

# What happened?

FORMING ANALYTICAL QUESTIONS



**Konstantinos Kattidis**

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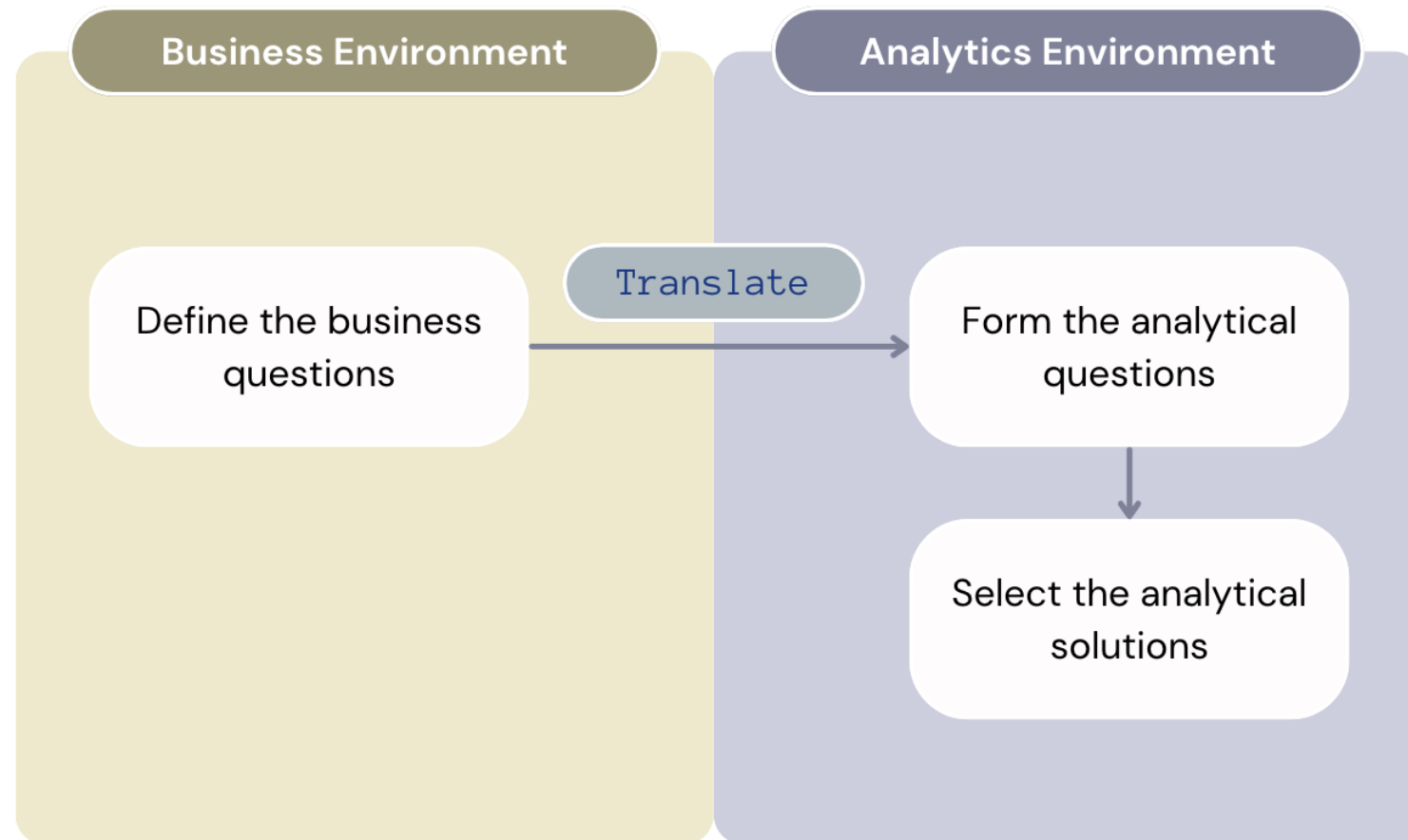
# Understanding descriptive analytics solutions

Descriptive analytics:

- Tracking trends
- Figuring out what works and what doesn't
- Overview of the business

Industry applications:

- Healthcare, Manufacturing, Fashion



# Healthcare industry example

## Business question:

How can we improve patient satisfaction?

## Analytical question:

What are the most common complaints of patients based on the last 3 months' data?

## Technique:

- Data visualization (e.g. word cloud)



# Manufacturing industry example

## Business question:

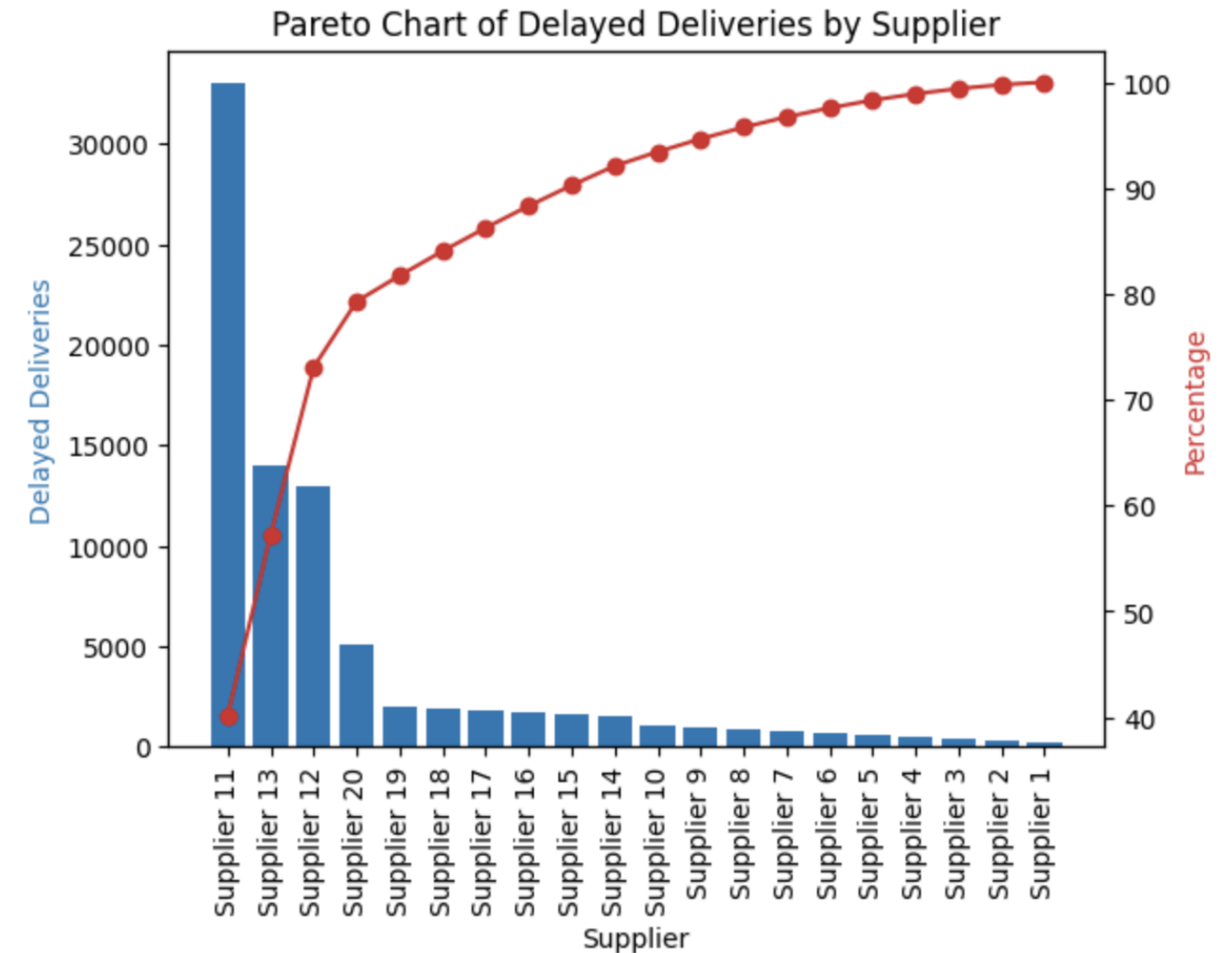
How can we improve the supplier delivery efficiency?

## Analytical question:

Which suppliers have the most delayed deliveries based on the last 6 months' data?

