SAS Visual Analytics 101
From ETL to Dashboard Creation

SAS® Institute Canada Inc.

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Charu Shankar

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, etc. 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

Explore main report objects in SAS Visual Analytics

Streamline ETL

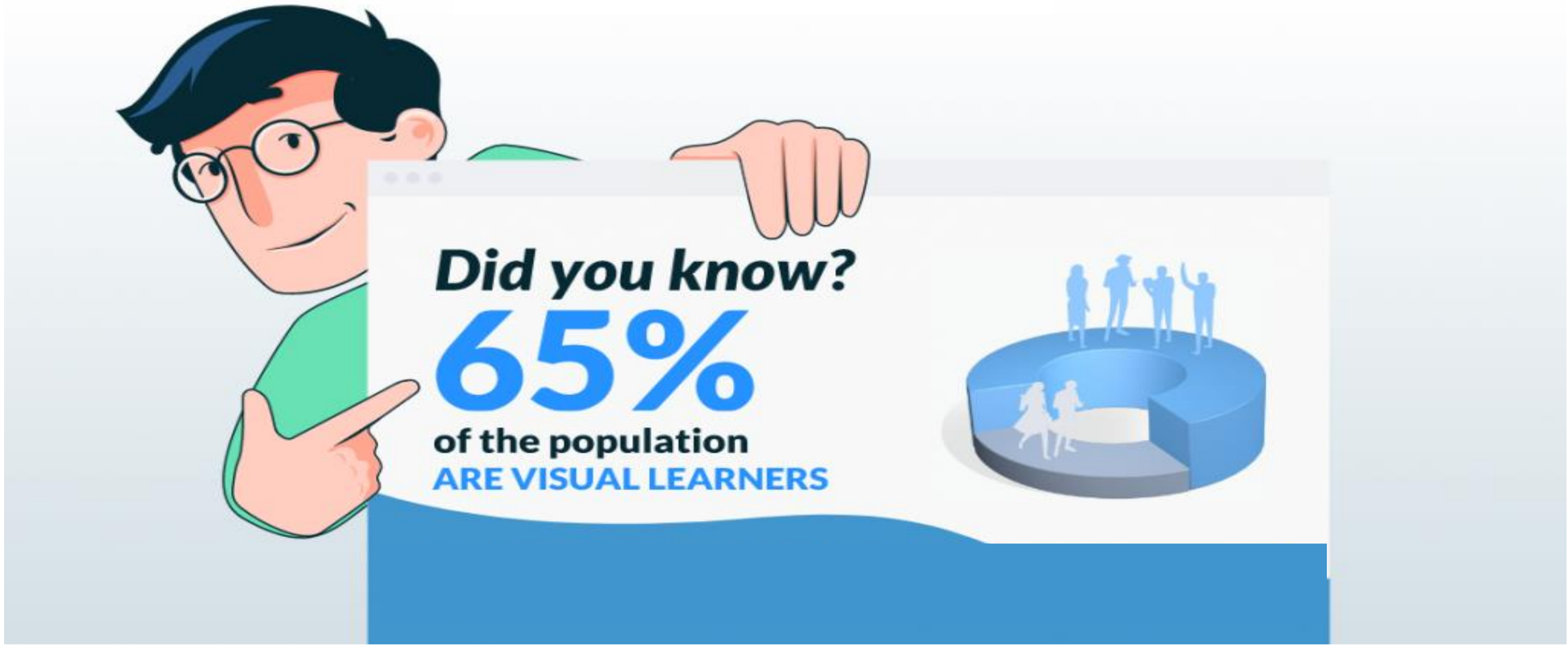
Create a dashboard with SAS Visual Analytics

Handy Links

Intro	5	Query audience Set stage for talk		
Etl short talk & demo code	15			
Good Reporting short talk	35			
VA Demo				
Q&A	5			

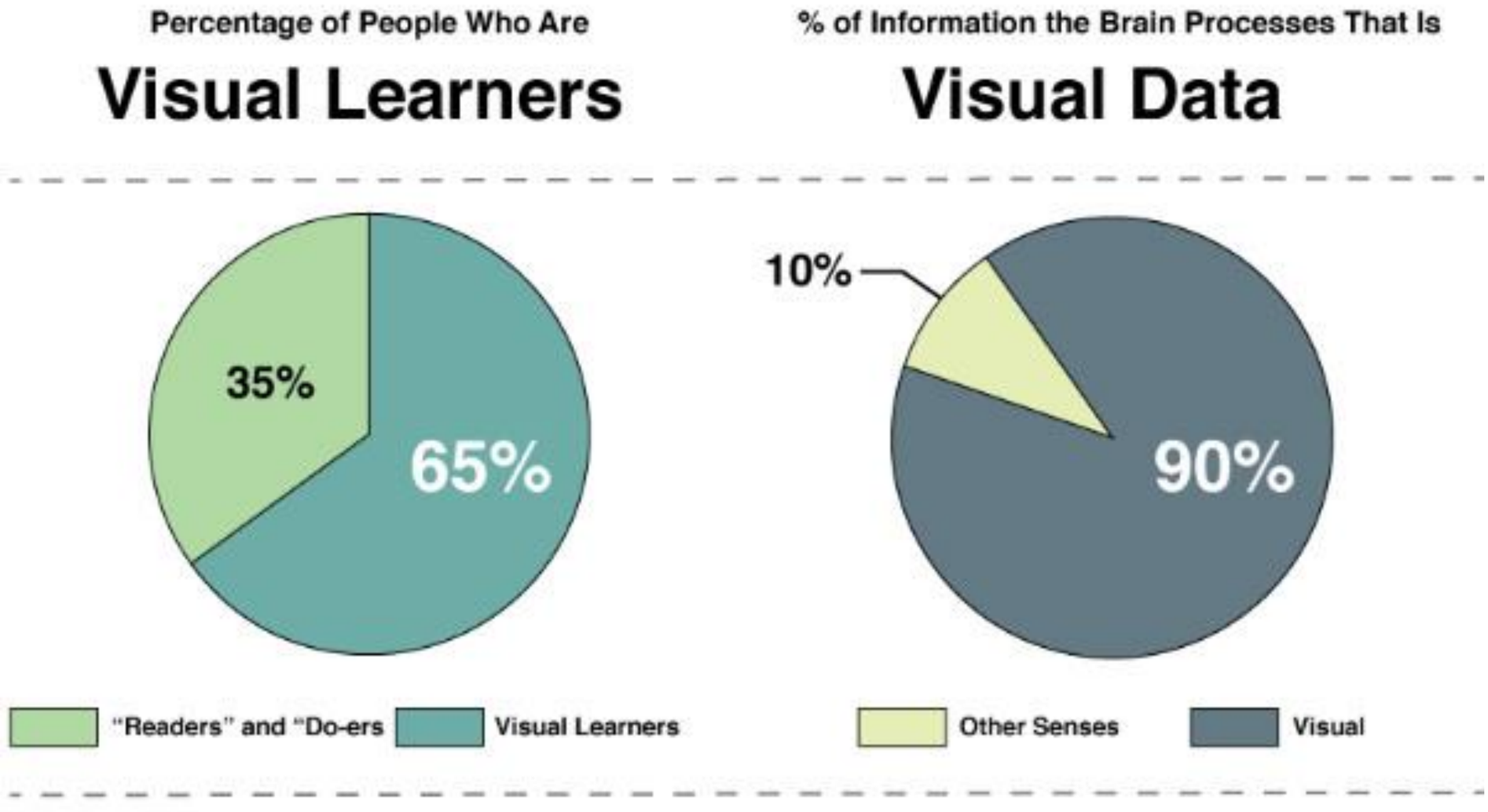
What % of population is visual?

65% of the population are visual learners

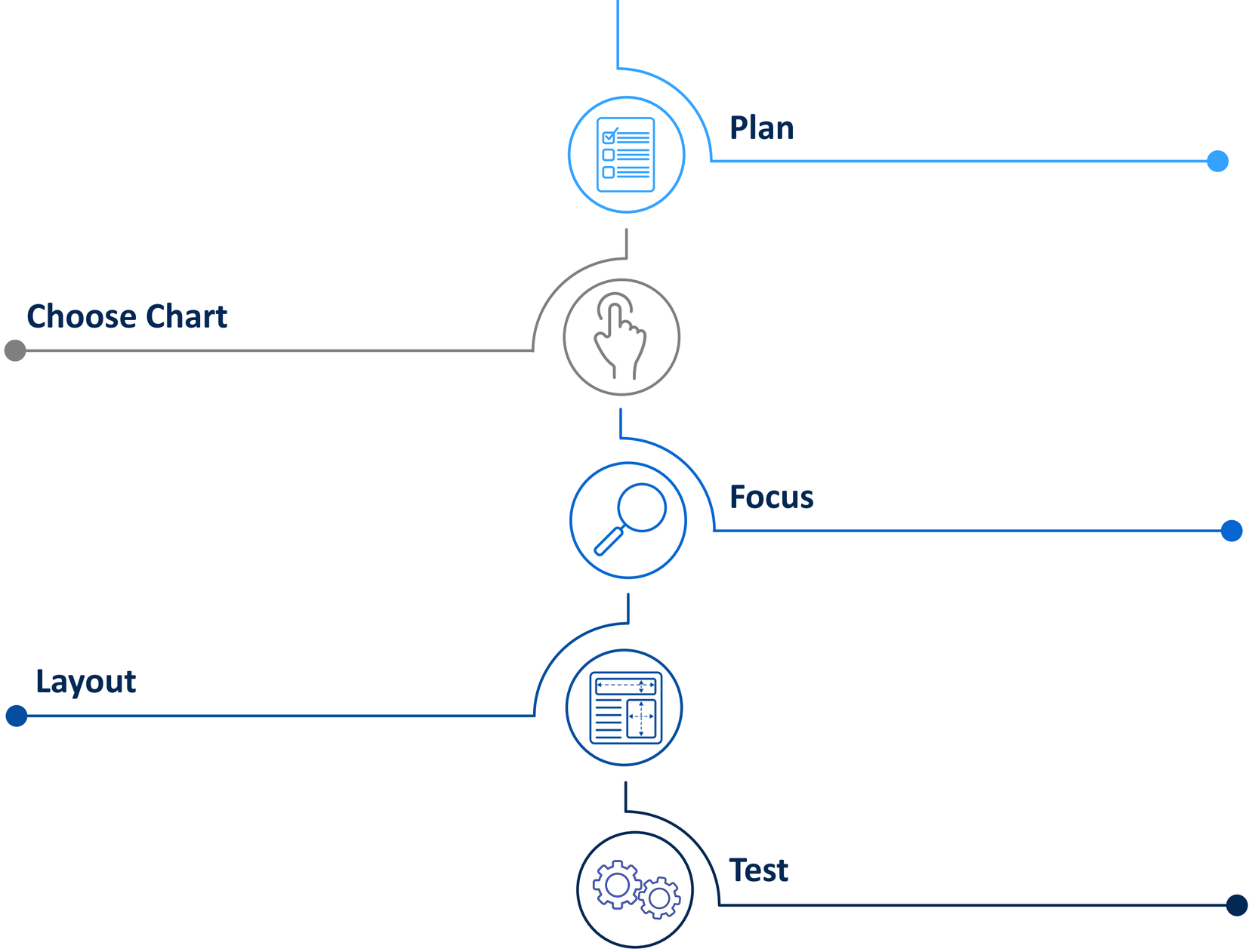


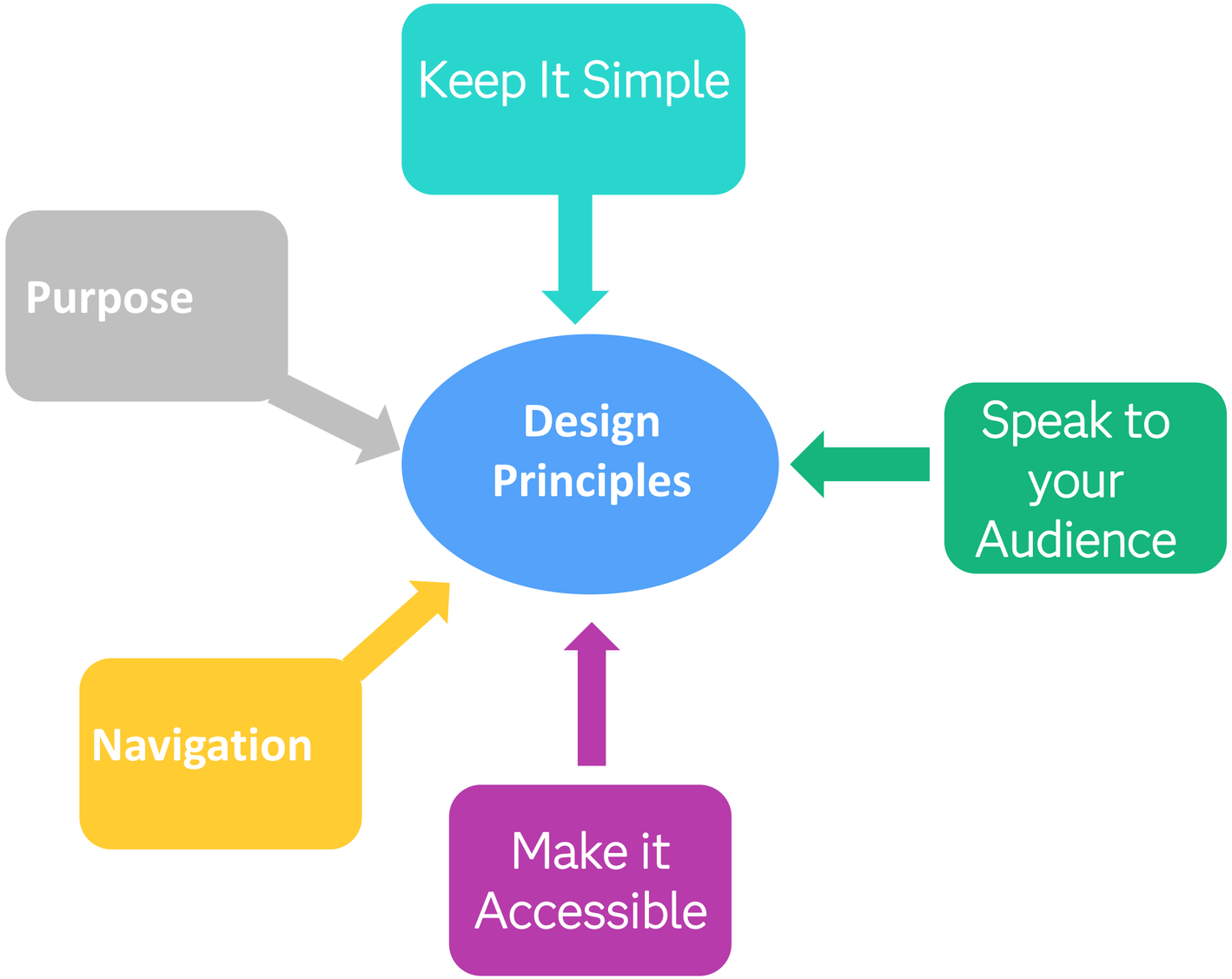
https://en.wikipedia.org/wiki/Visual_thinking

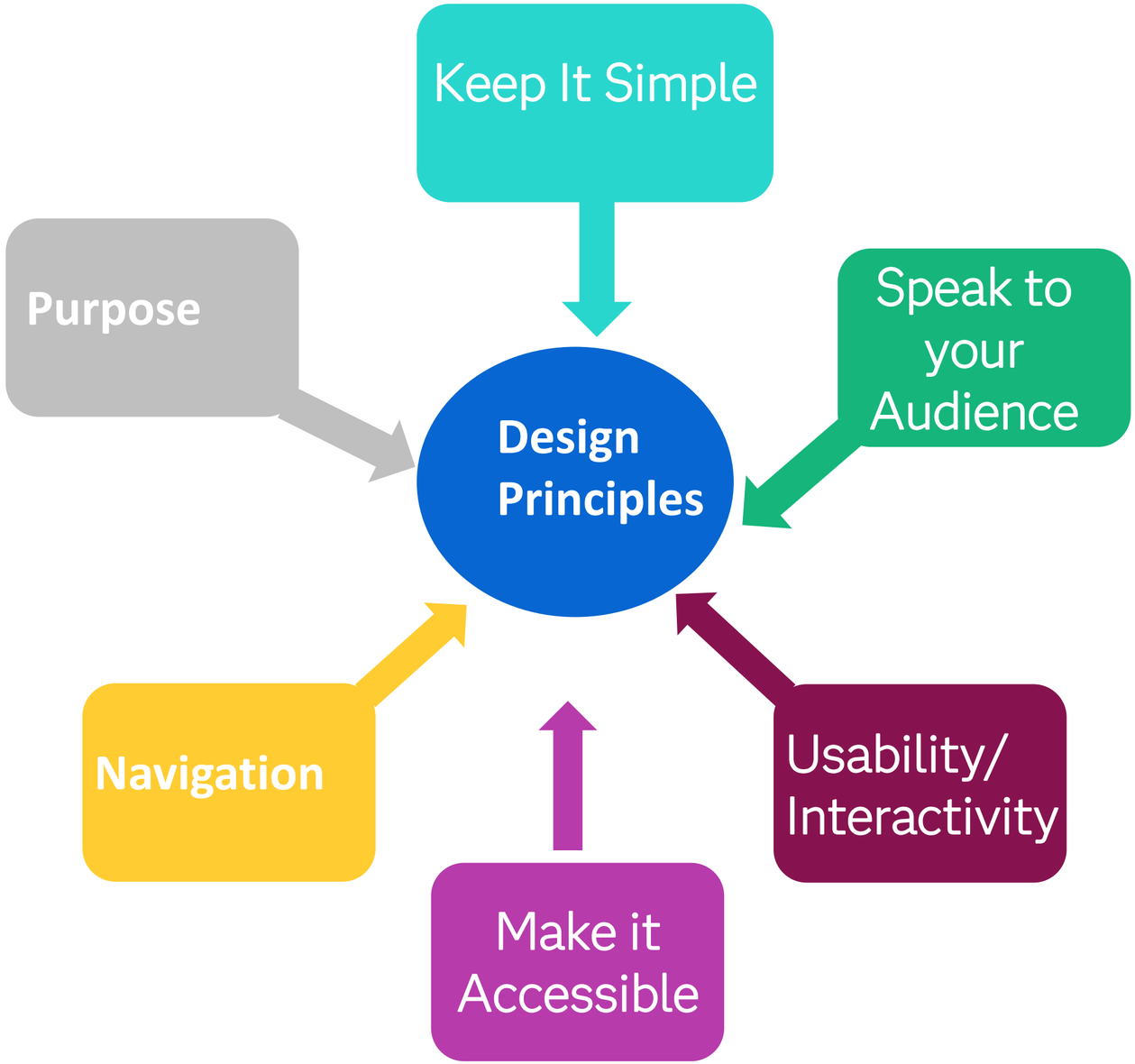
What % of information transmitted to the brain is visual?



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	Home Page
Visual Hierarchy	the human mind processes bigger elements as more important.	All Pages
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 web design.	A.I. collapsible button
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.	Infographic
Movement	Visually objects at diff speeds	Videos on home page/training/hot topics page Carousel on home page

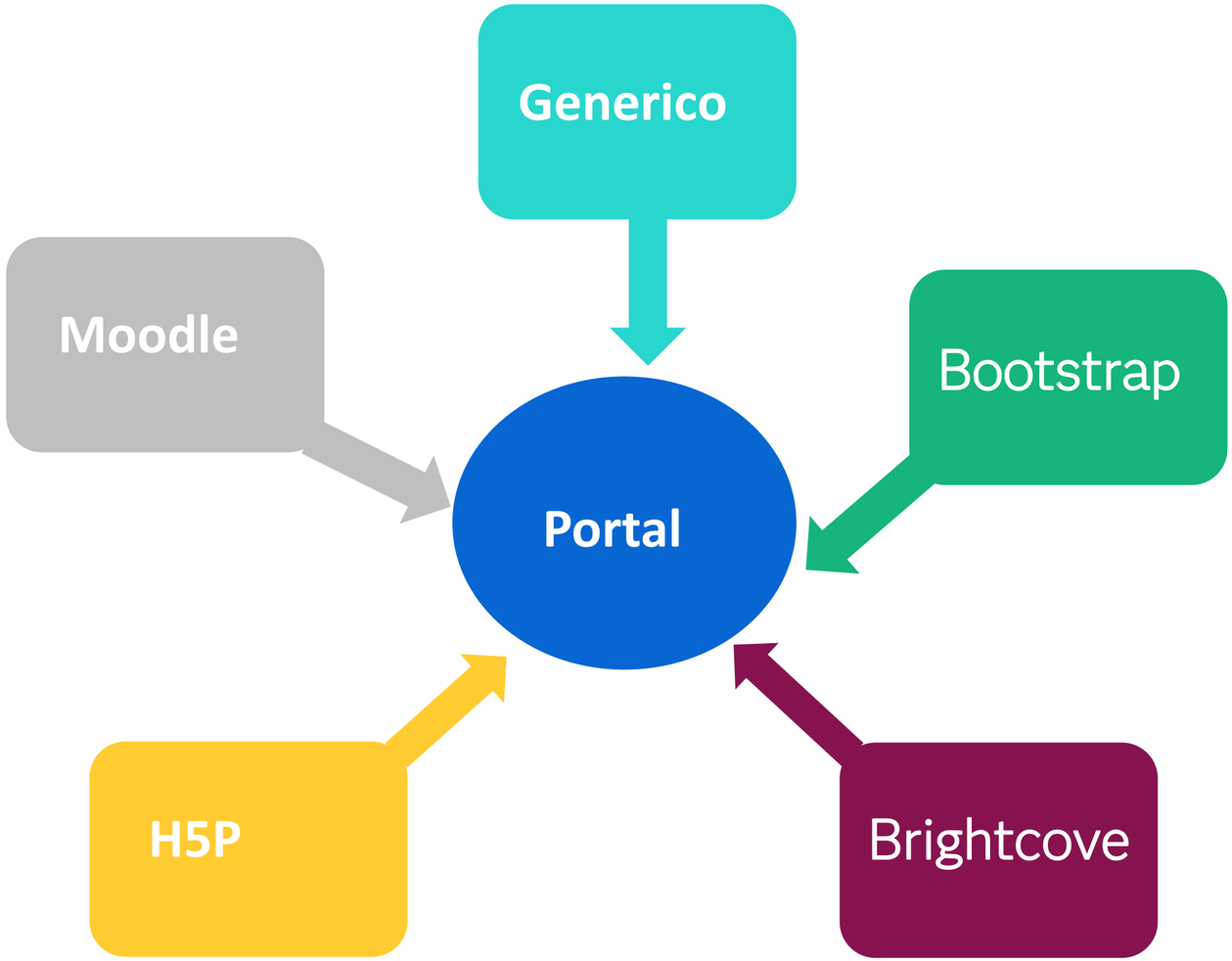



Keep It Simple
Purpose
Design Principles
Speak to your Audience
Navigation
Make it Accessible


Keep It Simple
Purpose
Speak to your Audience
Design Principles
Navigation
Usability/ Interactivity
Make it Accessible

Principles of Good Design

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
Gesta		
Visua		
Grid b		
Consi		
Image		
Movement	Visually objects at diff speeds	Videos on home page/training/hot topics page Carousel on home page


Generico
Moodle
Bootstrap
Portal
H5P
Brightcove

1 Plan

Select your data
Know your audience
Craft your message or story
Draft your report

Traditional Reporting vs. Dashboard Reporting

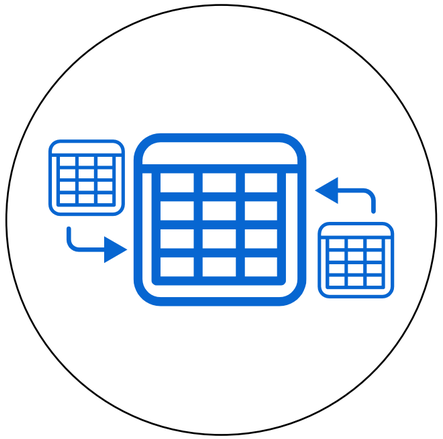
Feature	Dashboards	Reports
Data Type	Real-Time or Near-Real-Time	Historical
Interactivity	Interactive (filtering, drilling down)	Static
Visual Focus	Highly visual (charts, graphs)	Detailed information (tables, narratives)
Purpose	Summarized view for quick decision-making	In-depth analysis and insights
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

Draft a Plan

Select your data

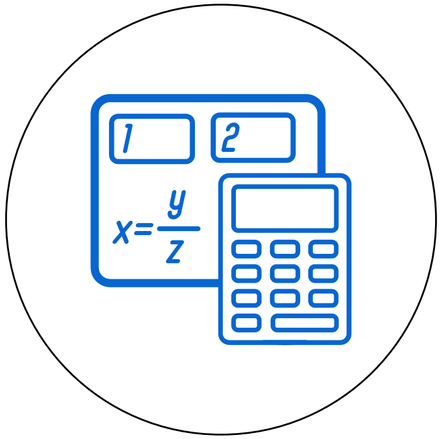
Any format

- SAS data sets
- Microsoft Excel files
- Database tables
- Text files



Multiple tables

- Combine tables
- Multiple data sources



Create data items

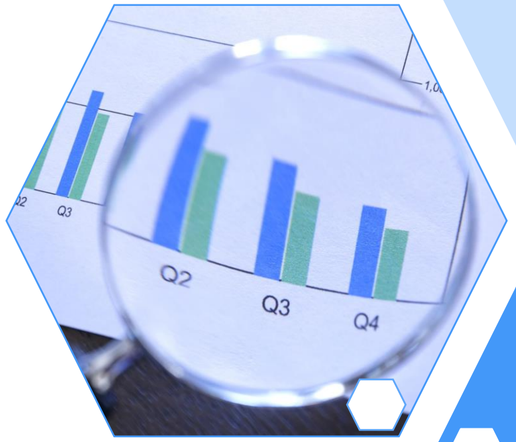
- One-click calculations
- Hierarchies
- Geography data items
- Parameters
- Statistical data items

Prepare your data before using it in SAS Visual Analytics

Draft a Plan

Know your audience

What to present?



