

# Data visualizations

INTRODUCTION TO DATA LITERACY

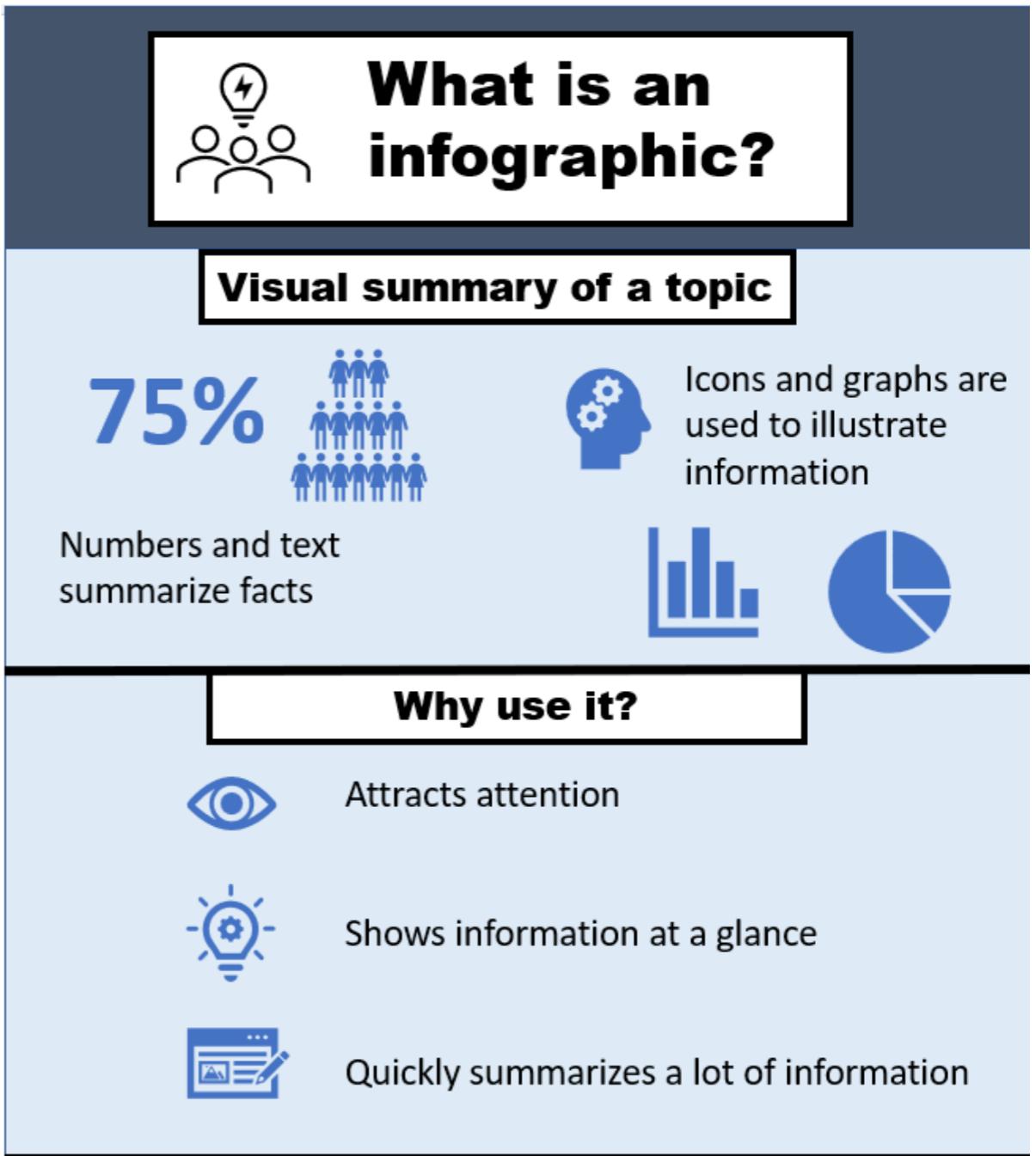


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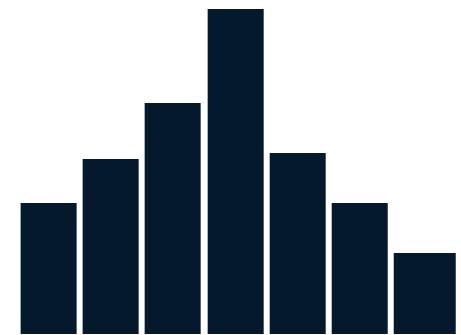
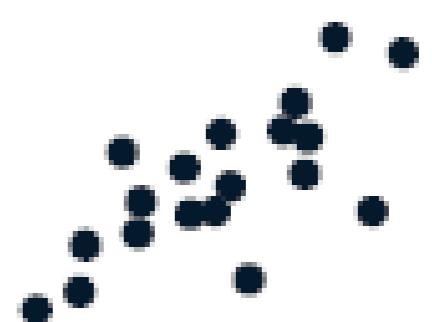
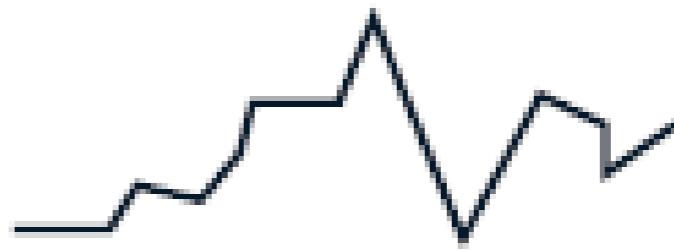
# A picture tells a thousand words

