



THINKING LIKE AN
ANALYST

FOUNDATIONAL SKILLS FOR ASPIRING DATA PROFESSIONALS

COURSE OUTLINE

1

Why Analytics?

Industry insights, typical roles, critical skills, and tips to help you find your path

2

Data Analysis Workflow

Step-by-step guide to help you consistently deliver insightful, high-quality work

3

Measurement Planning

Framework for defining success and identifying, tracking and optimizing KPIs

4

Data Prep & Analysis

Tips for preparing and analyzing data; QA, profiling, ETL, and data-driven insights

5

Visualization & Dashboards

Best practices for highly effective data visualization and dashboard design

6

The Analyst Toolkit

Analytics tools and common stacks used by BI Analysts, Data Scientists & DBAs

7

Tips for Success

Rules to live by and helpful resources curated by the Maven team

MEET YOUR INSTRUCTORS



CHRIS DUTTON

Chris is an analytics expert and best-selling instructor with 10+ years specializing in business intelligence.

Since founding Maven Analytics in 2018, his courses have been featured by Microsoft, Entrepreneur.com and the New York Times, reaching more than 500,000 students worldwide.

- ✓ Certified Excel & Power BI Expert
- ✓ Founder & Lead Instructor

MEET YOUR INSTRUCTORS



JOHN PAULER

John brings over a decade of business intelligence experience to the Maven team, having worked with companies ranging from Fortune 500 to early stage startups.

As a MySQL expert, he has played leadership roles across analytics, marketing, SaaS and product teams.

- ✓ 10+ Years in Applied Analytics
- ✓ Lead MySQL Instructor

MEET YOUR INSTRUCTORS



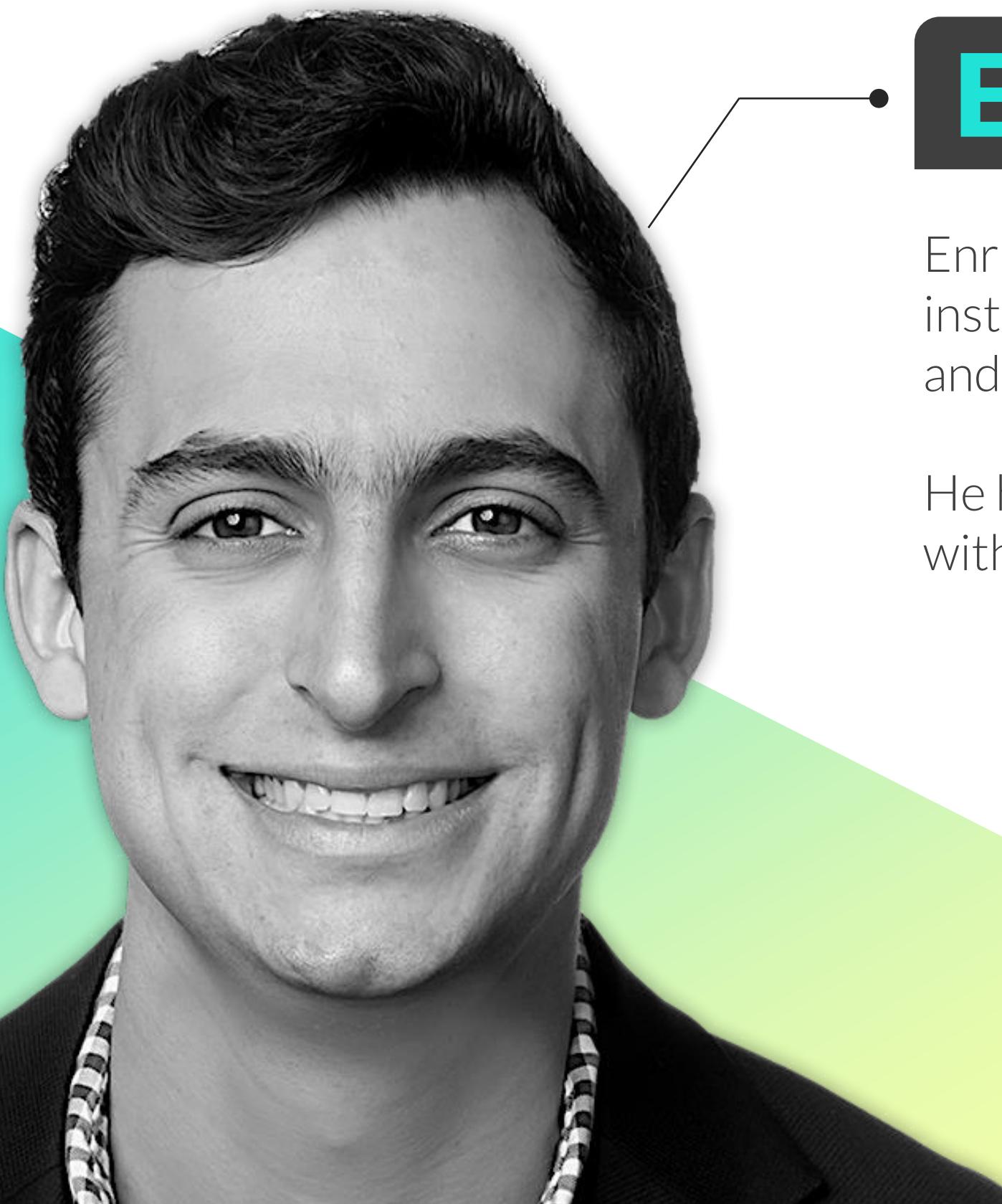
AARON PARRY

Aaron is a professional analytics consultant and Microsoft Power BI expert, with 10+ years in BI and marketing analytics.

He's an instructor, coach and mentor for aspiring analysts, and has deep experience helping companies develop and implement full-stack business intelligence solutions.

- ✓ Microsoft Certified Data Analyst
- ✓ Lead Power BI Instructor

MEET YOUR INSTRUCTORS



ENRIQUE RUIZ

Enrique is a certified Microsoft Excel Expert and top-rated instructor with a background in data analysis, visualization and dashboard design.

He has produced advanced Excel and test prep courses, along with adaptations for Spanish-speaking learners.

- ✓ Certified Excel Expert
- ✓ Excel & Data Viz Instructor

SETTING EXPECTATIONS



This is a **high-level intro** to core analytics skills & techniques

- We'll share helpful frameworks and explore key stages of the workflow (measurement planning, data prep, exploratory analysis, visualization, etc.) but won't dive deep into specialized or advanced topics



This is **NOT** a technical guide or tool-specific course

- We'll introduce several interactive exercises and case studies, but you won't need to use any tools or complete any technical assignments like the ones found in our Excel, SQL, Power BI & Tableau courses



Our goal is to help you **think like a world-class analyst**

- This course includes powerful frameworks, best practices, and resources curated by a team of seasoned analysts and award-winning business intelligence instructors (trust us, it works!)

WHY ANALYTICS?

WHY ANALYTICS?

THE WORLD RUNS ON DATA

Data is everywhere, but without analytics it's just numbers and noise; the analysts' role is to translate **raw information** into **insights and outcomes**

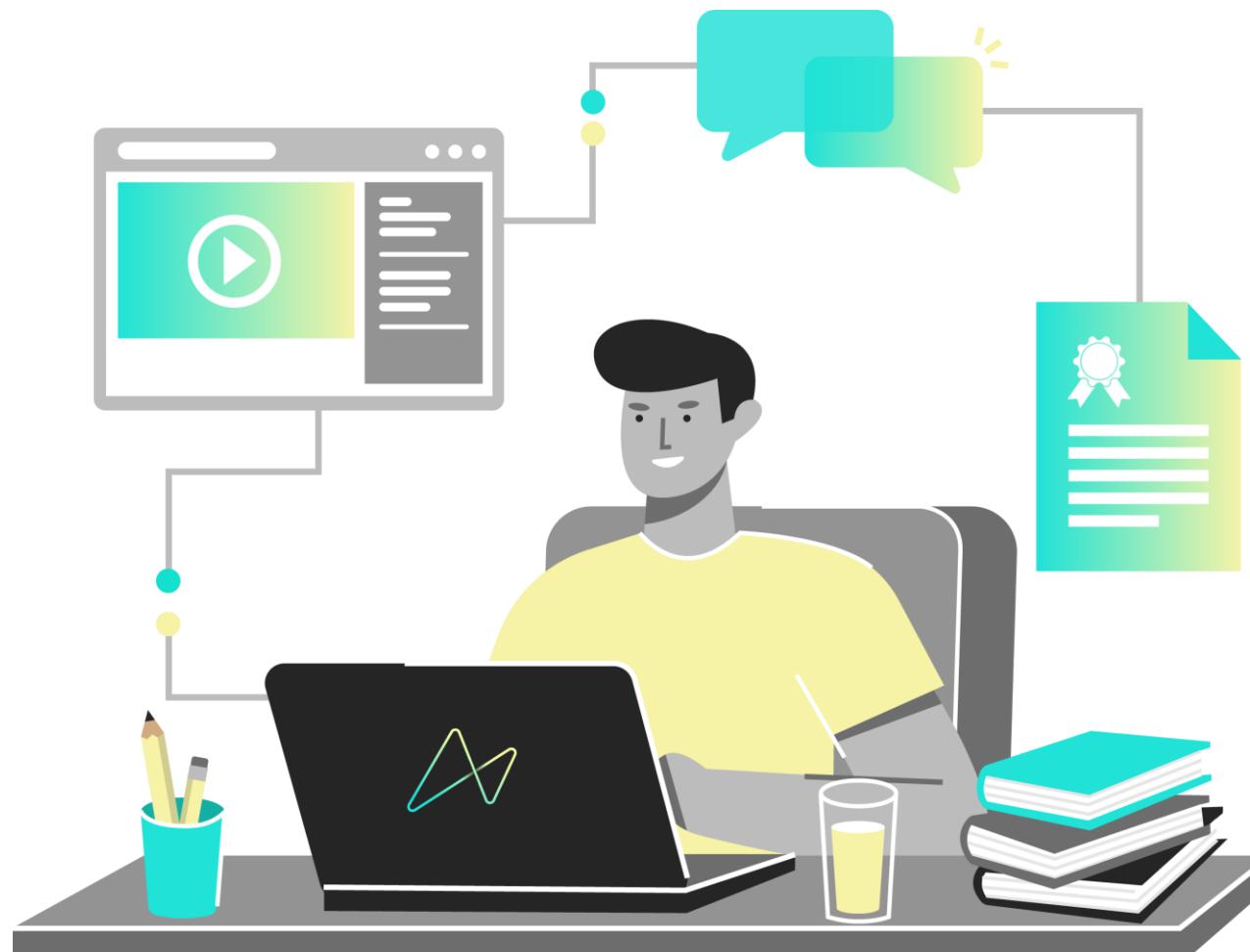
Reasons to work in Data Analytics:

- ✓ High average salary and job satisfaction
- ✓ Strong and growing demand for talent
- ✓ Highly versatile and transferrable skills
- ✓ Wide range of roles and specialties
- ✓ Unique blend of creative + analytical thinking
- ✓ Opportunity to make a **real impact**, at any level



DATA ANALYST JOB INSIGHTS

Data is playing an increasingly central and critical role in the business world; as companies seek to make better data-driven decisions, **demand for analytics talent is on the rise**



\$73,847

Avg. Analyst Salary

Based on data from indeed.com

47,885

US Job Openings

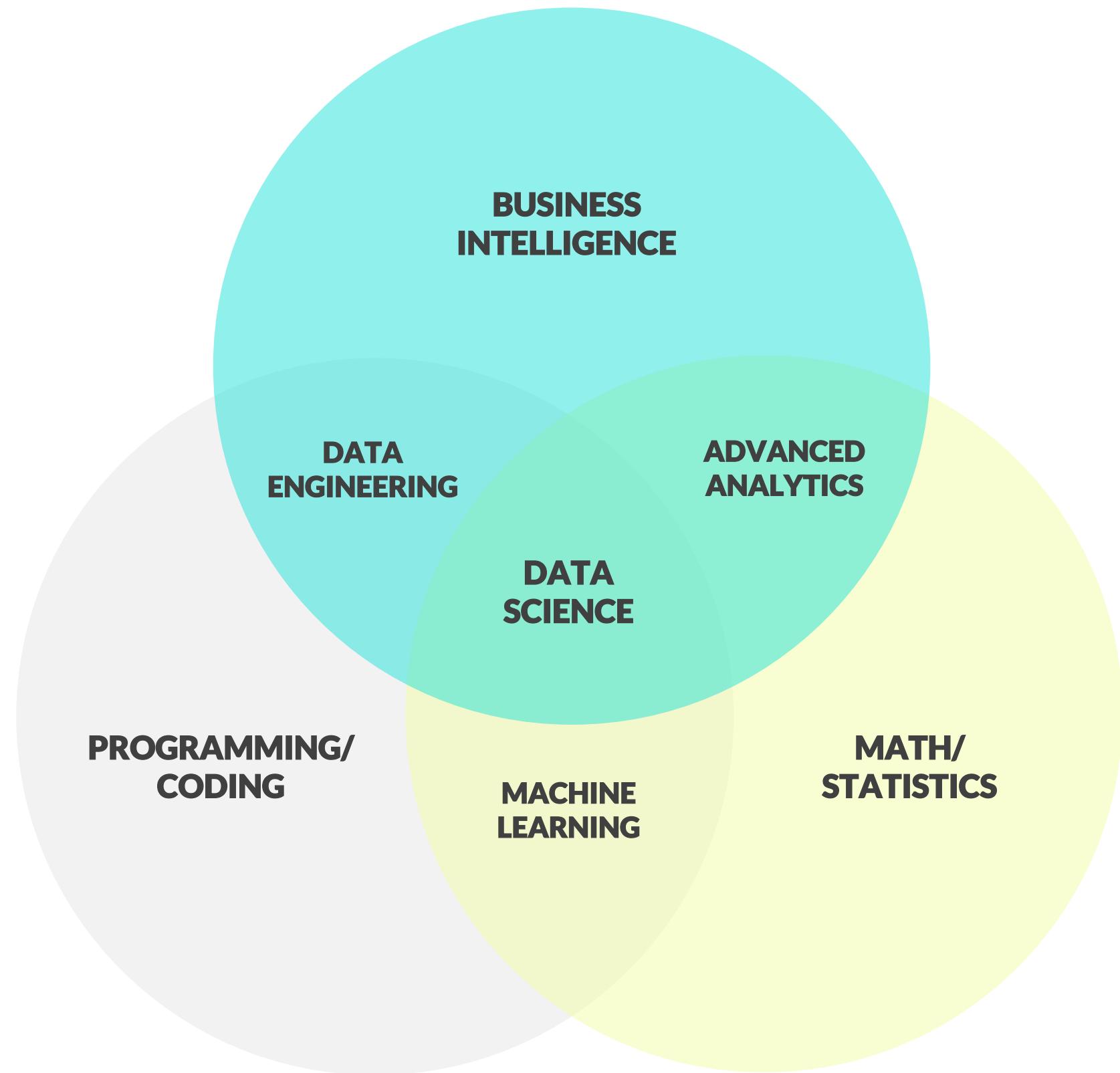
Based on data from LinkedIn (June 2021)

4.2/5

Avg. Job Satisfaction

Based on data from payscale.com

FLAVORS OF ANALYTICS



THIS IS
DATA ANALYTICS

Many types of roles fall under the larger analytics umbrella, but they are all about **using data to make smart decisions**.

The differences come down to the **types of problems** you are trying to solve, and the **types of tools** you are using to solve them.

BI + DATA SCIENCE

BUSINESS INTELLIGENCE



DATA SCIENCE

- Typically focused on **Descriptive Analytics**: *What happened, why did it happen, how can we learn from it?*
- Often deals with **specific, known questions**: *Why are sales declining? Which products drive the highest ROI?*
- Emphasis on self-service **database, analytics & visualization** tools (*Excel, SQL, Power BI, Tableau, etc.*)
- Designed to deal with **static, structured** data sources (*tabular datasets & pre-planned relational models*)
- GOAL: **identify patterns & trends** to turn data into insight
- Deliverables tend to be **visuals, reports & dashboards**
- Typically focused on **Predictive & Prescriptive Analytics**: *What will happen in the future, how can we prepare for it?*
- Often deals with **unknowns**: *Which employees are likely to churn? Which product will a customer purchase next?*
- Emphasis on **statistics & programming** tools designed for flexibility and agility (*R, Python, open-source libraries, etc.*)
- Can be used to deal with **high-velocity, structured or unstructured** data (*text, audio, images, IoT signals, etc.*)
- GOAL: **test hypotheses** through experimentation & iteration
- Deliverables tend to be **algorithms & statistical models**

FINDING YOUR PATH

BI ANALYST

A **Business Intelligence** or **Data Analyst** role may be a good fit if you:

- Love analyzing data for insights and convincing stakeholders to act
- Enjoy solving a wide variety of business cases and open-ended tasks
- Want to build a deep skillset, from data engineering to analysis and visualization

DATA VIZ SPECIALIST

A **Data Visualization Specialist** role may be a good fit if you:

- Love designing visuals to tell stories and bring data to life
- Want to flex both your creative and critical thinking skills
- Prefer working with prepared data and under specific project guidelines

DATA ENGINEER

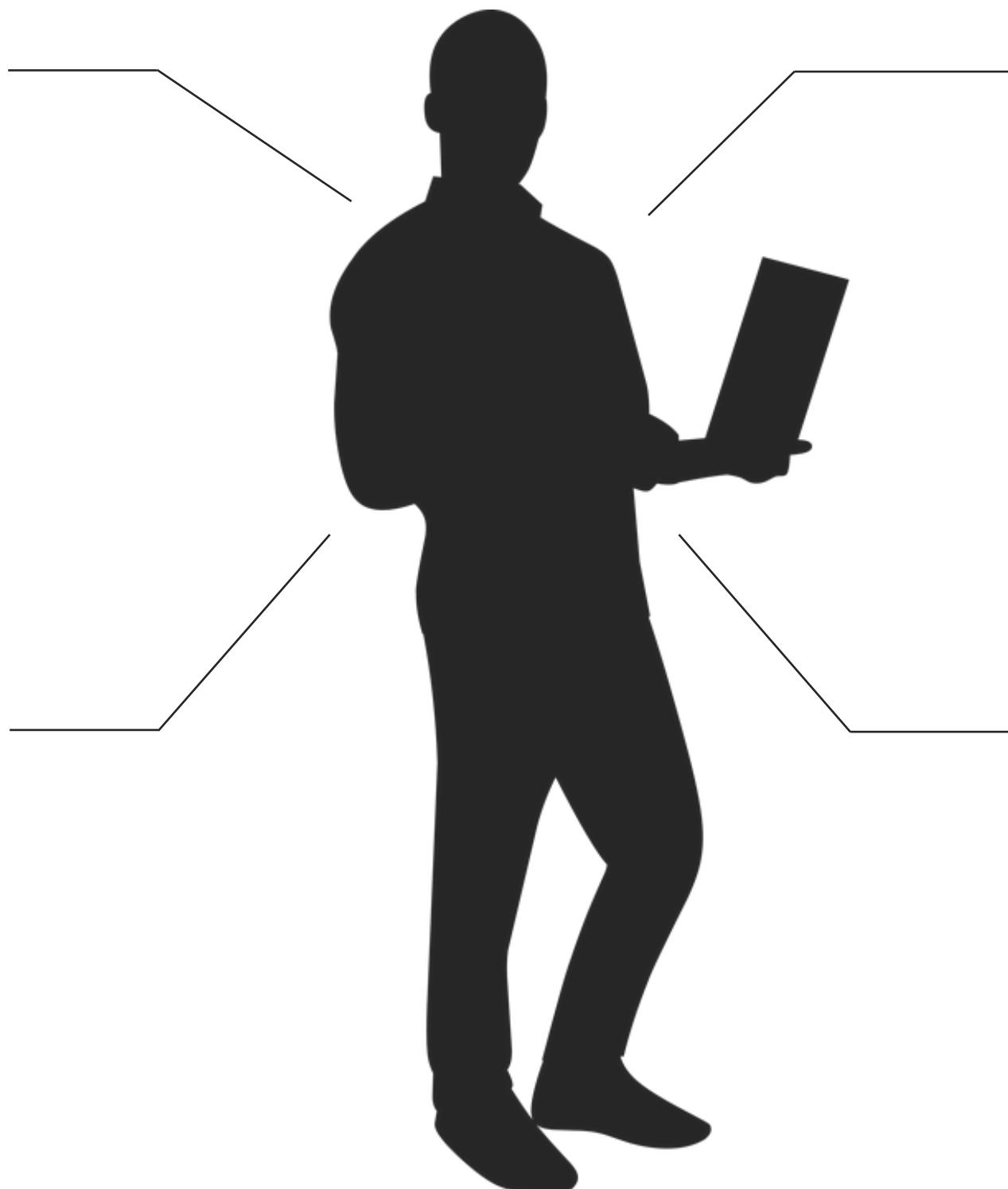
A **Data Engineer** or **Database Admin (DBA)** role may be a good fit if you:

