

# Solving BI Problems

CS 459 Business Intelligence

# What is Design Thinking

# DESIGN THINKING

More doing than thinking



ENGINEERING  
THINKING



Solve your  
way forward

BUSINESS  
THINKING



Optimize your  
way forward

RESEARCH  
THINKING



Analyze your  
way forward

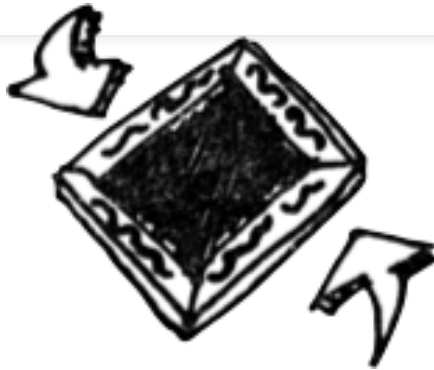
DESIGN  
THINKING



Build your  
way forward

# DESIGN THINKING

Key mindsets and practices



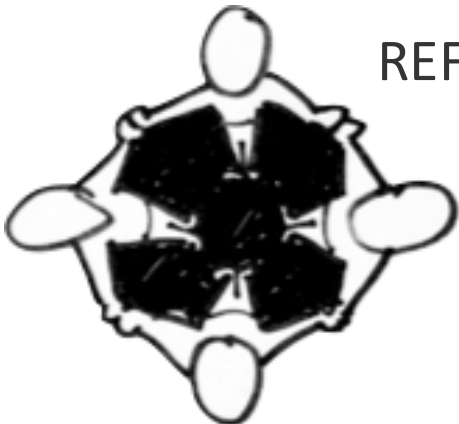
REFRAMING



MINDFULNESS OF  
PROCESS



STORYTELL



RADICAL  
COLLABORATION



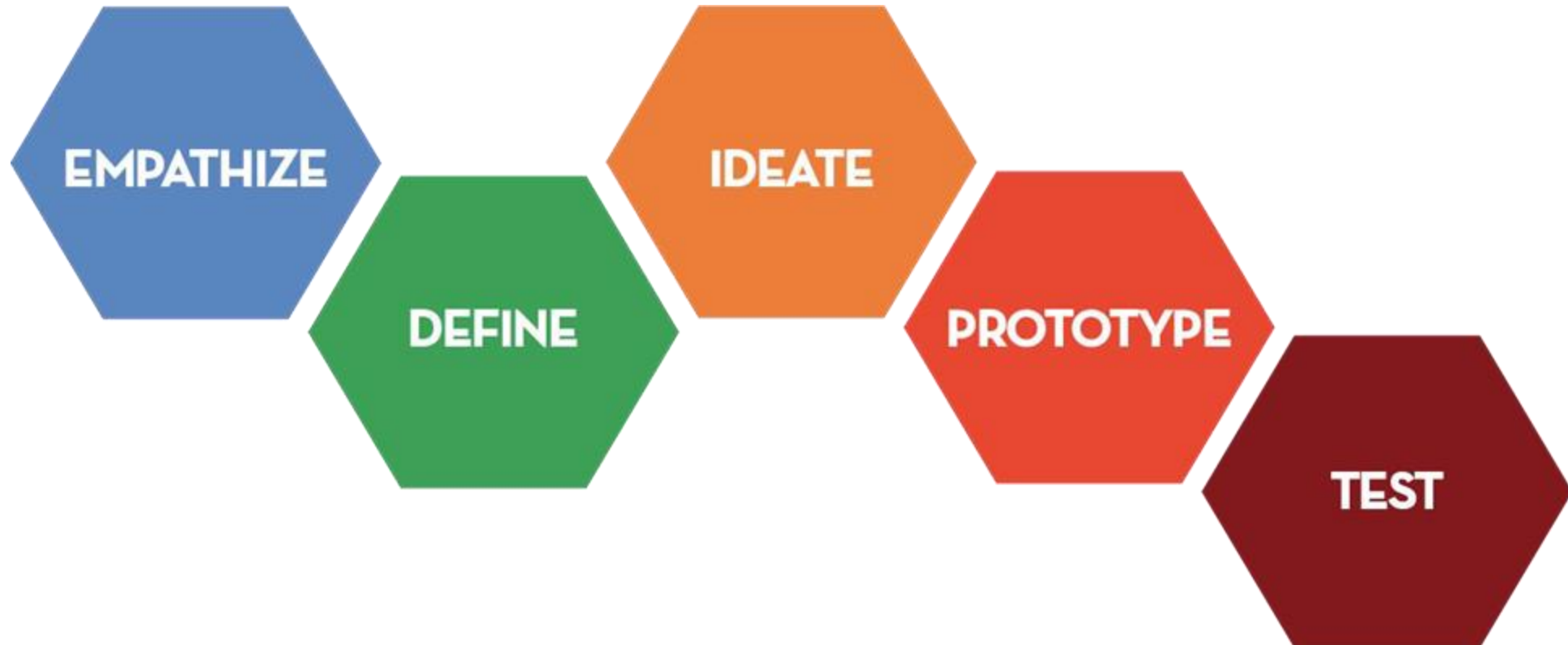
CURIOSITY



BIAS TOWARD  
ACTION

# DESIGN THINKING

The framework



# Empathize

## Understand Stakeholder Needs

Gather deep insights into business problems from stakeholders.

# Define

## Frame the BI Problem

Clearly articulate the BI challenge.

# **Ideate**

## Explore BI Solutions Creatively

Brainstorm potential BI approaches

# Prototype

## Build BI Solutions Iteratively

Develop tangible BI deliverables quickly.