- Visualization helps to understand complex data at a glance
- Makes it easier to understand insights identified in the data
- Several data tools and methods rely on visualization:
  - Exploratory data analysis
  - Dashboard
  - Infographic



# Common types of visualizations

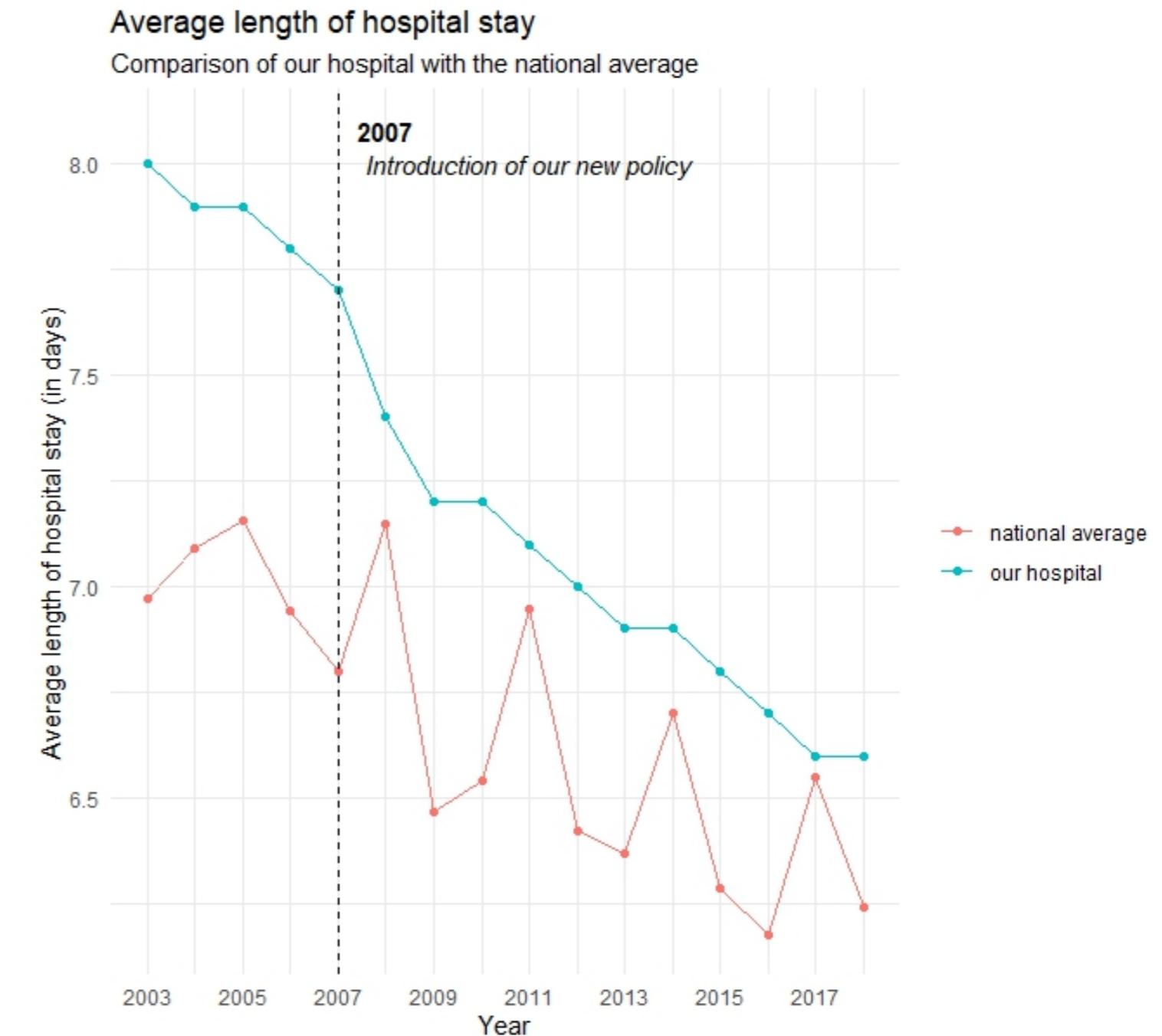
- Capture a trend
  - Line chart
- Visualize relationships
  - Bar chart, scatter plot
- Visualize distributions
  - Histogram, box plot



