

Visualization in Market Analysis

Market Regulation and Consumer Affairs (D) Committee

NAIC Summer National Meeting

August 15, 2023



DCI

Missouri Department of Commerce & Insurance

Agenda

- Why Visualize Data?
- Data Needs
- Effective Visualizations
- Picking the Right Visualization
- Best Practices
- Adding Value
- Market Analysis Examples
- Things to Consider
- Questions



How Many Nines Are There?

4	7	7	5	5	2	7	4	7	1
4	9	2	5	7	7	2	6	1	7
1	7	6	9	3	4	7	5	1	2
5	1	6	3	3	8	4	8	6	6
6	5	6	4	9	3	8	9	1	9
3	8	1	5	2	2	3	6	3	9
4	6	4	5	6	3	7	7	9	1
9	1	3	3	6	1	3	3	1	8
8	1	1	8	7	5	8	1	7	4
3	6	9	2	8	9	3	7	5	7
4	4	4	2	8	2	2	9	2	8

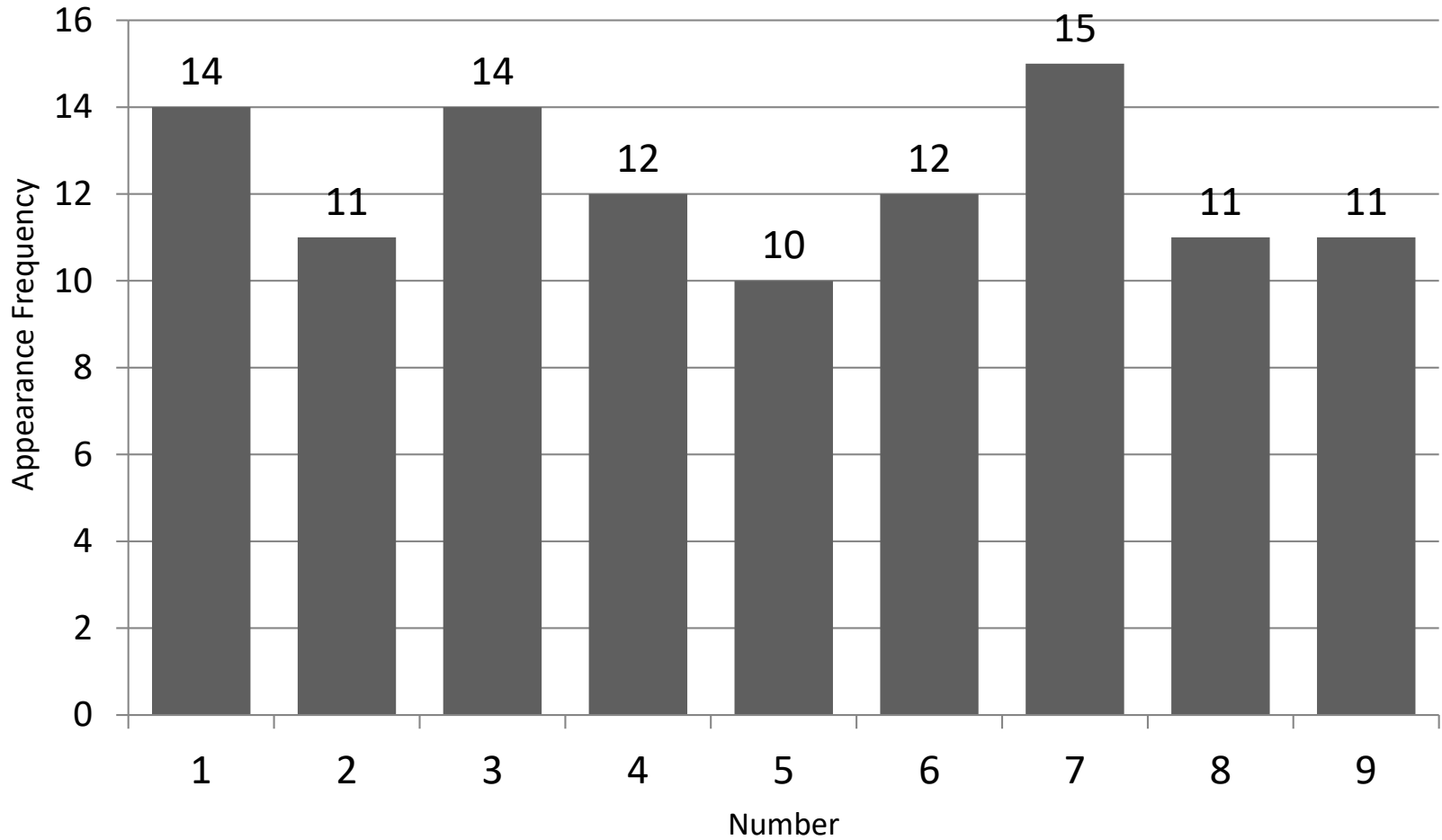


How Many Nines Are There?

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5	1	6	3	3	8	4	8	6	6
6	5	6	4	9	3	8	9	1	9
3	8	1	5	2	2	3	6	3	9
4	6	4	5	6	3	7	7	9	1
9	1	3	3	6	1	3	3	1	8
8	1	1	8	7	5	8	1	7	4
3	6	9	2	8	9	3	7	5	7
4	4	4	2	8	2	2	9	2	8



How Many Nines Are There?



Why Visualize Data?

- Leverages Human Perception Skills
 - Absorb More
 - Easier to Remember
 - Analyze More, Faster
 - Grasp Difficult Concepts
- Digest “Huge” Amounts of Data
 - Internal & External Data
 - Single Data Source
 - Multiple Data Sources
- Identify New
 - Trends
 - Patterns
 - Anomalies



Why Visualize (Continued)

- Today's Technology
 - Allows For Interactive/Investigative Analysis
 - Reduces Data Silos
 - Reduces IT Dependency
- Allows Regulators to 'Notch It Up'
 - Added Value Over Process
 - Better Understanding of What is Going On
 - Data Based Decisions
 - Remove subjectivity from process
 - Create repeatable outcomes
- Application of Advanced Analytics
 - Text Analytics
 - Machine Learning
 - Predictive Analytics
 - Network Analysis



Data Needs To Be:

- Available
- Accessible
- Usable
 - Relevant
 - Timely
 - Granularity
- Consumable
- Reliable
- Consistent
- Complete



Effective Visualizations Are:

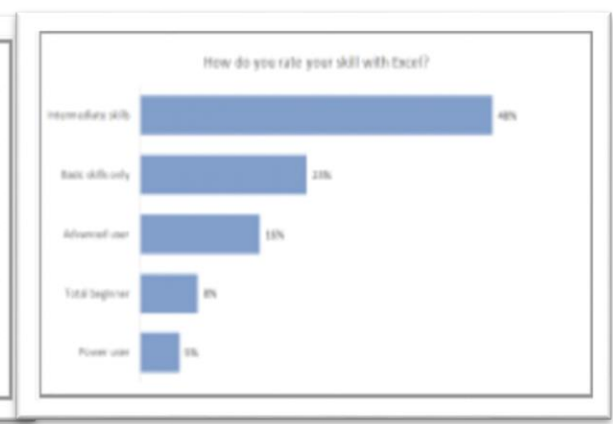
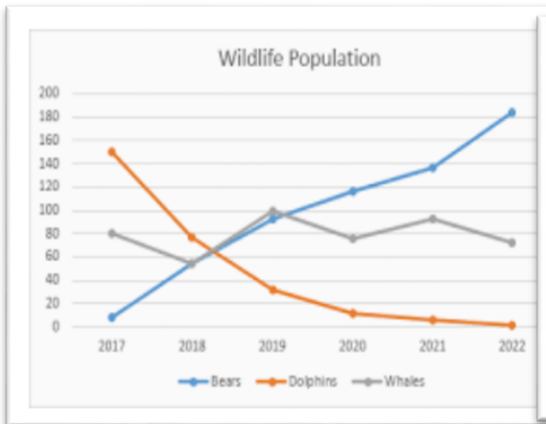
- Geared to the Audience
- Answers the Questions
- Tells the Story
 - Reveal Patterns, Trends
 - Won't Mislead
- Knowing Where You Are Going
 - Comparison
 - Relationship
 - Distribution
 - Composition



Comparison

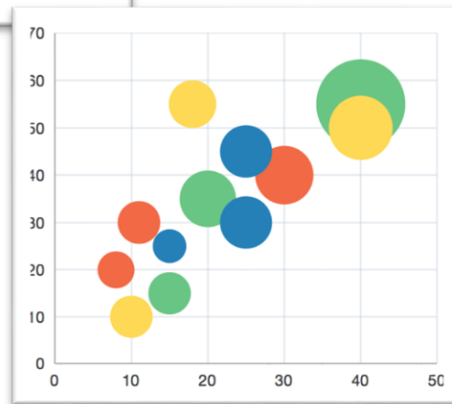
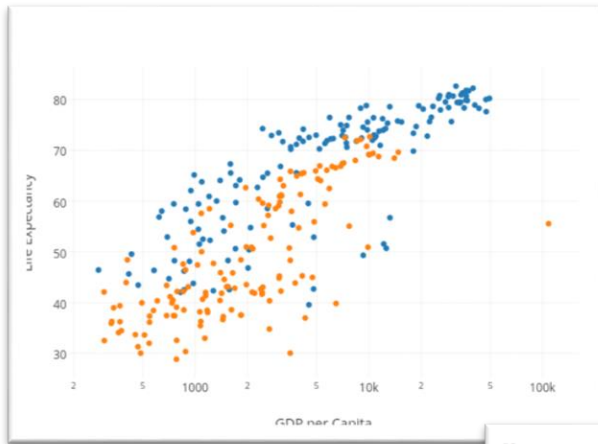
- Among Items
 - Few Categories
 - Many Categories
- Over Time
 - Number of Periods
 - Cyclical/Seasonal
 - Few/Many Variables

- Good Chart Types
 - Bar Chart
 - Column Chart
 - Area Chart
 - Line Chart
 - Distribution Chart



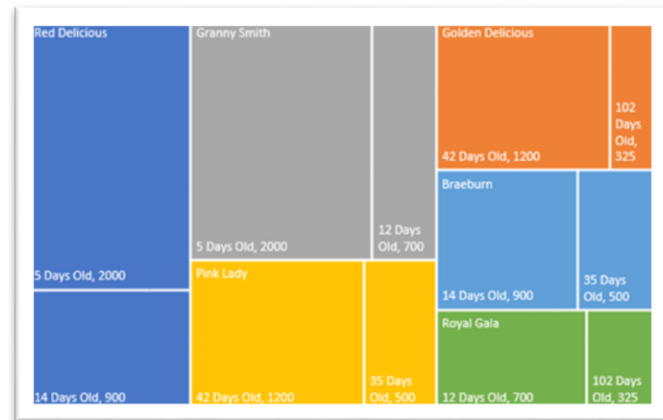
Relationships

- Number of Variables



- Good Chart Types

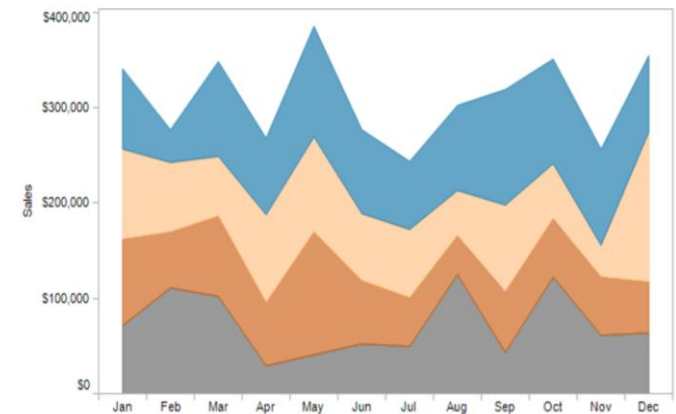
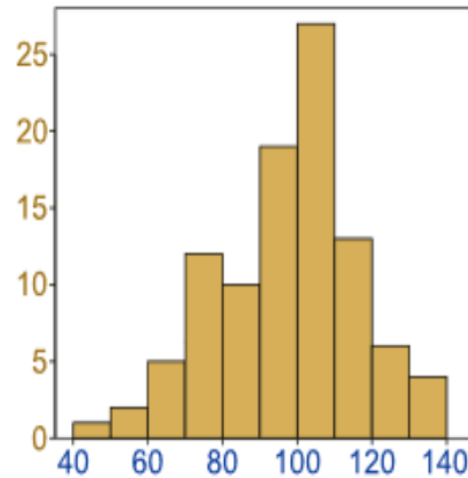
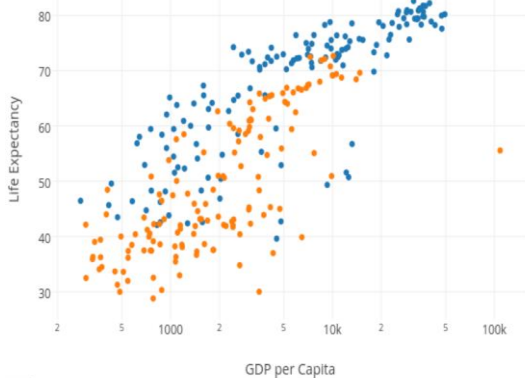
- Scatter Plot
- Bubble Chart
- Tree Map
- Gantt Chart



