

DATA ANALYTICS WITH COGNOS-GROUP 2

PROJECT 5: Product Sales Analysis

Phase2: Innovation

Empathize:

- In this phase, we will engage with the business or client to deeply understand their challenges. This could involve discussing their struggles with inventory management inefficiencies, marketing strategies that may not be working optimally, or their need for data-driven insights.

- We will conduct interviews, surveys, and discussions to gather insights into their specific pain points and objectives related to sales data analysis. This empathetic understanding will guide our project's direction.

Define (purpose and scope of project):

- Clearly explain the purpose of our project, which is to analyse sales data using IBM Cognos to extract specific insights.

- Determine the scope of the analysis. This includes issues such as deadlines for sales data, metrics to analyse (e.g., revenue, product sales, number of customers), and key questions we aim to answer (e.g., What are the best selling products? When do sales peak? What do customers want?).

Once these aspects are defined, we establish the boundaries and goals of our project.

Ideate:

In the idea phase, we encourage creative thinking in our team. We can explore new ways of analysing sales data that go beyond traditional methods.

- Consider using IBM Cognos to deliver insights in unique ways. Let's consider other data visualization techniques, predictive analytics, or machine learning models that can add value to our research.

- The goal is to generate new and innovative ideas for our project.

Prototype:

- Create prototype or sample analysis reports using IBM Cognos. This is a useful snapshot of our mind and consciousness.

- Develop a mock idea or prototype of how we plan to present research findings. This helps stakeholders visualize and to take action on the end result and to provide feedback.

Test (collect and edit answers):

- We should share our model with relevant stakeholders, colleagues, or potential end users. We collect data on the clarity, applicability, and effectiveness of the model.

- We can use this feedback to refine our analysis methods, visualization techniques and overall structure of the paper.

Implement:

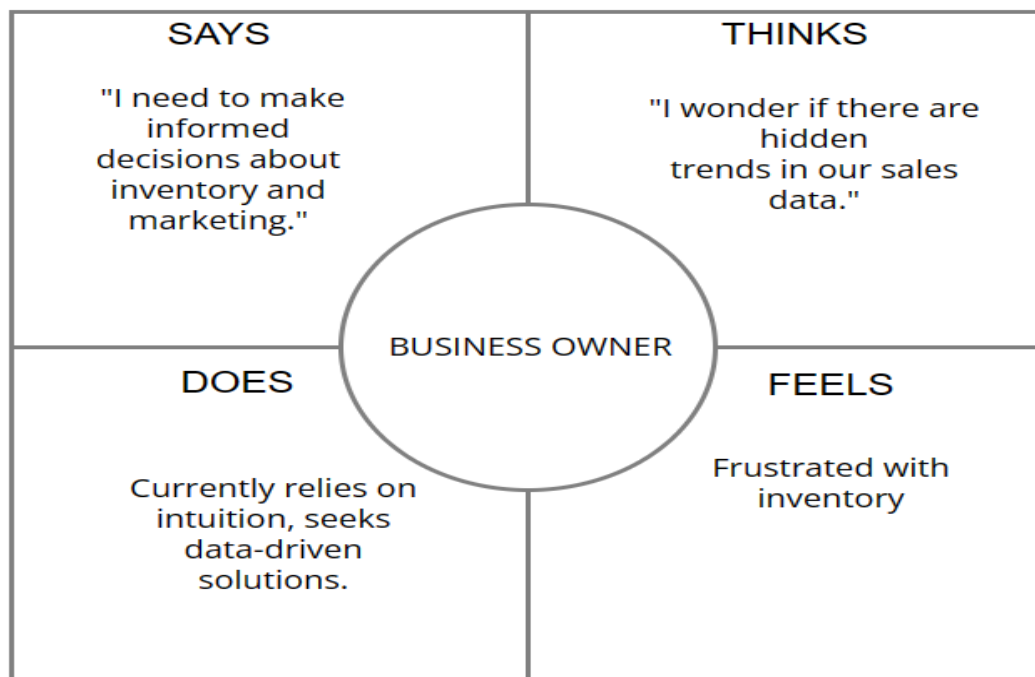
- Once our approach is refined and validated, let's move on to more accurate sales data analytics using IBM Cognos.

- Use selected methodologies and tools to extract insights into best-selling products, peak seasons and customer preferences. This phase involves working with real data to gain actionable insights.

