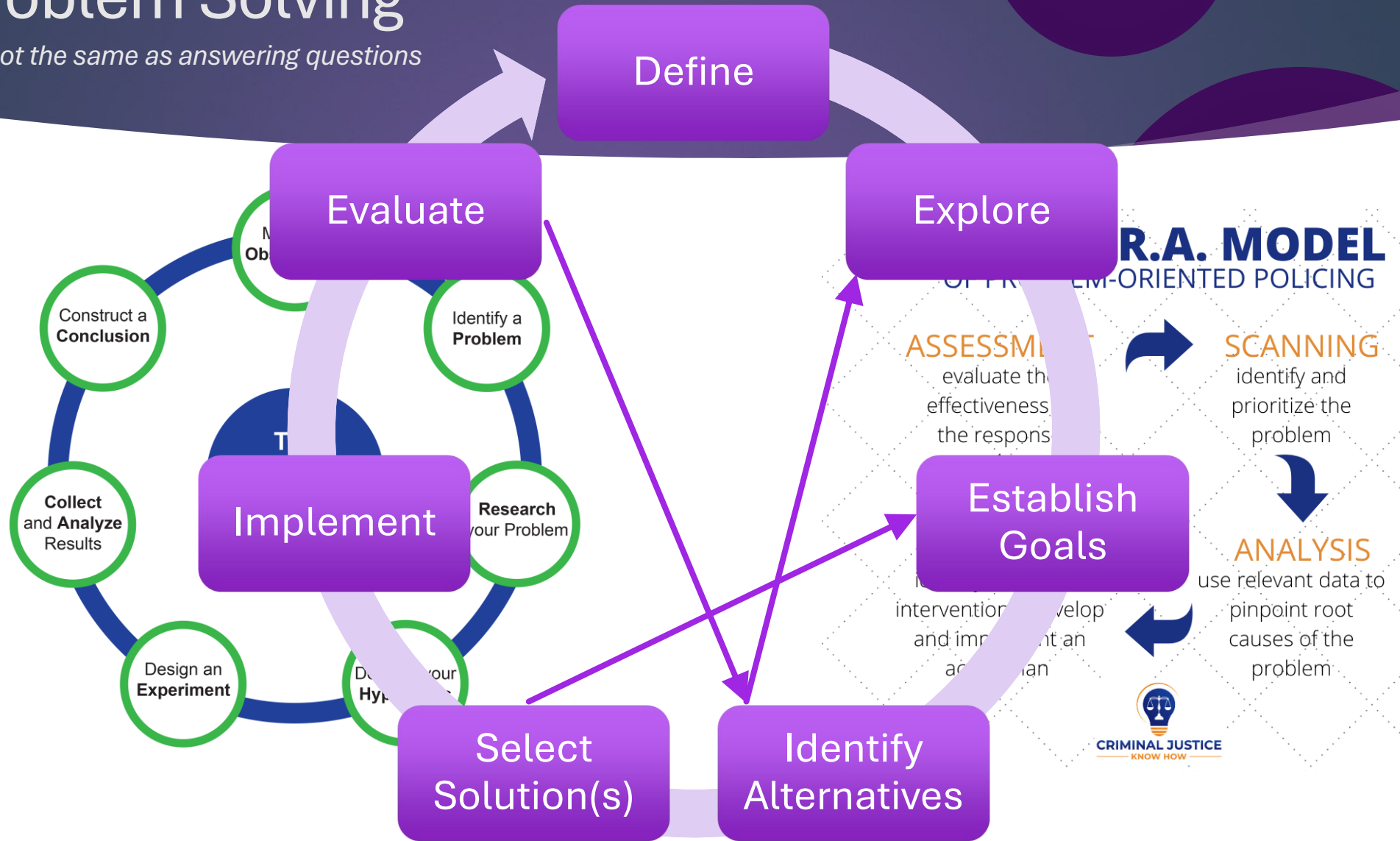
Vanderbilt University Center for Teaching