Distribution

- Number of Variables
- Number of Data Points

- Good Chart Types
 - Column Histogram
 - Line Histogram
 - Stacked Ratio Chart
 - Scatter Plot
 - 3D Area Chart



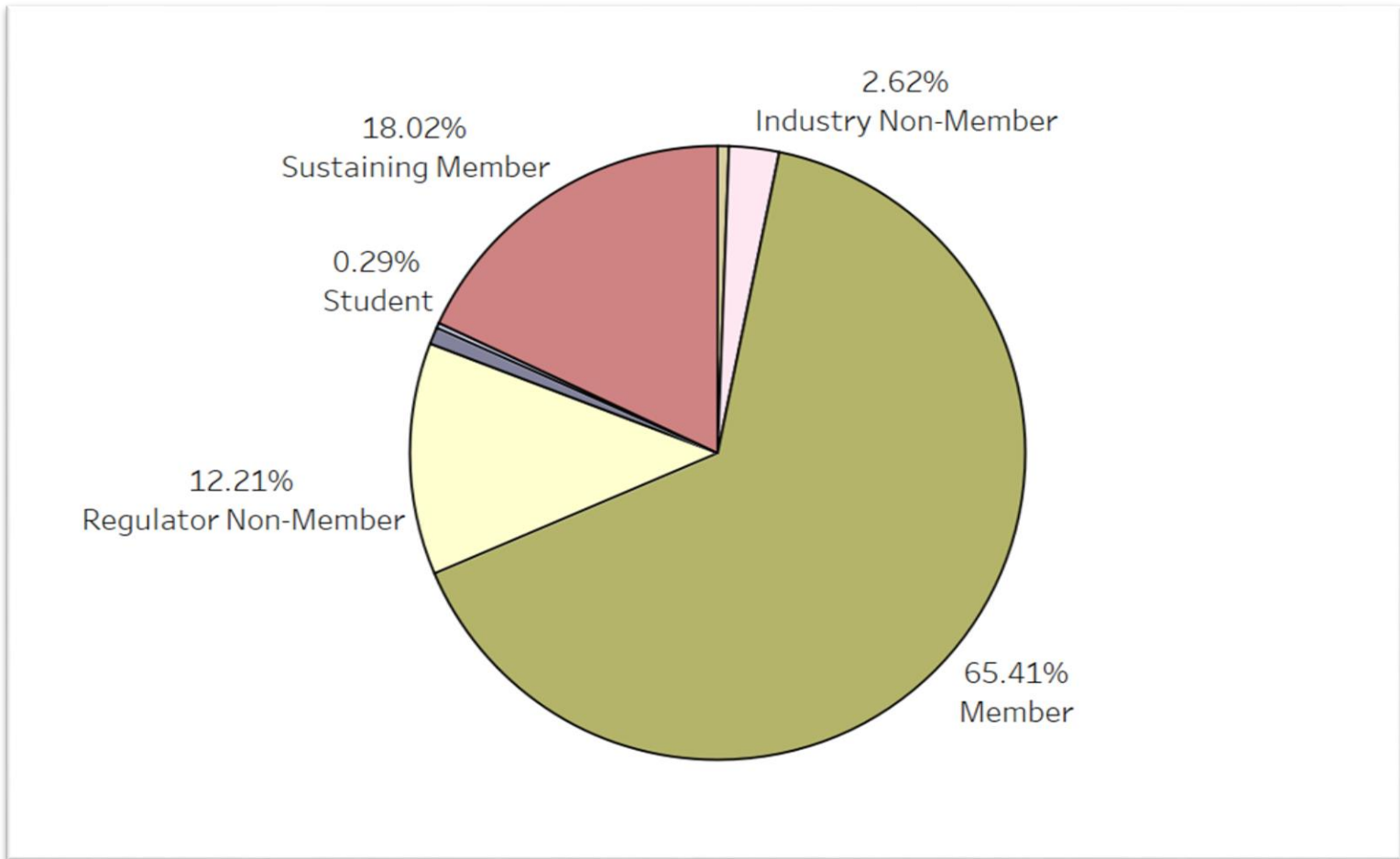
Composition

- Nature of Data
 - Static
 - Change Over Time
 - Number of Periods
 - Number of Categories
- Comparison Type
 - Relative Difference
 - Absolute Difference
 - Share of Total
 - Accumulation

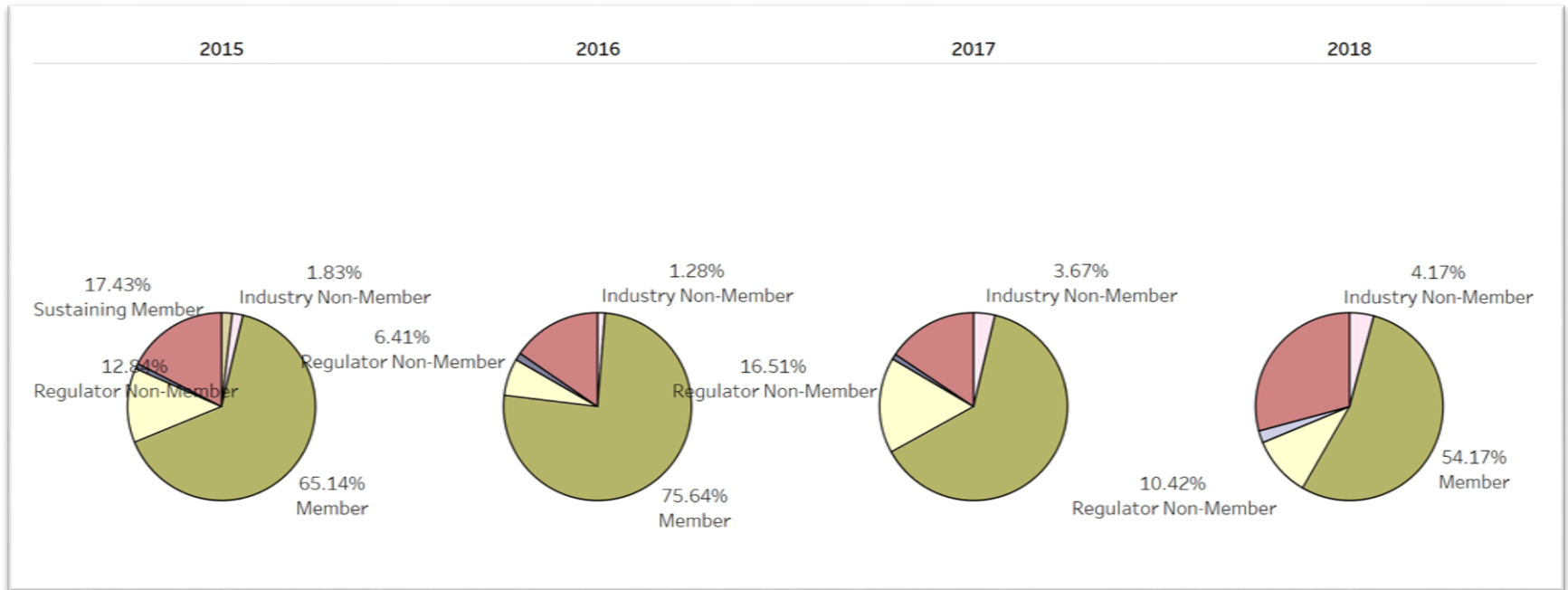
- Good Chart Types
 - Pie Chart
 - Donut Chart
 - Tree Map
 - Stacked Column/Bar Chart
 - Stacked Area Chart
 - Waterfall Chart



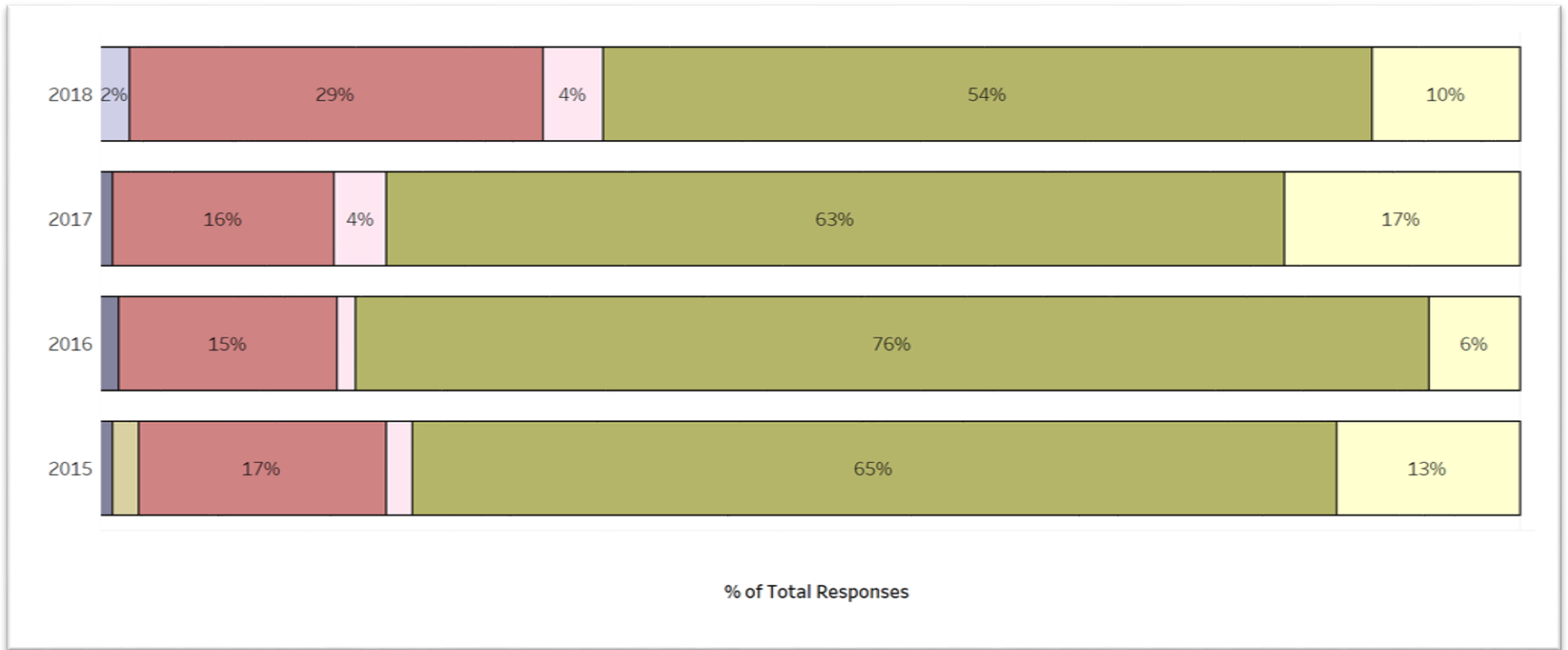
Picking The Right Chart



Picking The Right Chart (Continued)



Picking The Right Chart (Continued)