- Enjoy building data infrastructure and engineering database systems
- Prefer concrete technical tasks over open-ended business cases
- Would rather build and design databases than perform visual or exploratory analysis

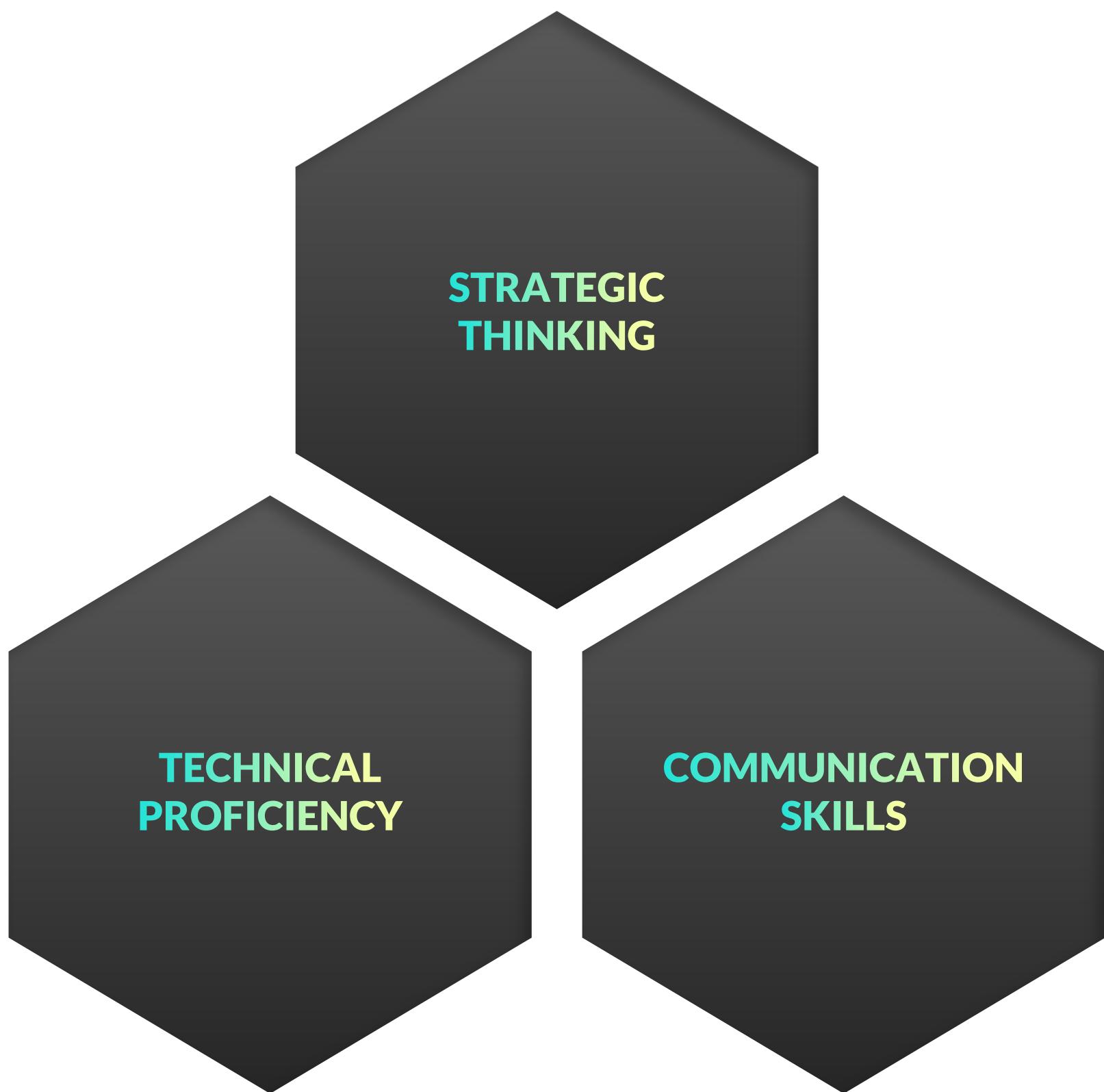
DATA SCIENTIST

A **Data Science** or **Machine Learning** role may be a good fit if you:

- Love to program and write code
- Enjoy math and statistics
- Can distill complex topics and communicate them clearly
- Prefer one-off projects over dashboard design or performance reporting



THE ANALYTICS TRIFECTA

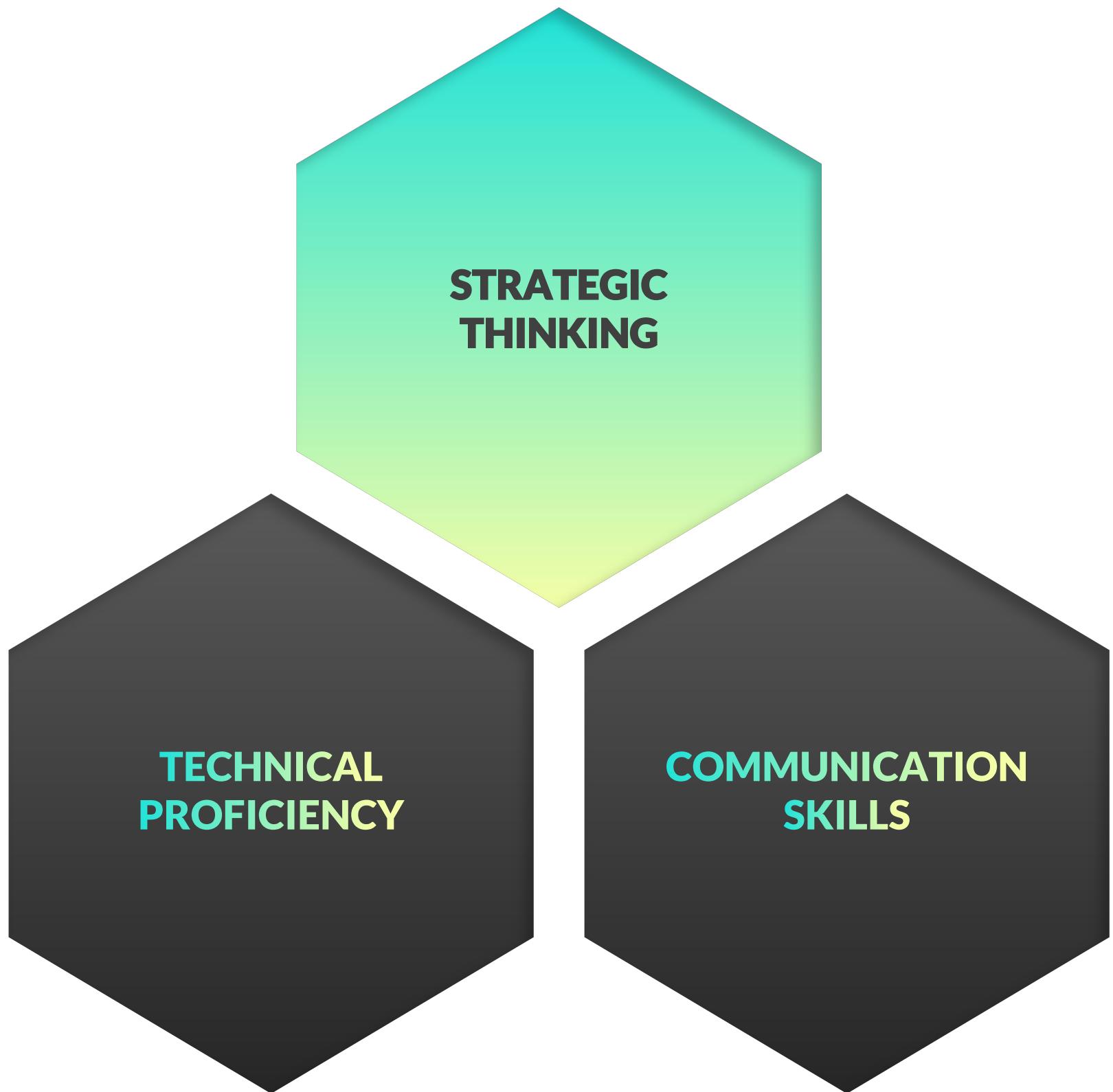


When we think about what separates a good analyst from a great one, the following three attributes come to mind:

1. Strategic thinking
2. Technical proficiency
3. Communication skills

We call this the "**Analytics Trifecta**", because it represents the three core skills which can help you produce exceptional results at every stage of the workflow.

THE ANALYTICS TRIFECTA



STRATEGIC THINKING

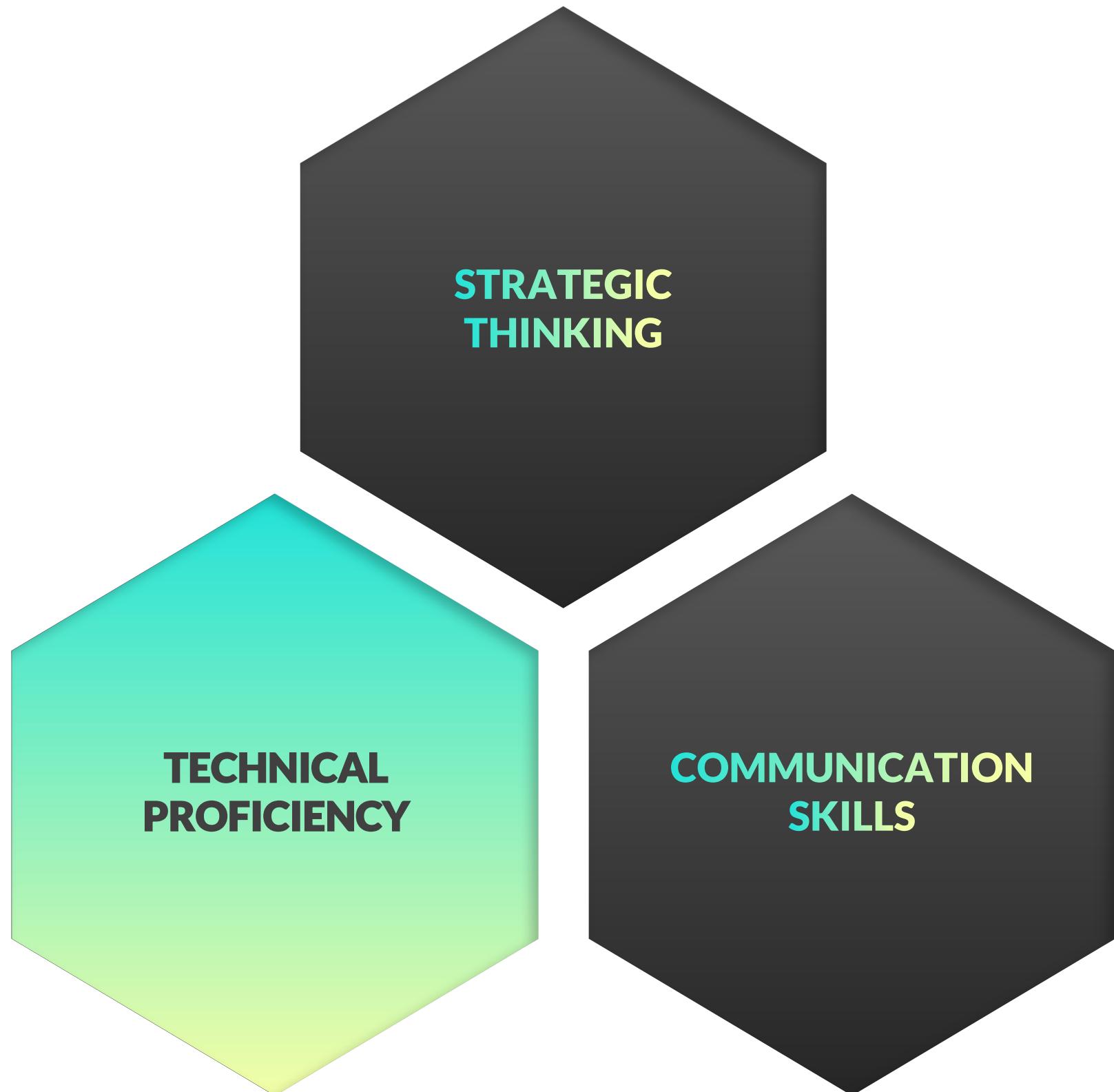
The ability to **think strategically** is critical, especially during the early stages of the analytics workflow.

Strategic thinking is about understanding business goals or pain points, identifying key factors for success or failure, and designing clear, tactical analyses and measurement plans to drive desired outcomes.



PRO TIP: Nothing beats real-world experience, but reading business case studies can be a great way to develop your strategic thinking skills!

THE ANALYTICS TRIFECTA



TECHNICAL PROFICIENCY

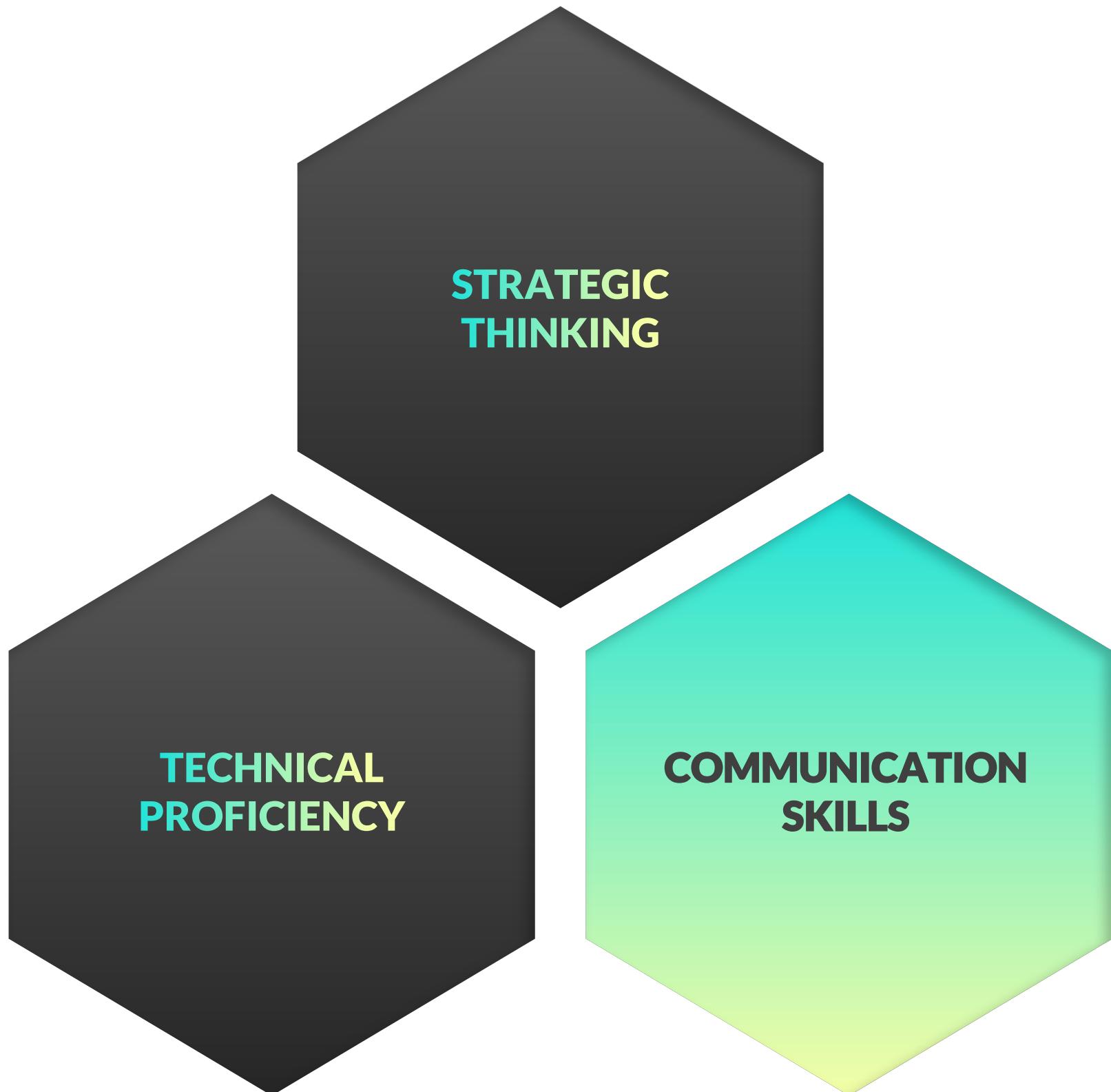
Simply put, technical proficiency is the **ability to execute**, whether that's writing code, building ETL pipelines, or designing data visualizations or dashboards.

Strong, well-rounded technical skills allow you to contribute to a broader range of analytics projects, work efficiently, and clearly showcase (and show off!) your skills.



PRO TIP: Most people focus too much on building technical skills and too little on strategic thinking or communication; find a balance!

THE ANALYTICS TRIFECTA



COMMUNICATION SKILLS

Analysts essentially act as the translators between raw data and end users, so your ability to **communicate clearly** is essential to your success.

This includes *all* forms of outbound communication (written, visual, verbal, non-verbal) as well as the ability to listen and interpret feedback effectively.



PRO TIP: People respond to stories, not data points; always aim to create a clear narrative to engage users and drive towards the key insights

KEY TAKEAWAYS



Demand for analytics talent is strong, **and on the rise**

- *Data is playing an increasingly critical role in business, and analysts are the ones who give it meaning*



Data Analytics skills are **powerful and versatile**

- *Analysis and visualization skills can immediately add value to virtually any company working with data*



All analytics roles are ultimately about making **smart, data-driven decisions**

- *There are many specialties or “flavors” of analytics, but they share many of the same core skills*



Strategic, technical, and communication skills are **equally important**

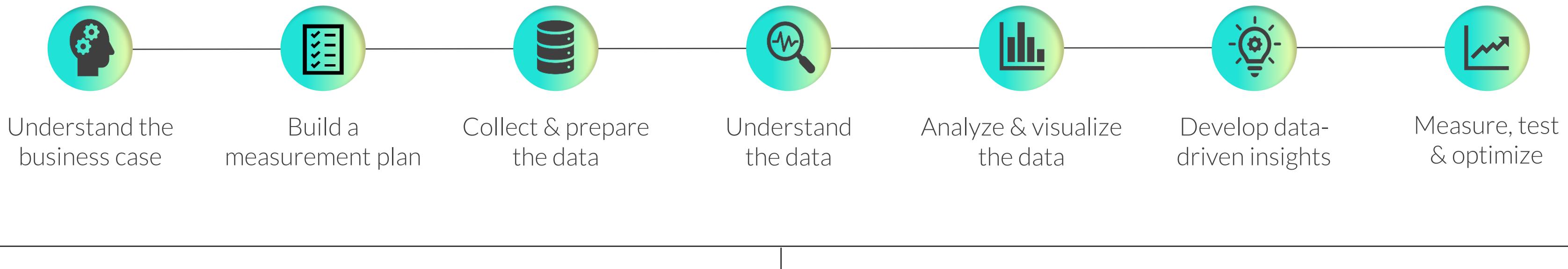
- *Aim to build a “trifecta” of skills: strategic thinking, technical proficiency, and clear communication*

DATA ANALYSIS WORKFLOW

DATA ANALYSIS WORKFLOW

WITHOUT A PROCESS, YOU'RE FLYING BLIND

This workflow will help you set clear expectations, define and measure key outcomes, improve accuracy and efficiency, and consistently deliver insightful, high-quality work



While there's no "right" or "wrong" workflow, **all analytics projects** should incorporate some combination of these steps

UNDERSTAND THE BUSINESS CASE



Before you start thinking like an analyst, **think like a business owner.**

Understand which specific outcomes you are trying to impact, who the key stakeholders are and what motivates them, and how your analysis fits into the bigger picture.

This will help you align on requirements, project scope, and desired outcomes from day one.

KEY QUESTIONS:



- Which goals or business outcomes am I trying to impact?
- Who are the key stakeholders, and how will this help them?
- How does my work fit into the overall business strategy?

BUILD A MEASUREMENT PLAN



Understand the business case



Build a measurement plan



Collect & prepare the data



Understand the data



Analyze & visualize the data



Develop data-driven insights



Measure, test & optimize

Think of a measurement plan like a **roadmap for success**.

Measurement planning is about defining what a successful outcome looks like for the business, determining which KPIs align with that outcome, and identifying the data you need to capture, track and optimize those metrics.

If your goal is to deliver data-driven insights and outcomes, don't skip this step!

KEY QUESTIONS:



- *What exactly does success look like for this analysis?*
- *Which specific metrics will help me quantify success?*
- *What data will I need to capture and track my KPIs?*

COLLECT & PREPARE THE DATA



Understand the business case



Build a measurement plan



Collect & prepare the data



Understand the data



Analyze & visualize the data



Develop data-driven insights



Measure, test & optimize

An analysis is **only as strong as the data supporting it.**

Data prep tends to be one of the most challenging and time-consuming stages in the workflow, often involving a mix of quality assurance (QA), data profiling, feature engineering, and ETL automation (*more on that later!*).

