Course — 2 - Ask Questions to Make Data-Driven Decisions

Objectives-

- How data analysts solve problems with data
- The use of analytics for making data-driven decisions
- Spreadsheet formulas and functions
- Dashboard basics, including an introduction to Tableau
- Data reporting basics

6 Data Analysis Phases (In detail)

There are 6 data analysis phases that will help you make seamless decisions:

1. Ask
2. Prepare
3. Process
4. Analyze
5. Share
6. Act
7.

Step 1: Ask — It's impossible to solve a problem if you don't know what it is. Things to consider:

- Define the problem you're trying to solve
- Make sure you fully understand the stakeholder's expectations
- Focus on the actual problem and avoid any distractions
- Collaborate with stakeholders and keep an open line of communication
- Take a step back and see the whole situation in context

Questions to ask yourself in this step:

1. What are my stakeholders saying their problems are?
2. Now that I've identified the issues, how can I help the stakeholders resolve their questions?

Step 2: Prepare — You will decide what data you need to collect in order to answer your questions and how to organize it so that it is useful. You might use your business task to decide:

- What metrics to measure (**Metrics** — quantifiable type of data that can be used for measurement)
- Locate data in your database
- Create security measures to protect that data

Questions to ask yourself in this step:

1. What do I need to figure out how to solve this problem?
2. What research do I need to do?

Step 3: Process — Clean data is the best data and you will need to clean up your data to get rid of any possible errors, inaccuracies, or inconsistencies. This might mean:

- Using spreadsheet functions to find incorrectly entered data
- Using SQL functions to check for extra spaces
- Removing repeated entries
- Checking as much as possible for bias in the data

Questions to ask yourself in this step:

1. What data errors or inaccuracies might get in my way of getting the best possible answer to the problem I am trying to solve?
2. How can I clean my data so the information I have is more consistent?

Step 4: Analyze — You will want to think analytically about your data. At this stage, you might sort and format your data to make it easier to:

- Perform calculations
- Combine data from multiple sources
- Create tables with your results

Questions to ask yourself in this step:

1. What story is my data telling me?
2. How will my data help me solve this problem?
3. Who needs my company's product or service? What type of person is most likely to use it?

Step 5: Share — Everyone shares their results differently so be sure to summarize your results with clear and enticing visuals of your analysis using data viz tools like graphs or dashboards. This is your chance to show the stakeholders you have solved their problem and how you got there. Sharing will certainly help your team:

- Make better decisions
- Make more informed decisions
- Lead to stronger outcomes
- Successfully communicate your findings

Questions to ask yourself in this step:

1. How can I make what I present to the stakeholders engaging and easy to understand?
2. What would help me understand this if I were the listener?

Step 6: Act — Now it's time to act on your data. You will take everything you have learned from your data analysis and put it to use. This could mean providing your stakeholders with recommendations based on your findings so they can make data-driven decisions.

Questions to ask yourself in this step:

1. How can I use the feedback I received during the share phase (step 5) to actually meet the stakeholder's needs and expectations?

These six steps can help you to break the data analysis process into smaller, manageable parts, which is called **structured thinking**. This process involves four basic activities:

1. Recognizing the current problem or situation
2. Organizing available information
3. Revealing gaps and opportunities
4. Identifying your options

When you are starting out in your career as a data analyst, it is normal to feel pulled in a few different directions with your role and expectations. Following processes like the ones outlined here and using structured thinking skills can help get you back on track.

6 Problem Types Data Analysts Typically Work With

1. Making predictions
2. Categorizing things
3. Spotting something unusual
4. Identifying themes
5. Discovering connections
6. Finding patterns

Making predictions — A company that wants to know the best advertising method to bring in new customers is an example of a problem requiring analysts to make predictions. Analysts with data on location, type of media, and number of new customers acquired as a result of past ads can't guarantee future results, but they can help predict the best placement of advertising to reach the target audience.

Categorizing things — An example of a problem requiring analysts to categorize things is a company's goal to improve customer satisfaction. Analysts might classify customer service calls based on certain keywords or scores. This could help identify top-performing customer service representatives or help correlate certain actions taken with higher customer satisfaction scores.