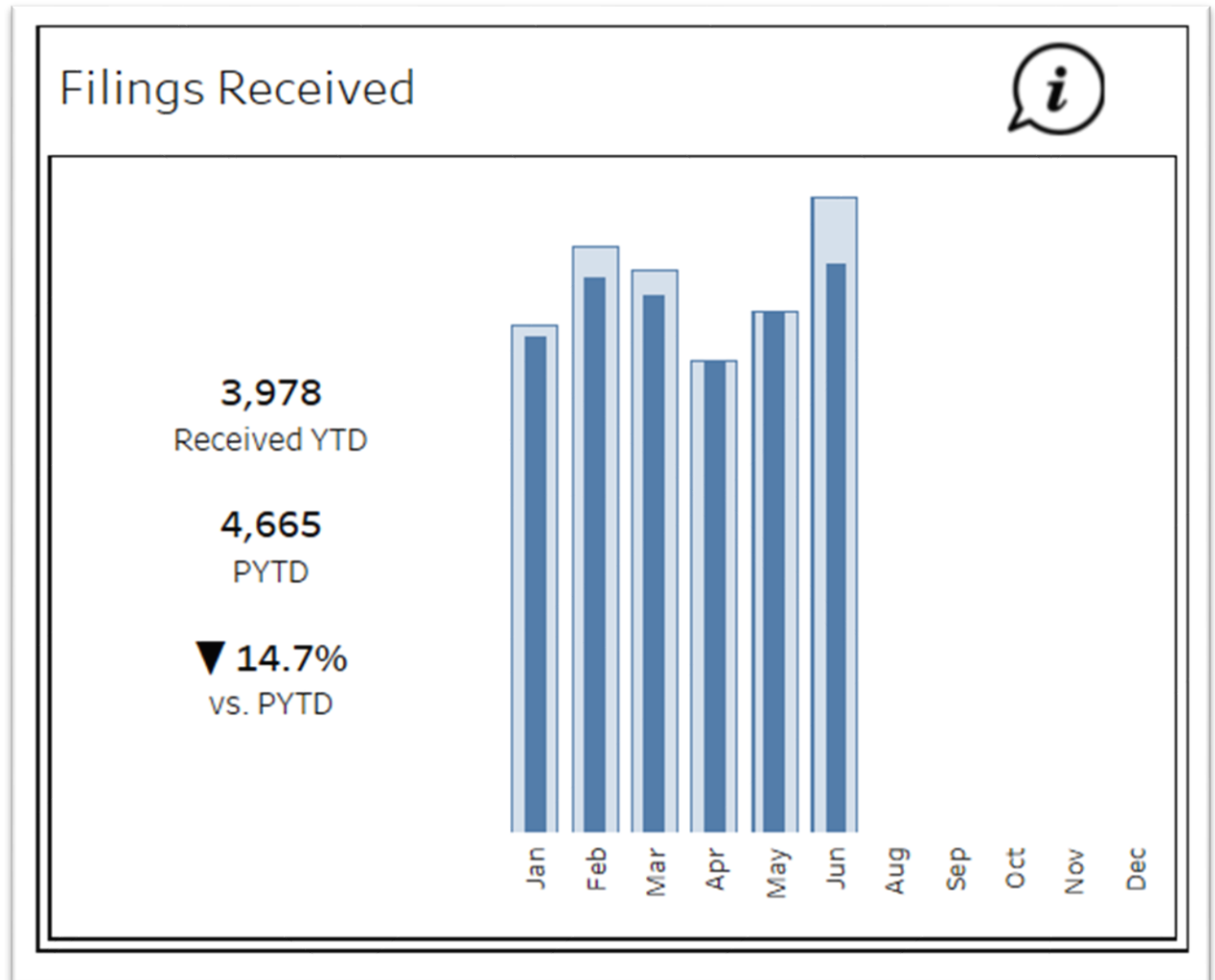


Best Practices

- Avoid the ‘Kitchen Sink Syndrome’
 - No Single Best Way
 - Keep It As Simple As Possible
 - Include Necessary Items Only
 - Provide Options To Investigate
- Direct Focus
 - Conditional Formatting
 - Reference Lines
 - Highlight Trends
 - Project Forecasts
- Help the End User
 - Provide Context
 - Chart Titles/Descriptions
 - Annotate
 - Labels/Axis
 - Pre-sort When Possible
- Colors Have Meaning
 - Categorical
 - Sequential
 - Diverging

Adding Value

- Trending
- Comparisons



Adding Value (Continued)

- Brings Together Information from a Variety of Sources

Market Analysis Profile Reports

[Financial Company Search](#) [Market Firm Search](#) [Market Individual Search](#) [Securities Search](#) [Subsidiaries Search](#) [Summary Reports](#) [Utilities](#)
[Change Password](#) [PICS](#) [StateNet](#) [Form A](#) [GRID](#) [Help](#) [E-Mail](#) [Login](#)

Cocode:	Entity Number:
FEIN:	Alien:
	Group:

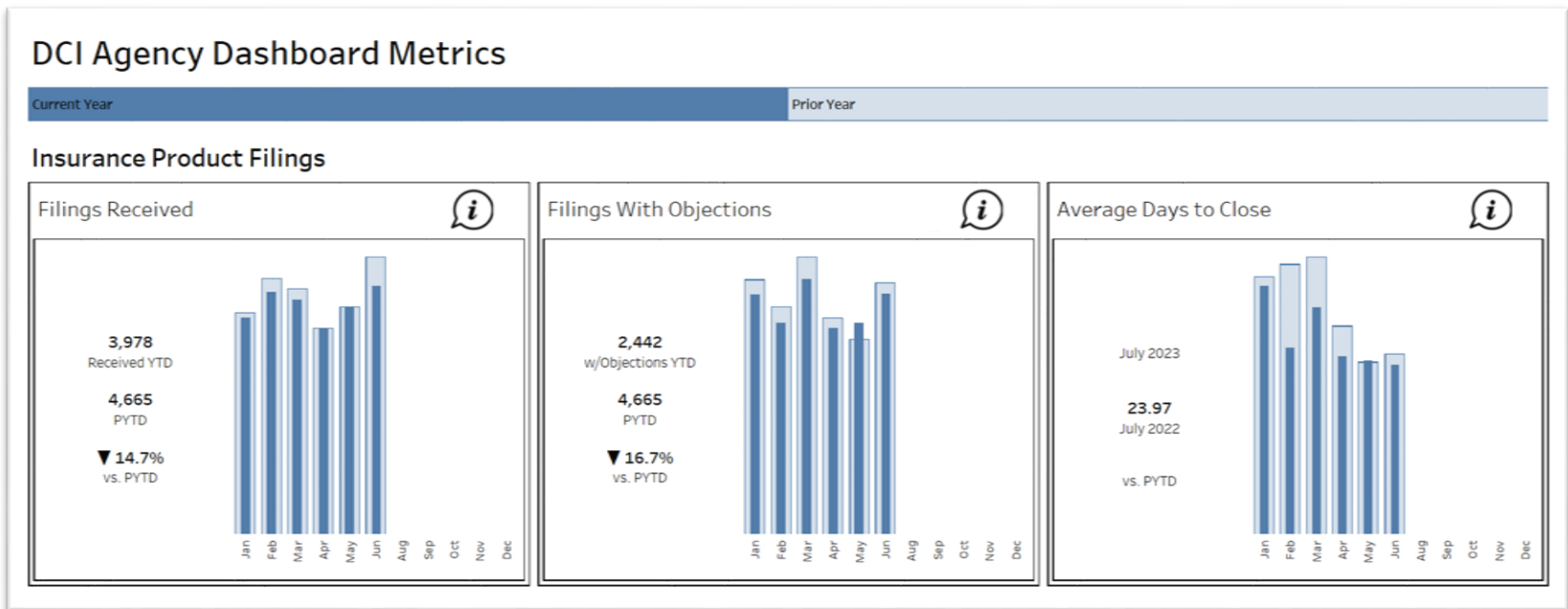
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<input type="checkbox"/>	MODIFIED FINANCIAL SUMMARY PROFILE - 5 YEARS
<input type="checkbox"/>	COMPLAINTS INDEX REPORT - 5 YEARS
<input type="checkbox"/>	REGULATORY ACTIONS REPORT- 5 YEARS
<input type="checkbox"/>	SPECIAL ACTIVITIES REPORT - 5 YEARS
<input type="checkbox"/>	CLOSED COMPLAINTS REPORT - 5 YEARS
<input type="checkbox"/>	ETS SUMMARY - 5 YEARS
<input type="checkbox"/>	MODIFIED IRIS RATIOS - 1 YEAR
<input type="checkbox"/>	DEFENSE COSTS AGAINST RESERVES - 5 YEARS
<input type="checkbox"/>	STATE-BY-STATE PREMIUM & COMPANY LICENSE INFO - 5 YEARS

All States Northeastern Zone Southeastern Zone Midwestern Zone Western Zone

Report Format Type:

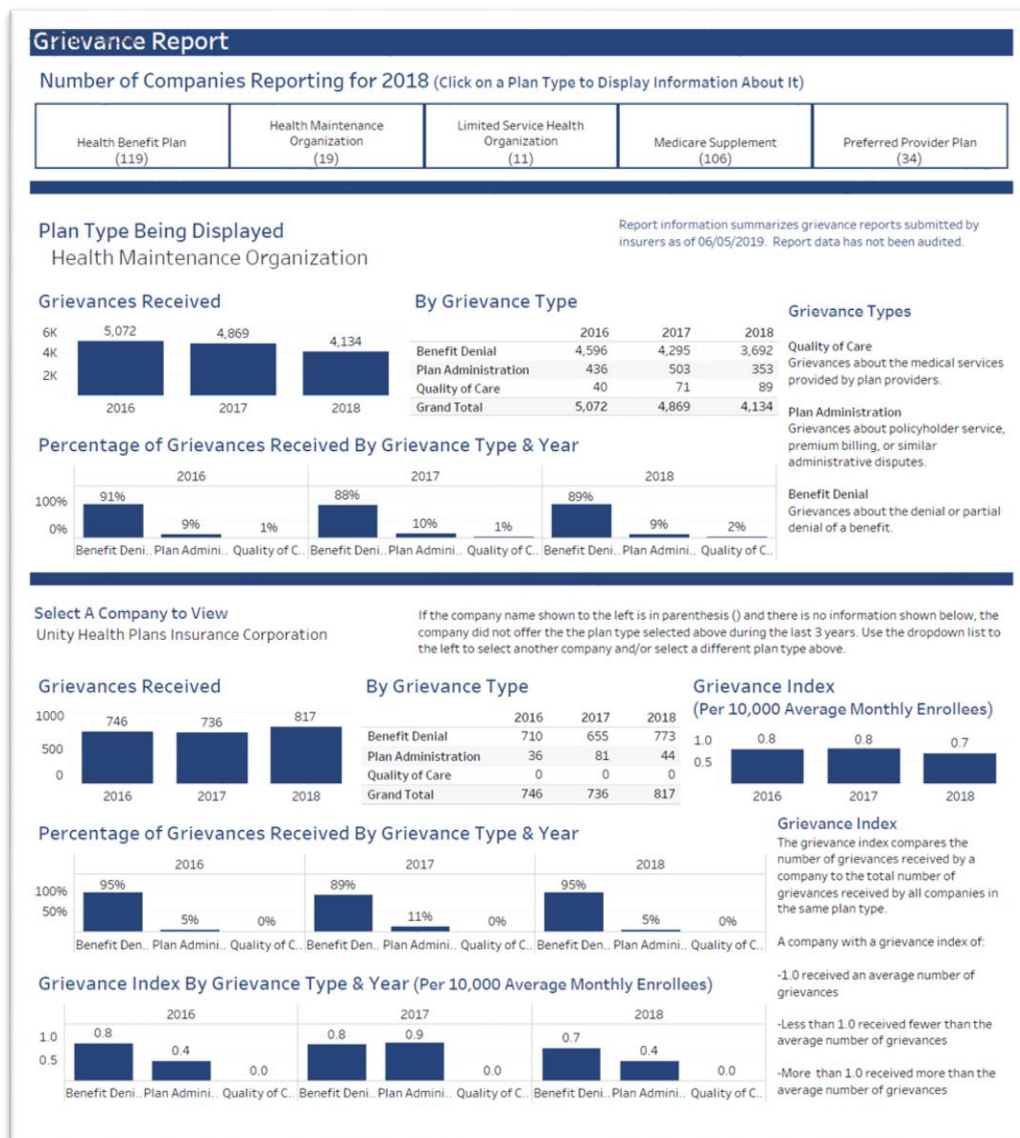
Adding Value (Continued)