How to present?

What level of detail?

Draft a Plan

- Select your data
- Know your audience
- Craft your story
- Sketch design

Choose the Best Chart

Focus on What's Important

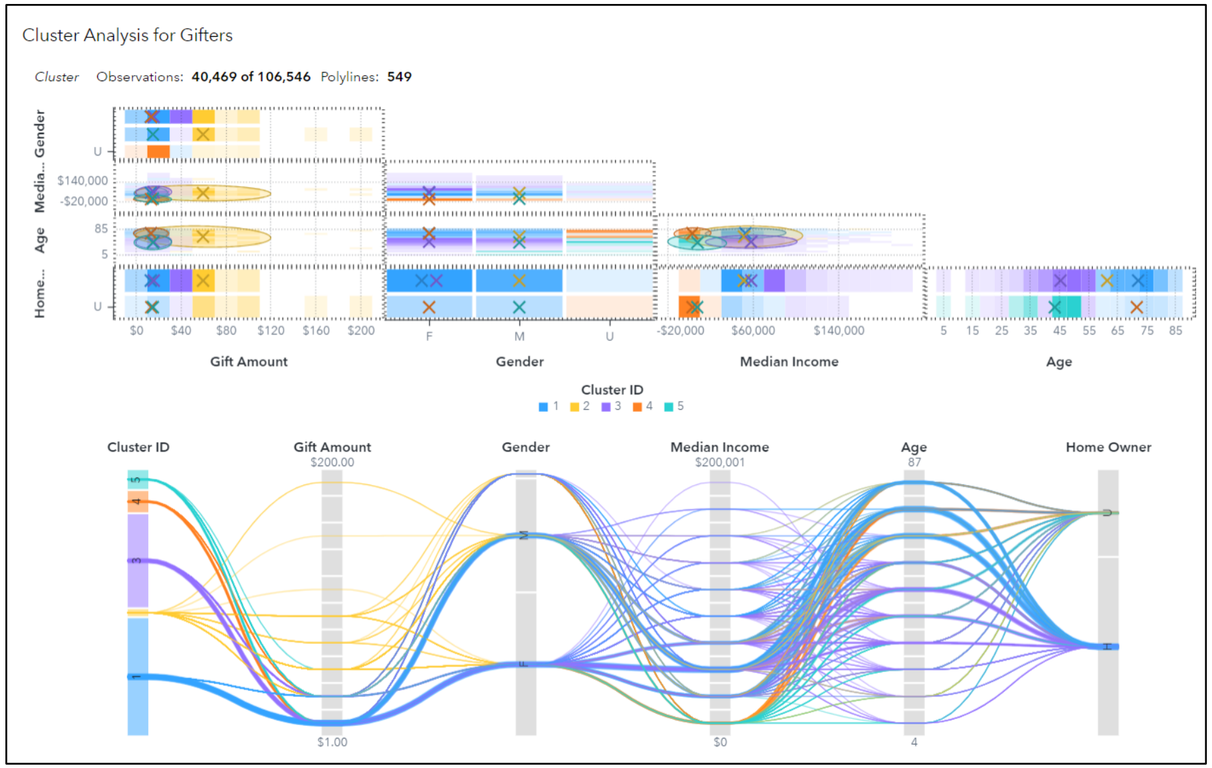
Consider the Layout

Test, Test, and Test Again

Draft a Plan

Know your audience

Data Scientist/Statistician/Data Analyst



Business User/Audience

South America
The below objects show the average customer satisfaction, average product quality, and the number of orders per product line for South America.

Customer Satisfaction
71%

Product Quality
89%

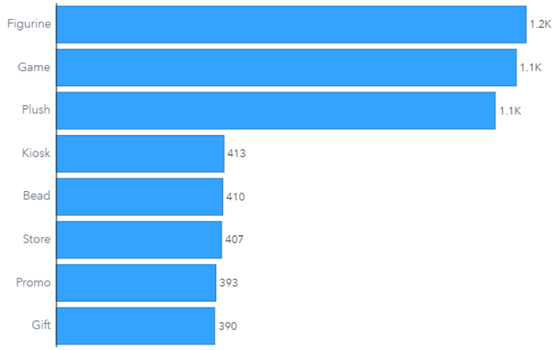
Number of Orders by Product Line

Europe
The below objects show the average customer satisfaction, average product quality, and the number of orders per product line for Europe.

Customer Satisfaction
45%

Product Quality
89%

Number of Orders by Product Line



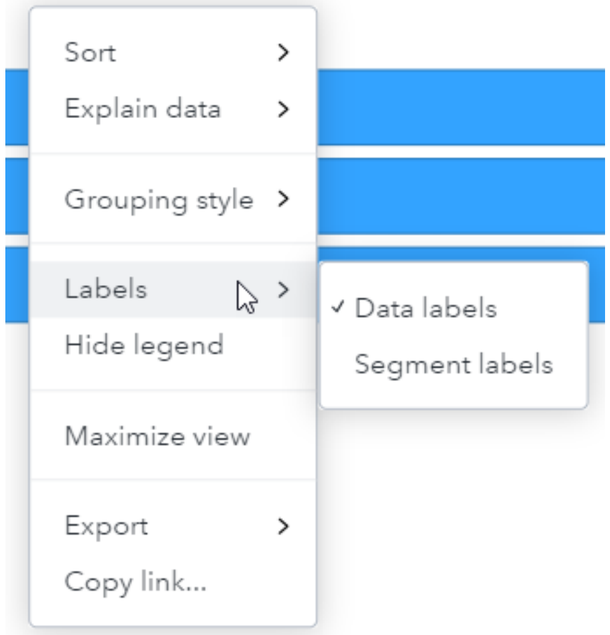
Notice that average customer satisfaction is higher in South America, but average product quality is the same. Perhaps the additional product lines in Europe (Kiosk, Bead, Store, Promo, and Gift) account for the lower satisfaction scores.

Provide context for graph content

Draft a Plan

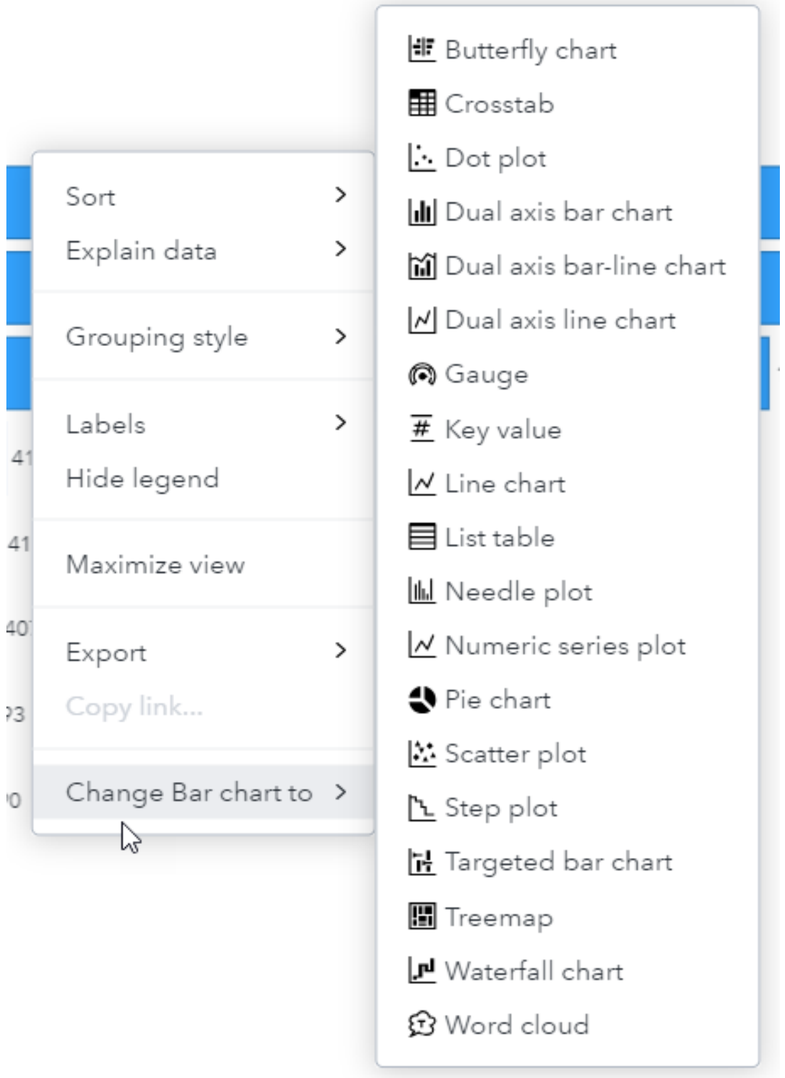
Know your audience

Simple edits

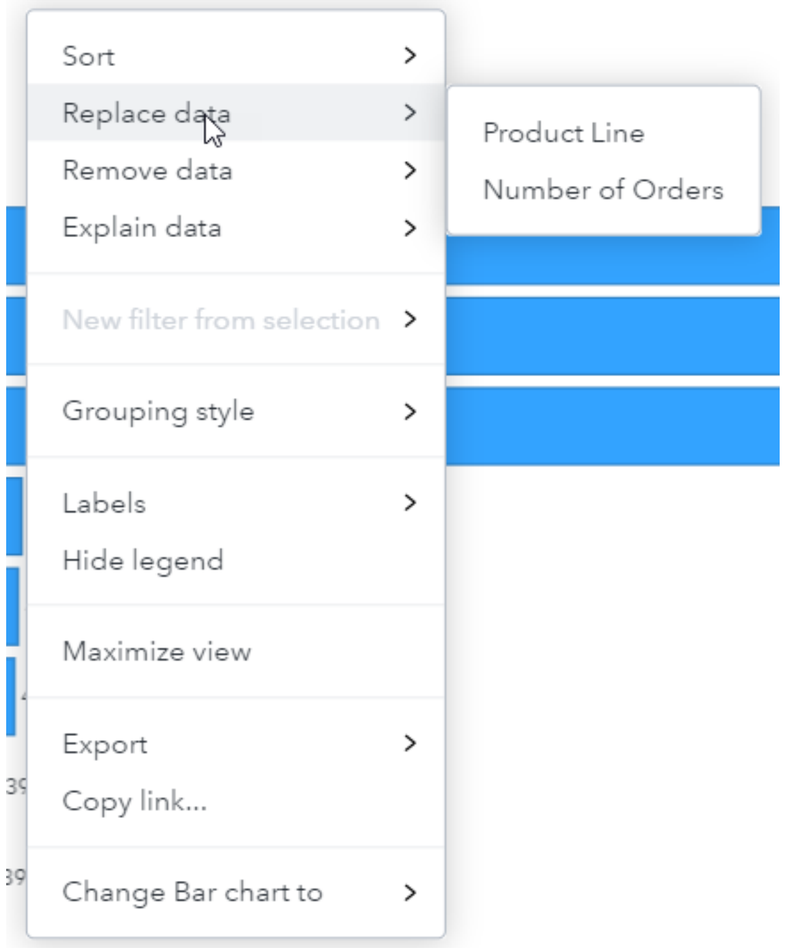


Viewer Customization Level

Comprehensive edits



Data edits



Draft a Plan

Craft your story

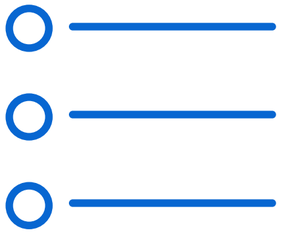
Are you trying to persuade?

Are you presenting facts?

Do you want the audience to take action?

Draft a Plan

Sketch design



Outline

Draft

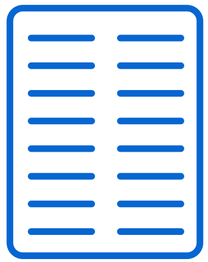
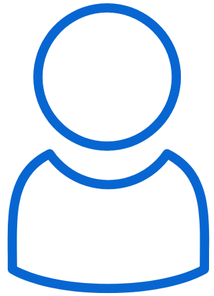
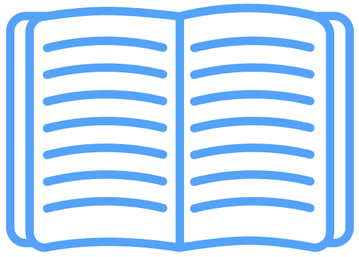


Table of contents



Plan for accessibility



Keep the story in mind

Draft a Plan

Choose the Best Chart

Best Practices

- Use the simplest graph
- Use visually appealing, easy to understand objects
- Use only most important data
- Keep graphs simple
- Use a zero baseline
- Use 2-dimensional charts
- Choose colors wisely

Focus on What's Important

Test, Test, and Test Again

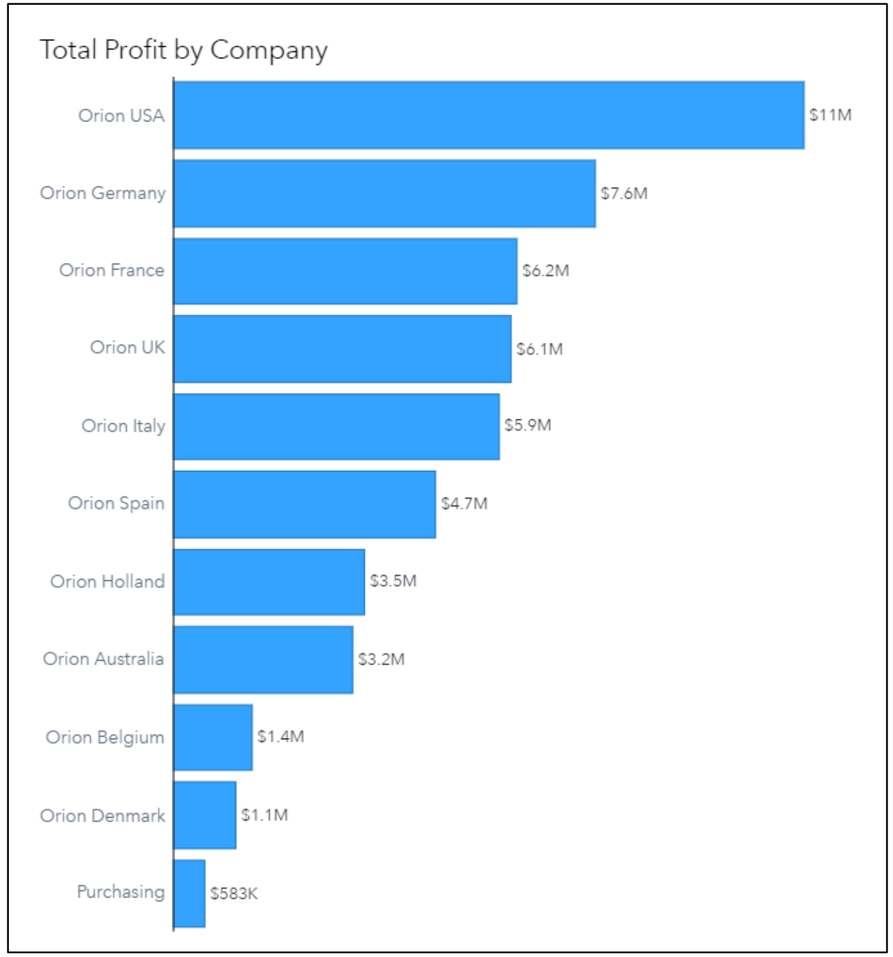
Choose the Best Chart (Best Practices)

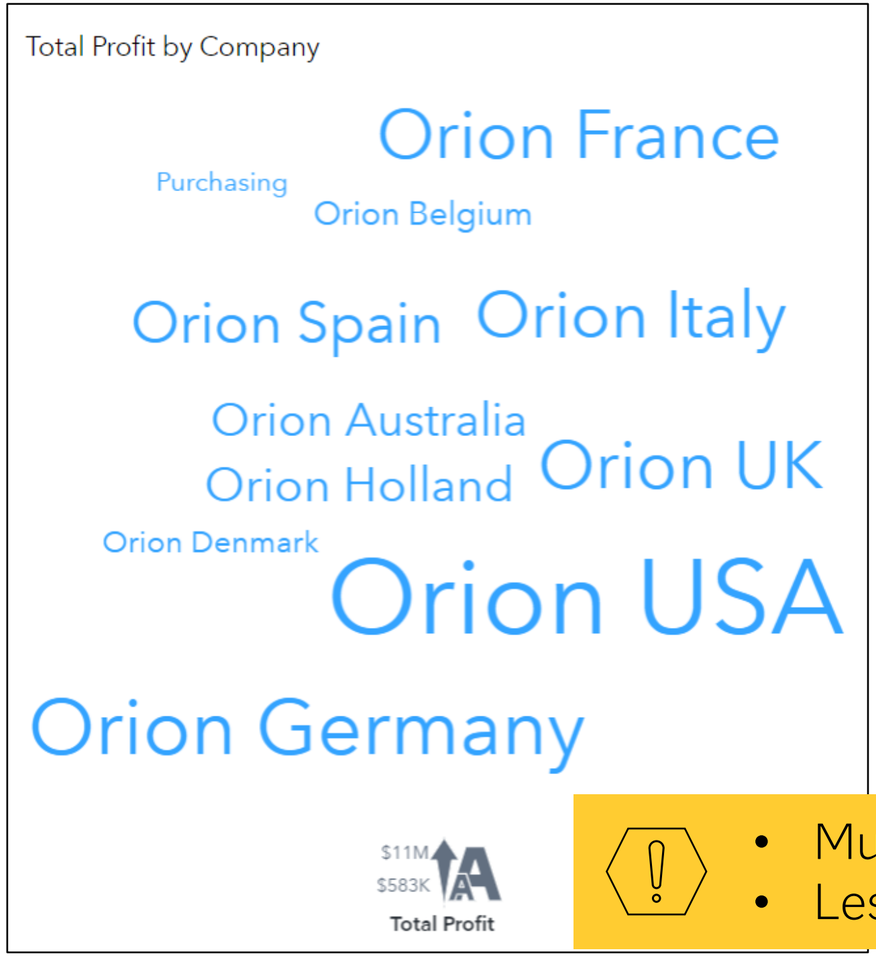
Who is the audience?

What data do you want to display?

Choose the Best Chart (Best Practices)

Use the simplest graph





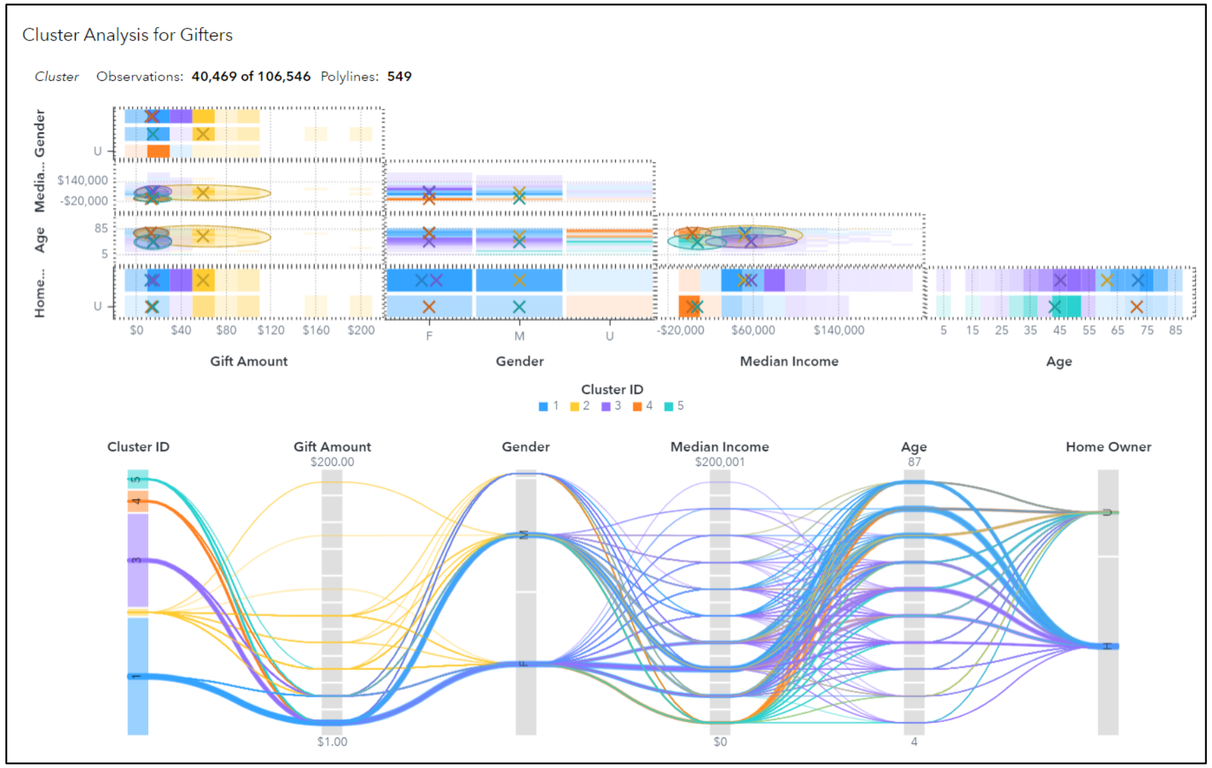
- Muddled message
- Less accessible

Create object templates to speed up development

Choose the Best Chart (Best Practices)

Use visually appealing, easy to understand objects

Statisticians

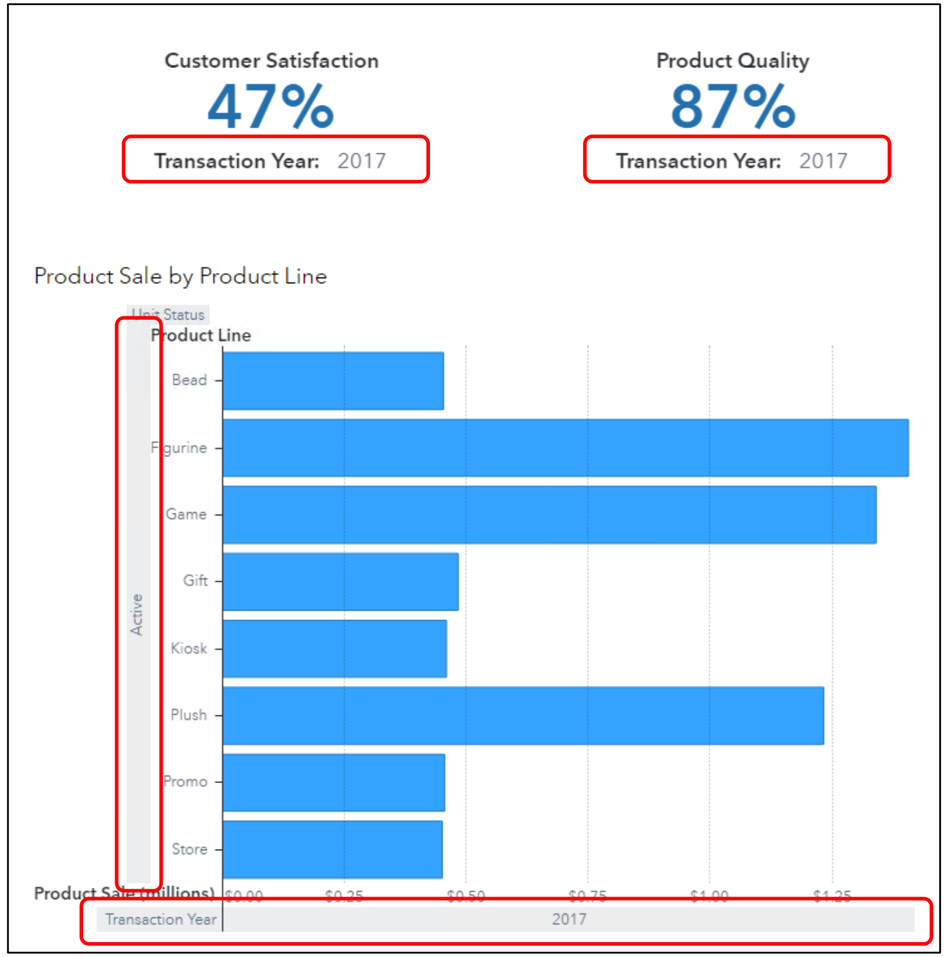


General audience

Consider the audience

Choose the Best Chart (Best Practices)