This creates a strong foundation for your analysis, and ensures that you're working with clean, high-quality data.

KEY QUESTIONS:



- Where is my data stored, and how can I access it?
- Are there quality issues that need to be fixed?
- Will I need to model or transform the data before analysis?

UNDERSTAND THE DATA



Understand the business case



Build a measurement plan



Collect & prepare the data



Understand the data



Analyze & visualize the data



Develop data-driven insights



Measure, test & optimize

It may sound obvious, but it's important to **understand your data** before you begin your analysis.

You should have a crystal-clear understanding of the scope, granularity and composition of your source data, especially if your analysis requires some level of industry knowledge or domain expertise.

This will help you work efficiently and ensure that you have the exact data you need to support your analysis.

KEY QUESTIONS:



- *What exactly does each record represent?*
- *Which fields are most relevant to my analysis?*
- *Are there important nuances or industry-specific metrics?*

ANALYZE & VISUALIZE THE DATA



Data visualization is about **bringing your data to life**.

Humans are poorly equipped to interpret and understand raw data; visualization is about creating clear patterns and visual cues to help us make sense of complex information.

This allows you to give your data a voice and create powerful, data-driven narratives.

KEY QUESTIONS:



- What type of data am I trying to analyze or visualize?
- What type of trend or pattern am I communicating?
- Who is the end user consuming this information?

DEVELOP DATA-DRIVEN INSIGHTS



Remember that you don't get paid to analyze data; you get paid to **deliver insights & outcomes for the business**.

A strong insight not only tells a clear, data-driven story, but provides actionable recommendations designed to drive the key outcomes in your measurement plan.

This is one of the most important steps in the workflow, but one that many analysts fail to prioritize.

KEY QUESTIONS:



- What key takeaways are we able to derive from the data?
- How can we use these insights to impact real outcomes?
- How can I convince stakeholders to take action?

MEASURE, TEST & OPTIMIZE



Understand the business case



Build a measurement plan



Collect & prepare the data



Understand the data



Analyze & visualize the data



Develop data-driven insights



Measure, test & optimize

You've completed your analysis, shared some strong data-driven insights, and delivered a set of actionable recommendations aligned with your measurement plan.

Great! Now what?

Once recommendations have been implemented, it's time to take credit. Track pre/post changes to your KPIs, quantify the impact of your work (*in dollars, if possible*), and seek opportunities to continue to test and optimize.

KEY QUESTIONS:



- Did my recommendations produce the desired outcomes?
- What value did this analysis generate for the business?
- Can this analysis help inform future tests or optimizations?

MEASUREMENT PLANNING

MEASUREMENT PLANNING

IF YOU CAN'T MEASURE IT, YOU CAN'T OPTIMIZE IT

Measurement planning is about defining exactly what a successful outcome looks like for the business, and building a framework to identify, track and optimize key metrics



Think business first

Know your audience

Define the KPIs

Identify data sources

CASE STUDY: MEASUREMENT PLANNING



THE SITUATION

You've just landed a job as the first Business Intelligence Analyst working in the call center for **Maven Muscles**, a nationwide gym that helps people get in shape. The call center handles new signups and customer service.



THE ASSIGNMENT

Your first assignment is to **build a detailed measurement plan** for the VP who runs the call center. She reports to the COO and indirectly to the CEO, and oversees 5 Managers who each lead a team of call center reps.



THE OBJECTIVES

1. Consider the goals of the business and needs of your stakeholders
2. Identify and prioritize Key Performance Indicators and supporting metrics
3. Make your plan to gather the data and address any gaps

MEASUREMENT ROADMAP

1

Think business first

2

Know your audience

3

Define the KPIs

4

Identify data sources

One of the most common pitfalls for Analysts is jumping into the data too quickly; before you start thinking like an analyst, think like a **business owner** first!

Key questions to ask:

- What are the **key business goals** and objectives?
- Where does this analysis **fit into the overall business**?
- What are the **most important questions** that stakeholders need answers to?
- What **types of actions** do you want them to take after seeing your analysis?



PRO TIP: Remember that you don't get paid to analyze data; you get paid to **drive outcomes**!

STEP 1: THINK BUSINESS FIRST

-  **1** What are the high-level goals of the Maven Muscles business?
-  **2** How does the call center support those business goals?
-  **3** What are the most important goals for the call center?
-  **4** What questions should you try to answer for call center leadership?
-  **5** What actions can you imagine leadership taking based on your data?

STEP 1: THINK BUSINESS FIRST

-  1 What are the high-level goals of the Maven Muscles business?
 - *Revenue, profit, high customer retention, customer satisfaction*
-  2 How does the call center support those business goals?
 - *Help customers sign up, reduce customer churn, identify and resolve issues quickly*
-  3 What are the most important goals for the call center?
 - *Sign up new customers, keep existing customers subscribed and happy*
-  4 What questions should you try to answer for call center leadership?
 - *Signups going up/down? Answering calls quickly? Are we staffed right? Are customers satisfied or churning?*
-  5 What actions can you imagine leadership taking based on your data?
 - *Changing schedules to match call demand. Incentivizing employees based on performance. Identifying problems.*

MEASUREMENT ROADMAP

1

Think business first

2

Know your audience

3

Define the KPIs

4

Identify data sources

After thinking about the business impact, focus on the **key stakeholders** next; who are they, what do they need, and how will your analysis support them?

Key questions to ask:

- Who is the **primary audience** you are designing the measurement plan for?
- What are their **goals and incentives**? What do they care most about?
- Are there **multiple stakeholders** who will be impacted by your analysis?
- What **type of information** would inspire them to take action?



PRO TIP: It's OK to ask! Do some thinking on your own, then run your ideas by stakeholders to make sure you're on the right track

STEP 2: KNOW YOUR AUDIENCE

- 1** What is your primary stakeholder most interested in? What are her goals?
- 2** What information should you provide to help her do her job well?
- 3** What are the COO and CEO most interested in?
- 4** What are the call center Managers most interested in?
- 5** What information do Managers need to make their teams more effective?

STEP 2: KNOW YOUR AUDIENCE

-  1 What is your primary stakeholder most interested in? What are her goals?
 - *Signups, Close Rates, Customer Retention, Customer Satisfaction, Call Center Efficiency, etc.*
-  2 What information should you provide to help her do her job well?
 - *Help her monitor the metrics above (trends), highlight areas where she can make impactful changes*
-  3 What are the COO and CEO most interested in?
 - *Revenue, Profit, High Customer Retention, Customer Satisfaction*
-  4 What are the call center Managers most interested in?
 - *Hitting their signup and customer satisfaction goals, improving their team*
-  5 What information do Managers need to make their teams more effective?
 - *Help them see individual-level performance and highlight any opportunities for improvement*

MEASUREMENT ROADMAP

1

Think business first

2

Know your audience

3

Define the KPIs

4

Identify data sources

Once you understand the business impact and stakeholder needs, you're ready to start identifying **Key Performance Indicators** (KPIs) and supporting metrics

Key questions to ask:

- Which **business goals** have you already identified?
- For each goal, which metrics can be used to **accurately measure it**?
- Which of those are **most important** for your stakeholders?
- Thinking one level deeper, what other **supporting metrics** might help you optimize or make decisions to improve your KPIs?



PRO TIP: Feeling analysis paralysis?
Brainstorm a list of metrics, then prioritize
and focus on the top few items

STEP 3: DEFINE THE KPIs

Primary Business Goal:

Signups



KPI Definition(s):

[Placeholder box for Signups KPI definition]

Component Metrics:

[Placeholder box for Signups component metrics]

Close Rate



[Placeholder box for Close Rate KPI definition]

[Placeholder box for Close Rate component metrics]

Customer Retention



[Placeholder box for Customer Retention KPI definition]

[Placeholder box for Customer Retention component metrics]

Customer Satisfaction



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[Placeholder box for Customer Satisfaction component metrics]

Call Center Efficiency



[Placeholder box for Call Center Efficiency KPI definition]

[Placeholder box for Call Center Efficiency component metrics]

STEP 3: DEFINE THE KPI'S

Primary Business Goal:

Signups



KPI Definition(s):

- Count of New Customer Signups

Close Rate



- % of Calls Resulting in a Sale

Customer Retention



- Avg. Months Enrolled per Signup
- % of Customers who Churn

Customer Satisfaction



- % of Customers Rating 5 Stars
- % Callers Reporting 1st Call Resolution

Call Center Efficiency



- % of Time Utilized
- Average Wait Time (Seconds)

Component Metrics:

- New Customer Count (or list)

- Count of Calls, Count of Sales

- Signup List, Months Retained
- Customer List, Count of Churners

- Survey Responses / Ratings
- Survey Responses

- Available Rep Time, Time on Calls
- Time of Calls, Time of Answers

MEASUREMENT ROADMAP

1

Think business first

2

Know your audience

3

Define the KPIs

4

Identify data sources

After identifying your KPIs and supporting metrics, it's time to think about **what data you need, where to source it, and how to prepare it for analysis**

Key questions to ask:

- Which **sources** provide the data you need to track each metric?
- Who **owns or manages** each data source?
- How **frequently** is each data source refreshed?
- Can you **automate or streamline** the data collection process?



PRO TIP: As part of your measurement plan, create a shared document to clearly define all **data requirements** (metrics, sources, owners, frequency, caveats, etc.)

STEP 4: IDENTIFY DATA SOURCES

Metric:

New Customer Count (or list)

Count of Calls, Count of Sales

Signup List, Months Retained

Customer List, Count of Churners

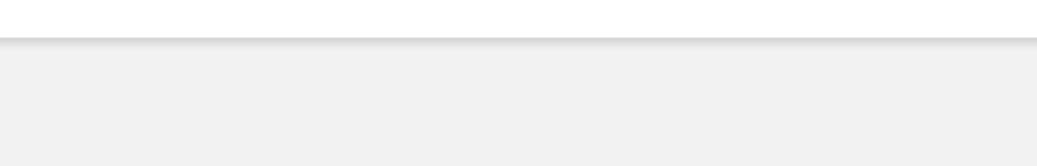
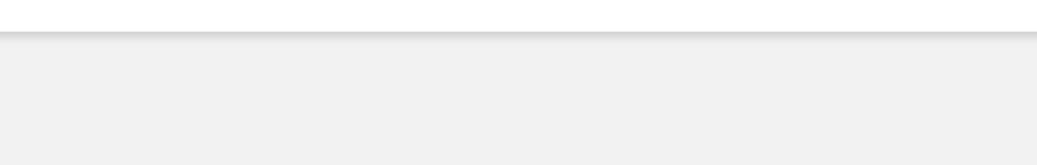
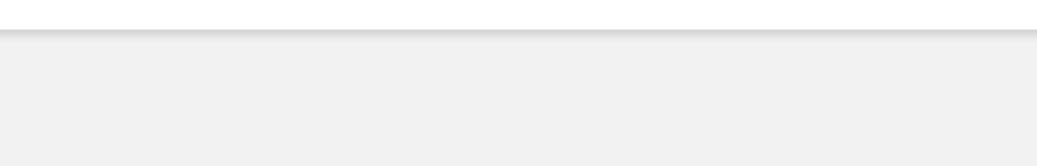
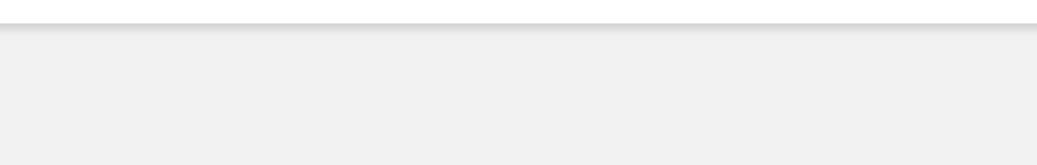
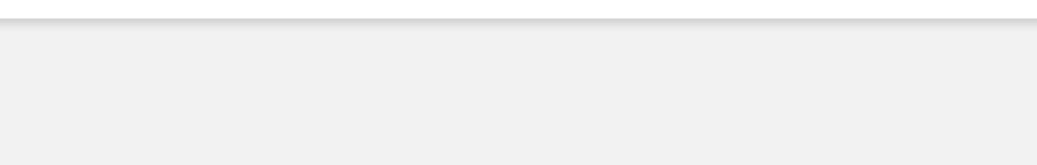
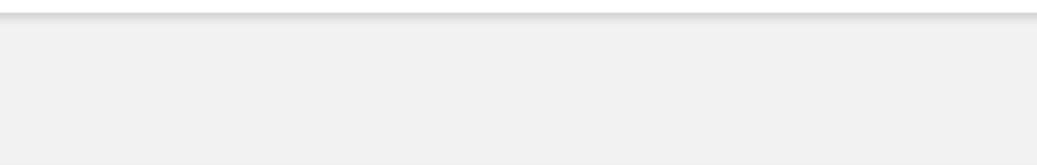
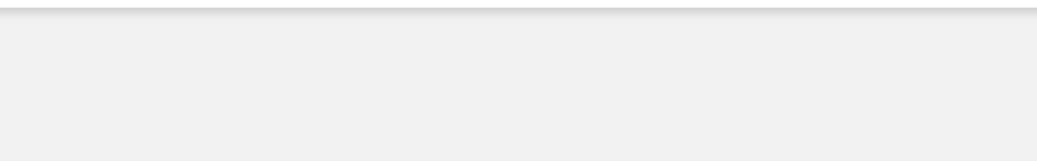
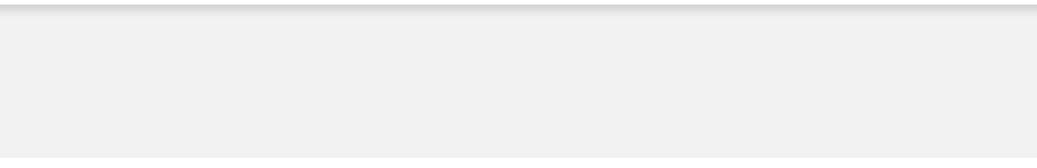
Survey Responses / Ratings

Survey Responses

Available Rep Time, Time on Calls

Time of Calls, Time of Answers

Potential Data Sources:



STEP 4: IDENTIFY DATA SOURCES

Metric:	Potential Data Sources:	Owner:	Frequency:
New Customer Count (or list)	Billing Platform, CRM	IT	Hourly
Count of Calls, Count of Sales	Call Center Software, Customer List	Call Center	Hourly
Signup List, Months Retained	Billing Platform, CRM	IT	Monthly
Customer List, Count of Churners	Billing Platform, CRM	IT	Monthly
Survey Responses / Ratings	Survey Tools, External Reviews	Research	Weekly
Survey Responses	Survey Tools	Research	Weekly
Available Rep Time, Time on Calls	Call Center Tools, HR Software	Call Center	Daily
Time of Calls, Time of Answers	Call Center Tools	Call Center	Daily

KEY TAKEAWAYS



Before you think like an analyst, think like a **business owner**

- *Focus on the specific business outcomes you want to impact, and the role your analysis will play*



Understand **who the stakeholders are**, and what motivates them

- *Think about how your analysis will impact key decision makers, and what will inspire them to act*



Define **clear, measurable KPIs** tied directly to key outcomes

- *Take time to identify the most important metrics to help you track and optimize performance*



Document your **data requirements** to stay organized

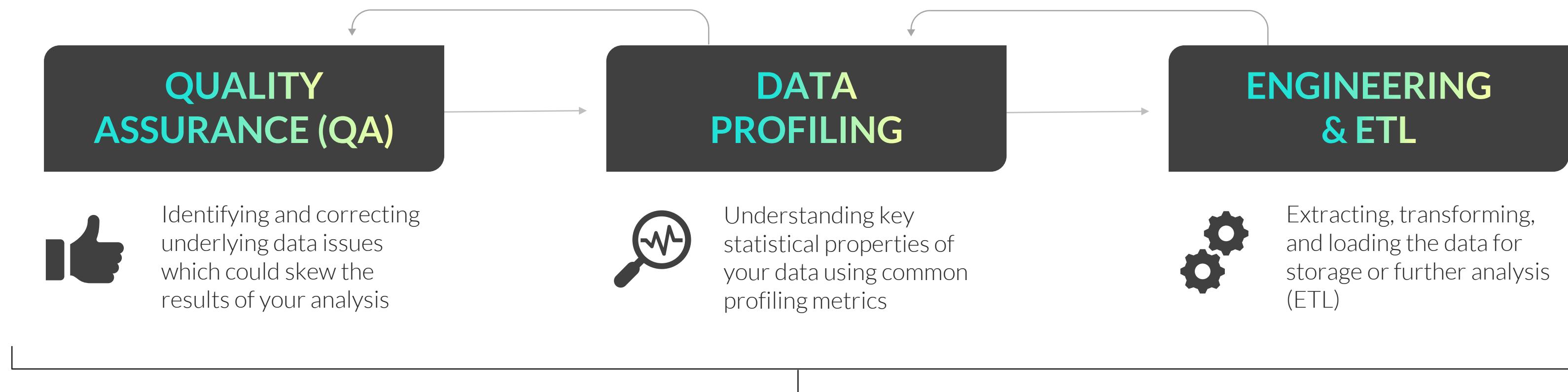
- *Create a shared document to outline your KPIs, supporting metrics, data sources, and requirements*

DATA PREP & ANALYSIS

DATA PREP

GARBAGE IN, GARBAGE OUT

Data prep is about creating clean, quality data for analysis, and typically involves a combination of quality assurance (QA), basic profiling, and data engineering



DATA PREP

CASE STUDY: QUALITY ASSURANCE



THE SITUATION

You've been hired as a Data Analyst for **Maven Talent Hub**, a company that sends email newsletters to subscribers looking for job insights and opportunities.



THE ASSIGNMENT

You are interested in analyzing customer-level data to help the company improve audience targeting and segmentation, but the data is a mess.

Your task is to **QA the raw customer records** to identify any data quality issues that could potentially skew your analysis.



THE OBJECTIVES

1. Review a sample of user records exported from the company's CRM platform
2. Identify any potential data quality concerns
3. Suggest a potential solution for each issue you encounter

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

First Name	Last Name	City	State	Postal Code	Telephone	HH Income	Birthdate
Jennifer	Mcgrath	Fieldon	IL	62031	6,183,763,064	\$32,000	7/27/99
Susan	Rodriguez	Maplewood	NJ	7040	9,082,641,670	\$45,000	
Wayne	Nielson	Dahlgren	VA	22448	5,406,447,658	\$75,000	
John	Depaul	Baton Rouge	LA	70815	2,252,744,802	\$60,000	8/27/67
Joseph	Martinez	Portland	OR	97205	5,034,022,075	\$120,000	12/10/60
Joseph	Martinez	Portland	OR	97205	5,034,022,075	\$120,000	12/10/60
Veronica	Comerford	Tuskegee	AL	36083	3,347,257,343	\$50,000	
Beverly	Nixon	Long Island	NY	11101	3,476,260,700	\$45,000,000	3/5/62
Ivan	Layton	Albany	New York	12207	5,184,317,602	\$105,000	
Debra	Ponce	Dallas	TX	75247	2,544,883,212	\$75,000	
Meg	Bryner	Providence	RI	2905	4,012,222,097	\$90,000	
Sue	Gay	Cataract	WI	54620	6,082,728,021	\$100,000	
Mark	Flores	Saginaw	MI	48607	9,896,694,705	\$55,000	
Julie	Purington	Piscataway	NJ	8854	7,329,814,756	\$25,000	3/11/93
Grace	Renninger	Chicago	IL	60661	7,732,504,788	\$95,000	
James	Weiss	Houston	TX	77060	8,322,324,190	\$135,000	
Addie	Stevenson	Jacksonville			9,042,482,500	\$80,000	
Laura	Hailey	Ephraim	Utah	84627	4,352,831,109	\$62,000	1/13/94
Daniel	Long						
Queen	Watson	Los Angeles	CA	90017	7,604,889,781	\$110,000	5/19/68

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

First Name	Last Name	City	State	Postal Code	Telephone	HH Income	Birthdate
Jennifer	Mcgrath	Fieldon	IL	62031	6,183,763,064	\$32,000	7/27/99
Susan	Rodriguez	Maplewood	NJ	7040	9,082,641,670	\$45,000	
Wayne	Nielson	Dahlgren	VA	22448	5,406,447,658	\$75,000	
John	Depaul	Baton Rouge	LA	70815	2,252,744,802	\$60,000	8/27/67
Joseph	Martinez	Portland	OR	97205	5,034,022,075	\$120,000	12/10/60
Joseph	Martinez	Portland	OR	97205	5,034,022,075	\$120,000	12/10/60
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ISSUE: Incorrect data types (text formatted as values)

SOLUTION:

- Format or re-encode fields to ensure accurate and consistent data types (numeric, string, date, etc.)