- Seeing the Bigger Picture



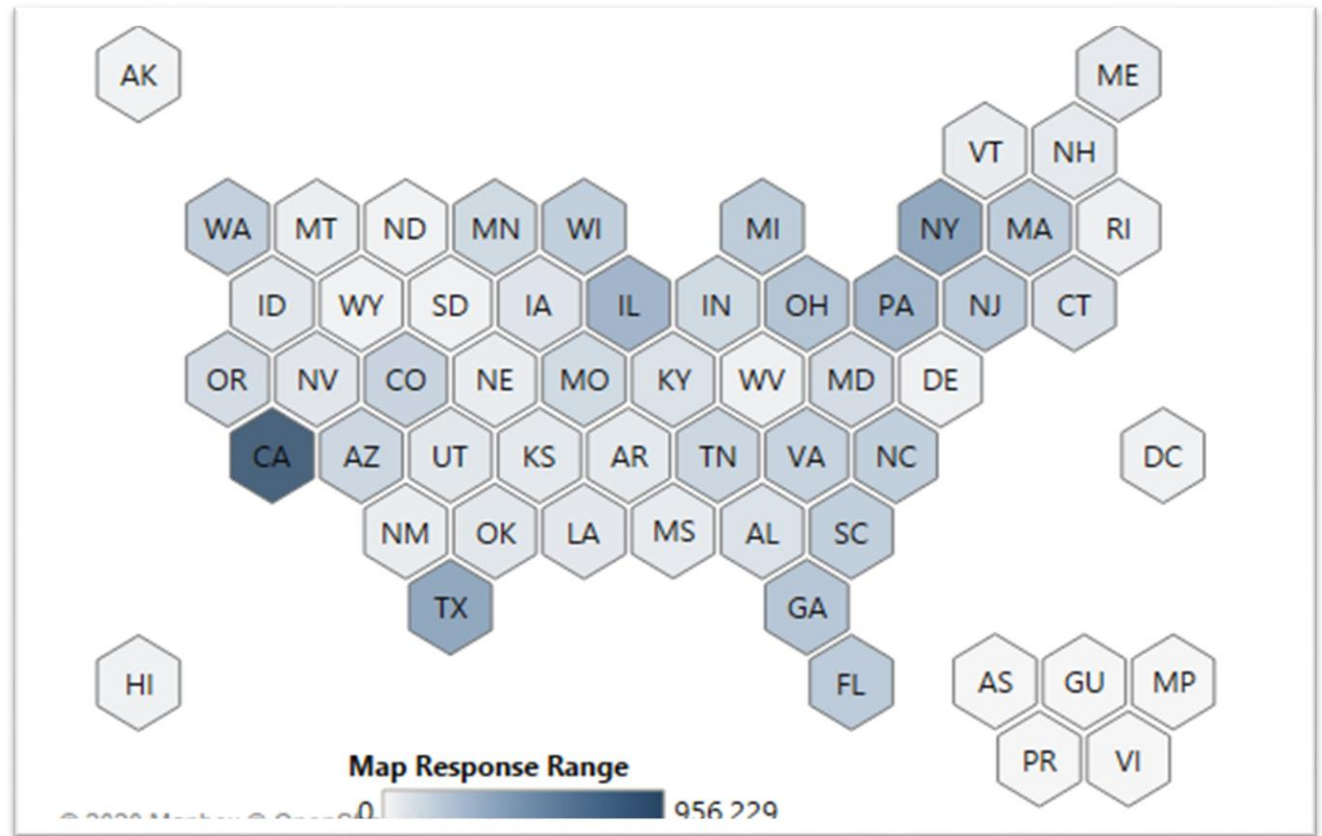
Adding Value (Continued)

- Tell the Whole Story
- Add Annotations



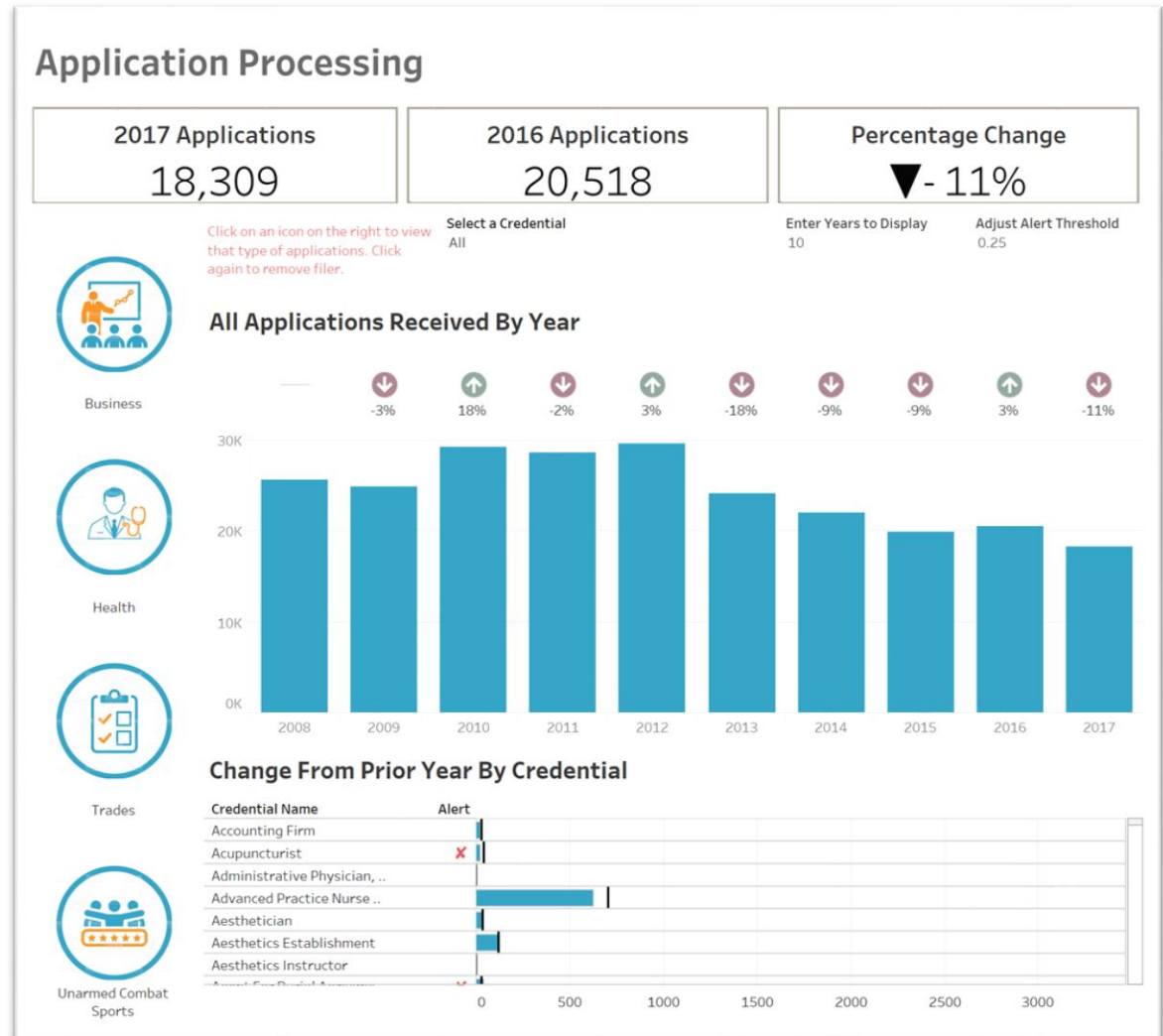
Adding Value (Continued)

- Easier To Read

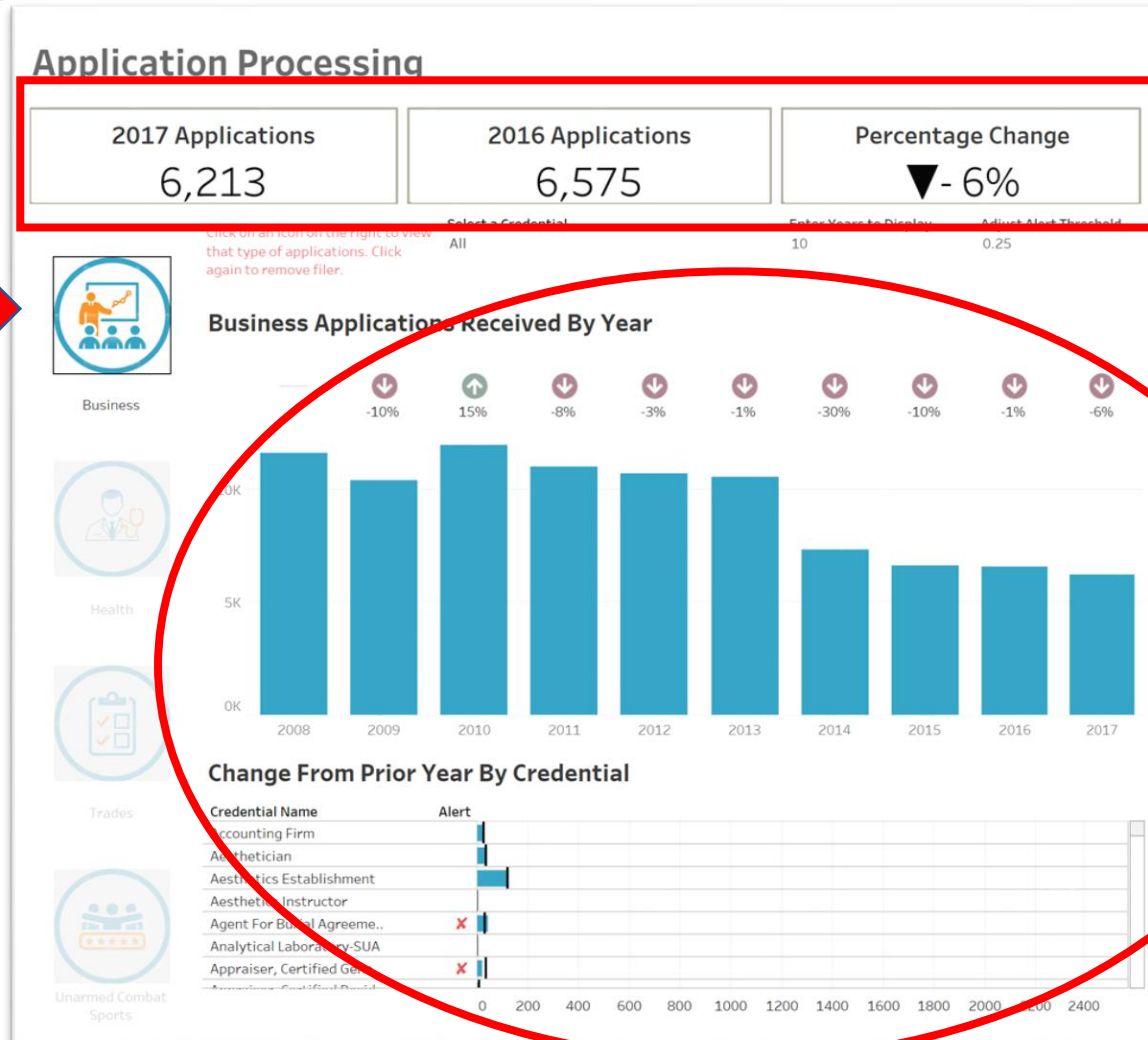


Adding Value (Continued)