# Test

## Validate with Stakeholders

Refine BI solutions based on feedback.

# Empathize

Understand  
Stakeholder  
Needs

# Gather deep insights into business problems from stakeholders.

- Conduct interviews, surveys, or workshops with end-users (business teams, managers, customers).
- Define pain points, goals, and decision-making needs.
- **"Business Knowledge" Integration:**
  - Document domain expertise (e.g., retail, healthcare, finance).
  - Review existing BI tools/APIs (e.g., Power BI, Tableau, SQL) and their relevance.
- ***Focus on human-centered problem discovery.***

# Get into the Manager's Shoes

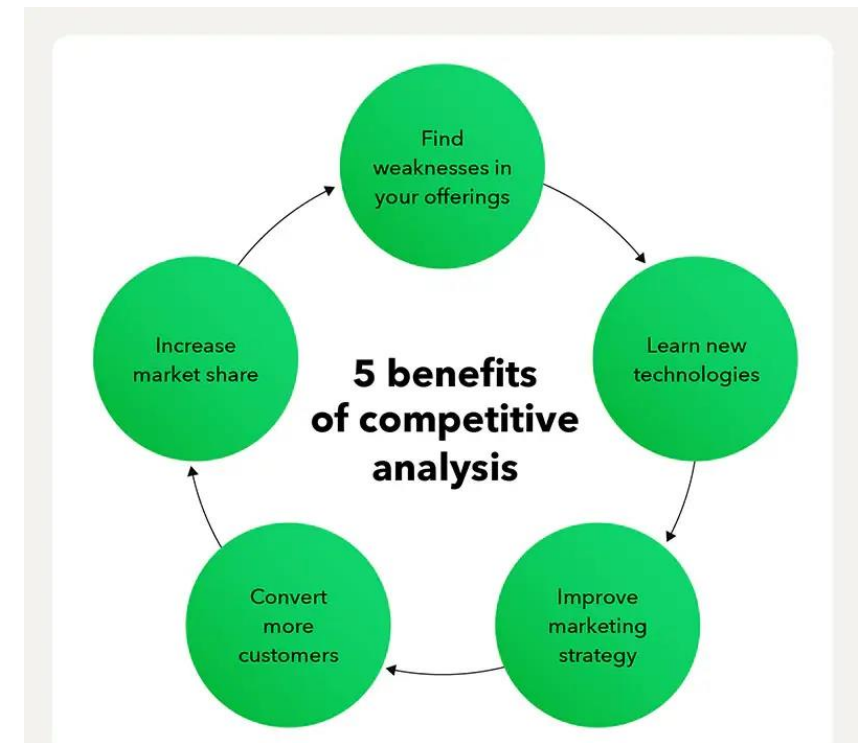
- Understand the business and key stakeholders needs
- Gain knowledge about business domains related to your BI task.
- Insert professional knowledge, knowledge gathered from online sources, and knowledge about any tools, APIs or software you have already experienced.