<sup>1</sup> <https://www.datacamp.com/cheat-sheet/data-viz-cheat-sheet>

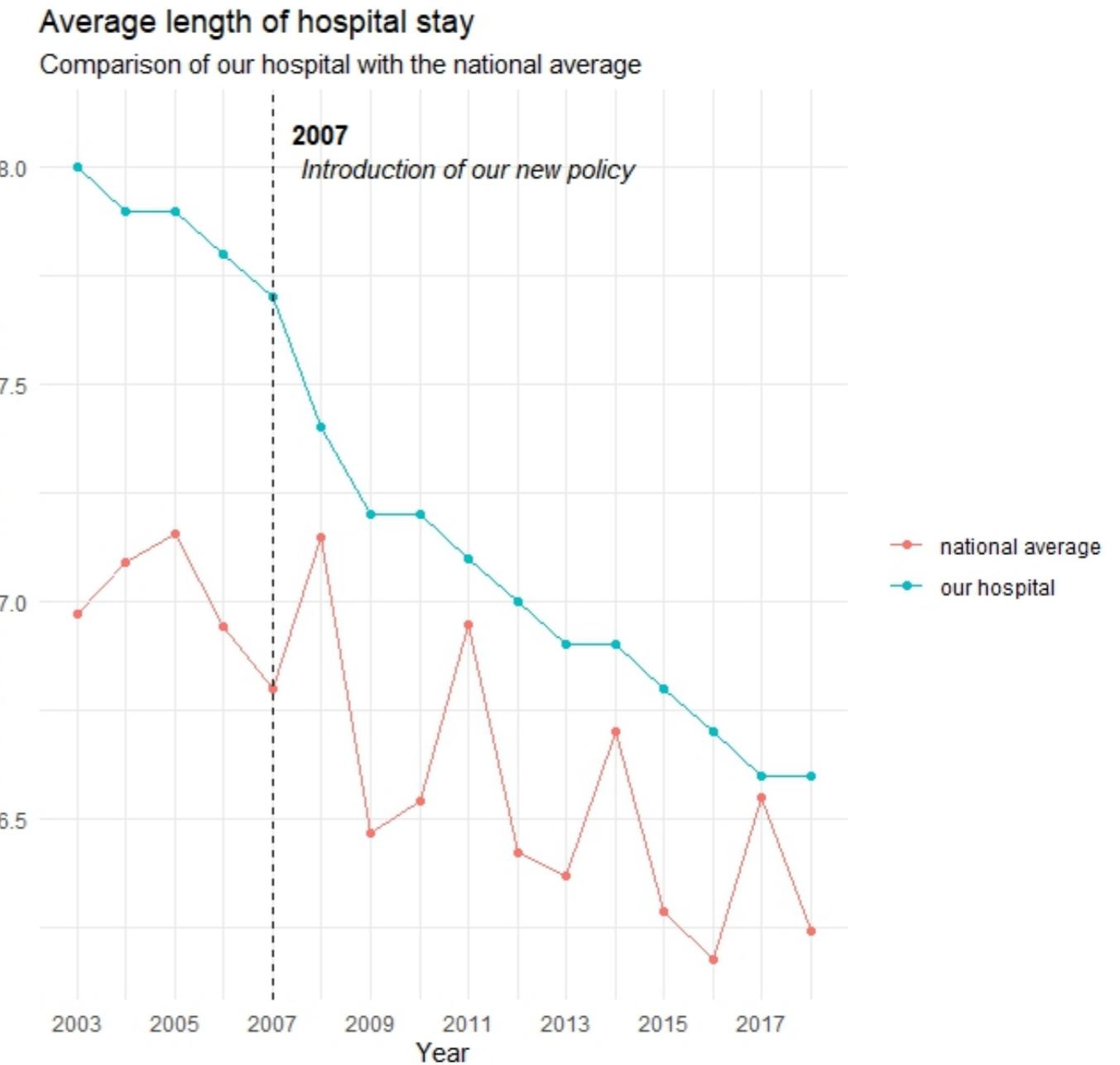
# What makes a good visualization?

- Eliminate clutter:
  - Less is more
  - Clarity and readability
- Focus attention:
  - Link to insights
  - Highlight key aspects
- Provide context: use the McCandless technique



# McCandless technique

1. Introduce the visualization
2. Anticipate obvious questions
3. State the central insight
4. Provide supporting evidence
5. Closing statement



<sup>1</sup> <https://artscience.blog/home/the-mccandless-method-of-data-presentation>