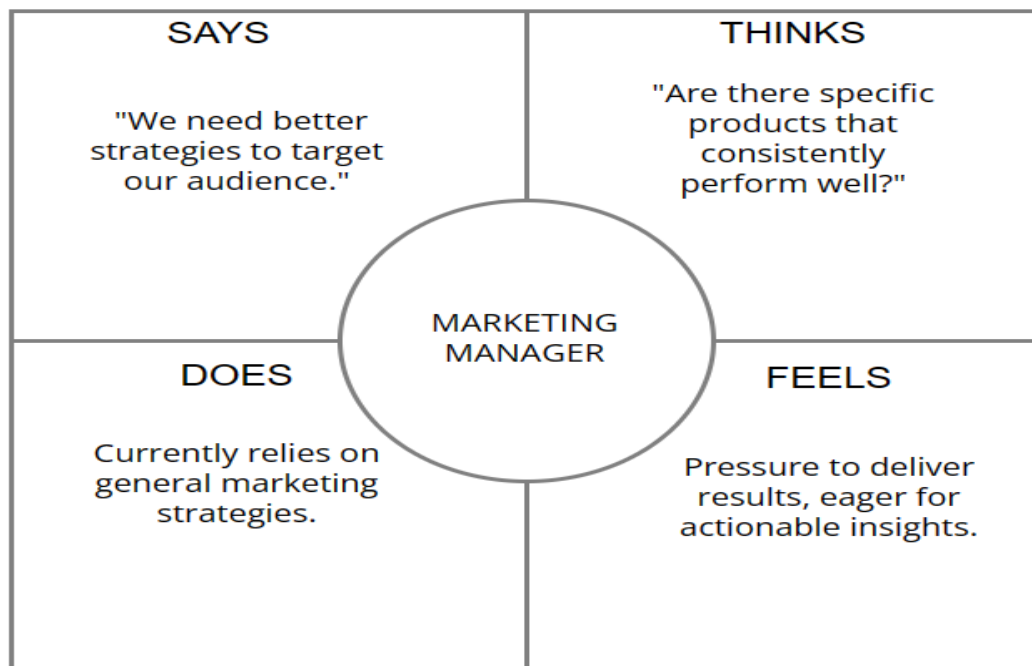
Evaluate:

- Once we have implemented the assessment, we need to evaluate its impact on performance. Let's see if the insights have helped improve inventory and marketing strategies.
- Let's reflect on the overall success of our project, what worked well and consider areas where we can apply the lessons learned to future projects.

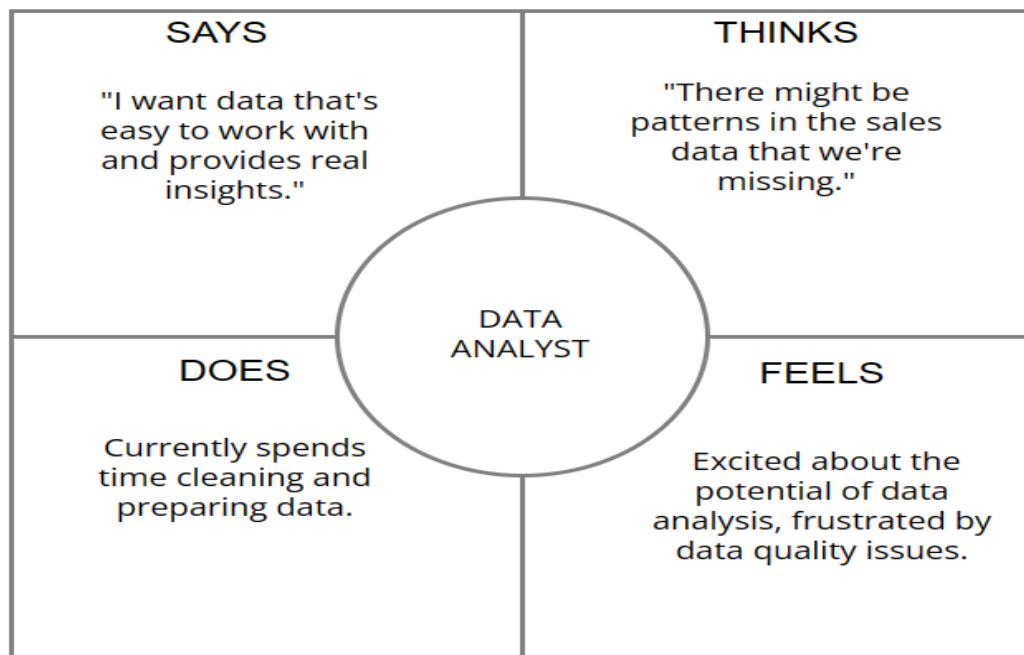
Empathy map as a Business Owner:



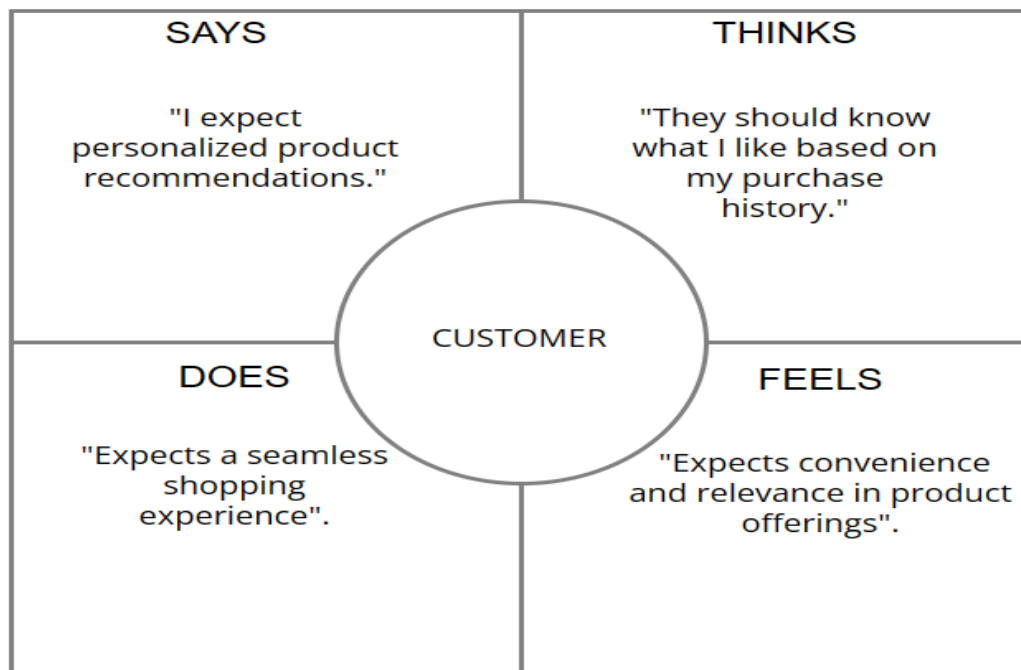
Empathy map as a Marketing Manager:



Empathy map as a Data Analyst:



Empathy map as a Customer:



STEPS FOR DOING THE PROJECT:

Step 1: Given the Dataset

We start with a data set with complete product information. We make sure we have collected all the important data points including item ID, sale date, sales quantity, prices and number of customers.

Step 2: Data Preprocessing

To prepare a dataset for analysis, we perform the following operations.

We replace missing values: we carefully address any missing data points, either by creating appropriate statistics or by removing incomplete records.

Remove duplicates: We check the dataset for duplicate entries and remove them to retain the data.

Data format: We ensure that data are correct; Let's change them if necessary. For example, we make sure the dates are always set.

Data consistency: We check for data set inconsistencies or data entry errors and make corrections. Data consistency is critical for meaningful analysis

DATA PREPROCESSING

Steps for Data Preprocessing



Step 3: Data Analysis

Before diving into the rigorous analysis, we conduct an initial exploratory data analysis (EDA) to gain insight:

We calculate descriptive statistics: To understand statistical variables such as sales volume, we calculate basic statistics such as average, median, standard deviation and quartiles.

Visualize data: Create data visualizations, such as histograms, box plots, scatter plots, and density plots, to visualize data distribution and identify outliers or trends.

Summarize the data: Prepare summary reports to state key features and trends in the data structure. These reports will serve as valuable references throughout the investigation.



Step 4: Define the purpose of the evaluation

We clearly stated our main objectives and research questions. This accuracy ensures that our research efforts remain focused and results-driven. immediately:

We identify the highest sales in a given period of time.

We see seasonal trends in sales.

We segment customers based on buying behaviour.

Step 5: Select Analysis Techniques

In order to meet our objectives, we selected the most appropriate research methods according to our specific requirements:

Descriptive Statistics: We use these to summarize and understand data.