## Bloom's Taxonomy

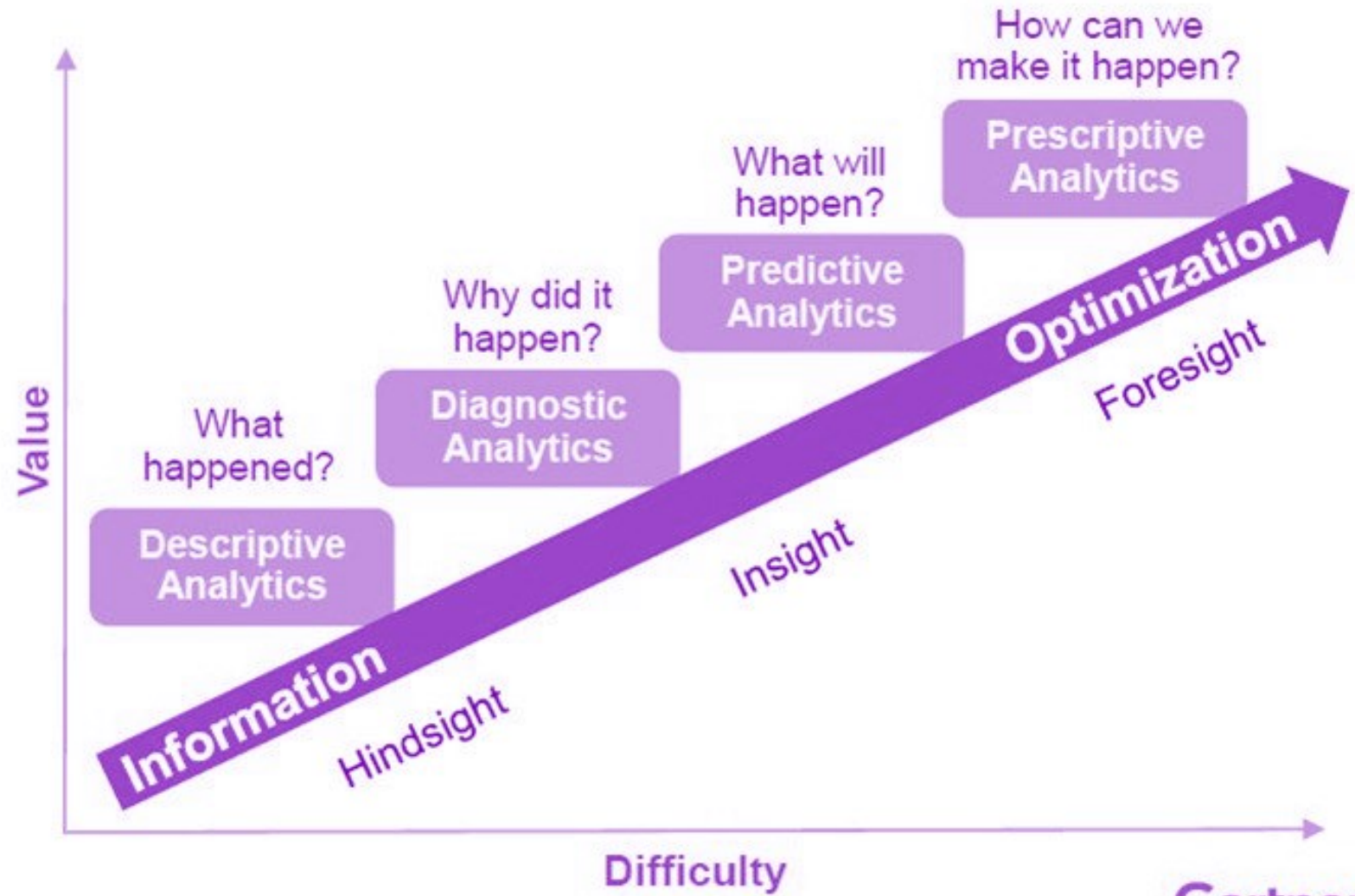
VANDERBILT UNIVERSITY –  
CENTER FOR TEACHING

# Problem Solving

*It's not the same as answering questions*







Gartner.