- Allows for Investigation
- Drill Down Interactive Visualizations

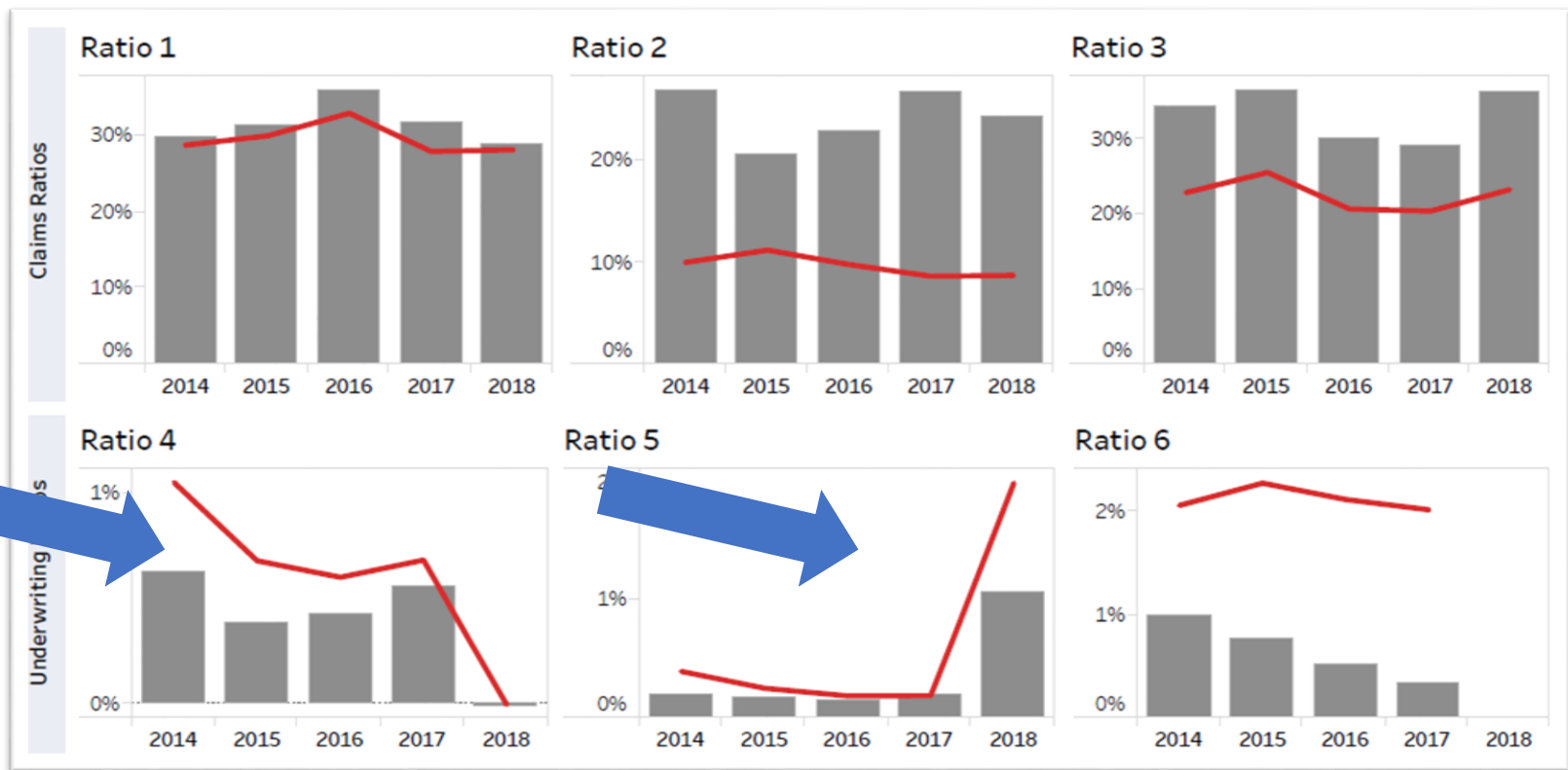


Adding Value (Continued)



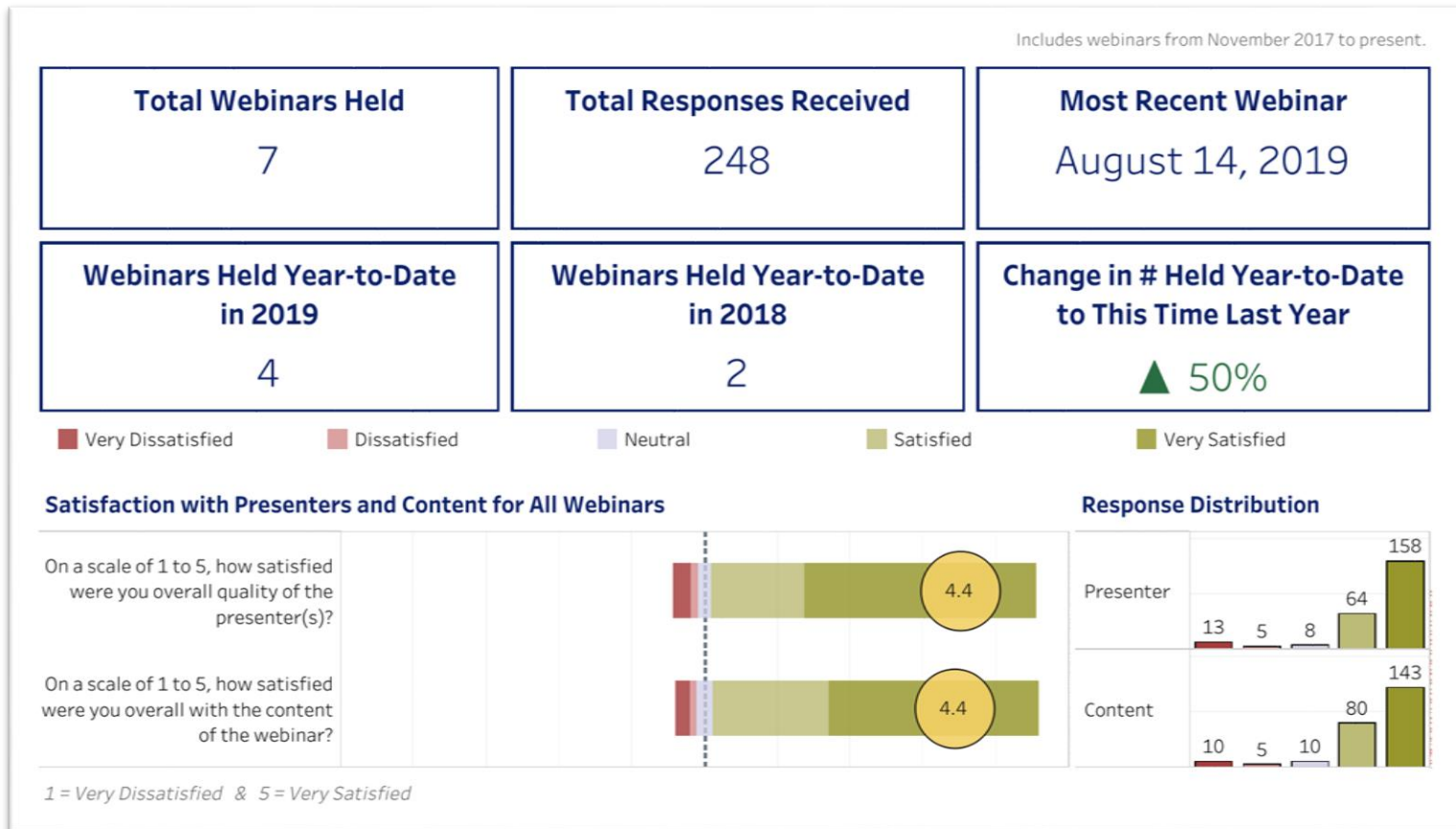
Adding Value (Continued)

- Add Context for Better Understanding



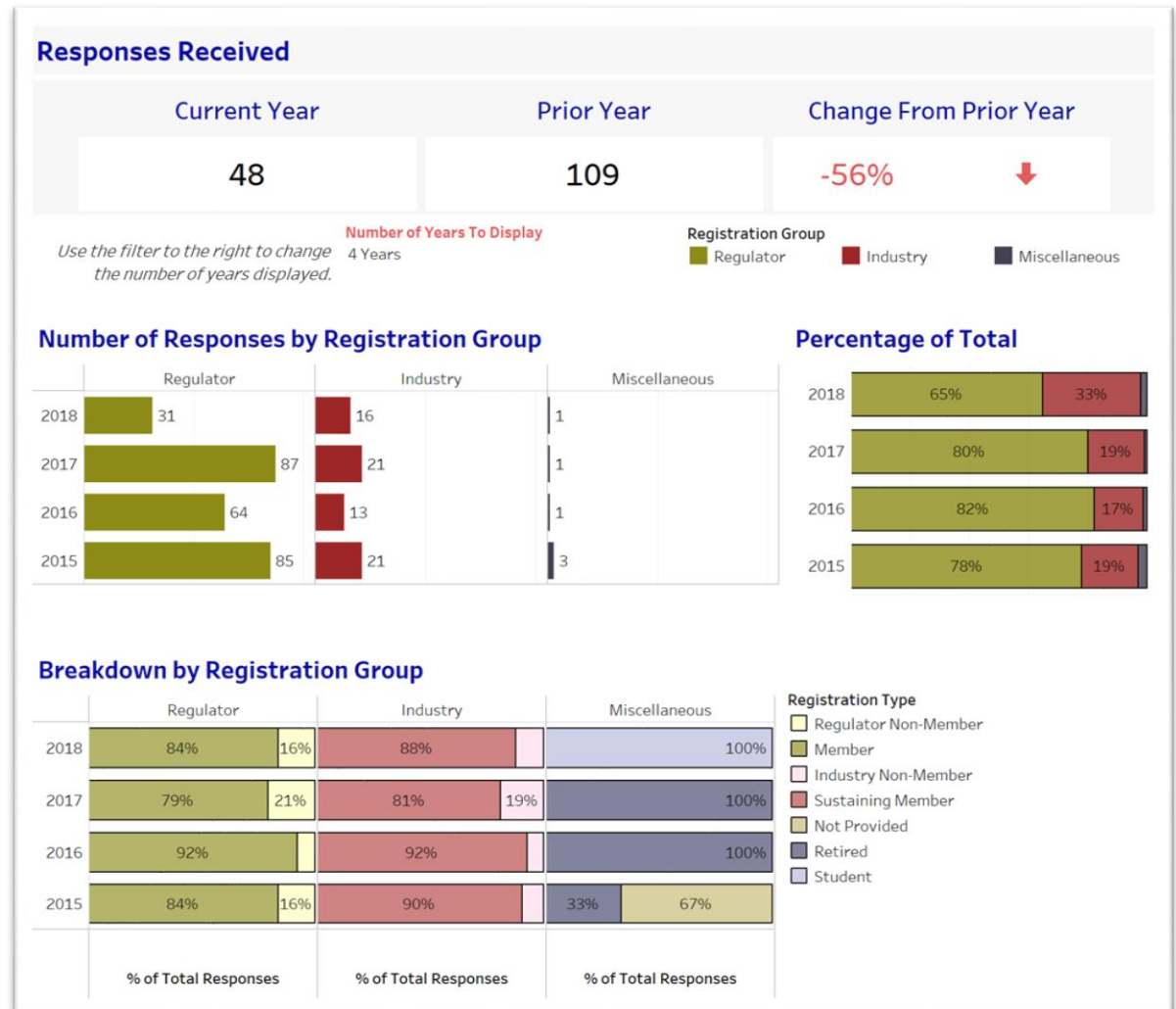
Adding Value (Continued)

- Know Your Audience



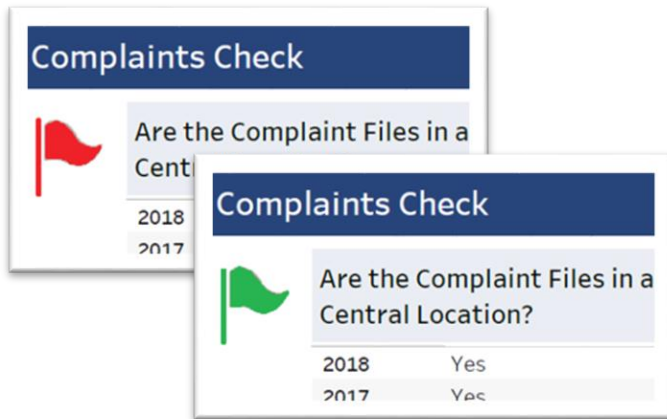
Adding Value (Continued)

- Save the Details For Those That Need to See It



Adding Value (Continued)

- Direct Focus



Market Analyst Prioritization Tool (MAPT)

- Baseline Analysis / Prioritization Tool
 - ≈ 2005 / 2006
 - State & National Data
- Content (Data Points) Compiled from Independent Systems
 - Complaints
 - Regulatory Actions
 - Premium & Loss
 - Examinations
 - Company Demographics

- Missouri Data Points:

	LOB	Credit	LTC	Home	Auto	IAH
Data Points		166	160	214	214	221
Records		17	80	149	172	318
Cells to Analyze		2,822	12,800	31,886	36,808	70,278

MAPT Challenges

- Cannot See Whole Picture
- Excel Spreadsheet
- Additional Work Needed to Identify Companies of Interest
 - Sorting
 - Formatting
- Decisions May Not Be:
 - Traceable
 - Repeatable
- No Benchmarks/Context Provided
- True Outliers May Be Masked

Overall Score Analysis: *Private Passenger Auto*

Highlight A Company
No items highlighted

Run Date

To view company data, click on a company in the scatter plot.