PRO TIP: Fields containing dates, zip codes or phone numbers often cause problems!

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

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 **ISSUE:** Duplicate records

SOLUTION:

- Delete redundant records to avoid inflation or bias, unless duplicates serve a specific, valid purpose (i.e. up-sampling)

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

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ISSUE: Inconsistent categorical values (state name vs. abbreviation)

SOLUTION:

- Determine a standard and find & replace inconsistent values
- Preserve the original data and add a new, standardized version for analysis



PRO TIP: Use **distinct count** to identify inconsistencies (great for catching leading or trailing spaces!)

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

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 ISSUE: Empty values

SOLUTION:

- **KEEP** if you are certain that the empty values are accurate and meaningful
- **IMPUTE** (substitute) if you can accurately populate or estimate the data
- **REMOVE** if you have a large volume of data and can't impute the empty values



PRO TIP: Never replace empty or NULL values with **0** unless you know it won't skew the data

QUALITY ASSURANCE (QA)

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

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 ISSUE: Outlier value

SOLUTION:

- **KEEP** the outlier if it's valid and you want to capture its impact on the data
- **IMPUTE** (substitute) outliers with caps or replacement values
- **REMOVE** the outlier if it's an impossible value or significantly skews the analysis
- **TRANSFORM** values to reduce the effect of the outlier

In this case we see an average household income of **\$2,400,000** when we include the outlier. Does that feel accurate to you?

DATA PROFILING METRICS

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

Count = 24
(Total # of Product SKUs)

Distinct Count = 8
(# of Unique Categories)

Conditional Count
(# Records by Category)

Snacks & Candy = 3

Frozen Foods = 3

Beverages = 3

Fruits & Vegetables = 3

Breakfast & Cereal = 3

Canned Goods = 3

Miscellaneous = 3

Dairy & Cheese = 3

SKU	Product Name	Category	Retail Price	Unit Cost	Margin
2827	Club Chocolate Bar	Snacks & Candy	\$1.25	\$0.38	\$0.88
4061	Big Time Cinnamon Waffles	Frozen Foods	\$3.75	\$2.57	\$1.19
4309	McGreevy's Apple Drink	Beverages	\$2.49	\$1.86	\$0.64
4637	High Top Oranges	Fruits & Vegetables	\$1.25	\$0.79	\$0.47
4967	Jeffers Oatmeal	Breakfast & Cereal	\$2.25	\$1.45	\$0.80
1285	Orchard Direct Frozen Fruits	Frozen Foods	\$2.99	\$1.66	\$1.33
4984	Toucan Canned Mixed Fruit	Canned Goods	\$1.49	\$0.40	\$1.09
4524	Best Choice Potato Chips	Snacks & Candy	\$1.99	\$1.77	\$0.22
5026	Club 1% Milk	Beverages	\$2.49	\$1.33	\$1.16
2874	Farmer's Choice Potatoes	Fruits & Vegetables	\$1.00	\$0.66	\$0.34
4554	Blue Label Black Beans	Canned Goods	\$1.25	\$1.15	\$0.10
4307	Acme Chip Clip	Miscellaneous	\$1.25	\$0.99	\$0.26
2472	Super Strawberry Preserves	Canned Goods	\$2.49	\$1.18	\$1.31
1893	Big Time Frozen Cauliflower	Frozen Foods	\$2.49	\$2.45	\$0.05
1715	Club Havarti Cheese	Dairy & Cheese	\$2.99	\$2.12	\$0.87
4476	Best Choice Peach Yogurt	Dairy & Cheese	\$1.75	\$1.25	\$0.51
4797	Lemon Dish Soap	Miscellaneous	\$3.99	\$2.97	\$1.02
2706	Honey Pot Apples	Fruits & Vegetables	\$1.00	\$0.54	\$0.47
2357	Club String Cheese	Dairy & Cheese	\$1.99	\$1.15	\$0.84
4599	Sunrise Corn Splats	Breakfast & Cereal	\$1.49	\$1.04	\$0.45
1931	Blue Ribbon Tonic Water	Beverages	\$1.00	\$0.69	\$0.32
3568	Best Choice Fruit Roll	Snacks & Candy	\$2.75	\$1.50	\$1.26
4363	Top Choice Wheat Bites	Breakfast & Cereal	\$2.75	\$2.69	\$0.06
4603	Denny Copper Pot Scrubber	Miscellaneous	\$3.75	\$3.12	\$0.63

Range = \$1.00 - \$3.99
(Max & Min Retail Price)

Mean = \$2.16
(Average Retail Price)

Median = \$2.12
("Middle" Retail Price)

Mode = \$1.25
(Most Frequently Observed Price)

Percentile = 91%
(% of Records where Margin <\$1.26)

DATA PROFILING VISUALS

QUALITY ASSURANCE (QA)



Histogram

Shows the frequency distribution of a data set, and can be used to identify outliers or compare profiling metrics like variance or skew

DATA PROFILING



Box Plot

Shows the minimum, maximum, median, mean, and 25th/75th quartile values, and can be used to plot outliers or compare distributions across categories

ENGINEERING & ETL



Scatter Plot

Shows the relationship between two numerical variables, and can be used to identify correlation or impute missing values

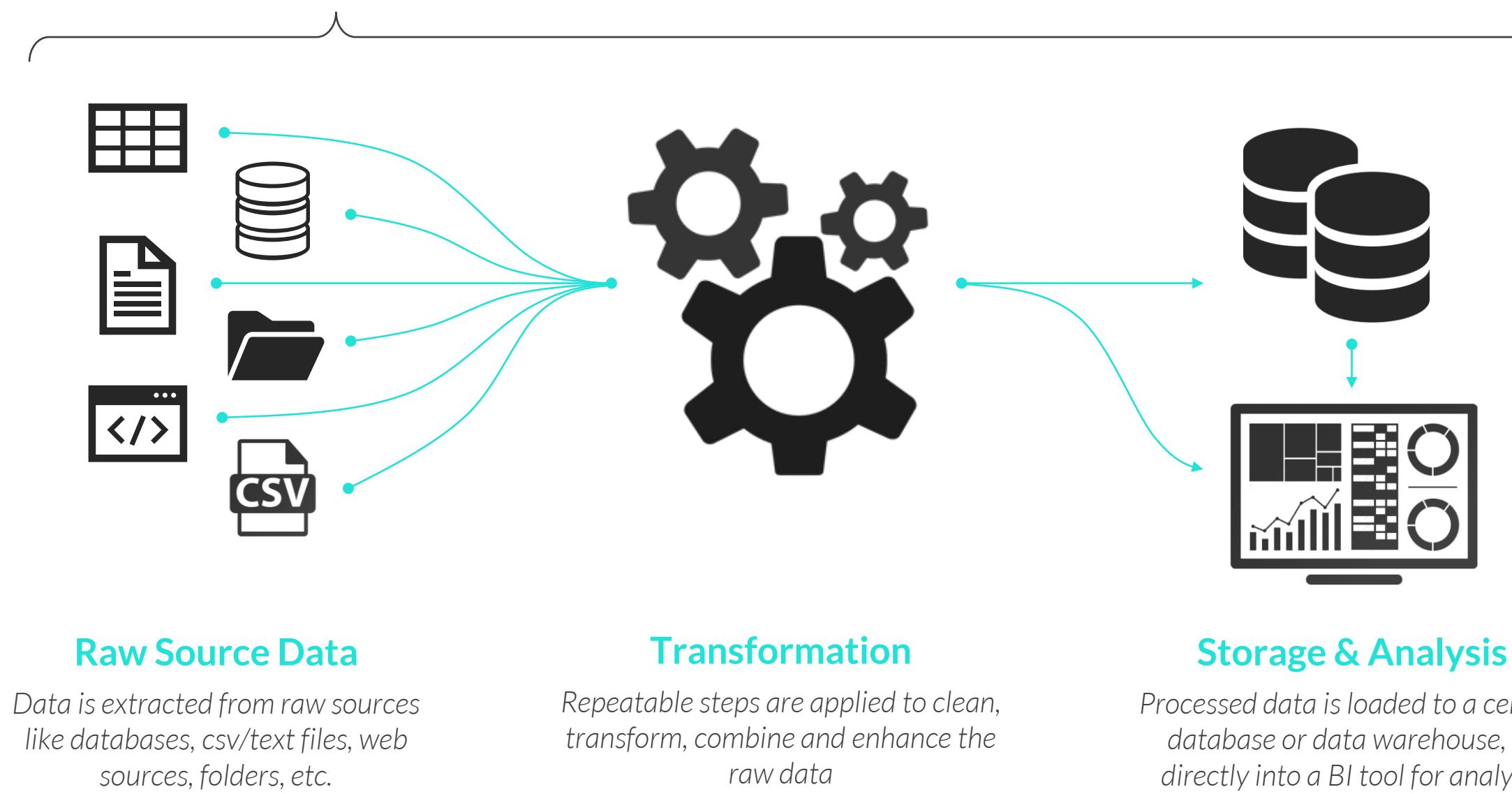
DATA ENGINEERING & ETL

QUALITY ASSURANCE (QA)

DATA PROFILING

ENGINEERING & ETL

ETL is a term used to describe the process of **extracting**, **transforming** and **loading** raw data for centralized storage or analysis



Common ETL transformations:

- ✓ Feature engineering
- ✓ Filtering
- ✓ Cleaning
- ✓ Merging, appending & joining
- ✓ Transposing
- ✓ Grouping & aggregating
- ✓ Normalizing

ETL EXAMPLE

ENGINEERING & ETL



1 Extract/query the source data:

- **Transactions** from SQL database
 - **Product** details from a CSV file
 - **Customer** demographics from CRM platform

Clean & transform the data:

- **QA** the data, remove blanks and standardize categorical fields
 - **Aggregate** transactions to daily-level
 - **Filter** records older than 13 months
 - **Join** Transactions table with Product and Customer tables
 - **Add calculated columns** to label high-value customers and large orders

3 Load the data into a BI tool for visualization and analysis



PRO TIP: Many full-stack BI platforms include powerful native ETL tools, like Power Query and Tableau Prep

DATA ANALYSIS

Data analysis is about identifying insights to help you make smarter data-driven decisions, and can generally be categorized as either **exploratory** or **explanatory**



EXPLORATORY (EDA)

- Goal is to **explore and profile** the data to see what insights emerge
- Unbiased, open-minded analysis (no specific objective or assumptions)
- Helps you understand the data and identify interesting patterns and trends



EXPLANATORY

- Goal is to **tell a specific story** or explain what happened and why
- Purpose-driven, root-cause analysis (answers a specific question)
- Identifies key business drivers and delivers insights & recommendations



PRO TIP: Hold the code! Simple tools like Excel PivotTables and charts can be incredibly effective for exploratory data analysis!

DATA ANALYSIS



EXPLORATORY (EDA)

“How does performance compare across different segments or categories?”

“Are there any interesting correlations or relationships between variables?”

“How is the data distributed, and are there any outliers or missing values?”

“How are key metrics changing over time? Are there predictable seasonal trends?”



EXPLANATORY

“Why did Conversion Rate drop by 25% month-over-month?”

“Which products have seen the largest increases in gross revenue this year?”

“Which customer segments deliver the most lifetime value (LTV)?”

“Based on geographical trends, where should we open our next store location?”

DATA-DRIVEN INSIGHTS

TURN INFORMATION INTO **INSIGHT**

A strong, data-driven insight should communicate **what** happened, **why** it happened, and **how** you recommend taking action (*this one is key!*)



Tips for writing effective insights:

- ✓ Tell a clear and logical story
- ✓ Support your findings with hard data and facts
- ✓ Provide meaningful context behind key data points
- ✓ Include actionable recommendations and next steps
- ✓ Remember that it's all about **driving business outcomes**

DATA-DRIVEN INSIGHTS



“

This week we sold **80** pairs of socks

”



✓ Explains what happened (sort of)

- Doesn't provide any meaningful context
- Doesn't explain what drove the sales
- Offers no recommendation or plan of action

DATA-DRIVEN INSIGHTS



“

This week we sold **80** pairs of socks
(**+14%**), while spend increased **25%**

”



- ✓ Explains what happened
- ✓ **Provides context in terms of weekly change and comparison against spend**
- Doesn't explain what drove the sales or the spend increase
- Offers no recommendation or plan of action

DATA-DRIVEN INSIGHTS

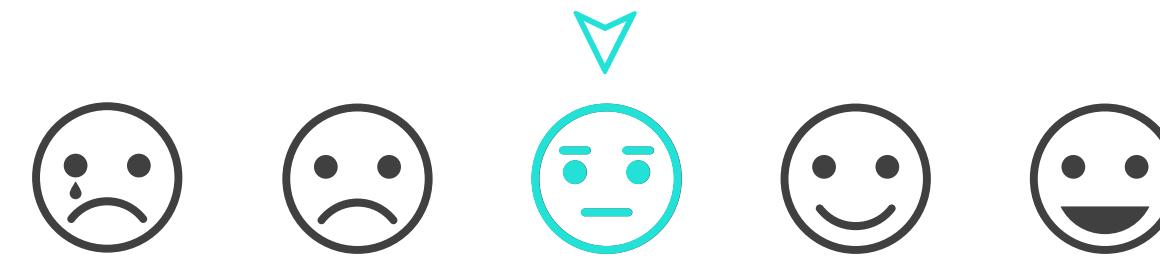


“

This week we sold **80** pairs of socks
(**+14%**), while spend increased **25%**

- New ads drove the incremental sales, at **\$7/sale** (vs. \$4 benchmark)

”



- ✓ Explains what happened
- ✓ Provides context in terms of weekly change and comparison against spend
- ✓ **Explains that new ads drove the incremental sales, but at a high cost vs. benchmark**
- Offers no recommendation or plan of action

DATA-DRIVEN INSIGHTS

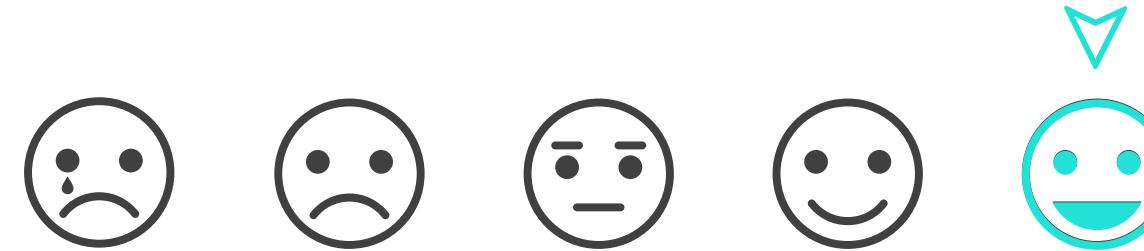


“

This week we sold **80** pairs of socks
(**+14%**), while spend increased **25%**

- New ads drove the incremental sales, at **\$7/sale** (vs. \$4 benchmark)
- **Recommendation:** Pause new ads and allocate budget to more efficient channels

”



- ✓ Explains what happened
- ✓ Provides context in terms of weekly change and comparison against spend
- ✓ Explains that new ads drove the incremental sales, but at a high cost vs. benchmarks
- ✓ Offers a clear, actionable, data-driven recommendation

KEY TAKEAWAYS



QA comes first. **Every. Single. Time.**

- *Underlying data issues can significantly skew the results of your analysis, so take QA seriously!*



Before you analyze your data, **understand** it first

- *Use profiling metrics and tools like box plots or histograms to explore statistical properties of the data*



Create a repeatable plan to **extract, transform & load** data for analysis

- *Many self-service BI tools include powerful, native ETL capabilities (like Power Query and Tableau Prep)*



Data analysis can be categorized as either **exploratory** or **explanatory**

- *Exploratory data analysis (EDA) is about discovering insights; explanatory analysis is about telling a story*



Insights should always lead to **clear, actionable recommendations**

- *If your insights don't drive measurable improvements to the business, what purpose do they serve?*

VISUALIZATION & DASHBOARDS

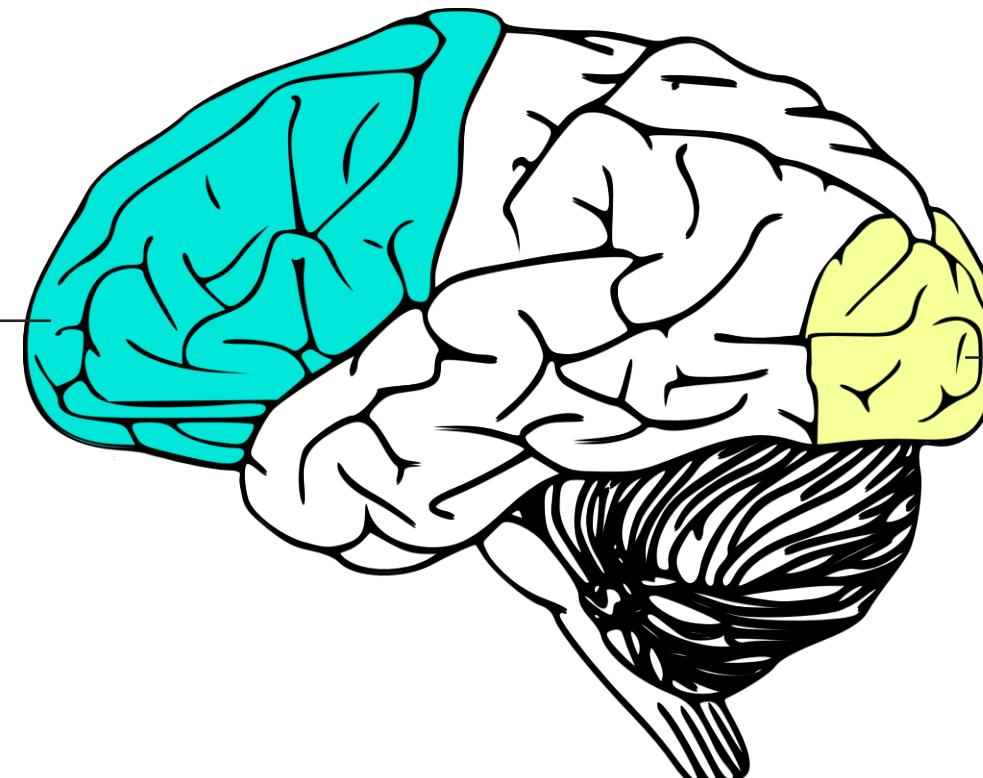
DATA VISUALIZATION

BRING YOUR DATA **TO LIFE**

The human brain isn't built to interpret raw data; we need **clear patterns** and **visual cues** to help us quickly make sense of complex information

Prefrontal Cortex

- Located in the frontal lobe
- Responsible for cognitive functioning & problem solving
- Slow & conscious
- Helps us make sense of non-visual information (like raw data)



Visual Cortex

- Located in the occipital lobe
- Responsible for visual perception & understanding
- Instantaneous & subconscious
- Helps us make sense of colors, patterns, shapes, sizes, etc.

Data visualization puts both our prefrontal and visual cortex to work, combining the power of **cognition** (slow and conscious) and **perception** (instantaneous)

DATA VISUALIZATION

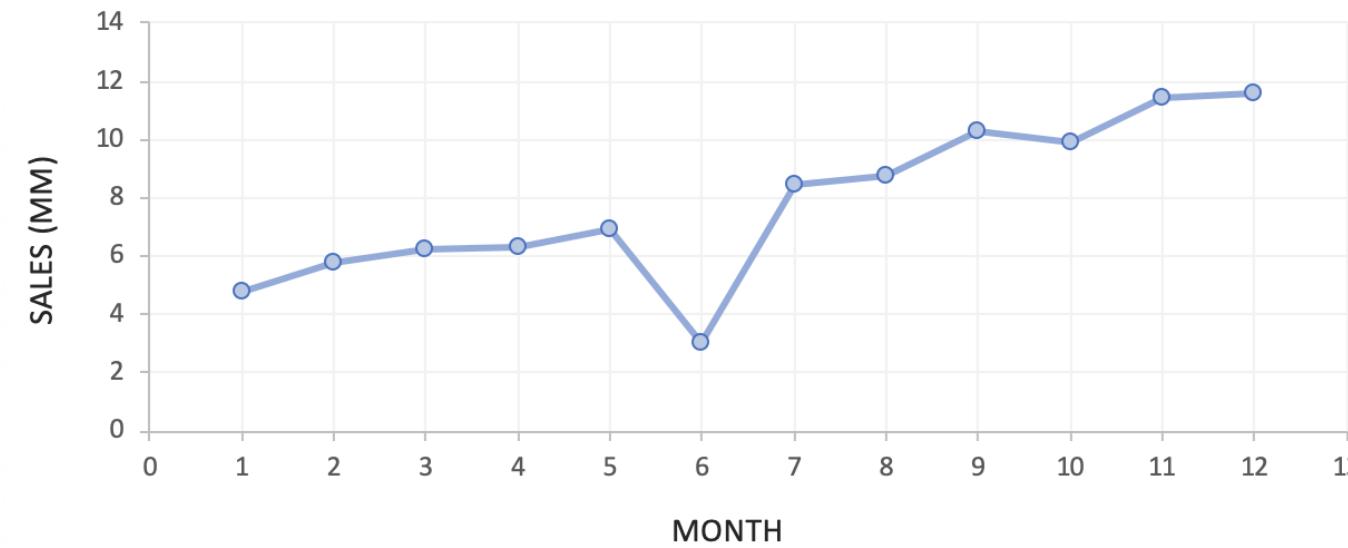
In **10 seconds**, what can you learn from the data below?