# The Question Behind the Question

## What They Asked For

- ▶ I would like to know how many times on A-Shift does E4xx's paramedic upgrade the ambulance. And how many times they arrive on-scene and call for a medic.
- ▶ Can you pull data to see if the medication Calcium Chloride was administered to any patient over the past year?
- ▶ Any consumer grade fireworks fires, injuries and deaths within Fairfax County for CY 2022.
- ▶ Number of failures that would have occurred with this new set of numbers compared to the current numbers. Determine if the pass/fail rate decreases with the new numbers.

## What They Wanted to Know

- ▶ Is E4xx following EMS protocol for upgrading ambulances for an incident?
- ▶ Why are some patients receiving more than one dose of Calcium Chloride during the same encounter?
- ▶ Should there be legislative change?
- ▶ Fitness improvement plans (FIP) require a lot of effort on the part of them employee and coach. Should we modify the standards to reduce the number of FIPs, particularly for employees "on the bubble"?



# Dos and Don'ts

## DO NOT TELL ME...

Which data answers your questions

What the solution is

That there's only one solution

## DO TELL ME...

What questions you have

What you've observed in the field

What solutions are non-starters

# Data Wrangling

*Documenting the wrangling is as important as the wrangling itself*

- ▶ Cleaning
  - ▶ NULLs, data type mismatches, erroneous entries
- ▶ Validity
  - ▶ Does it represent/measure what it's supposed to?
- ▶ Reliability
  - ▶ Is it consistently accurate?
- ▶ Human vs Technological Errors
  - ▶ Typos vs ETL or scripting failures
- ▶ Privacy/Confidentiality
  - ▶ Least access to complete the task

```
dbo.Fact_RMS_Level_of_Care
dbo.Fact_RMS_Opioid_Population
dbo.Fact_Telestaff_Roster
dbo.Fact_Weather_Observations
dbo.i15
dbo.i21
dbo.i22
dbo.i25
```

IncidentNumber	CommentDT	LineOrder	UnitID	TimeEstimate	Reason	GreaterThan
E240010715	2024-01-01 08:38:02.000	1	E428M	1.9	AFR1	0
E240010715	2024-01-01 08:38:02.000	2	M428	1.9	M	0

Rank

Tech Cave In

**Punishment for typos  
will be severe.**

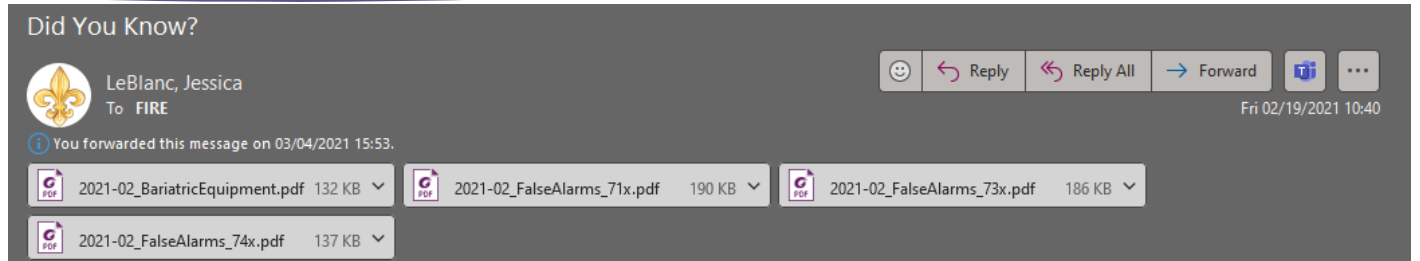
```
flow.Fact_FCFRD_NewEquipment
flow.Fact_FCFRD_Notifications
```

# Data Visualization & Presentation

*Know your audience and their intellectual and technological competencies*

## CONSIDERATIONS

- ▶ Public, front line, leadership
- ▶ Summary vs detailed
- ▶ Text vs graphics
- ▶ Use of white space and color
- ▶ Delivery platform
  - ▶ Digital vs Paper vs Verbal
  - ▶ Interactive vs Static
  - ▶ Viewing environment
  - ▶ Color vs B&W



### *Standing in the bay version:*

The attached Did You Know? sheets explain how to properly classify a **False Alarm/False Call** and how to document the use of **Bariatric Equipment**. Please read them, it's important. Hang them up in the kitchen, bathroom, and office of your fire station. Learning passively really is a thing. You'll receive similar sheets each month. Read them, it's important.