Time series analysis: To identify temporal patterns and trends in sales data.

Customer Classification: We use clustering algorithms such as K-means or hierarchical clustering to group customers with similar purchase behavior.

Regression analysis: We use this to predict future sales based on historical data.

Step 6: Data Visualization

Visual aids play an important role in effectively communicating our research results:

We use graphs: we show sales trends over time, so that seasons or growth patterns can be seen.

We use Bar Charts or Pie Charts: we show the distribution of sales.

We create Heatmaps: We highlight connections and patterns in a data structure.



Step 7: Data analysis

We perform the selected analytical methods on the dataset:

For example, when looking to find the best-selling products, we calculate and rank the products based on sales volume.

When analyzing sales trends, we use time series techniques such as moving averages or exponential smoothing to identify underlying trends.

Step 8: Derive Insights

We interpret the results of our study in broad terms:

We analyze data and images for meaningful insights. For example, we may find that a product consistently performs better than others, or that sales peak during particular months.

Step 9: Recommendations

We formulate actionable recommendations based on the insights we have gathered:

We provide specific guidance on how the project can use research findings. For example, we suggest increasing the volume of high-demand products or launching targeted marketing campaigns during peak sales periods.

Step 10: Documentation

Produce a well-structured document or report that accompanies our entire research journey:

Includes professional summaries, data visualizations, interpretations of findings, recommendations, and any technical issues or methods used in the research.

Step 11: Test and validate

To ensure the integrity of our research:

Analyze calculations, data changes, and any assumptions made during analysis.

We believe that the evaluation process adheres to best practices and is consistent with the defined objectives.

Step 12: Peer Review

- Ask for feedback and validation from colleagues or peers:
- Collaborate with others to contribute to our analysis, gather new insights, and identify potential blind spots or errors.



Step 13: Presentation

- If necessary, prepare and provide stakeholders with an explanation of our research findings:
- Use illustrations and short descriptions to effectively communicate results and engage the audience.



Step 14: Implementation

Helps implement recommended changes or strategies:

Collaborates with relevant teams to ensure implementation of actionable recommendations.



Step 15: Analysis

Continuously monitoring and evaluating the impact of changes implemented:

Examine whether recommended strategies lead to improvements in inventory and marketing strategies over time.



Step 16: Integrating Machine Learning

After gaining insights from the initial research, we are considering using a machine learning model to make predictive analytics part of our work. Machine learning can help accurately predict future sales and consumer behaviour.



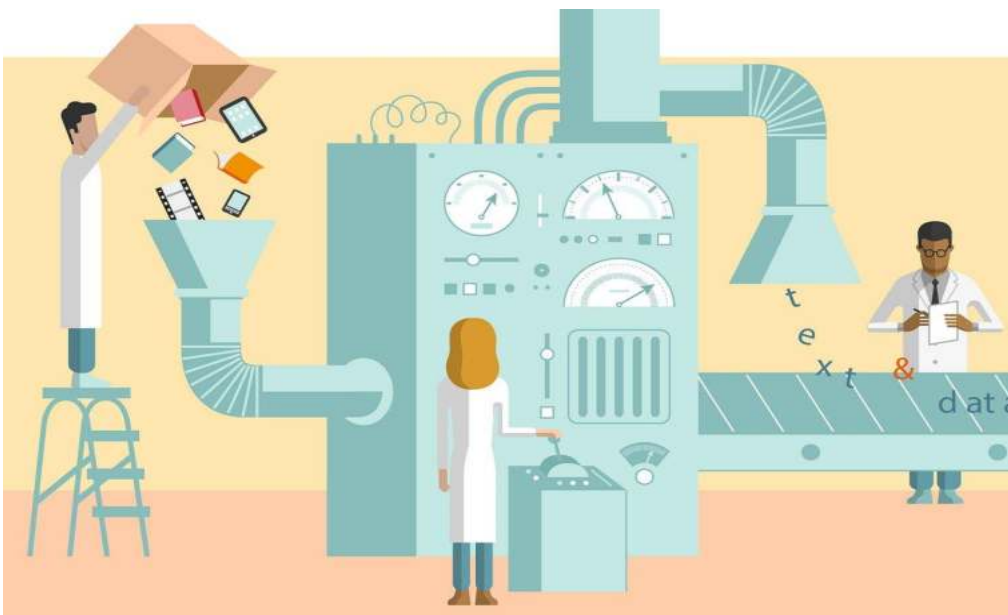
Step 17: Preparing data for machine learning

We prepare specific data sets for machine learning, which may include:

Feature Engineering: We create new features or modify existing ones to improve model performance.