## Technique:

- Pareto chart



# Fashion industry example

## Business question:

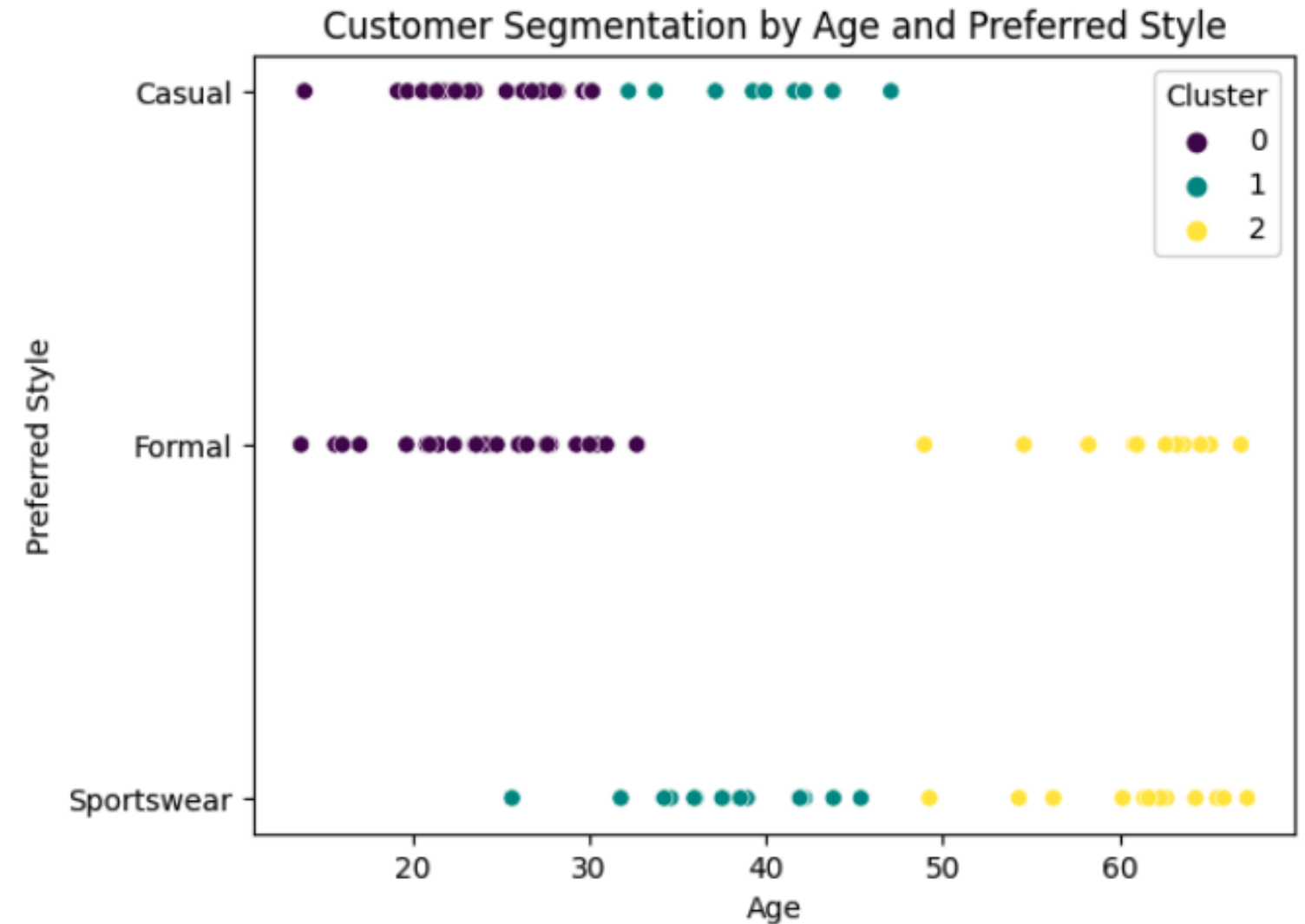
How can we develop customized products that meet our customer preferences?

## Analytical question:

What are the distinct groups of customers based on their purchasing behavior and style preferences?

## Technique:

- Clustering analysis (e.g. scatter plots)



# Scenario - PureHealth (1/2)



An online store that sells health & wellness products such as supplements and organic foods.

How can we improve website engagement to increase sales?

Assumption: measuring **website engagement** by **average session duration**

Find out pages associated with higher session duration

# Scenario - PureHealth (2/2)

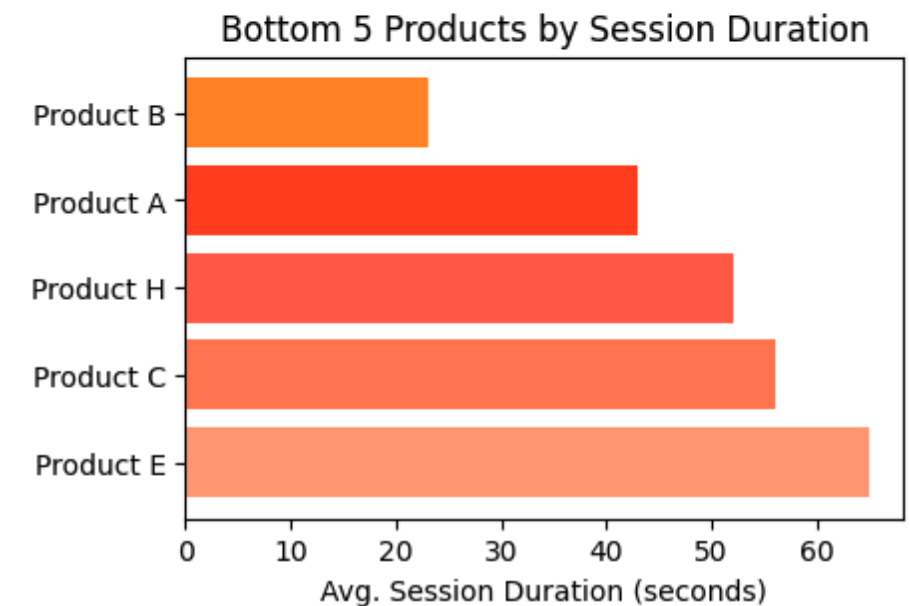
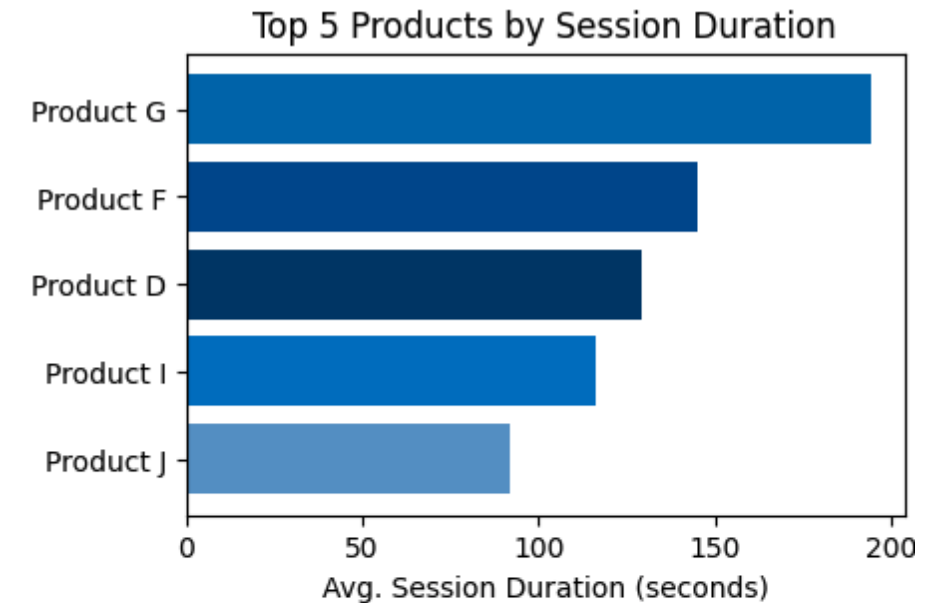
## Analytical questions:

Which product pages on the website have the highest and lowest session duration based on the last six-month traffic data?

What is the demographic profile of users who visit high session duration pages compared to those who visit for less duration during the same period?

## Technique:

- Data aggregation, visualization



# Let's practice!

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# Why did it happen?

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# Understanding why something happened

Diagnostic analytics solutions help:

- Identify the root causes of problems
- Make data-driven decisions to:
  - Optimize processes
  - Improve efficiency
  - Reduce costs

# Education industry example

Business question:

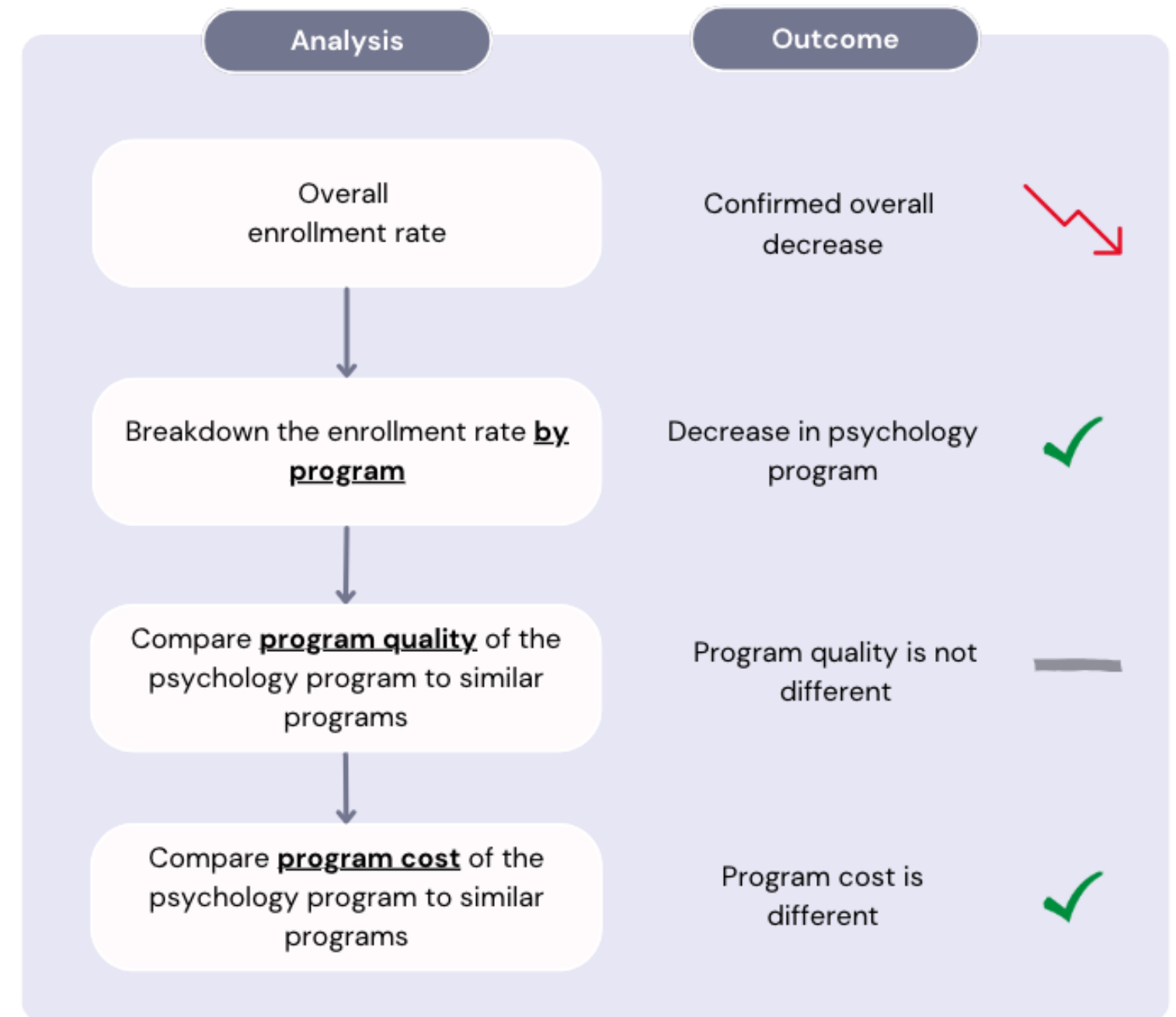
Why is there a decline in program enrollments since last year?

Analytical question:

What specific factors are contributing to the decline in enrollment rates based on the last two years' enrollment data?

Technique:

- Drill-down analysis, hypothesis testing



# Manufacturing industry example

Business question:

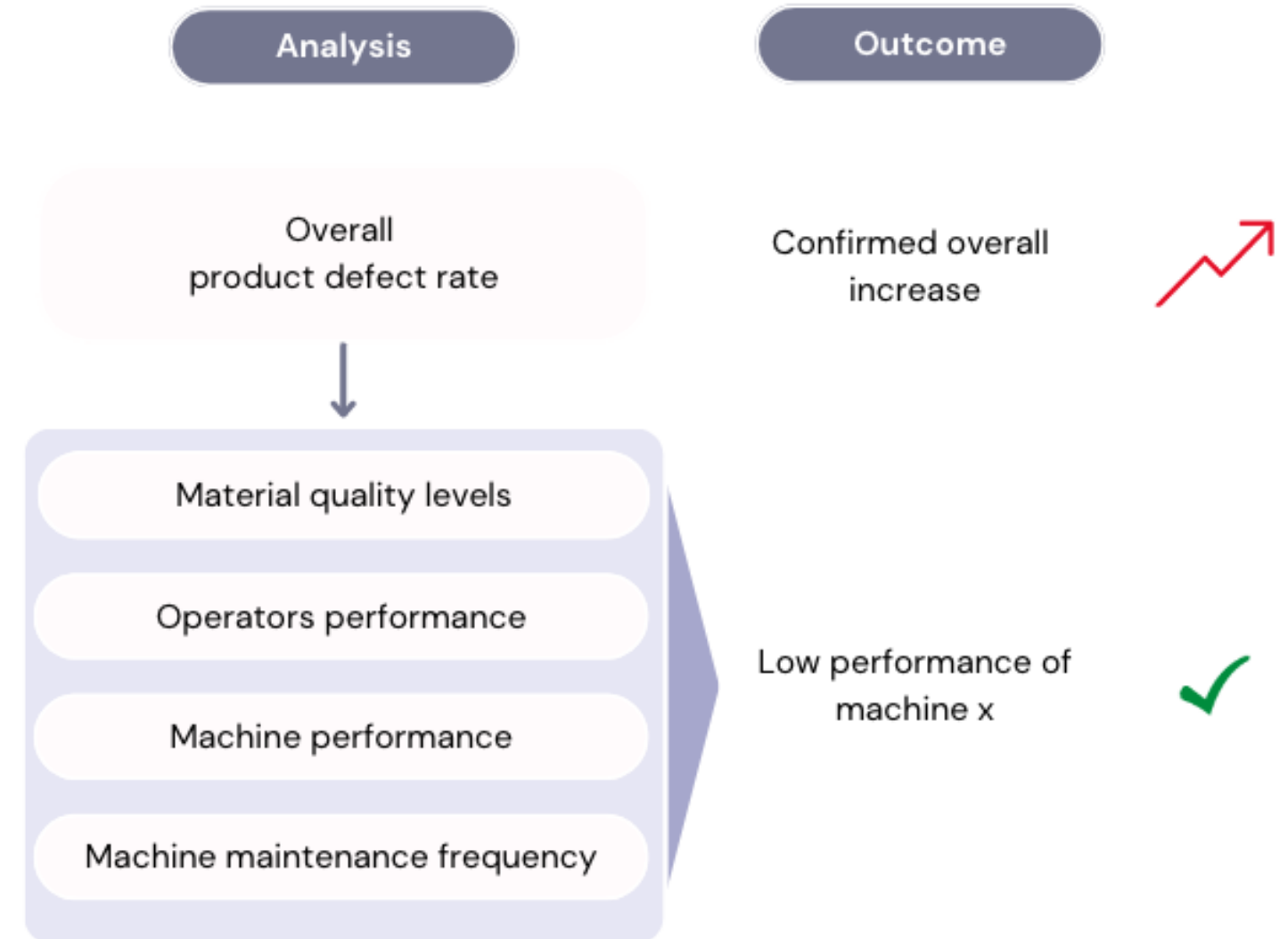
Why is the defect rate of our products increasing?

Analytical question:

Which manufacturing processes are contributing to the increase in defect rate?

Technique:

- Root cause analysis



# Marketing industry example

Business question:

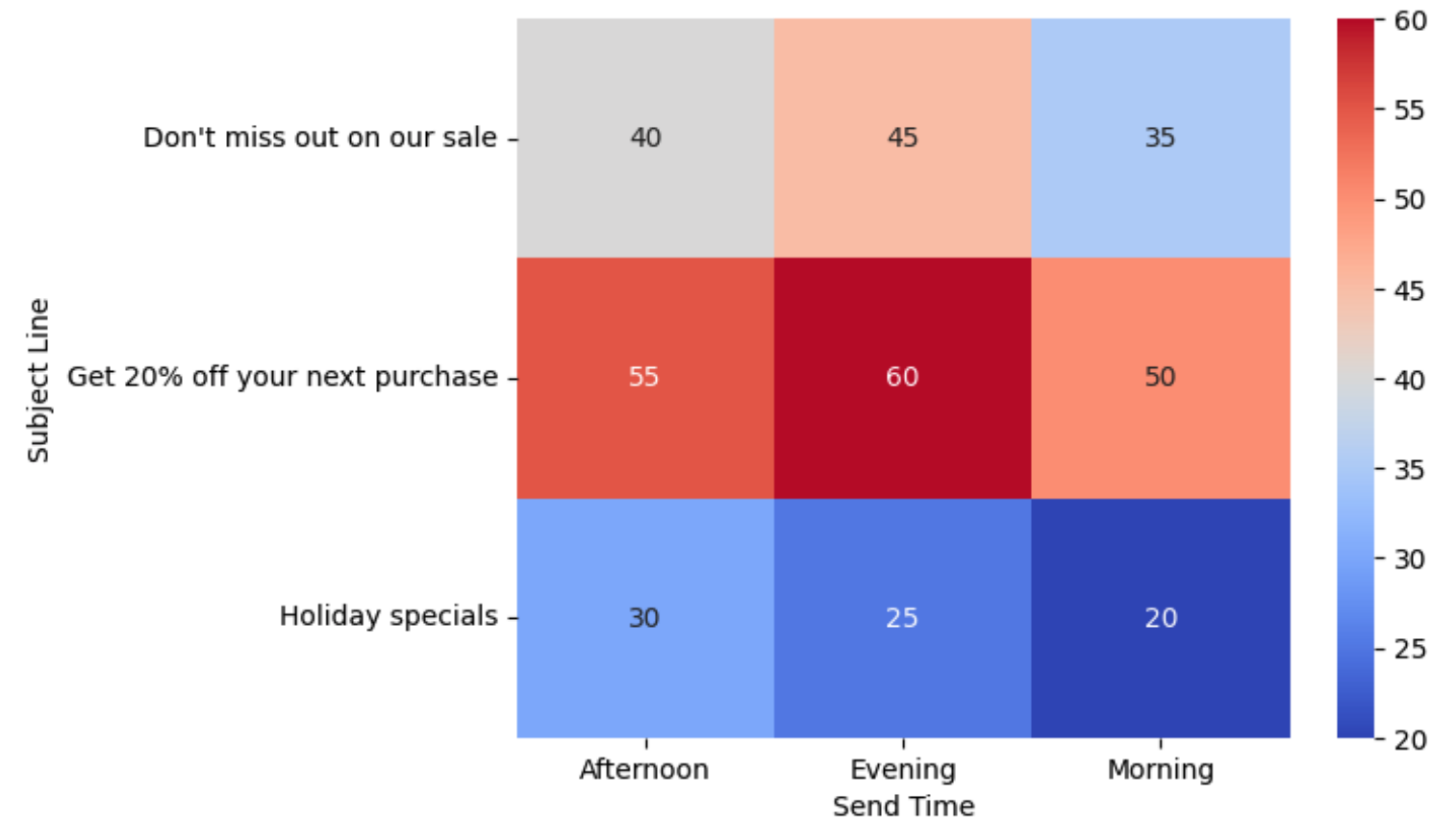
Why are our email open rates declining?