State Score Weight
0.75

Jitter Control
5

Overall Score Range
95 609

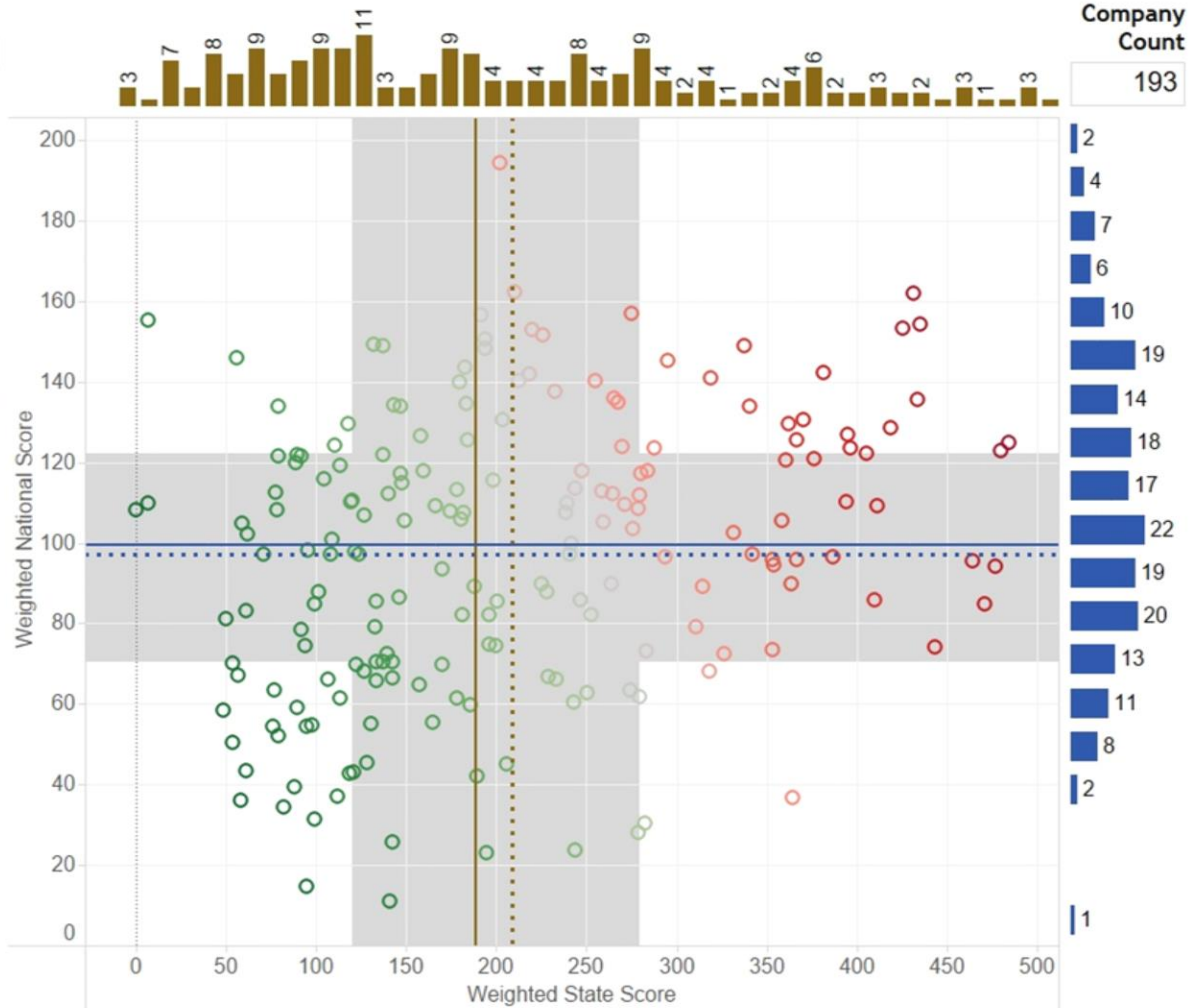
Maximum Point Value

National Component

- Complaints 400
- RIRS 200
- Premium 150
- Exam History 100
- Loss, etal 100
- Demographic 50

State Component

- Complaints 400
- RIRS 200
- Premium 200
- Loss, etal 200



Selected Company



DCI

Overall Score Analysis: Private Passenger Auto

Highlight A Company
No items highlighted

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To view company data, click on a company in the scatter plot.

State Score Weight
0.75

Jitter Control
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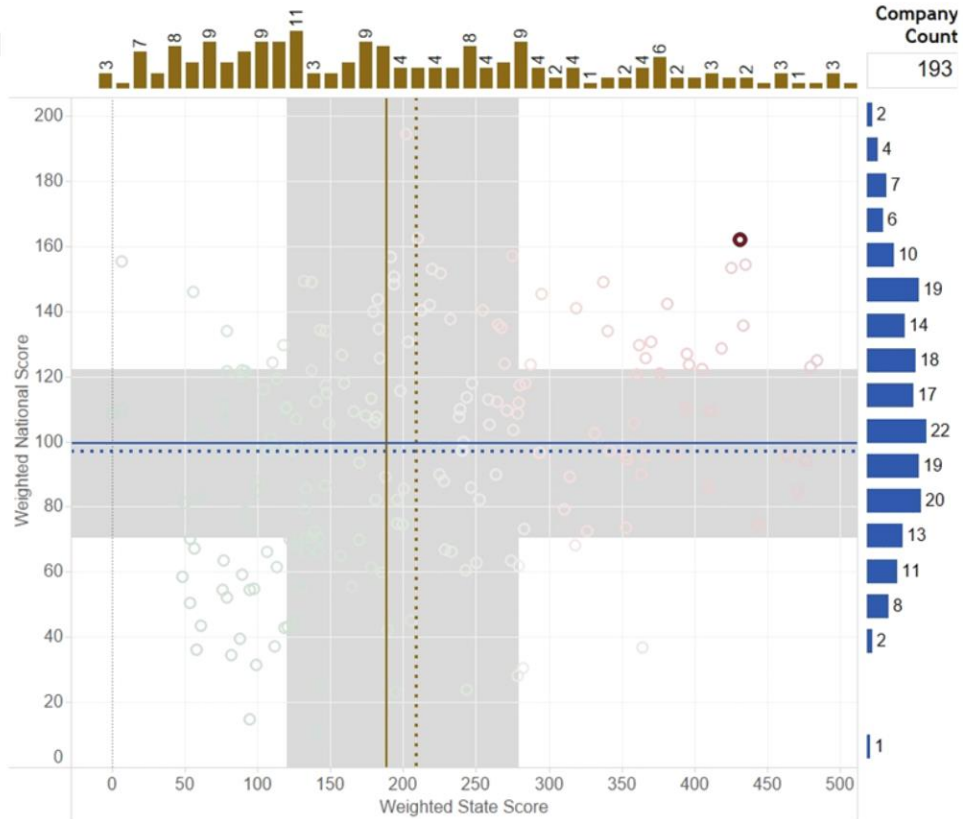
Maximum Point Value

National Component

Complaints	400
RIRS	200
Premium	150
Exam History	100
Loss, etal	100
Demographic	50

State Component

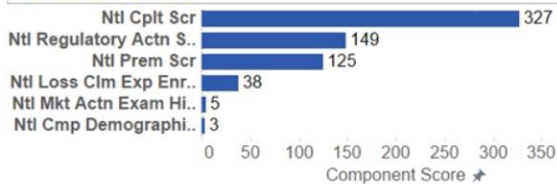
Complaints	400
RIRS	200
Premium	200
Loss, etal	200



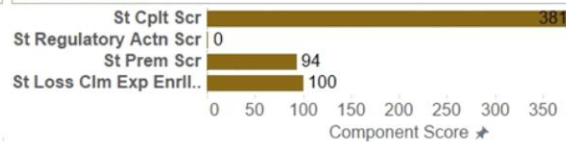
Selected Company

Cmp Name Cocode Grp Code Nationally Significant Domicile St

National Score



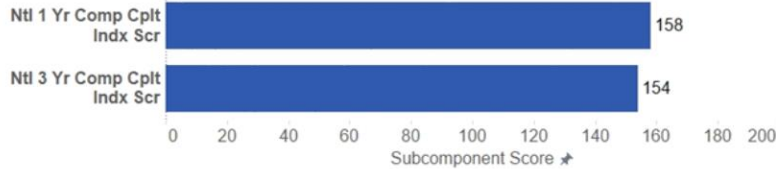
State Score



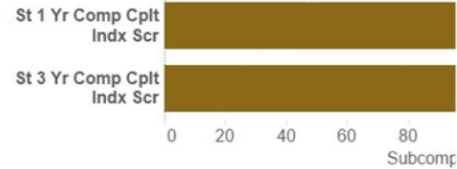
Company Complaint Data: *Private Passenger Auto*

Cmp Name _____ Cocode _____ Grp Code _____ Nationally Significant _____ Domicile St _____

National Complaint Subcomponents



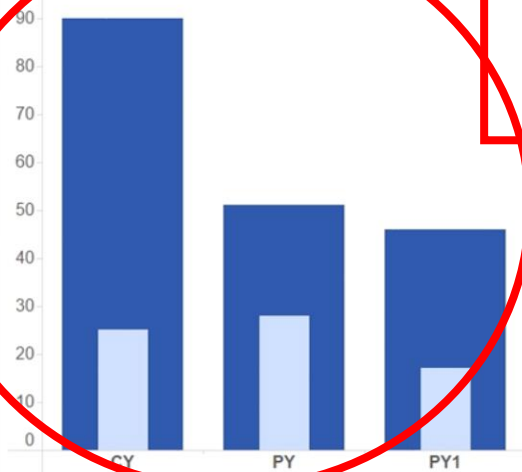
State Complaint Subcomponents



National Data

■ Ntl Comp Cplt Cnt ■ Ntl Conf Cplt Cnt

Complaint Counts



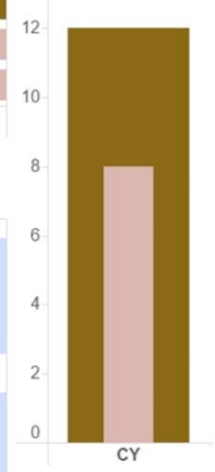
Complaint Indices



State Data

■ St Comp Cplt Cnt

Complaint Count



Confirmed Complaints As % of Complete



State Complaints As % of National



Complaint Indices



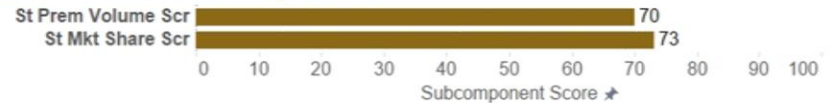
Company Premium Data: *Private Passenger Auto*

Cmp Name _____ Cocode _____ Grp Code _____ Nationally Significant _____ Domicile St _____

National Premium Subcomponents



State Premium Subcomponents



Top 5 Premium States

NAIC Zone

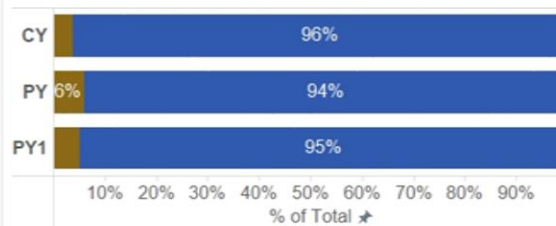


National Data

Direct Premium Written (DPW)



State DPW as % of National



State Data

Direct Premium Written (DPW)



Market Conduct Annual Statement (MCAS)

- Market Regulation Monitoring Tool
 - Since 2002/2003
 - 50 Participating Jurisdictions
- Provides Market Regulators With Information Not Otherwise Available
- Content (Data Points) Complaints
 - Claims/Loss
 - Premium & Underwriting
 - Complaints/Lawsuits
- Data Reported By
 - Jurisdiction
 - Line of Business
 - Coverage Type



MCAS Challenges

- Prioritization Tool & Individual Reports
- Missouri Homeowners MCAS MAPT
 - 180 Columns * 840 Rows = 151,200 Cells
- Granularity of Data Varies
 - Claims [At Coverage Type & Rolled Up to All Coverages]
 - Underwriting [At Line of Business & Repeated Within Spreadsheet]
 - National/State
- Limited Benchmarks/Context Provided in Reports
- Cannot See Whole Picture
- Additional Work Needed to Identify Companies of Interest
- Decisions May Not Be Traceable/Repeatable
- True Outliers May Be Masked

MCAS Ratio Analysis: Homeowners

To view the underlying data for a specific company, enter the company NAIC CoCode to the right and hit the **Enter** key before proceeding to the other dashboards.