Product A		Product B		Product C		Product D	
Month	Sales (MM)						
1	4.80	1	0.67	1	4.53	1	8.35
2	5.78	2	1.05	2	4.61	2	7.72
3	6.24	3	1.62	3	4.74	3	12.05
4	6.34	4	2.67	4	5.10	4	7.70
5	6.95	5	3.91	5	5.32	5	7.05
6	3.02	6	5.49	6	5.70	6	11.05
7	8.45	7	8.36	7	5.77	7	6.95
8	8.79	8	10.99	8	6.32	8	6.39
9	10.30	9	13.58	9	6.56	9	9.50
10	9.93	10	14.81	10	6.64	10	4.83
11	11.40	11	15.13	11	18.50	11	4.03
12	11.56	12	15.26	12	19.80	12	8.03

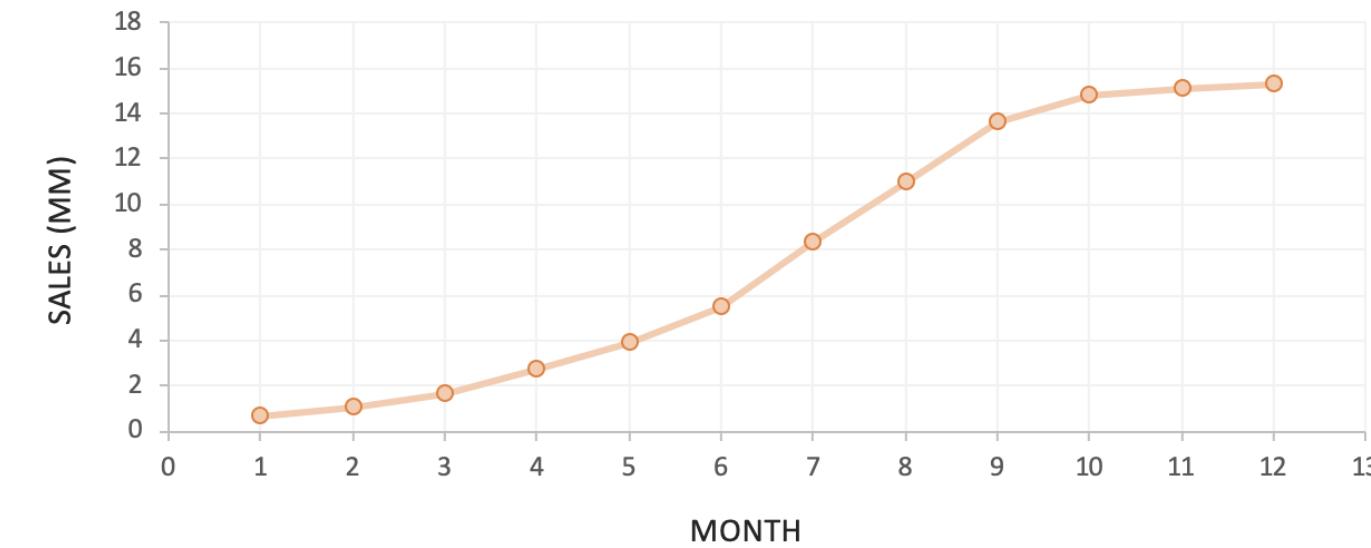
DATA VISUALIZATION

How about now?

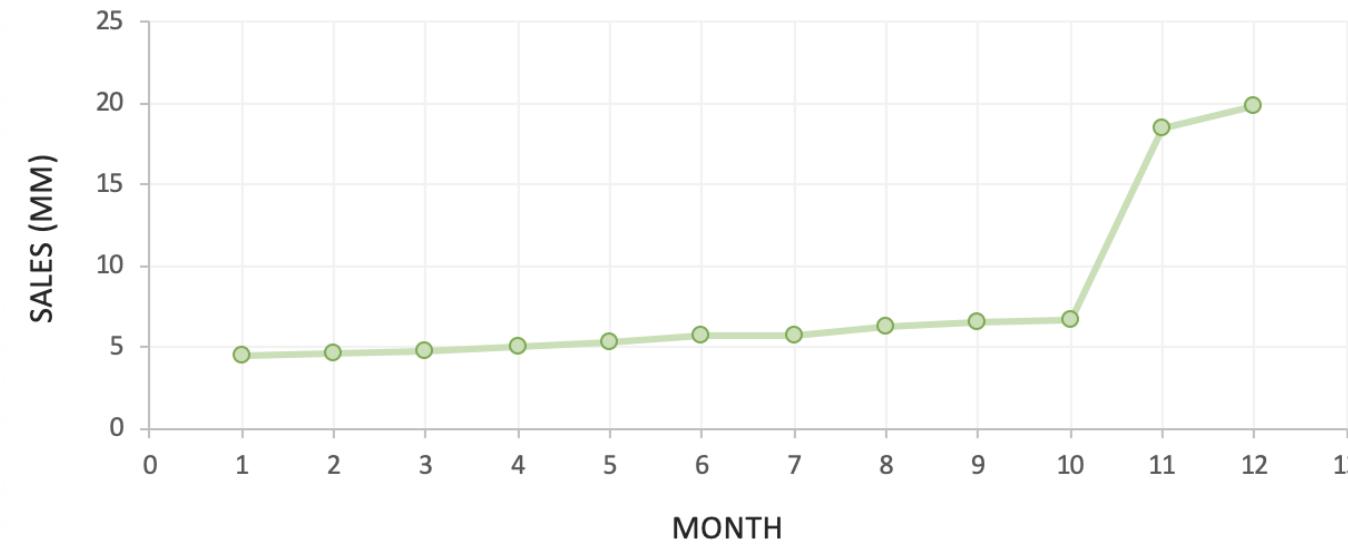
PRODUCT A



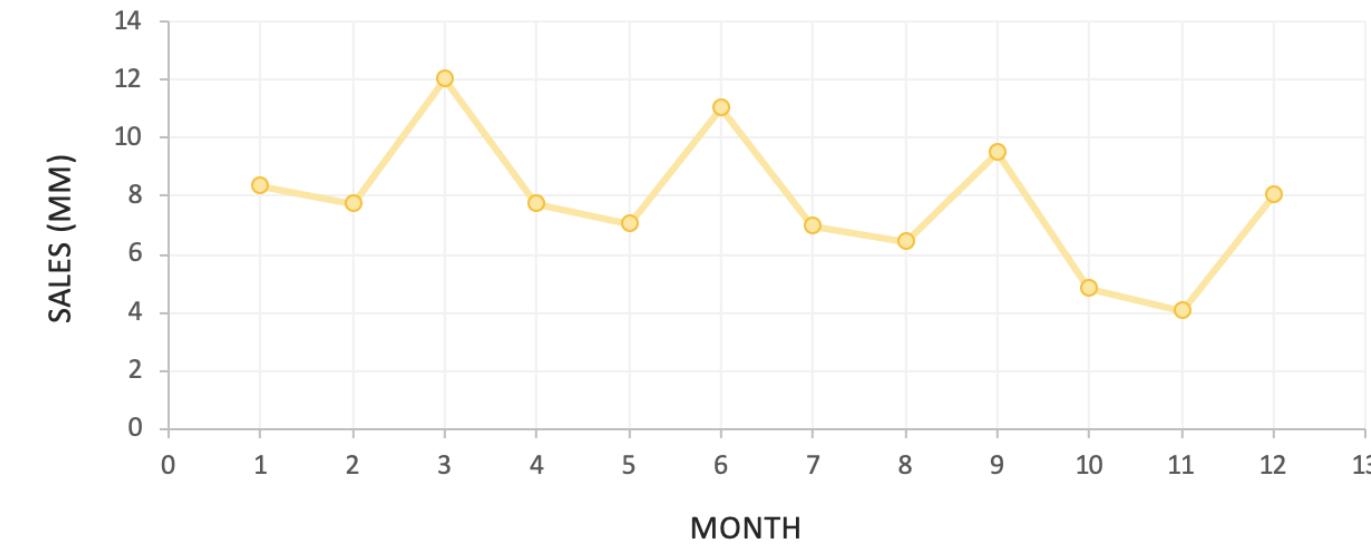
PRODUCT B



PRODUCT C



PRODUCT D



This is a variation of
Anscombe's Quartet

Despite sharing similar
descriptive stats, each
series tells a very different
visual story

3 KEY QUESTIONS

1

What **TYPE OF DATA** are you working with?

- Geospatial? Time-series? Hierarchical? Financial?
-

2

What do you want to **COMMUNICATE**?

- Comparison? Composition? Relationship? Distribution?
-

3

Who is the **END USER** and what do they need?

- Analyst? Manager? Executive? General public?

3 KEY QUESTIONS

1

What **TYPE OF DATA** are you working with?

 Time-series

 Financial

 Geospatial

 Textual

 Categorical

 Funnel

 Hierarchical

 Survey



The type of data you're working with often determines **which type of visual will best represent it**; for example, using maps to represent geospatial data, line charts for time-series data, or tree maps for hierarchical data

3 KEY QUESTIONS

2

What do you want to **COMMUNICATE?**

COMPARISON

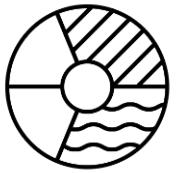


Used to **compare values over time or across categories**

Common visuals:

- Column Chart
- Bar Chart
- Clustered Column/Bar
- Data Table/Heat Map
- Radar Chart
- Line Chart (*time series*)
- Area Chart (*time series*)

COMPOSITION

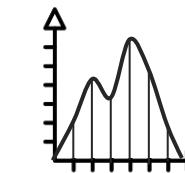


Used to **break down the component parts of a whole**

Common visuals:

- Stacked Bar/Column Chart
- Pie/Donut Chart
- Stacked Area (*time series*)
- Waterfall Chart (*gains/losses*)
- Funnel Chart (*sequential stages*)
- Tree Map/sunburst (*hierarchies*)
- Map/Choropleth (*geospatial*)

DISTRIBUTION

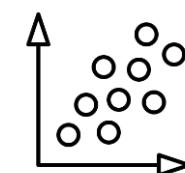


Used to **show the frequency of values within a series**

Common visuals:

- Histogram
- Density Plot
- Box & Whisker
- Violin Plot
- Scatter Plot
- Data Table/Heat Map
- Map/Choropleth (*geospatial*)

RELATIONSHIP



Used to **show correlation between multiple variables**

Common visuals:

- Scatter Plot
- Bubble Chart
- Data Table/Heat Map
- Correlation Matrix

There are **hundreds of charts to choose from**, but most either serve specialized purposes (like stock charts, Gantt charts and network diagrams) or are variations of these common types (gauges, bullet charts, chord diagrams, etc.)

3 KEY QUESTIONS

3

Who is the **END USER** and what do they need?



THE ANALYST

Likes to see details and understand exactly what's happening at a granular level

- Tables or combo charts
- Granular detail to support root-cause analysis



THE MANAGER

Wants summarized data with clear, actionable insights to help operate the business

- Common charts & graphs
- Some detail, but only when it supports a specific insight



THE EXECUTIVE

Needs high-level, crystal clear KPIs to track business health and topline performance

- KPI cards or simple charts
- Minimal detail, unless it adds critical context to KPIs

How you visualize and present your data is a function of **who will be consuming it**; a fellow analyst may want to see granular details, while managers and executives often prefer topline KPIs and clear, data-driven insights

CONTEXT IS KEY

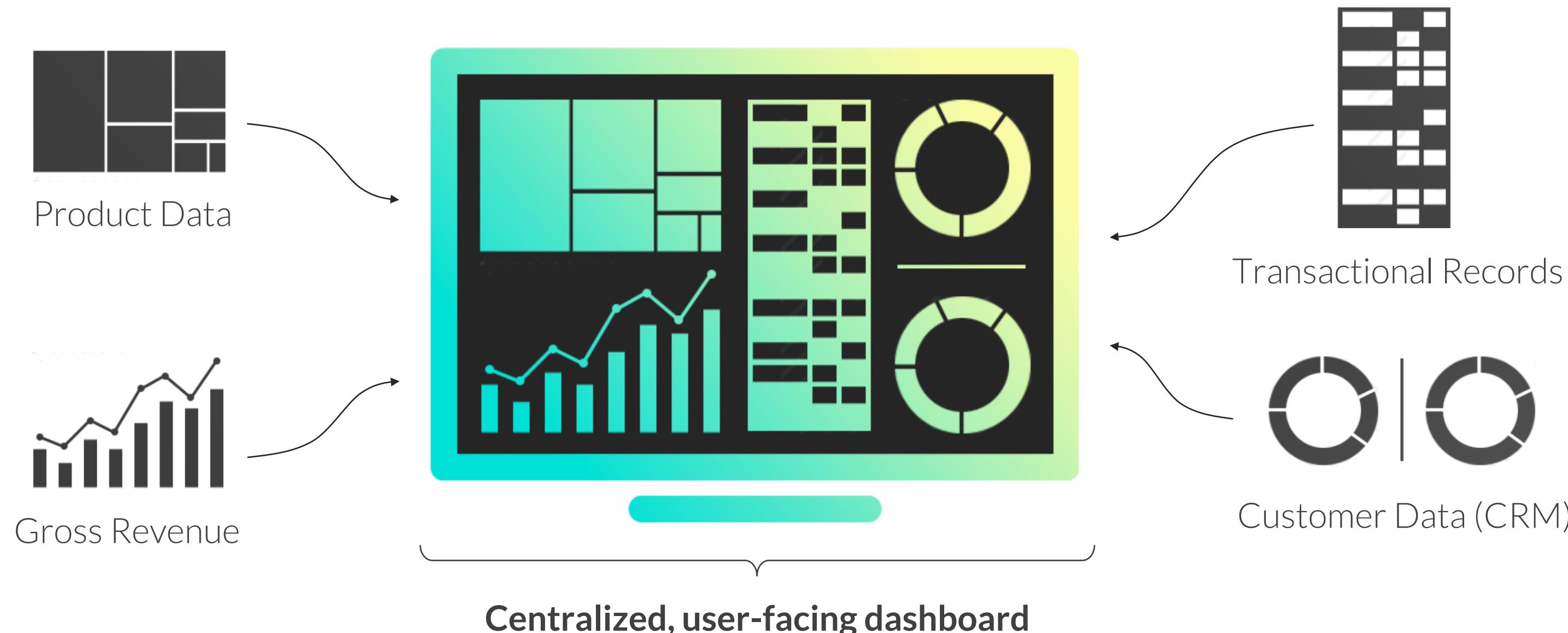
When you are presenting or visualizing data, remember that **context is key**; context gives numbers meaning, and helps users interpret them accurately



- ✓ We drove **690 sales** in October
- ✓ Sales are **down 4%** vs. last month, but **up 9%** year-over-year
- ✓ We **exceeded our target** in Sep/Oct after falling short in August
- ✓ We see an **upward trend** in 2020, with a significant **July peak**
- ✓ Based on seasonality, we can expect a **strong Nov/Dec**

ANALYTICS DASHBOARDS

Dashboards are analytics tools designed to consolidate data from multiple sources, track key metrics at a glance, and facilitate data-driven decision making



CASE STUDY: DATA VISUALIZATION



THE SITUATION

You've just been hired as Lead Business Intelligence Analyst for **Maven Toys**, a nationwide chain of toy stores.



THE ASSIGNMENT

Your assignment is to **design a dashboard for Regional Sales Managers**, to help them track revenue trends by region.

They review the dashboard once a month, and need information on sales trends, product performance, and lost revenue due to inventory shortages.



THE OBJECTIVES

1. Define the purpose
2. Choose the right metrics
3. Present the data effectively
4. Eliminate clutter & noise
5. Use layout to focus attention
6. Tell a clear story



DASHBOARD DESIGN PROCESS

1

Define the purpose

2

Choose the right metrics

3

Present the data effectively

4

Eliminate clutter & noise

5

Use layout to focus attention

6

Tell a clear story

Dashboards can be built to serve **many purposes**, including executive-level reporting, performance deep dives, exploratory analysis, or infographic-style storytelling.

How you design your dashboard is largely a function of the *purpose* it will serve, and the audience it will be serving.



Key questions to consider:

- Who will be the **end-users** of your dashboard?
- What are their **key business goals** and objectives?
- What are the **most important questions** they need answers to?
- How **frequently** will the dashboard be reviewed?

STEP 1: DEFINE THE PURPOSE

-  **1** Who will be the end-users of your dashboard?
-  **2** What are their key business goals and objectives?
-  **3** What are the most important questions they need answers to?
-  **4** How frequently will the dashboard be reviewed?

STEP 1: DEFINE THE PURPOSE

1

Who will be the end-users of your dashboard?

- *Regional sales managers*

2

What are their key business goals and objectives?

- *Increase revenue, minimize revenue loss due to lack of inventory*

3

What are the most important questions they need answers to?

- *Revenue going up/down? Main revenue drivers? Missing any products in stock?*

4

How frequently will the dashboard be reviewed?

- *Once a month*

DASHBOARD DESIGN PROCESS

1

Define the purpose

2

Choose the right metrics

3

Present the data effectively

4

Eliminate clutter & noise

5

Use layout to focus attention

6

Tell a clear story

Once you've defined the purpose of your dashboard, it's important to identify **which metrics and KPIs** to include.

Focus on the metrics which *directly align* with key business goals, and consider the level of detail most appropriate for your audience.



Key questions to consider:

- Which metrics **accurately measure** each business goal?
- What **level of detail** is appropriate for each metric?



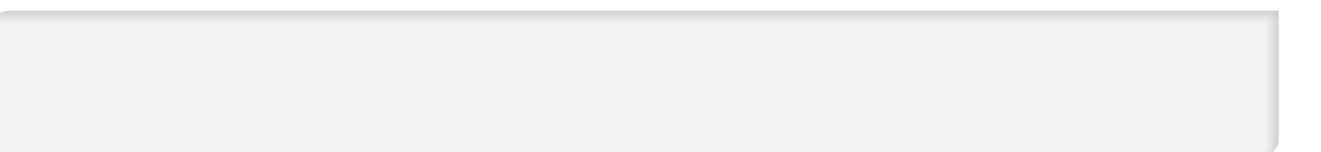
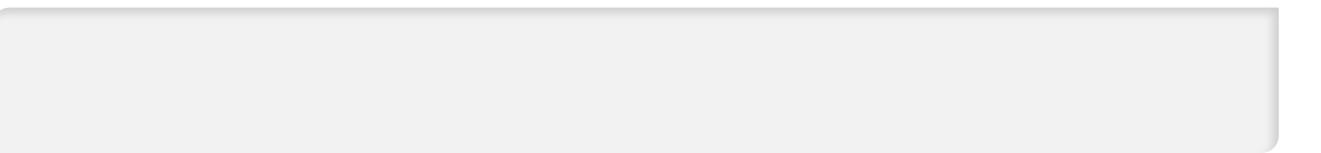
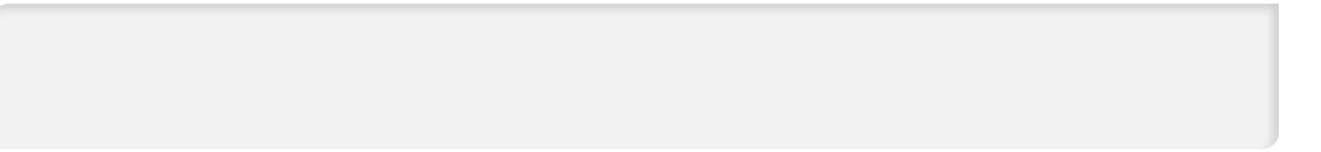
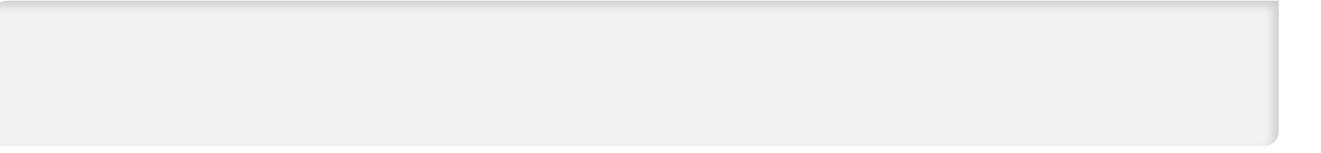
PRO TIP: You might be tempted to include *everything* in your dashboard, but remember less is more; focus on the metrics that *matter*!