# Know Your Competition

## Competitor Analysis:

- Document knowledge gained about your local or global competitors, from online sources, connections or financial reports.



# Interviews – Know Your Stakeholders

Empathize with business teams,  
managers, customers.

Document your findings.

Consider empathy mapping.



# Current Excel and SQL Analysis

- **Current Excel Analysis**

- What does the current Excel Analysis tell us? What problems are already catered through data analysis using Excel in the company?



- **Current SQL Analysis**

- What does the current SQL Analysis tell us? What problems are already catered through data analysis using SQL in the company?



# Data Knowledge Analysis

The following to be quantified by problem being solved and the performance metrics:

1. What are we doing?
2. What the competitors are doing?
3. What is the global perspective?

Gauge the performance of the company based on the above and identify the gaps, pain areas, goals and decision-making needs.

BI isn't just about data—it's about translating pain points into analytical questions.

# Define

Frame the BI  
Problem

# Clearly articulate the BI Challenge

- Synthesize findings from Step 1 into a "Problem Statement."
- Identify key metrics/KPIs (e.g., sales growth, customer churn).
- Example: "**How might we** analyze supply chain delays to improve inventory decisions?"
- Narrow down the problem space before jumping to solutions.



# How to *frame* and *reframe*?

# Reframing in Design Thinking

- *Reframing* is a core concept in design thinking.
- It's the process of challenging and evolving your understanding of a problem throughout the design process.





The problem you're trying to solve is often not clear at the beginning of the design process.

# Why is Reframing Important?



By reframing the problem, you can gain new insights and identify a better problem to solve.



Reframing can also help you to develop more creative and innovative solutions.

# Define – Problem Generation

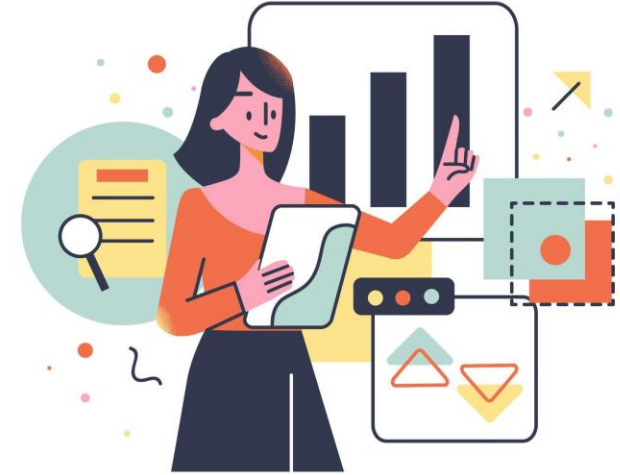
- **Data.Info - Template**

- Based on “Analysis” data, create now at least 2 problems statements for your BI task
- Enter information about each attribute in the table. The table is designed to assist you in creating the exact BI queries that need to be answered.
- These queries will metamorphose as you fill up the table (same BI query can obviously be shared across different attributes). When you have finished filling up the table, it is expected that the queries will have converged.
- Write down the final list of BI queries at the bottom of the table.