Analytical question:

Which factors are contributing to the decline in email open rates?

Technique:

- Correlation analysis



# Retail industry example

Business question:

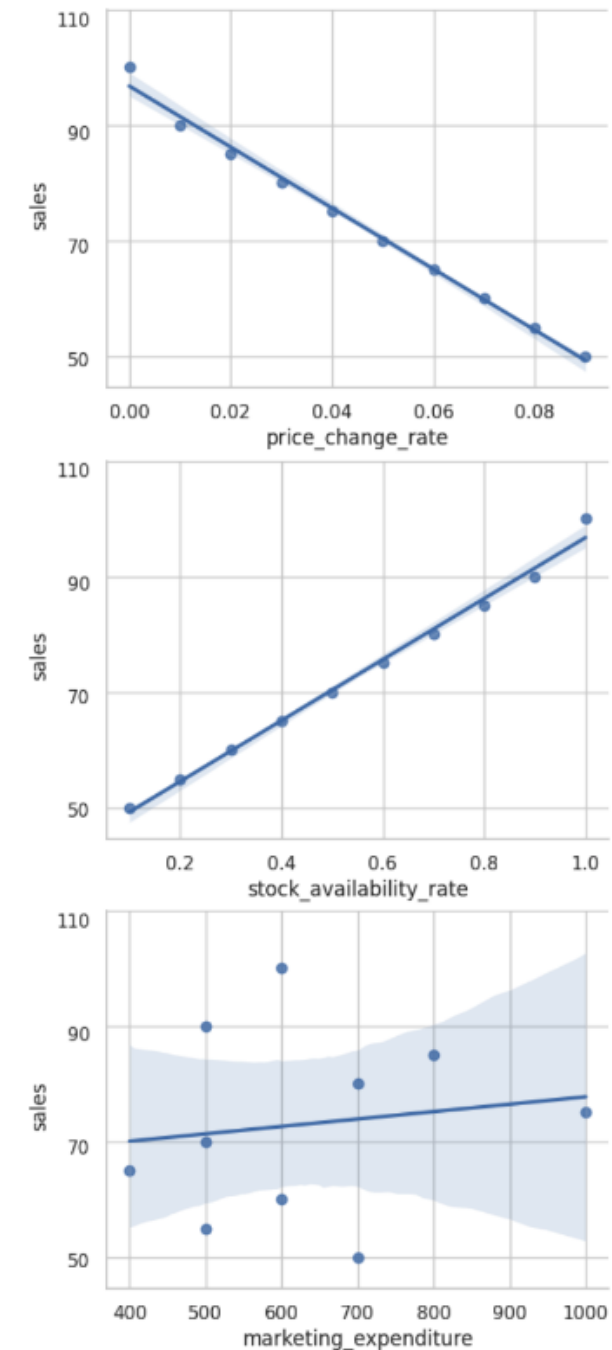
Why is there a decline in sales in the past quarter?

Analytical question:

What is the relationship between the decline in sales and relevant variables?

Technique:

- Regression analysis



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# What will happen?

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# Understanding what will happen

Predictive analytics is focused on:

- Analyzing past data to make predictions
- Predicting what is likely to happen in the future

# Retail industry example

## Business question:

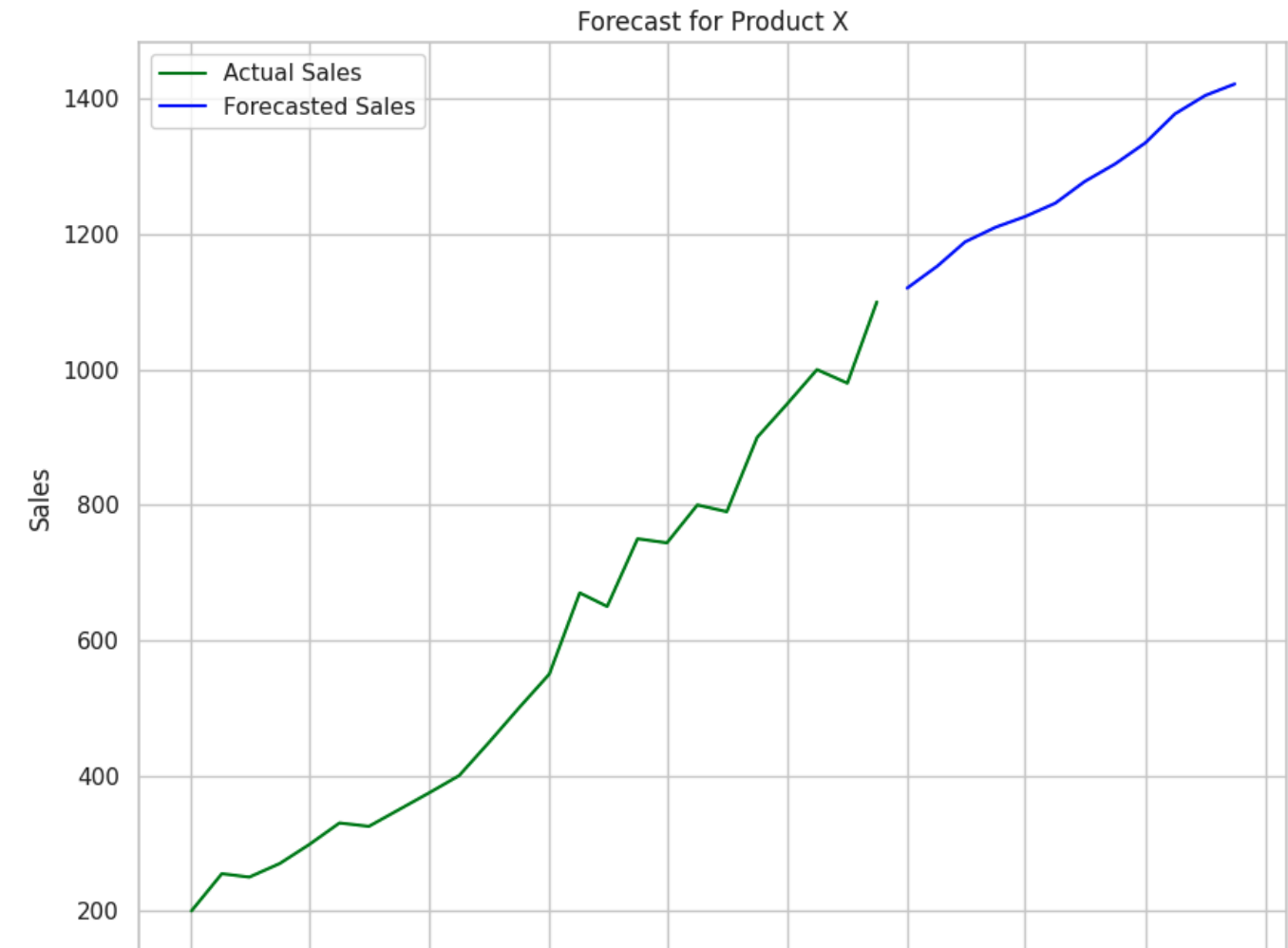
How much should we order to meet customer demand and minimize inventory costs?

## Analytical question:

What is the predicted customer demand for product x based on various factors?