# **Let's practice!**

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# Data storytelling

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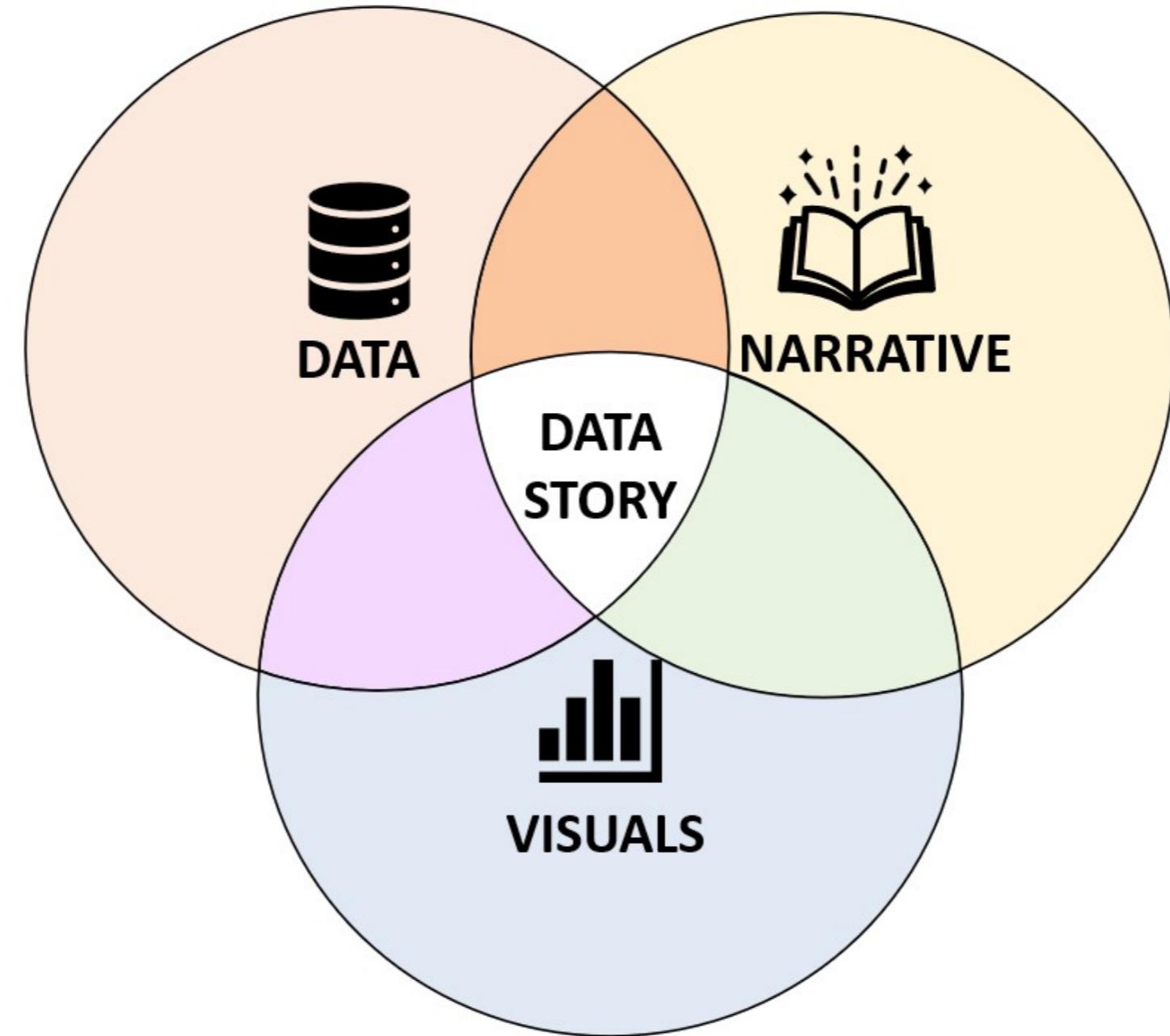
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# Why do you need to tell a story?

- Make key points more memorable
- Keep attention and engagement
- Convince your audience of your message
- Motivate them to take action