### *Sitting at a desk version:*

The Data Analysis Section (DAS) of the Data Analytics Strategy Management Division is prioritizing data quality in 2021. If outstanding report-writing didn't drive you into this career, here's why you should care about writing good reports anyway.

Properly and completely documenting every call you go on allows for:

- \$\$\$: opportunities to justify training, equipment, grants
- Performance: what are we doing really well, where can we improve, and why does it matter?
- Planning: what's on the rise, what's bottoming out, and how can we address it before it's on our doorstep?
- Conversation: with the public, with the Board of Supervisors, with the media. They want to know and we should drive the narrative, not follow it around.

As the DAS finds trends in missing data or mistaken data, we'll send out Did You Know? sheets to explain what's going on and why it matters in the grand scheme. The goal is to help you do the best job, the first time, with the least effort.

As time and conditions permit, you may see us participating in ride-alongs in the field. Understanding the call and the encounters that create the data is as important as making sense of the information once the call is done.

Questions? Feel free to call or email anytime.

Thanks,

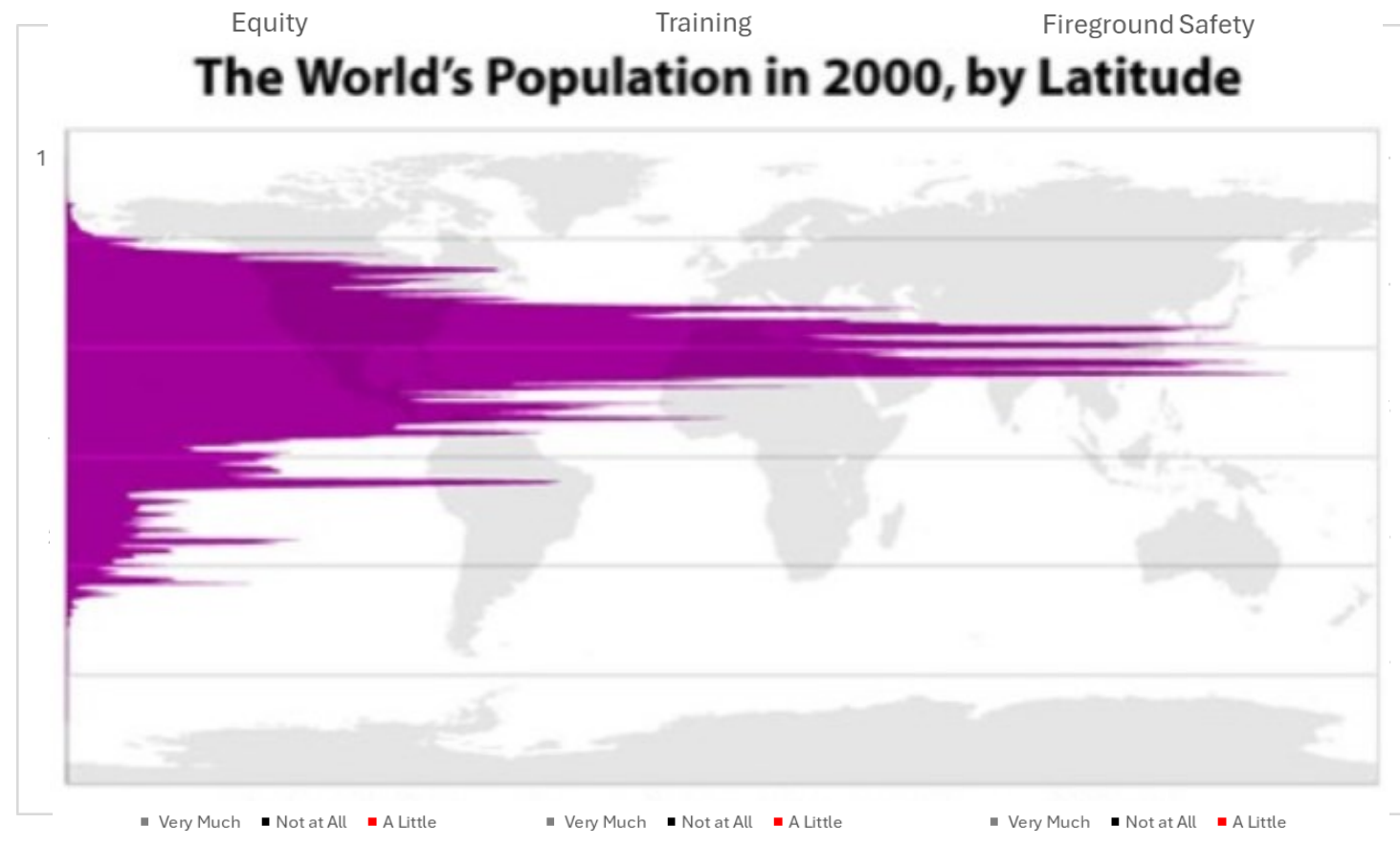
Jessica B. LeBlanc  
Data Analyst II  
Fairfax County Fire and Rescue Department  
Data Analytics Strategy Management Division