## Technique:

- Time-series forecasting



# Insurance industry example

## Business question:

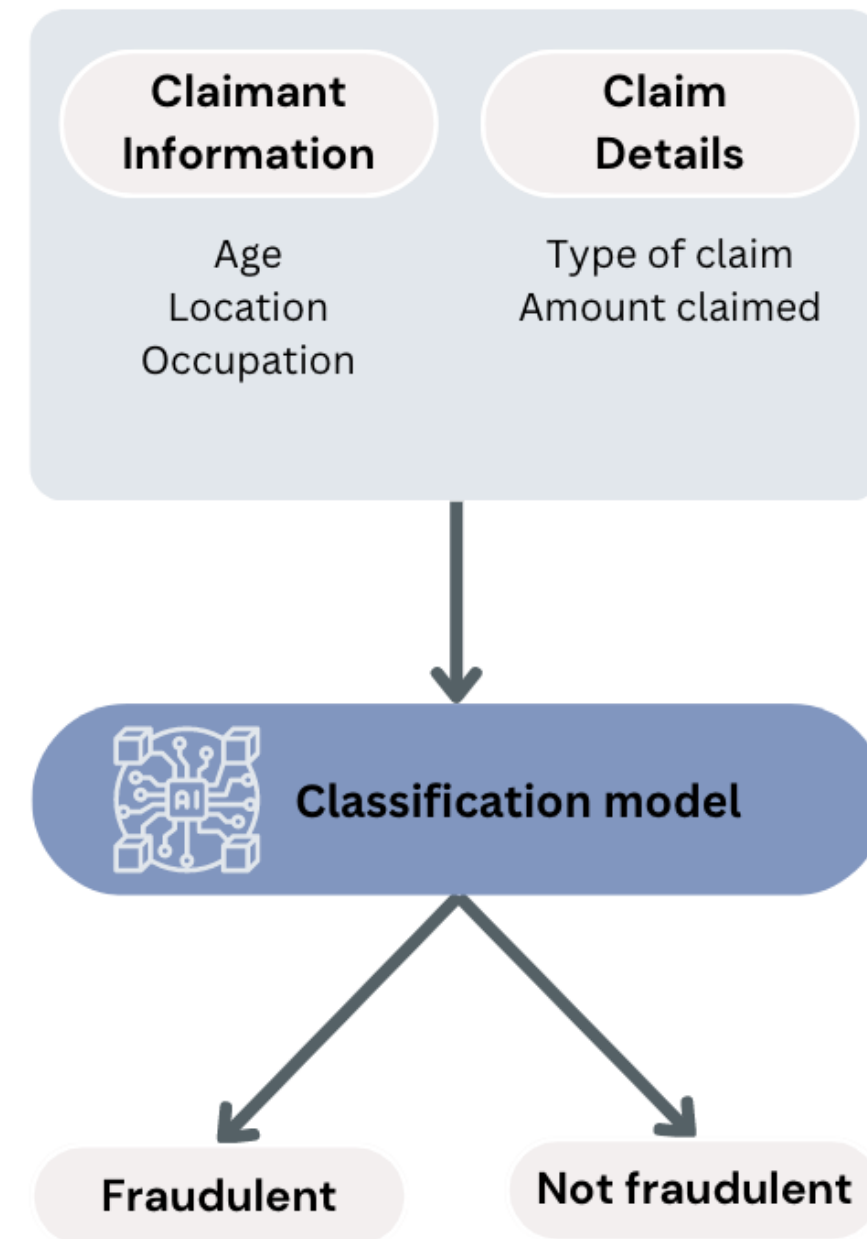
How can we identify fraudulent claims and mitigate the risk of fraudulent payouts?

## Analytical question:

What is the likelihood of a claim being fraudulent based on various variables from historical claim data?

## Technique:

- Classification prediction algorithm



# Healthcare industry example

## Business question:

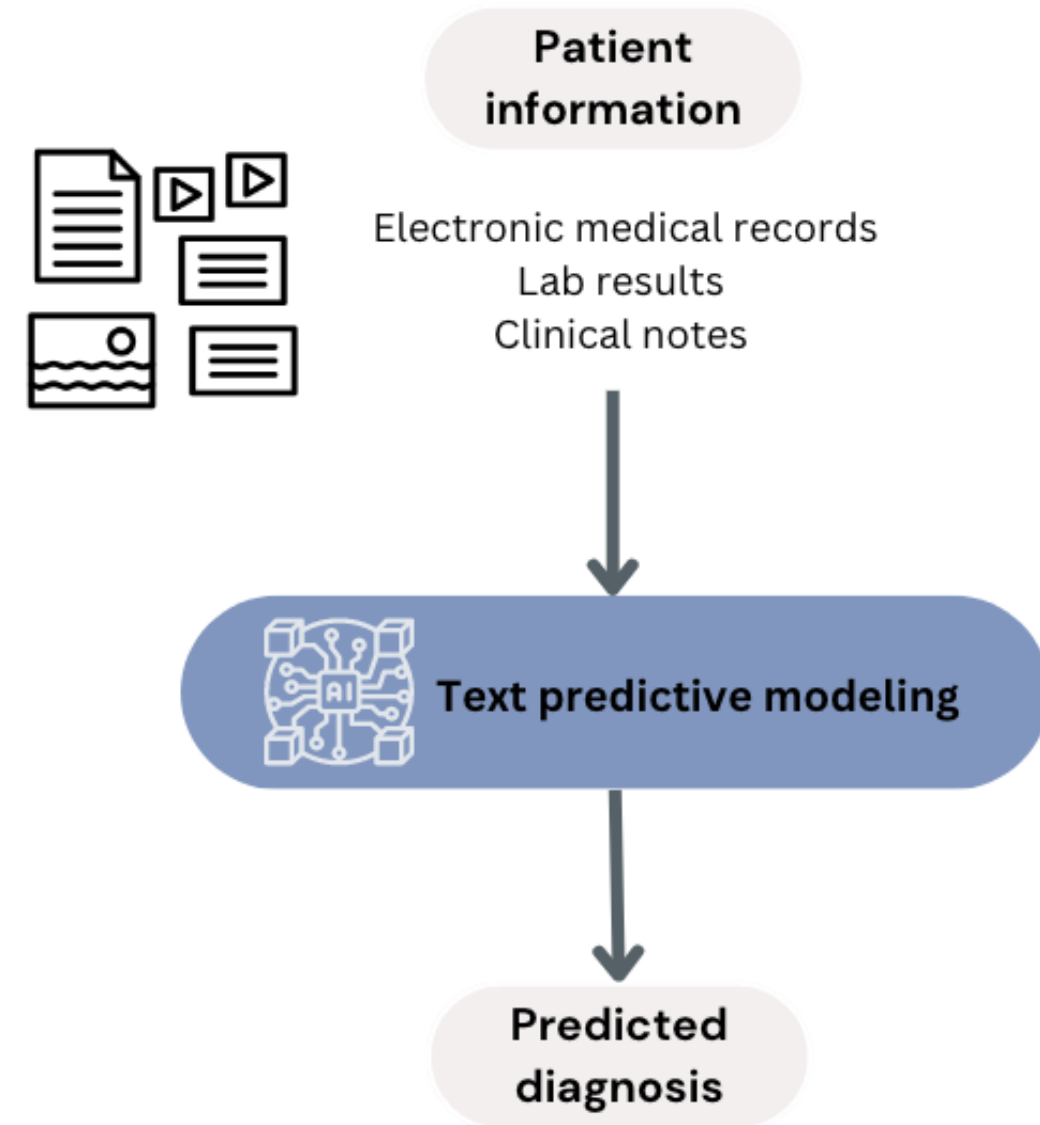
How can we improve patient outcomes by identifying which patients are at risk for certain health conditions?

## Analytical question:

Can we predict which patients are at risk for certain health conditions based on relevant variables?

## Technique:

- Text predictive modeling



# Scenario in the finance industry (1/2)

## Business question:

How can we identify which loan applications are most likely to result in default?

## Analytical questions:

**Descriptive analytics:** Which loan applications resulted in default in the past?

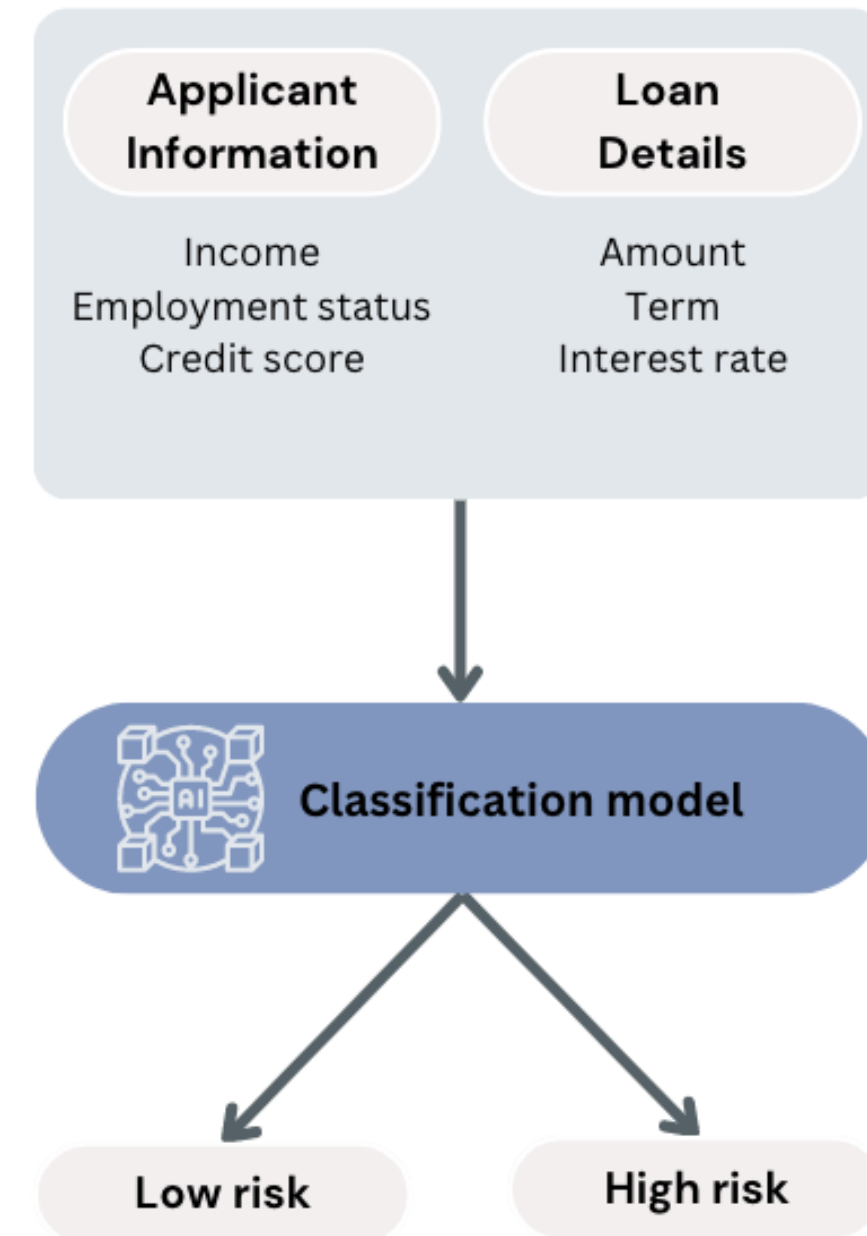
**Diagnostic analytics:** Why certain loan applications are usually resulting in defaults?