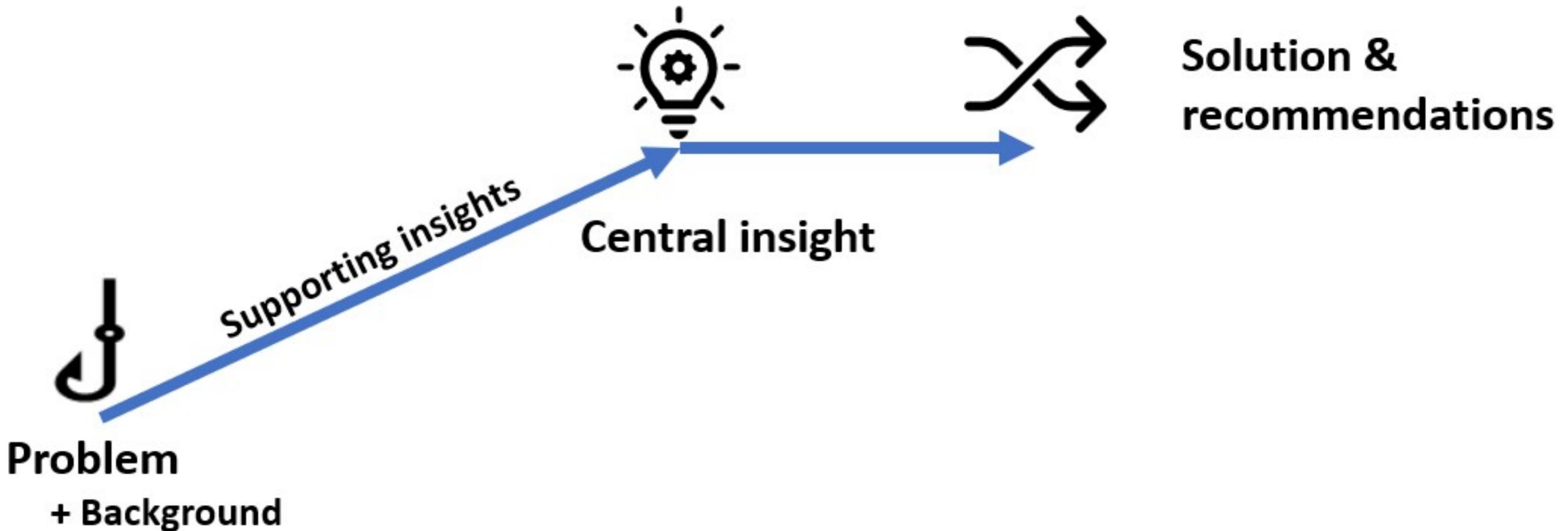
# Components of data storytelling



# Elements of a narrative

- Characters
- Problem
- Setting
- Plot
- Resolution
- Stakeholders
- Business problem
- Relevant background
- Central and supporting insights
- Solution and recommendations

# Narrative structure



<sup>1</sup> Dykes, B. (2019). Effective data storytelling. Wiley.

# Example narrative



## Problem + Background

Average customer satisfaction has decreased.  
Why?

*Supporting insights*



## Central insight

Dissatisfaction is mostly related to the aircon not working properly.

## Solution & recommendations

Hire two more technicians to ensure aircons are fixed more quickly.

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# Three keys to communicating effectively

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# The three keys



## Focus

Keeps it relevant, to the point and meaningful



## Structure

Acts as a guide and increases understandability



## Form

Ensures it is tailored to its purpose and the audience

# Focus

- Select the right data
- Select the right visualizations
- Keep your central message in mind



# Building your central message

Describe in a few sentences the take-home message

1. Problem
2. Insights
3. Impact

*(Problem) Average math scores of students at University A are in decline for the last three years.*

*(Insights) Data analysis indicates that more students enroll with a weaker starting knowledge of mathematics.*

*(Impact) By organizing math summer schools, University A can help students better prepare for the expected knowledge level of mathematics.*

# Structure

- Use structuring techniques like storytelling and McCandless
- Think about visual structure in the lay-out
- Prepare an outline in advance and use this as a blueprint



# Crafting an outline

1. Introduction
  - Data problem statement
  - Context
  - Objectives
2. Body
  - Data
  - Analysis
  - Key findings
3. Conclusions
  - Insights
  - Recommendations



# Form

- Medium: oral vs. written communication
- Language: technical vs. non-technical
- Scope: short- vs. long-form

To find the appropriate format: think about the purpose of your communication and its audience



# Thinking about your audience

- Who are they?
- What do they need to know?
- What do they want?

*The University board:*

- *Non-technical managers*
- *Need to know key findings*
- *Want specific recommendations*

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# From data to story: a case study

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# The case study: Customer Churn

- Problem: Customer churn has increased recently. Why?
- Analysis of customer churn rate over time and its characteristics
- Next task: presenting findings and recommendations