Spotting something unusual — A company that sells smart watches that help people monitor their health would be interested in designing their software to spot something unusual. Analysts who have analyzed aggregated health data can help product developers determine the right algorithms to spot and set off alarms when certain data doesn't trend normally.

Identifying themes — User experience (UX) designers might rely on analysts to analyze user interaction data. Usability improvement projects might require analysts to identify themes to help prioritize the right product features for improvement.

Discovering connections — A third-party logistics company working with another company to get shipments delivered to customers on time is a problem requiring analysts to discover connections. By analyzing the wait times at shipping hubs, analysts can determine the appropriate schedule changes to increase the number of on-time deliveries.

Finding patterns — Minimizing downtime caused by machine failure is an example of a problem requiring analysts to find patterns in data. For example, by analyzing maintenance data, they might discover that most failures happen if regular maintenance is delayed by more than a 15-day window.

SMART Questions

It's a huge part of the job of a data analyst to ask questions constantly. And these questions must be effective that lead to key insights which you can use to solve all kinds of problems.

Types of Questions

- ***Leading —*** A question that leads you to answer in a certain way. (Biased)
- ***Closed-ended —*** Yes/No questions. Rarely lead to valuable insights.
- ***Ineffective —*** Questions that are too vague and lack context. Ex- Do you like this game?
- ***Effective —***Questions that follow the **SMART** Methodology —

S — Specific questions are simple, significant and focused on a single topic or a few closely related ideas. The more specific the question, it can give you more useful information.

M — Measurable questions can be quantified and assessed.

A — Action-oriented questions encourage change. Problem solving is about seeing the current state and figuring out how to transform it into the ideal future state. Action-oriented questions help you get there. So rather than asking, "how can we get customers to recycle our product packaging?" You

could ask, “what design features will make our packaging easier to recycle?” This brings you answers you can act on.

R — Relevant questions matter, are important and have significance to the problem you’re trying to solve.

T — Time-bound questions specify the time to be studied. Limit’s range of possibilities.

Fairness of Questions

Fair Questions

- *Fairness***—** Ensuring that your questions don’t create or reinforce bias.
- It also means crafting questions that make sense to everyone.
- It’s important for questions to be clear and have a straightforward wording that anyone can easily understand.

Unfair Questions

- They are phrased to lead you into a certain answer. Examples of unfair questions — “These are the best sandwiches ever, aren’t they?” Make’s it difficult to answer honestly, if you didn’t like the taste of the sandwich.
- Another common example of an unfair question is the one that makes assumptions.
- Unfair questions leads to unreliable feedback and missed opportunities to gain some truly valuable insights.

Note: *Different career paths for someone who’s interested in data. Generally there are 3 different core roles.*

Data analysts — *Someone who works with SQL, spreadsheets, databases, might work as a business intelligence team creating those dashboards.*

Data engineer — *Where does all that data come from? Generally, a data analyst will work with a data engineer to turn that raw data into actionable pipelines.*

Data scientists — *They actually to turn these clean and actionable data pipelines built by data engineers and analysts into really cool machine learning models or statistical inferences that are just well beyond anything you could have ever imagined.*

You don’t have to know at the outset which path you want to go down. Try ’em all. See what you really, really like.

Data-driven Decisions

The more data we have, the bigger the problems we can solve and the more powerful our solutions can be. But responsibly gathering data is only part of the process. We also have to turn data into knowledge that helps us make better solutions.

Businesses and other organizations use data to make better decisions all the time. There’s two ways they can do this, with data-driven or data-inspired decision-making.

Data Driven Decision Making — Using facts to guide business strategy. More likely to lead to successful outcomes.

Data-inspired decision-making — Explores different data sources to find out what they have in common.

Quantitative and Qualitative Data

Quantitative Data

- All about the specific and objective measures of numerical facts. This can often be the what, how many, and how often about a problem.
- In other words, things you can measure, like how many commuters take the train to work every week.

Quantitative Data

- Describes subjective or explanatory measures of qualities and characteristics or things that can't be measured with numerical data, like your hair color.
- Great for helping us answer why questions. For example, why people might like a certain celebrity or snack food more than others. With quantitative data, we can see **numbers visualized as charts or graphs**.
- Gives us a more high-level understanding of why the numbers are the way they are. This is important because it helps us add context to a problem.

