

# SAS Visual Analytics

## A Low Code No Code Approach To Visual Reporting

SAS®Institute Canada Inc.

Charu Shankar



# Charu Shankar

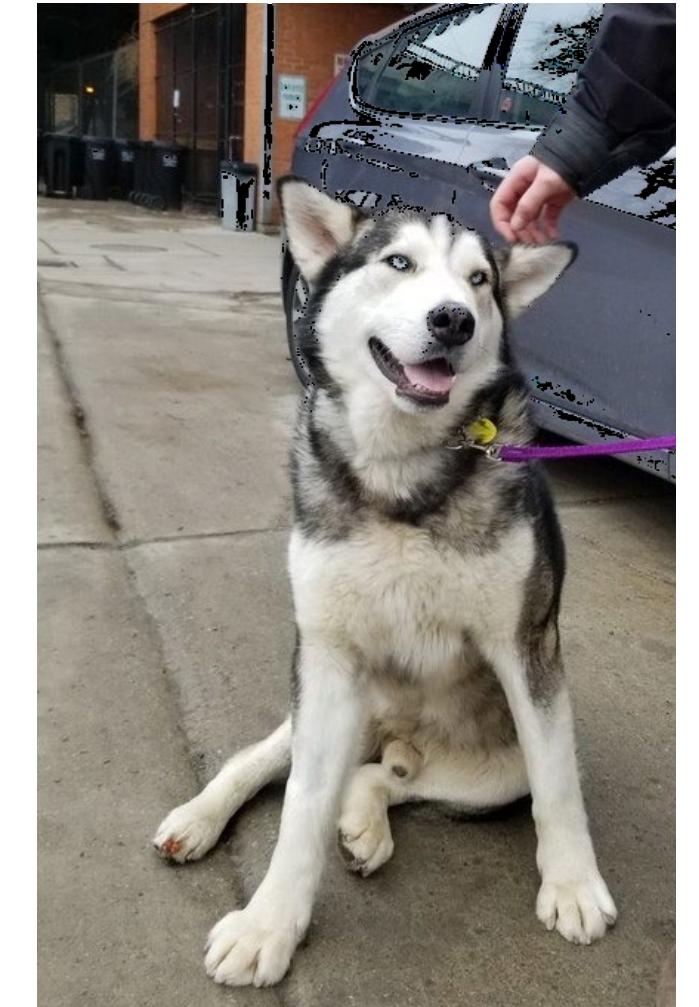
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With a background in computer systems management, SAS Instructor Charu Shankar engages with logic, visuals, and analogies to spark critical thinking since 2007.

Charu curates and delivers unique content on SAS, SQL, Viya, Python, SAS Visual Analytics to support users in the adoption of SAS software.

When not coding, Charu teaches yoga and loves to explore Canadian trails with her husky Miko.



# Agenda



- Introduction



- Use principles of good design in reporting



- Review the Process to create a dashboard in SAS VA



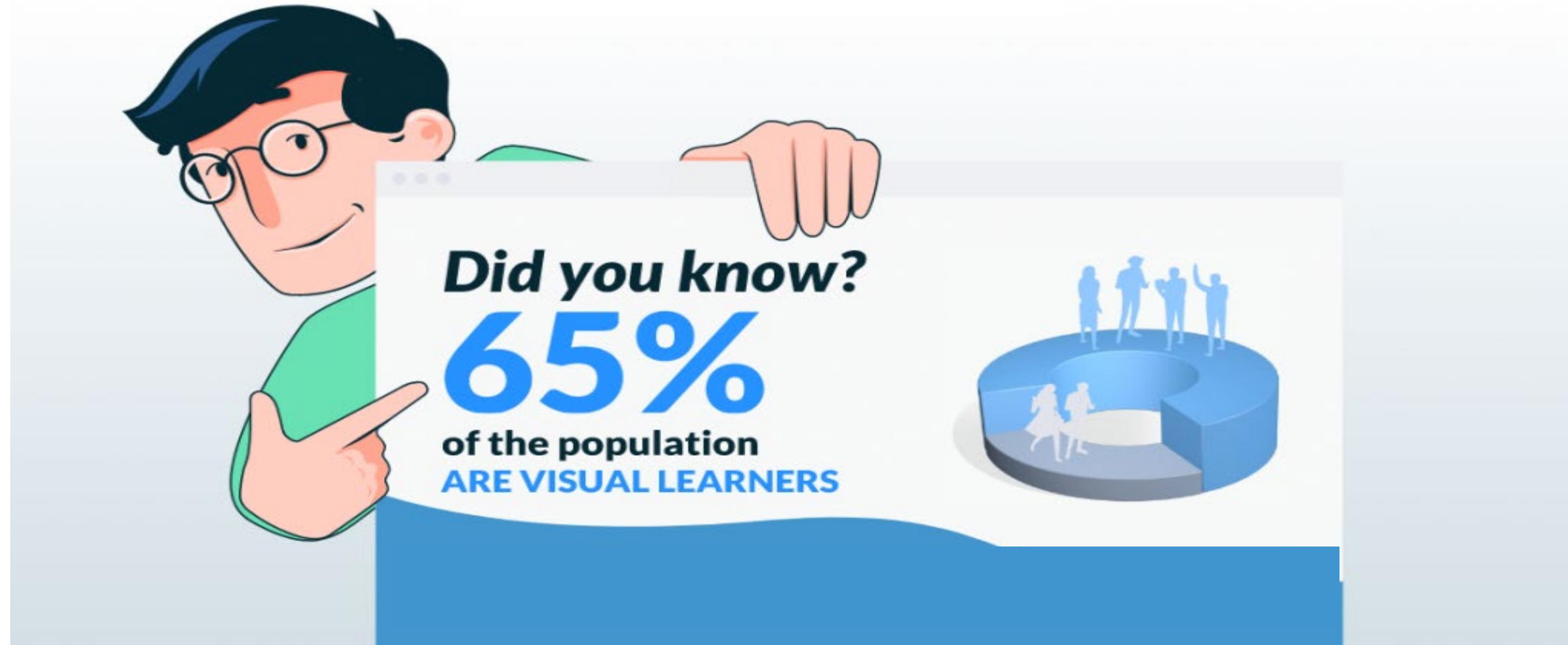
- Demo - Create a dashboard in SAS Visual Analytics



- Handy Links

# Introduction

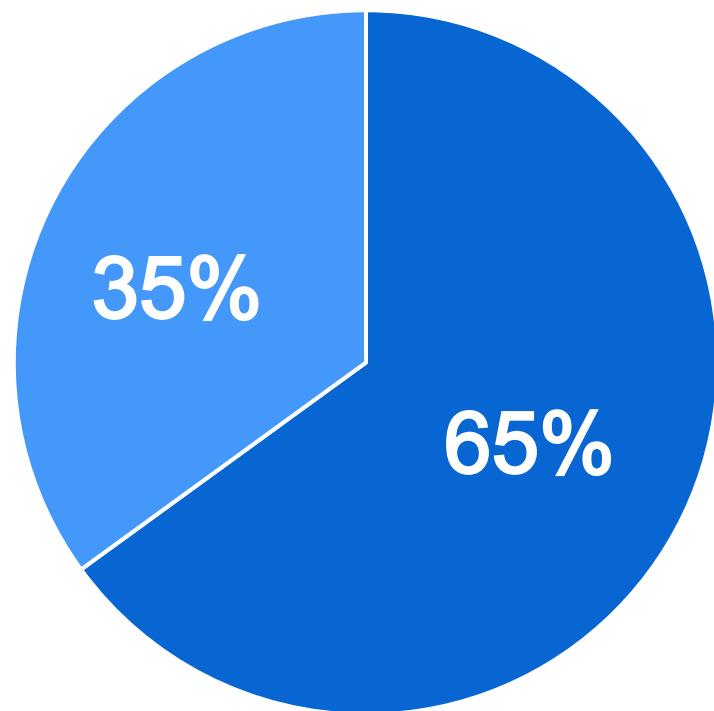
# What % of population is visual?



[https://en.wikipedia.org/wiki/Visual\\_thinking](https://en.wikipedia.org/wiki/Visual_thinking)

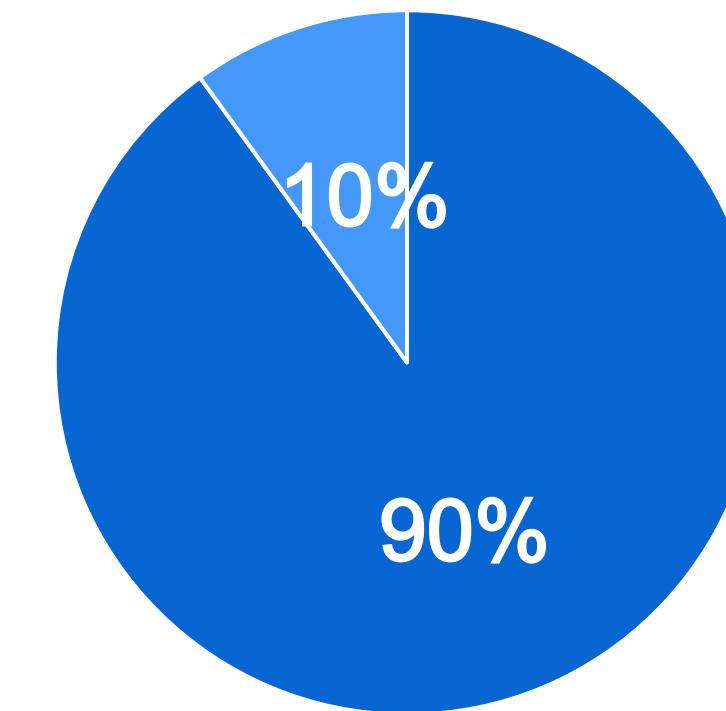
# What % of information transmitted to the brain is visual?

% of People Who Are Visual Learners



■ Visual Learners ■ "Readers" and "Do-ers" ■ ■

% of Information The Brain Processes That is Visual Data



■ Visual ■ Other Senses ■ ■

# Principles of Good Design

# Principles Of Good Design

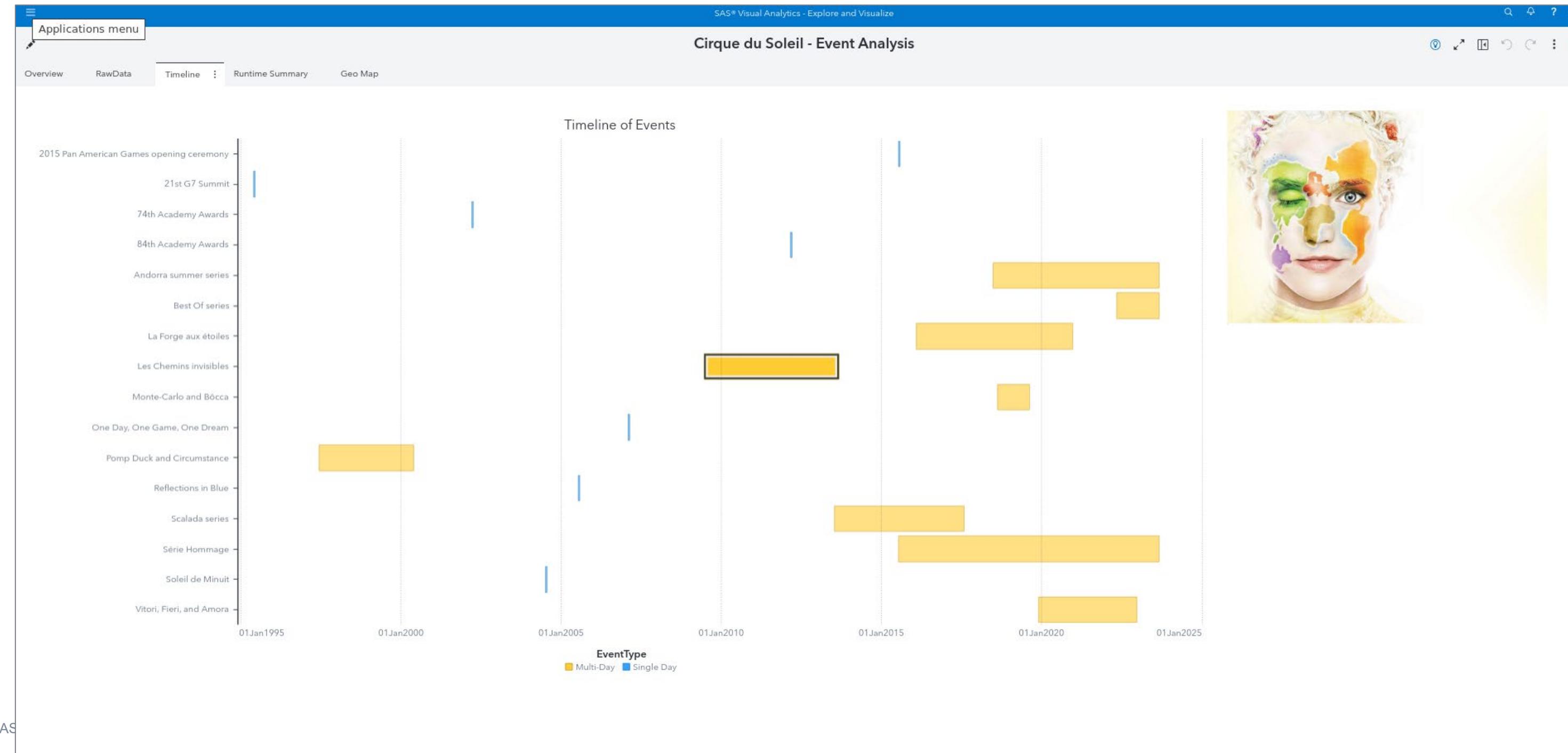
Keep It Simple

Speak to your Audience

Make it Accessible

# Good Design Principles In Practice

Principle	Definition	Action
Rule of Thirds	Designs are more interesting and visually appealing when you place the object(s) of your design in one of the thirds sections.	Imagery on one third of each page



# Good Design Principles In Practice

Principle	Definition	Action
Gestalt design	Users see the entirety before the detail	Overview Page

Overview :: RawData Timeline Runtime Summary Geo Map

This dashboard will enhance visibility into the global footprint of Cirque du Soleil events, support data-driven decisions, and improve overall event management and strategy.

#### AUDIENCE

The primary audience for this Dashboard is Cirque Du Soleil Senior Leadership. A version of this dashboard is also available to Cirque audience members.

#### OBJECTIVES

- Event Location Mapping: Displays the geographical locations of Cirque du Soleil events worldwide, allowing users to see where events are happening at any given time.
- Run Time Regional Analysis: Enables analysis of event distribution across different regions and countries, helping to identify areas with higher or lower event density.
- Interactive Exploration: Allows users to interact with a geomap to filter events by country, offering a dynamic view of the data.

#### RECOMMENDED USE FOR LEADERSHIP

1. Click the Timeline Tab to get an overview of single/multi day events.
2. Click The Runtime Summary tab. 2. Select Country from drop-down at top of report to view numbers dynamically change
3. Click the Geomap tab to filter events by country.

#### RESOURCES

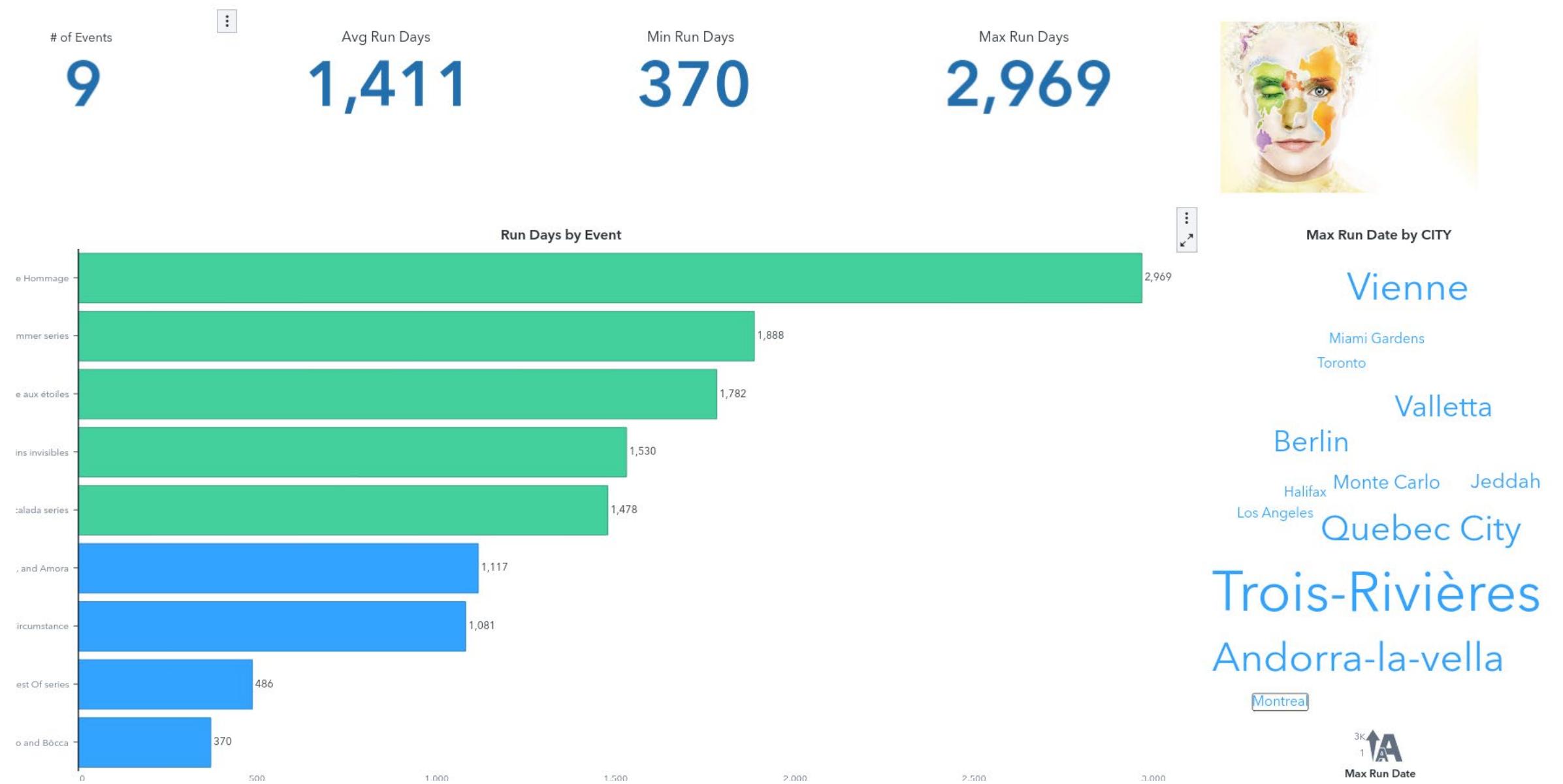
Data for this Dashboard was extracted from [WIKI](#)