Data partitioning: We split the dataset into training and testing sets for model analysis.

Scaling or Normalization: We ensure that the data are on the same scale for models that are sensitive to the magnitude of the feature.



Step 18: Model selection and training

Choose the right machine learning framework for your specific prediction tasks:

Time Series Forecasting: Use algorithms such as ARIMA, Exponential Smoothing, or Prophet to forecast future sales based on historical data.

Predicting consumer behaviour: Use classification or regression models to predict consumer behaviour, such as purchase probability or product preferences.

Train selected models using the training dataset and fine-tune their hyperparameters for better performance.

Step 19: Model analysis

Check the performance of machine learning models with test data sets:

Use a metric such as Mean Absolute Error (MAE), Mean Squared Error (MSE), or classification accuracy to measure model accuracy.

To validate the ability of the model to accurately predict unobserved events.

Step 20: Interpretation of machine learning results

Interpret the results of machine learning models in conjunction with your initial research methods:

Understand how predictive models reinforce or enhance insights you already have.

Identify the key factors and factors that affect the predictions made by the models.

Step 21: Integrating machine learning search

Add insights from machine learning to your recommendations:

Use forecasts to make informed decisions about inventory management, marketing strategies, and customer engagement.

Update your strategies with forecasts of future sales or models of customer behaviour.

Step 22: Continuous improvement

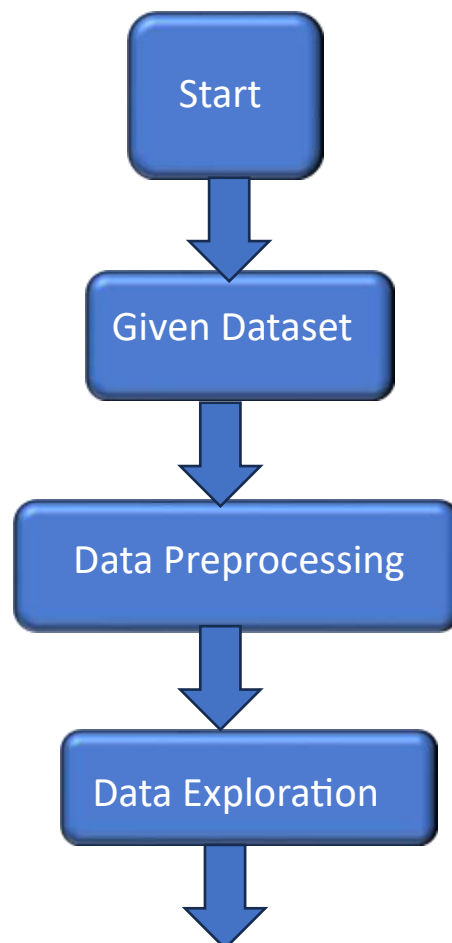
Implement continuous monitoring and further training of machine learning models to adapt to changing market dynamics:

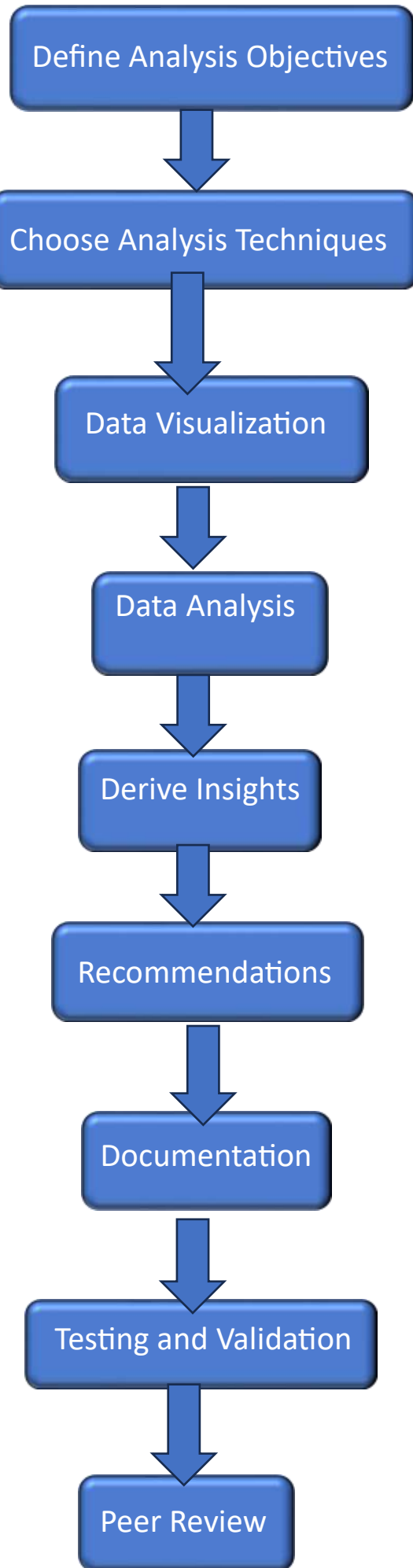
Regularly update images with new sales information to ensure accuracy and relevance.