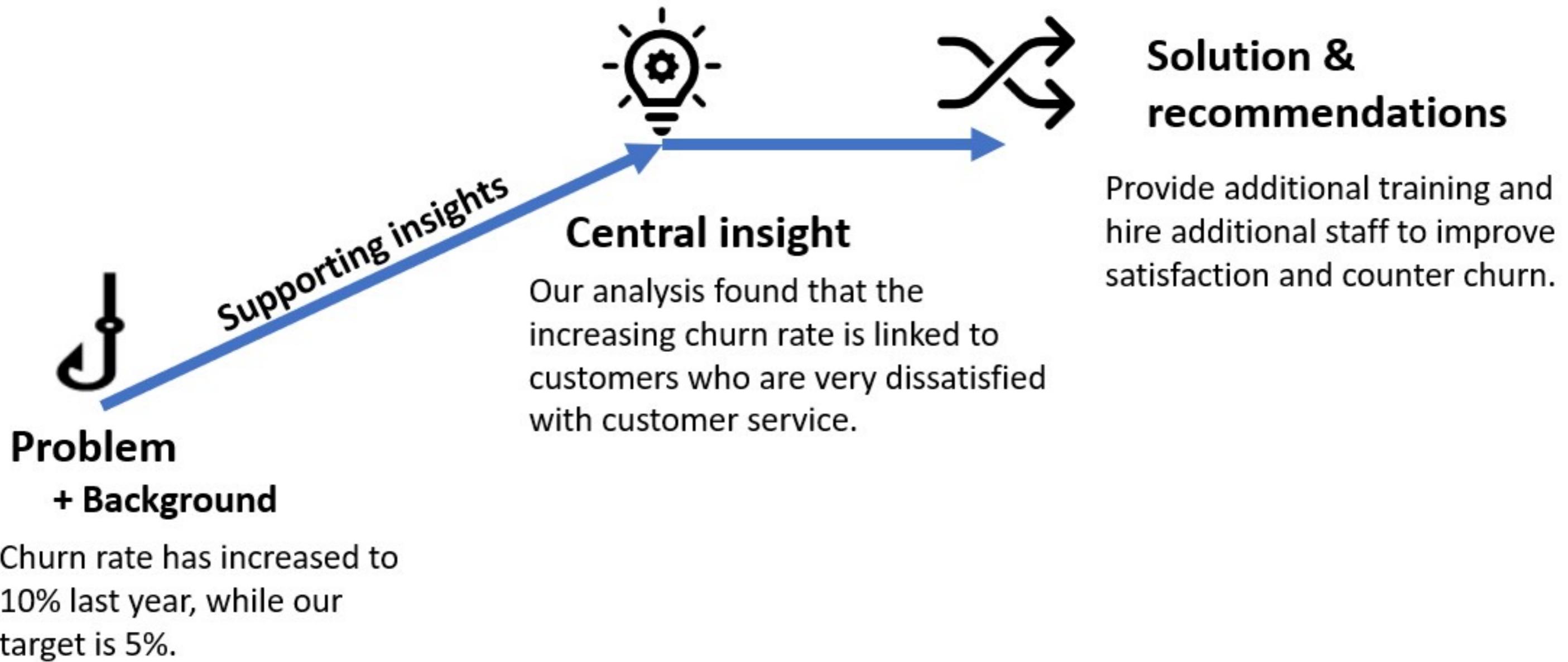
# Formulating the central message

**(Problem)** *The number of customers canceling their subscriptions has increased to 10% in the last year, while our target churn rate is 5%.*

**(Insights)** *Our analysis found that the increasing churn rate is linked to customers who are very dissatisfied with customer service.*

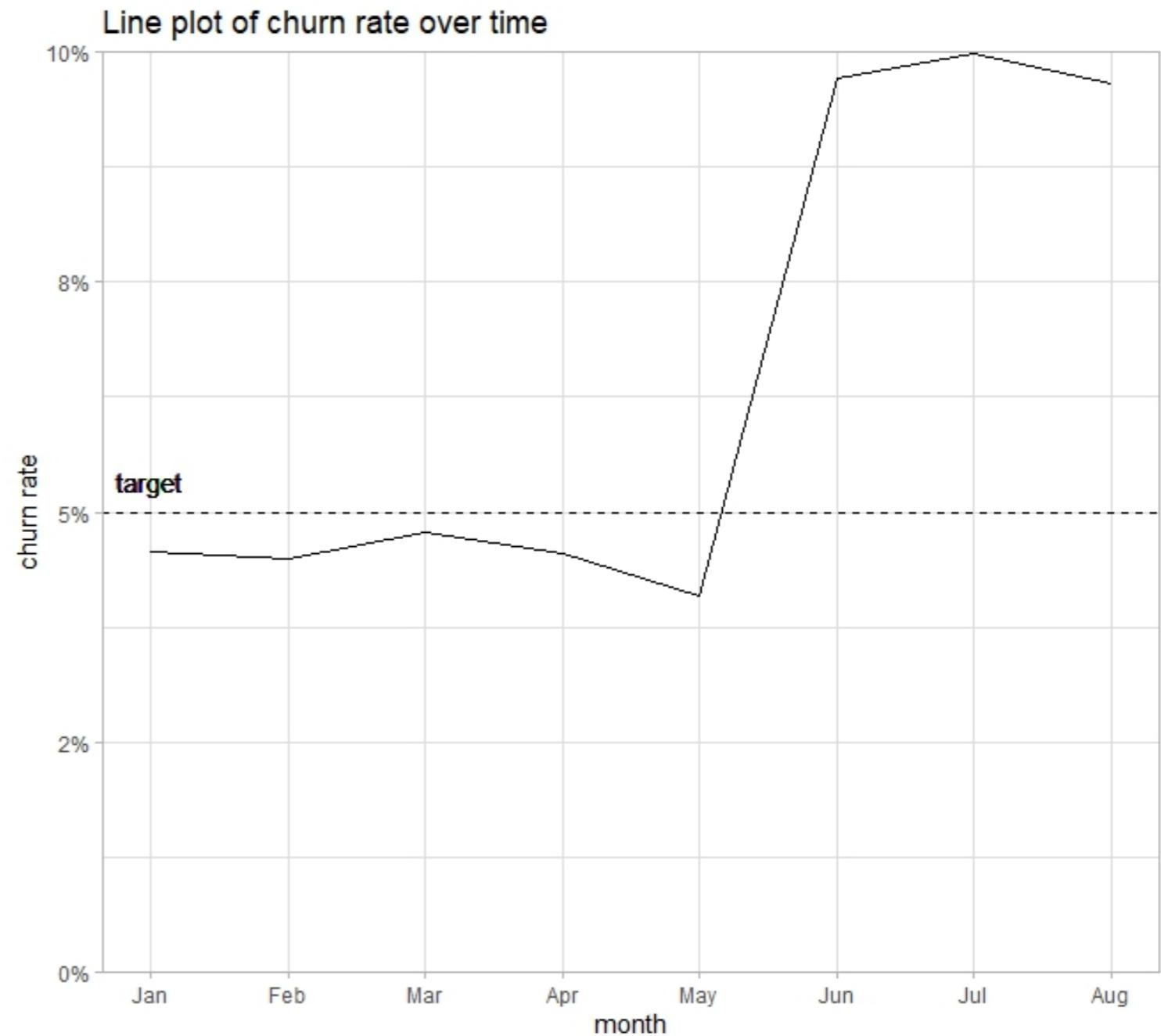
**(Impact)** *By providing additional training for customer service staff and hiring additional staff to cope with the workload, we can increase customer satisfaction and counter the increasing churn rate.*