Code created to perform ETL tasks to cleanse data is available at [Github](#)



# Good Design Principles In Practice

Principle	Definition	Action
Visual Hierarchy	The human mind processes bigger elements as more important.	Word cloud



# Good Design Principles In Practice

Principle	Definition	Action
Grid based layout	Users can easily scan predictable grid-based interfaces. A good grid is easy to adapt to various screen sizes and orientations. Grid layouts are an essential component of responsive dashboard design.	Raw data page

Cirque du Soleil - Event Analysis

CITY	COUNTRY NAME	ORIGDATE	▲ STARTC	ENDC	STARTN	ENDN	EVENTNAME	RUNDAYS	Overall AVG RunDays	EventType
Berlin	Germany	12 June 1997 - 28 May 2000	12 June 1997	28 May 2000	12Jun1997	28May2000	Pomp Duck a...	1,081	794	Multi-Day
Andorra-l...	Andorra	13 July 2013 - 30 July 2017	13 July 2013	30 July 2017	13Jul2013	30Jul2017	Scalada series	1,478	794	Multi-Day
Monte C...	Monaco	14 August 2018 - 19 August 20...	14 August 2018	19 August 2019	14Aug2018	19Aug2019	Monte-Carlo ...	370	794	Multi-Day
Trois-Rivi...	Canada	15 July 2015-present	15 July 2015	31AUG2023	15Jul2015	31Aug2023	Série Homma...	2,969	794	Multi-Day
Jeddah	Saudi Ara...	2 May 2022-present	2 May 2022	31AUG2023	02May2022	31Aug2023	Best Of series	486	794	Multi-Day
Quebec ...	Canada	24 June 2009 - 1 September 2...	24 June 2009	1 September 2013	24Jun2009	01Sep2013	Les Chemins i...	1,530	794	Multi-Day
Valletta	Malta	27 November 2019 - 18 Decem...	27 November 2019	18 December 2022	27Nov2019	18Dec2022	Vitori, Fieri, a...	1,117	794	Multi-Day
Andorra-l...	Andorra	30 June 2018-present	30 June 2018	31AUG2023	30Jun2018	31Aug2023	Andorra sum...	1,888	794	Multi-Day
Halifax	Canada	34851	34851		01Jun1995	01Jun1995	21st G7 Summit	1	794	Single Day
Los Ange...	United St...	37339	37339		24Mar2002	24Mar2002	74th Academ...	1	794	Single Day
Montreal	Canada	38179	38179		11Jul2004	11Jul2004	Soleil de Minuit	1	794	Single Day
Montreal	Canada	38549	38549		16Jul2005	16Jul2005	Reflections in...	1	794	Single Day
Miami Ga...	United St...	39117	39117		04Feb2007	04Feb2007	One Day, On...	1	794	Single Day
Los Ange...	United St...	40965	40965		26Feb2012	26Feb2012	84th Academ...	1	794	Single Day
Toronto	Canada	42195	42195		10Jul2015	10Jul2015	2015 Pan Am...	1	794	Single Day
Vienne	France	6 February 2016 - 23 Decembe...	6 February 2016	23 December 2020	06Feb2016	23Dec2020	La Forge aux ...	1,782	794	Multi-Day

# Good Design Principles In Practice

Principle	Definition	Action
Consistency	Pages have a similar look & feel to cut out white noise	All pages

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**AUDIENCE**  
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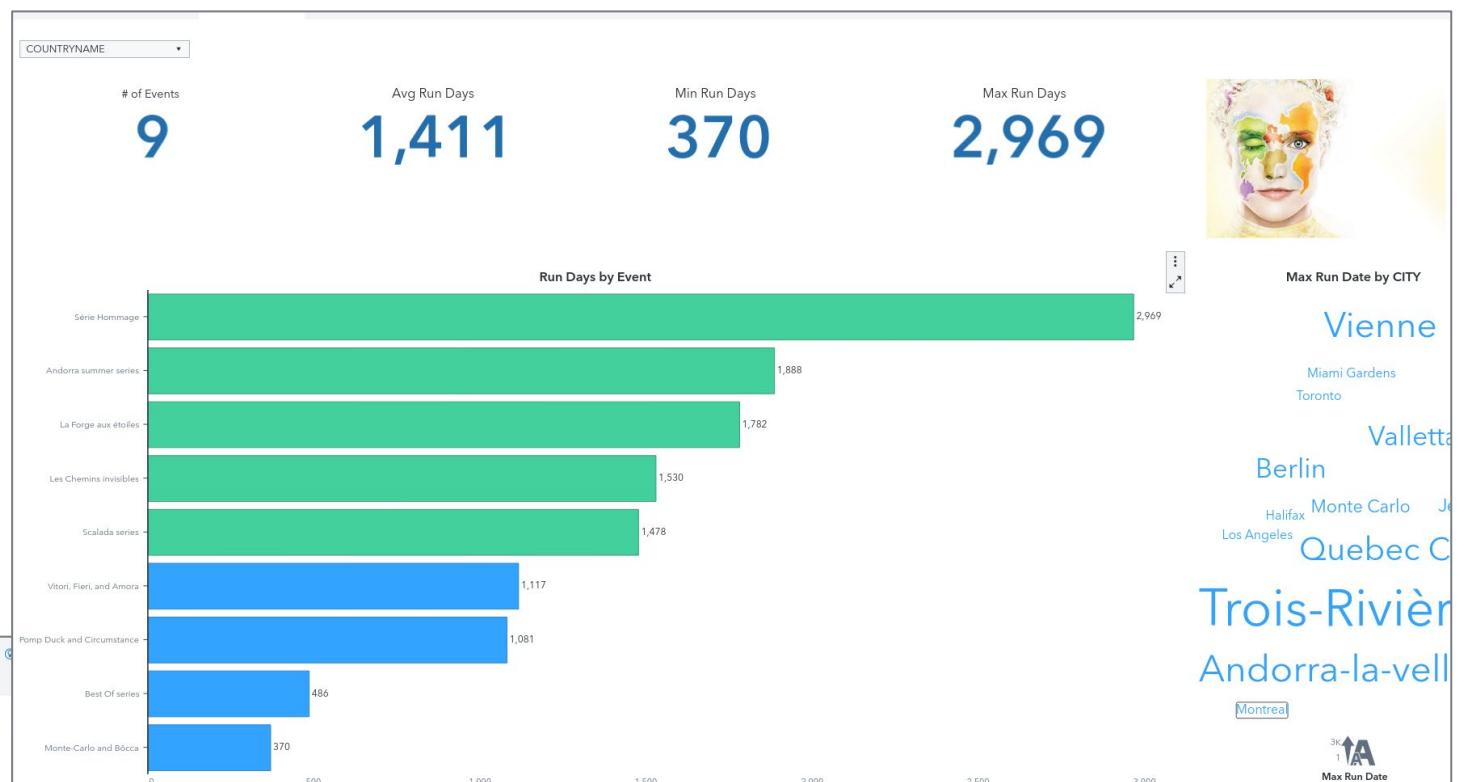
**OBJECTIVES**

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- Interactive Exploration: Allows users to interact with a geomap to filter events by country, offering a dynamic view of the data.

**RECOMMENDED USE FOR LEADERSHIP**

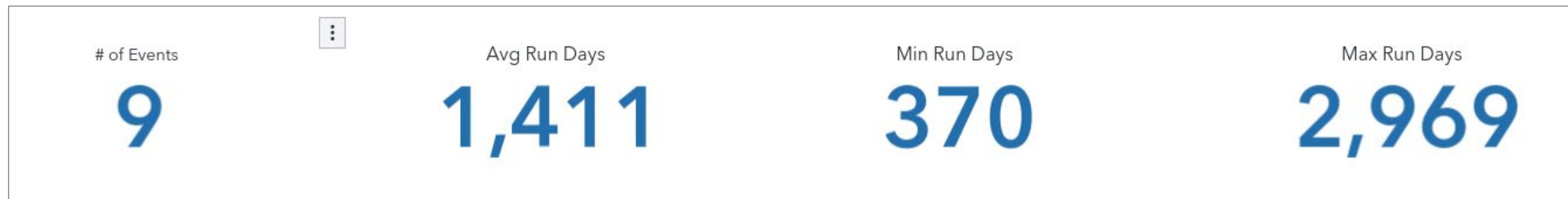
- Click the Timeline Tab to get an overview of single/multi day events.
- Click The Runtime Summary tab. 2. Select Country from drop-down at top of report to view numbers dynamically change
- Click the Geomap tab to filter events by country.

**RESOURCES**



# Good Design Principles In Practice

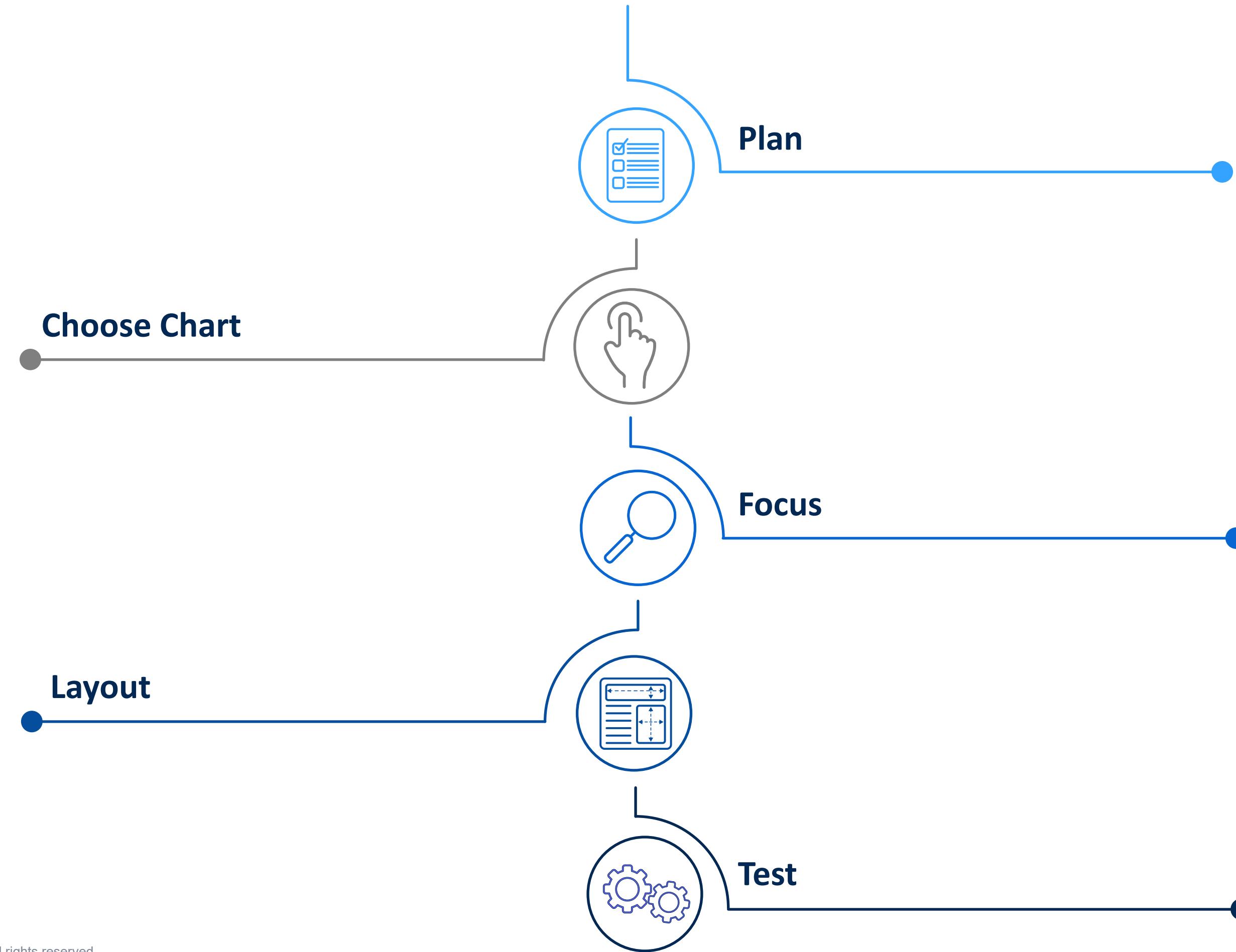
Principle	Definition	Action
Imagery	Humans are very visual so can digest a lot of information from one image.	Key Value Infographic



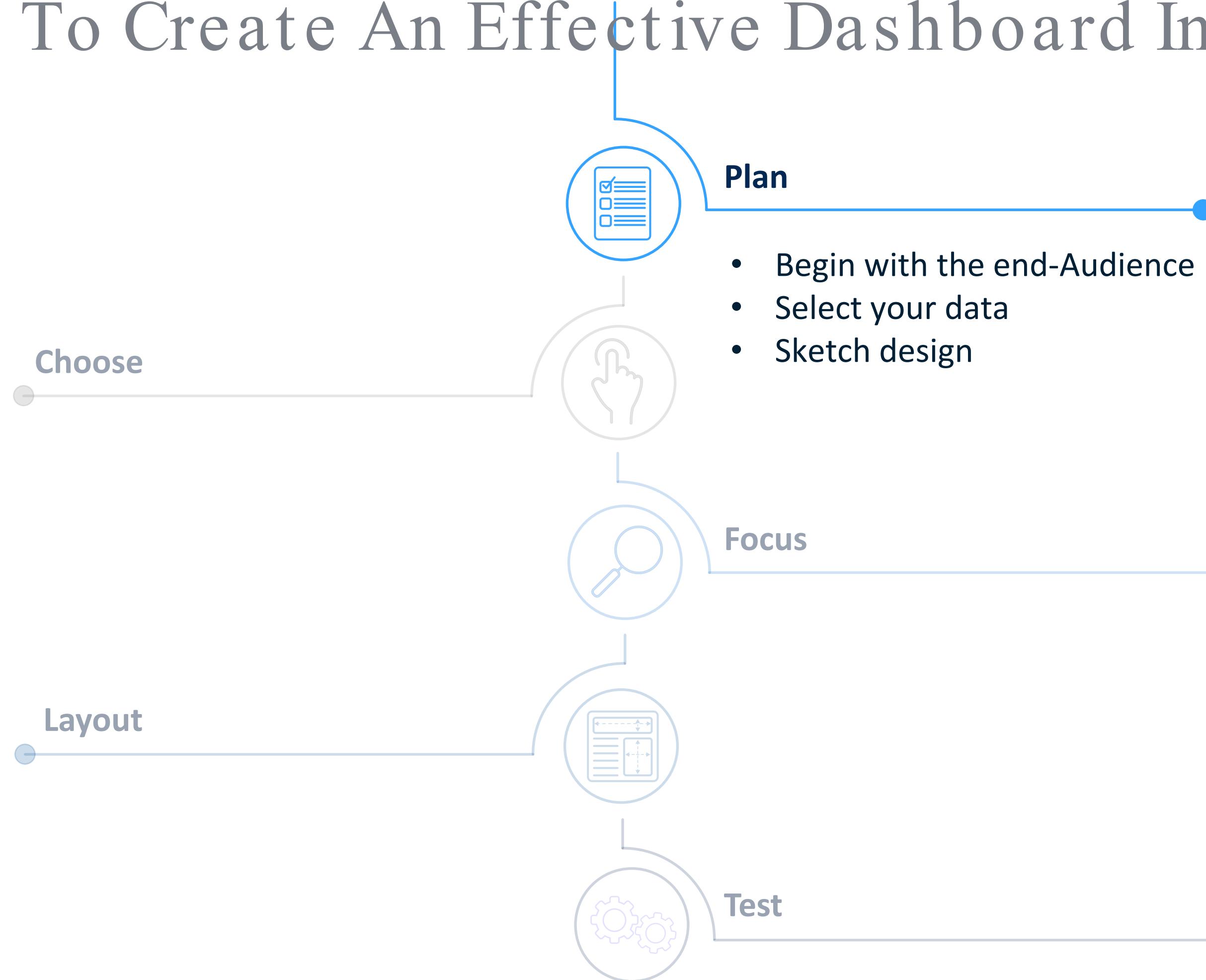
# Recap - Good Design Principles In Practice

Principle	Definition	Action
Rule of Thirds	designs are more interesting and visually appealing when you place the object(s) of your design in one of the thirds sections.	Imagery on one third of each page
Gestalt design	Users see the entirety before the detail	Overview Page
Visual Hierarchy	The human mind processes bigger elements as more important.	Word cloud
Grid based layout	Users can easily scan predictable grid-based interfaces. A good grid is easy to adapt to various screen sizes and orientations. grid layouts are an essential component of responsive dashboard design.	Raw data page
Consistency	Pages have a similar look & feel to cut out white noise	All pages
Imagery	Humans are very visual so can digest a lot of information from one image.	Key Value Infographic

# 5 Steps To Create A Dashboard In SAS VA



# 5 Steps To Create An Effective Dashboard In SAS VA





Plan

# Begin With The End – Know Your Audience



What level  
of detail?

What to  
present?



How to  
present?