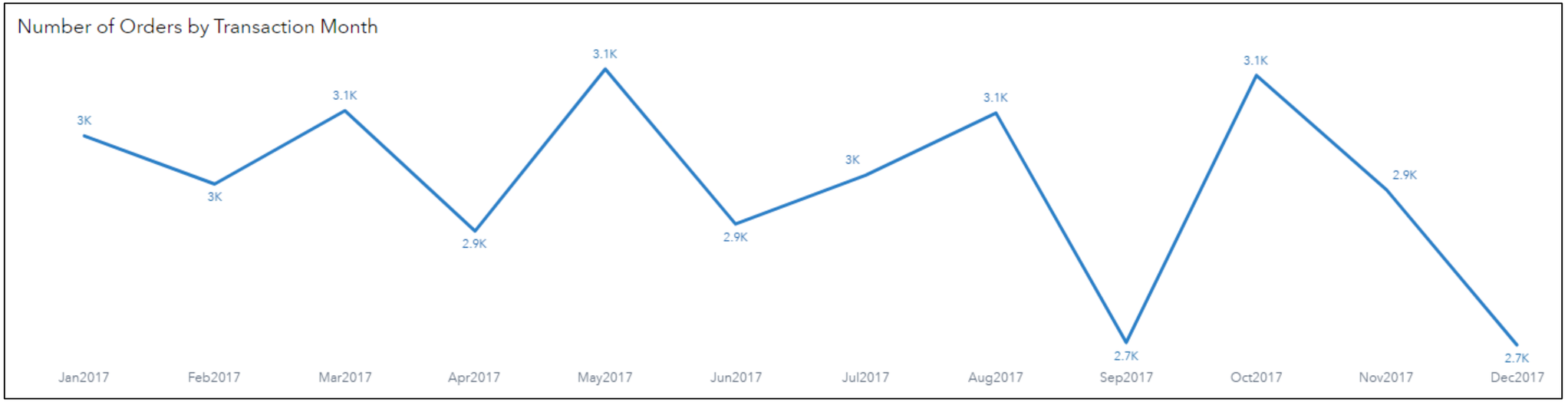
Use only the most important data



Notify users if lattice columns or lattice rows are used

Choose the Best Chart (Best Practices)

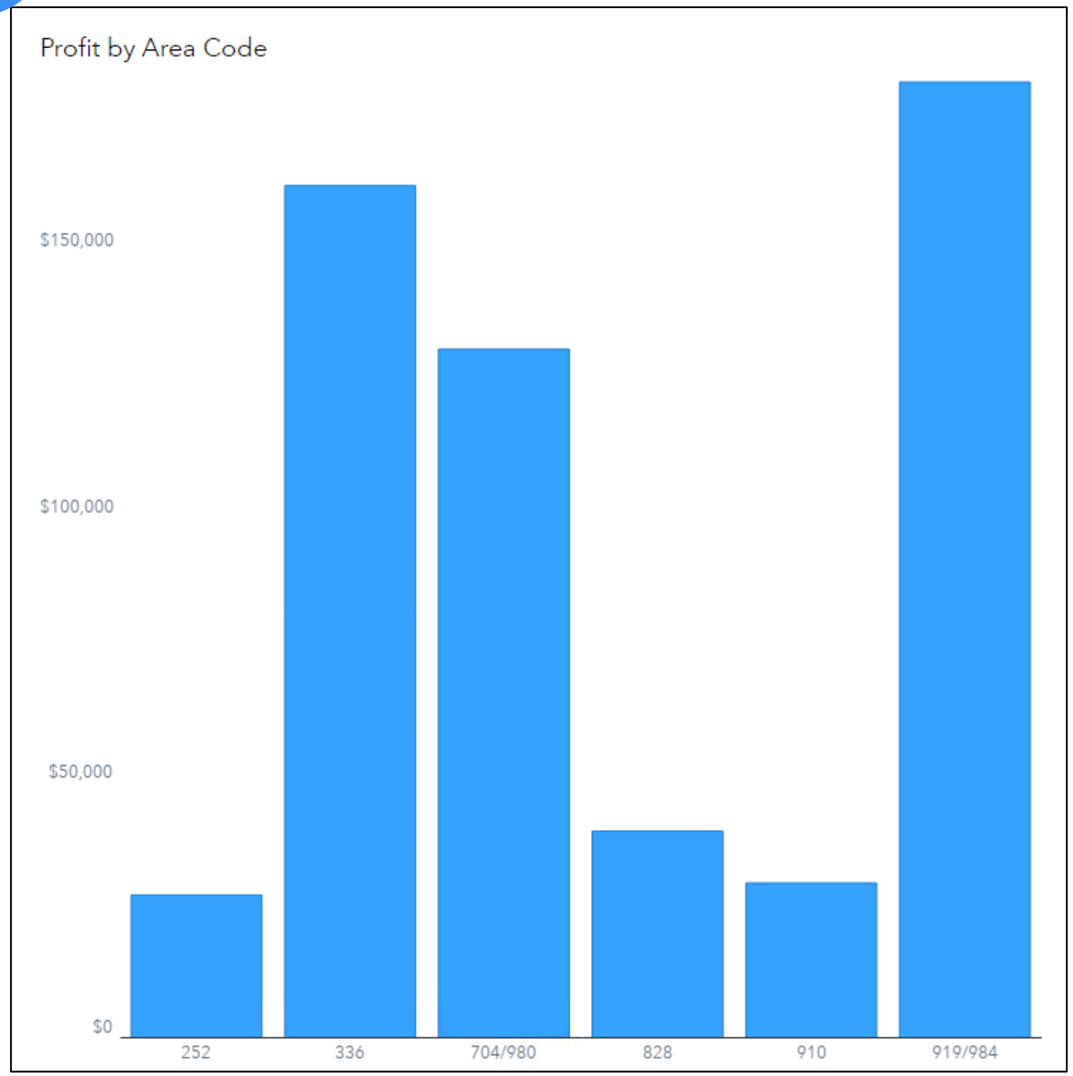
Keep graphs simple



Avoid chartjunk

Choose the Best Chart (Best Practices)

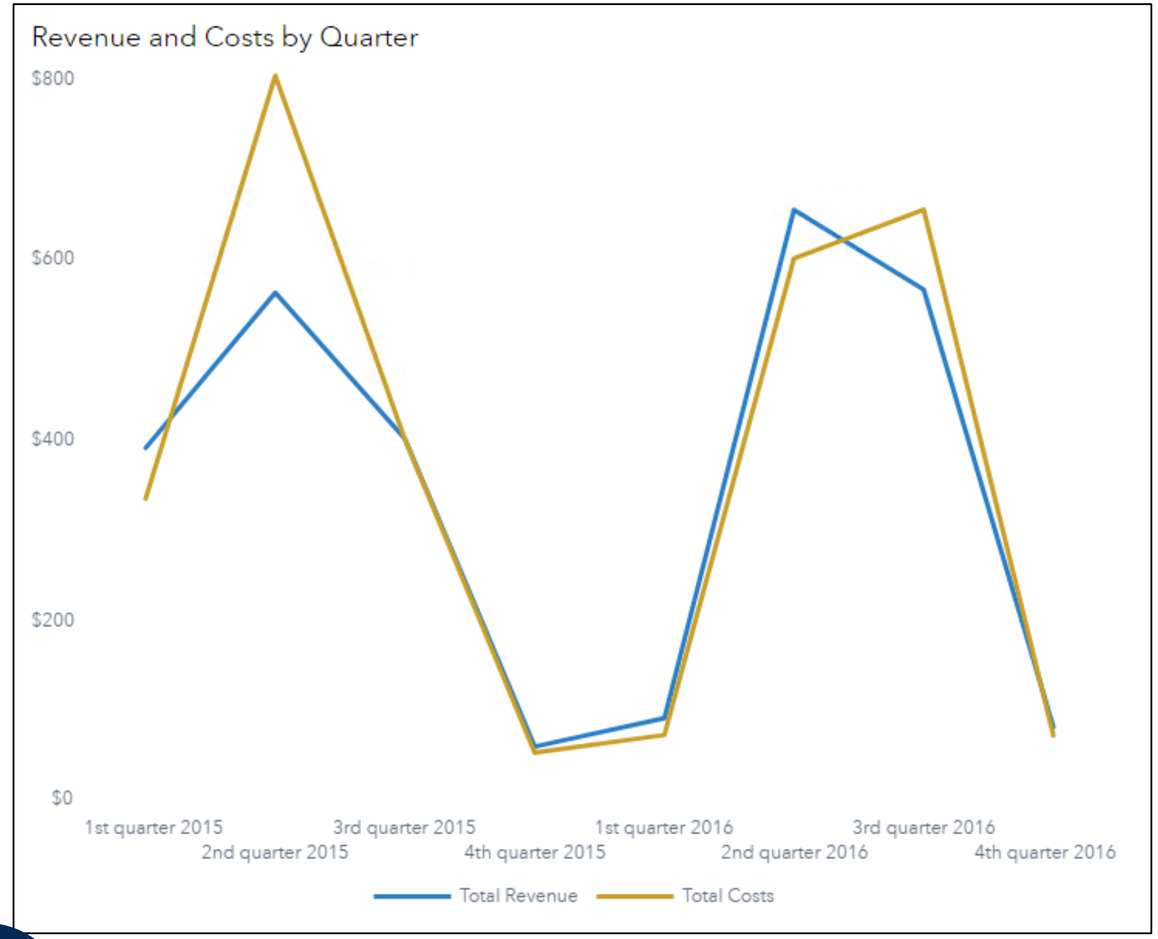
Use a zero baseline

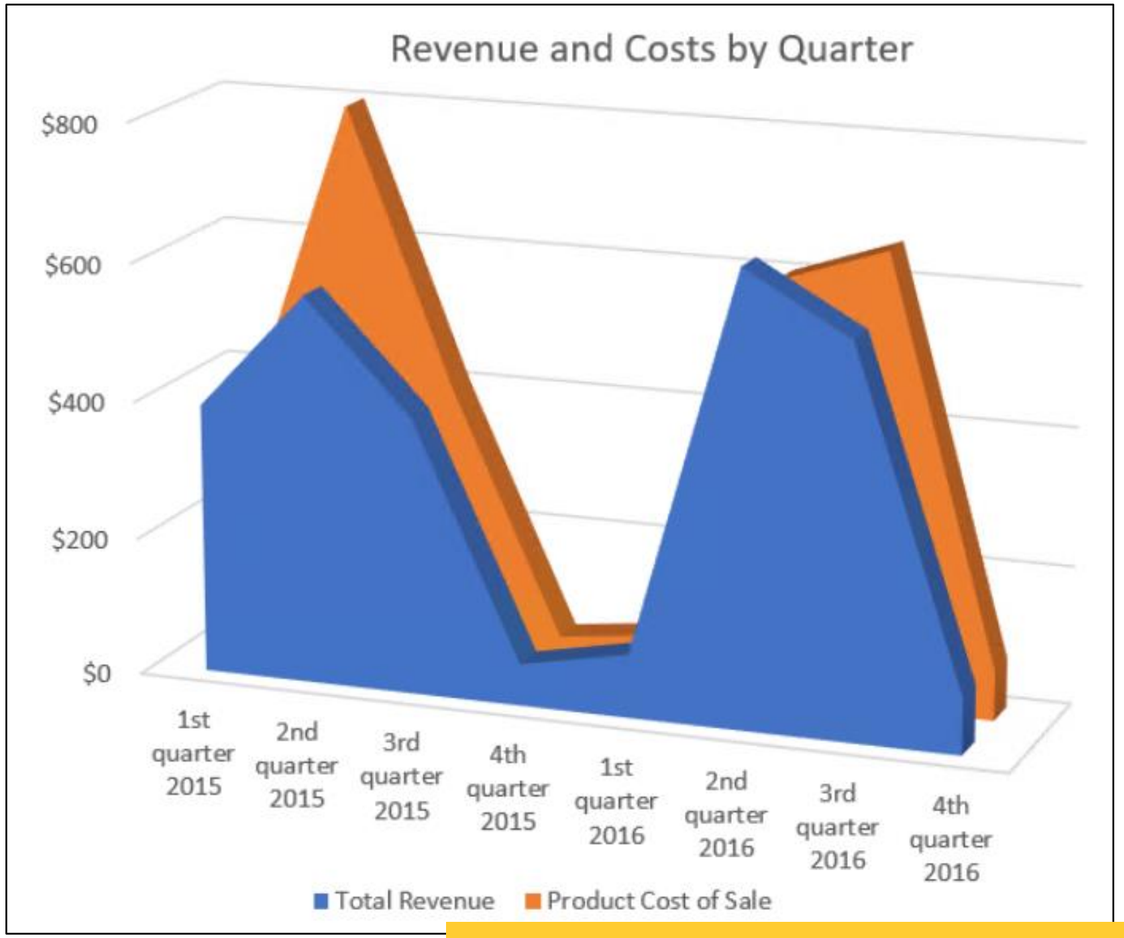


Misinterpretation

Choose the Best Chart (Best Practices)

Use two-dimensional charts



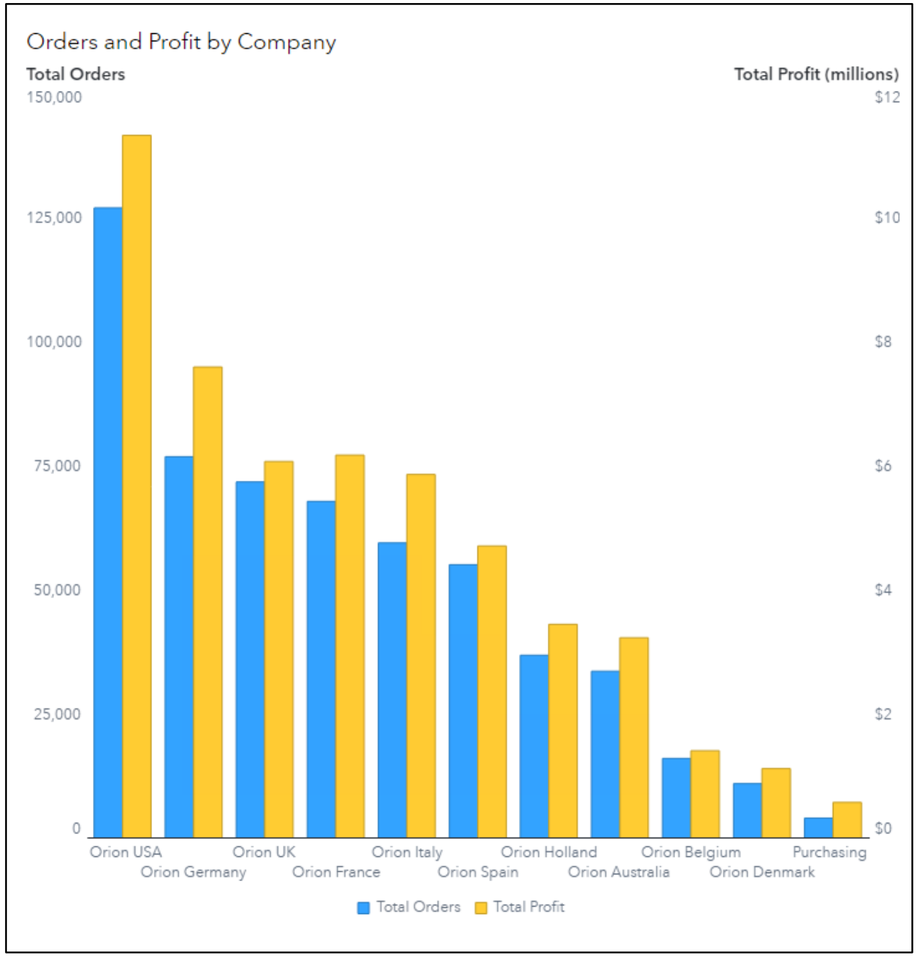


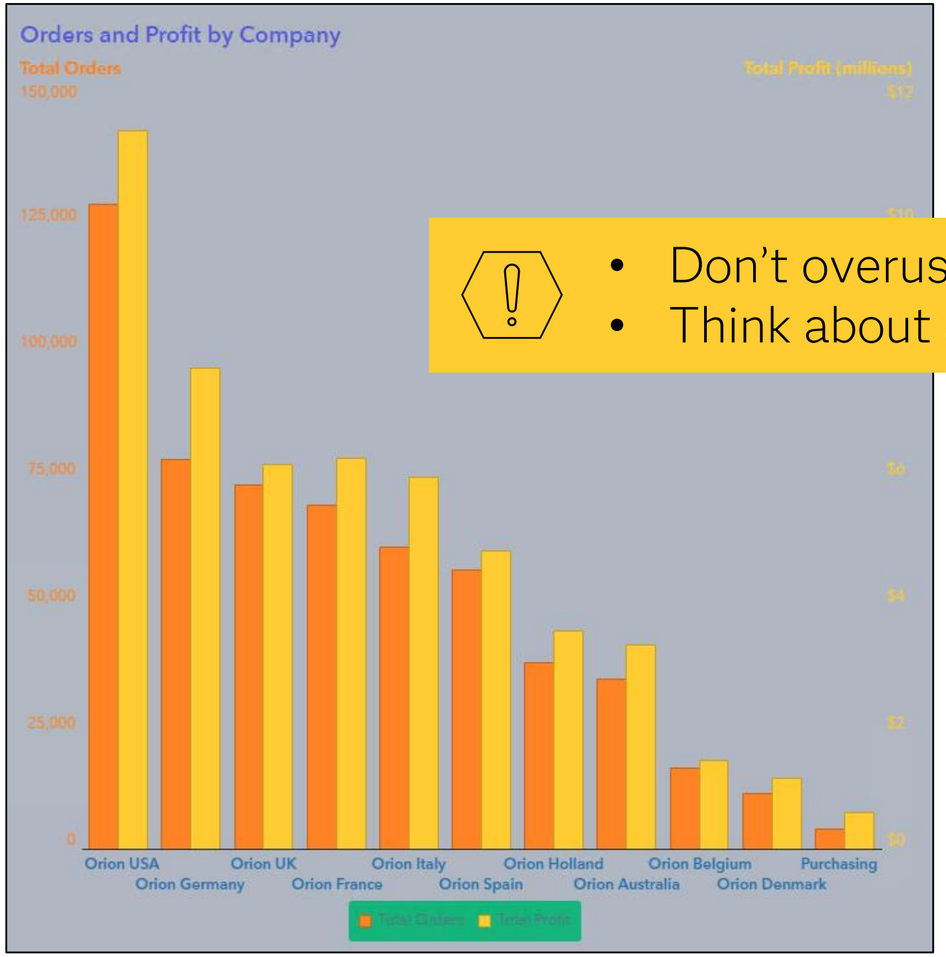
For multi-line charts, rotate attributes for data element styles

- Miss vital information
- Distorts data

Choose the Best Chart (Best Practices)

Choose colors wisely





- Don’t overuse
- Think about accessibility

Create custom themes to customize the color palette

Above all else, show the data.

Edward Tufte
- Godfather of data visualization

Draft a Plan

Choose the Best Chart

Best Practices

- Use the simplest graph
- Use visually appealing, easy to understand objects
- Use only most important data
- Keep graphs simple
- Use a zero baseline
- Use 2-dimensional charts
- Choose colors wisely

Focus on What's Important

Test, Test, and Test Again

Draft a Plan

Choose the Best Chart

Presentation

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

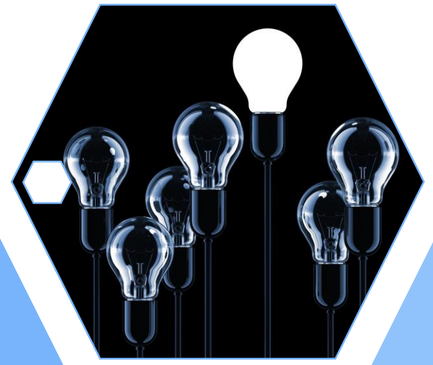
Focus on What's Important

Test, Test, and Test Again

Choose the Best Chart (Presentation)

Which chart do I choose?

Highlighting one important fact?



Showing survey or questionnaire results?

Comparing two or more things?

Describing how parts relate to the whole?

Showing relationships between data items?

Is a graph required?

Choose the Best Chart (Presentation)

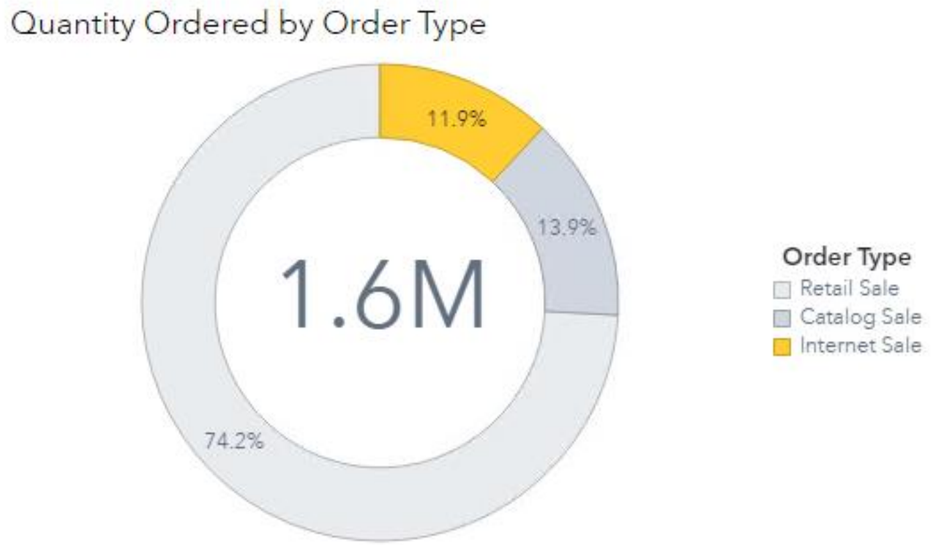
Highlight one important fact

Key value object

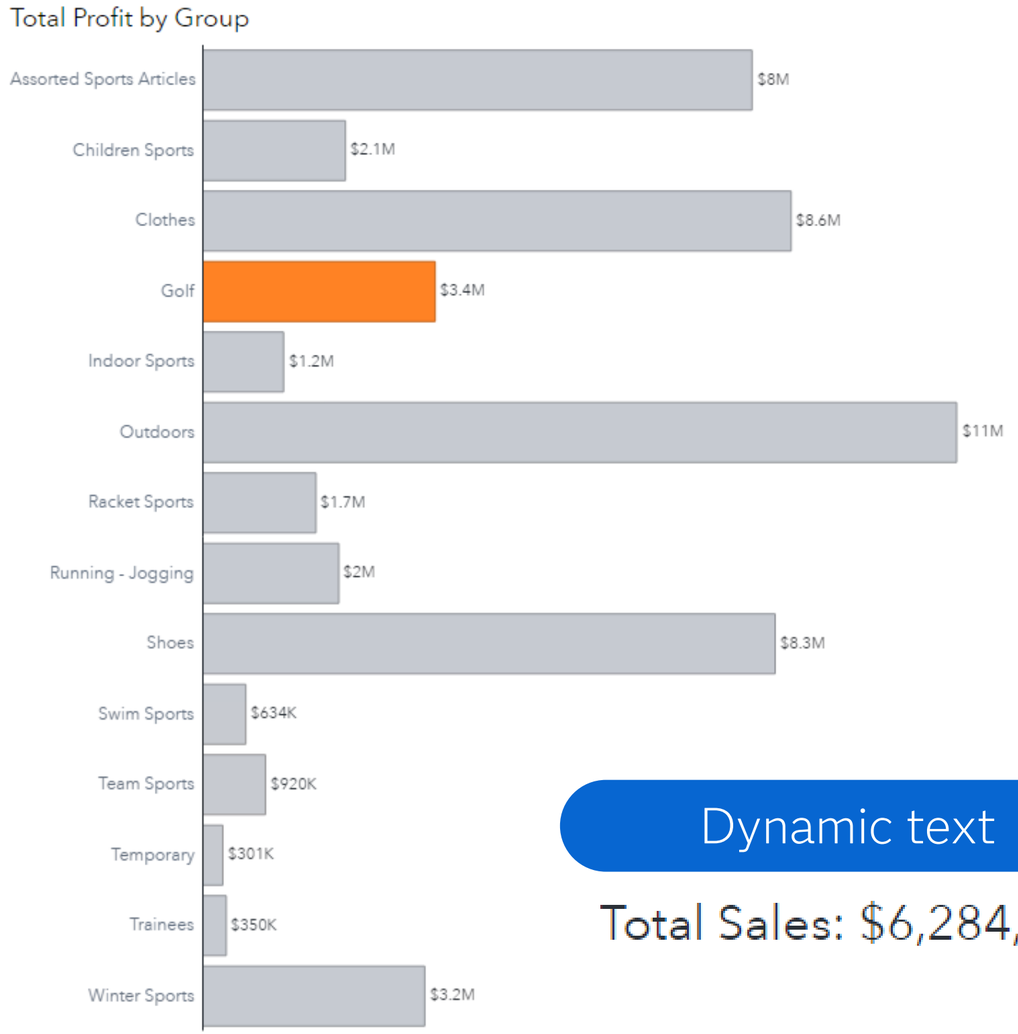
Customer Satisfaction

47%

Donut chart



Faded bar chart



Dynamic text

Total Sales: $6,284,652

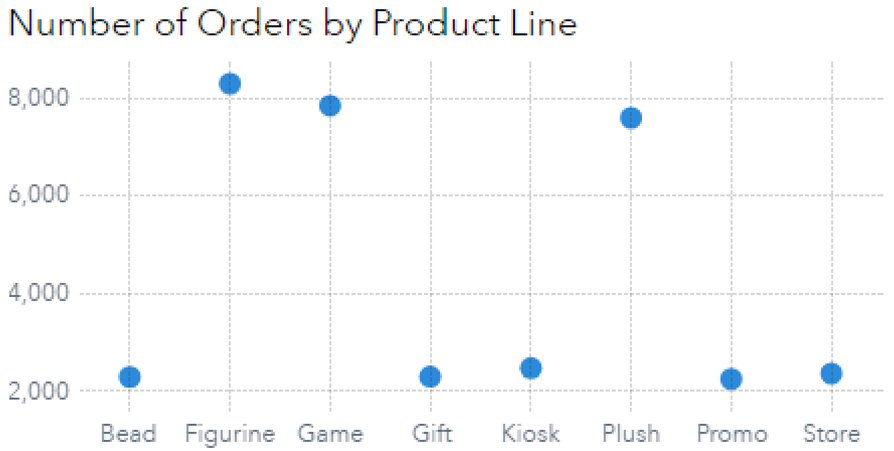
Use display rules to highlight important values