# Setting up the narrative structure



# Choosing visualizations

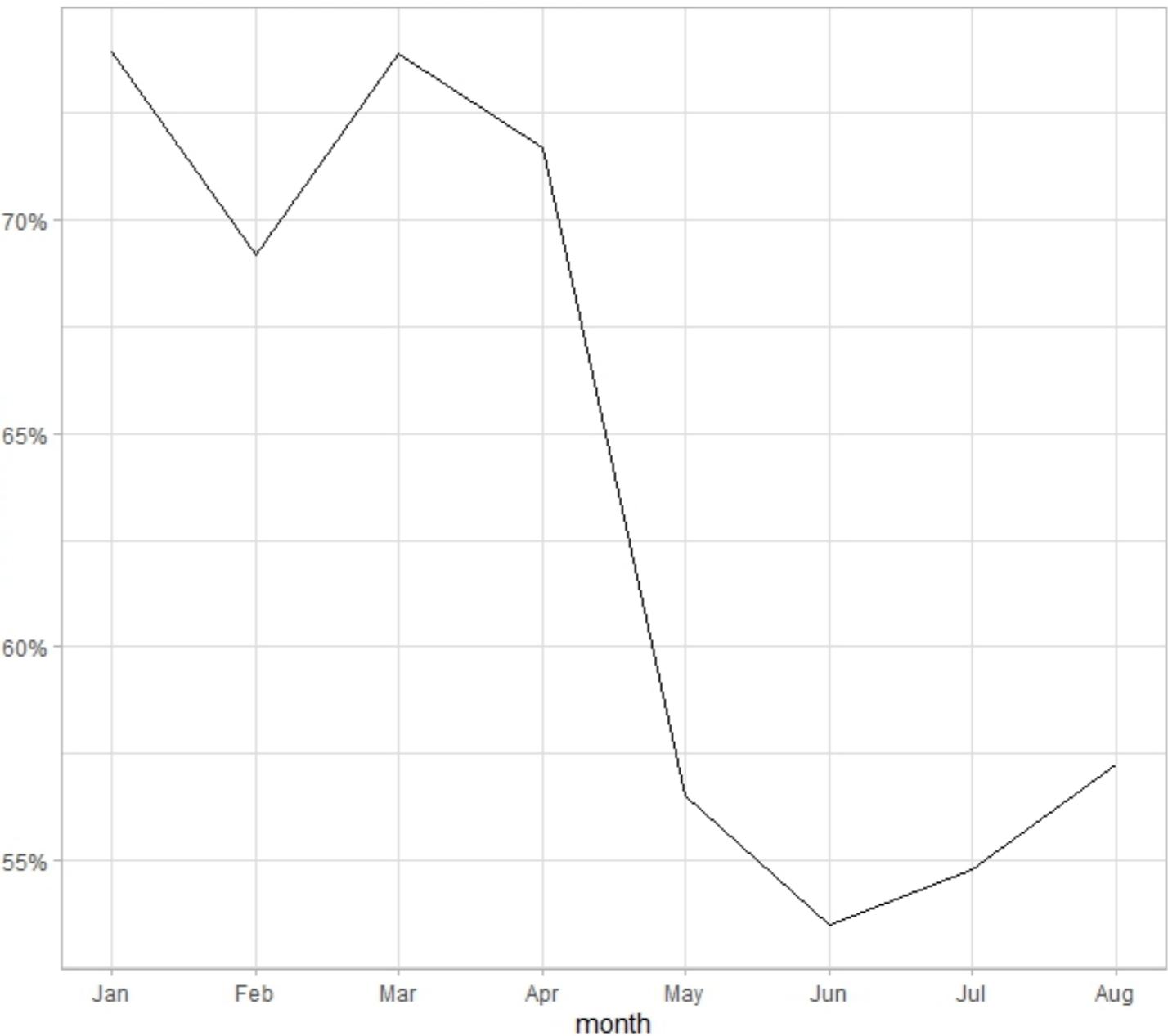
- Problem: increasing churn rate



# Choosing visualizations

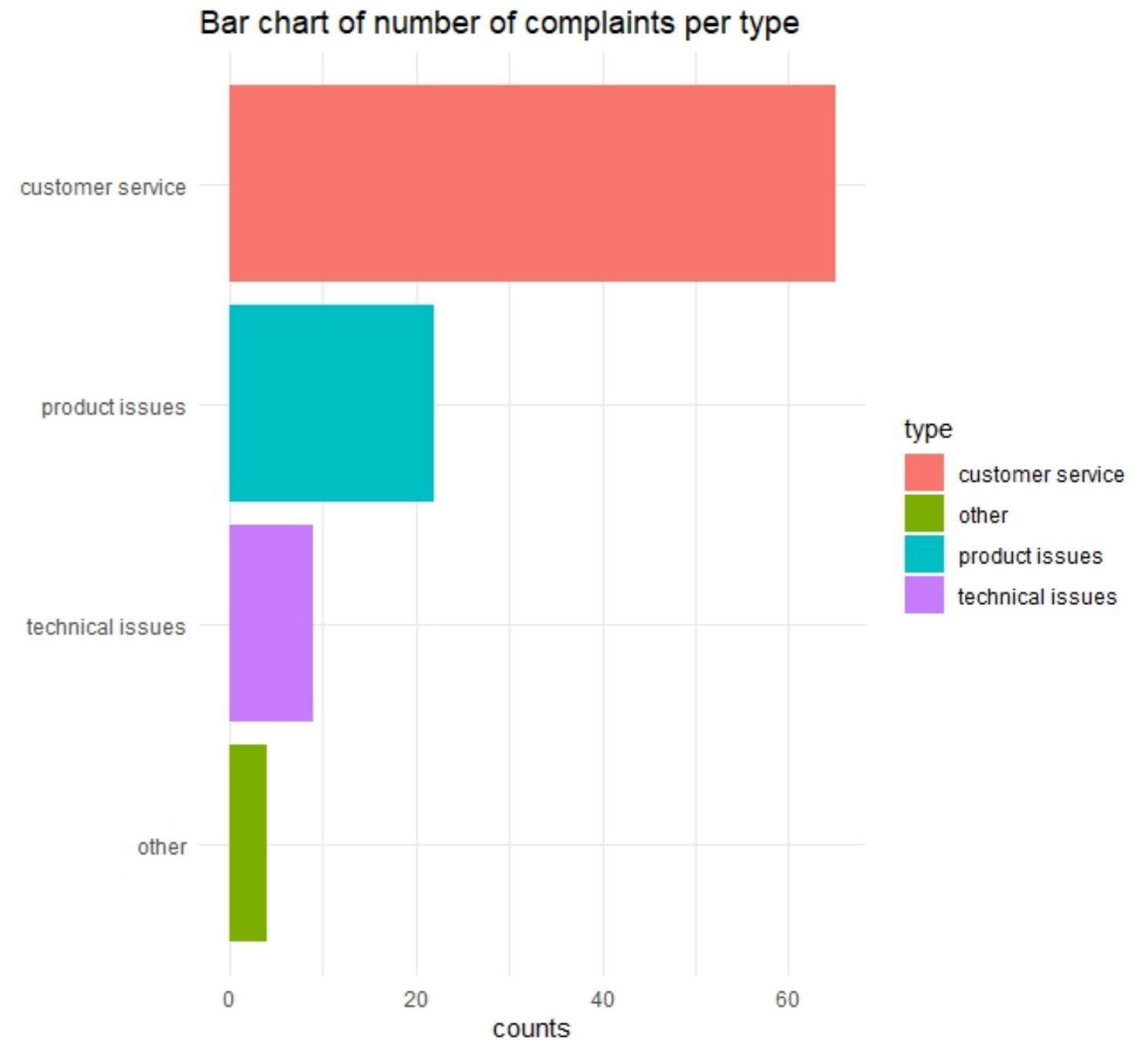
- Problem: increasing churn rate
- Insight 1: increasing customer dissatisfaction

Line plot of satisfaction rate over time



# Choosing visualizations

- Problem: increasing churn rate
- Insight 1: increasing customer dissatisfaction
- Insight 2: majority of complaints are about customer service



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# Wrap-up

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# Recap

## Chapter 1: Data literacy basics

- What it means to be data literate
- Why data literacy is an important life skill
- How to get from data to insights
- Data-driven decision making

## Chapter 3: Getting insights from data

- The four types of analytics
- How to choose the right type of analytics for your question or business problem

## Chapter 2: Reading data

- Where to find data
- How to distinguish different data types
- How to manage data
- How to handle common data problems

## Chapter 4: Communicating insights

- How to use visualizations and storytelling
- The three keys to communicating effectively

# Next steps

Suggested theoretical follow-up courses:

- Introduction to Statistics
- Understanding Data Science
- Understanding Data Visualization
- Understanding Machine Learning
- Data Communication Concepts

Suggested introductory courses:

- Introduction to Python
- Introduction to R
- Introduction to SQL
- Introduction to Power BI
- Introduction to Tableau

# **Congratulations!**

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