# Data Visualization & Presentation

*Delivery of the right information to the target audience in an easily consumable format*

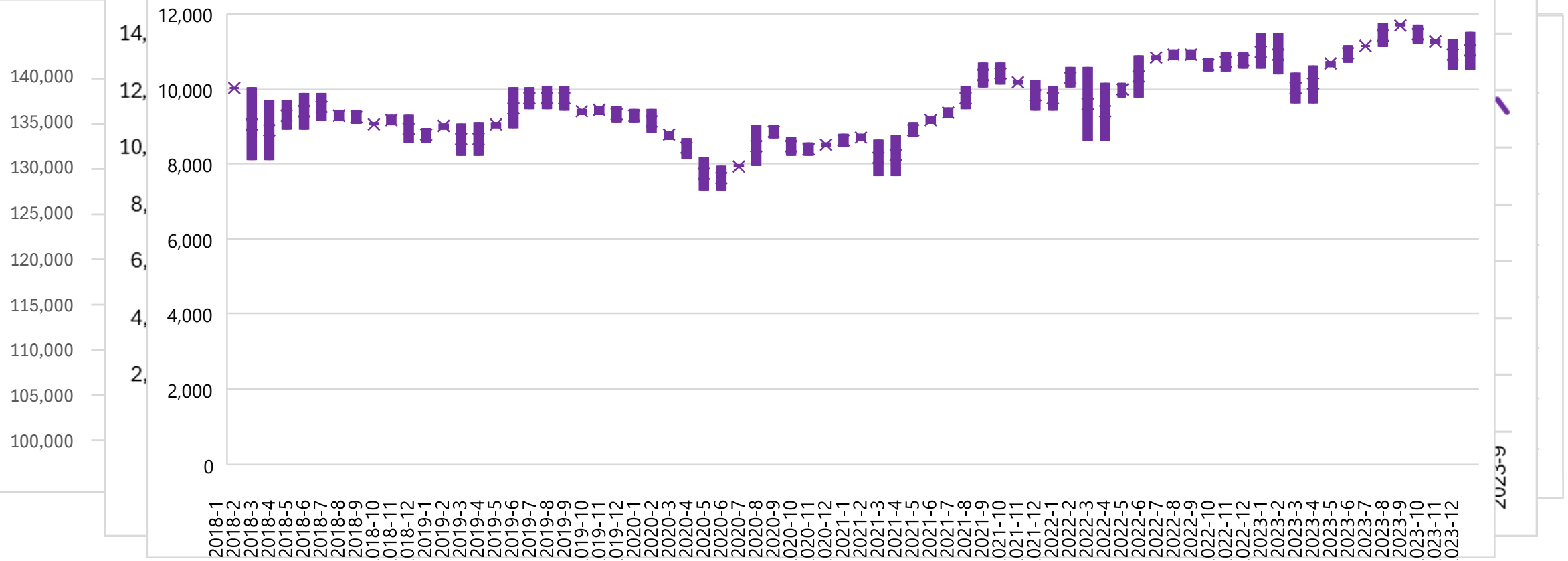
## GOALS

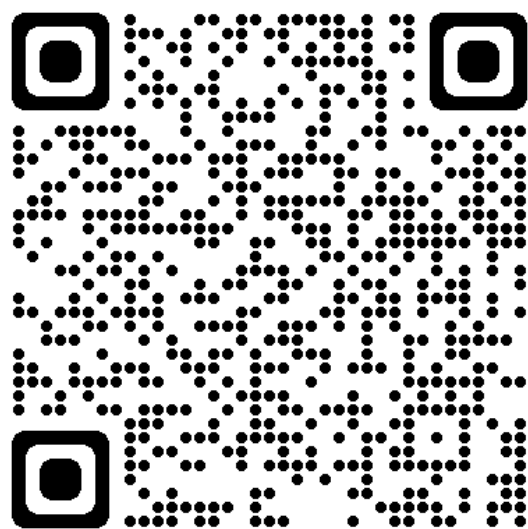
- ▶ Clarity
- ▶ Visual balance & contrast
- ▶ Meaningful graphics/symbols
- ▶ Appropriate charts/graphs
- ▶ Grammatically impeccable



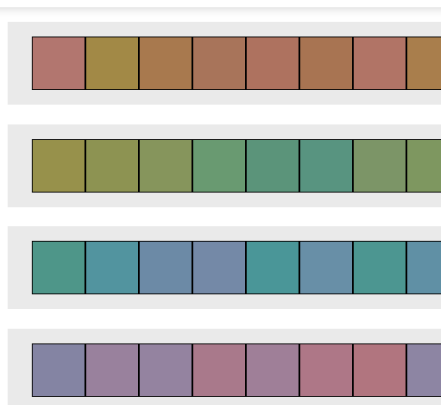
# Lies and Charting

Incidents by Calendar Year





PANTONE®



# Color Test Challenge



# Recommendations

*Read the room*

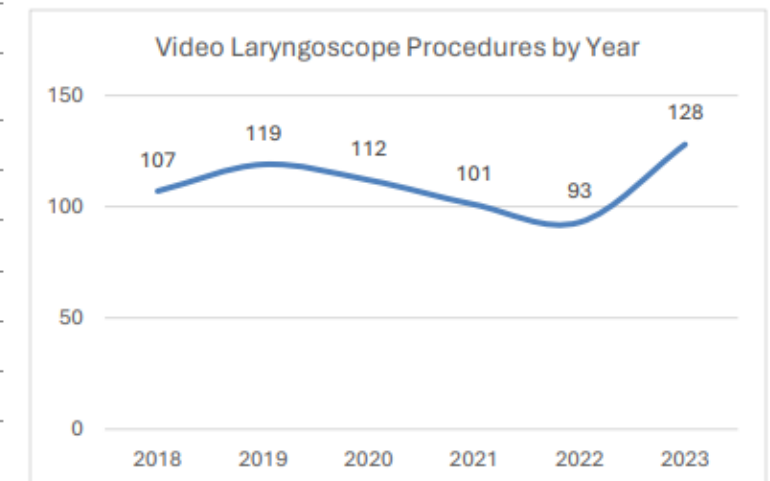
- ▶ Defensible
- ▶ Responsive to the goal
- ▶ Avoid over/misinterpretation
- ▶ Include caveats/limitations

**Purpose:** To determine the number of times a Video Laryngoscope was used between 2017 and 2023.

**Requestor:** Philippa Durham, Battalion Chief-EMS Operations

**Summary:** The table and chart below summarize the number of procedures and patients where video laryngoscope was a documented procedure on a patient's electronic patient care report (ePCR) during encounters with Fairfax County Fire & Rescue (FRD) personnel between January 1, 2017 and April 23, 2024. In some cases, the video laryngoscope procedure was performed multiple times on the same patient. This is evident during years where the number of procedures exceeds the number of patients. The earliest documentation of this procedure on an ePCR was recorded on December 24, 2017.

Year	Procedures	Patients
2017 (from 12/24/17)	5	5
2018	107	99
2019	119	116
2020	112	100
2021	101	95
2022	93	90
2023	128	117
2024 (through 04/23/24)	44	41



Questions?

Contact  
Jessica  
LeBlanc



GitHub Resource  
Repository



Analysts LinkedIn  
Group