As a data analyst, you'll be using both quantitative and qualitative analysis, by gathering different types of data by asking different questions specific to the business task.

Qualitative data can help analysts better understand their quantitative data by providing a reason or more thorough explanation. i.e., **quantitative data** generally gives you the **what**, and **qualitative data** generally gives you the **why**.

Importance and benefits of dashboards and reports

Reports

Static collection of data given to stakeholders periodically. Easy to knock up, but need continual maintenance and is less appealing, even so, it's widely used. Ex — Spreadsheets.

Dashboards

Dashboards are powerful visual tools that help you tell your data story and monitor live, incoming data. It organizes information from multiple datasets into one central location, offering huge time-savings. Data analysts use dashboards to track, analyze, and visualize data in order to answer questions and solve problems.

Tools used to clear dashboards — Tableau, Power BI, etc.

Benefits of using a dashboard for both data analysts and their stakeholders -

Benefits	For Data Analysts	For Stakeholders
Centralization	Sharing a single source of data with all stakeholders	Working with a comprehensive view of data, initiatives, objectives, projects, processes, and more
Visualization	Showing and updating live, incoming data in real time*	Spotting changing trends and patterns more quickly
Insightfulness	Pulling relevant information from different datasets	Understanding the story behind the numbers to keep track of goals and make data-driven decisions
Customization	Creating custom views dedicated to a specific person, project, or presentation of the data	Drilling down to more specific areas of specialized interest or concern

Creating a dashboard

- **Identify the stakeholders who need to see the data and how they will use it —** Check out this Requirements Gathering Worksheet to explore a wide range of good questions you can use to identify relevant stakeholders and their data needs. This is a great resource to help guide you through this process again and again.
- **Design the dashboard (what should be displayed) —** Make your dashboard design clear, easy to follow, and simple — Use a clear header to label the information, Add short text descriptions to each visualization, Show the most important information at the top.
- **Create mock-ups if desired —** (Optional) Sketch out the dashboard before designing.
- **Select the visualizations you will use on the dashboard —** Choose the right charts and graphs depending on what data story you are telling.
- **Create filters as needed —** Filters show certain data while hiding the rest of the data in a dashboard. This can be a big help to identify patterns while keeping the original data intact.

Dashboards are part of a business journey. It helps them navigate the path of the project inside the data. Adding clear markers and highlight important points on your dashboard will help users understand where your data story is headed. Then, you can work together to make sure the business gets where it needs to go.

TABLEAU — HOW TO CREATE DASHBOARD

Mathematical Thinking to Problem Solving

Mathematical thinking means looking at a problem and logically breaking it down step-by-step, so you can see the relationship of patterns in your data, and use that to analyze your problem.

This kind of thinking can also help you figure out the best tools for analysis because it lets us see the different aspects of a problem and choose the best logical approach.

Big Data and Small Data

There are a lot of factors to consider when choosing the most helpful tool for your analysis. One way you could decide which tool to use is by the size of your data-set. When working with data, you'll find that there's big and small data.

Small data can be really small, useful for making simple day-to-day decisions, it doesn't have a huge impact on bigger frameworks like business operations.

Big data on the other hand has larger, less specific datasets covering a longer period of time, useful for looking at large-scale questions and problems, and they help companies make big decisions.. They usually have to be broken down to be analyzed.

Small data	Big data
Describes a data set made up of specific metrics over a short, well-defined time period	Describes large, less-specific data sets that cover a long time period
Usually organized and analyzed in spreadsheets	Usually kept in a database and queried
Likely to be used by small and midsize businesses	Likely to be used by large organizations
Simple to collect, store, manage, sort, and visually represent	Takes a lot of effort to collect, store, manage, sort, and visually represent
Usually already a manageable size for analysis	Usually needs to be broken into smaller pieces in order to be organized and analyzed effectively for decision-making

Before Solving a Problem, Understand It

It's important to define the problems before trying to solve them. A lot of times, teams jump right into data analysis before realizing a few months later that they are either solving the wrong problem or they don't have the right data.