Choose the Best Chart (Presentation)

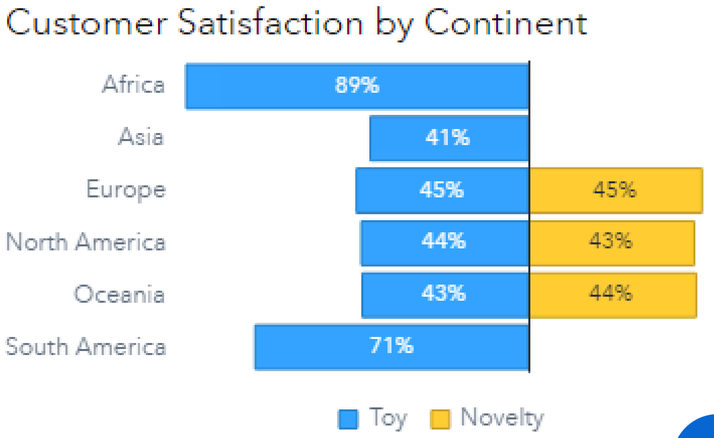
Compare two or more things

(General)

Dot plot

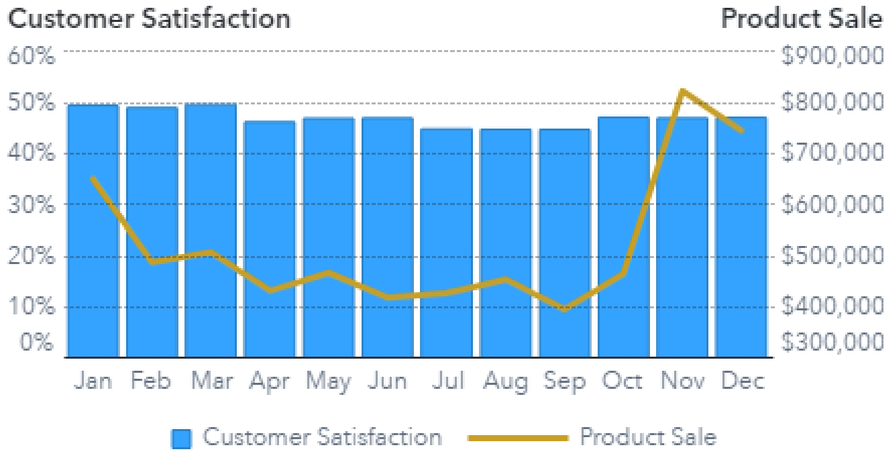


Butterfly chart



Bar chart

Dual axis chart



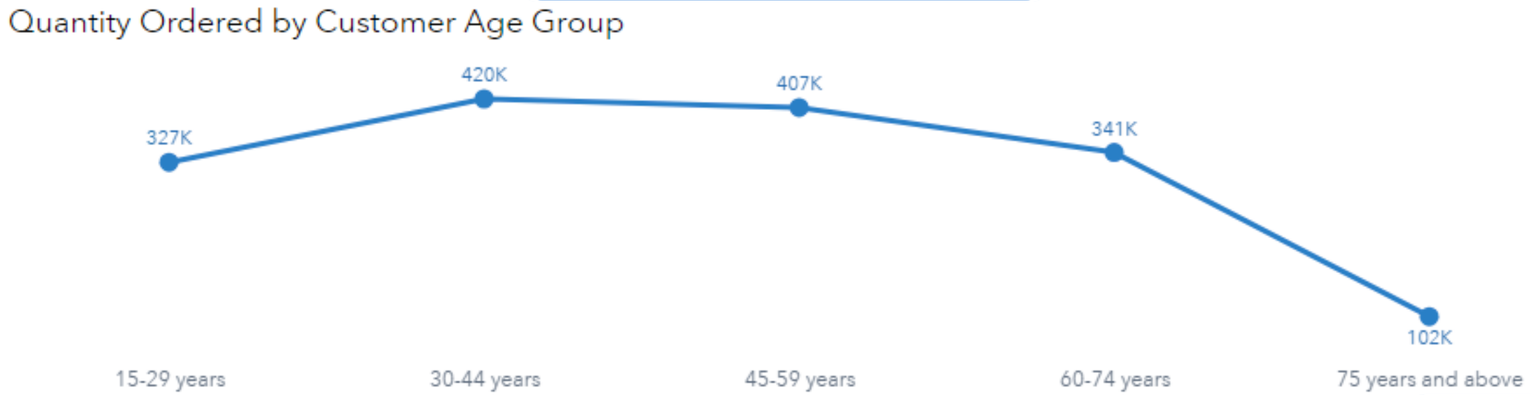
Cautiously consider fixed axis ranges

Choose the Best Chart (Presentation)

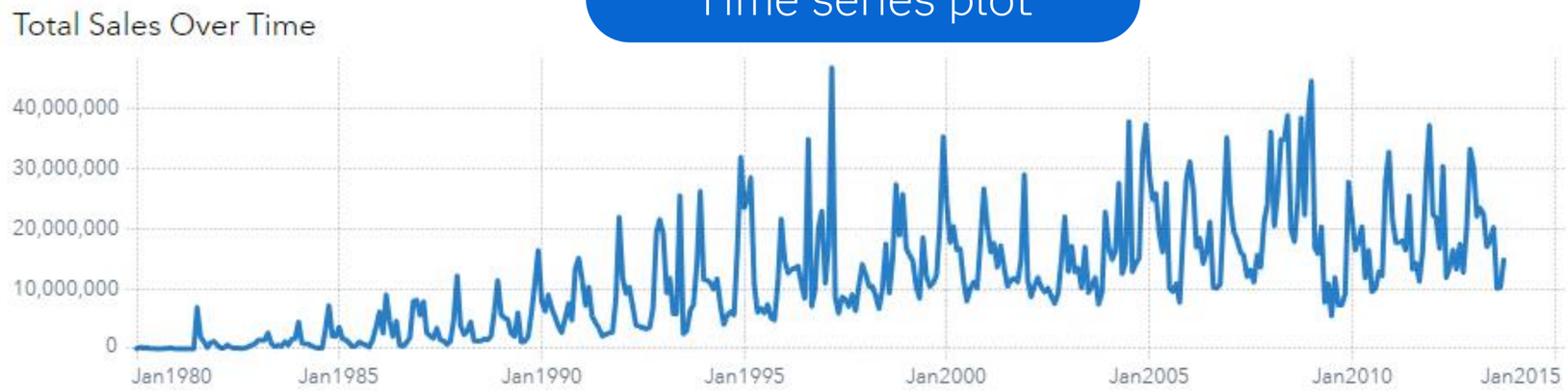
Compare two or more things

(Over time)

Line chart



Time series plot



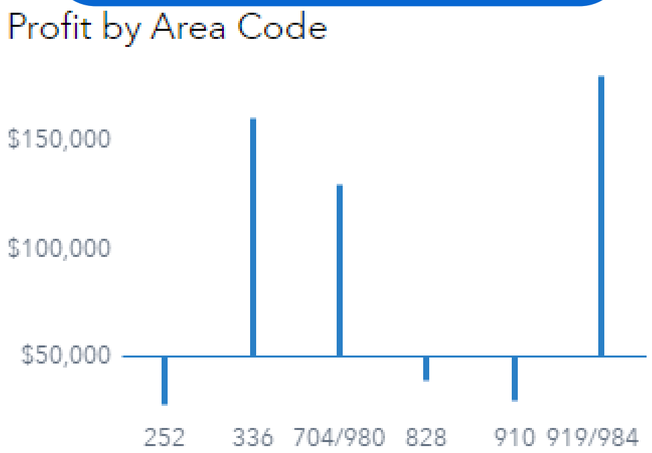
Avoid using an overview axis, use animation with caution

Choose the Best Chart (Presentation)

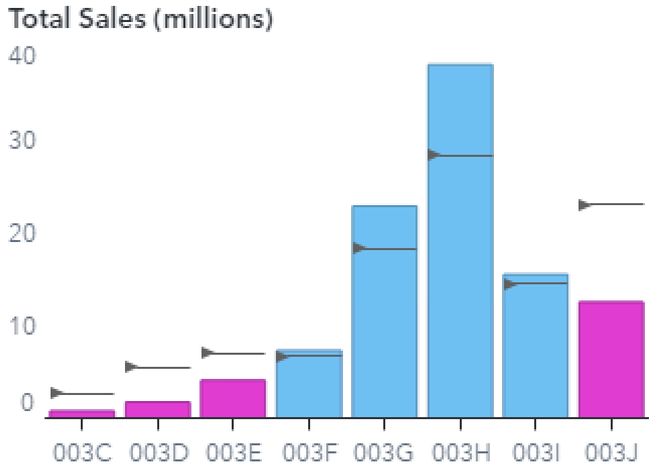
Compare two or more things

(Benchmark)

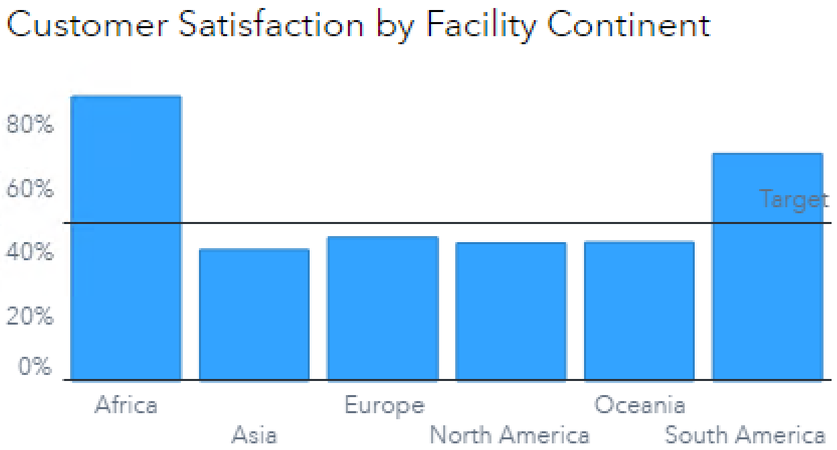
Needle plot



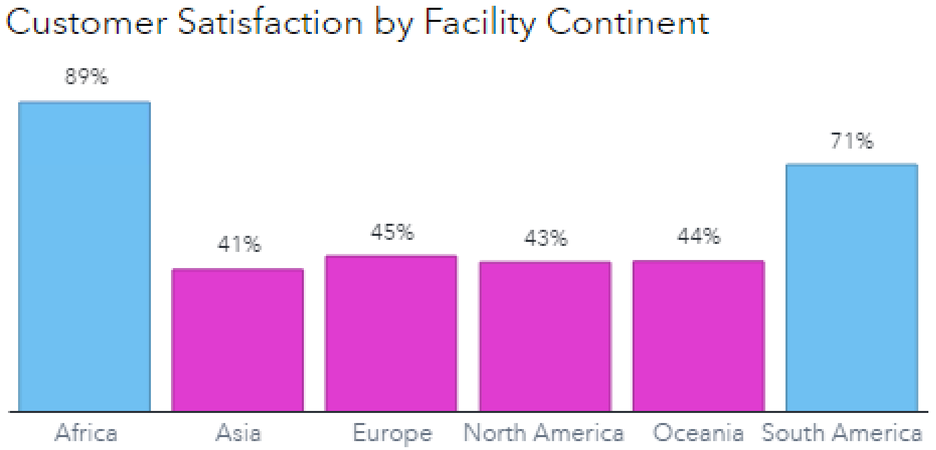
Targeted bar chart



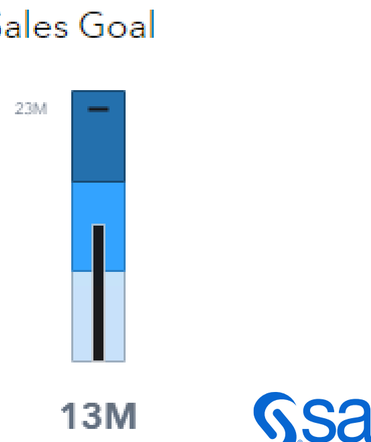
Reference lines



Display rules



Bullet gauge

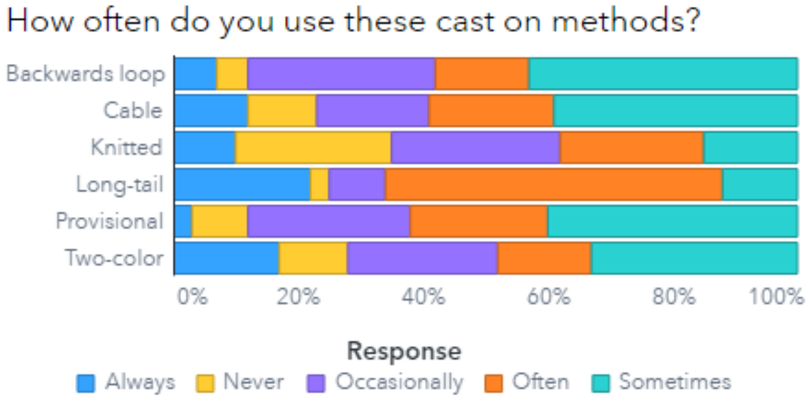


Avoid three-color gradients

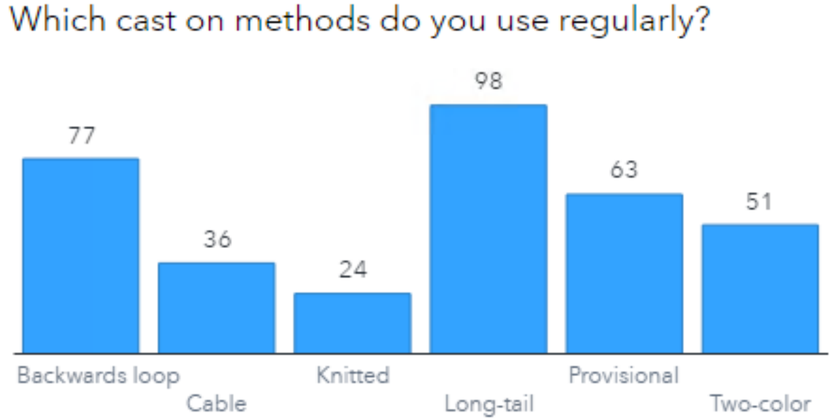
Choose the Best Chart (Presentation)

Show survey or questionnaire results

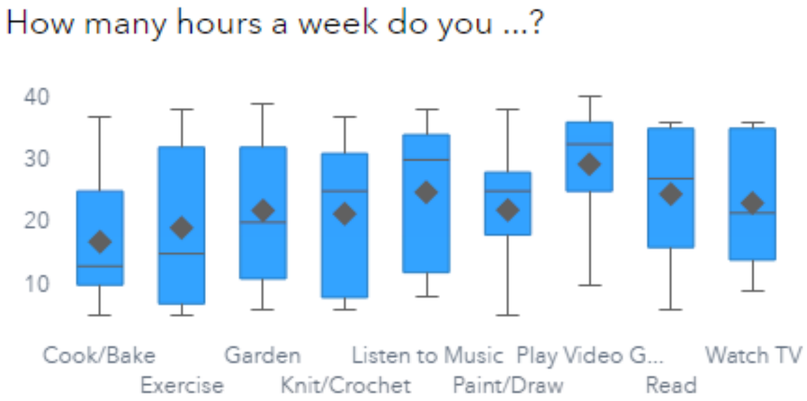
Stacked bar chart



Vertical bar chart



Box plots



Crosstab

Average hours spent per week

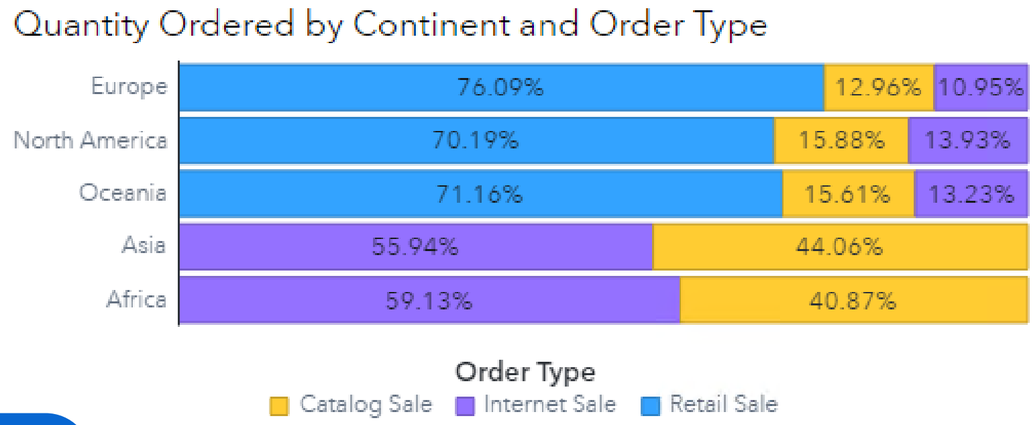
Question ▲	Answer
Cook/Bake	16.9
Exercise	19.1
Garden	21.9
Knit/Crochet	21.4
Listen to Music	24.8
Paint/Draw	22
Play Video Games	29.3
Read	24.5
Watch TV	23.1

Choose the Best Chart (Presentation)

Describe how parts relate to the whole

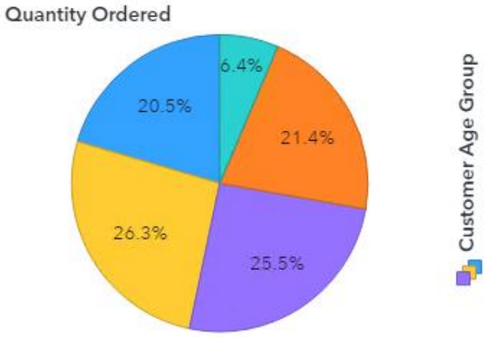
Donut chart

Stacked bar chart



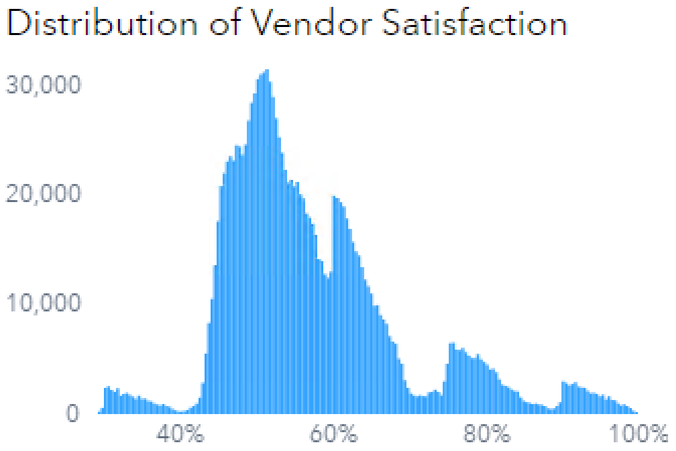
Treemap

Pie chart



Geo map

Histogram



Use pie charts sparingly

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

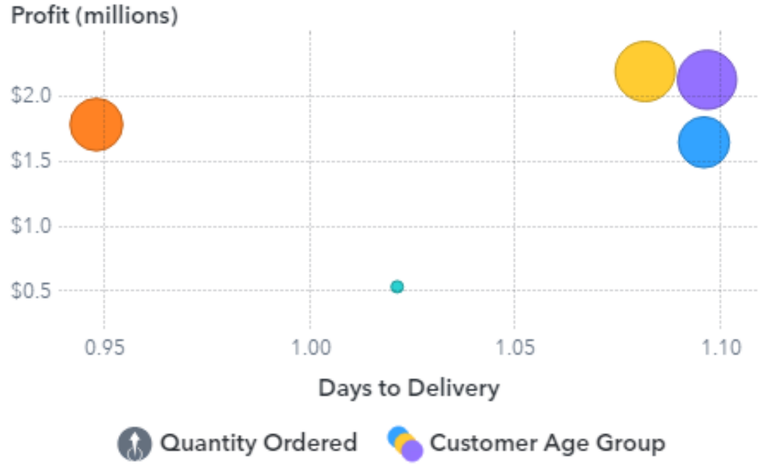
“Save the pies for dessert.” – Stephen Few

Choose the Best Chart (Presentation)

Show relationships between data items

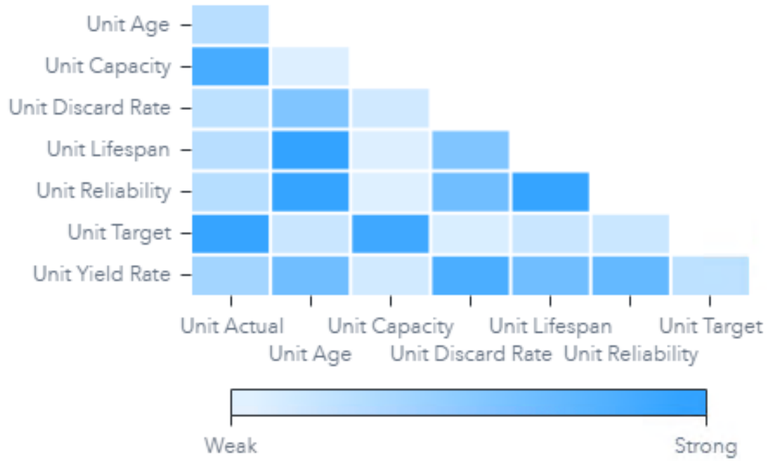
Scatterplot

Bubble plot



Heat map

Correlation matrix

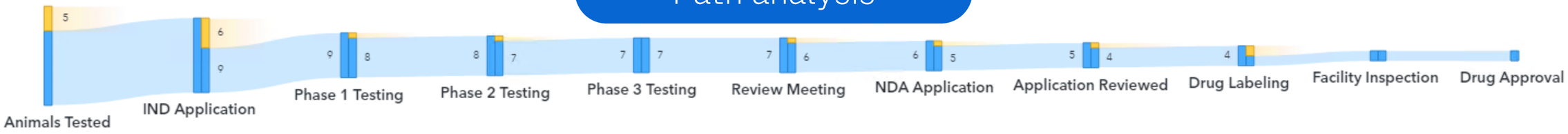


Limit digits after decimal points

Choose the Best Chart (Presentation)

Show relationships between data items

Path analysis

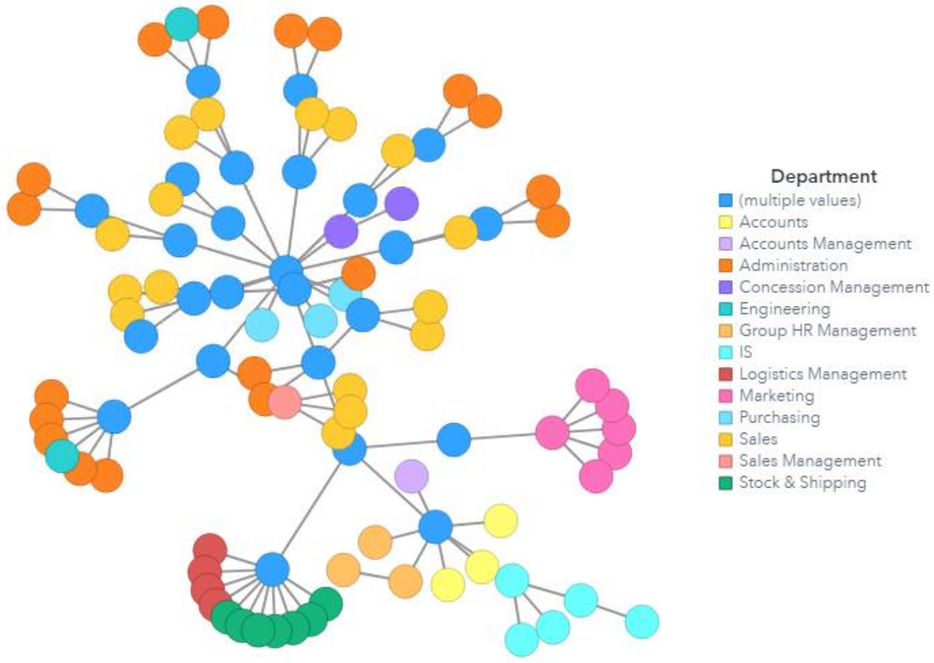


Text object

Moving To-Do List

- Schedule movers
- Obtain packing supplies
- Cancel existing utilities
- Start new utilities
- Pack
- Change address
- New driver's license
- Register car
- Register to vote
- Find new providers

Network diagram



Ensure legends can be displayed on all screen sizes

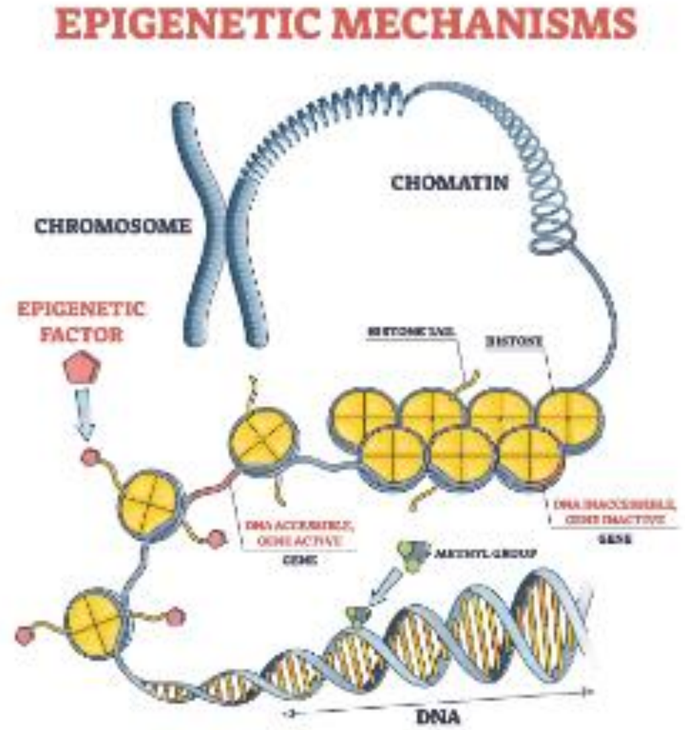
Choose the Best Chart (Presentation)

Is a graph required?