# Data Gathering and Exploration

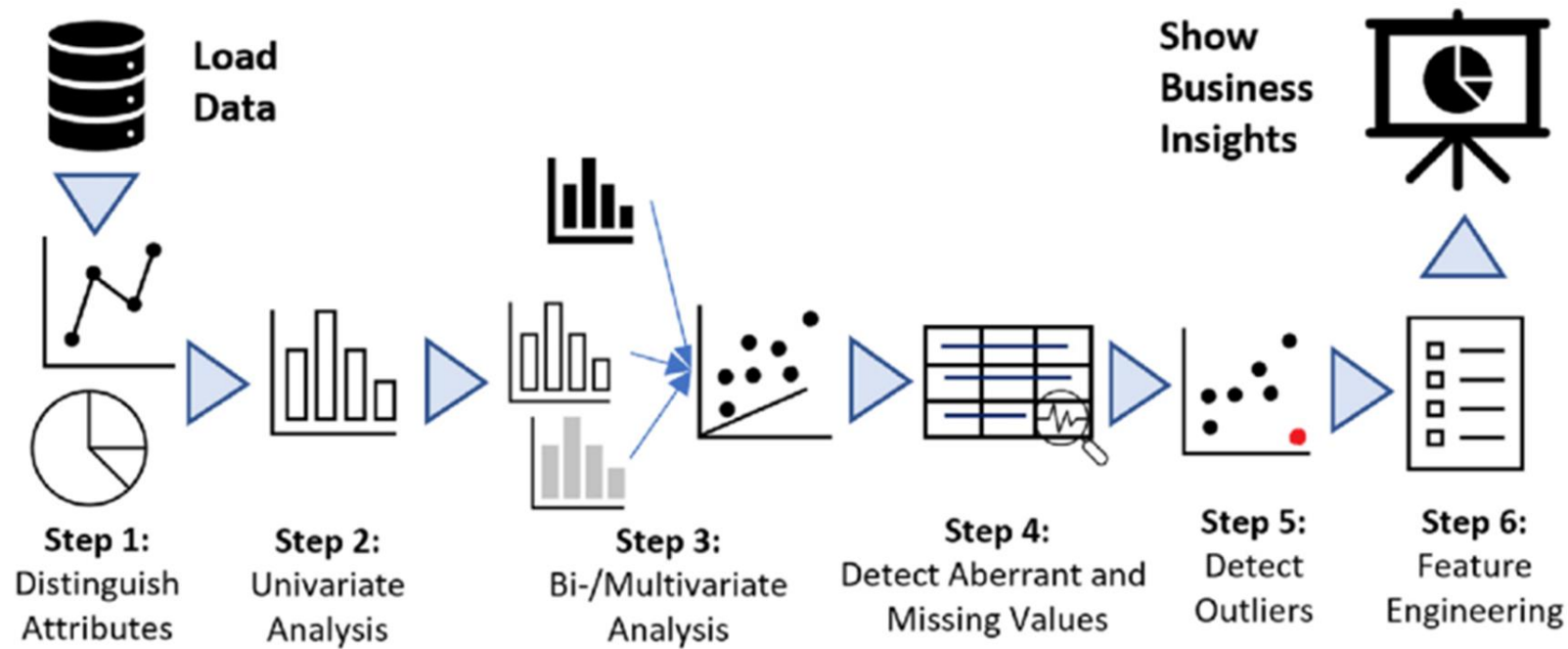


# Collect Data



- Contact IT for data
- Compromises –
  - Extract data yourself,
  - Security measures so not all data available,
  - Database is difficult to read,
  - Tendency to follow the IT's current analyses (if you are doing disruptive work)

# Data Cleaning and EDA



# Ideate

Explore BI  
Solutions  
Creatively

# Ideate - Explore BI Solutions Creatively

- Brainstorm potential BI approaches.
- Host collaborative sessions to generate ideas (dashboards, predictive models, reports).
- Leverage "Business Knowledge" to assess feasibility
- Encourage out-of-the-box thinking
- *Divergent thinking to explore multiple solutions.*

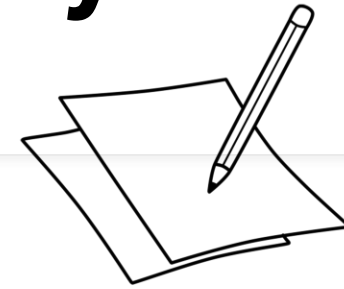
# Prototype

Build BI  
Solutions  
Iteratively

# Prototype - Build BI Solutions Iteratively

- Develop tangible BI deliverables quickly.
- Create low-fidelity mockups (e.g., wireframes for dashboards).
- Develop small-scale data models/queries (e.g., SQL snippets, Power BI drafts).
- Use agile sprints for incremental improvements.
- *Fail fast, learn faster with minimal viable products (MVPs).*