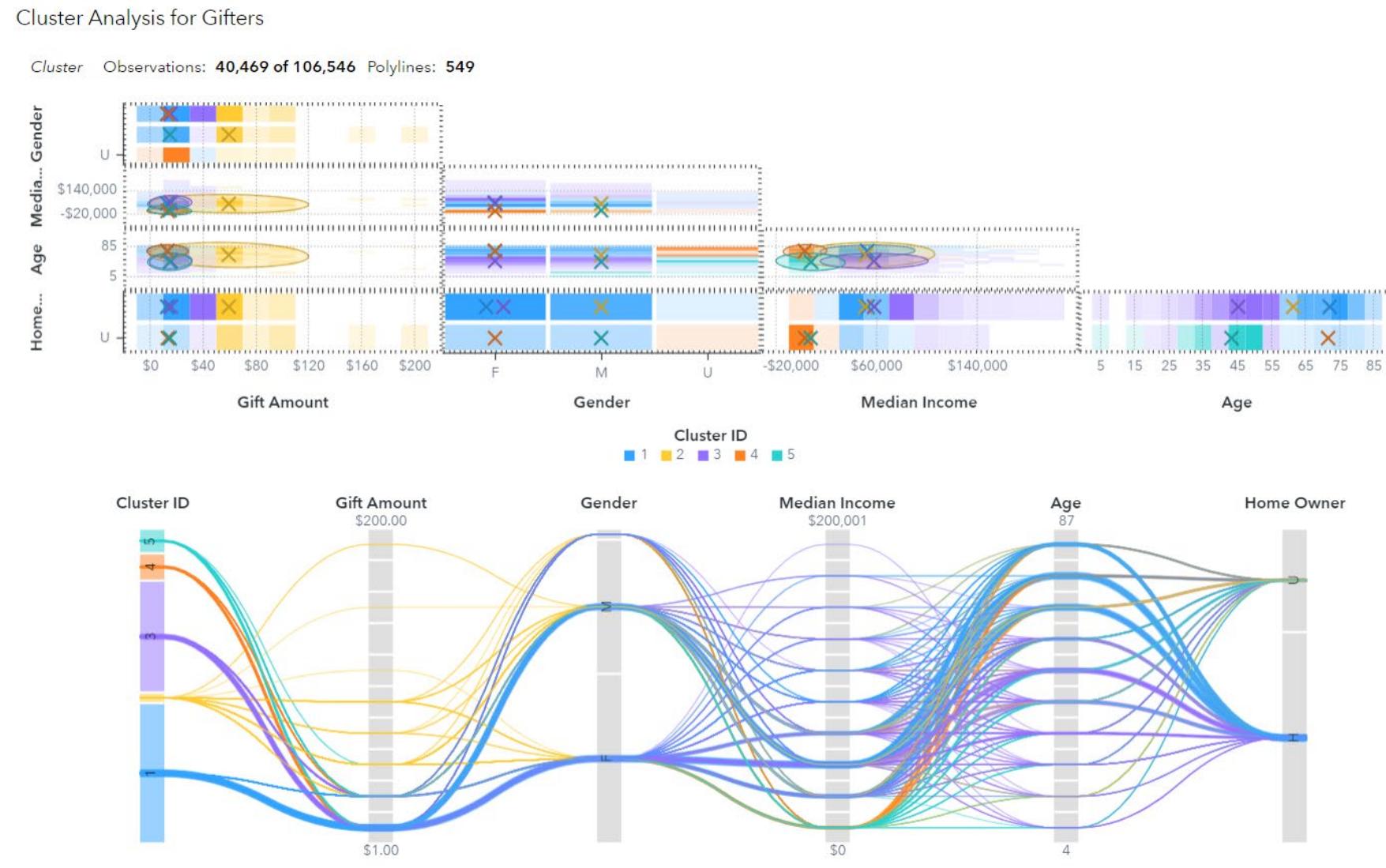




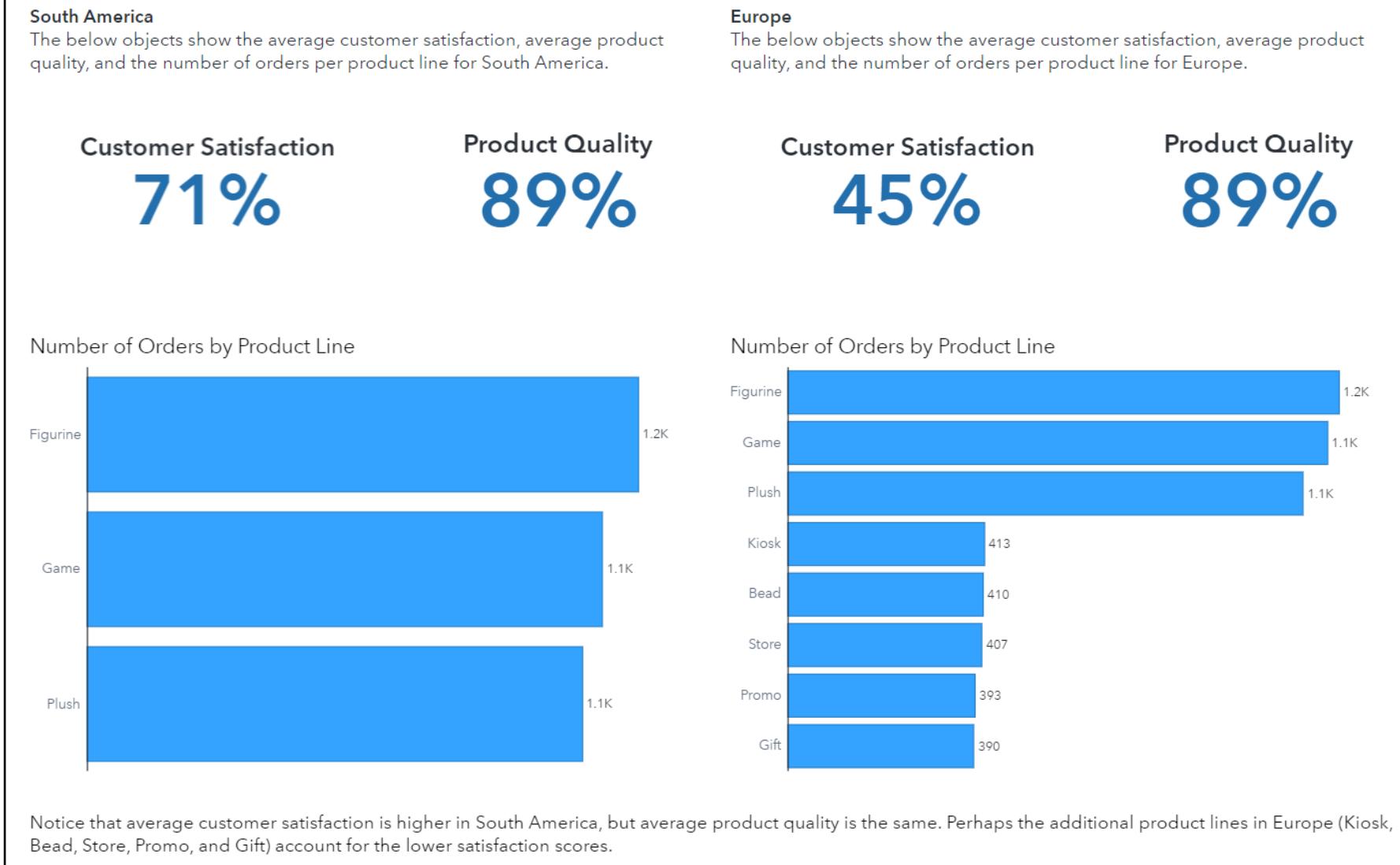
Plan

# Know Your Audience

## Data Scientist/Statistician/Data Analyst



## Business User/Audience



Provide context for graph content



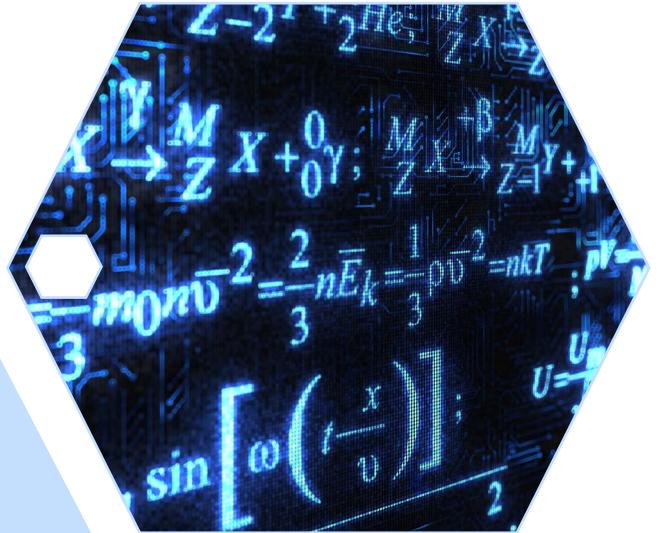
Plan

# Sketch Design- Craft Your Story



Are you  
trying to  
persuade?

Do you  
want the  
audience to  
take action?



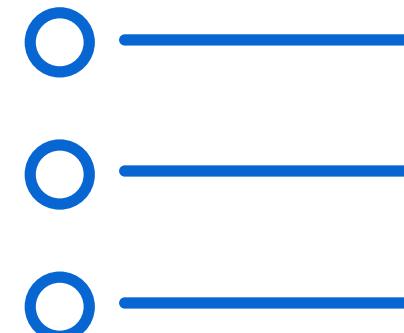
Are you  
presenting  
facts?



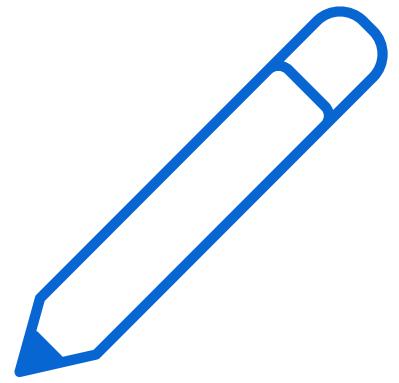


Plan

# Sketch Design - Outline



Outline



Draft

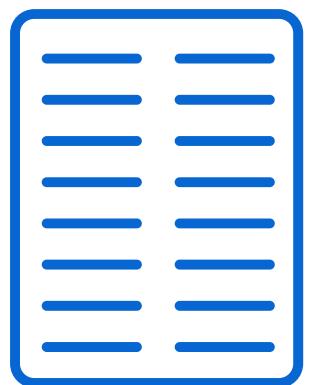
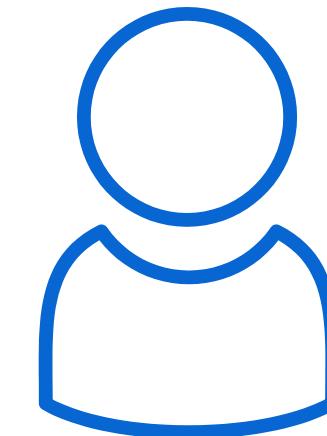
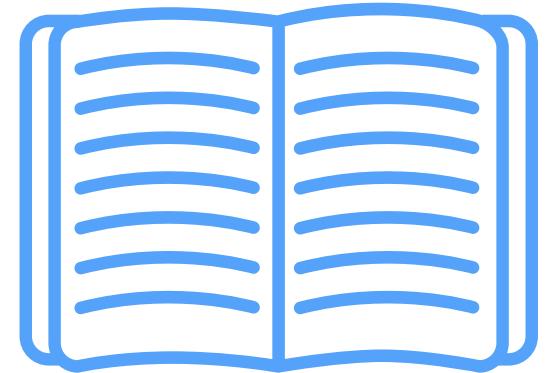


Table of contents



Plan for accessibility



Keep the story in  
mind

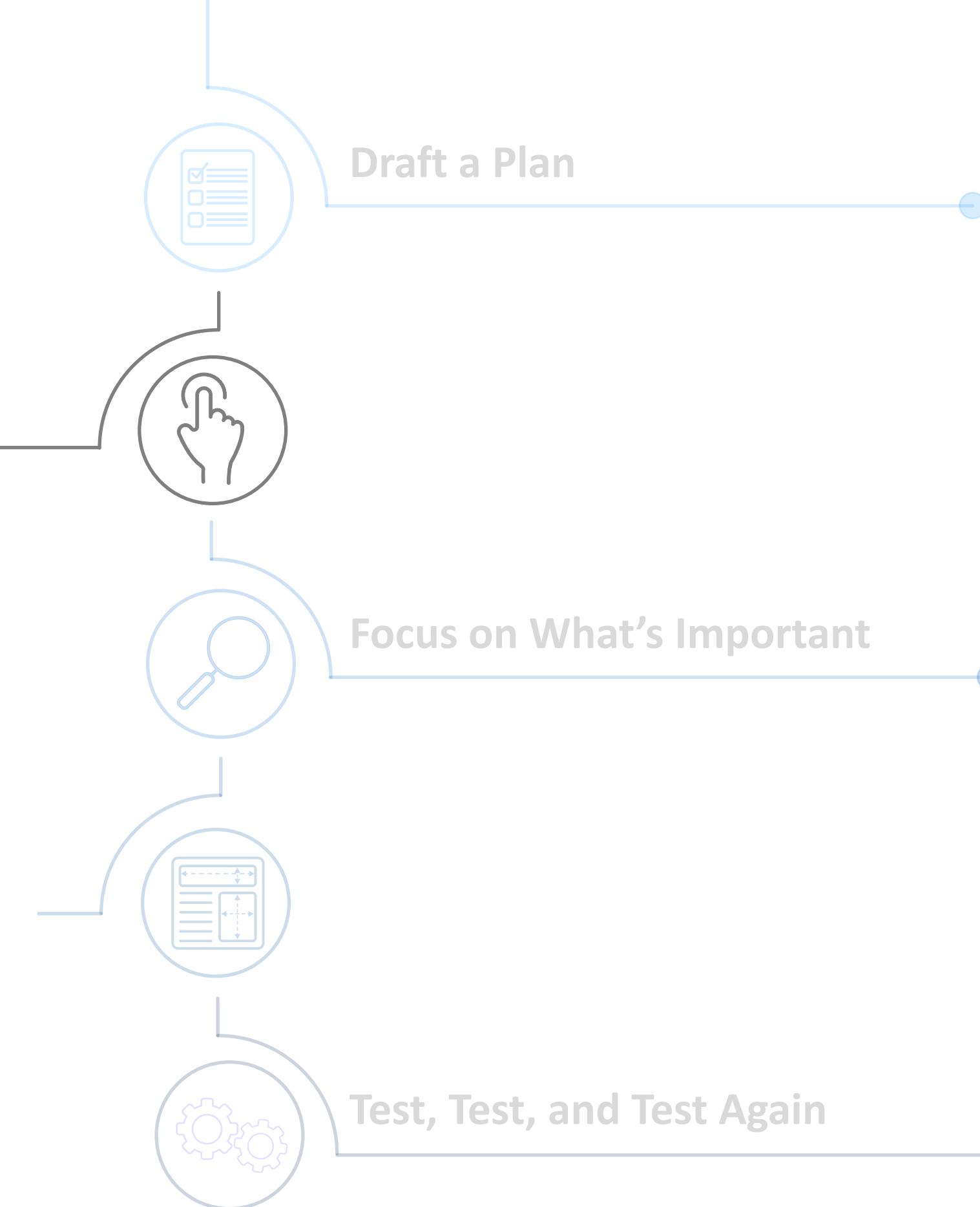


## Choose the Best Chart (Best Practices)

### Choose the Best Chart

#### Best Practices

- Use the simplest graph
- Use visually appealing, easy to understand objects
- Use only most important data
- Choose colors wisely





# Choose the Best Chart (Best Practices)



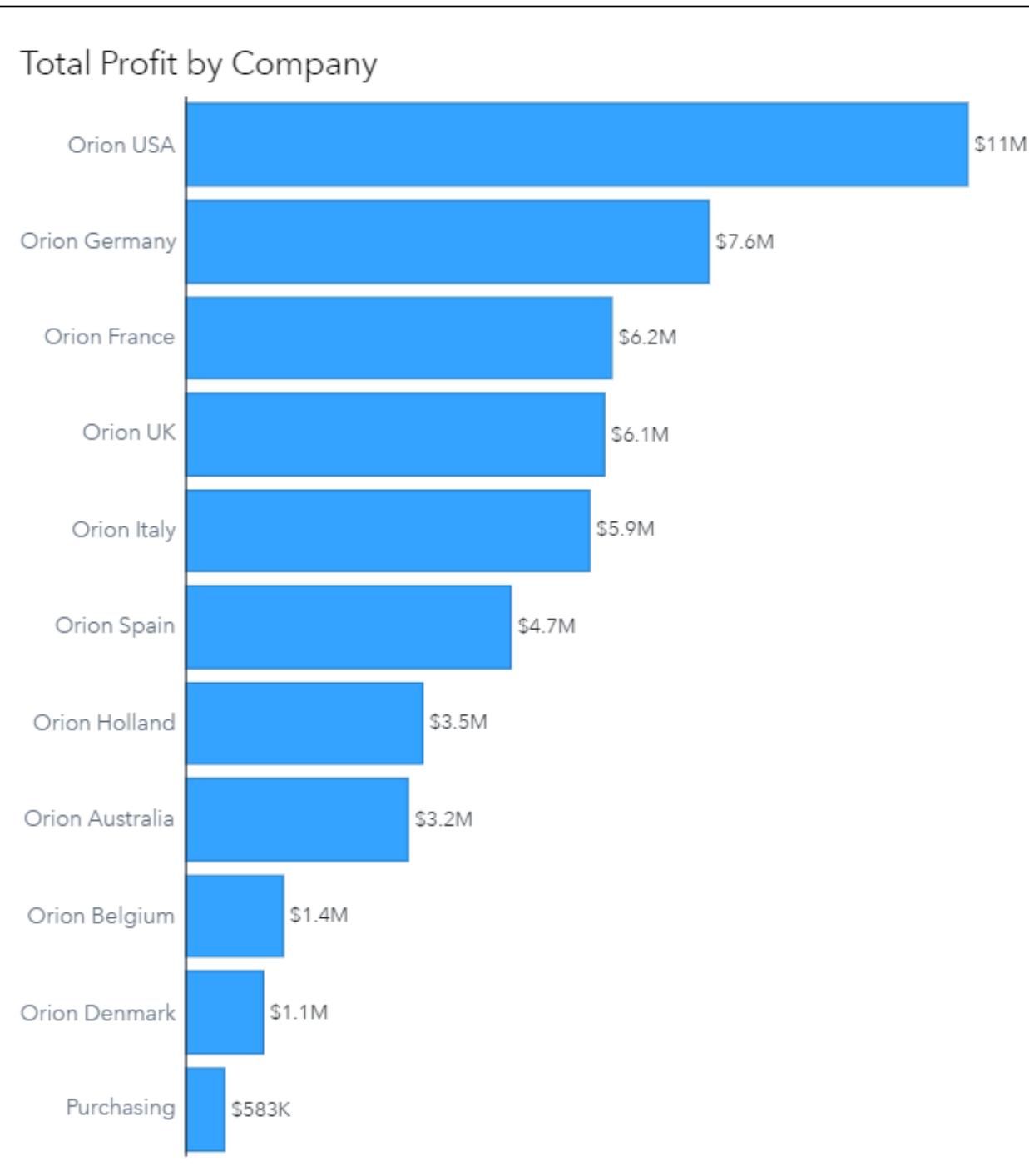
Who is the audience?