Word cloud

Images

Illustrations



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)

Draft a Plan

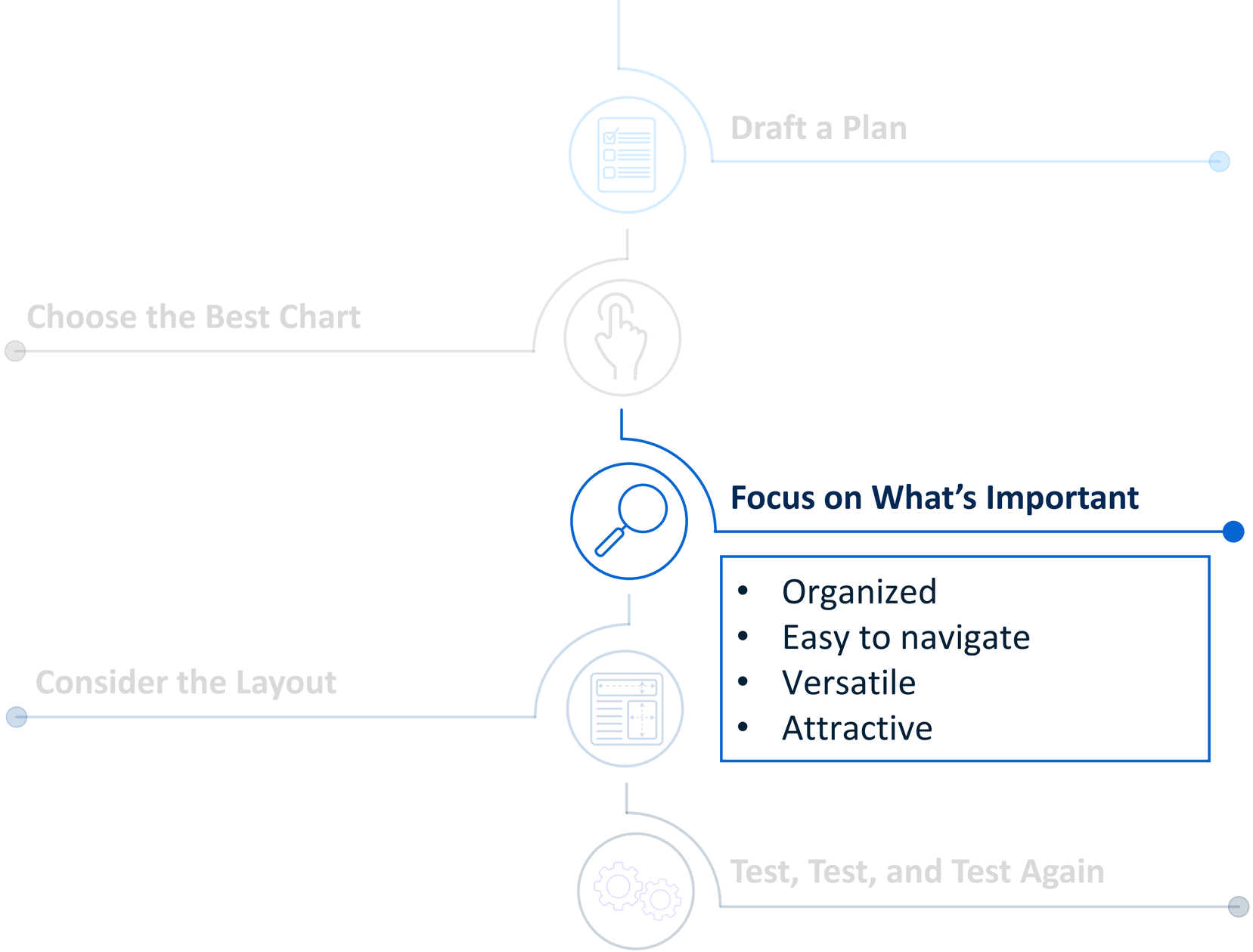
Choose the Best Chart

Presentation

- Highlighting one important fact
- Comparing two or more things
  - General
  - Over time
  - Against benchmark
- Showing survey or questionnaire results
- Describing how parts relate to the whole
- Showing relationship between data items
- Is a graph required?

Focus on What's Important

Test, Test, and Test Again

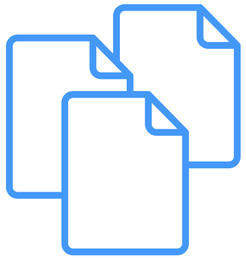


Focus on What's Important

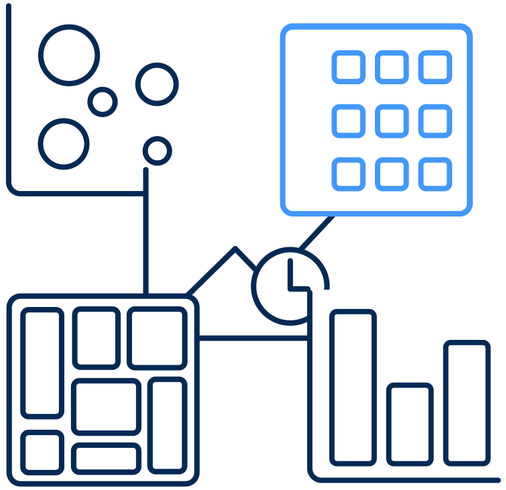
Organized

Focus on a single idea

Multiple pages



Limit the number of objects



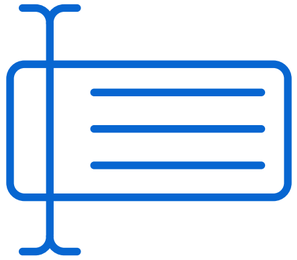
Use hidden and pop-up pages to provide details

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

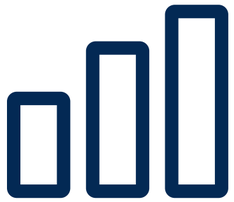
ADD INSTRUCTIONS

- 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

Versatile



Ranks

- Focus on important values
- Identify leaders or laggers

Actions

- Add interactivity
- Aid in self discovery

Viewer customization

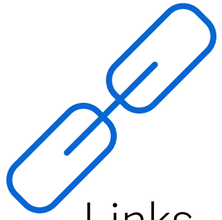
- Modify options
- Change chart types
- Select the data

Animation

- View changes over time
- Focus on differences

Prompts

- Focus on specific areas
- Filter report or page



Links

- Provide additional information

Use automatic actions to speed up development

Focus on What's Important

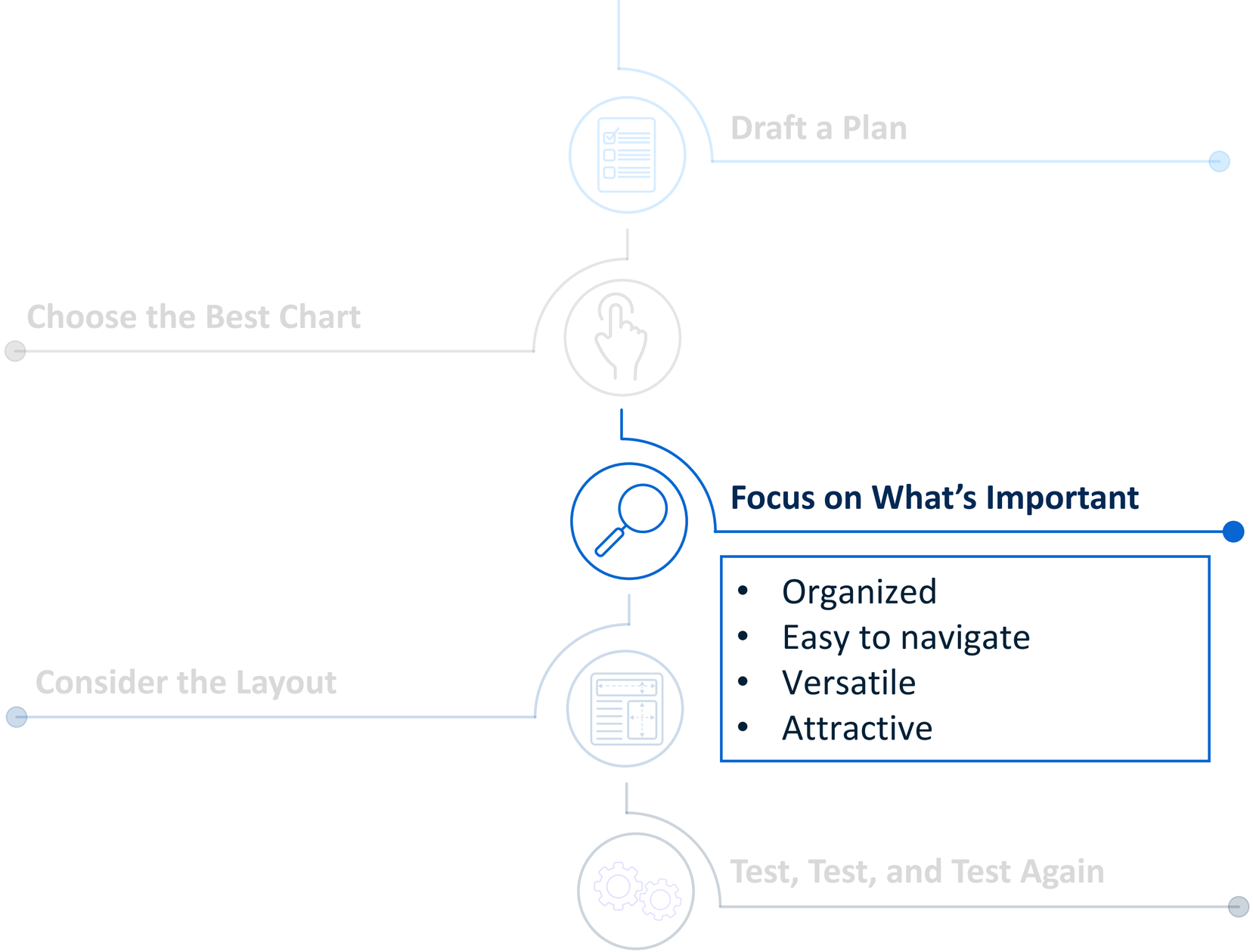
Attractive

Styles

Display rules

Excitement Energy Passion Love	Danger Revolution	
Happiness Optimism Warmth Joy	Cowardice Caution	
Nature Freshness Wealth Youth	Depression Jealously	
Warmth Autumn Visibility Harvest		
Royalty Wealth Nobility Honor		
Immortality Peace Trust Security	Sadness	
Purity Elegance Peace Cleanliness		
Sophisticati on Mystery Formality	Death Mourning Illness	

Specify labels for display rules, choose WCAG-compliant colors



Draft a Plan

Focus on What’s Important

- Limit the number of pages
- Limit the number of objects
  - Make more important objects larger
  - Consider placement of objects
  - Arrange objects with actions in a logical order
  - Use negative space
  - Use the default grid layout or containers