Problem Domain — the specific area of analysis that encompasses every activity affecting or affected by the problem.

Developing a structured approach to defining the problem clearly from the start, it'll be easier to solve, which saves a lot of time, money, and resources.

Structured Thinking — is the process of recognizing the current problem or situation, organizing available information, revealing gaps and opportunities, and identifying the options.

It's having a clear list of where you are expected to deliver, a timeline for major tasks and activities, and checkpoints so the team knows you're making progress.

Structured thinking will help you understand problems at a high level so that you can identify areas that need deeper investigation and understanding. The starting place for structured thinking is the problem domain. Once you know the specific area of analysis, you can set your base and lay out all your requirements and hypotheses before you start investigating.

Another way that you can practice structured thinking and avoid mistakes is by using a scope of work.

Scope of Work (SOW) — is an agreed- upon outline of the work you're going to perform on a project. For many businesses, this includes things like work details, schedules, and reports that the client can expect.

As a data analyst, your scope of work will be a bit more technical and include those basic items just mentioned, but also focus on things like data preparation, validation, analysis of quantitative and qualitative datasets, initial results, and maybe even some visuals to really get the point across.

Balancing needs and expectations across your team

As a data analyst, you'll be required to focus on a lot of different things, And your stakeholders' expectations are one of the most important.

Stakeholders are people that have invested time, interest, and resources into the projects that you'll be working. There's a good chance they'll need the work you do to perform their own needs. That's why it's so important to make sure your work lines up with their needs and why you need to communicate effectively with all of the stakeholders across your team.

Your stakeholders will want to discuss things like the project objective, what you need to reach that goal, and any challenges or concerns you have. This is a good thing. These conversations help build trust and confidence in your work.

You might even be working with other data analysts who are covering different aspects of the data. It's so important that you know who the stakeholders and other team members are in a project so that you can communicate with them effectively and give them what they need to move forward in their own roles on the project.

Balancing Expectations and Realistic Project Goals

Data has limitations. Sometimes you don't have access to the data you need, or your data sources aren't aligned or your data is unclean. This can definitely be a problem when you're analyzing data, but it can also affect your communication with your stakeholders. Hence it's important to balance your stakeholders' expectations with what is actually possible for a project.

It's important to set realistic, objective goals and know how to best communicate with your stakeholders about problems you might run into.

It can be tempting to tell your stakeholders that you'll have this done in no time, no problem. But setting expectations for a realistic timeline will help you in the long run. Your stakeholders will know what to expect when, and you won't be overworking yourself and missing deadlines because you over-promised. You want to help your stakeholders achieve their goals, but it's important to set realistic expectations at every stage of the project.

As you're getting started, you'll need to create a high-level schedule with different phases of the project and their approximate start dates.

This will help stakeholders understand the timeline and have confidence in your ability to achieve those goals.Staying focused on the objective

This can be tricky when you find yourself working with a lot of people with competing needs and opinions. But by asking yourself a few simple questions at the beginning of each task, you can ensure that you're able to stay focused on your objective while still balancing stakeholder needs.

There are three things you can focus on that will help you stay on track.

- Who are the primary and secondary stakeholders?
- Who is managing the data?

- Where can you go for help?

Take time at the beginning of every project to identify your stakeholders and their goals. Then see who else is on your team and what their roles are.

Next, you'll want to ask who's managing the data? By understanding who's managing the data, you can spend your time more productively.

Next step, you need to know where you can go when you need help. This is something you should know at the beginning of any project you work on. When you know who's able to help, you'll spend less time worrying about other aspects of the project and more time focused on the objective, so who could you go to if you ran into a problem on this project? (Project managers).

Communication Best Practices

The secret to effective communication — Before you put together a presentation, send an e-mail, or even tell that hilarious joke to your co-worker, think about

- Who your audience is,
- What they already know,
- What they need to know and
- How you can communicate that effectively to them.

When you start by thinking about your audience, they'll know it and appreciate the time you took to consider them and their needs.

Now that you've decided who needs to know what, you can choose the best way to communicate with them. Instead of a long, worried e-mail which could lead to lots back and forth, you decide to quickly book in a meeting with your project manager and fellow analysts.