What data do you want to display?





## Choose the Best Chart (Best Practices)



## Use The Simplest Graph

Total Profit by Company

Orion France  
Orion Belgium  
Orion Spain Orion Italy  
Orion Australia Orion Holland Orion UK  
Orion Denmark Orion USA  
Orion Germany

\$11M  
\$583K  
Total Profit



- Muddled message
- Less accessible

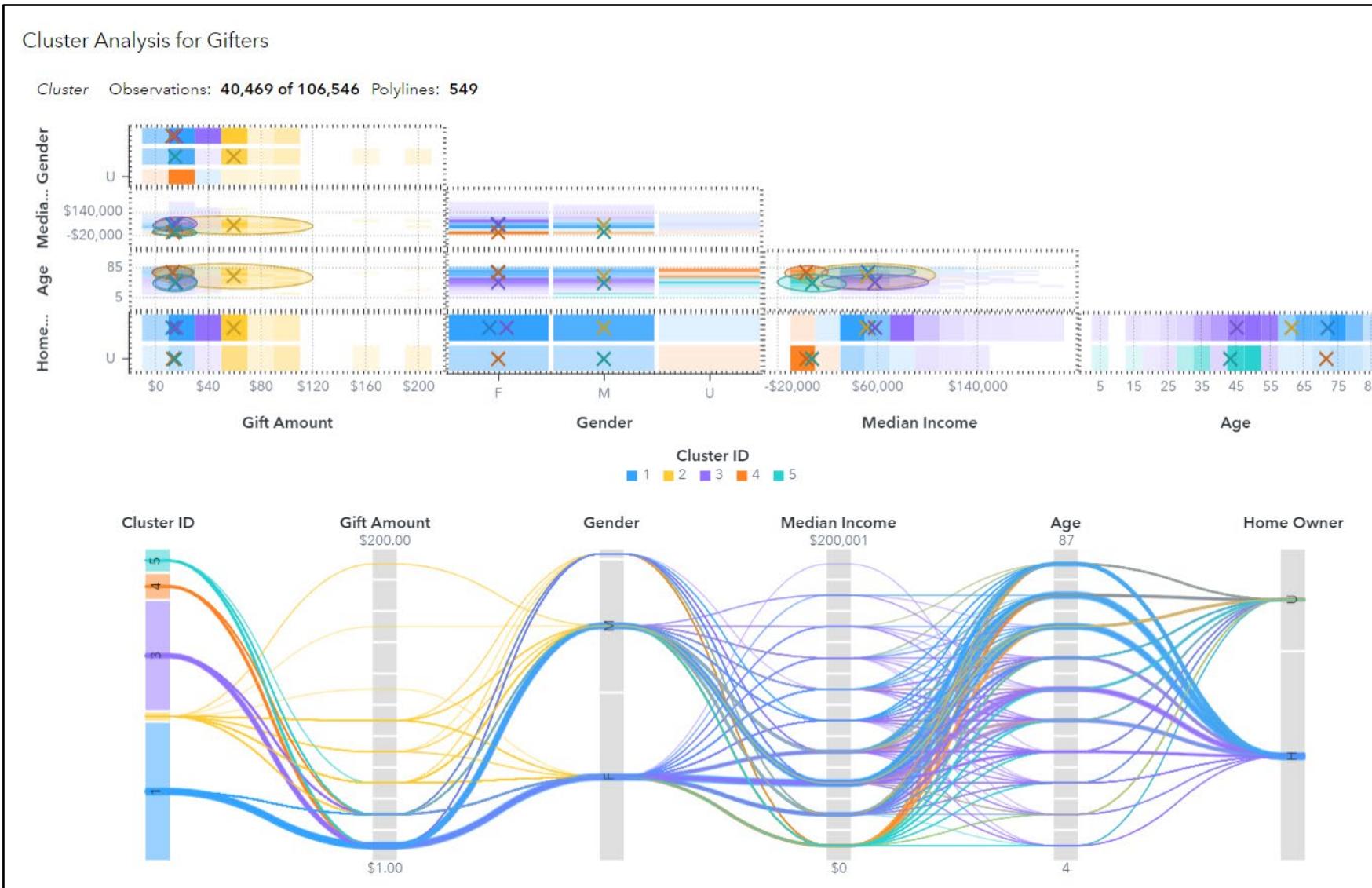


Create object templates to speed up development



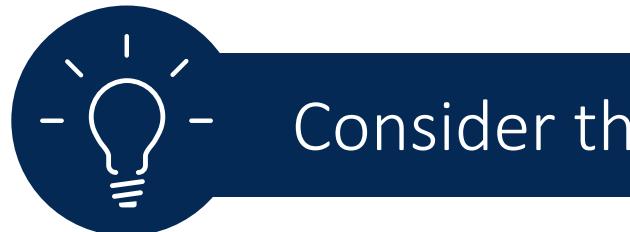
## Choose the Best Chart (Best Practices)

### Statisticians



# Use Visually Appealing, Easy To Understand Objects

### General audience

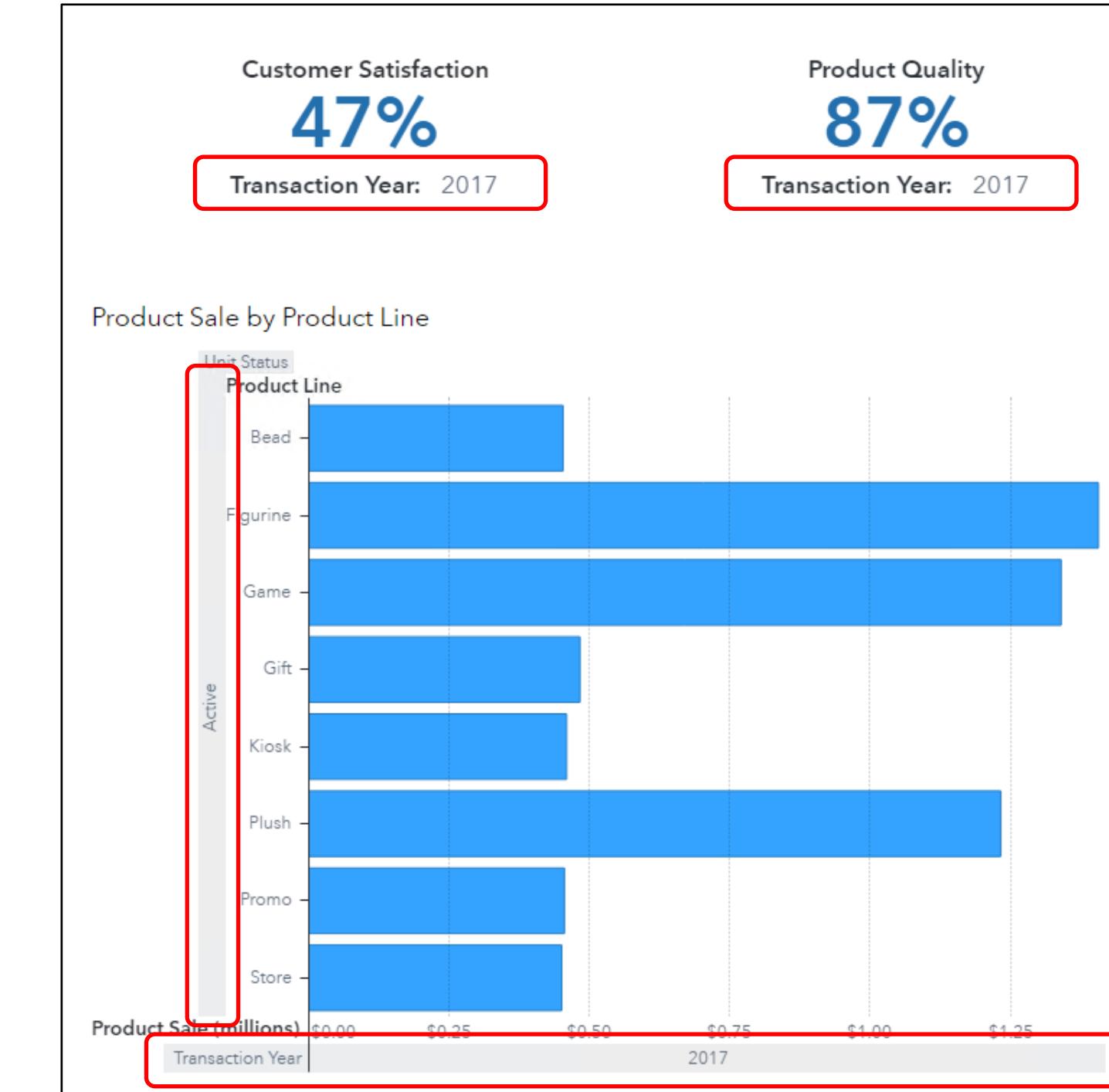


Consider the audience



## Choose the Best Chart (Best Practices)

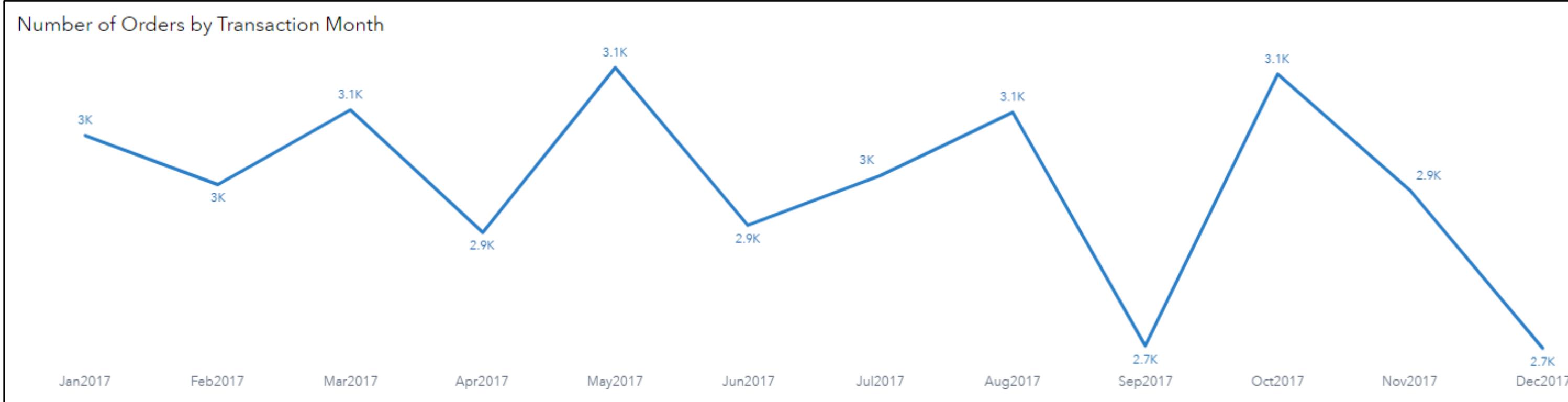
# Use Only The Most Important Data





## Choose the Best Chart (Best Practices)

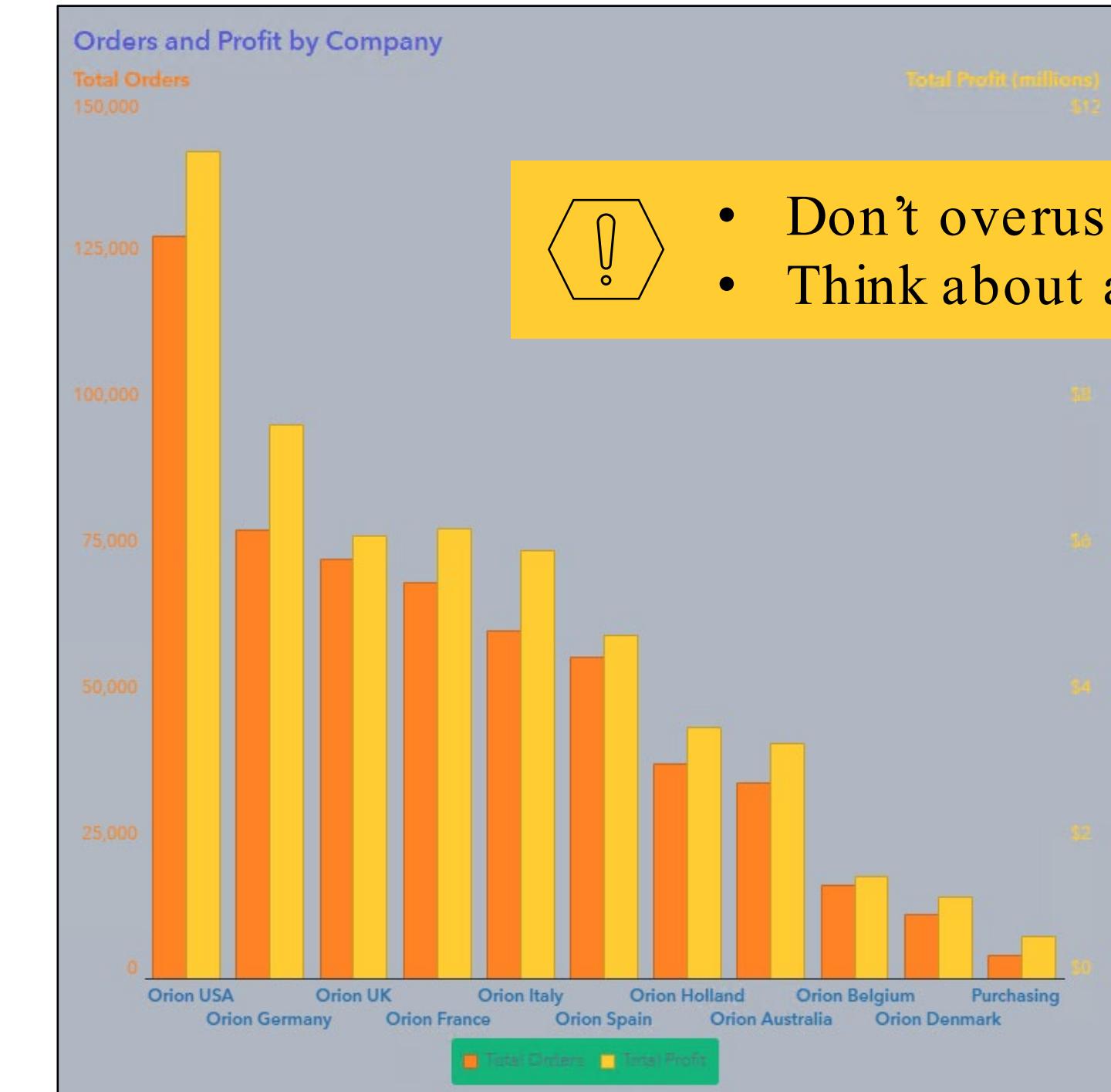
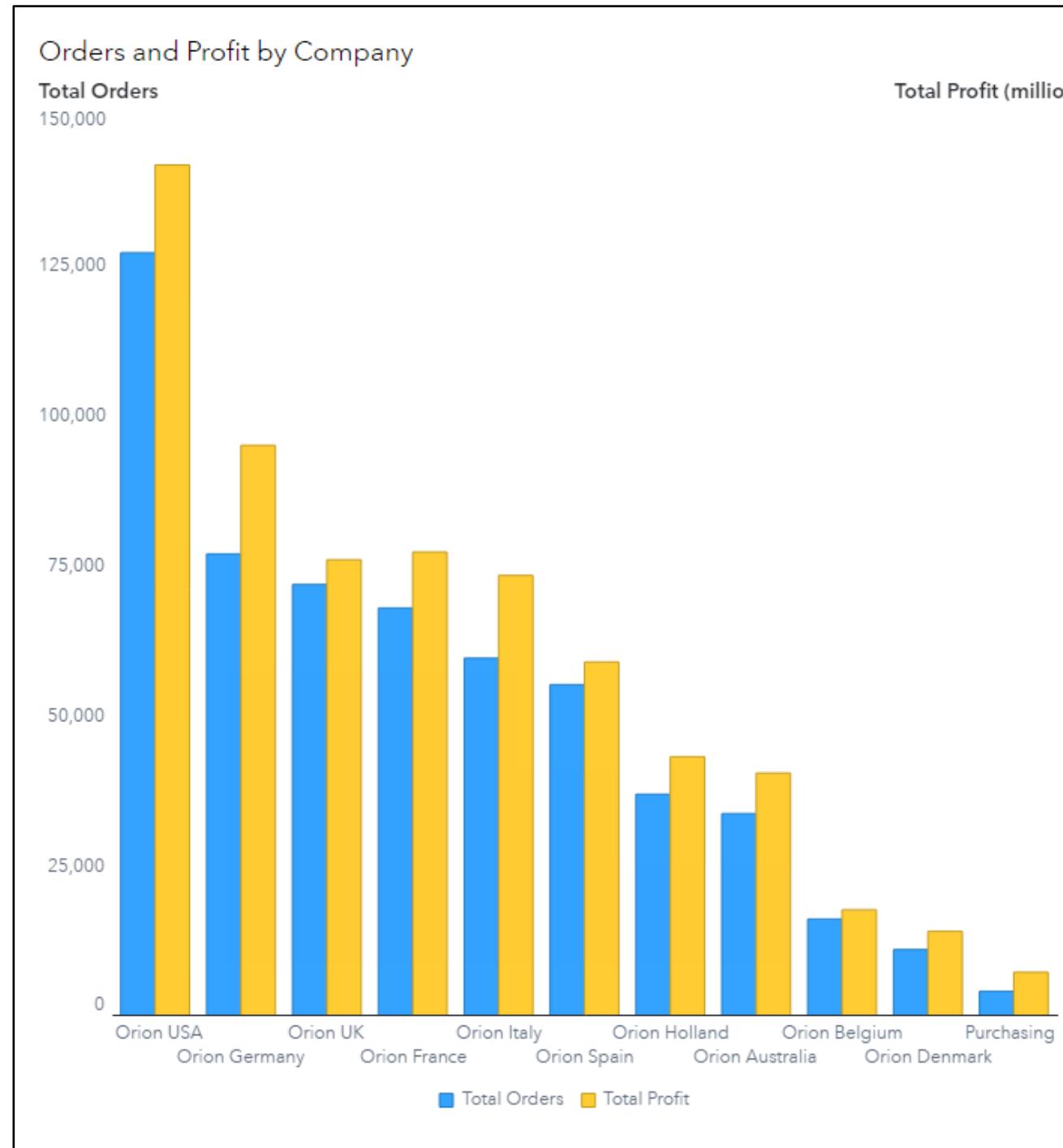
# Keep Graphs Simple