**Predictive analytics:** Can we predict the likelihood of a loan application resulting in default based on various variables in the application?

# Scenario in the finance industry (2/2)

## Technique:

- Classification prediction algorithm such as **logistic regression**
- The model can be applied to new loan applications to predict the likelihood of default
- This would help mitigate the risk of default and improve overall portfolio performance



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# What should we do next?

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# Understanding what should be done

Predictive analytics answers questions about the future

- What will happen?

Prescriptive analytics goes a step further to prescribe the course of action.

- What should be done?
- What can we do to make something happen?

# E-commerce industry example

## Business question:

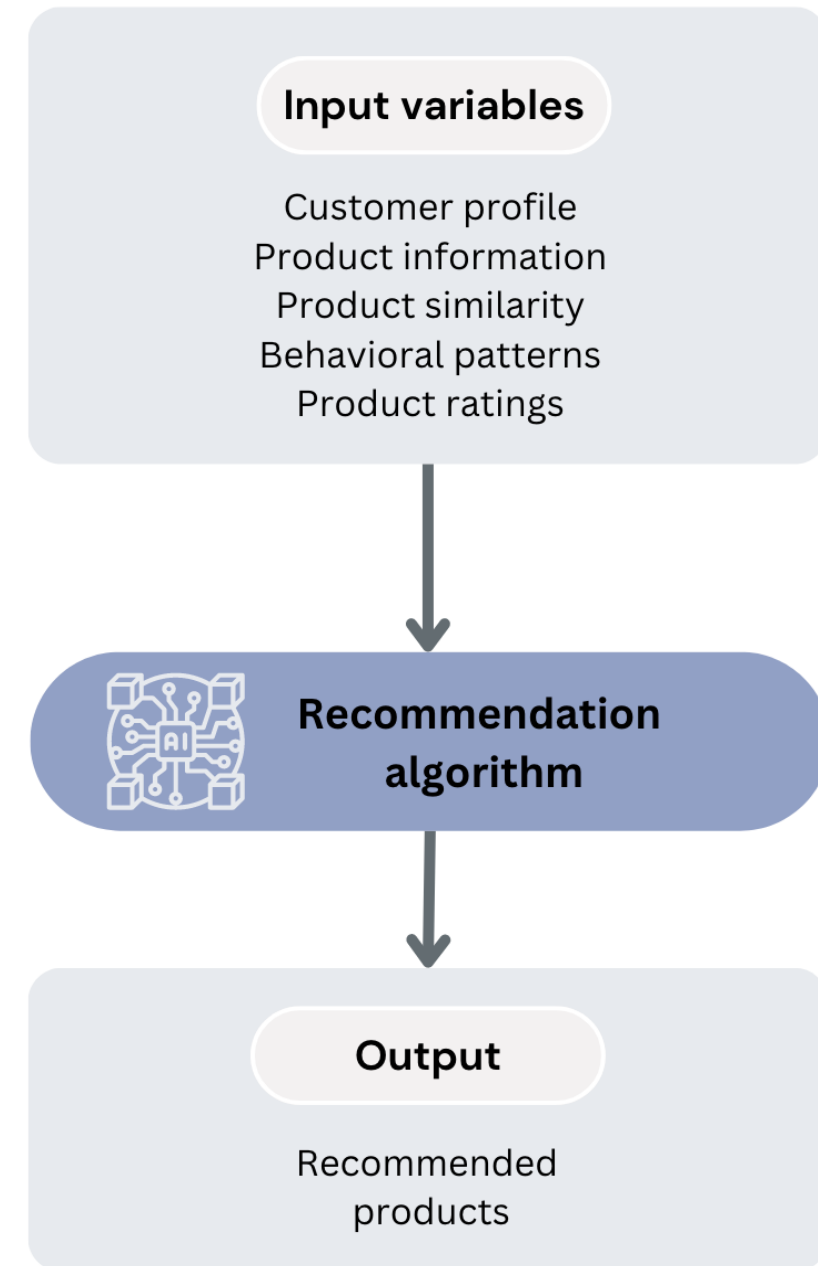
How can we recommend relevant products to our customers to increase sales?

## Analytical question:

How can we develop an algorithm to recommend relevant products to customers, based on relevant variables?

## Technique:

- Product recommendation algorithm



# Banking industry example

## Business question:

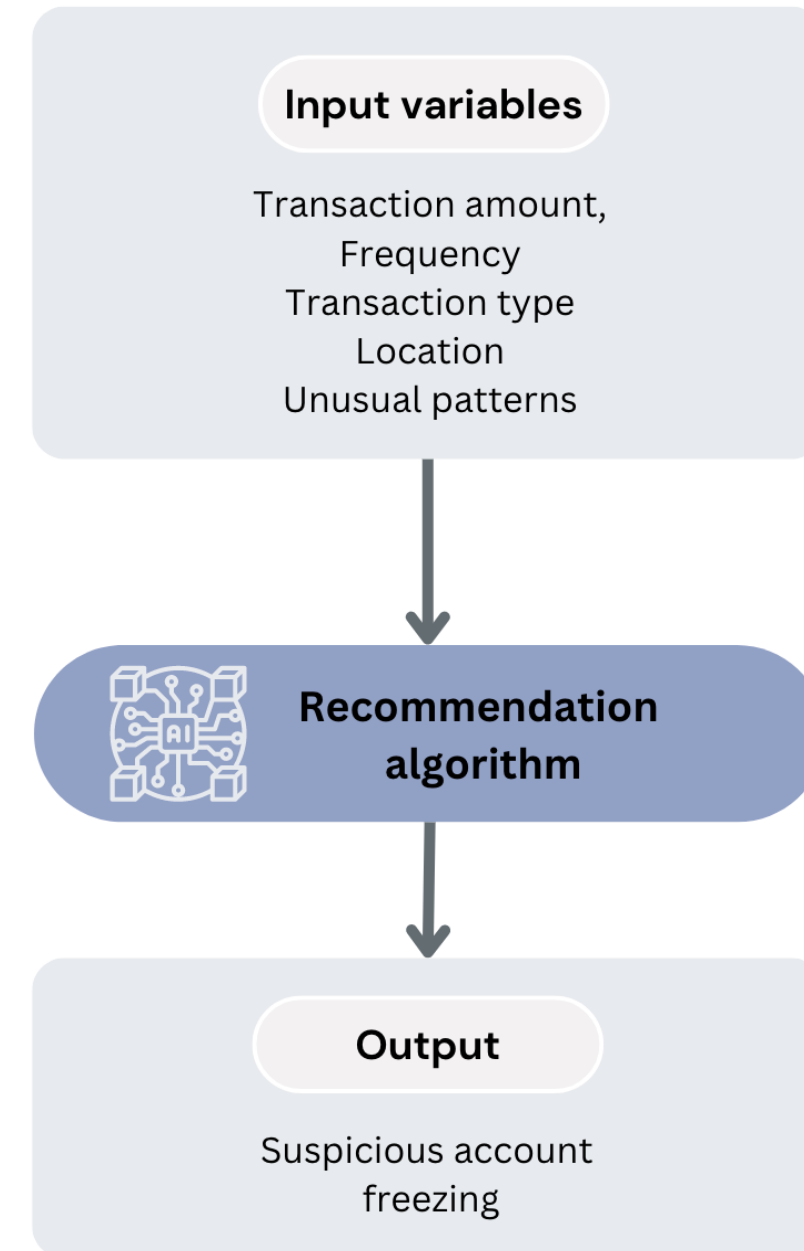
How can we detect and prevent bank fraud in real-time to protect our customers and minimize financial losses?

## Analytical question:

How can we identify fraudulent behavior in our data, and automatically prescribe the best course of action?

