

SIEMENS

Case 2: Monthly Sales Forecast

Team:**André Moreira (20222132)****Beatriz Teixeira ()****Catarina Nunes (20230083)****Pedro Catarro ()**

CRISP-DM: Cross Industry Standard Process for Data Mining

Most widely used methodology for data science and analytics projects. 49%







Business Objectives

Background

- Innovative and sustainable technologies and solutions
- Industry, Energy, Healthcare, Mobility and Infrastructure

Business Questions

- Primary factors influencing sales trends
- Macroeconomic indices impact sales performance – German market
- Seasonal patterns or trends affecting sales fluctuations
- Key drivers behind variations in sales volumes over the specified period
- Historical sales data be leveraged to predict future sales trends accurately

Business Objectives

- Achieve a robust sales forecast model
- Challenge of generate a monthly sales forecast



Situation Assessment: Available Resources

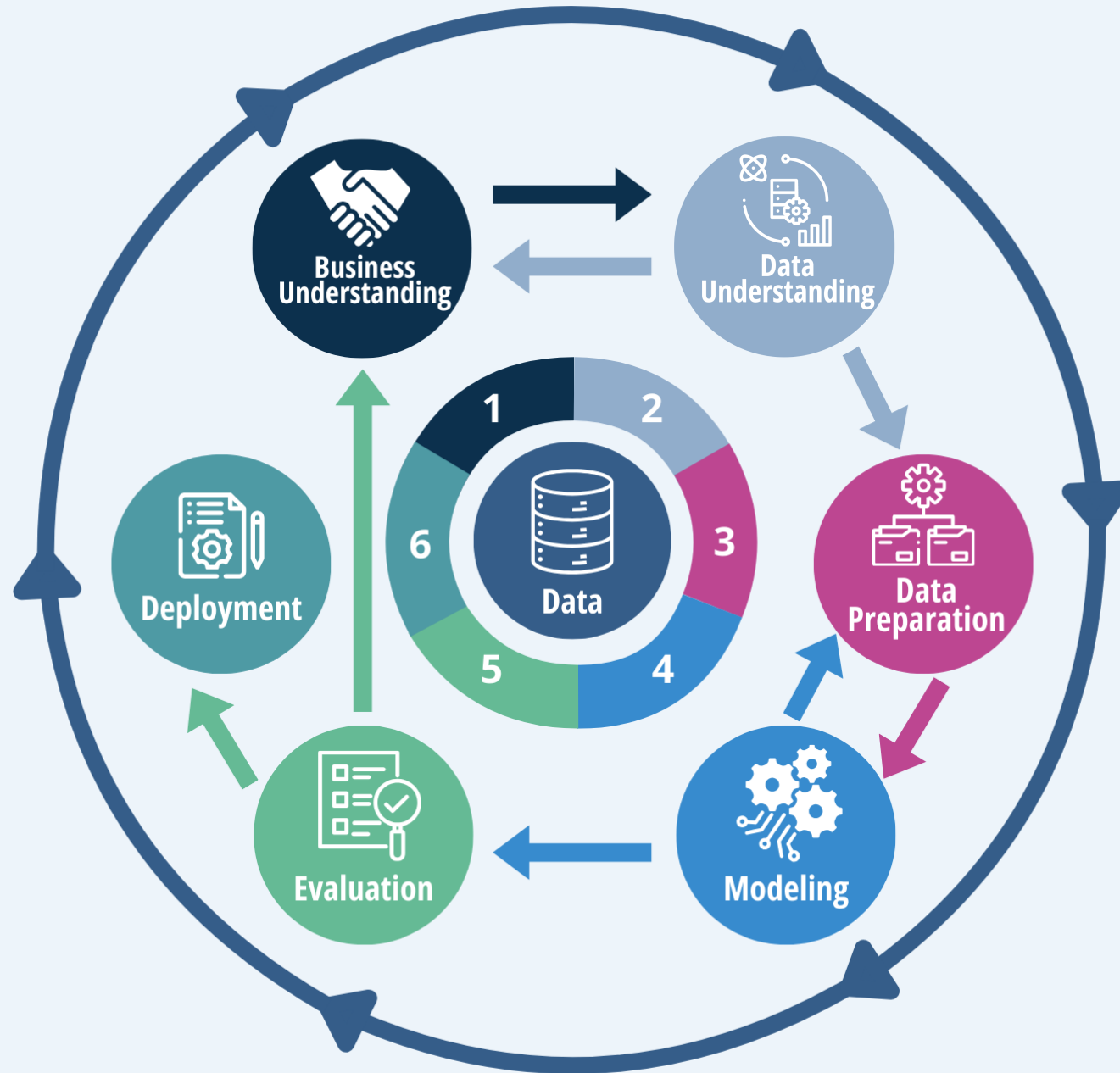
From Siemens	Extra: Macro Indicators	Extra: Microeconomic Indicators
<ol style="list-style-type: none">1. Training Set 'Sales data.csv': Sales data from October 2018 to April 2022 for 14 products.2. 'Market data.xlsx': Important macro-economic indices for Siemens in its most important countries	<p>Monthly Interest Rates Exchange Rates Consumer Price Index (CPI) Nominal Effective Exchange Rates Gross Domestic Product (GDP) Unemployment Rate Consumer Confidence Index Business Confidence Indicator Business Tendency (Manufacturing) Business Tendency (Construction) Geopolitical Events and Conflict Data</p>	<p>Siemens Stock Performance</p>