## Choose the Best Chart (Best Practices)

# Choose Colors Wisely



Create custom themes to customize the color palette

# Above all else, show the data.

Edward Tufte  
- Godfather of data visualization

## Choose the Best Chart

### Presentation

- Highlight one important fact
- Compare two or more things
  - General
  - Over time
  - Against benchmark
- Show survey or questionnaire results
- Describe how parts relate to the whole
- Show relationship between data items
- Is a graph required?
- Accessibility

Draft a Plan



Focus on What's Important



Test, Test, and Test Again



## Choose the Best Chart (Presentation)

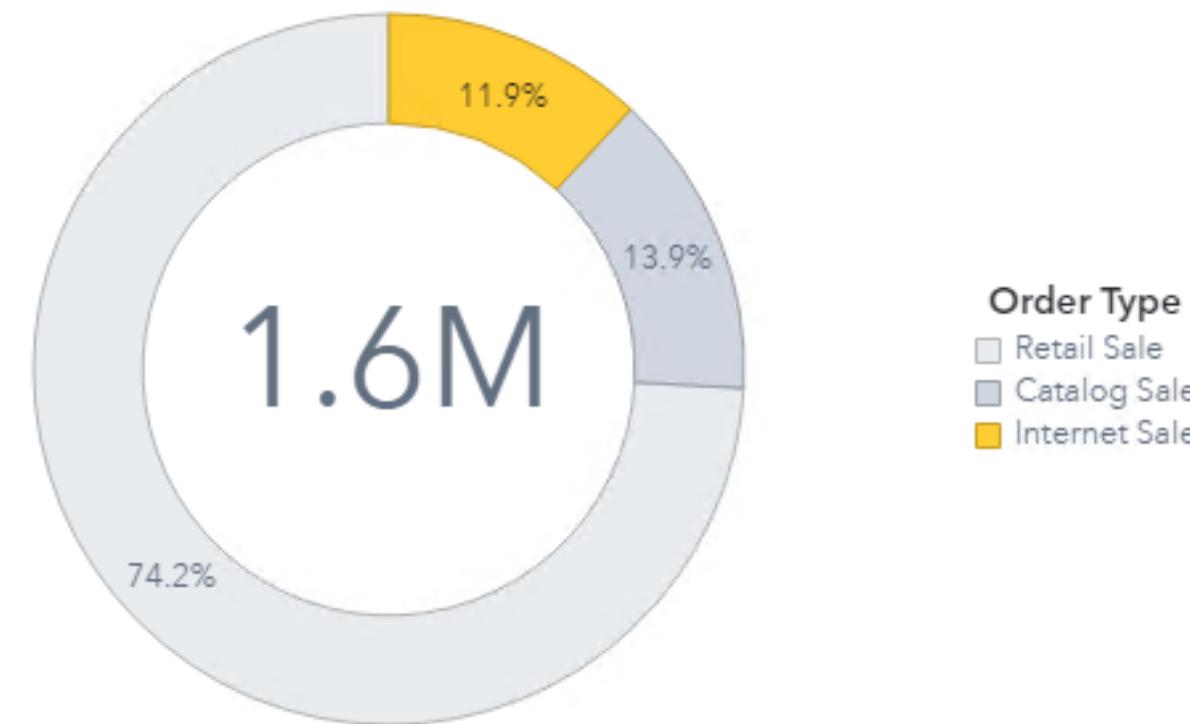
Key value object

Customer Satisfaction

47%

Donut chart

Quantity Ordered by Order Type

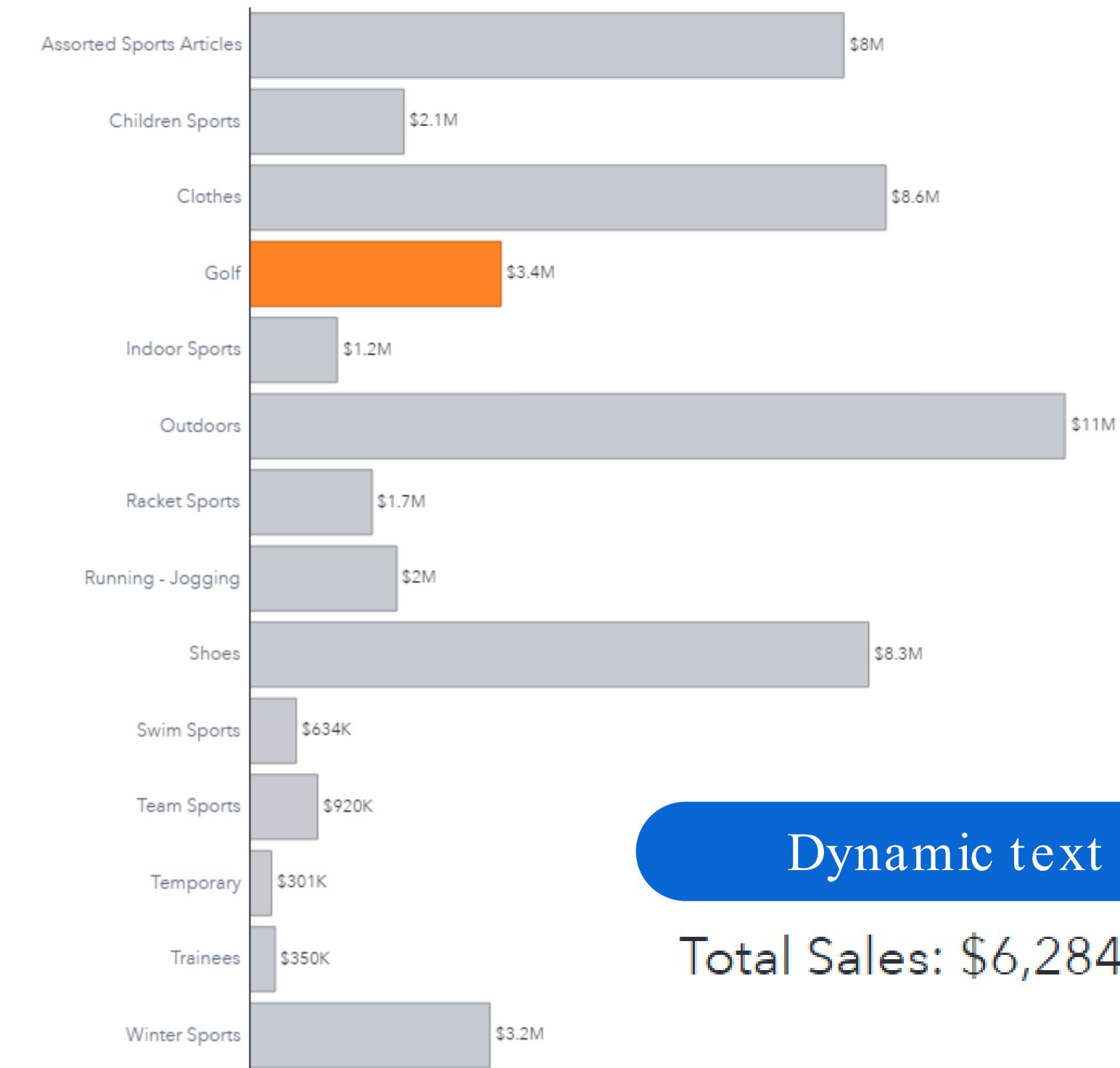


Use display rules to highlight important values

# Highlight One Important Fact

Faded bar chart

Total Profit by Group



Dynamic text

Total Sales: \$6,284,652



Choose the Best Chart  
(Presentation)

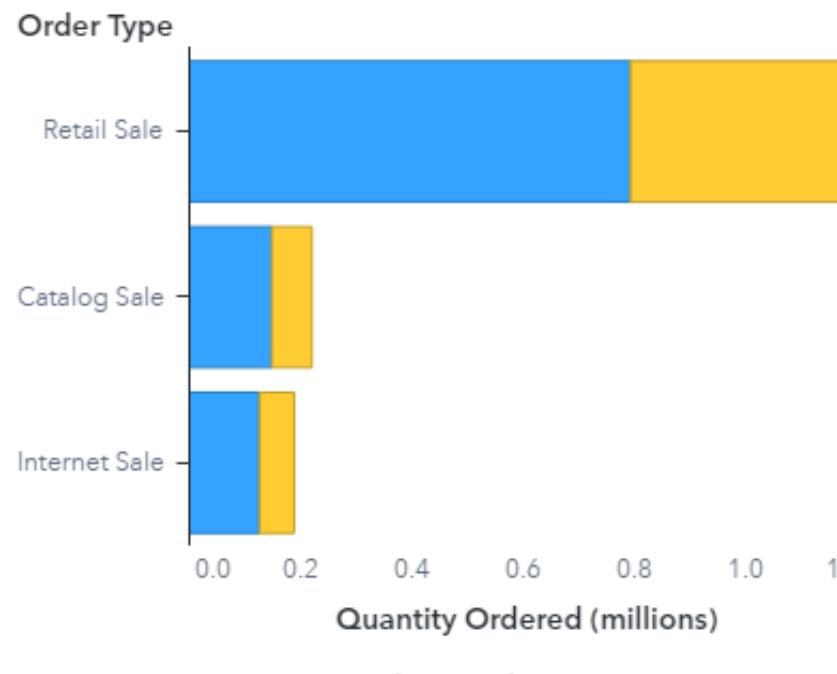
# Compare two or more things (General)