CoCode

Run Date



Displaying Ratio 1

Click on the logo above to access the NAIC MCAS State Report Cards.

Select desired display options.

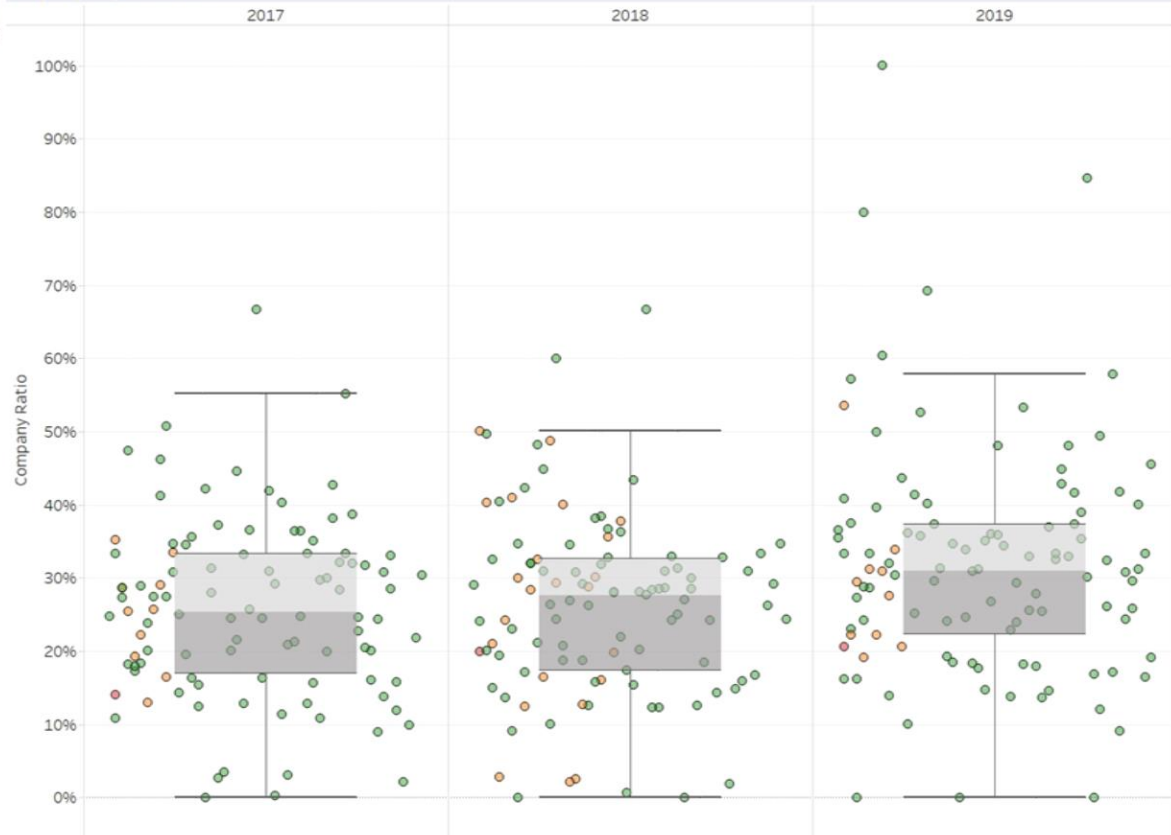
State
Missouri

Number of Years
3

- Ratio
- Ratio 1
 - Ratio 2
 - Ratio 3
 - Ratio 4
 - Ratio 5
 - Ratio 6
 - Ratio 7

Minimum Policies Inforce
From 0

Market Segment
All



1st Tier 2nd Tier 3rd Tier
Jitter Control
50

Highlight A Group
No items highlighted

Highlight A Company
No items highlighted

Companies Reporting

MCAS Ratio Analysis: Homeowners

To view the underlying data for a specific company, enter the company NAIC CoCode to the right and hit the **Enter** key before proceeding to the other dashboards.

CoCode

Run Date



Displaying Ratio 1

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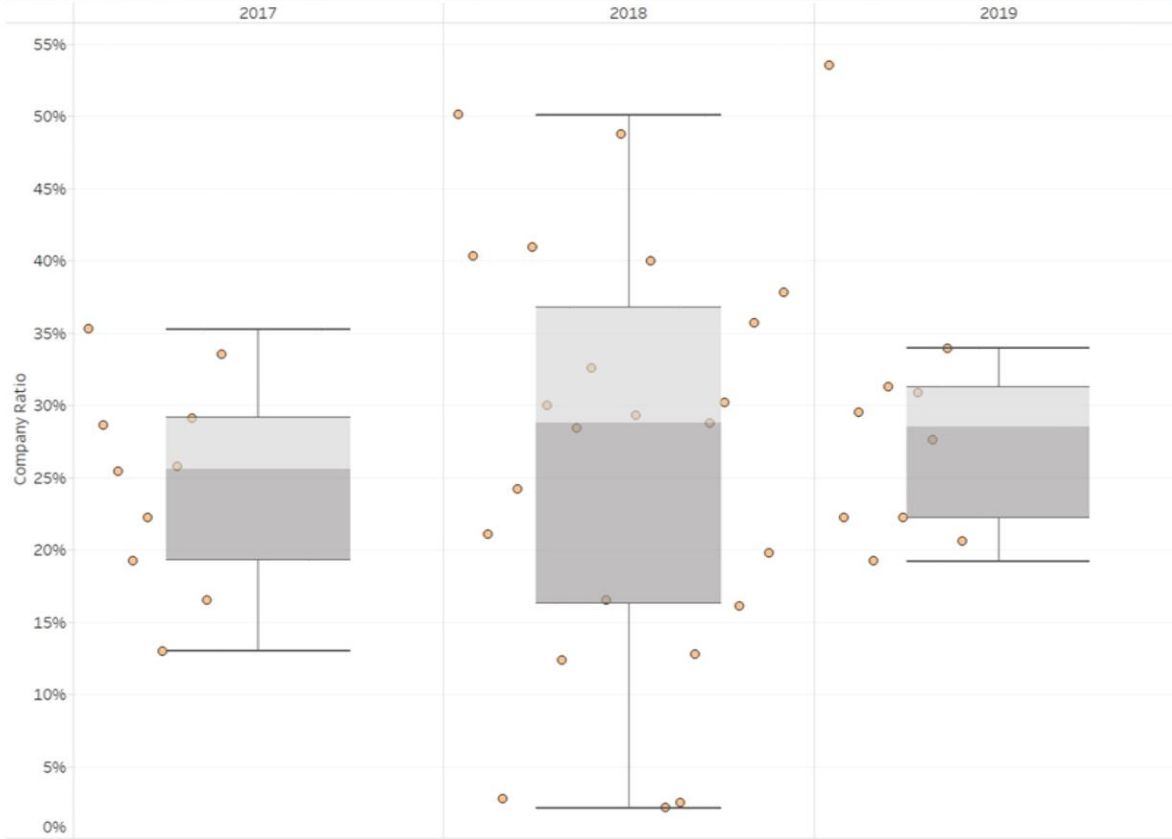
State
Missouri

Number of Years
3

- Ratio
- Ratio 1
 - Ratio 2
 - Ratio 3
 - Ratio 4
 - Ratio 5
 - Ratio 6
 - Ratio 7

Minimum Policies Inforce
From 0

- Market Segment
- 1st Tier
 - 2nd Tier
 - 3rd Tier



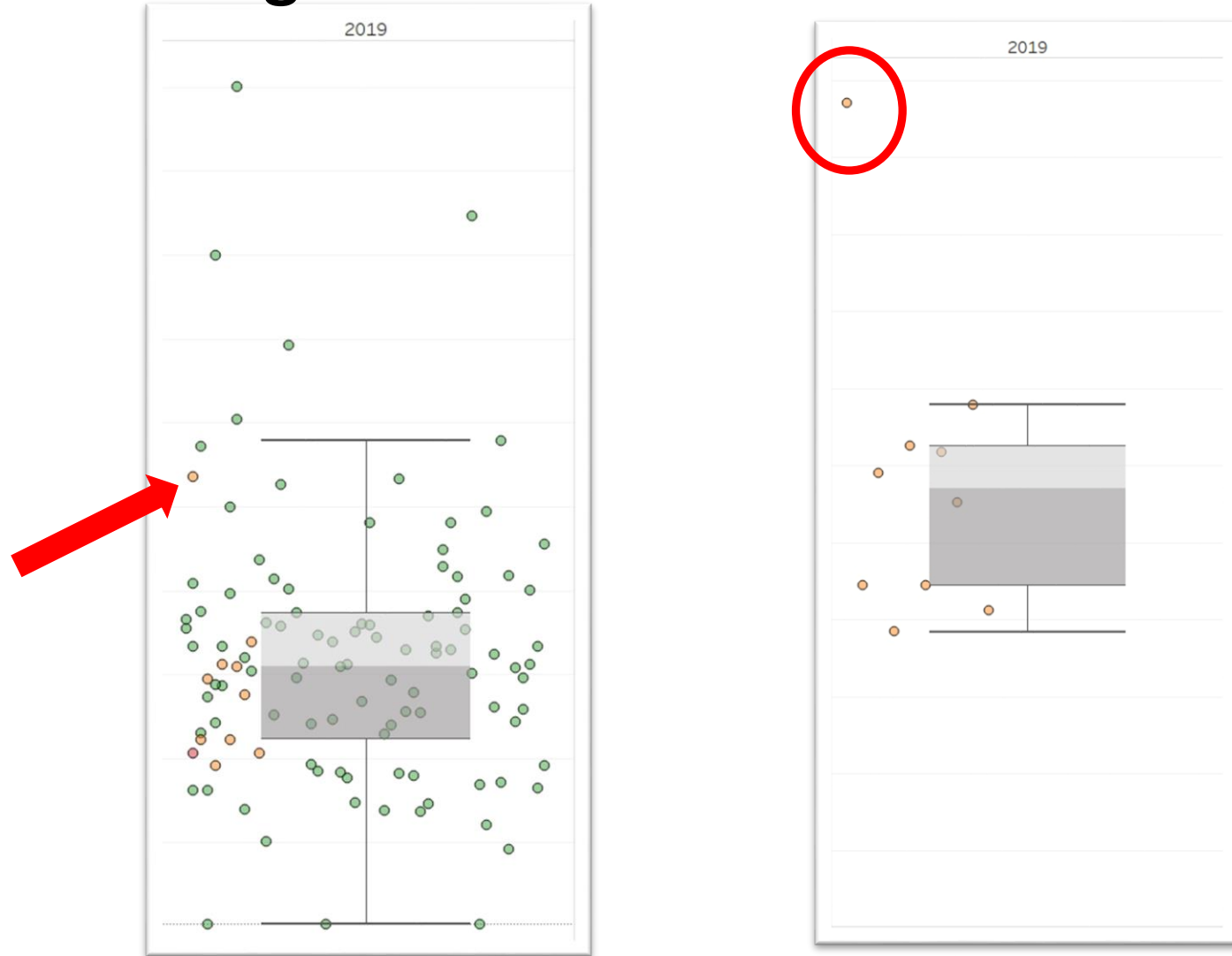
1st Tier 2nd Tier 3rd Tier
Jitter Control
50