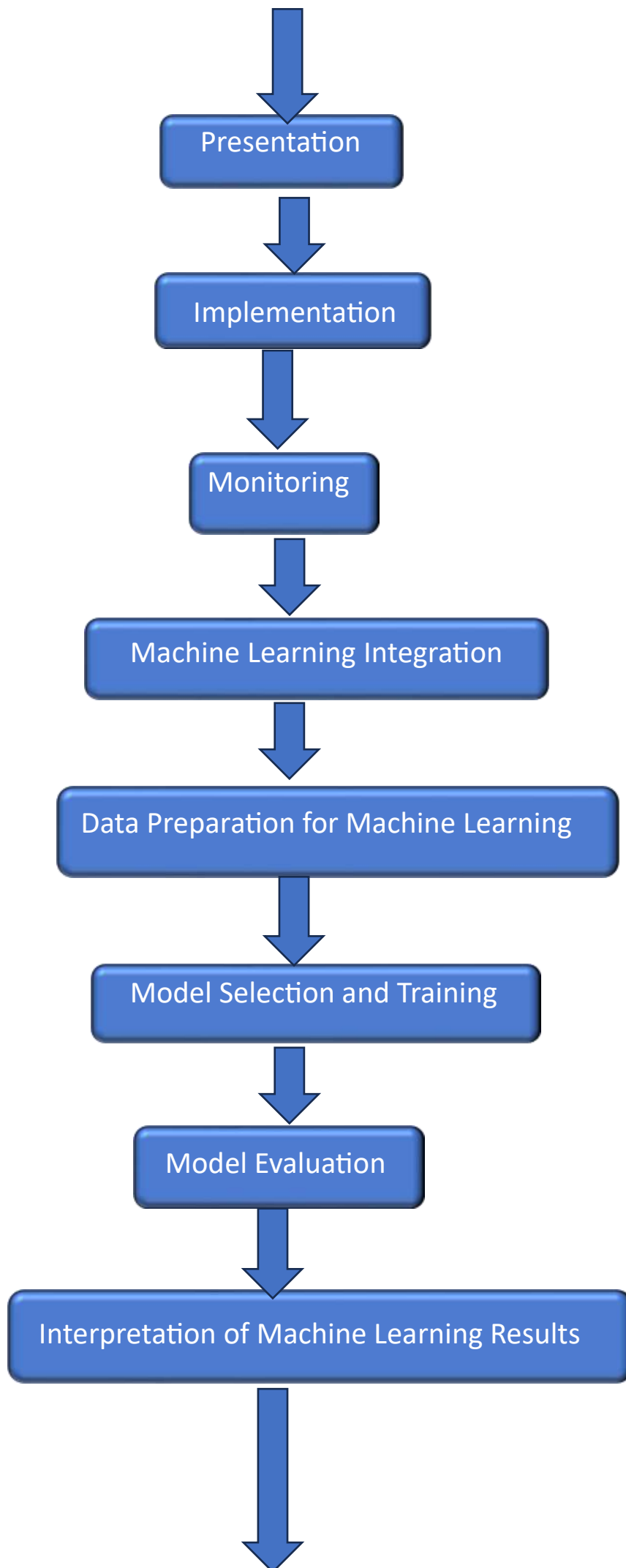
Adjust strategies and recommendations as new insights emerge from predictive models.



FLOW CHART OF THE PROCESS:







Integration of Machine Learning Insights



Continuous Improvement



End