Dot plot

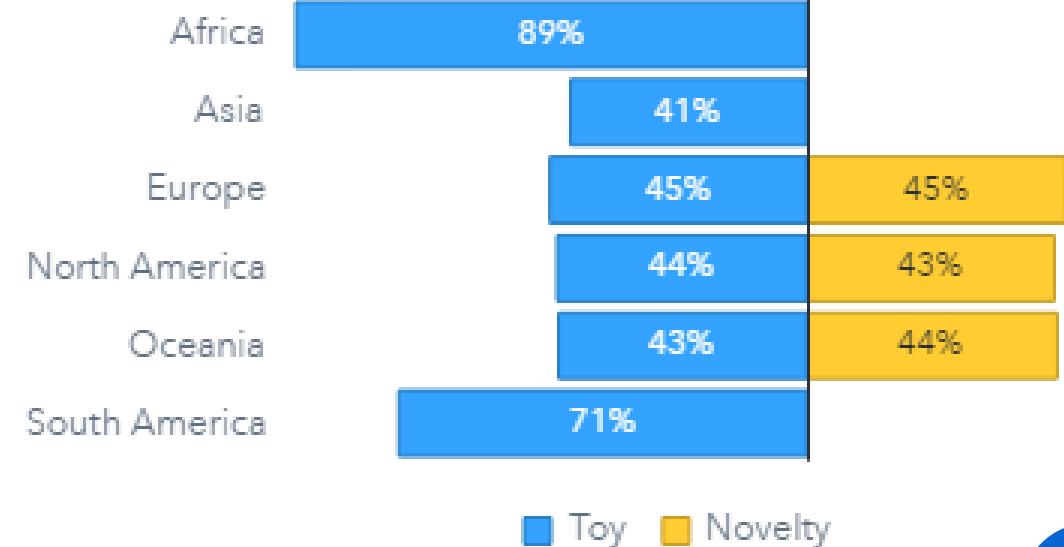
Butterfly chart

Customer Satisfaction by Continent

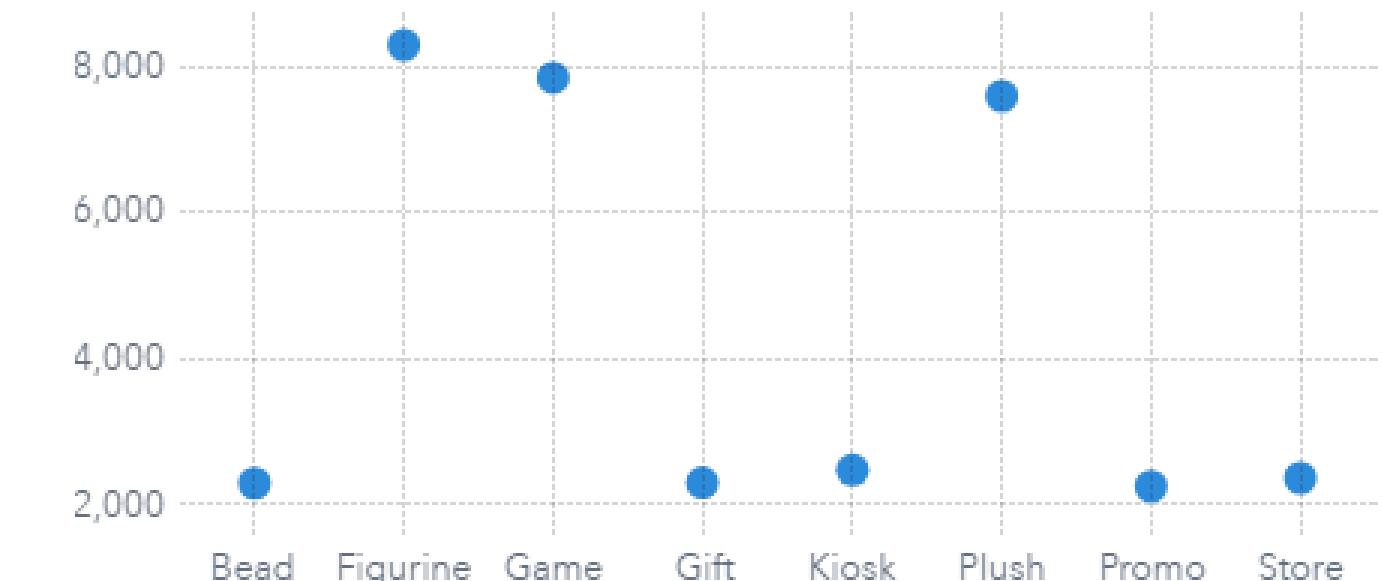
Bar chart



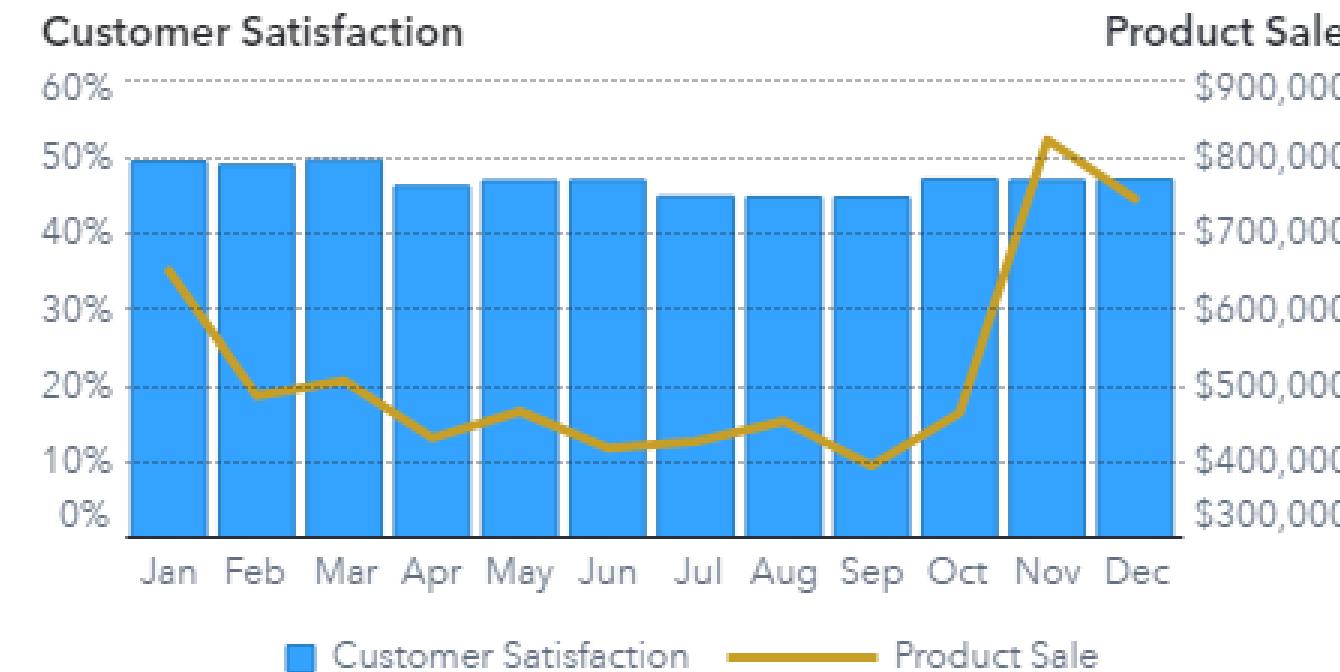
Cautiously consider fixed axis ranges



Number of Orders by Product Line



Dual axis chart



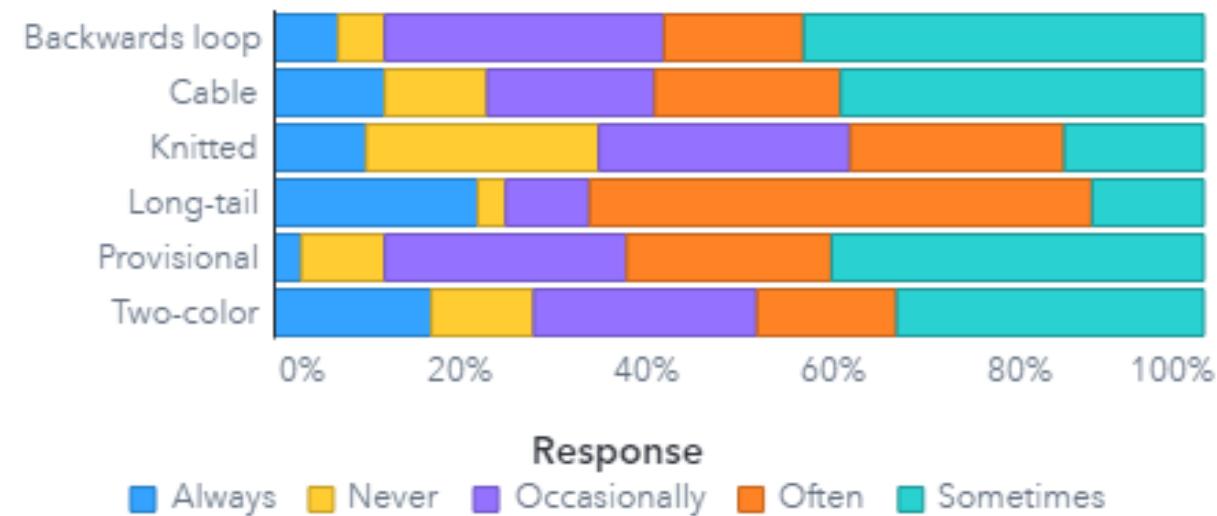


## Choose the Best Chart (Presentation)

# Show Survey Or Questionnaire Results

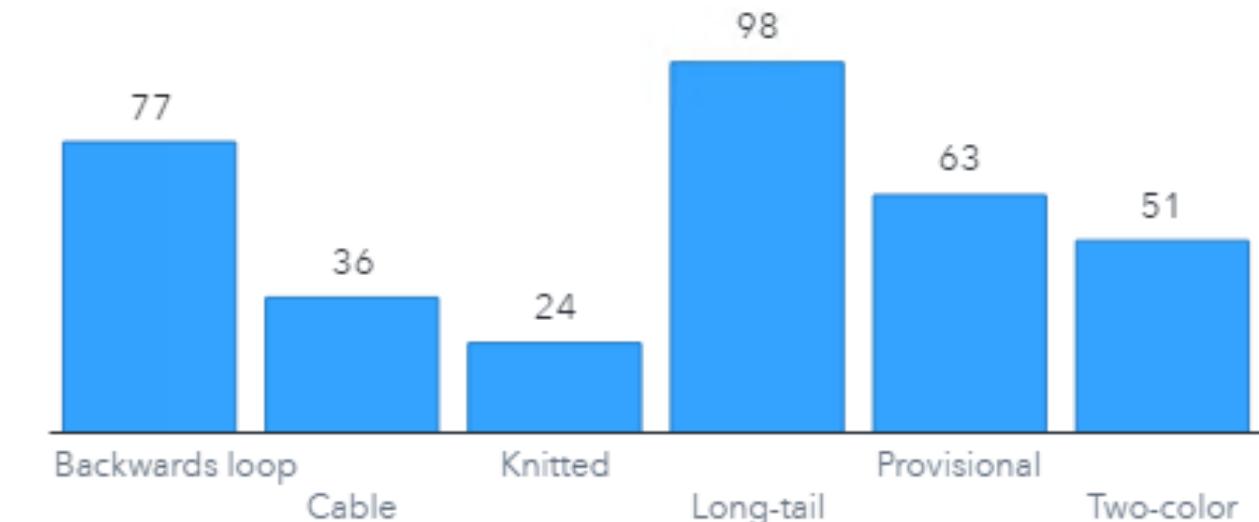
### Stacked bar chart

How often do you use these cast on methods?



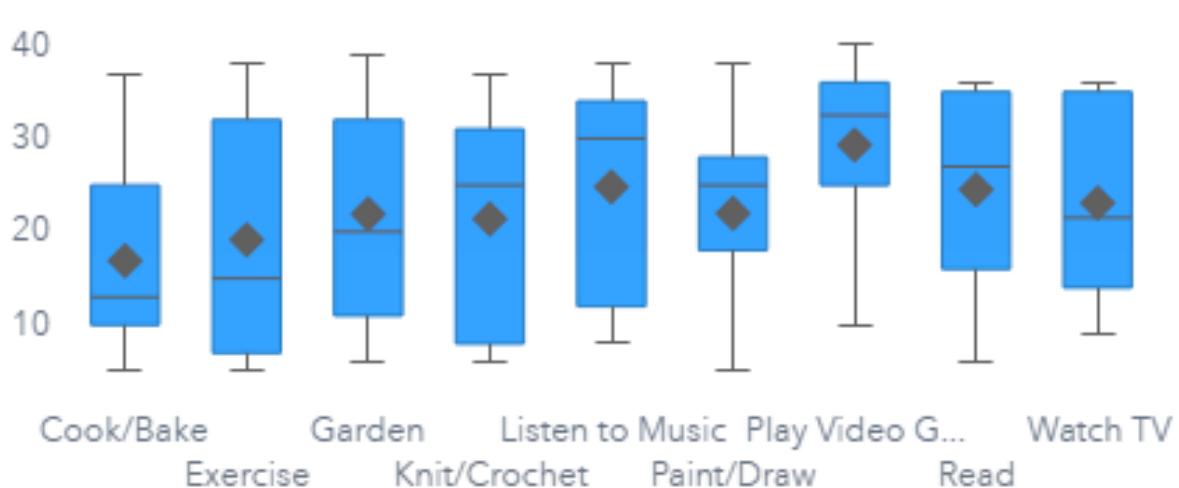
### Vertical bar chart

Which cast on methods do you use regularly?



### Box plots

How many hours a week do you ...?



### Crosstab

Average hours spent per week

Question	Answer
Cook/Bake	16.9
Exercise	19.1
Garden	21.9
Knit/Crochet	21.4
Listen to Music	24.8
Paint/Draw	22
Play Video Games	29.3
Read	24.5
Watch TV	23.1

*“...the only thing worse than a pie chart is several of them.” – Edward Tufte*

**“Save the pies for dessert.” – Stephen Few**



Choose the Best Chart  
(Presentation)

# Show Relationships Between Data Items

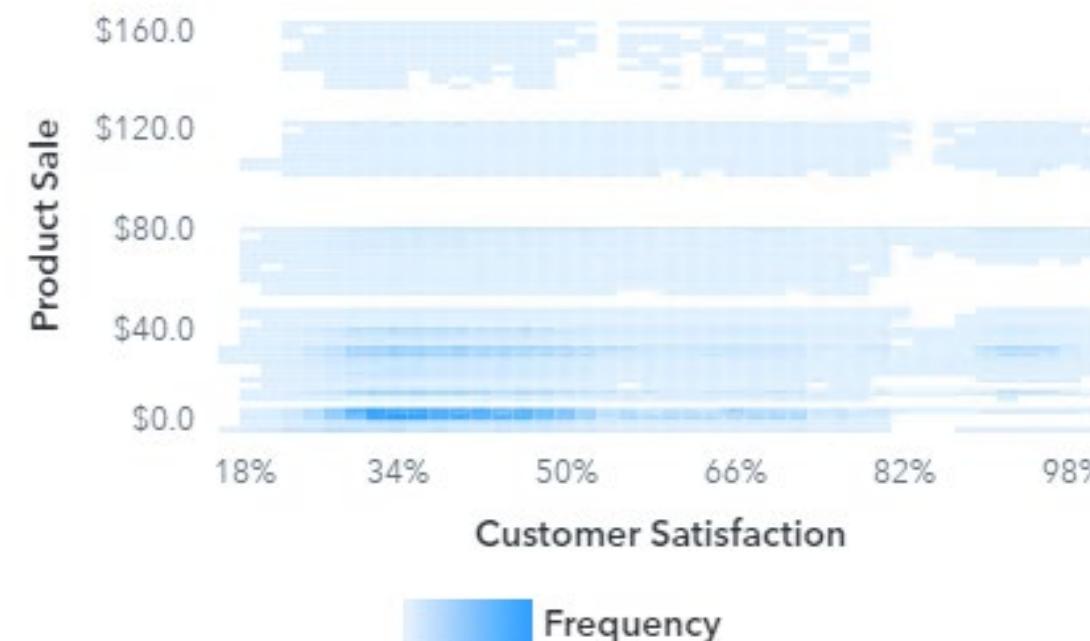
## Scatterplot



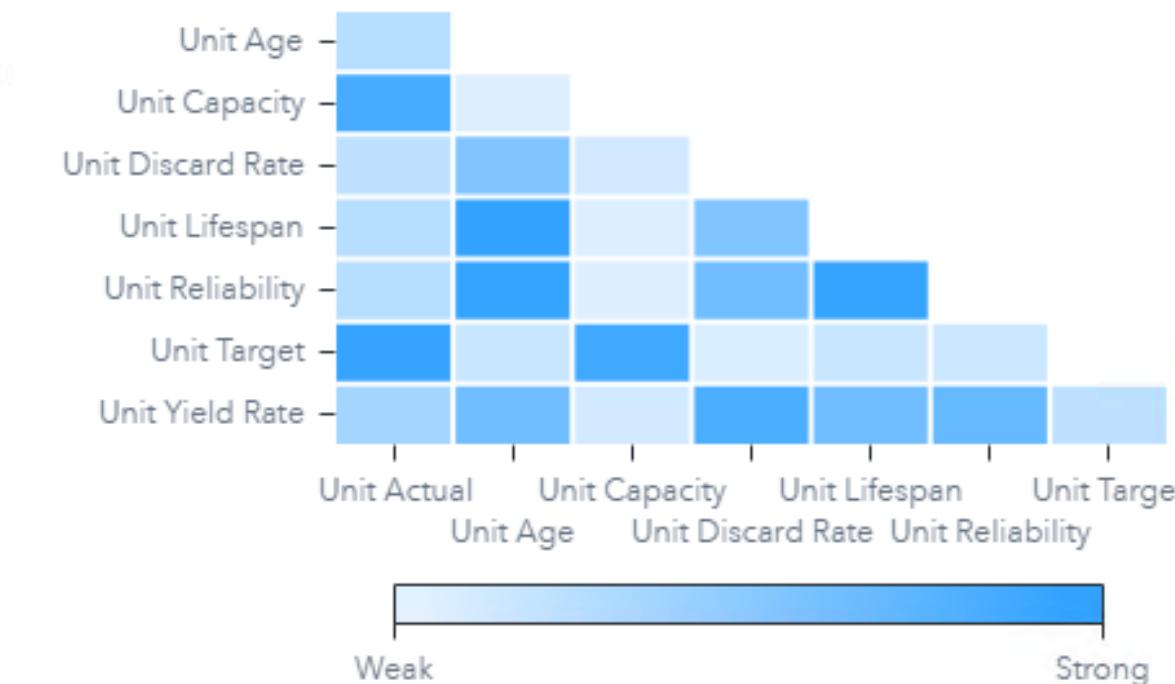
## Bubble plot



## Heat map



## Correlation matrix



Limit digits after decimal points



# Choose the Best Chart (Presentation)

# Word cloud

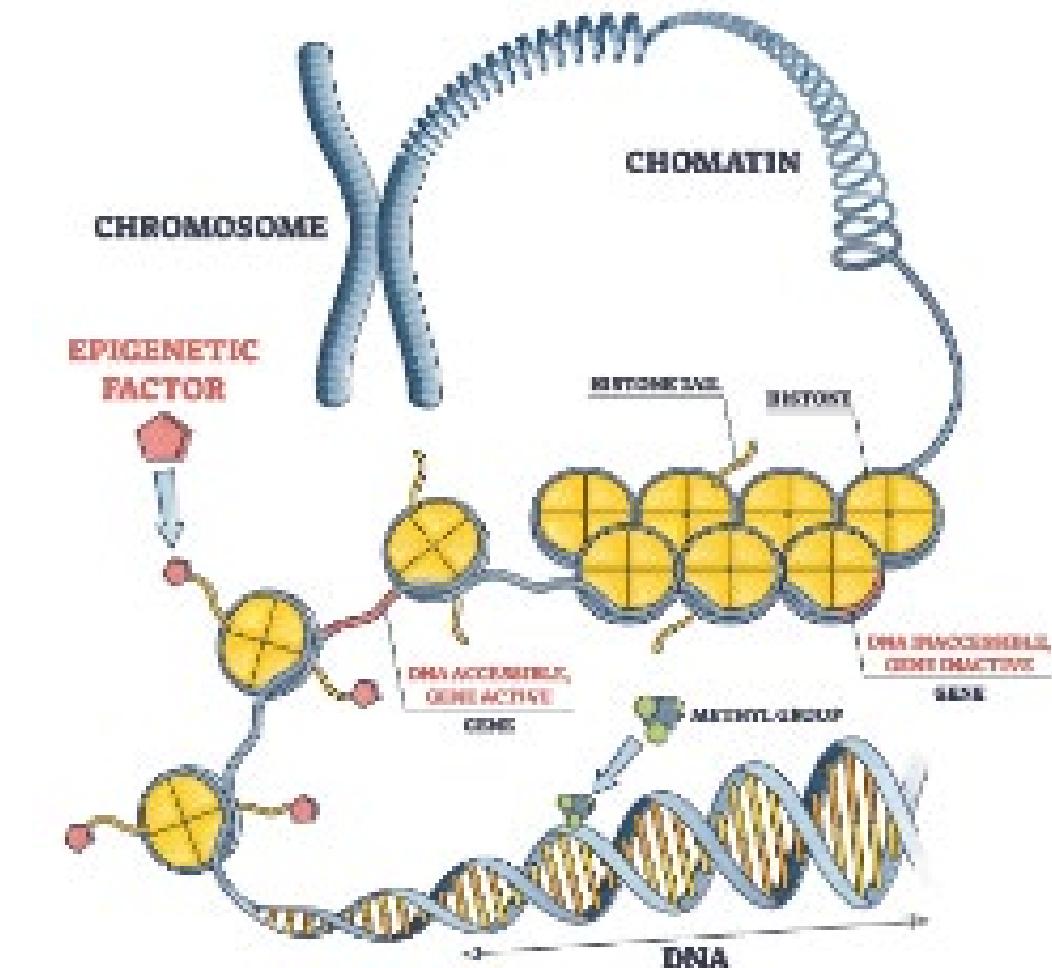


# Images



# Illustrations

## EPIGENETIC MECHANISMS



# Text object

Average customer satisfaction is higher in South America, but average product quality is the same. Perhaps the additional product lines in Europe (Kiosk, Bead, Store, Promo, and Gift) account for the lower satisfaction scores.