## Technique:

- Fraud detection recommendation algorithm



# Marketing example

## Business question:

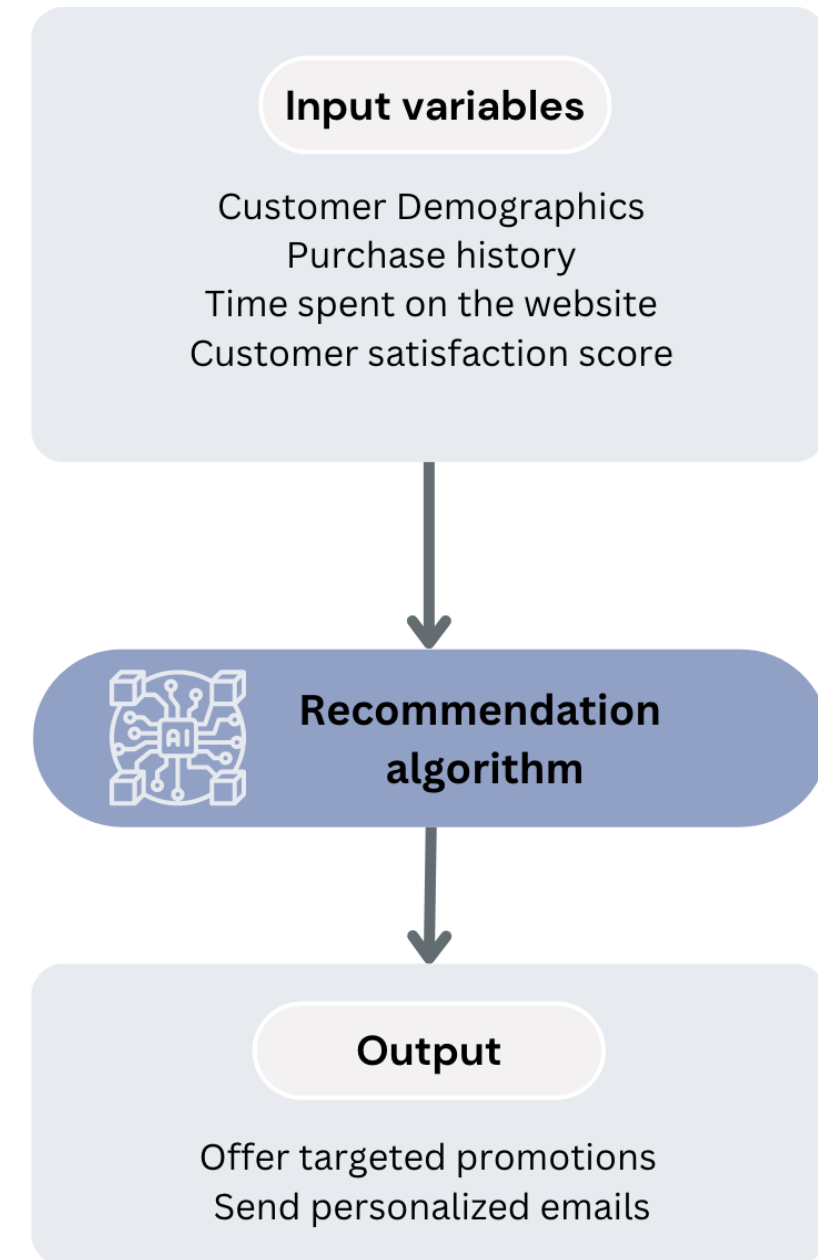
What marketing strategies should we use to reduce customer churn?

## Analytical question:

How can we develop a model to identify customers who are at risk of churning and prescribe the most effective marketing strategies to retain them?

## Technique:

- Recommendation algorithm



# Airline scenario (1/2)

Business question:

How can we optimize airline ticket prices in real-time to maximize sales?

Analytics questions:

- **Descriptive analytics:** What ticket prices in the past resulted in higher revenue?
- **Diagnostic analytics:** Why have the ticket prices last week result in sub-optimal profits?
- **Predictive analytics:** What is the expected customer demand in the coming weeks?
- **Prescriptive analytics:** What is the optimal price for a specific flight at a specific time to maximize sales?

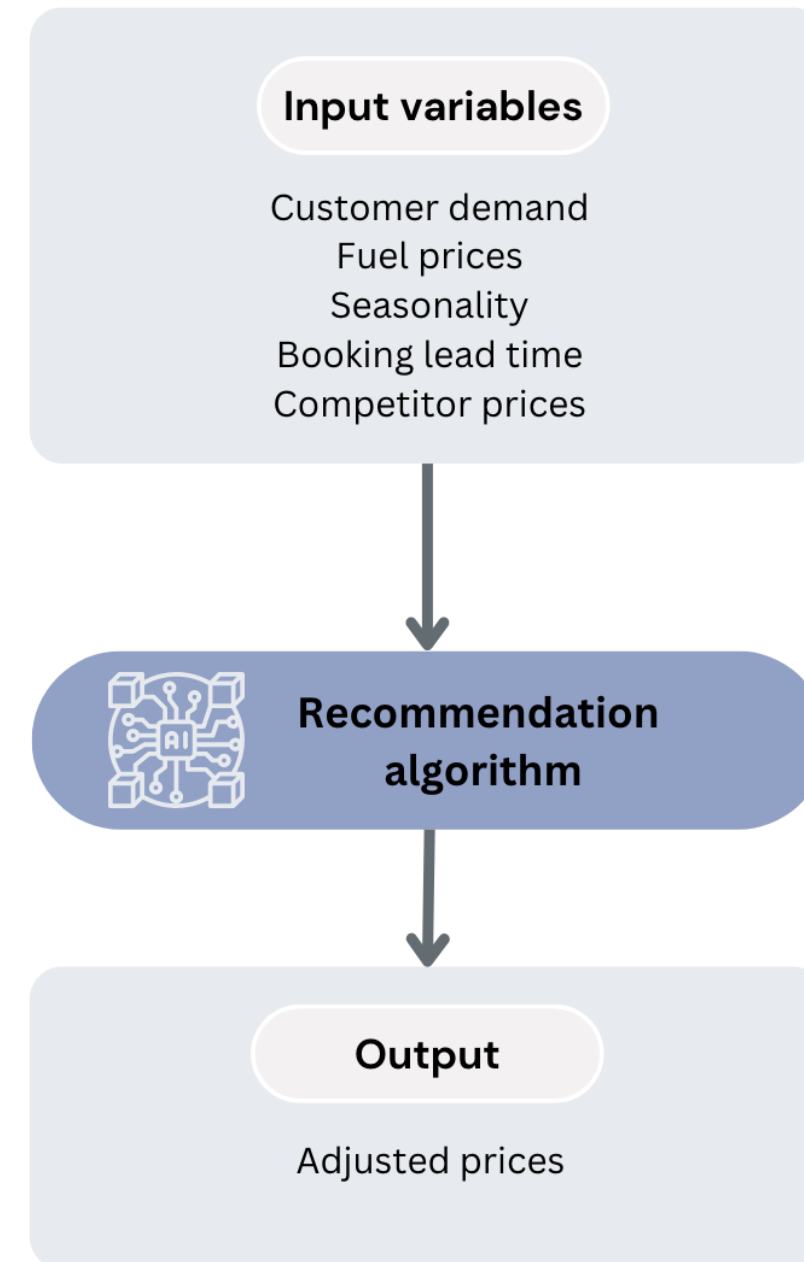
# Airline scenario (2/2)

## Technique:

- Price recommendation system

## Outcome:

- Dynamic adjustment of prices considering the following variables:
  - Customer demand
  - Fuel prices
  - Weather



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# Congratulations!

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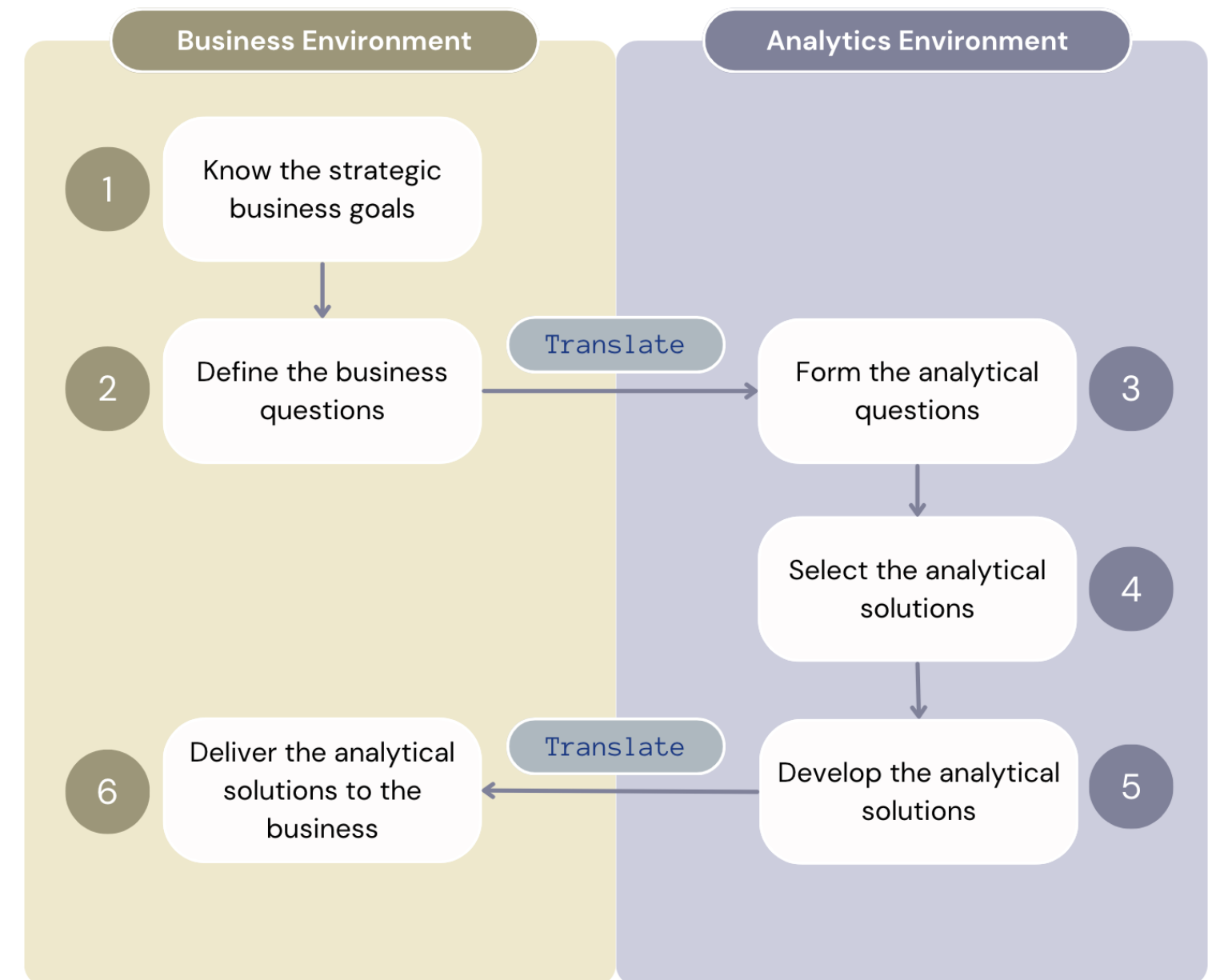
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# Chapter 1