Consider the Layout

Test, Test, and Test Again

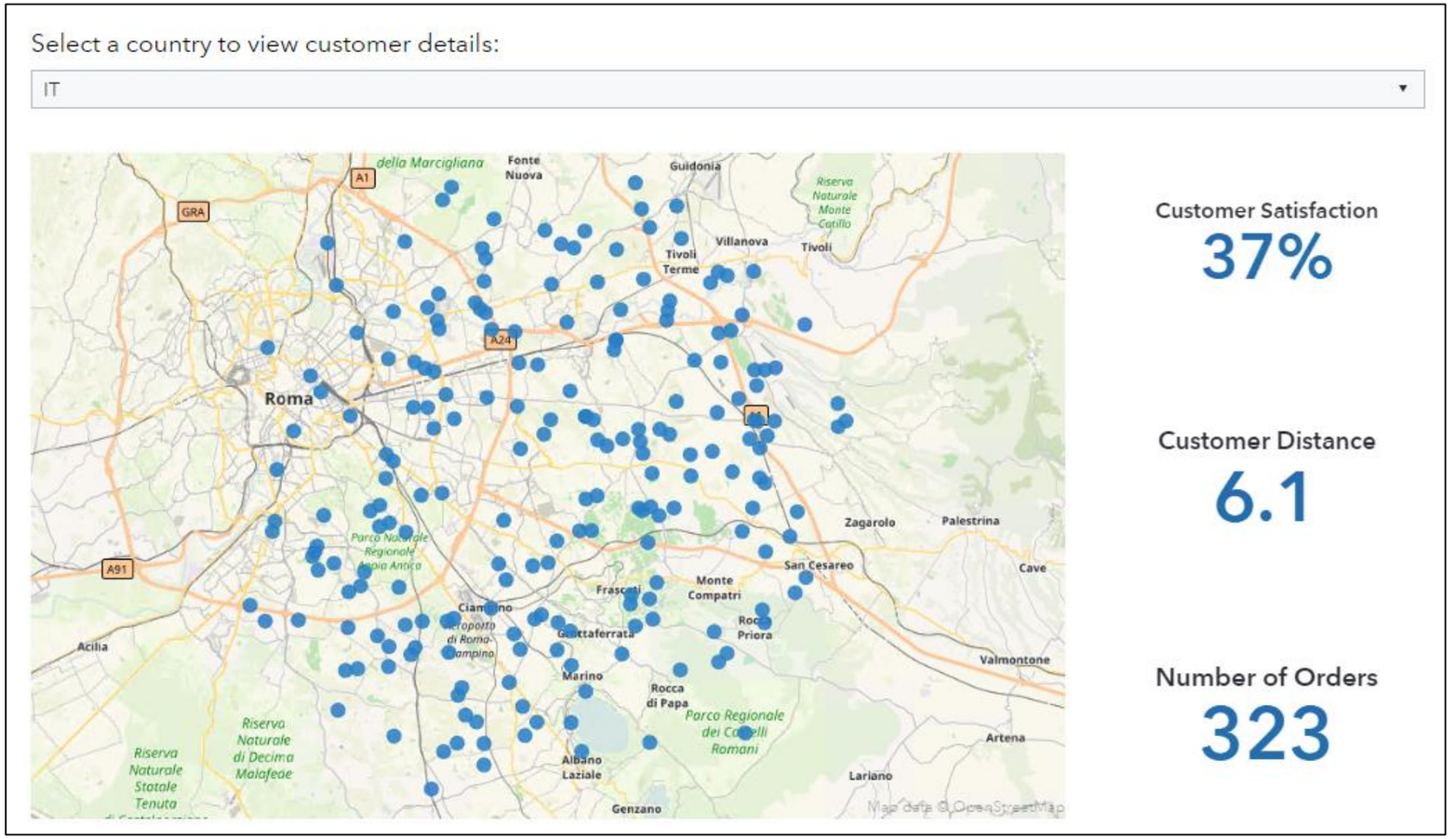
Consider the Layout

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

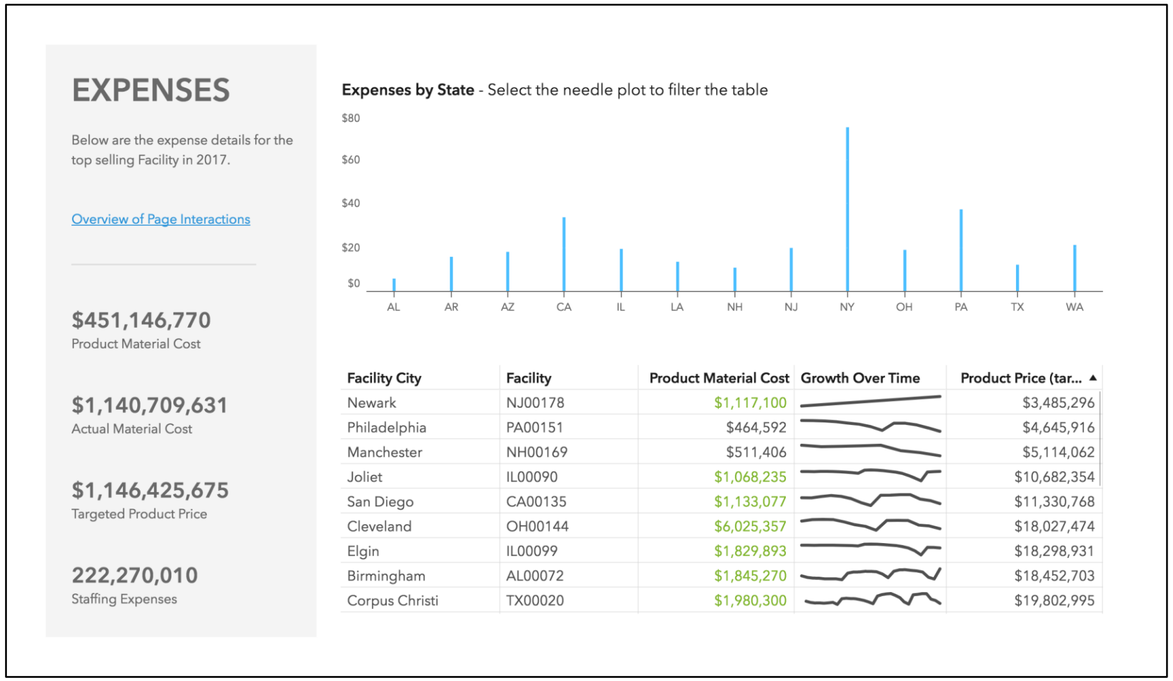


Use page templates to speed up development

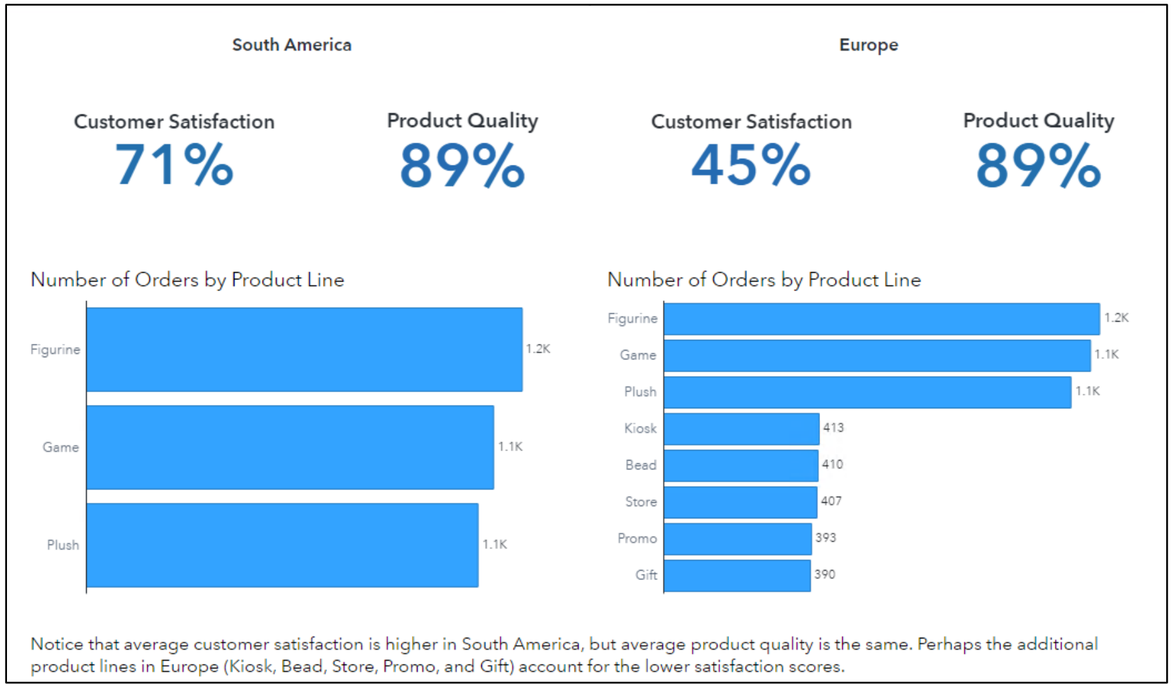
Consider the Layout

Consider the placement of objects

Focal point

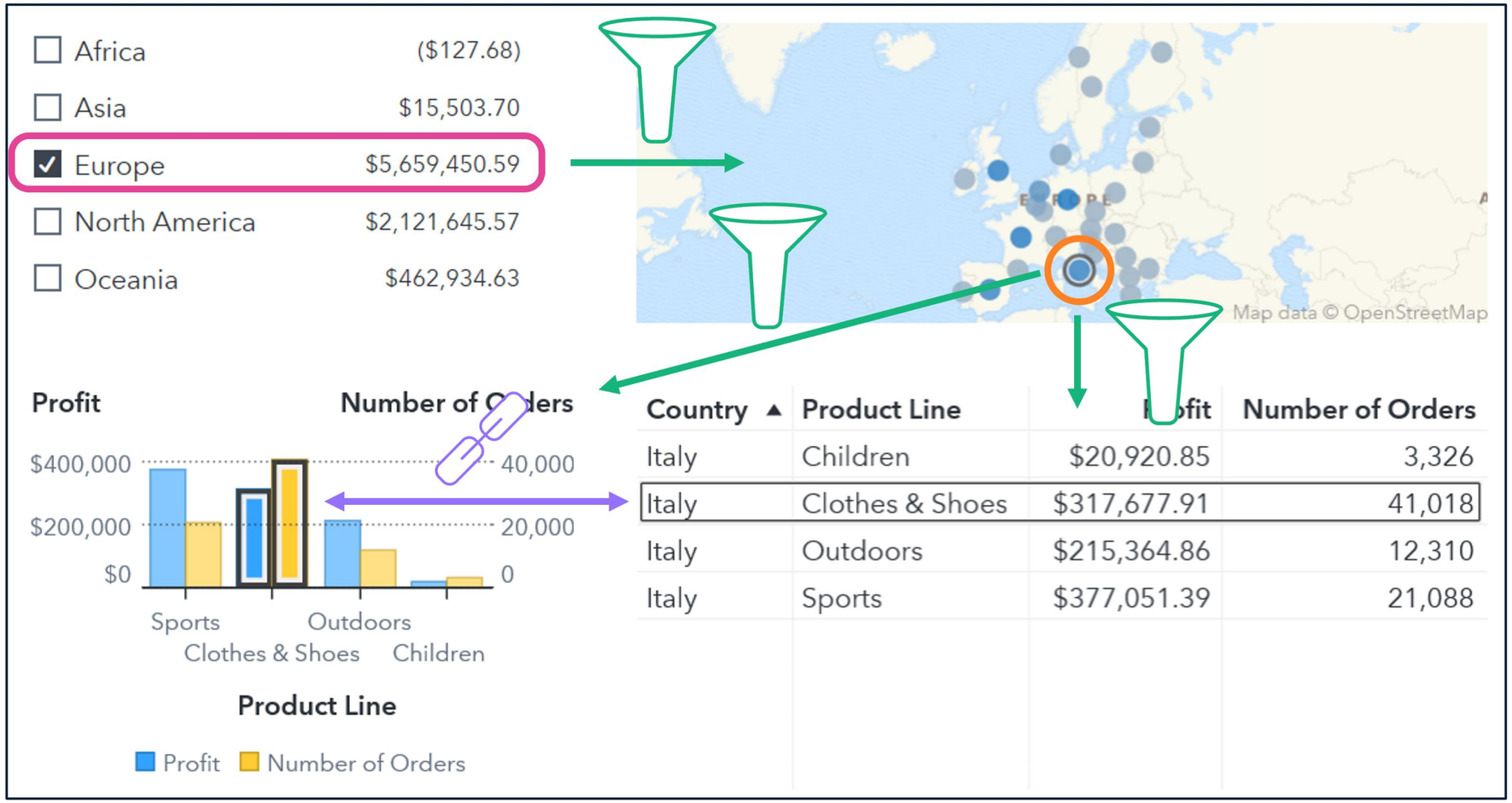


Related objects



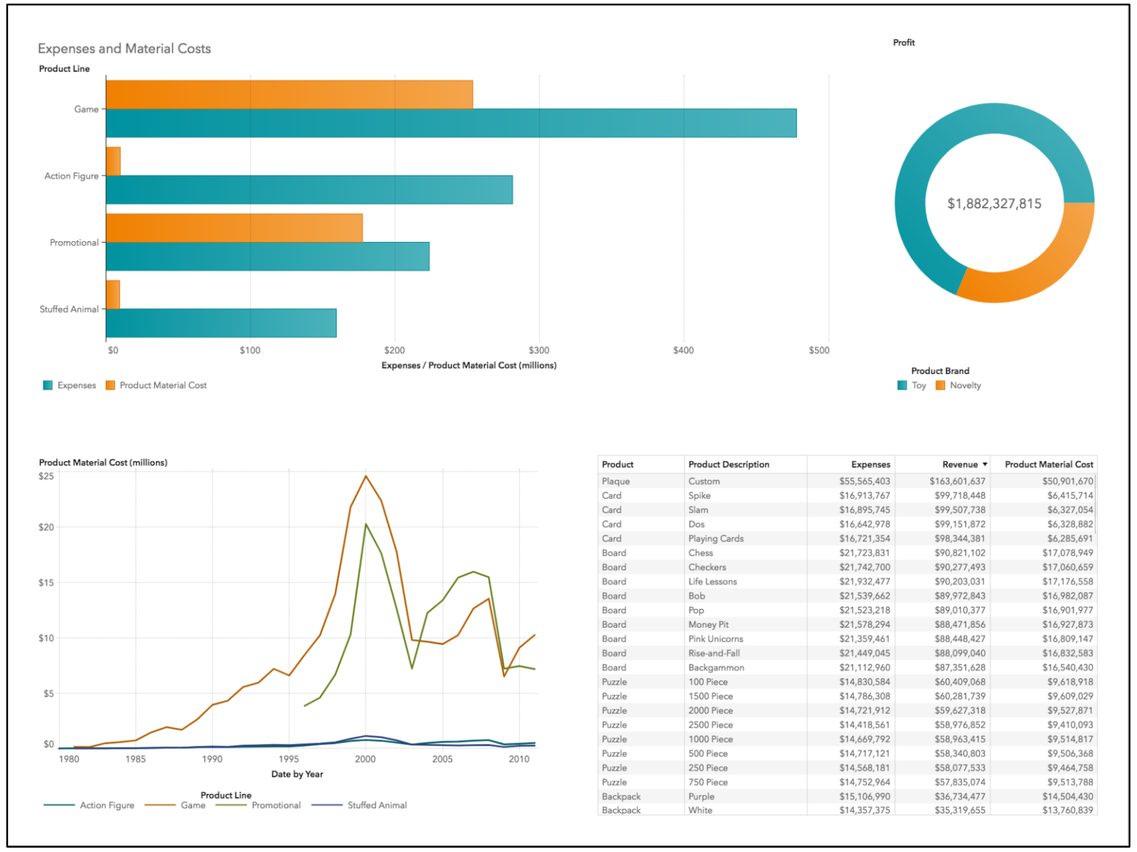
Consider the Layout

Arrange objects with actions in a logical order



Consider the Layout

Use negative space



Product	Product Description	Expenses	Revenue	Product Material Cost
Plaque	Custom	$55,565,403	$163,601,637	$50,901,670
Card	Spike	$16,913,767	$99,718,448	$6,415,714
Card	Slam	$16,895,745	$99,507,738	$6,327,054
Card	Dos	$16,642,978	$99,151,872	$6,328,882
Card	Playing Cards	$16,721,354	$98,344,381	$6,285,691
Board	Chess	$21,723,831	$90,821,102	$17,078,949
Board	Checkers	$21,742,700	$90,277,493	$17,060,659
Board	Life Lessons	$21,932,477	$90,203,031	$17,176,558
Board	Bob	$21,539,662	$89,972,843	$16,982,087
Board	Pop	$21,523,218	$89,010,377	$16,901,977
Board	Money Pit	$21,578,294	$88,471,856	$16,927,873
Board	Pink Unicorns	$21,359,461	$88,448,427	$16,809,147
Board	Rise-and-Fall	$21,449,045	$88,099,040	$16,832,583
Board	Backgammon	$21,112,960	$87,351,628	$16,540,430
Puzzle	100 Piece	$14,830,584	$60,409,068	$9,618,918
Puzzle	1500 Piece	$14,786,308	$60,281,739	$9,609,029
Puzzle	2000 Piece	$14,721,912	$59,627,318	$9,527,871
Puzzle	2500 Piece	$14,418,561	$58,976,852	$9,410,093
Puzzle	1000 Piece	$14,669,792	$58,963,415	$9,514,817
Puzzle	500 Piece	$14,717,121	$58,340,803	$9,506,368
Puzzle	250 Piece	$14,568,181	$58,077,533	$9,464,758
Puzzle	750 Piece	$14,752,964	$57,835,074	$9,513,788
Backpack	Purple	$15,106,990	$36,734,477	$14,504,430
Backpack	White	$14,357,375	$35,319,655	$13,760,839

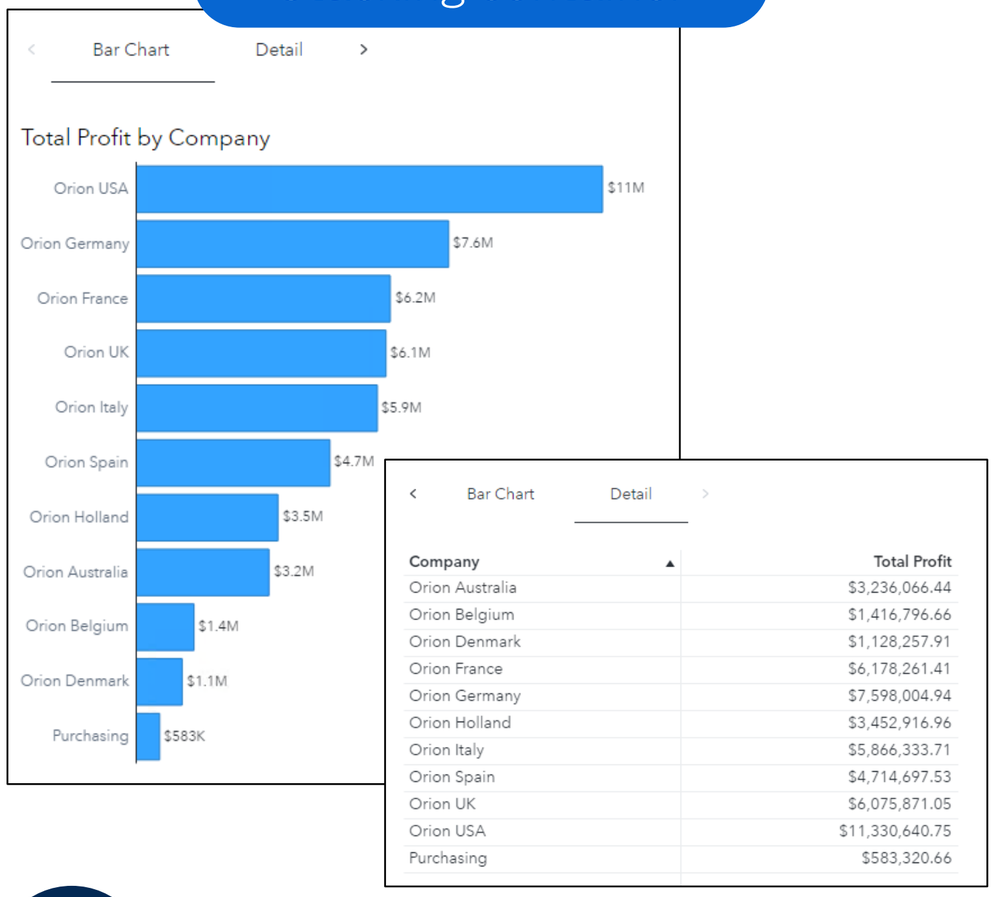
Product	Product Description	Expenses	Revenue	Product Material Cost
.	.	337,074,471	0	0
Puzzle	100 Piece	14,830,584	60,409,068	9,618,918
Puzzle	1000 Piece	14,669,792	58,963,415	9,514,817
Puzzle	1500 Piece	14,786,308	60,281,739	9,609,029
Puzzle	2000 Piece	14,721,912	59,627,318	9,527,871
Puzzle	250 Piece	14,568,181	58,077,533	9,464,758
Puzzle	2500 Piece	14,418,561	58,976,852	9,410,093
Puzzle	500 Piece	14,717,121	58,340,803	9,506,368
Puzzle	750 Piece	14,752,964	57,835,074	9,513,788
Cat	Abyssinian	981,276	3,864,310	133,061
Elephant	African	5,030,846	19,701,569	687,755
Soldier	Air Force	5,516,333	9,212,844	356,762
Horse	American Quarter	1,125,514	4,321,397	150,958
Cat	American Shorthair	1,000,273	3,827,446	135,253
Horse	Andalusian	1,119,423	4,618,091	154,914
Primate	Ape	2,004,428	7,907,577	271,020
Horse	Appaloosa	1,160,219	4,465,680	156,623
Horse	Arabian	1,139,417	4,483,835	158,674
Soldier	Army	5,448,852	9,287,519	361,054
Elephant	Asian	5,073,483	19,811,043	691,391
Board	Backgammon	21,112,960	87,351,628	16,540,430
Athlete	Baseball	1,711,359	2,981,500	112,908
Athlete	Basketball (F)	1,729,310	2,909,743	112,540
Athlete	Basketball (M)	1,728,578	2,901,383	111,004
Dog	Beagles	1,013,203	4,067,958	138,614
Cat	Birman	1,015,316	3,965,949	138,139
Backpack	Black	13,995,712	33,865,153	13,443,304
Bear	Black	5,122,205	20,078,044	700,037

Use caution when modifying padding from default

Consider the Layout

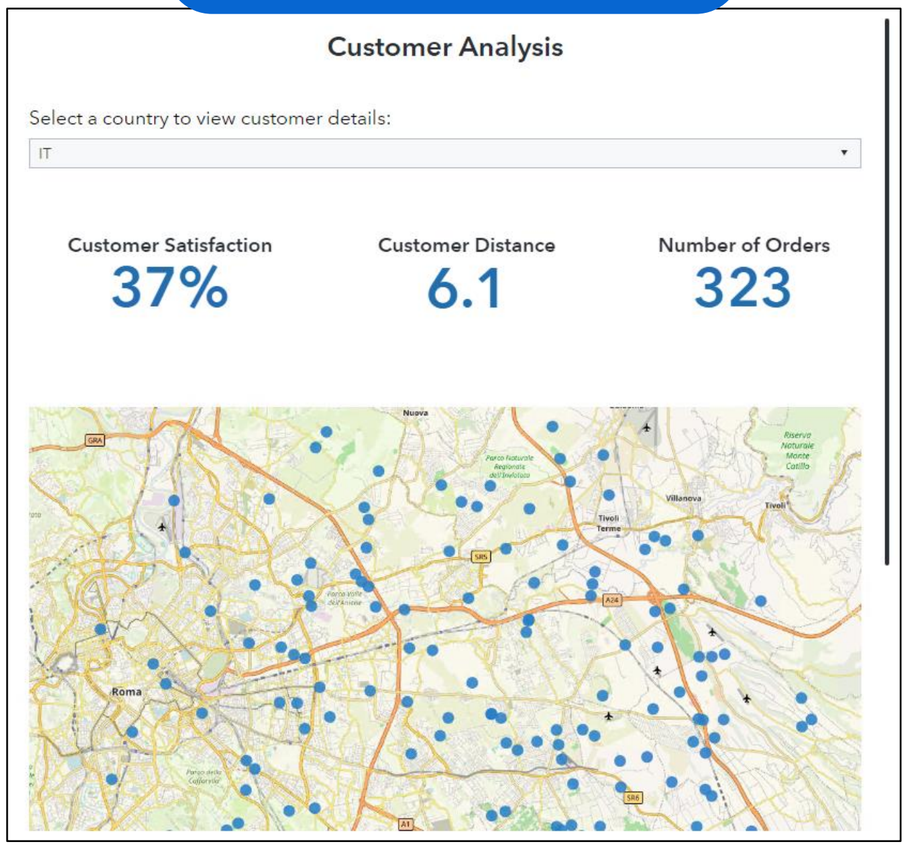
Use the default grid layout or containers

Stacking container

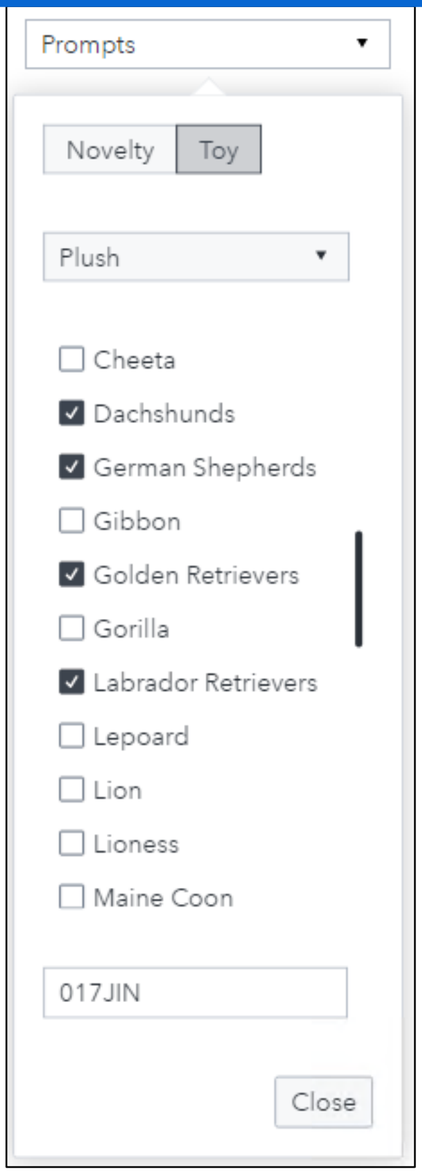


Company	Total Profit
Orion Australia	$3,236,066.44
Orion Belgium	$1,416,796.66
Orion Denmark	$1,128,257.91
Orion France	$6,178,261.41
Orion Germany	$7,598,004.94
Orion Holland	$3,452,916.96
Orion Italy	$5,866,333.71
Orion Spain	$4,714,697.53
Orion UK	$6,075,871.05
Orion USA	$11,330,640.75
Purchasing	$583,320.66

Scrolling container



Prompt container



Avoid precision containers

Draft a Plan

Focus on What’s Important

- Limit the number of pages
- Limit the number of objects
  - Make more important objects larger
  - Consider placement of objects
  - Arrange objects with actions in a logical order
  - Use negative space
  - Use the default grid layout or containers

Consider the Layout

Test, Test, and Test Again

Draft a Plan

Choose the Best Chart

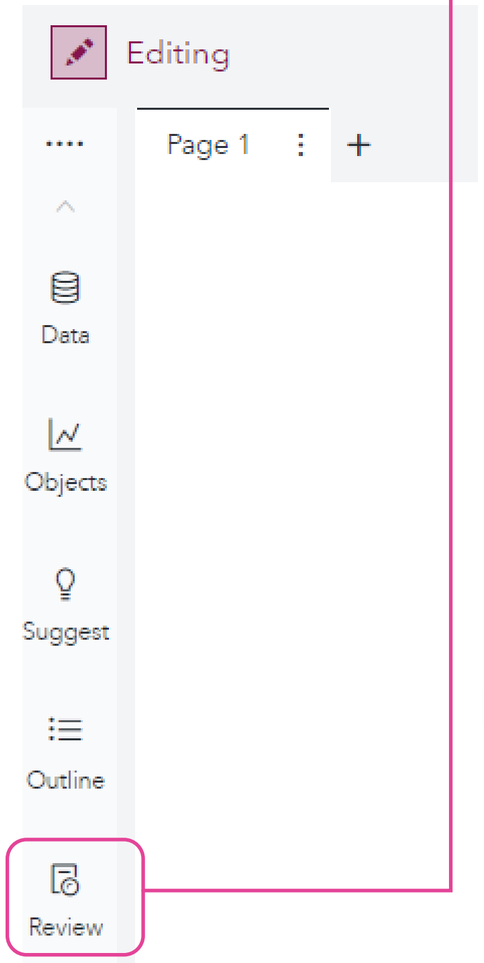
- Report Review pane
- Peer review
- Test on multiple devices
- Create PDF (report distribution)
- Perform a test print (hard copies)
- Project the report to check colors
- Embed report using SAS Viya SDK for JavaScript
- Access report from SAS for Microsoft 365
- Play the report (kiosk or slideshows)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

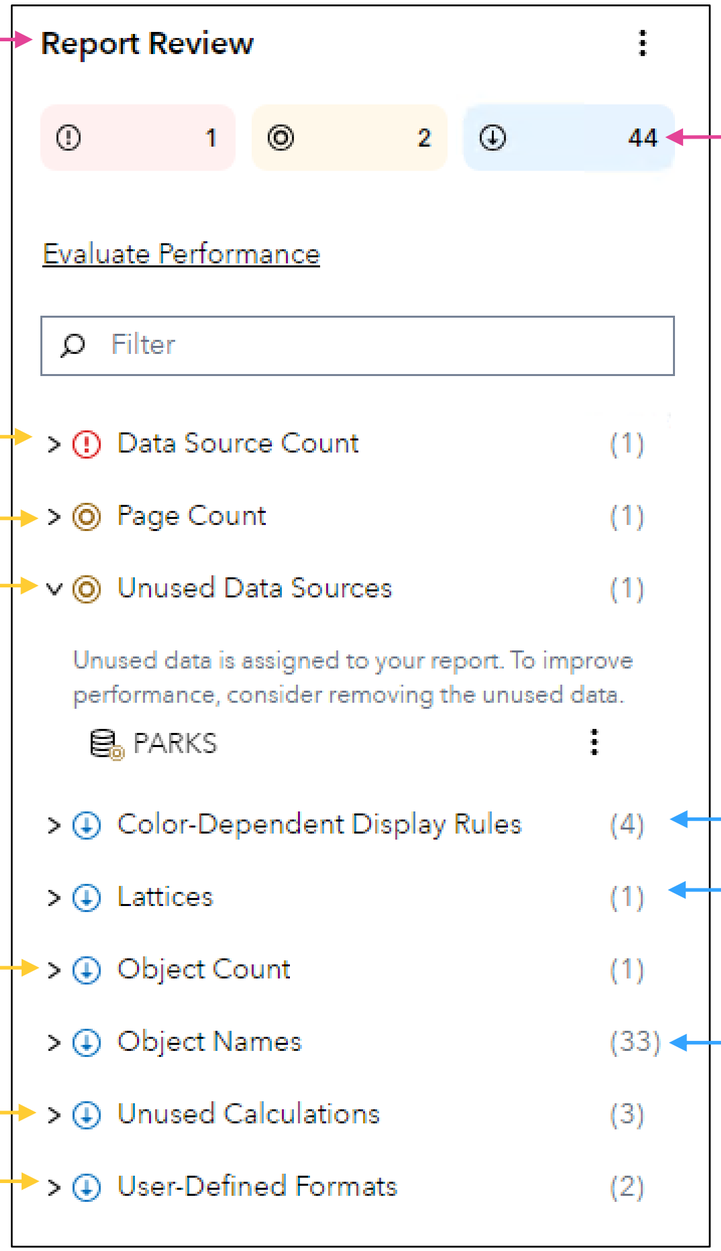
Consider the Layout

Test, Test, and Test Again

Test, Test, and Test Again

Report Review pane





Severity

Performance issues

Accessibility issues

Provide meaningful titles for accessibility

Test, Test, and Test Again

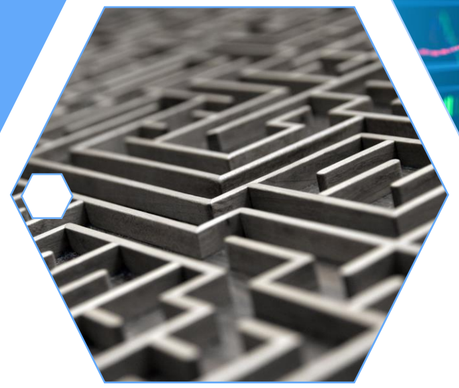
Peer review

What is the story?

Did you get lost?

Is the report easy to navigate?

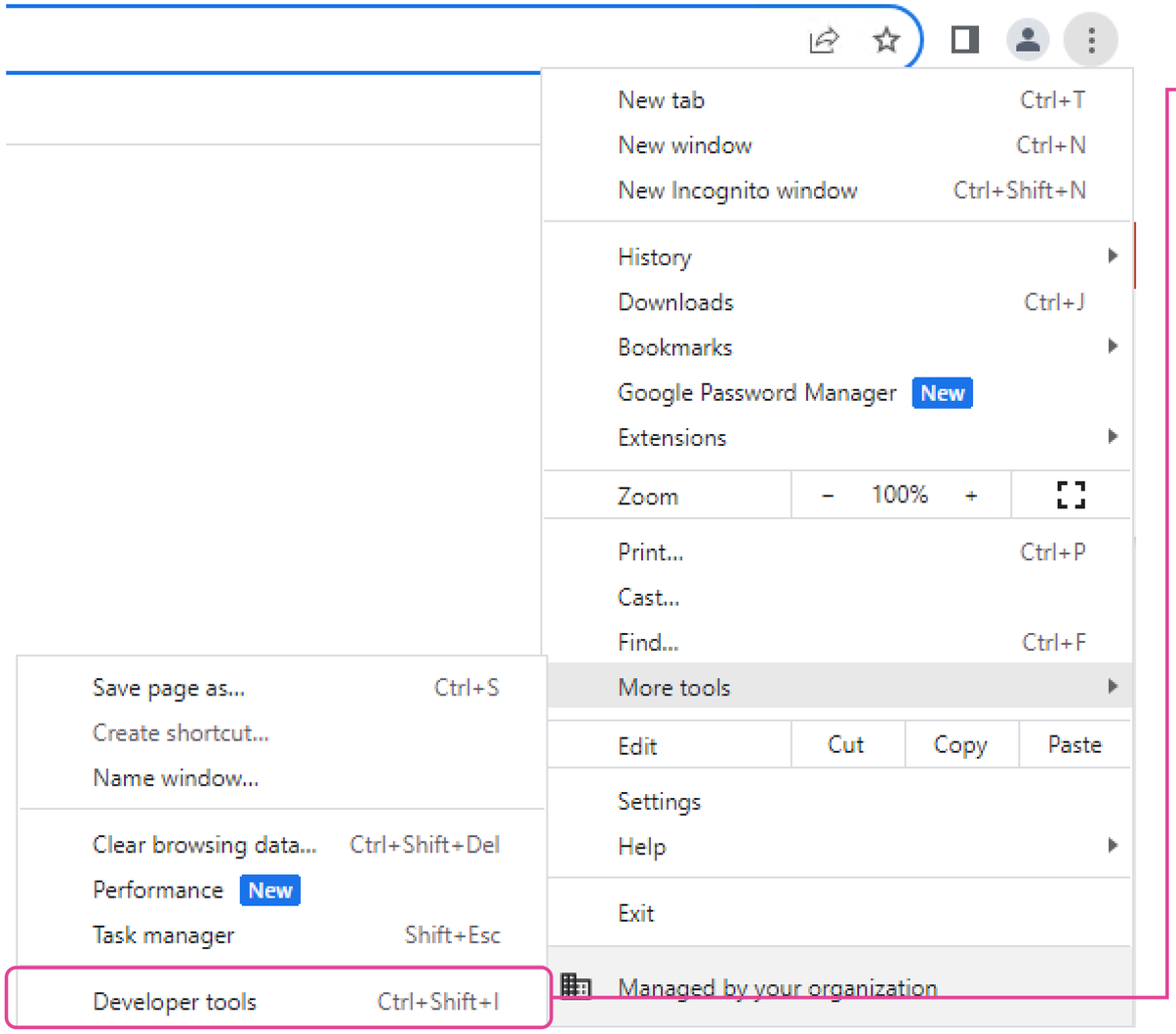
Did all the actions work?