Highlight A Group
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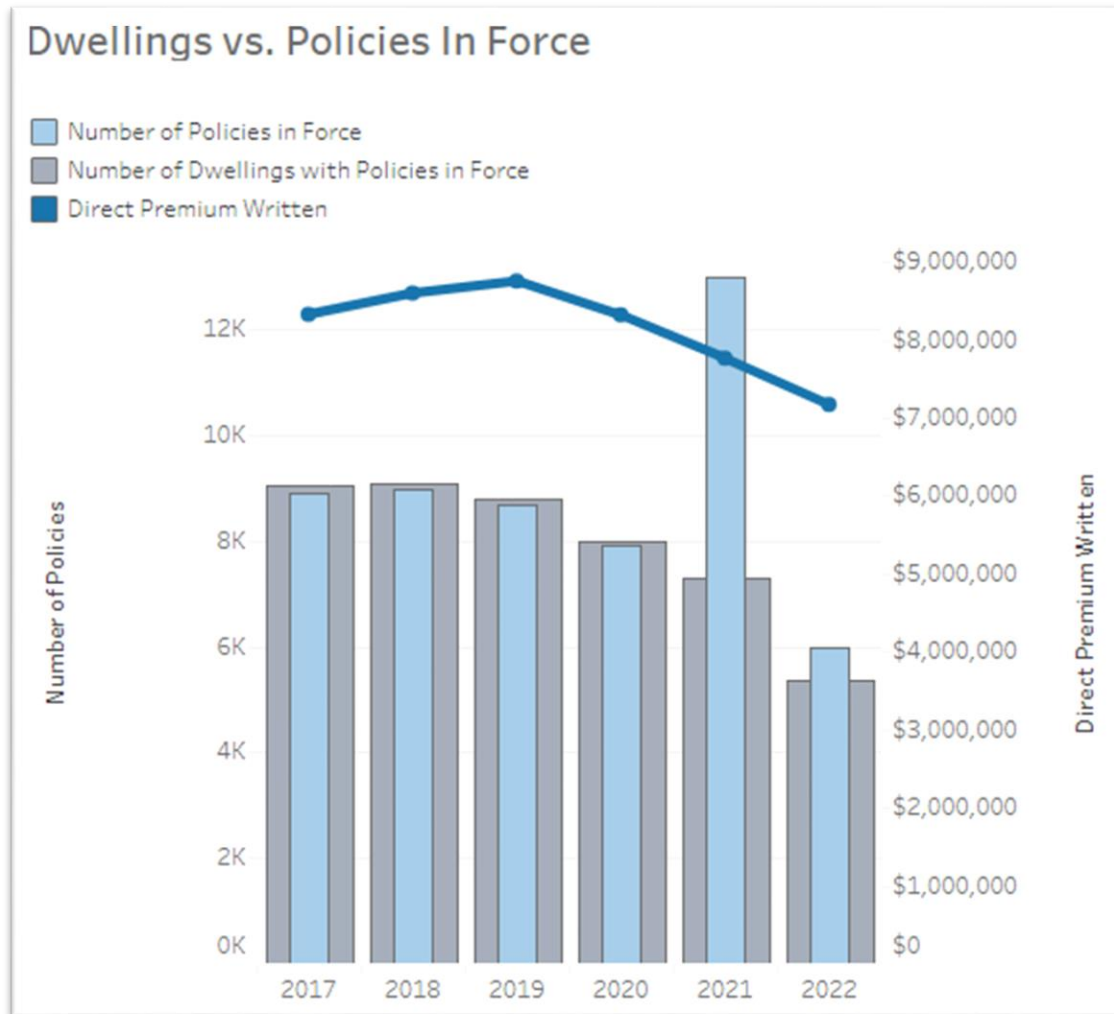
Highlight A Company
No items highlighted

Companies Reporting

Unmasking Potential Outliers

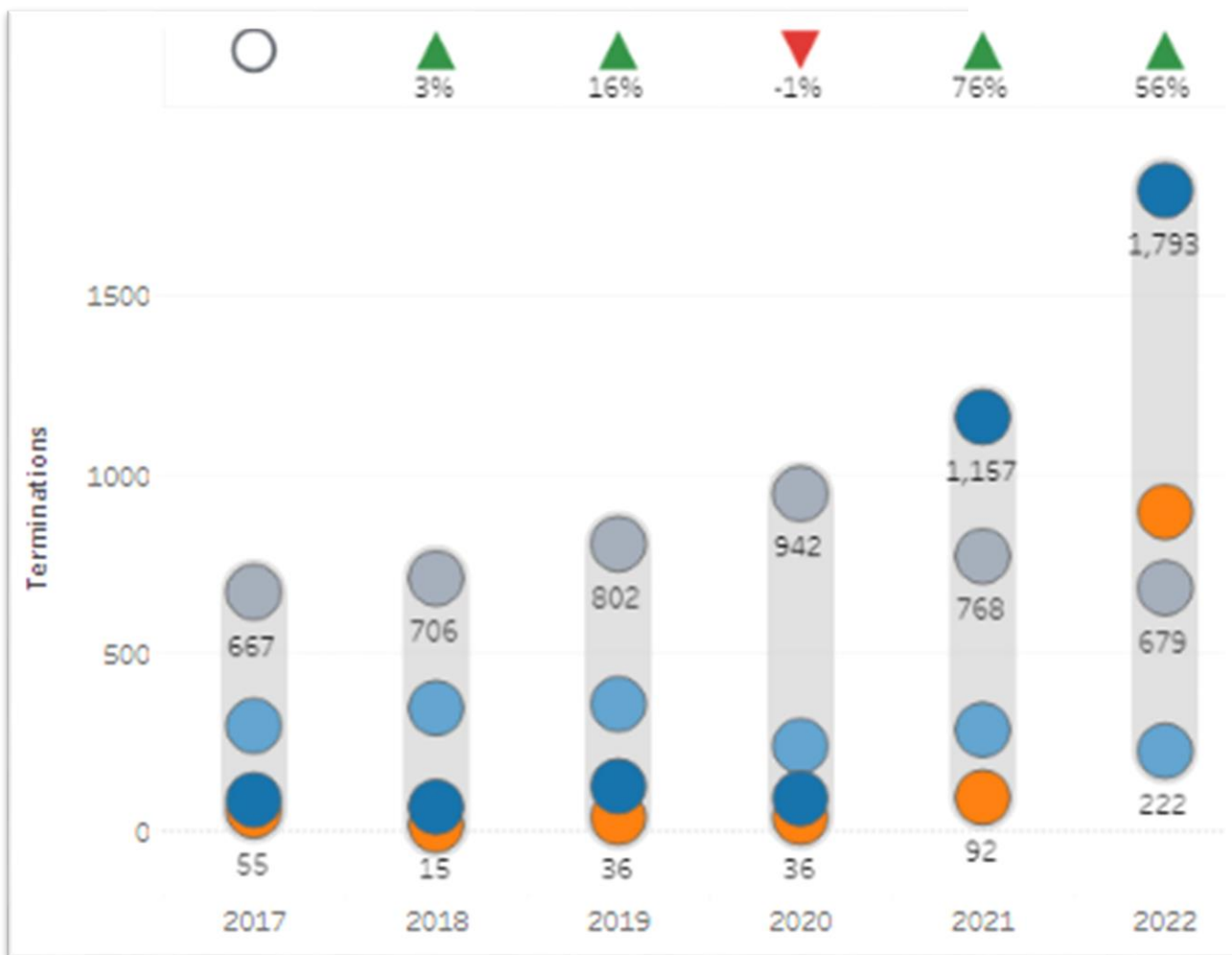


Spotting Data Integrity Issues



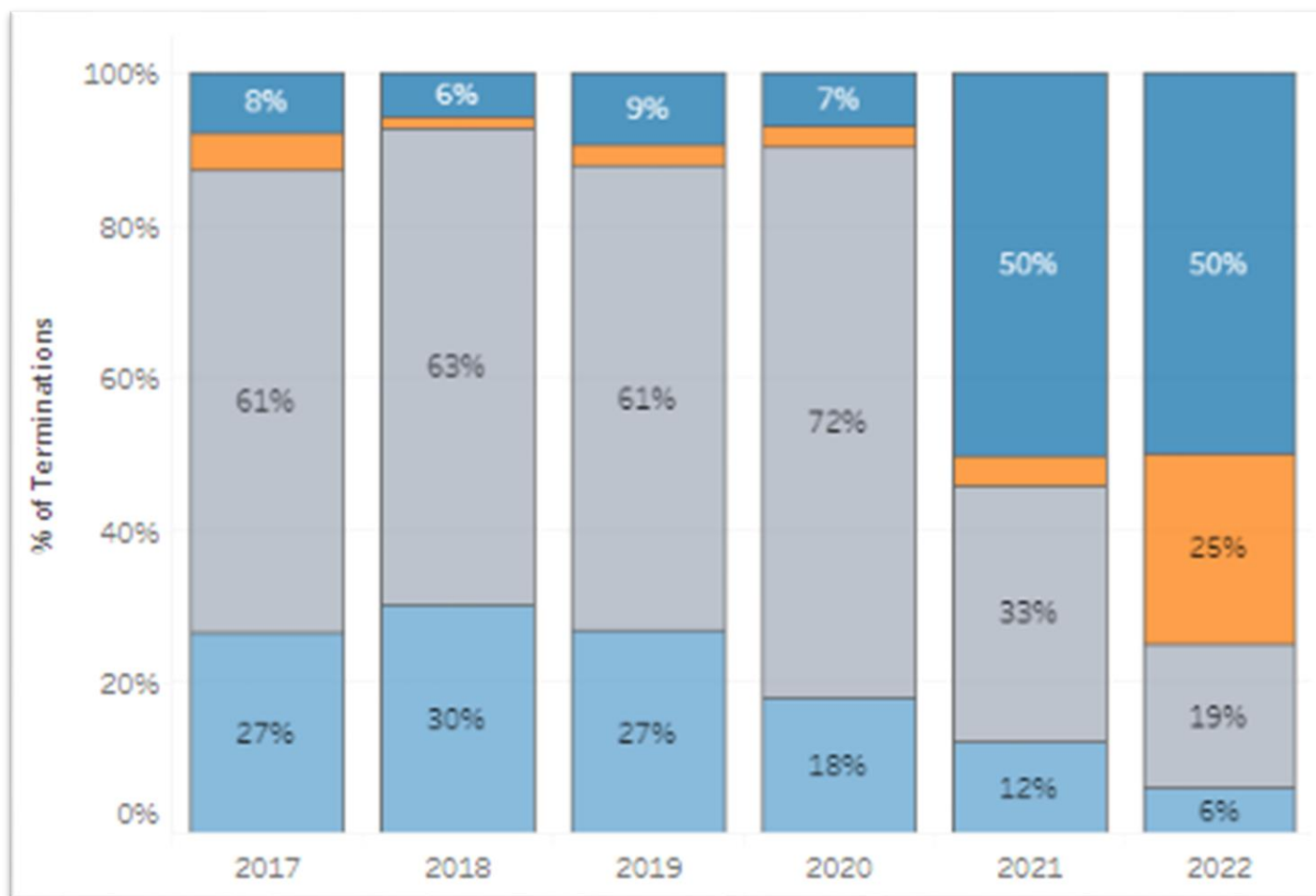
Seeing Trends

- Company Initiated Cancellations
- Company Initiated Non-Renewals
- Insured Requested Cancellations
- Non-Pay & NSF Cancellations



Seeing Trends (Continued)

- Company Initiated Cancellations
- Company Initiated Non-Renewals
- Insured Requested Cancellations
- Non-Pay & NSF Cancellations



Things to Consider

- Value Added
 - Is there real value?
 - Will it yield any real insights?
 - What will this help drive?
- Costs vs Benefits
 - What benefits will be derived?
 - Is existing data readily available?
 - What are the costs/benefits of obtaining/creating new data sources?
- Fundamental Change
 - Process
 - Mindset
- Skill Set Differential
 - Examiner vs Analyst
 - Transaction Based vs Big Picture



Questions?

Jo A. LeDuc, CIE, MCM, CPCU, FLMI, AIDA

Division Director, Insurance Market Regulation

jo.leduc@insurance.mo.gov

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