Data Mining Goals

Determine Data Mining Goals

- Creation of a model that predict the monthly sales
- Create a final forecast of the monthly sales for the year of 2023





Sales Evolution for each product: Trend and Seasonality analysis

- According to the data, P1 is the product with the highest sales, followed by product 5 and 3.
- There are some significant anomalies in almost all the products that might affect the modeling, but these will be addressed during data preparation.
- There is a clear growth trend in product 8.
- Most of the products are challenging to identify seasonality, except for product 11.









Data Preparation

Data Preparation:

Missing Values

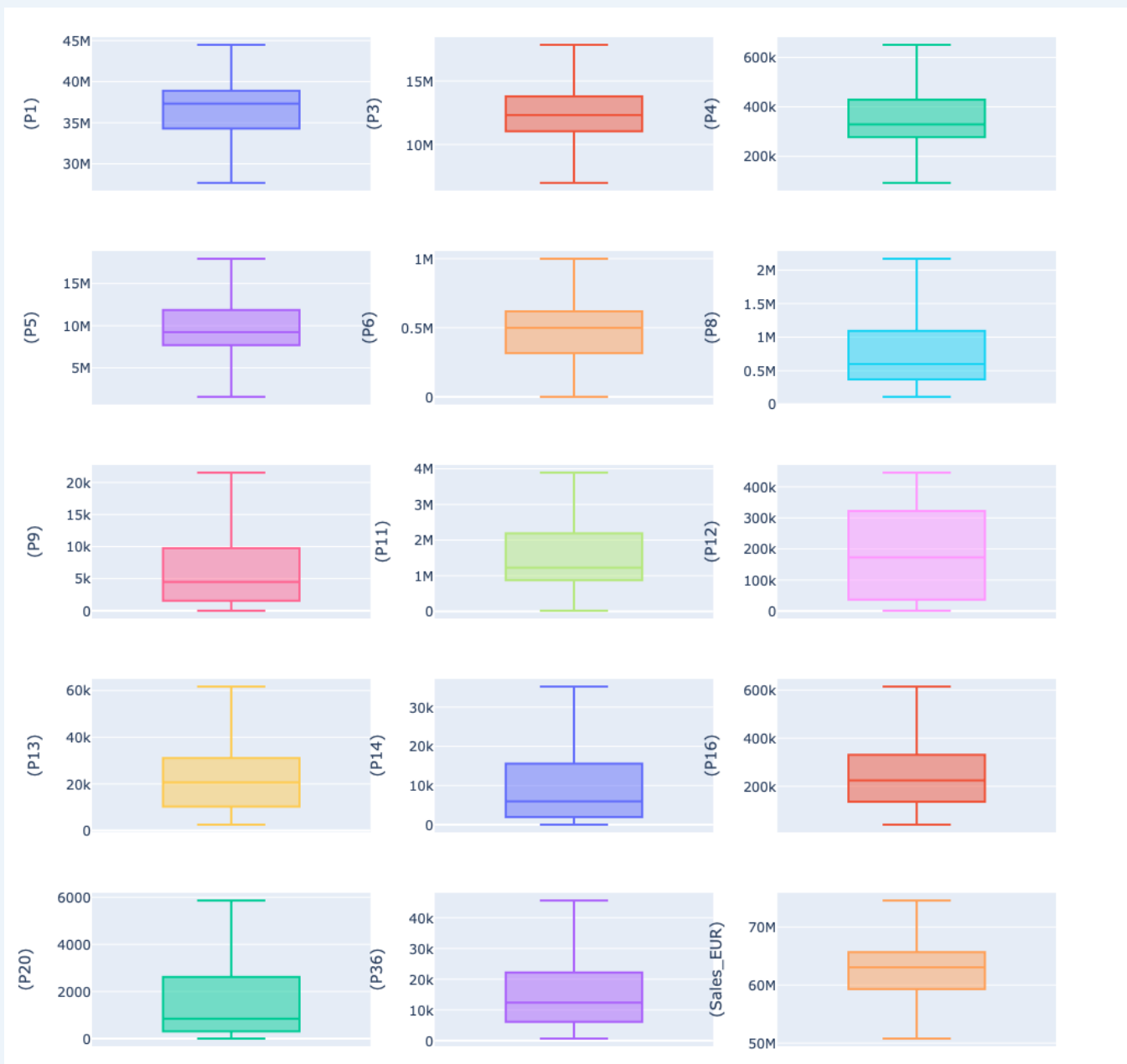
- Removed columns
- Fill with zeros

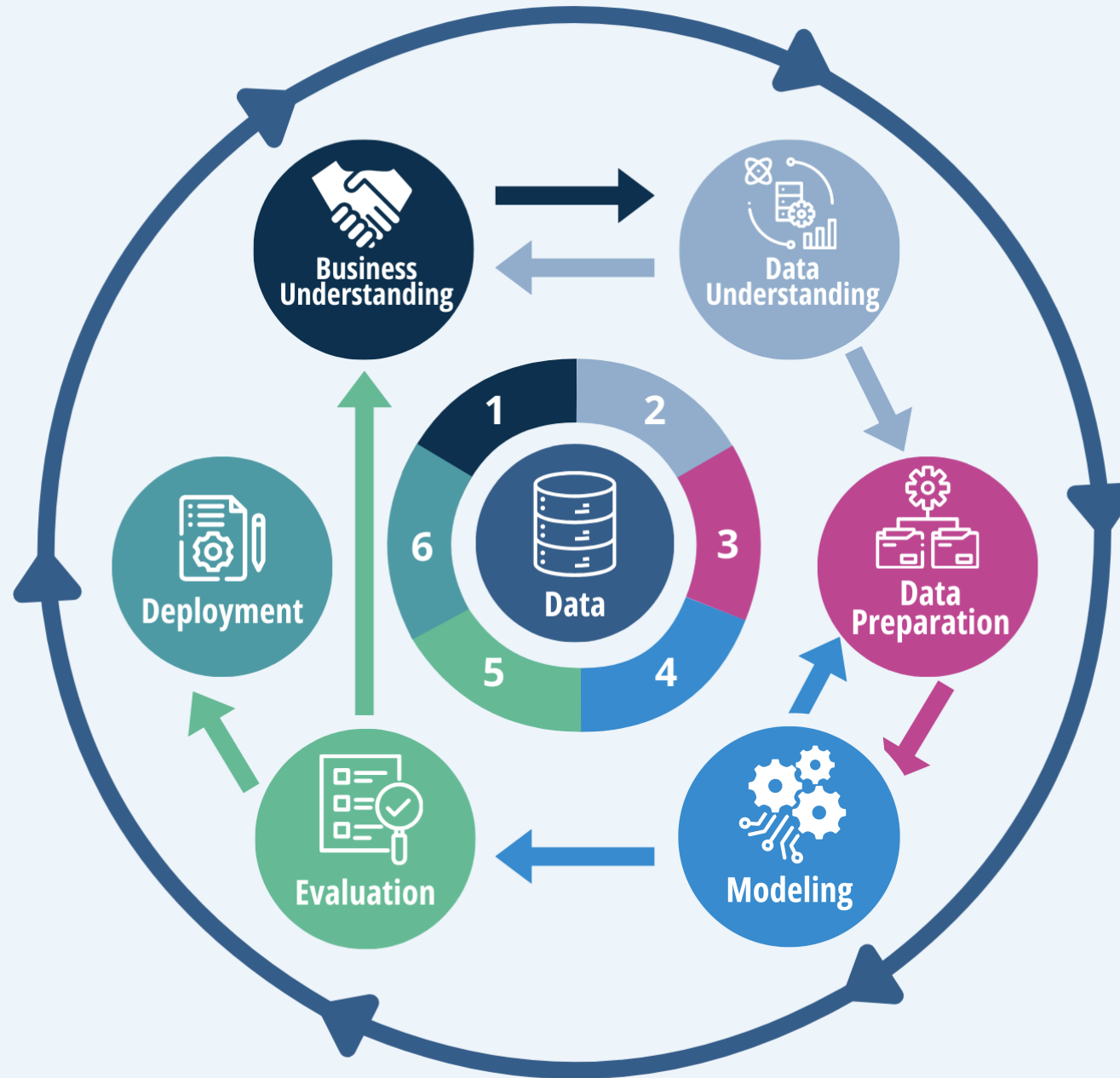
Outliers

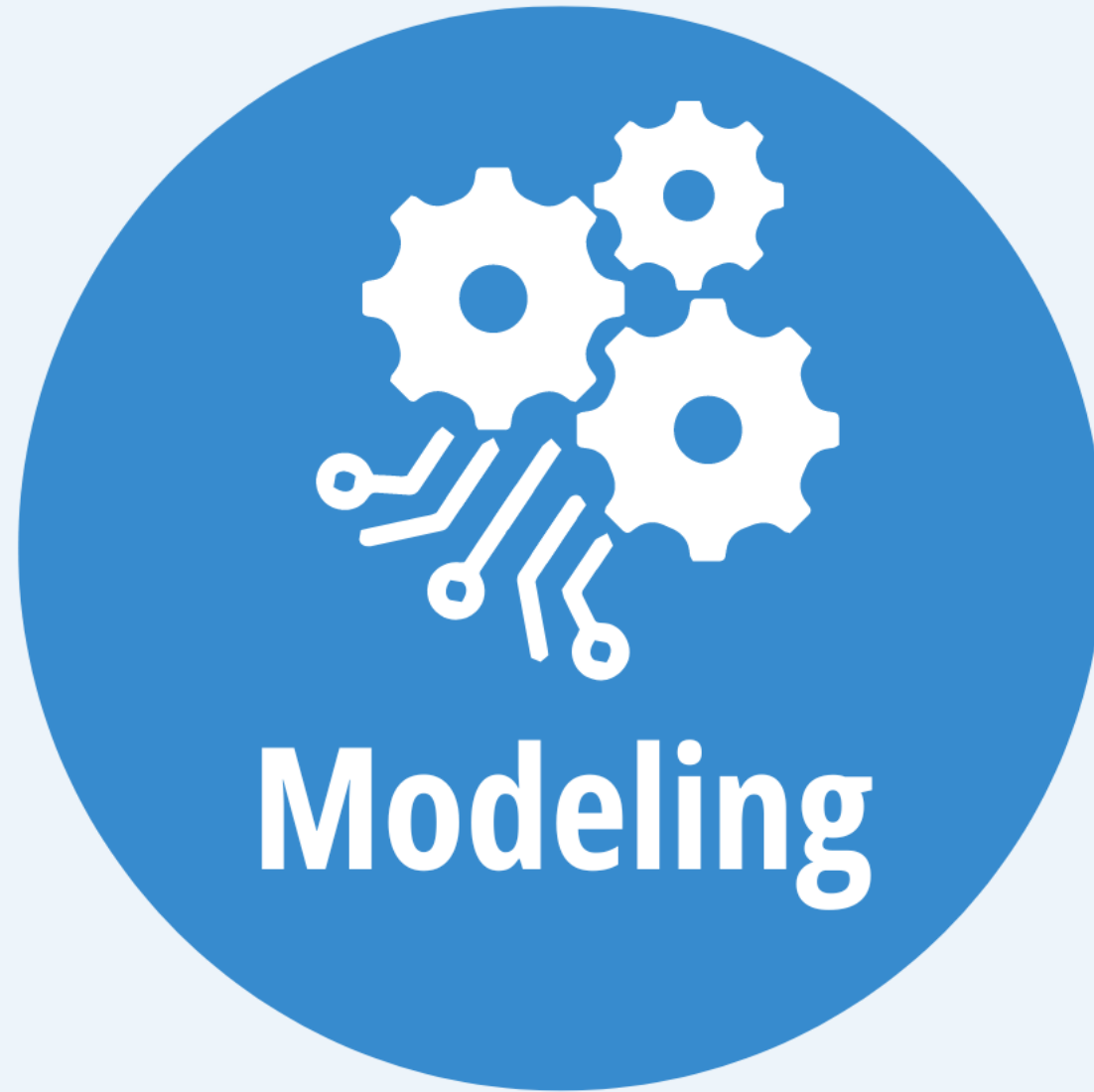
- Set negative values to zero
- Established lower and upper bounds