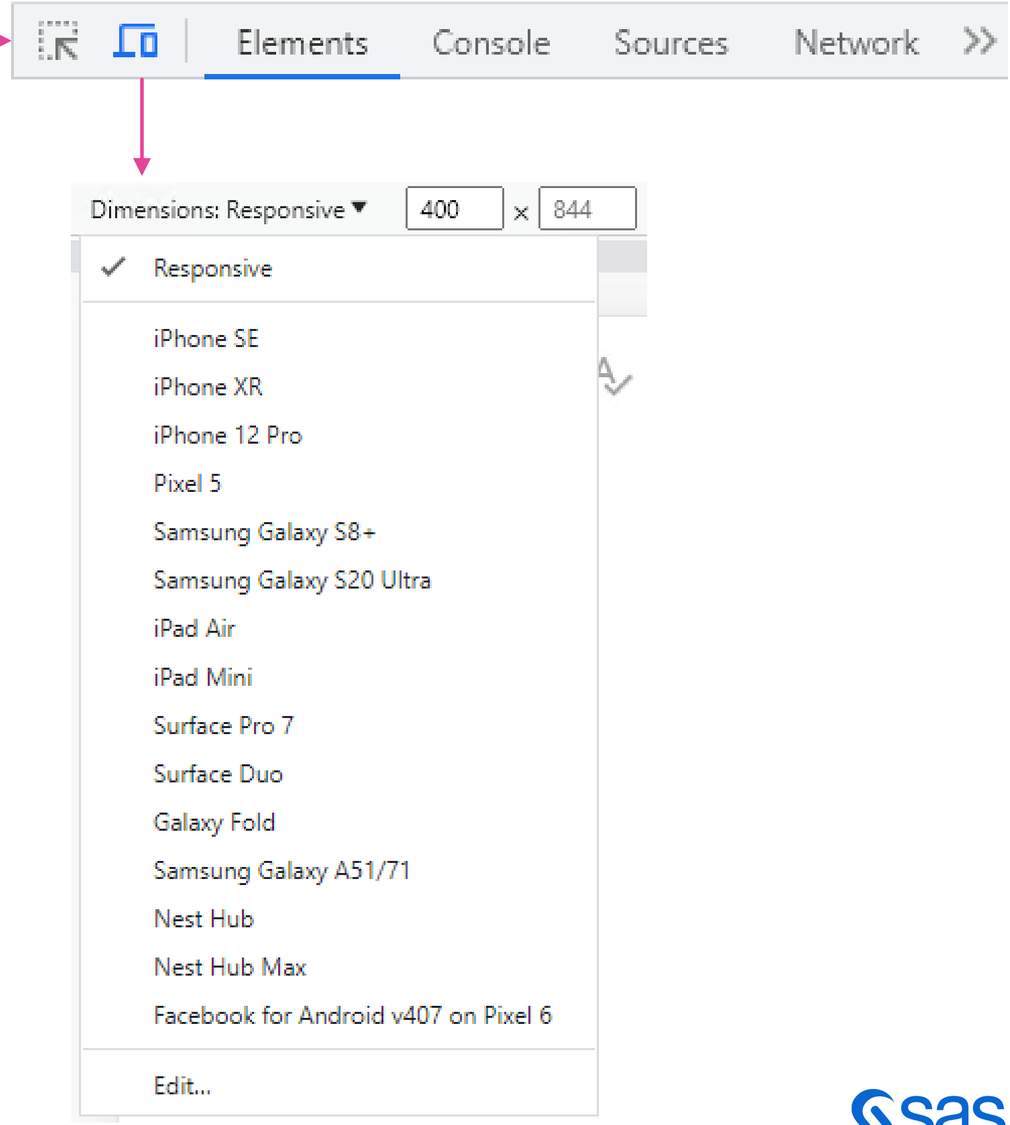


Were all the features apparent?

Test, Test, and Test Again

Test on multiple devices





Test, Test, and Test Again

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

Draft a Plan

Choose the Best Chart

Consider the Layout

- 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

Test, Test, and Test Again

Handy Links

Beautiful Reports

Creating Accessible Reports Using SAS Visual Analytics

Envisioning Information by Edward Tufte

Gallery of SAS Visual Analytics Objects

Telling Your Data Story by Atrin Assa

Tips and Techniques for Designing the Perfect Layout with SAS Visual Analytics by Ryan Norris and Brian Young

Tips for Building Rich Interaction in Your SAS Visual Analytics Reports by Jeanne Marie Tan and Sierra Shell

SAS Visual Analytics Stories are Data With a Soul by Ted Stolarczyk

The Visual Display of Quantitative Information by Edward Tufte

Types of Charts: Choose the Best Chart to Convey Your Message

Visual Explanations by Edward Tufte

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TWITTER CharuYogaCan
LINKEDIN https://www.linkedin.com/in/charushankar/

✓ Did you enjoy this session, Let us know in the evaluation

The SAS® Viya® ETL Playbook

Charu Shankar

SAS EXPLORE

sas

The SAS® Viya® ETL Playbook

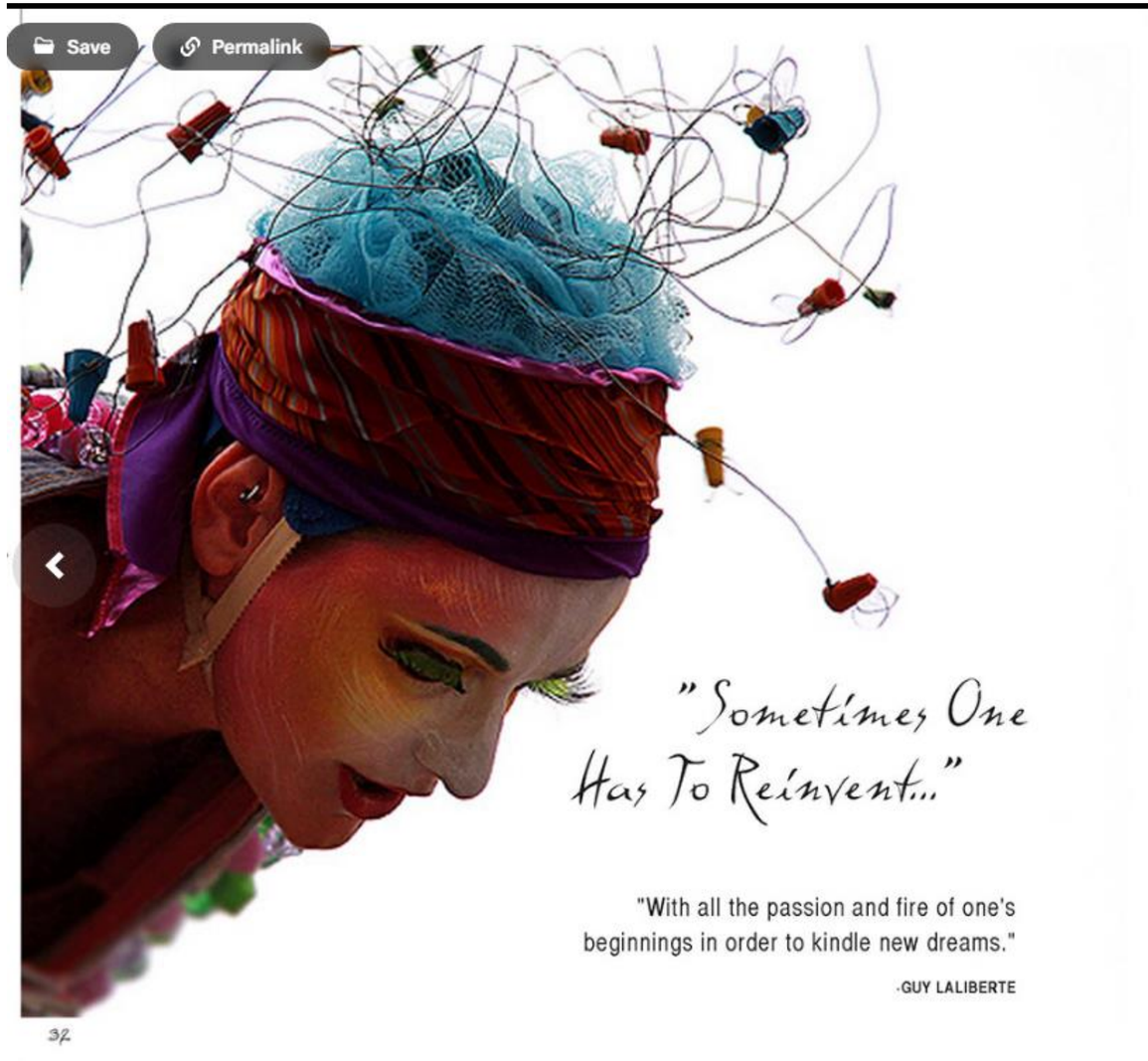
Charu Shankar, SAS® Institute

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, etc. 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.

Data Used In This Presentation

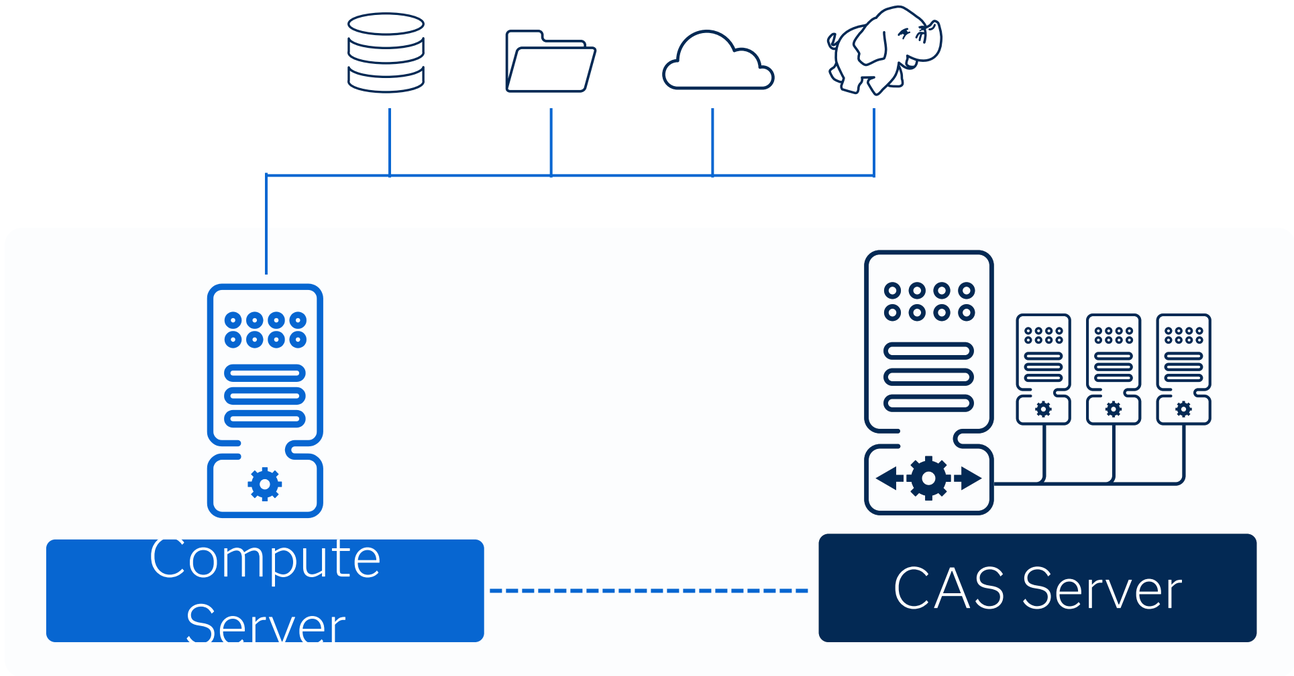


Agenda

ETL or Extract, transform, and Load is an integral process for data engineers to extract data from different sources, transform the data into a trusted resource, and load that data into systems that end users such as data scientists can use for computation and analysis. In all the buzz around analytics, ETL is often relegated to the background, but data scientists depend deeply on this solid foundational task before they can deep dive into analytics.
Leverage the power of the Cloud to extract, transform and load data using SAS programs executed in the SAS Viya Compute Server. The good news is that if you are already programming in SAS 9, you'll feel right at home in Viya!

1. Introduction
2. Servers on SAS 9 vs. SAS Viya
3. Live Demo

SAS Viya Compute Server Overview

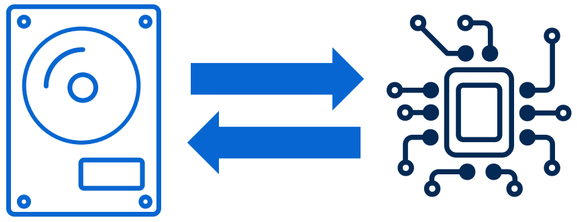


Program using SAS®9 code

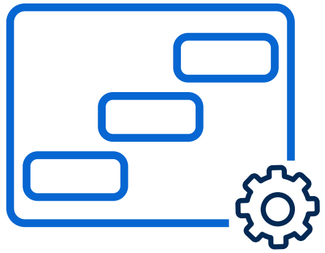
Access data using SAS/ACCESS

Client to the CAS server

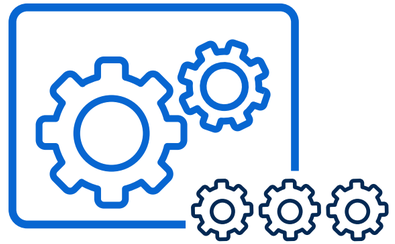
- DISK
- RAM
- CPU



Data is transferred from disk to **memory**.

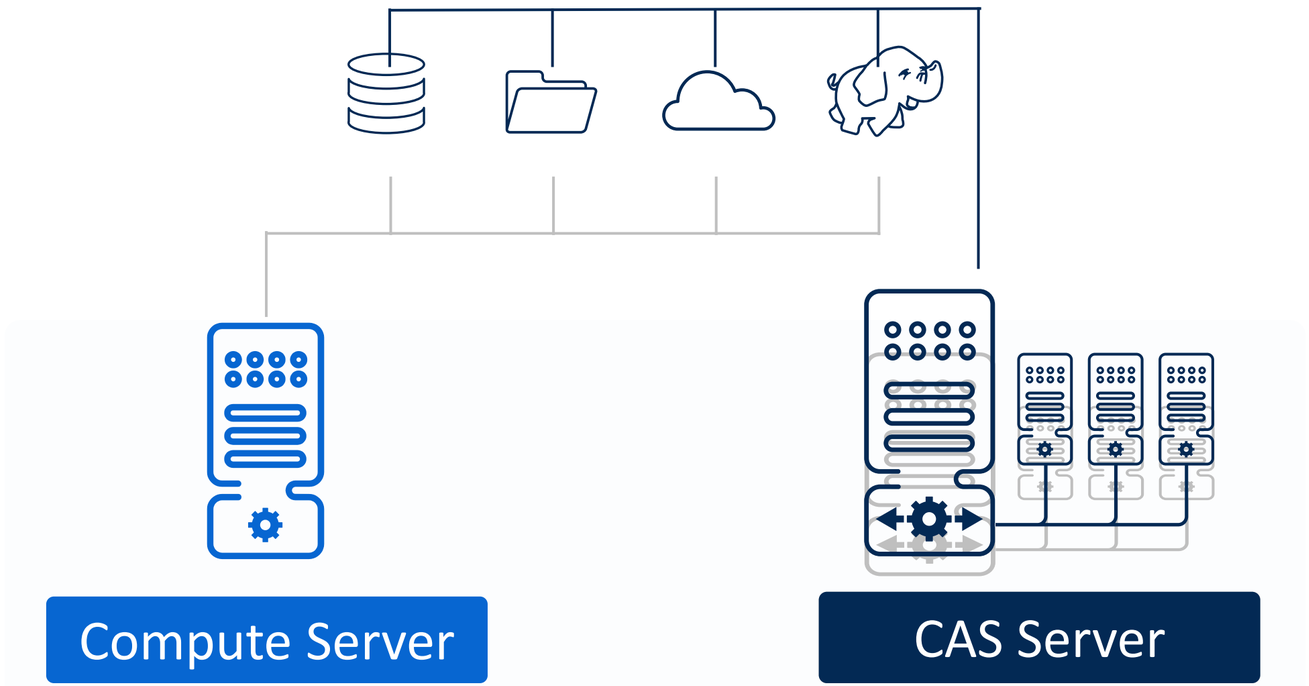


DATA step is processed **single-threaded**.

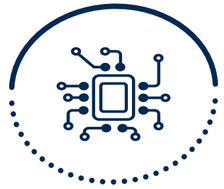


Many PROCS are **multi-threaded**.

CAS Server on SAS Viya



Parallel Processin



In-Memo

SAS Viya

SAS Viya Servers and Processing Environments

SAS Viya

Traditional SAS processing engine

Executes traditional SAS®9 code

SAS Compute Server

Next-gen SAS processing engine

SAS Cloud Analytic Services (CAS)

Executes CAS-enabled code in parallel on in-memory data

SAS Viya Servers

SAS Compute Server

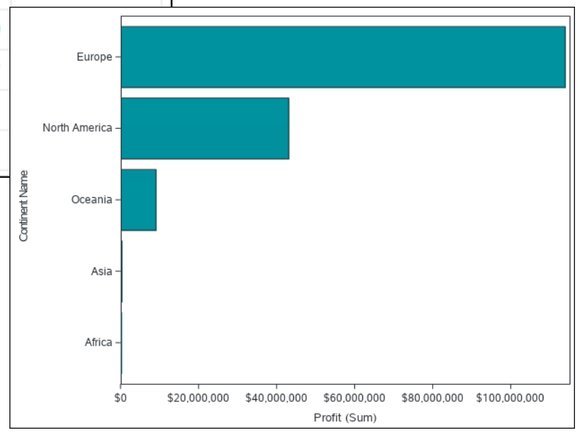
Standard SAS code executes on the SAS Compute Server.

```
libname pvbase "&path/data";

data profit;
     set pvbase.orders;
     ...
run;

proc means data=profit;
     ...
run;
```

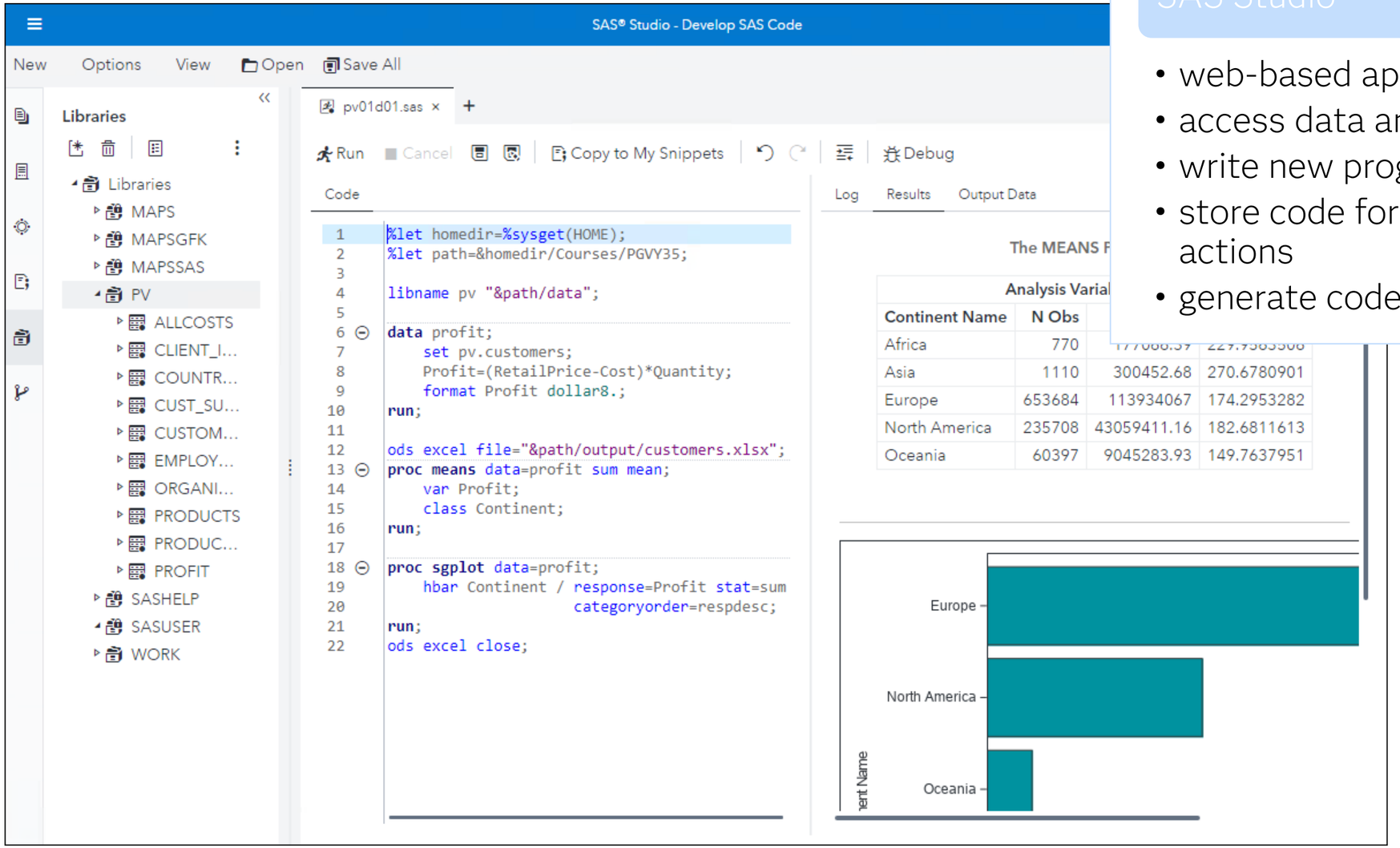
The MEANS Procedure

Analysis Variable : Profit

Continent Name	N Obs	Sum	Mean
Africa	770	-127.6800000	-0.1658182
Asia	1110	15503.70	
Europe	653684	5659450.59	
North America	235708	2121645.57	
Oceania	60397	462934.63	