STEP 2: CHOOSE THE RIGHT METRICS

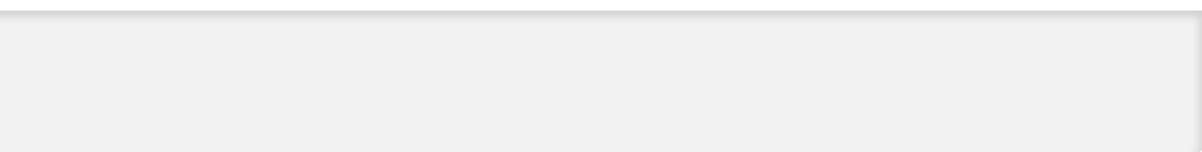
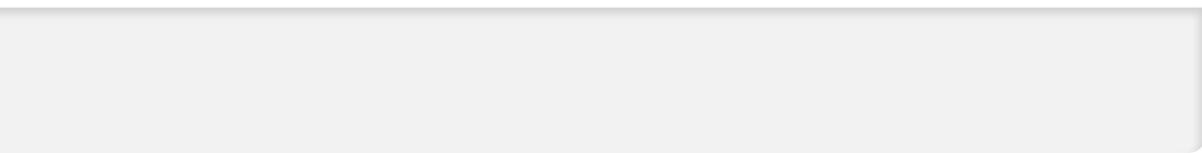
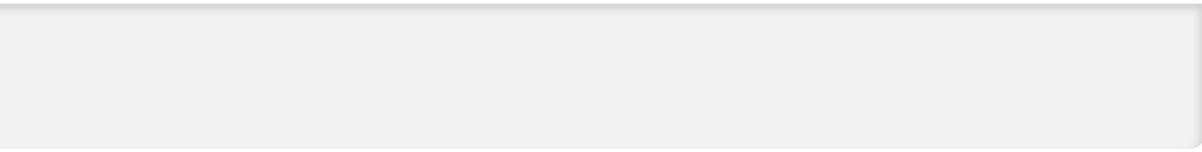
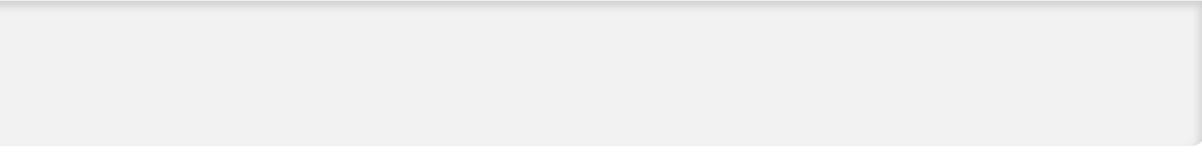
Business Goal:

Increase
revenue

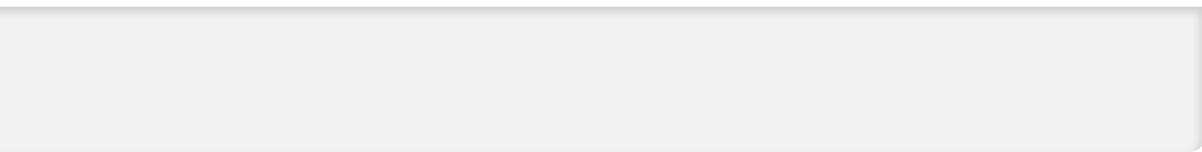
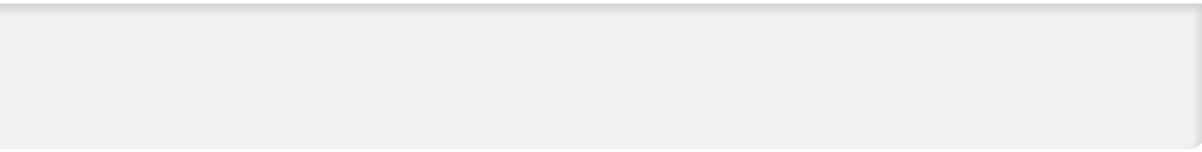
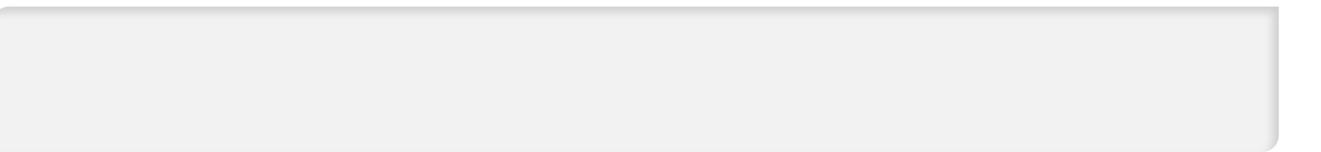
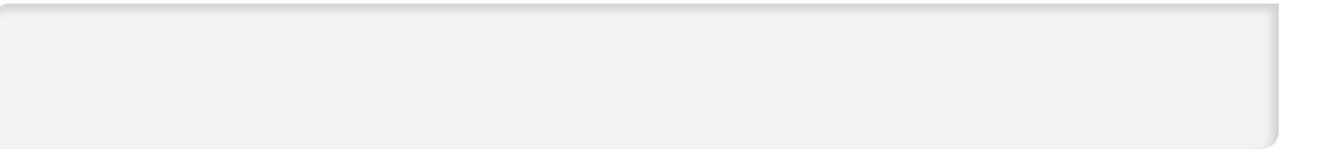
Metrics:



Level of Detail:



Minimize revenue
loss due to lack of
inventory



STEP 2: CHOOSE THE RIGHT METRICS

Business Goal:

Increase revenue

Metrics:

- Total Revenue
- MoM Revenue Change
- MoM % Revenue Change
- YoY % Revenue Change

Level of Detail:

- Date, Region, Category, Product
- Product
- Region, Category
- Region

Minimize revenue loss due to lack of inventory

- Stock on Hand
- Est Monthly Revenue Loss*

- Store-Product
- Region

* Based on average monthly revenue for out-of-stock products

DASHBOARD DESIGN PROCESS

1

Define the purpose

Dashboards are all about communicating information **quickly and clearly**.

2

Choose the right metrics

Remember to use charts and visuals suited to the type of data you're working with, the story you're communicating, and the end user consuming the information.

3

Present the data effectively

Want to allow for some exploratory analysis? **Add filters and interactivity** to allow users to explore on their own, answer new questions, and discover fresh insights.

4

Eliminate clutter & noise

5

Use layout to focus attention

6

Tell a clear story



PRO TIP: One of the most common mistakes we see is prioritizing variety over effectiveness. Always choose the right chart for the job!

STEP 3: PRESENT THE DATA EFFECTIVELY

Metric & Level of Detail:

- Total Revenue by Date

- Total Revenue by Region

- Total Revenue by Category

- Total Revenue by Product

- MoM Revenue Change by Product

- MoM % Revenue Change by Region

- MoM % Revenue Change by Category

- YoY % Revenue Change by Region

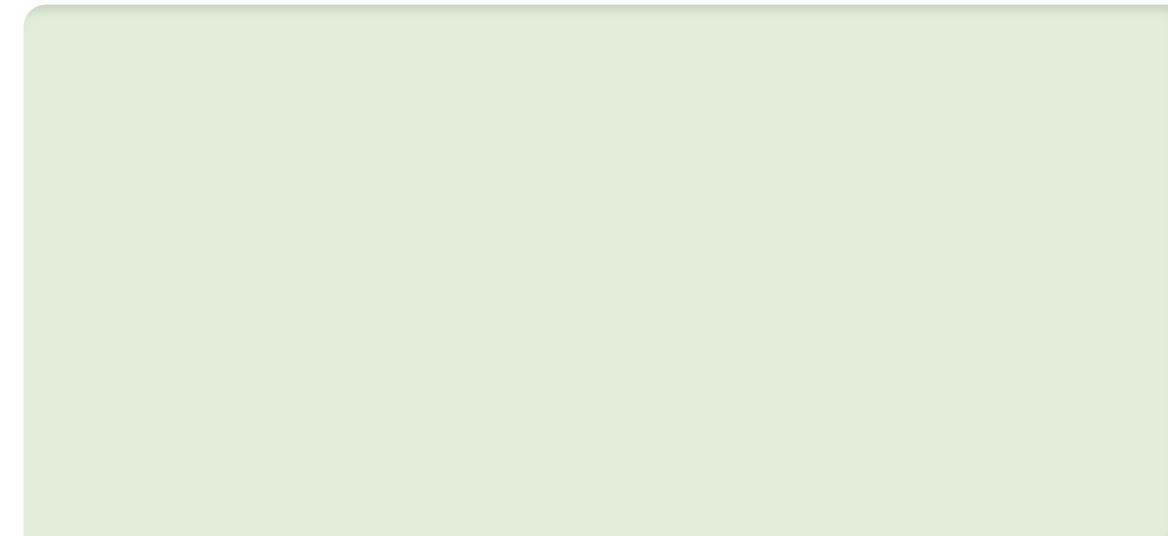
- Stock on Hand by Store-Product

- Est. Monthly Revenue Loss by Region

Visual Type:



Filters:



STEP 3: PRESENT THE DATA EFFECTIVELY

Metric & Level of Detail:

- Total Revenue by Date
- Total Revenue by Region
- Total Revenue by Category
- Total Revenue by Product
- MoM Revenue Change by Product
- MoM % Revenue Change by Region
- MoM % Revenue Change by Category
- YoY % Revenue Change by Region
- Stock on Hand by Store-Product
- Est. Monthly Revenue Loss by Region

Visual Type:

- 1) Line Chart
- 2) KPI Card (#1)
- 3) Bar Chart (#1)
- 4) Table (#1)
- 5) Table (#1)
- 6) KPI Card (#2)
- 7) Bar Chart (#2)
- 8) KPI Card (#3)
- 9) Table (#2)
- 10) KPI Card (#4)

Filters:

- Month (interactive)
- Region (interactive)
- Top/Bottom 5 Products
- Store-Products with 0 stock

This is typically an **evolving, iterative process**, so don't expect to come up with an exhaustive set of metrics and visuals off the top of your head!

STEP 3: PRESENT THE DATA EFFECTIVELY



REGIONAL SALES DASHBOARD

September 2021

Region: New York

2 \$50,618

Total Monthly Revenue

6 1.6%

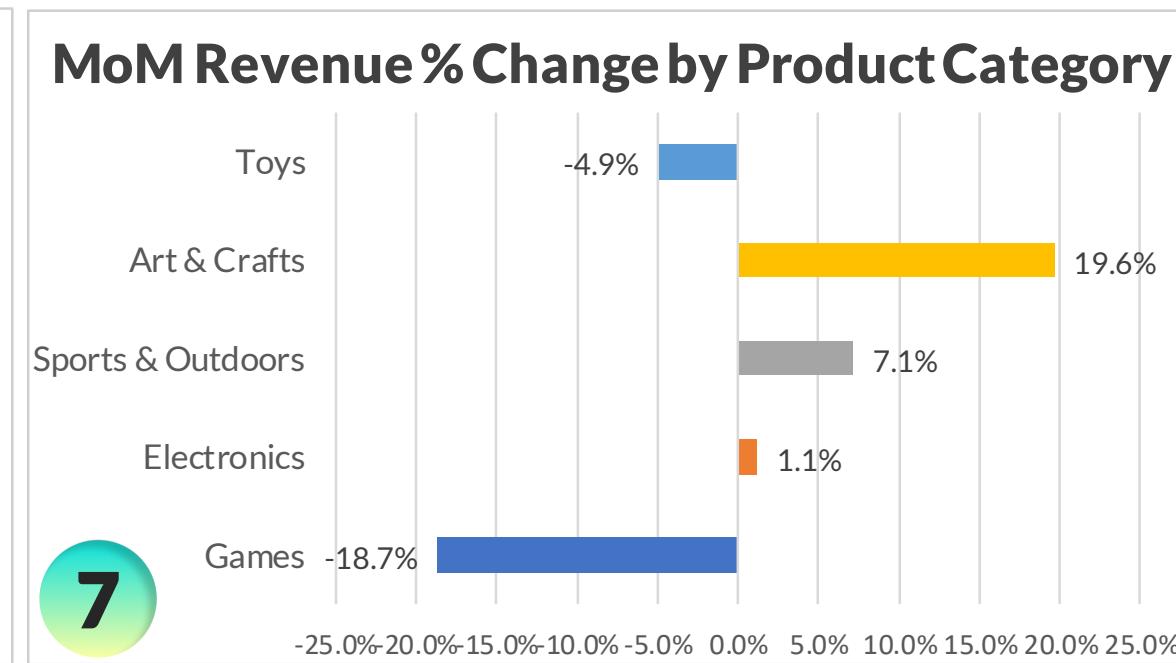
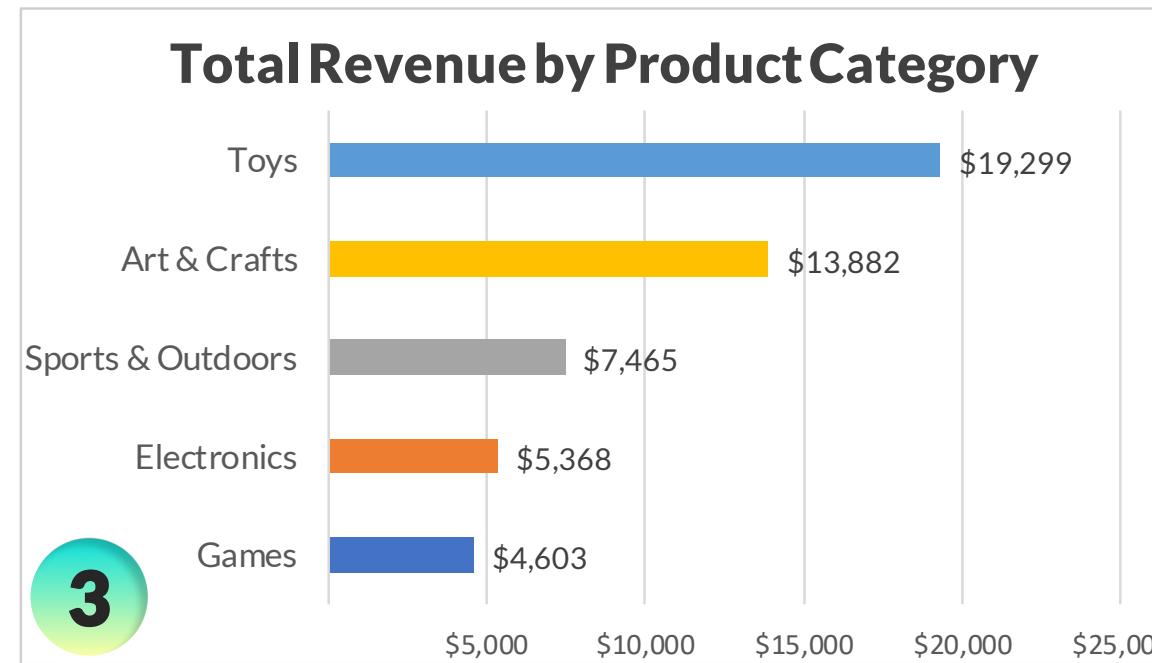
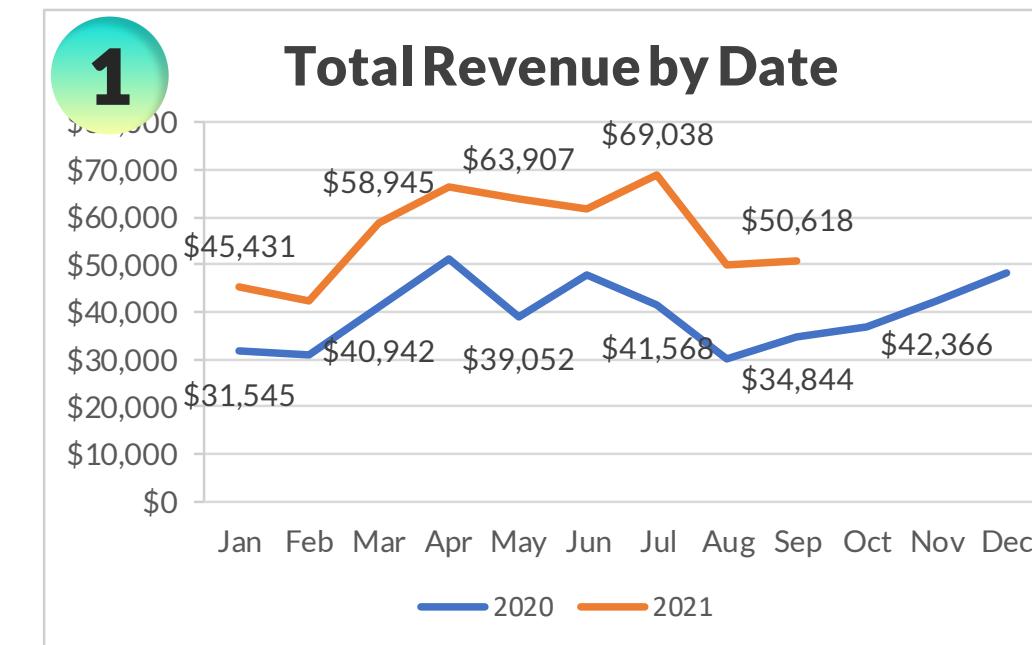
M-o-M Revenue % Change

10 \$1,640

Potential Monthly Revenue Loss

8 45.3%

Y-o-Y Revenue % Change



Products with 0 Stock by Store

Store Name	Product Name	Stock
JFK Airport	Gamer Headphones	0
JFK Airport	Hot Wheels 5-Pack	0
Times Square	Dino Egg	0
Times Square	Playfoam	0

Top 5 Products by MoM Revenue Change

Category	Product	Revenue	Δ Revenue
Art & Crafts	Playfoam	\$3,352	\$2,011
Toys	Dinosaur Figures	\$2,893	\$989
Games	Monopoly	\$900	\$740
Art & Crafts	Magic Sand	\$4,589	\$688
Art & Crafts	Barrel O' Slime	\$1,357	\$551

Bottom 5 Products by MoM Revenue Change

Category	Product	Revenue	Δ Revenue
Games	Rubik's Cube	\$640	-\$1,359
Toys	Lego Bricks	\$9,318	-\$800
Toys	Mr. Potatohead	\$460	-\$719
Art & Crafts	Etch A Sketch	\$882	-\$525
Games	Glass Marbles	\$989	-\$517

DASHBOARD DESIGN PROCESS

1

Define the purpose

2

Choose the right metrics

3

Present the data effectively

4

Eliminate clutter & noise

5

Use layout to focus attention

6

Tell a clear story

When it comes to dashboard design, **real estate is precious**; cut anything that takes up space but doesn't add value.

Things like 3D formats, chart borders, excessive colors, or background images only distract users from the story and insights you are trying to communicate.

Clarity always trumps aesthetics!

“Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away”

Antoine de Saint-Exupery

STEP 4: ELIMINATE CLUTTER & NOISE



REGIONAL SALES DASHBOARD

September 2021

Region: **New York**

\$50,618

Total Monthly Revenue

1.6%

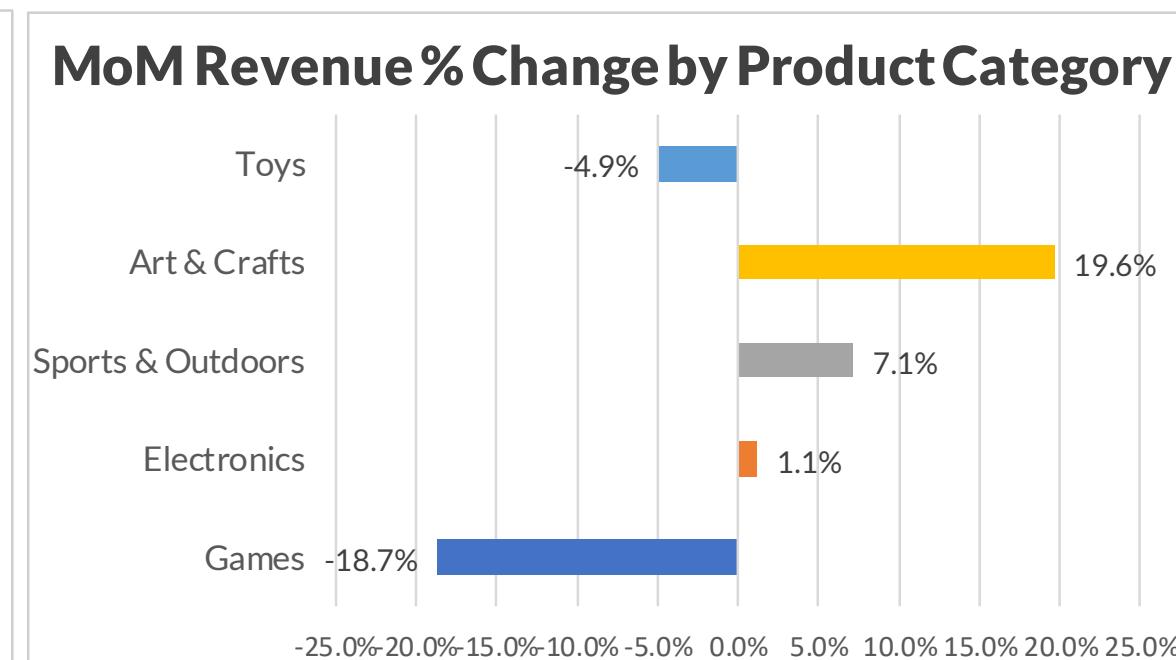
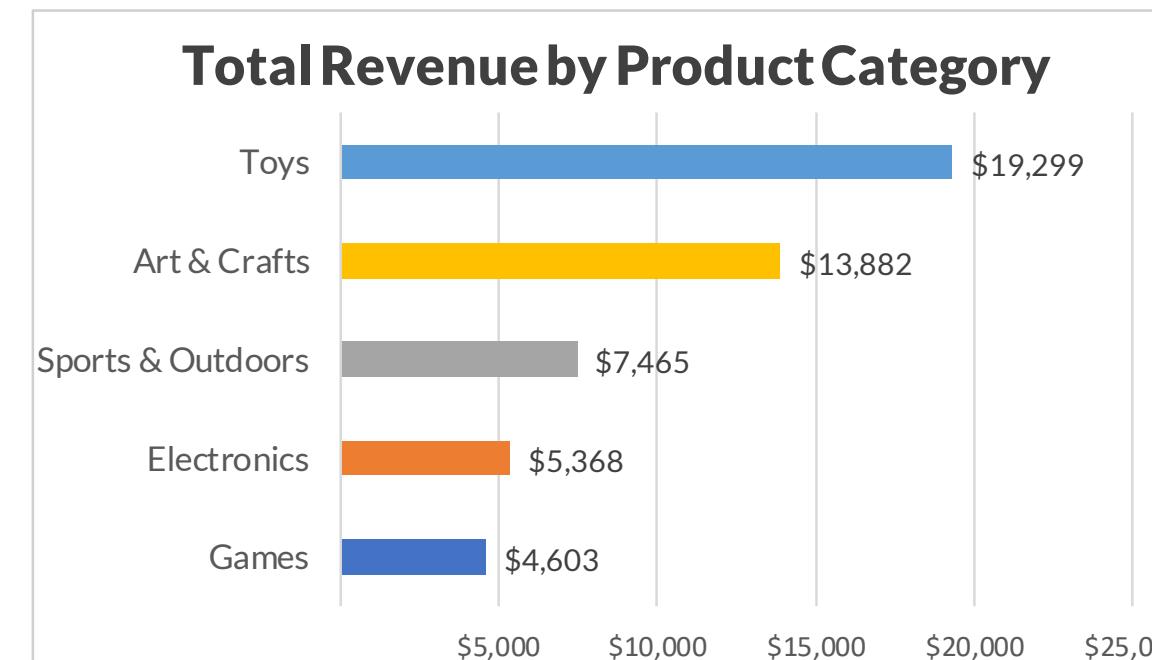
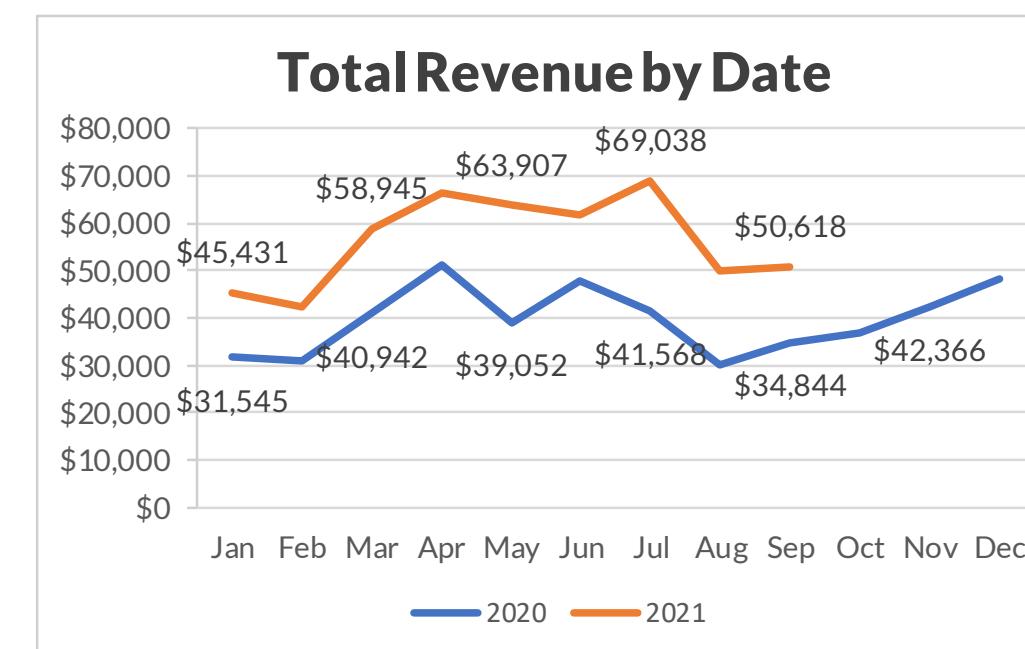
M-o-M Revenue % Change

\$1,640

Potential Monthly Revenue Loss

45.3%

Y-o-Y Revenue % Change



Products with 0 Stock by Store

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STEP 4: ELIMINATE CLUTTER & NOISE



REGIONAL SALES DASHBOARD

September 2021

Region: **New York**

\$50,618

Total Monthly Revenue

1.6%

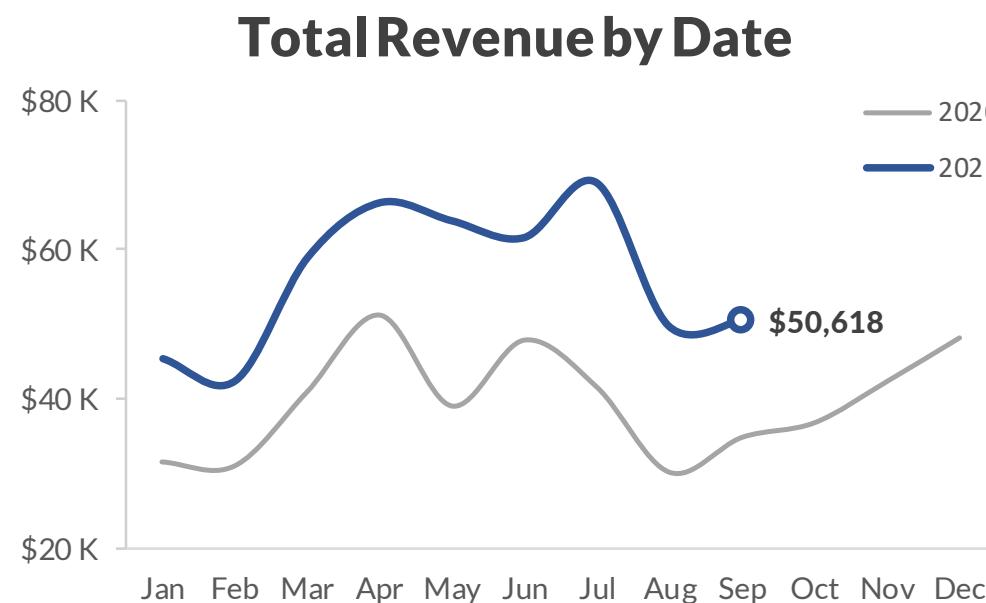
M-o-M Revenue % Change

\$1,640

Potential Monthly Revenue **Loss**

45.3%

Y-o-Y Revenue % Change



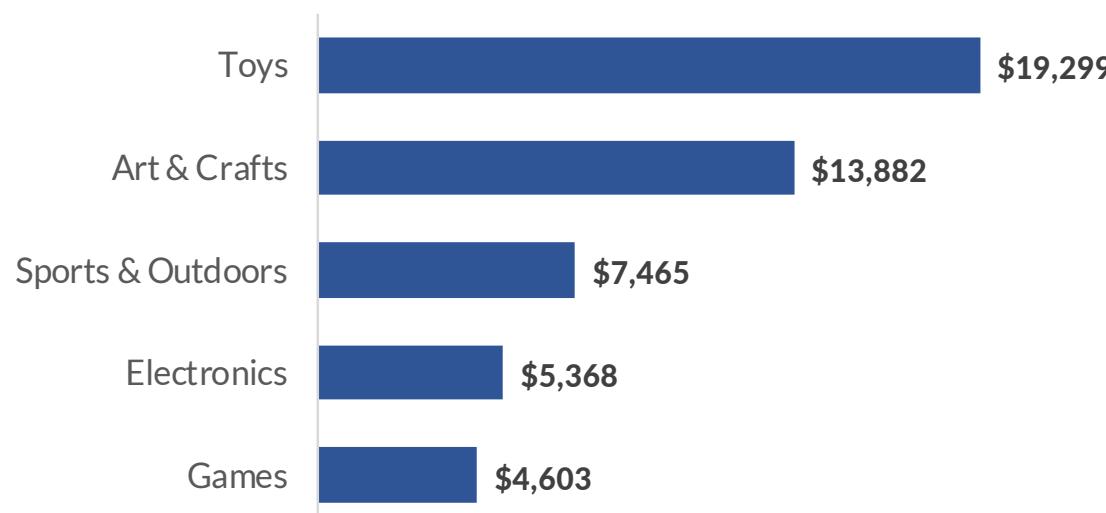
Products with 0 Stock by Store

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Times Square	Dino Egg	0
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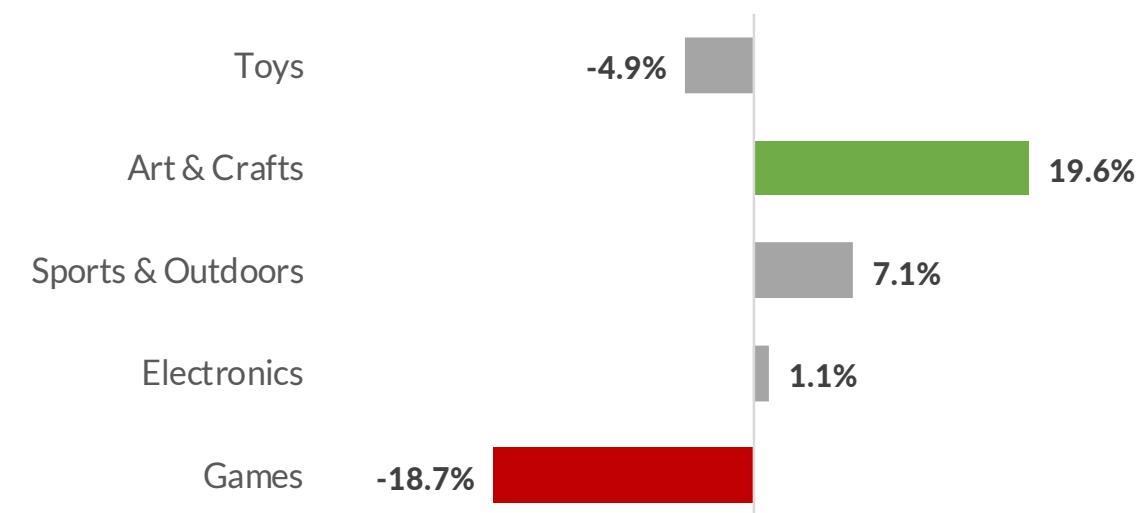
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Total Revenue by Product Category



MoM Revenue % Change by Product Category



Bottom 5 Products by MoM Revenue Change

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DASHBOARD DESIGN PROCESS

1

Define the purpose

2

Choose the right metrics

3

Present the data effectively

4

Eliminate clutter & noise

5

Use layout to focus attention

6

Tell a clear story

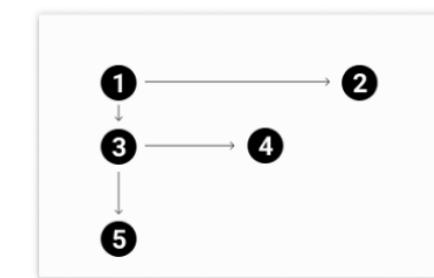
A good layout features the most important insights and trends upfront, and guides the viewer through a logical story; **don't expect users to connect the dots on their own!**



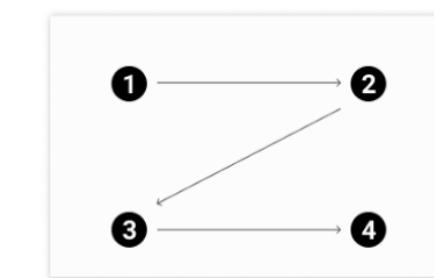
Tips to focus attention:

- Use **pre-attentive attributes** like size, color, and position to highlight key data points or specific patterns
- Use **Gestalt principles** like proximity, enclosure and connection to group related visual elements
- Consider common **reading patterns** (like Z or F patterns) when designing your dashboard layout

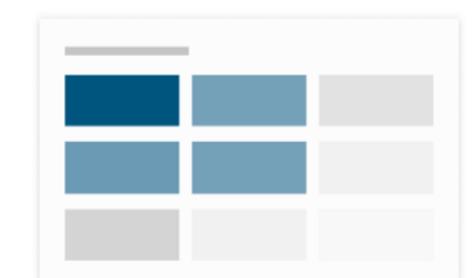
F-PATTERN



Z-PATTERN



MOST ATTRACTING AREAS



STEP 4: ELIMINATE CLUTTER & NOISE



REGIONAL SALES DASHBOARD

September 2021

Region: **New York**

\$50,618

Total Monthly Revenue

1.6%

M-o-M Revenue % Change

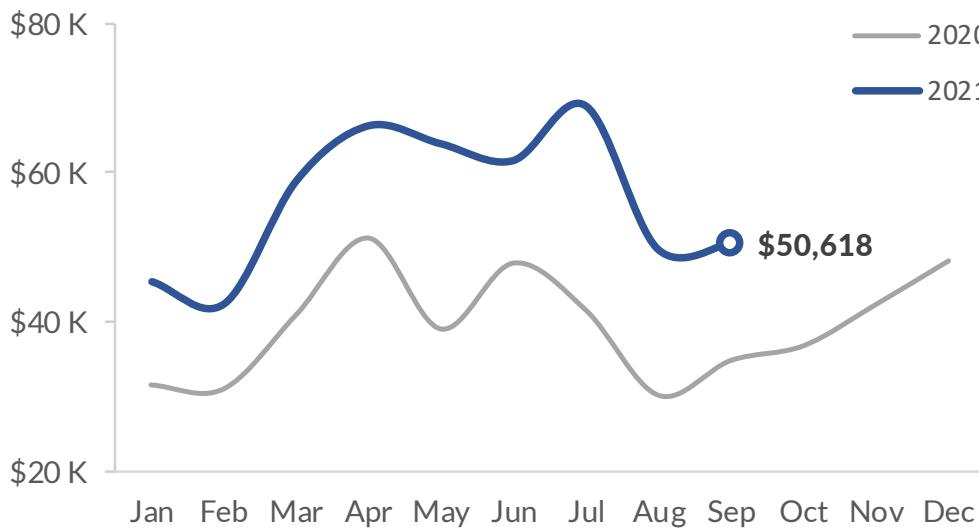
\$1,640

Potential Monthly Revenue **Loss**

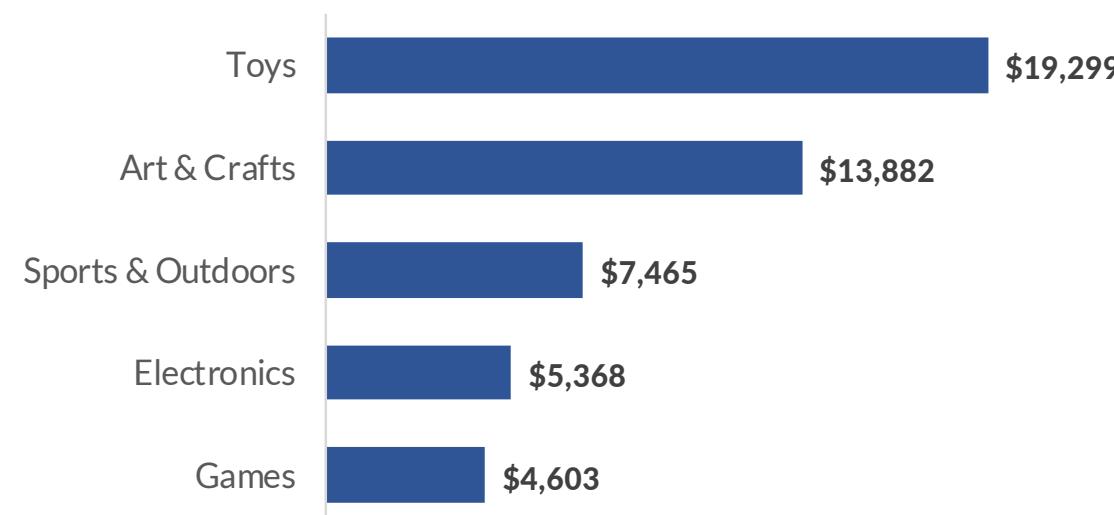
45.3%

Y-o-Y Revenue % Change

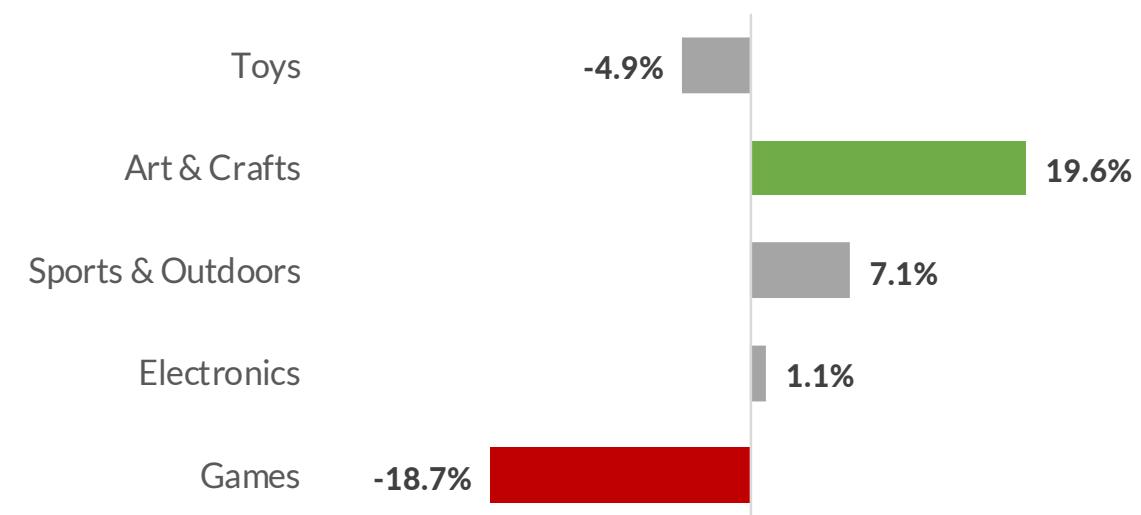
Total Revenue by Date



Total Revenue by Product Category



MoM Revenue % Change by Product Category



Products with 0 Stock by Store

Store Name	Product Name	Stock
JFK Airport	Gamer Headphones	0
JFK Airport	Hot Wheels 5-Pack	0
Times Square	Dino Egg	0
Times Square	Playfoam	0

Top 5 Products by MoM Revenue Change

Category	Product	Revenue	Δ Revenue
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Bottom 5 Products by MoM Revenue Change

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STEP 5: USE LAYOUT TO FOCUS ATTENTION