## Limit sensitivity characteristics (size, shape, position)

Choose the Best Chart

Draft a Plan

Consider the Layout

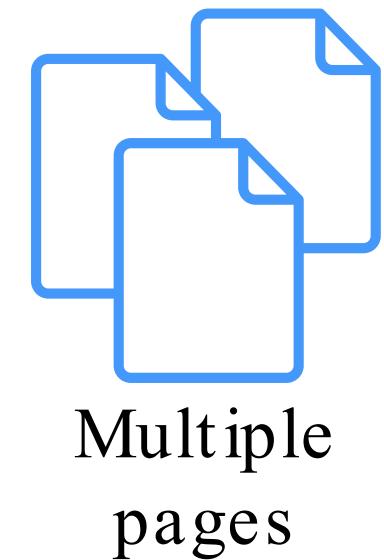
### Focus on What's Important

- Organized
- Easy to navigate
- Versatile
- Attractive

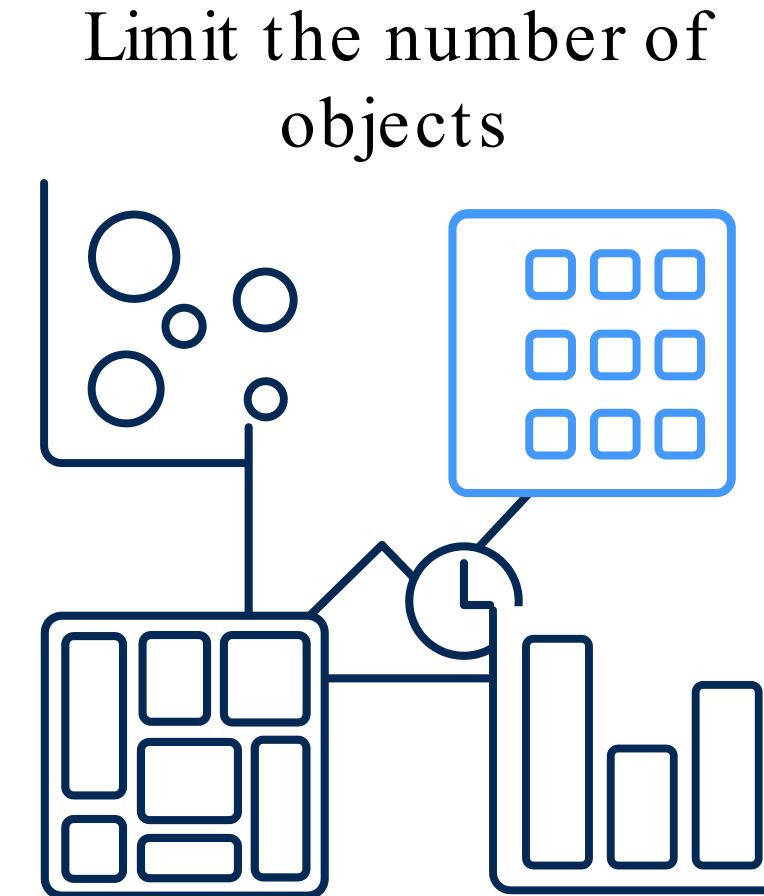
Test, Test, and Test Again



Focus on What's  
Important



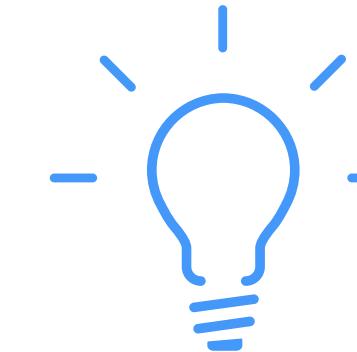
Multiple  
pages



Limit the number of  
objects

# Organized

Focus on a single idea



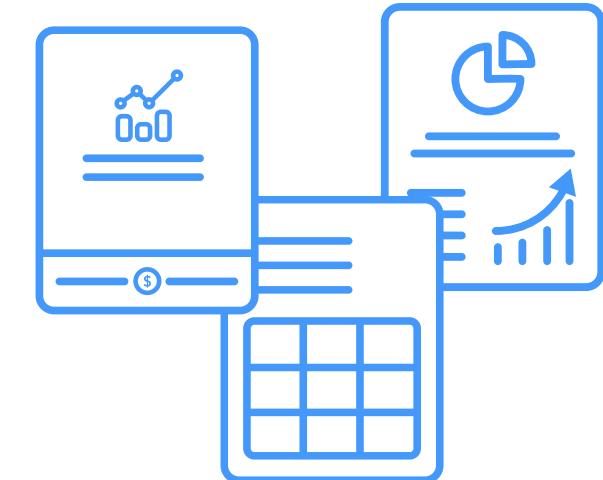
Use hidden and pop-up  
pages to provide details



Stand on its  
own



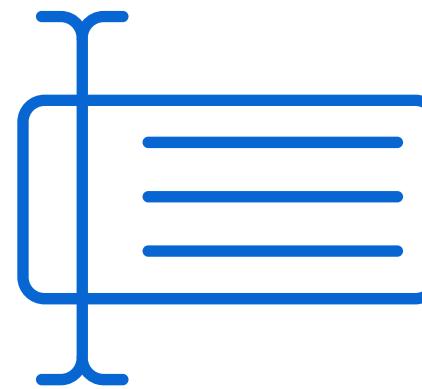
Limit the number of  
pages





Focus on What's  
Important

# Easy To Navigate



## ADD DESCRIPTIONS

- Use clear, detailed titles
- Add additional details and numbers, when needed



## ADD INSTRUCTIONS

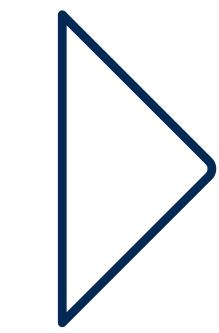
- Table of contents
- Introductory page
- Instructions for each page
- Explain report actions



Use consistent fonts, provide details for keyboard shortcuts

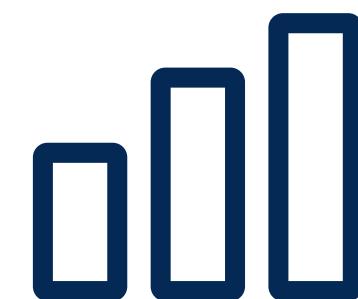


## Focus on What's Important



### Animation

- View changes over time
- Focus on differences



### Ranks

- Focus on important values
- Identify leaders or laggards



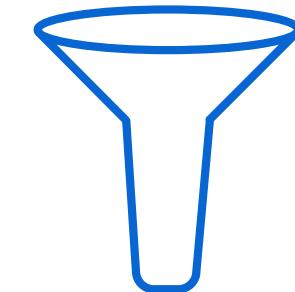
### Prompts

- Focus on specific areas
- Filter report or page



Use automatic actions to speed up development

# Versatile



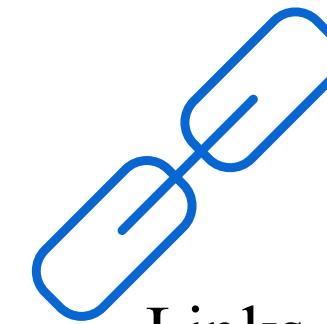
### Actions

- Add interactivity
- Aid in self-discovery



### Viewer customization

- Modify options
- Change chart types
- Select the data

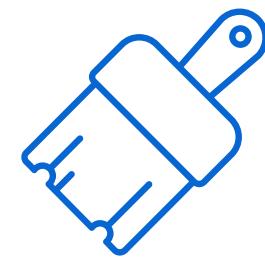


### Links

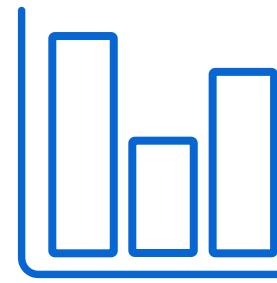
- Provide additional information



Focus on What's  
Important



Styles



Display  
rules



Specify labels for display rules, choose WCAG-compliant colors

# Attractive

Excitement      Revolution  
Energy  
Passion  
Love  
Danger

Happiness      Caution  
Optimism  
Warmth  
Joy  
Cowardice

Nature      Jealousy  
Freshness  
Wealth  
Youth  
Depression

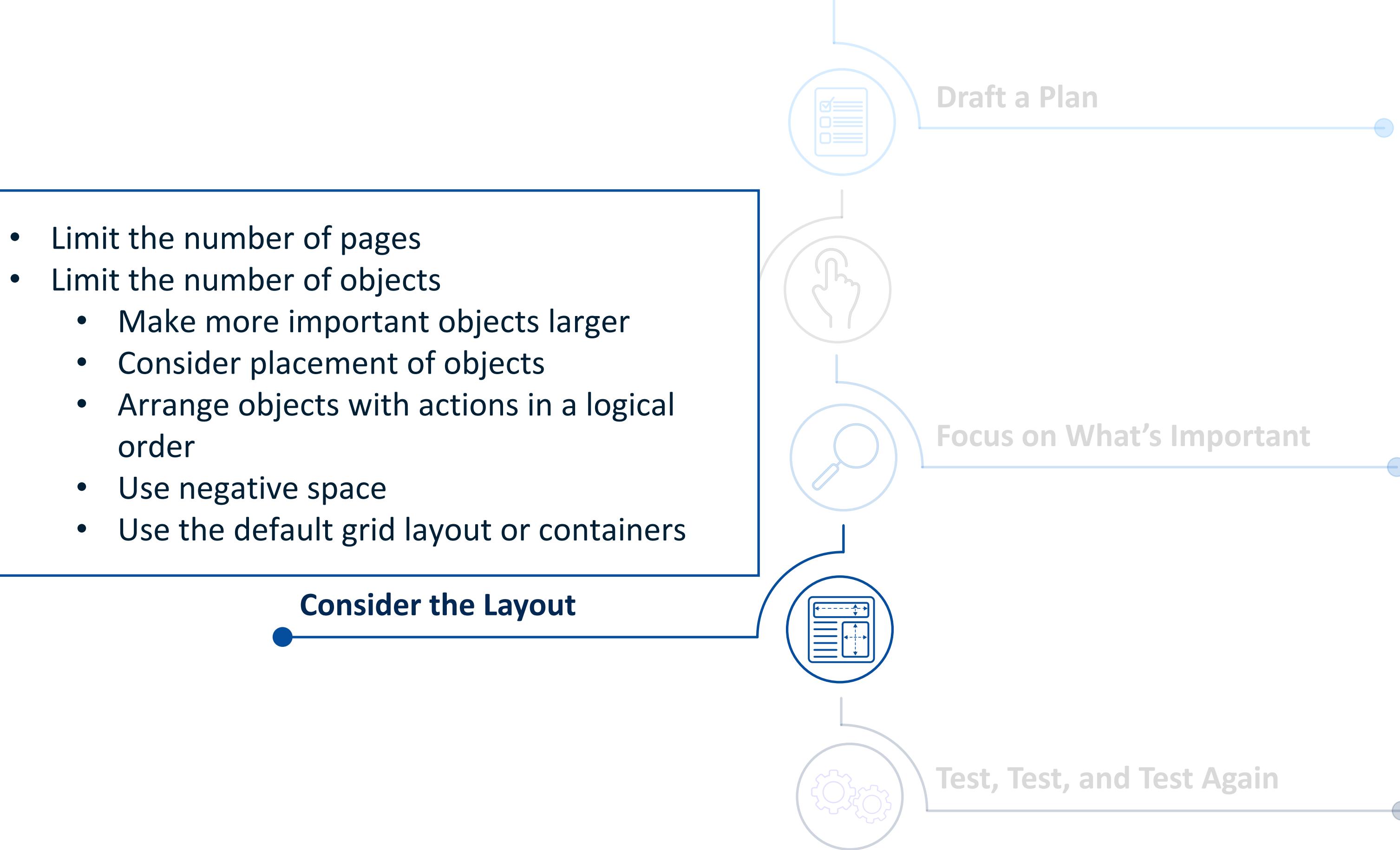
Warmth  
Autumn  
Visibility  
Harvest

Royalty  
Wealth  
Nobility  
Honor

Immortality  
Peace  
Trust  
Security  
Sadness

Purity  
Elegance  
Peace  
Cleanliness

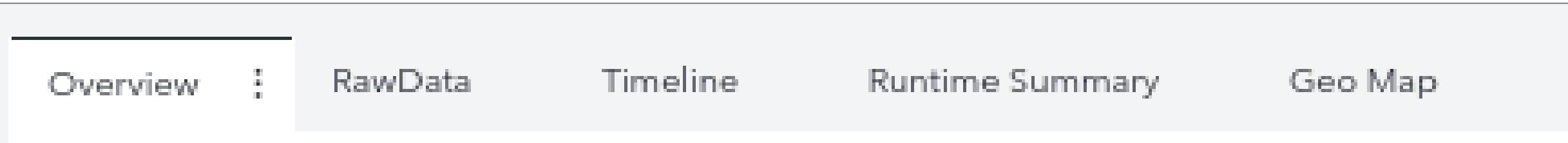
Sophistication      Illness  
Mystery  
Formality  
Death  
Mourning





## Consider the Layout

# Limit The Number Of Pages



Arrange the pages to advance your data story

Limit the number of pages (less than 6)

Add a table of contents or introductory page

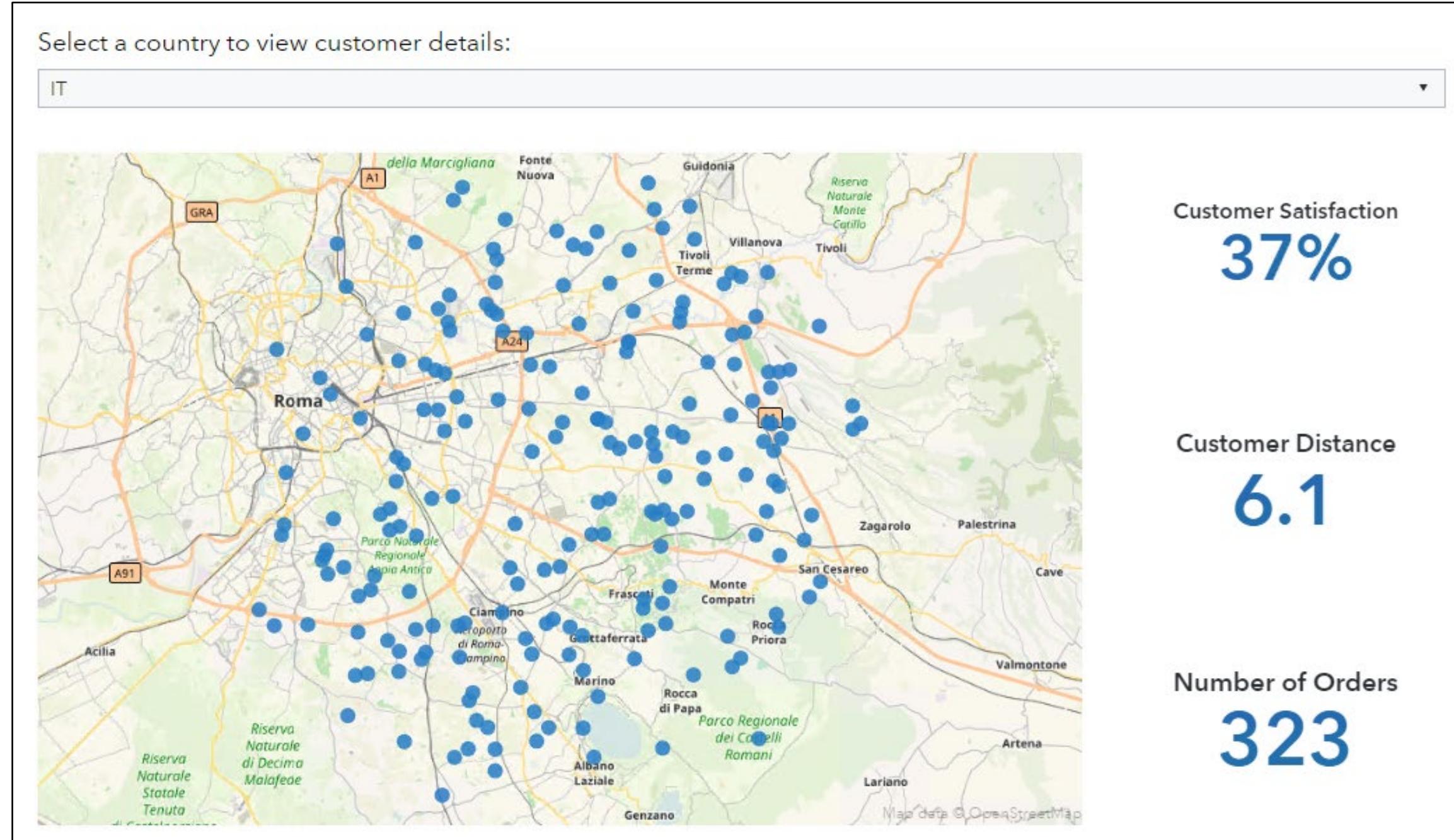
Use page links to control navigation

Use pop-up pages to provide additional details



Consider the  
Layout

# Make More Important Objects Larger



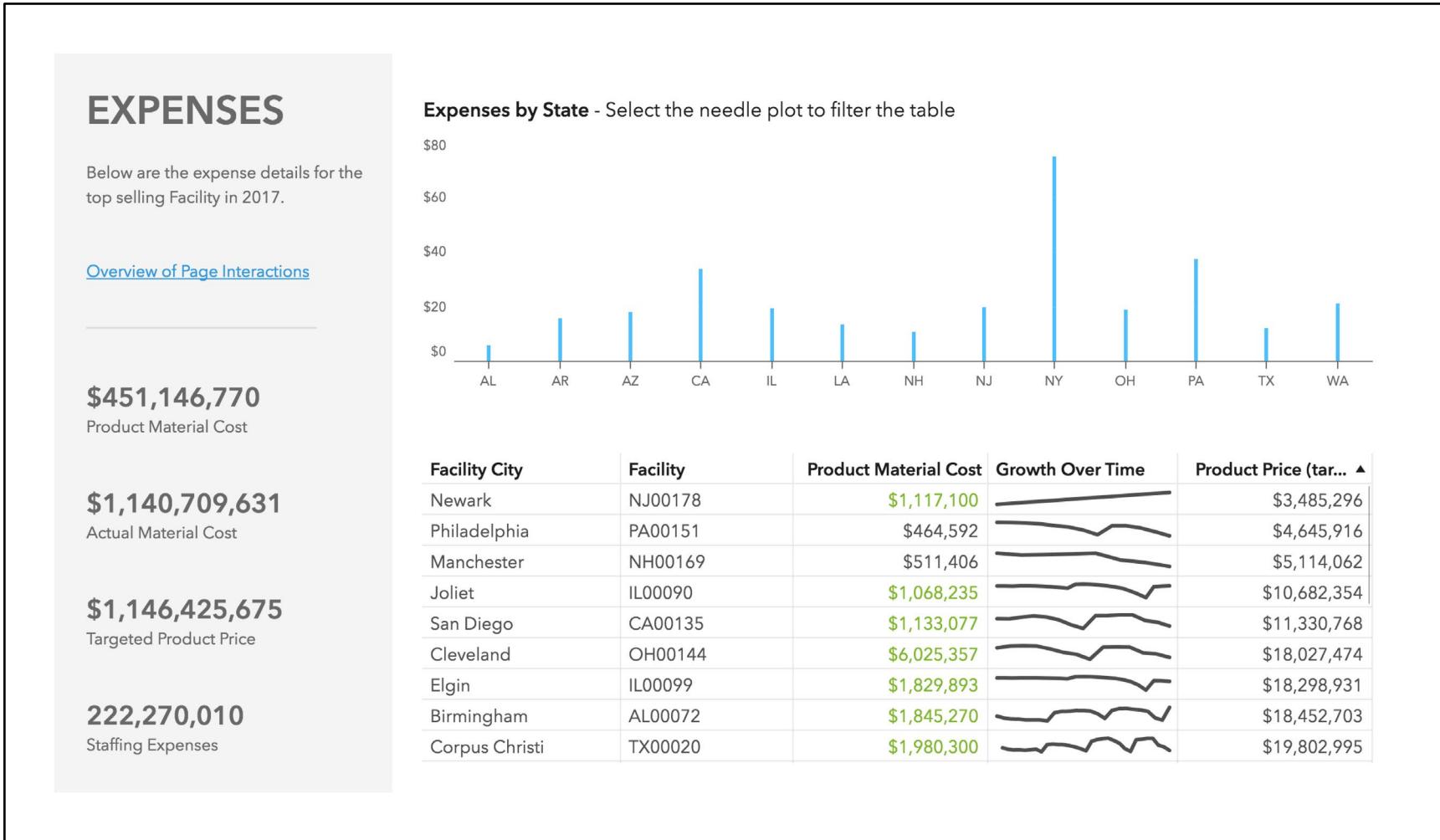
Use page templates to speed up development