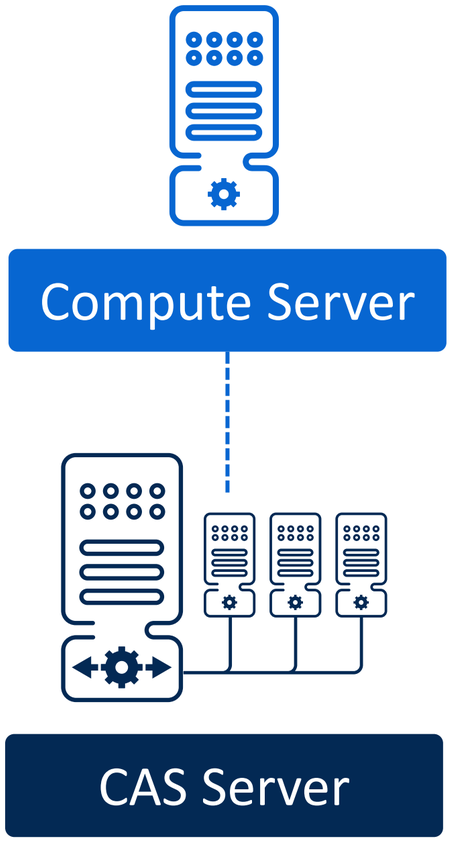
SAS Viya Programming Interface

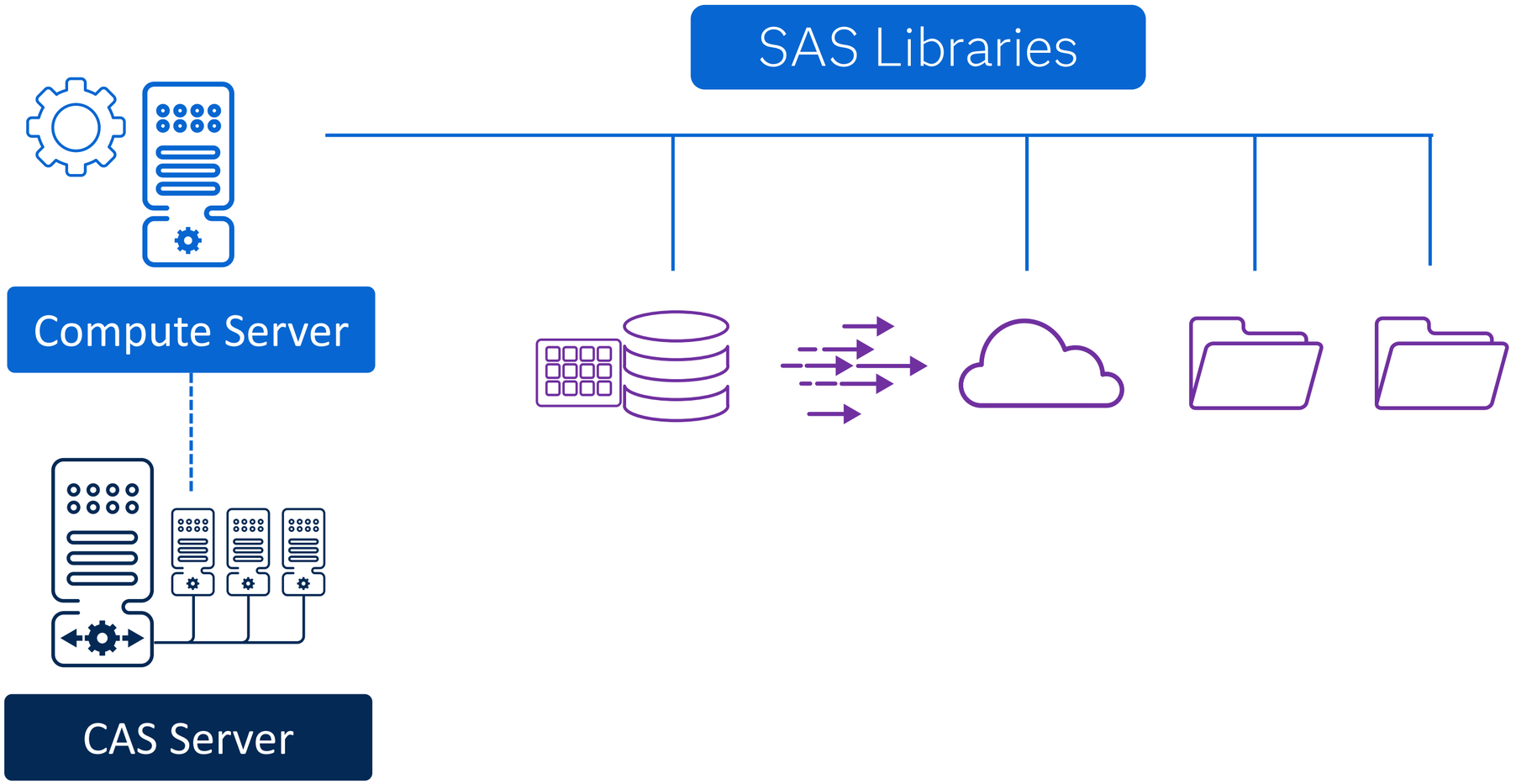


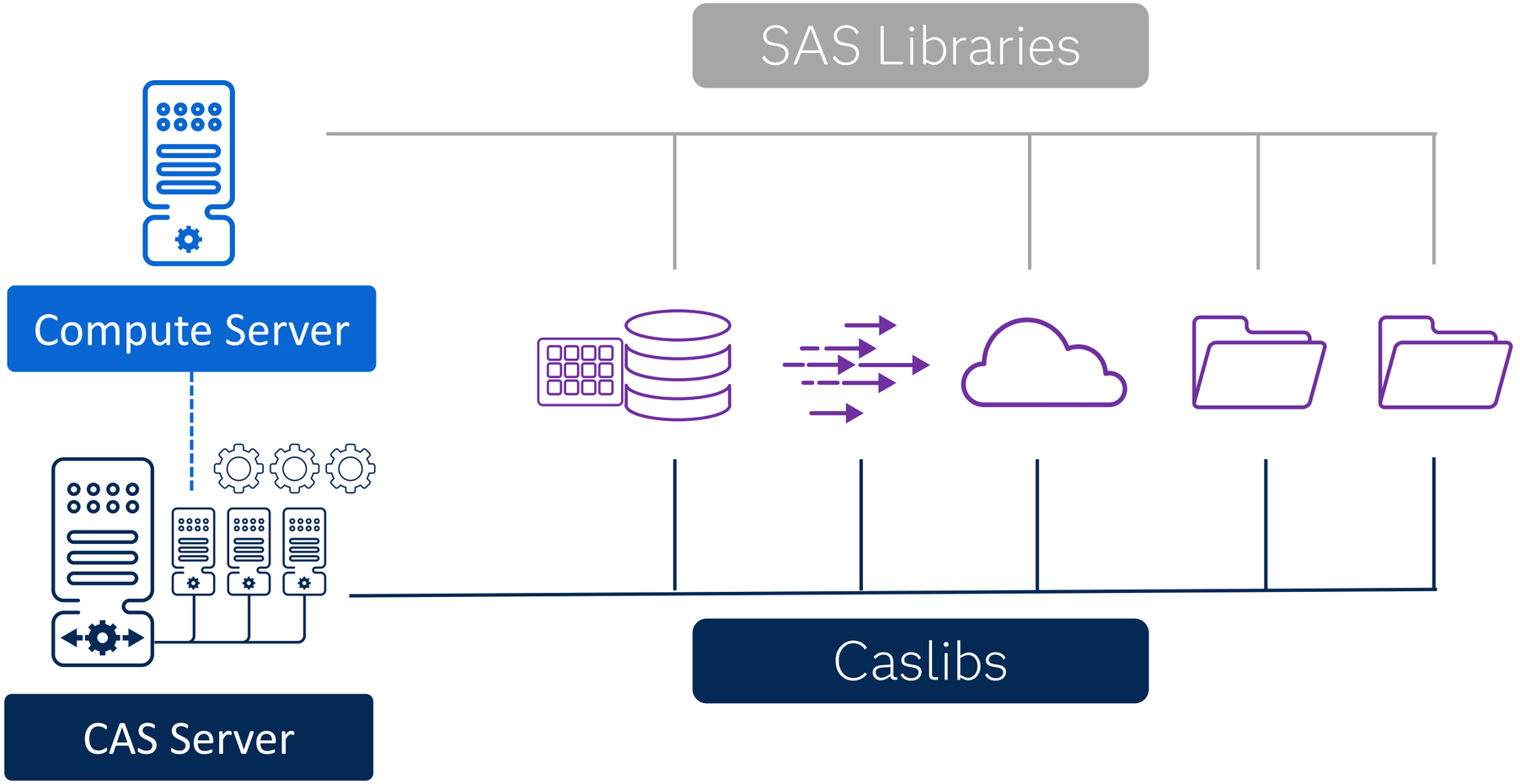
SAS Studio

- web-based application
- access data and programs
- write new programs
- store code for common actions
- generate code with tasks

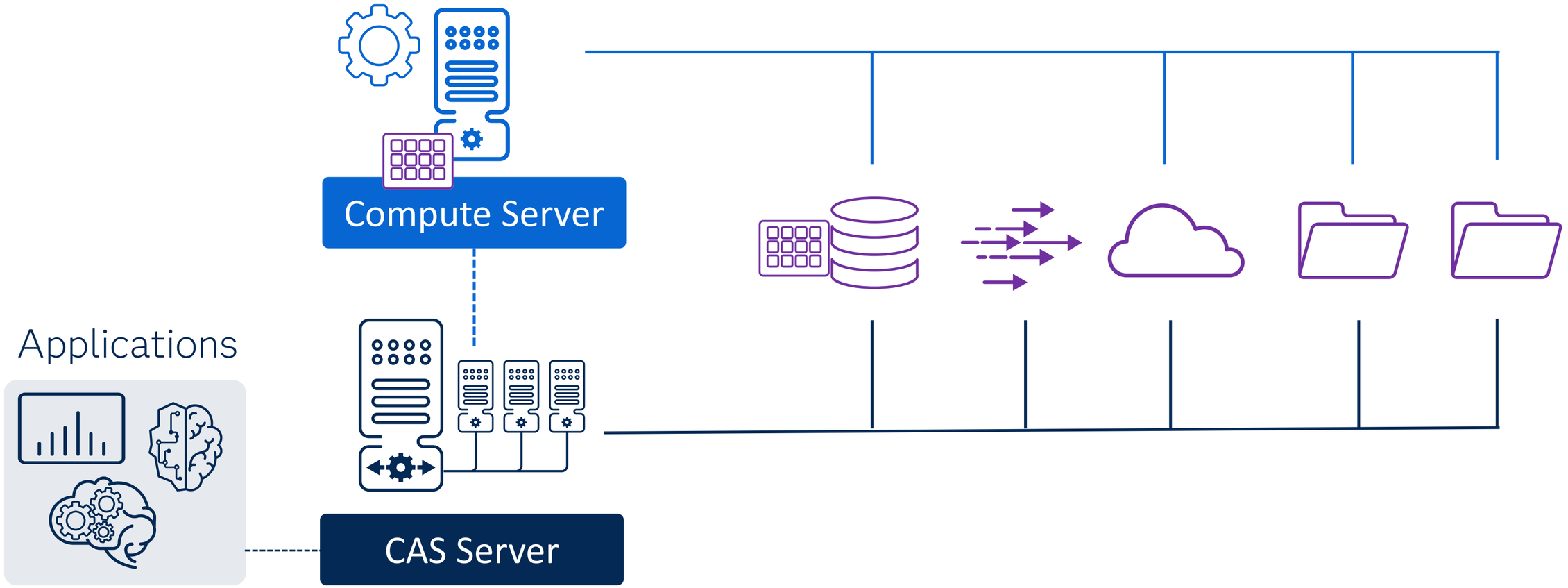
Accessing Data Sources with Compute or CAS



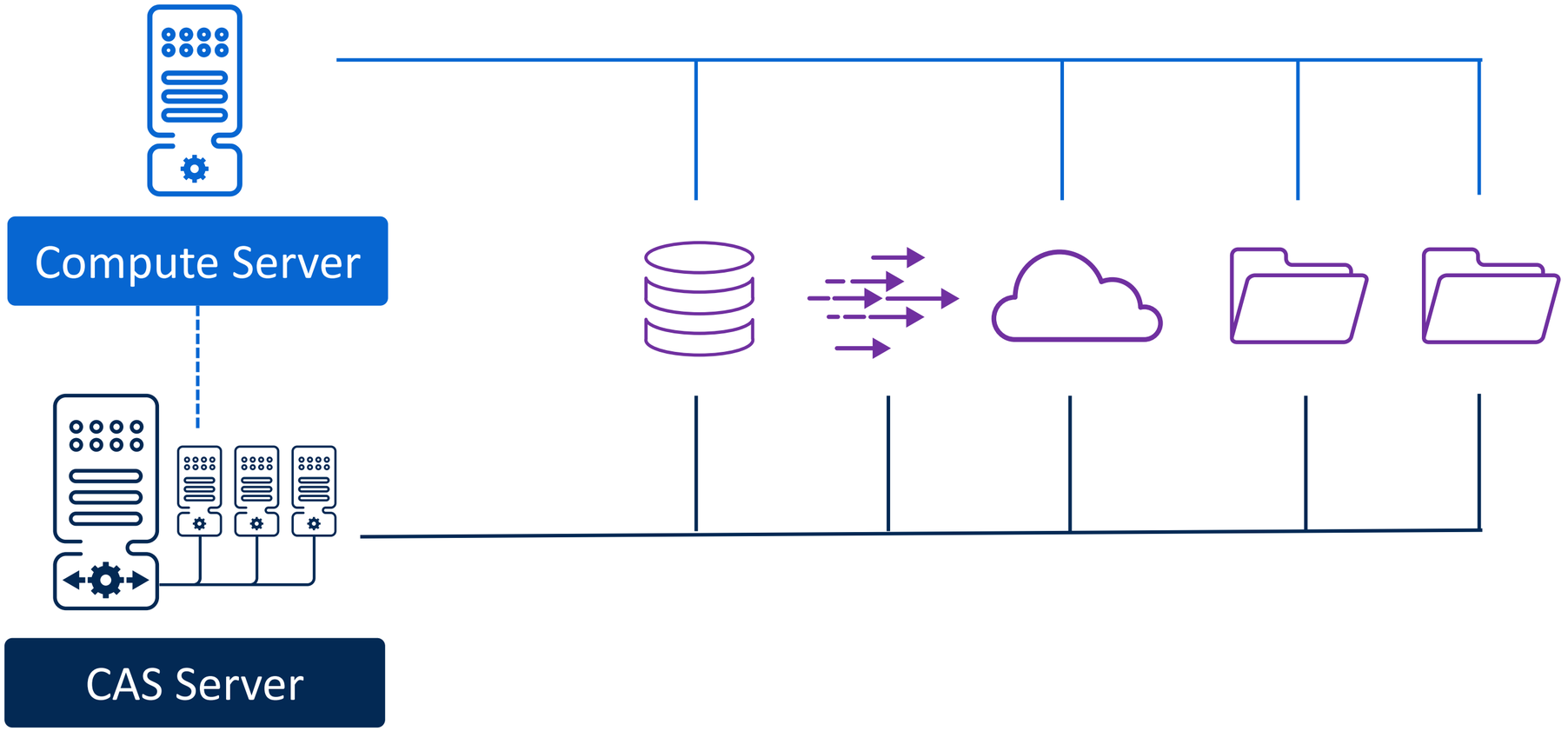




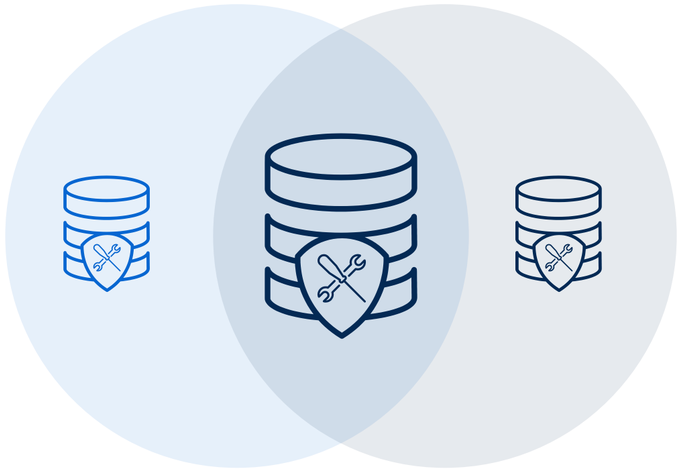
You can transfer data from Compute to CAS.



Depending on the **data size** and your **objectives**, you will want to read the data from the data source into the **appropriate server**.

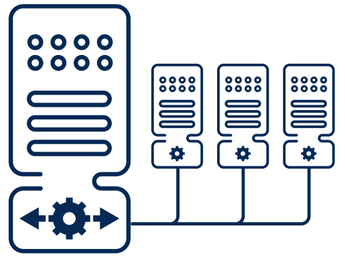


Data Sources



Compute Server

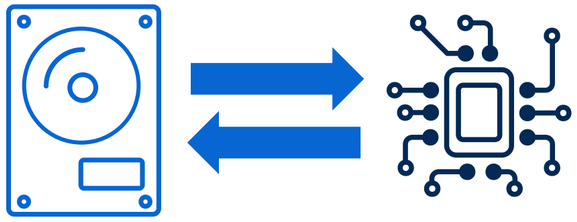
SAS/ACCESS Interfaces



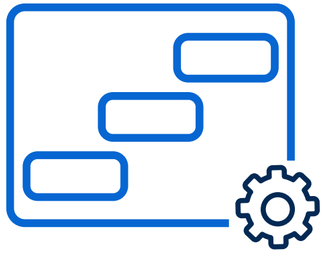
CAS Server

SAS Viya Data Connectors

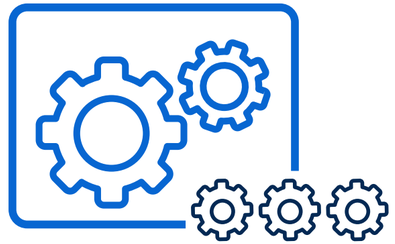
- DISK
- RAM
- CPU



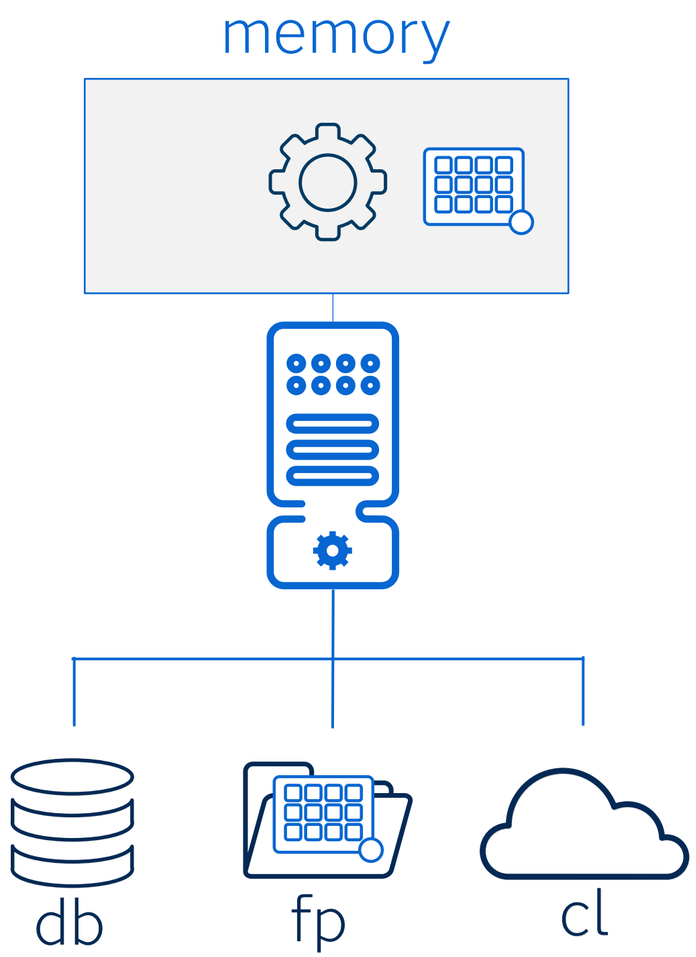
Data is transferred from disk to **memory**.



DATA step is processed **single-threaded**.



Many PROCS are **multi-threaded**.



1
```
data fp.final;
     set fp.new;
run;
```

2
```
proc freq data=fp.new;
run;
```

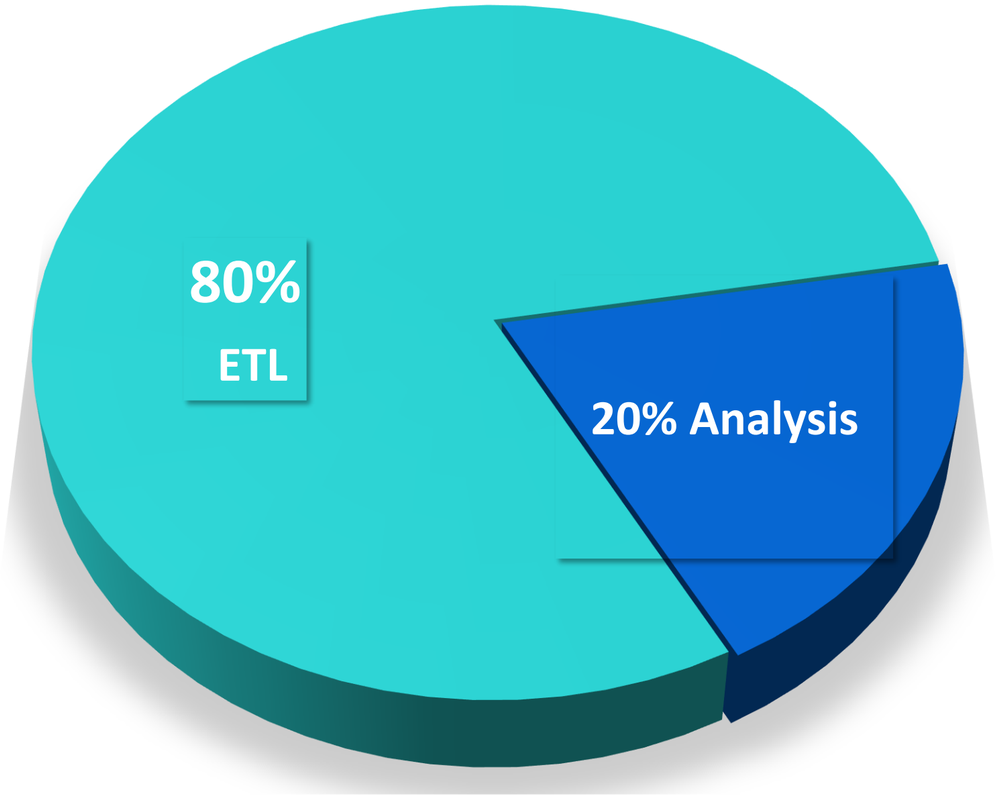
3
```
proc means data=fp.new;
run;
```

Data is loaded and unloaded from memory ***three times***.

1 Introduction

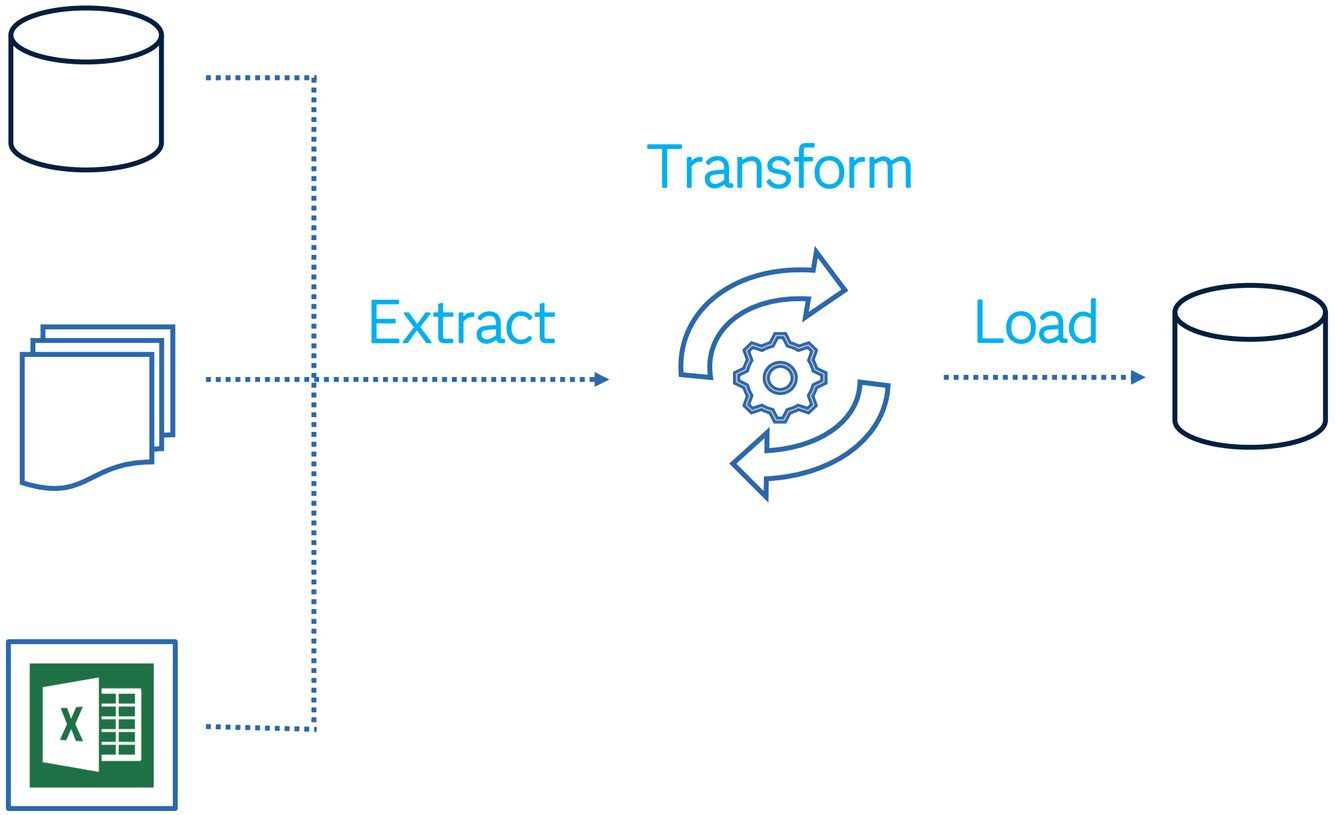
ETL Purpose

ETL allows businesses to consolidate data from multiple databases and other sources into a single repository with data that has been cleansed and qualified in preparation for analysis. This unified data repository allows for simplified access for analysis and additional processing. It also provides a single source of truth, ensuring that all enterprise data is consistent and up-to-date.



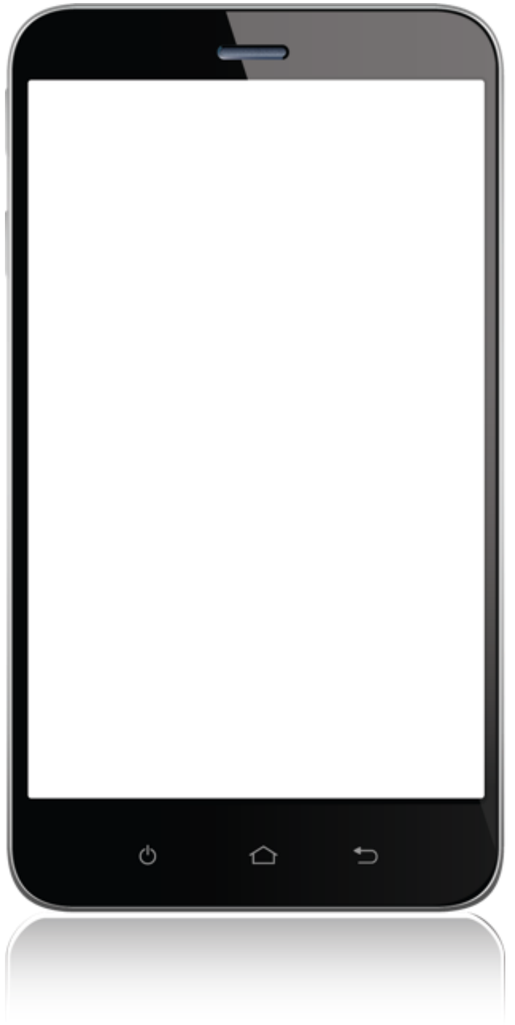
1 Introduction

ETL The Big Picture



Viya applications, personas-data scientist

5 ETL Demo



LINKS

[Loading and joining tables in cas]

Thank You

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