REGIONAL SALES DASHBOARD

September 2021

Region: New York



Total Revenue & Revenue % Changes

\$50,618

Total Monthly Revenue

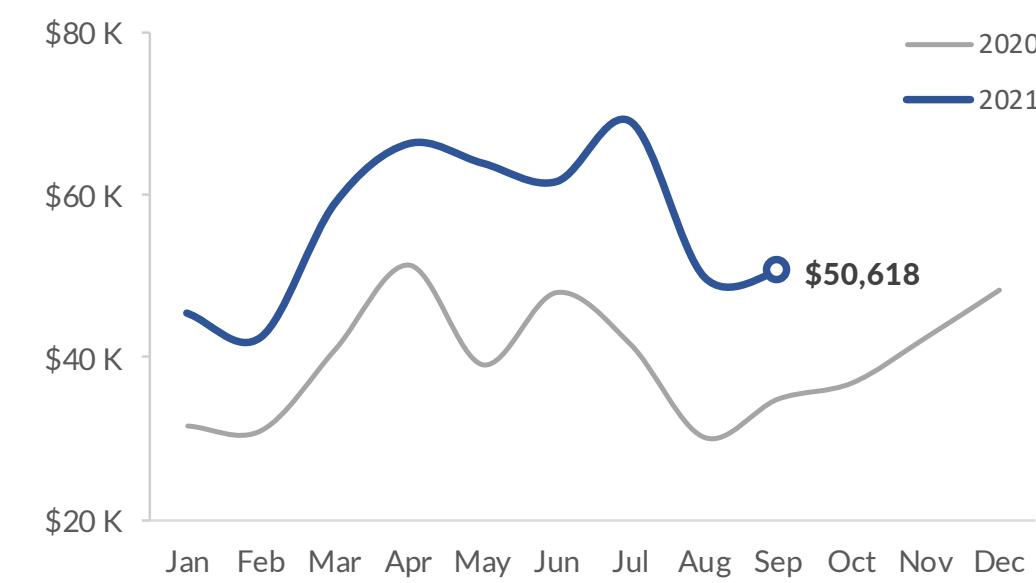
1.6%

M-o-M

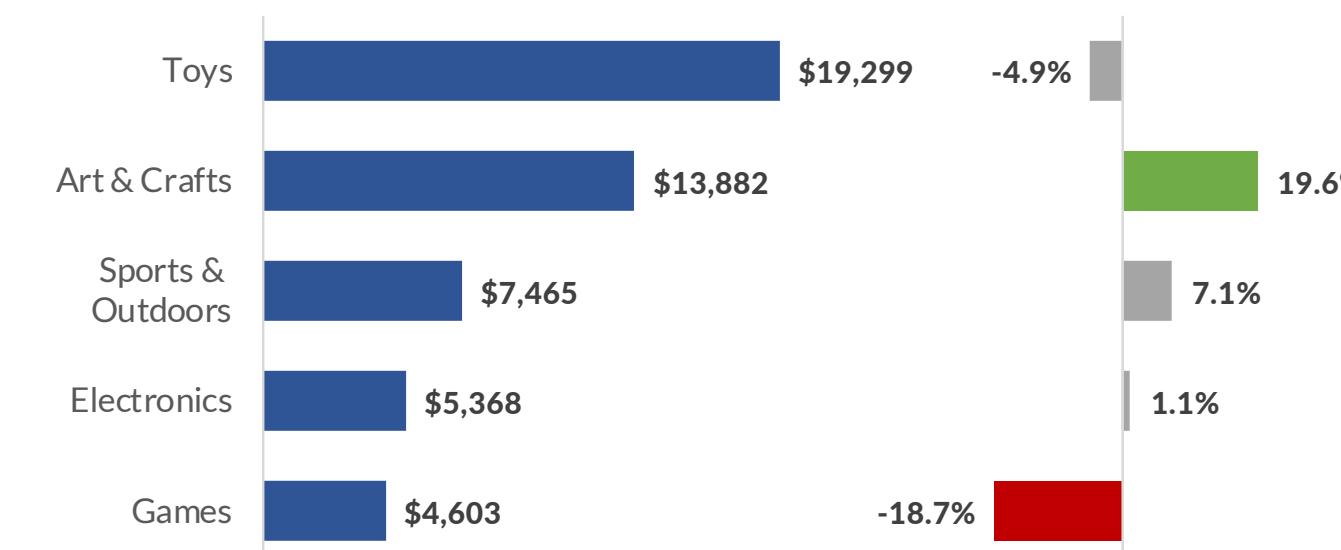
45.3%

Y-o-Y

Total Revenue by Date



Revenue & MoM Revenue % Change by Product Category



Products with 0 Stock

Store Name	Product Name	Stock
JFK Airport	Gamer Headphones	0
JFK Airport	Hot Wheels 5-Pack	0
Times Square	Dino Egg	0
Times Square	Playfoam	0

\$1,640

Potential Monthly Revenue **Loss**

Top & Bottom 5 Products by MoM Revenue Change

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DASHBOARD DESIGN PROCESS

1

Define the purpose

Human beings aren't inspired by numbers, charts or graphs; **we're inspired by stories.**

2

Choose the right metrics

The most effective BI dashboards use data to drive real-world business outcomes; they tell clear, data-driven stories designed to expose key insights and inspire stakeholders to act.

3

Present the data effectively

If your dashboard doesn't inspire action or facilitate change, **what purpose does it serve?**

4

Eliminate clutter & noise

5

Use layout to focus attention



PRO TIP: Don't be afraid of a little text! Using descriptive titles and data labels can be a great way to create narratives within your dashboard

6

Tell a clear story

STEP 5: USE LAYOUT TO FOCUS ATTENTION

REGIONAL SALES DASHBOARD

September 2021

Region: New York



Total Revenue & Revenue % Changes

\$50,618

Total Monthly Revenue

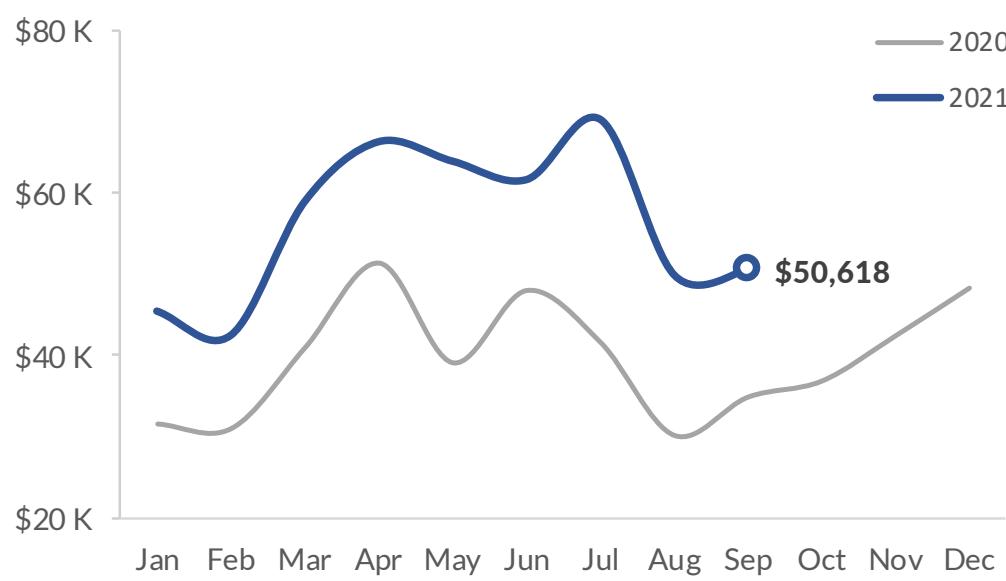
1.6%

M-o-M

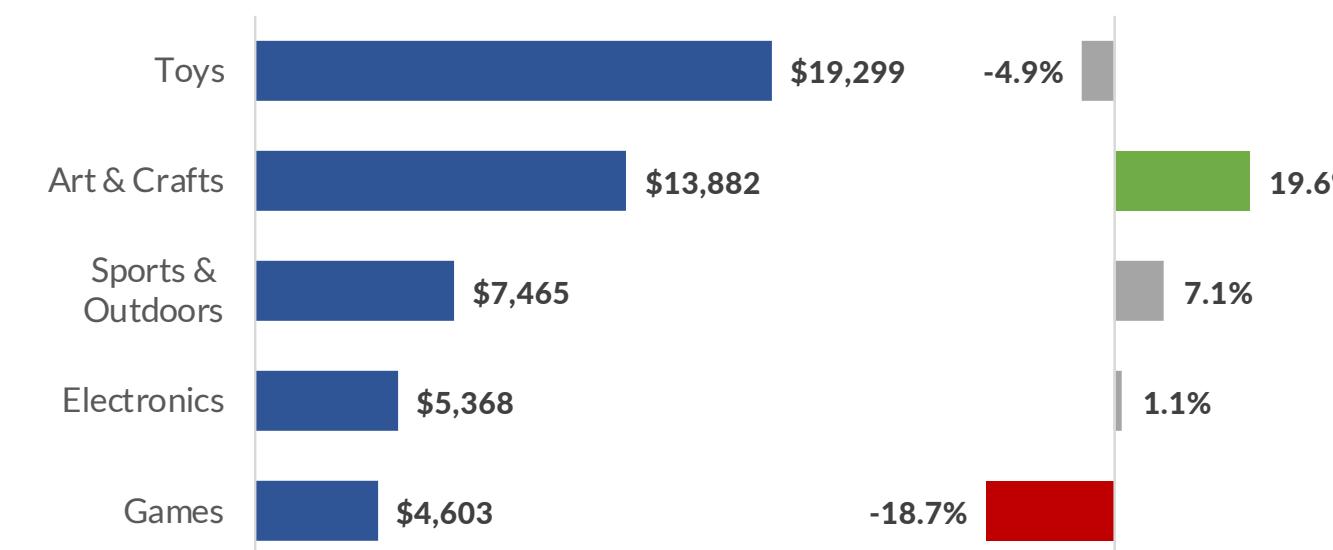
45.3%

Y-o-Y

Total Revenue by Date



Revenue & MoM Revenue % Change by Product Category



Products with 0 Stock

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\$1,640

Potential Monthly Revenue **Loss**

Top & Bottom 5 Products by MoM Revenue Change

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Art & Crafts	Barrel O' Slime	\$1,357	\$551

Category	Product	Revenue	Δ Revenue
Games	Rubik's Cube	\$640	-\$1,359
Toys	Lego Bricks	\$9,318	-\$800
Toys	Mr. Potatohead	\$460	-\$719
Art & Crafts	Etch A Sketch	\$882	-\$525
Games	Glass Marbles	\$989	-\$517

STEP 6: TELL A STORY

REGIONAL SALES DASHBOARD

How did the region perform in **September 2021**?

Region: **New York**



This is how much **revenue** we generated...

\$50,618

Total Monthly Revenue

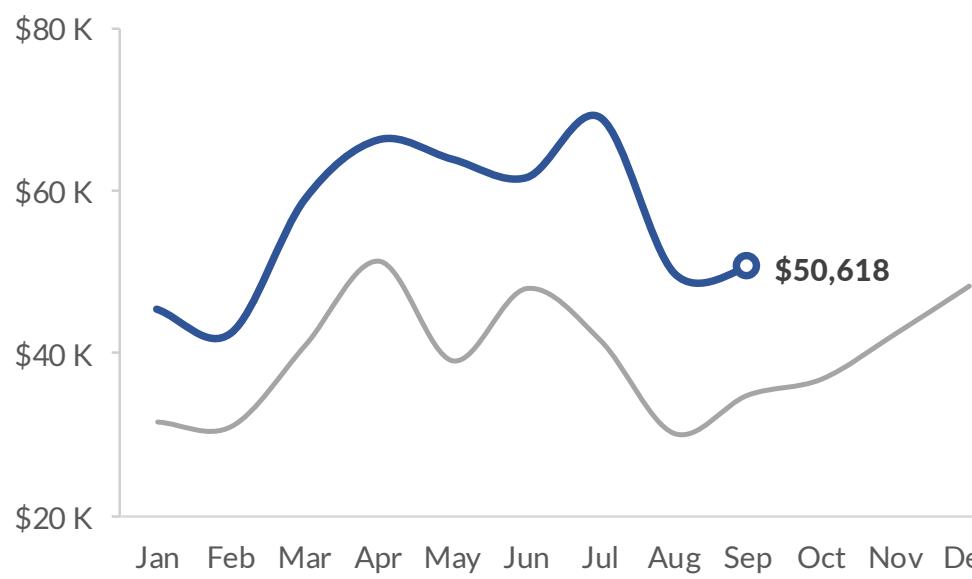
+1.6%

M-o-M

+45.3%

Y-o-Y

... and the trend in **2021** vs **2020**



This is the revenue split by **product category** this month...



We are **losing sales** here...

Store Name	Product Name	Stock
JFK Airport	Gamer Headphones	0
JFK Airport	Hot Wheels 5-Pack	0
Times Square	Dino Egg	0
Times Square	Playfoam	0

\$1,640

Potential Monthly Revenue **Loss**

... where these **5 products** drove the **increases** & **decreases** in revenue

Category	Product	Revenue	Δ Revenue
Art & Crafts	Playfoam	\$3,352	+\$2,011
Toys	Dinosaur Figures	\$2,893	+\$989
Games	Monopoly	\$900	+\$740
Art & Crafts	Magic Sand	\$4,589	+\$688
Art & Crafts	Barrel O' Slime	\$1,357	+\$551

Category	Product	Revenue	Δ Revenue
Games	Rubik's Cube	\$640	-\$1,359
Toys	Lego Bricks	\$9,318	-\$800
Toys	Mr. Potatohead	\$460	-\$719
Art & Crafts	Etch A Sketch	\$882	-\$525
Games	Glass Marbles	\$989	-\$517

KEY TAKEAWAYS



Always answer the **3 key questions** when visualizing data

- *What type of data are you working with? What do you want to communicate? Who is the end user?*



Keep it simple by eliminating noise and distractions

- *"Perfection is achieved not when there is nothing more to add, but when there is nothing left to take away"*



Tell a story by focusing the viewer's attention

- *Use pre-attentive attributes, gestalt principles, and thoughtful layouts to create a clear narrative*



Remember that **context** is key

- *Context is what makes the data mean something, and helps users interpret it accurately*

THE ANALYST TOOLKIT

THE ANALYST TOOLKIT

TOOLS MATTER, BUT SKILLS MATTER MORE

When it comes to analytics tools, **don't be afraid to specialize**; focus on building deep skills and expertise in a few key areas, rather than trying to master it all



You have permission to **NOT** learn all of these tools

THE ANALYST TOOLKIT

BI Platforms

Database Tools

Data Prep/ETL Tools

Spreadsheet Tools

Programming Languages

BI PLATFORMS



Power BI



+ a b l e a u*



Qlik



Sisense

Self-service tools designed to support the entire business intelligence workflow, including data prep, modeling, analysis, visualization and administration



INDUSTRY
LEADERS*

- Power BI
- Tableau
- Qlik



TYPICAL
USER ROLES

- Business Intelligence Analyst
- Data Analyst
- Data Visualization Specialist



COMMON
USE CASES

- Performance dashboards
- ETL & data prep
- Ad hoc data visualization
- Report administration



PRO TIP: Rather than trying to everything at once, focus on going deep with one platform first; the skills you build will be highly transferrable if you need to switch

THE ANALYST TOOLKIT

BI Platforms

Database Tools

Data Prep/ETL Tools

Spreadsheet Tools

Programming Languages

DATABASE TOOLS



INDUSTRY LEADERS*

- MySQL
- Microsoft SQL Server
- PostgreSQL



TYPICAL USER ROLES

- Database Administrator
- Business Intelligence Analyst
- Data Scientist



COMMON USE CASES

- Storing large datasets
- Ad hoc database analysis
- Producing custom tables or views for analysis and visualization



PRO TIP: There are many “flavors” of SQL database tools, but they are all built on the same query language and universal standards (with slight variations in syntax)

THE ANALYST TOOLKIT

BI Platforms

Database Tools

Data Prep/ETL Tools

Spreadsheet Tools

Programming Languages

DATA PREP/ETL TOOLS



Used for extracting, cleaning, transforming, and loading data from disparate sources into a centralized location for analysis



INDUSTRY LEADERS*

- Talend/Informatica (cloud)
- Alteryx
- Tableau Prep
- Power BI (Power Query)



TYPICAL USER ROLES

- Data Engineer
- Database Administrator
- Business Intelligence Analyst



COMMON USE CASES

- Building data pipelines for analysis
- Developing an automated ETL process for ongoing reporting
- Blending data from multiple sources into a central database or BI platform



PRO TIP: Tableau Prep and Power Query are both excellent ETL tools, and are directly integrated with tools you're likely already using (Tableau, Power BI & Excel)

THE ANALYST TOOLKIT

BI Platforms

Database Tools

Data Prep/ETL Tools

Spreadsheet Tools

Programming Languages

SPREADSHEET TOOLS



Used for creating, managing, modeling and analyzing structured data stored in rows and columns



INDUSTRY
LEADERS*

- Microsoft Excel
- Google Sheets



TYPICAL
USER ROLES

- Data Analyst
- Business Intelligence Analyst
- Financial Analyst
- Anyone working with data



COMMON
USE CASES

- Ad hoc analysis & visualization
- Financial modeling
- Forecasting & optimization
- Performance reporting



PRO TIP: Excel might just be the most versatile tool in the analytics stack, and can be a great solution for anything from ad hoc analysis to complex data modeling

THE ANALYST TOOLKIT

BI Platforms

Database Tools

Data Prep/ETL Tools

Spreadsheet Tools

Programming Languages

PROGRAMMING LANGUAGES



Coding languages and packages commonly used for statistical analysis, machine learning and data science



INDUSTRY
LEADERS*

- Python
- R
- SAS
- SQL



TYPICAL
USER ROLES

- Data Scientist
- Machine Learning Engineer
- Data Engineer



COMMON
USE CASES

- Training machine learning models
- Analyzing massive datasets
- Processing unstructured data

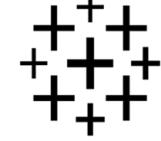


PRO TIP: Most analytics roles won't require heavy programming unless you work in Data Science or Machine Learning; focus on Excel + SQL first, and build from there

COMMON TOOL STACKS

As you begin to develop your skills, it's important to identify a **collection (or “stack”) of tools** which will help you perform the responsibilities of your specific role

BI ANALYST



DATA VIZ SPECIALIST



DATA ENGINEER



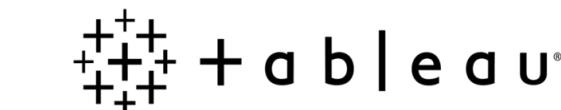
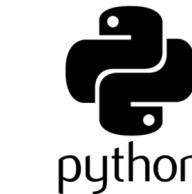
Microsoft®
SQL Server®



mongoDB



DATA SCIENTIST



There's no “right” or “wrong” stack, as long as the tools you use allow you to perform your job effectively

KEY TAKEAWAYS



Think about **skills first, tools second**

- *Don't focus on which tool you want to learn; focus on which SKILL you want to build*



Don't be afraid to **specialize**

- *Aim to go deep rather than broad, and focus on building 1-2 expert-level skills (vs. 10 mediocre ones)*



During the learning process, focus on **one tool at a time**

- *Staying focused helps you learn efficiently, retain your skills, and transfer your knowledge to similar tools*



Work towards building a "**tool stack**" specific to your role

- *For analytics professionals, we recommend Excel, SQL, and a BI platform like Power BI/Tableau*

TIPS FOR SUCCESS

TIPS FOR SUCCESS



Obsess over
OUTCOMES



Master **SKILLS**,
not tools



Don't be afraid to
SPECIALIZE



Don't ignore the
SOFT SKILLS



Never stop
LEARNING



Follow your **OWN**
PATH

A FEW OF OUR FAVORITE THINGS

Practice & Learn

Maven Analytics

- mavenanalytics.io

Data Playground

- mavenanalytics.io/data-playground

Competitions & Data Sets

- Kaggle.com

Tableau Public

- public.tableau.com

Power BI Blog

- powerbi.Microsoft.com/blog

In-Browser SQL Practice

- sqlzoo.net

In-Browser Regex Practice

- regexr.com

Community Support

Stack Overflow

- stackoverflow.com

Local Meetup Groups

- meetup.com

Microsoft Answers Forum

- answers.microsoft.com

Power BI User Groups

- pbiusergroup.com

Tableau Community Forums

- community.tableau.com

Tableau User Groups

- usergroups.tableau.com

Technical Resources

Microsoft Office Support

- support.microsoft.com

Microsoft Documentation

- docs.microsoft.com

DAX Function Reference

- dax.guide

Tableau Documentation

- help.tableau.com

MySQL Developer Tools

- dev.mysql.com

Other Fun Stuff

Online Stats Calculators

- mathcracker.com

Color Palette Designer

- paletton.com

Color Blindness Viewer

- colororacle.org

Free & Paid Icon Libraries

- fontawesome.com
- icons8.com

Stock Images & Graphics

- elements.envato.com

Analytics Jobs & Salary Guides

- harnham.com

NEXT STEPS



BI ANALYST PATH

For aspiring Analysts and Business Intelligence professionals looking to master advanced Excel, Power BI, MySQL, and Tableau

Want to choose your own path?

Take our **Guided Learning** survey to create a personalized learning plan!



EXCEL SPECIALIST

For analysts looking to build a deep, expert-level Excel skill set and prepare for the Microsoft MO-201 Expert Exam



POWER BI SPECIALIST

For users looking to master Power BI Desktop & Service, learn advanced DAX, and ace the Microsoft DA-100 exam



MYSQL SPECIALIST

For database admins and analysts looking to apply powerful MySQL skills to real-world projects and case studies



TABLEAU SPECIALIST

For users looking to master Tableau Desktop & Prep and become a Certified Associate or Tableau Desktop Specialist