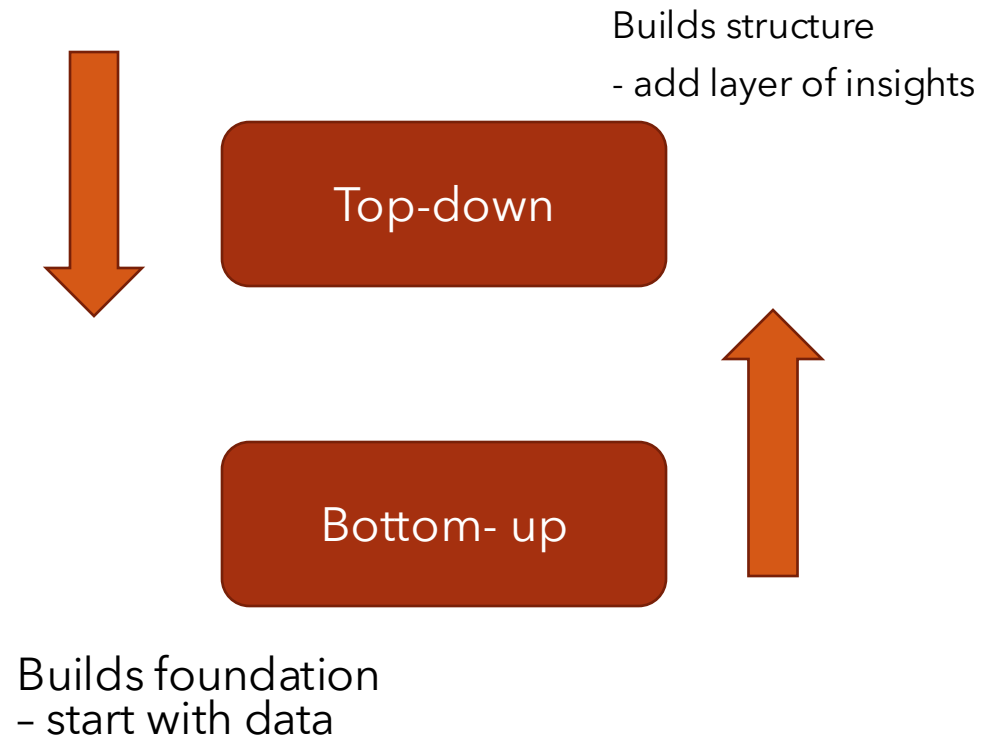
# Prototype : Charting on Paper - Storytelling



- Sketch out the charts on paper as a step towards problem solving
- Steppingstone towards solution – details emerge during BI tool phase
- Draft of your data story telling narrative.
- Plan and list all charts and dashboards.

# Replicate Story in Tool

- **Top-down approach** is when you start from a summary or higher-level chart and dig deeper—adding more dimensions like product, region, or time to extract more insights. Think of it as starting from the structure and drilling down for details.
- **Bottom-up approach** is when we build our understanding from raw data and basic charts. Once we have that base, we can evolve those simple charts into more complex, multi-dimensional visualizations that reveal new insights we didn't initially notice.



# Develop Dashboards





## **Answer BI queries and Business Solution**

Provide answer to each of your BI queries. Remember that multiple answers will be available for each query.

# Test

Validate with  
Stakeholders

# Test - Validate with Stakeholders

- Refine BI solutions based on feedback.
- Present prototypes to end-users for usability testing.
- Measure effectiveness (e.g., "Does this dashboard reduce time-to-insight-to-decision making?").
- Iterate based on feedback (return to Step 1 if needed).
- *Continuous improvement through user validation.*

# Dataset Understanding (Team Exploration – 10 mins)