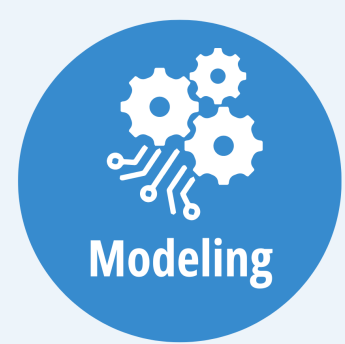
Merge Datasets

- Kept all variables
- Will determine the optimal variables for each product

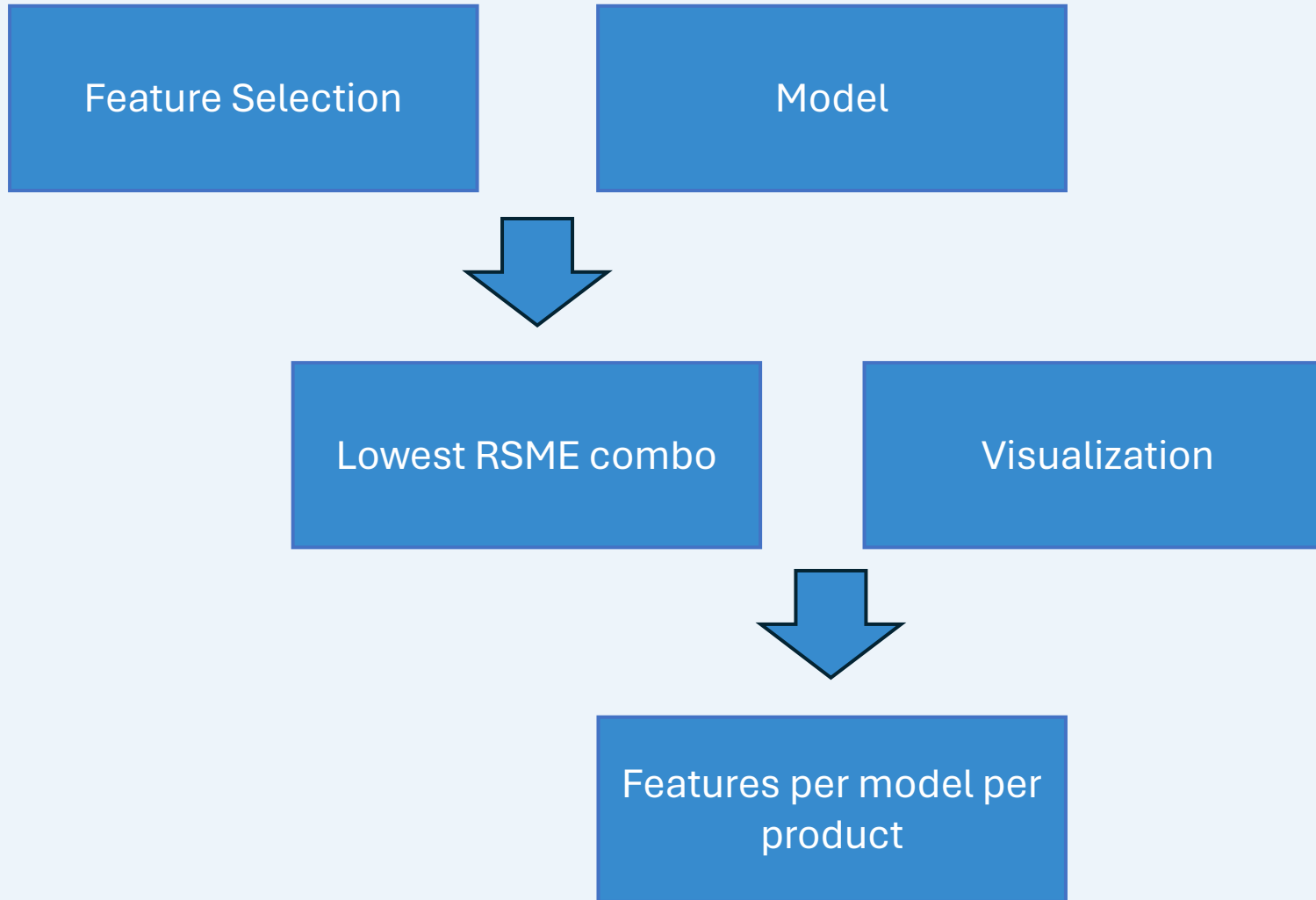


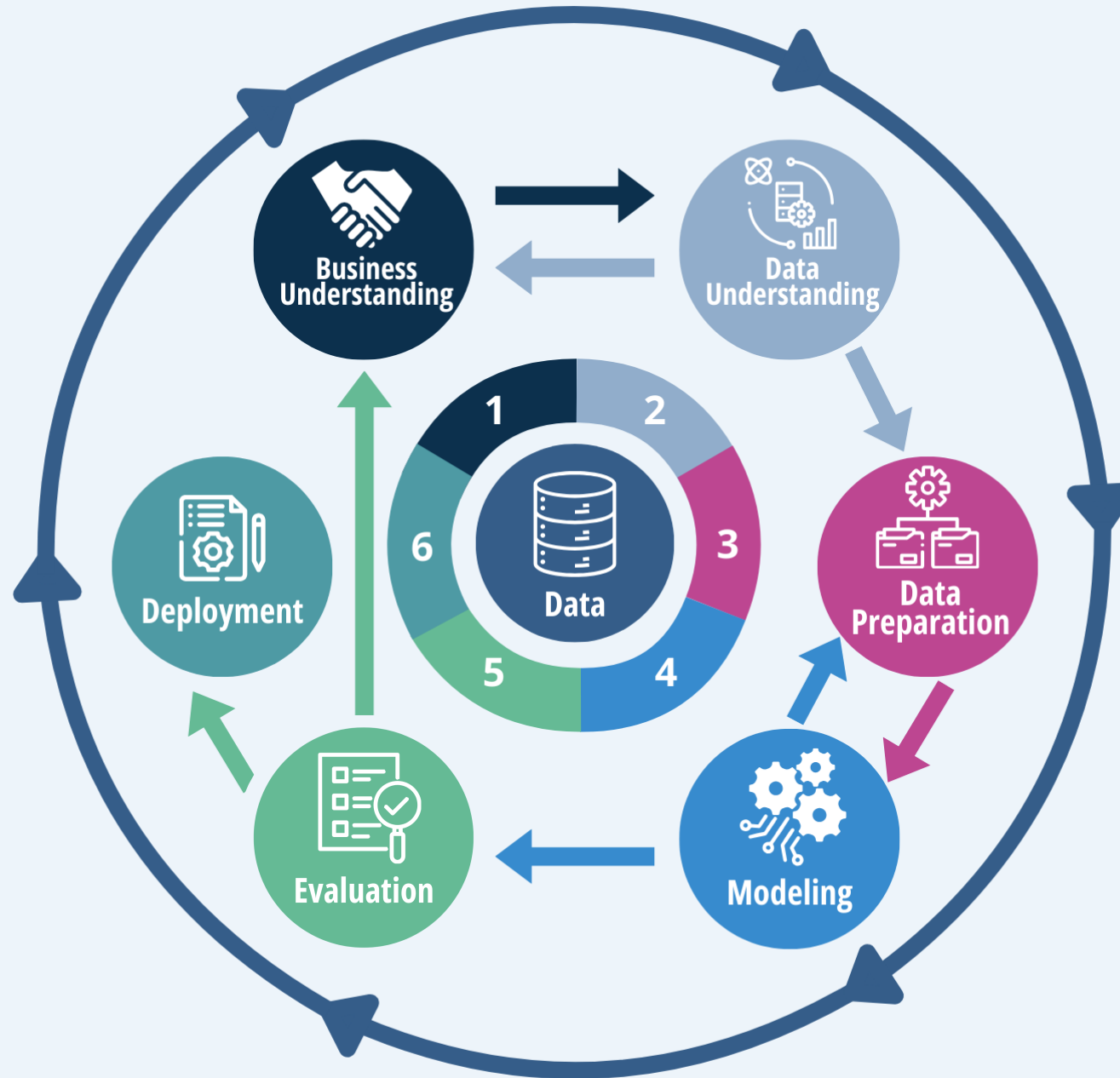






Modeling:









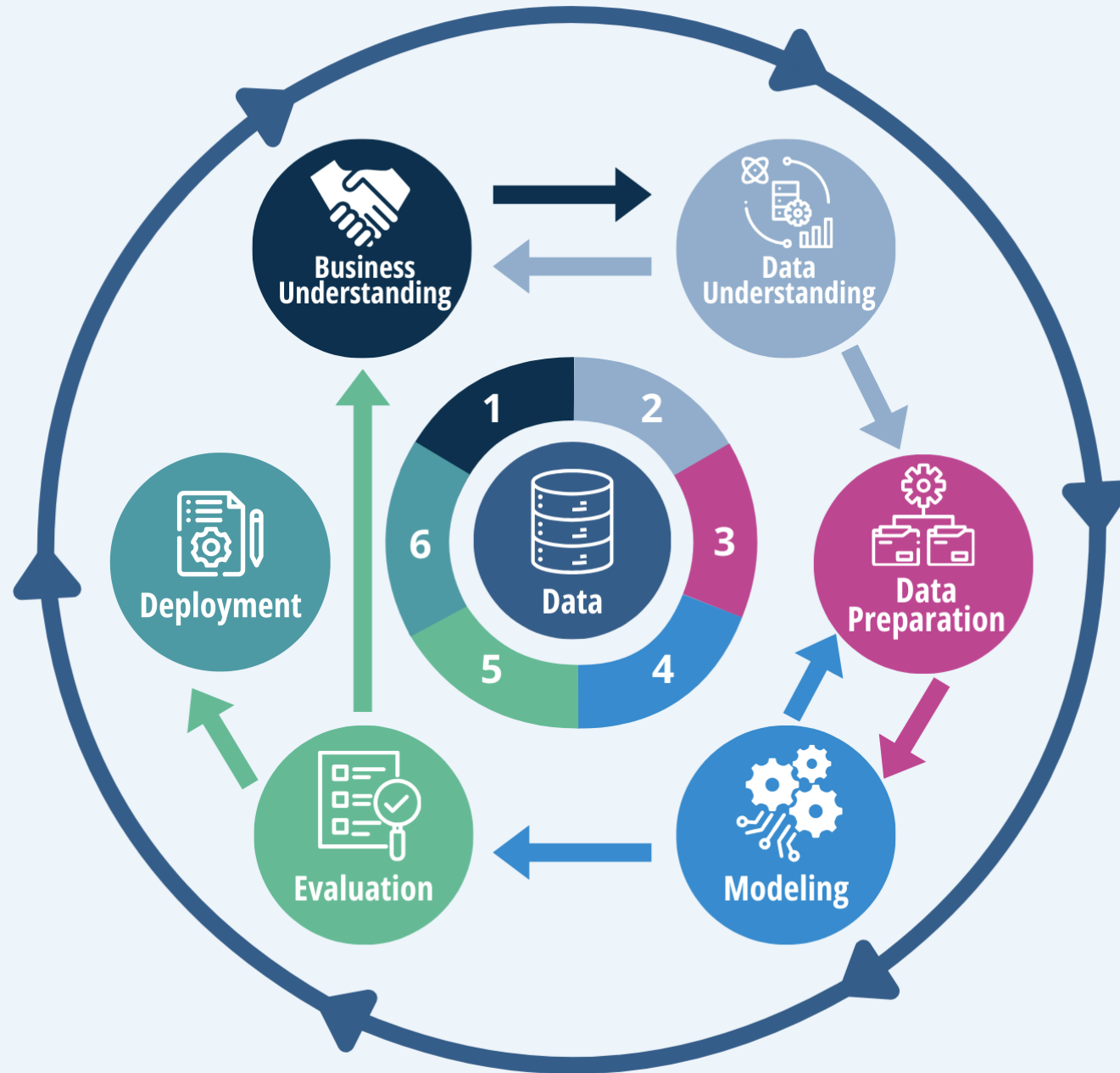
Evaluation:

Success criteria checklist

- Predict monthly sales for the next 10 months
- Avoid cost of opportunity
- Which factors contribute to each product
- Added value

Limitations

- Lack of historical data
- Product contextualization
- Market sales view
- Suppliers analysis





Deployment



Deployment

Deployment: Next Steps?

14/03/2022

Planning and Assessment

- Analysis of forecast model challenges and requirements
- Siemens tutoring

Today
(11/04/2022)

Proof of Concept

- Initial solution to the problem presentation.
- Meeting with the Administration

2 Months
(11/06/2022)

Prepare for Deployment

- Meeting with Other Teams (Data, Marketing, Commercial, and Procurement):
 - Explain the model.
 - Address questions.
 - Brainstorm improvements.
- Test Model Accuracy in the Next 2 Months.
- Commission Market Study for Smart Infrastructure Investment Data.
- Test with New Data and Compare Performances.

15/08/2022


Final Proposition

- Final 2023 Forecast Presentation to Administration and Teams Involved:
- Comparison of Proposed Model with Current Model:
- Discuss findings and implications.
- Insights, Recommendations, and Precaution Measures

Yearly

Monitoring and Maintenance

- Siemens employees training
- Resilience cases demonstration
- Continuous model refinement

Thank You! 

Any Questions feel free to contact:
catarina.goncalves.n@gmail.com