## Delivering value through data

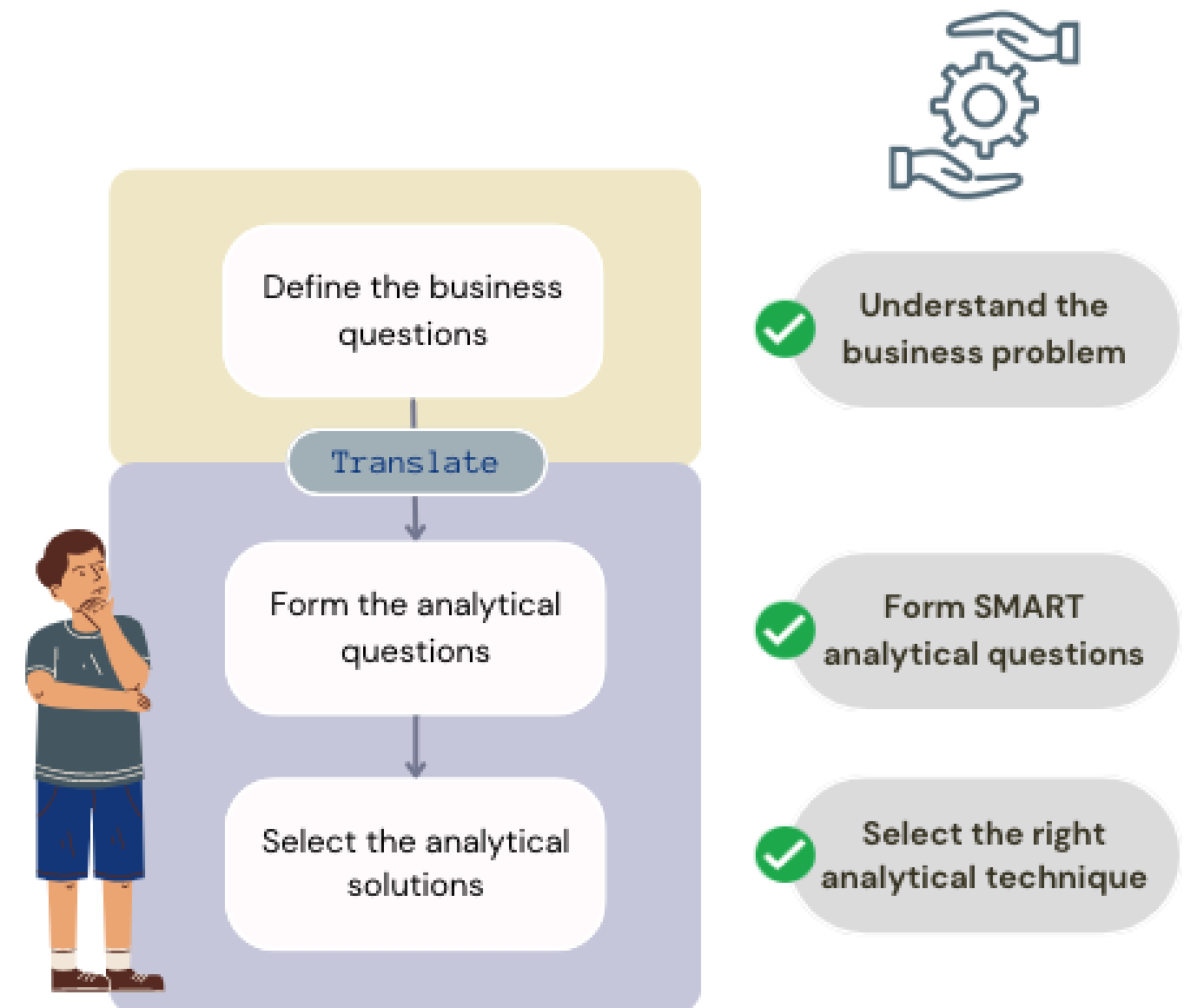
- The workflow to derive value from analytics
- The difference between a well-formed analytical question and a business question
- The main challenges the analytics teams face during this translation process



# Chapter 2

## Impactful solutions need the right questions

- Communication techniques to **understand the business problem**
- Techniques to **form SMART analytical questions**
- Techniques and considerations to **select the analytical solution**

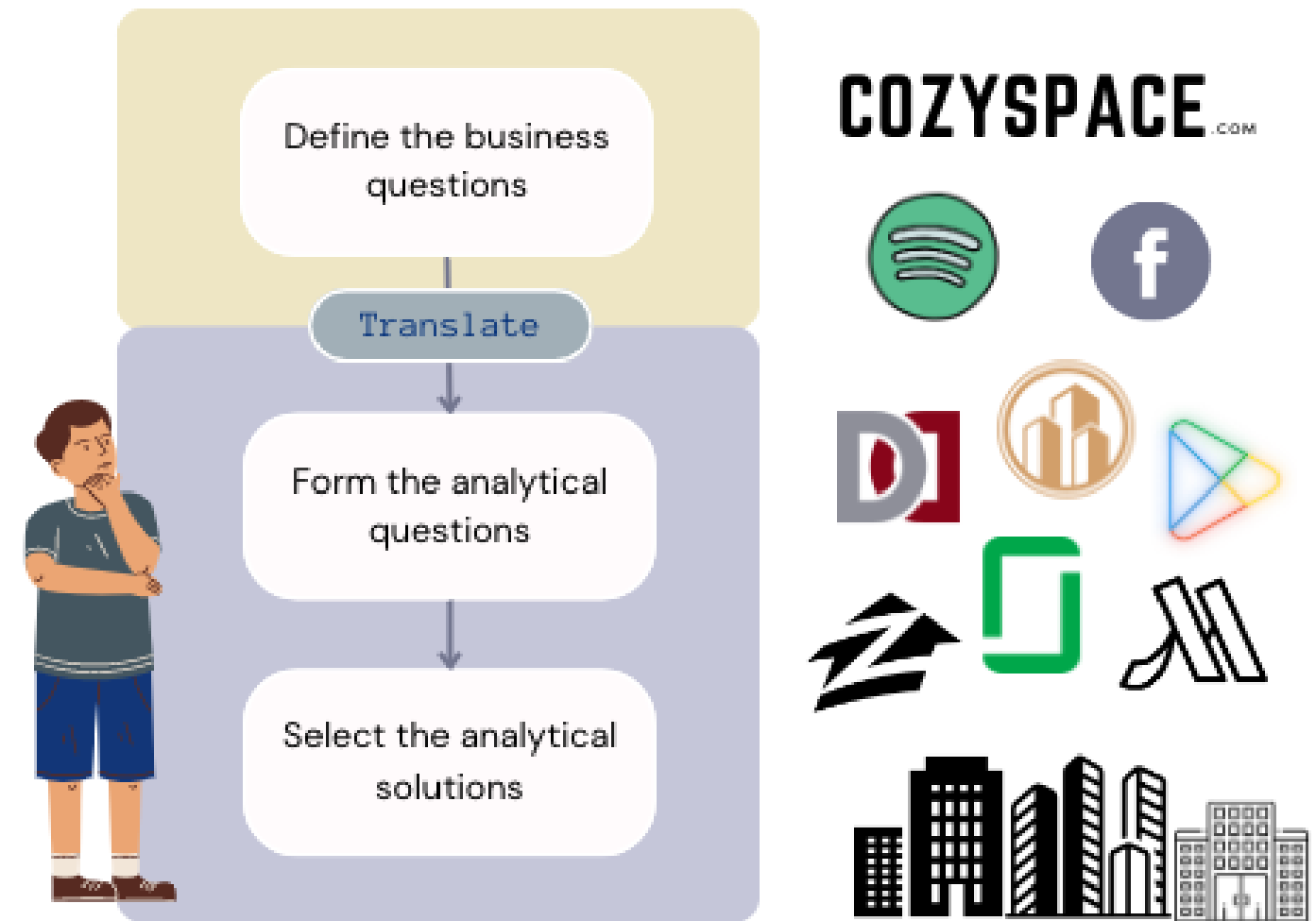


# Chapter 3

## Analytical questions in action

How this translation process and analytical solutions apply to:

- Different industries
- Different **business problems**



# Congratulations!

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