## Consider the Layout

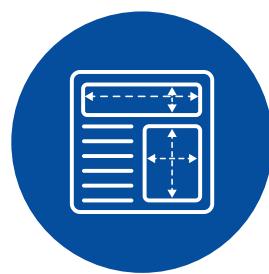
# Consider The Placement Of Objects

## Focal point



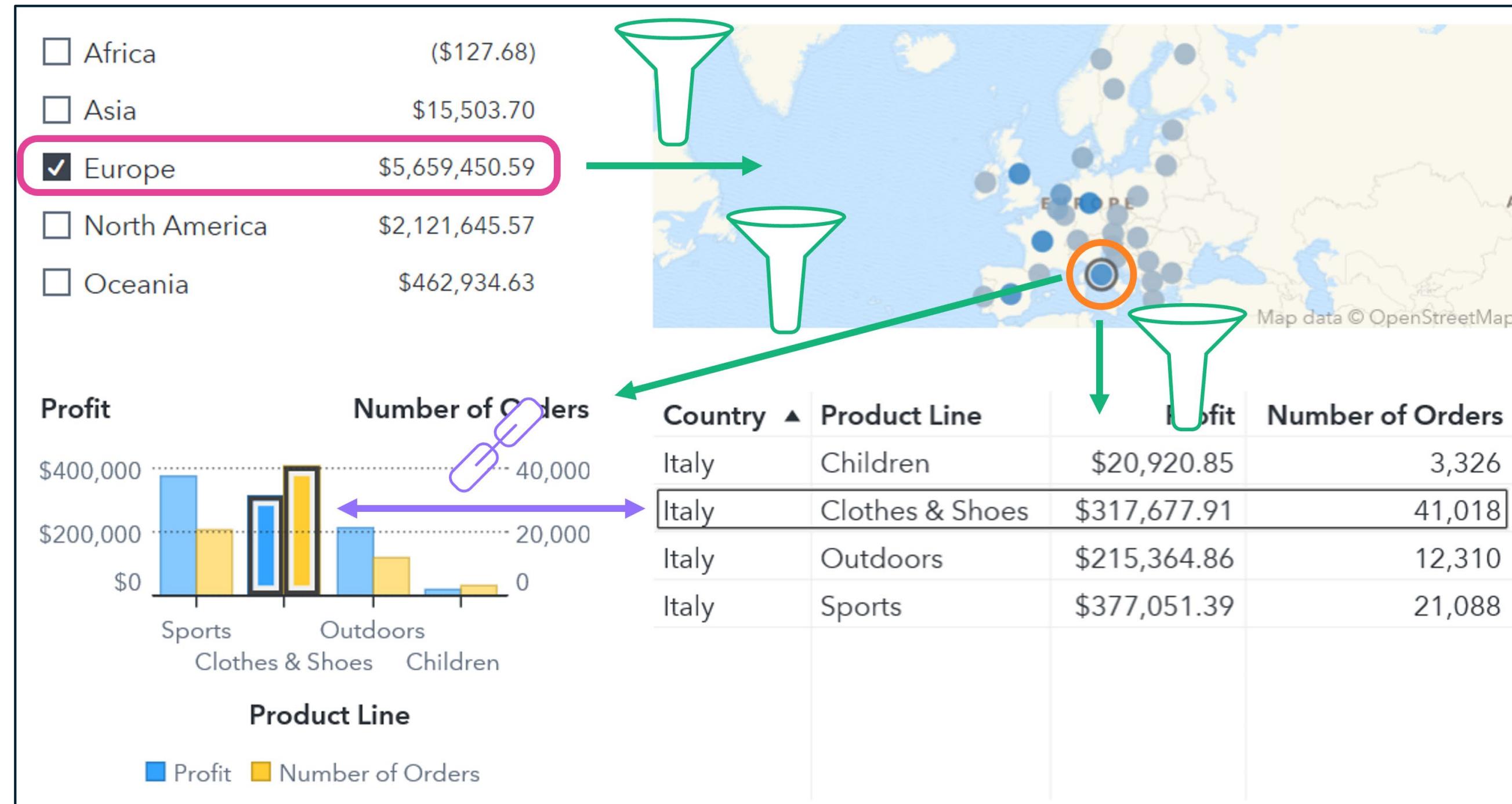
## Related objects

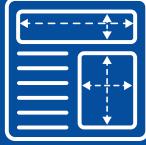




Consider the  
Layout

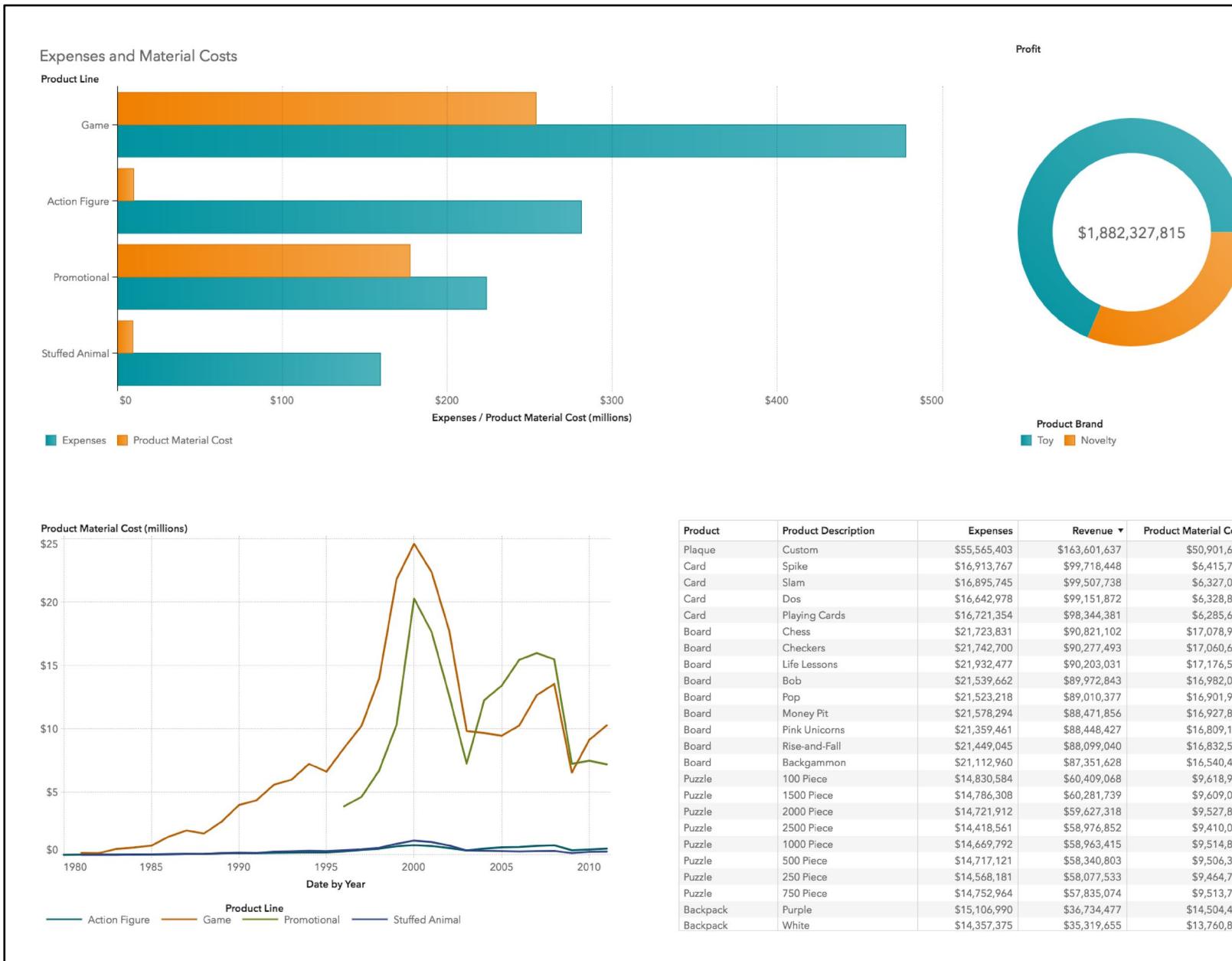
# Arrange Objects With Actions In A Logical Order





## Consider the Layout

# Use Negative Space



Use caution when modifying padding from default

## Choose the Best Chart

## Draft a Plan

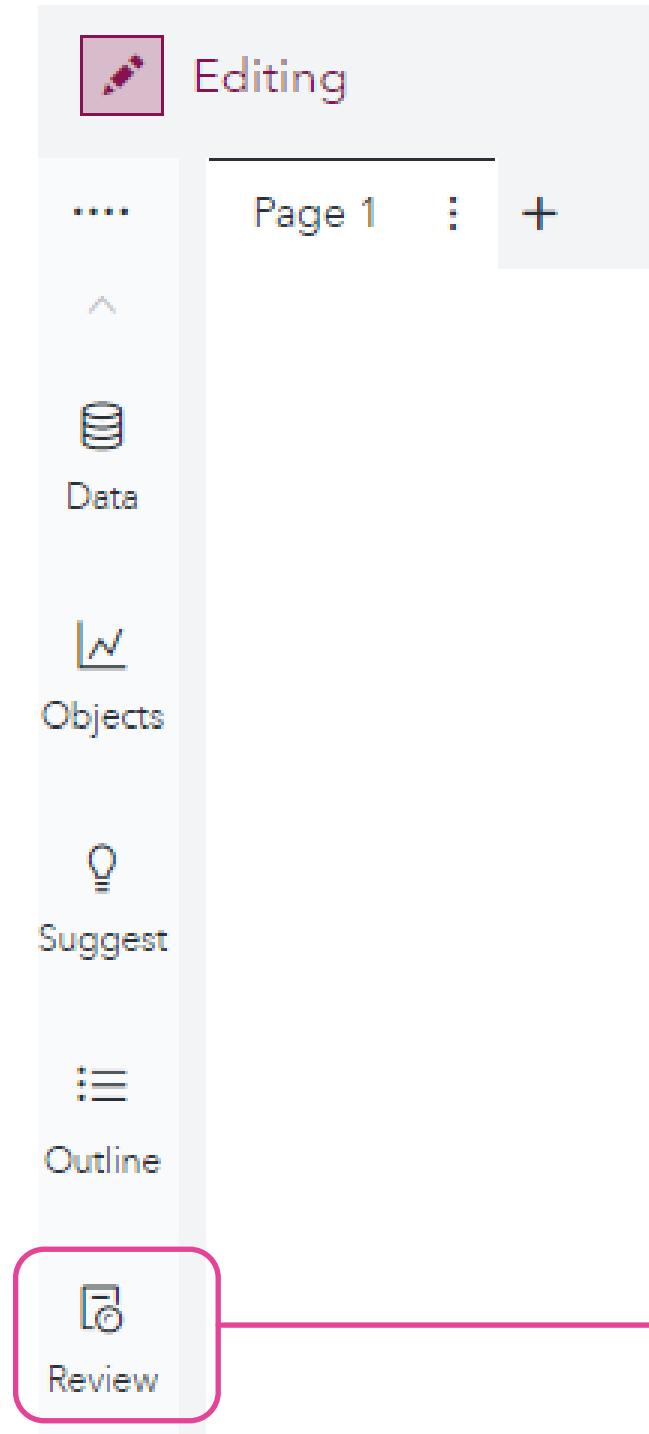
- Report Review pane
- Peer review
- Test on multiple devices
- Create PDF (report distribution)
- Perform a test print (hard copies)
- Project the report to check colors
- Embed report using SAS Viya SDK for JavaScript
- Access report from SAS for Microsoft 365
- Play the report (kiosk or slideshows)
- View report using browser with different locale

## Consider the Layout

## Test, Test, and Test Again



## Test, Test, and Test Again



# Report Review Pane

## Report Review

ⓘ 0 ⓘ 0 ⓘ 3 3

[Evaluate Performance](#)

Filter

### ✓ ⓘ Color-Dependent Display Rules (1)

The effects of color-dependent display rules are not accessible to users with color-deficient vision (color blindness) or other visual impairments, which includes screen reader users. If you need to include color-dependent display rules in an object, include a second object (for example, a list table or a crosstab) that presents the same information in an accessible way. In the second object, include the information contained in the display rule.

Bar - EVENTNAME 1

### ✓ ⓘ Object Names (2)

Objects (except text objects and containers) need meaningful, accessible names for assistive technology. Choose meaningful names for your objects (rather than using the default name), specify visible and meaningful titles for the objects, or use the "Alternative text" option for the objects in your report.

List - Finalized Country 1

List table - CITY 1

Severity

Accessibility issues

Performance issues



Provide meaningful titles for accessibility



Test, Test, and Test Again

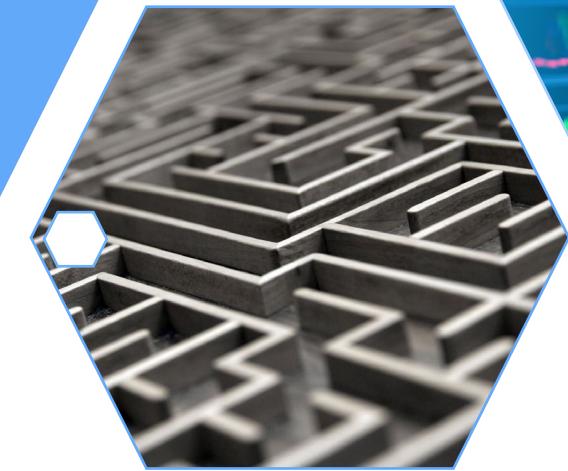
# Peer Review



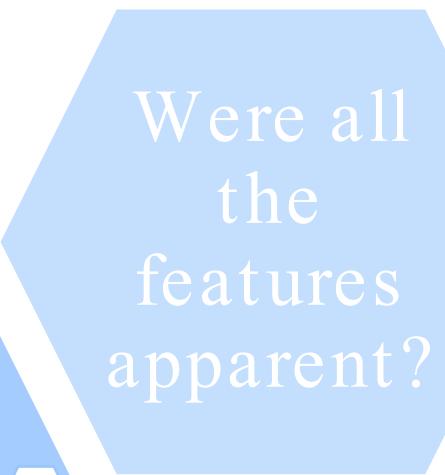
Is the report easy to navigate?



What is the story?



Did you get lost?



Were all the features apparent?



Did all the actions work?



Test, Test, and Test Again

# Test On Multiple Devices

The image shows a screenshot of a web browser's developer tools menu, specifically the "More tools" section. A pink box highlights the "Developer tools" option, which is associated with the keyboard shortcut "Ctrl+Shift+I". Below this, a pink arrow points from the "Developer tools" menu item to a list of mobile devices displayed in a separate window. The list includes:

- ✓ Responsive
- iPhone SE
- iPhone XR
- iPhone 12 Pro
- Pixel 5
- Samsung Galaxy S8+
- Samsung Galaxy S20 Ultra
- iPad Air
- iPad Mini
- Surface Pro 7
- Surface Duo
- Galaxy Fold
- Samsung Galaxy A51/71
- Nest Hub
- Nest Hub Max
- Facebook for Android v407 on Pixel 6

At the bottom of the list, there is an "Edit..." option.

# Other Tests

- Create PDF (report distribution)
- Perform a test print (hard copies)
- Project the report to check colors
- Embed report using SAS Viya SDK for JavaScript
- Access report from SAS for Microsoft 365
- Play the report (kiosk or slideshows)
- View report using browser with different locale

# Demo

# Traditional Reporting vs. Dashboard Reporting

Feature	Dashboards	Reports
Data Type	Real-Time or Near-Real-Time	Historical
Interactivity	Interactive (filtering, drilling down)	Static
Visual Focus	Highly visual (charts, graphs)	Detailed information (tables, narratives)
Purpose	Summarized view for quick decision-making	In-depth analysis and insights
Usage	Continuous monitoring of key metrics	Periodic generation for performance review
Data Update Frequency	Continuous updates	Periodic updates (e.g., weekly, monthly)
User Accessibility	User-friendly, accessible to non-technical users	May require technical expertise to create/interpret
Typical Content	Key Performance Indicators (KPIs)	Comprehensive narratives, tables, annotations
Primary Use Case	Operational contexts requiring ongoing tracking	Compliance, audits, detailed performance analysis

# Handy Links

[Beautiful Reports](#)

[Visual Explanations by Edward Tufte](#)

[Gallery of SAS Visual Analytics Objects](#)

[Creating Accessible Reports Using SAS Visual Analytics](#)

[Tips for Building Rich Interaction in Your SAS Visual Analytics](#)

[The Visual Display of Quantitative Information by Edward Tufte](#)

[Types of Charts: Choose the Best Chart to Convey Your Message](#)

[SAS Visual Analytics Stories are Data With a Soul by Ted Stolarczyk](#)

[Tips and Techniques for Designing the Perfect Layout with SAS Visual Analytics](#)

✓ Did you  
enjoy this  
session, Let us  
know in the  
[evaluation](#)

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