

No Forecast? No Problem

Improving customer demand forecasting



ThermoFisher
SCIENTIFIC



Project sponsor: Sarah Englert

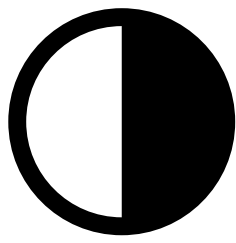
Faculty advisor: Dr. Jonas Jonasson

MIT team: Zack Horton & Tanner Street

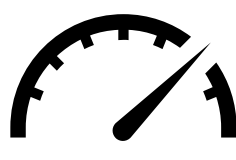
Problem statement



The S&OP team manually generates 12-month forecasts for revenue and job steps each month.



50% of revenue is from clients that don't provide forecasts, making them harder to predict.

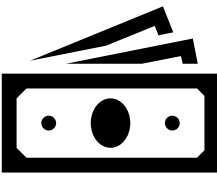


Goal: Automate entire forecasting procedure and improve accuracy for 'no forecast' clients.

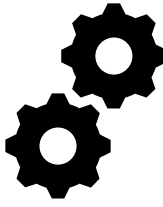
Data sources



Salesforce: Information on upcoming contracts (features predictive of revenue)



Revenue: Historical monthly revenue



Job Steps: Historical monthly job steps

42

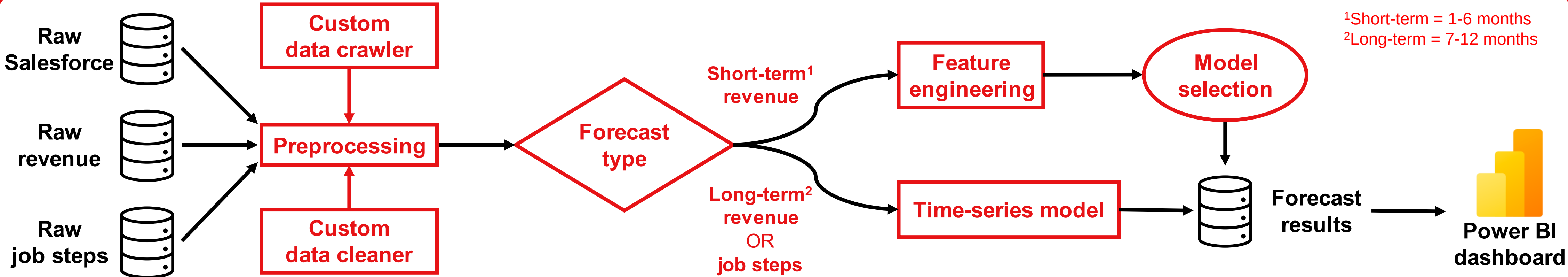
months

17 10

global
sites

client
categories

Automated system overview



Short-term revenue

Feature engineering

Sparse PCA, aggregated by client bucket

Features to capture maturity of future opportunities

Seasonality and trend

1.6K

Features from data crawler

Model selection

Walk-forward validation procedure selects model with lowest percent error

Select between Elastic Net, Random Forest, and XGBoost models



Long-term revenue & job steps

Time-series model



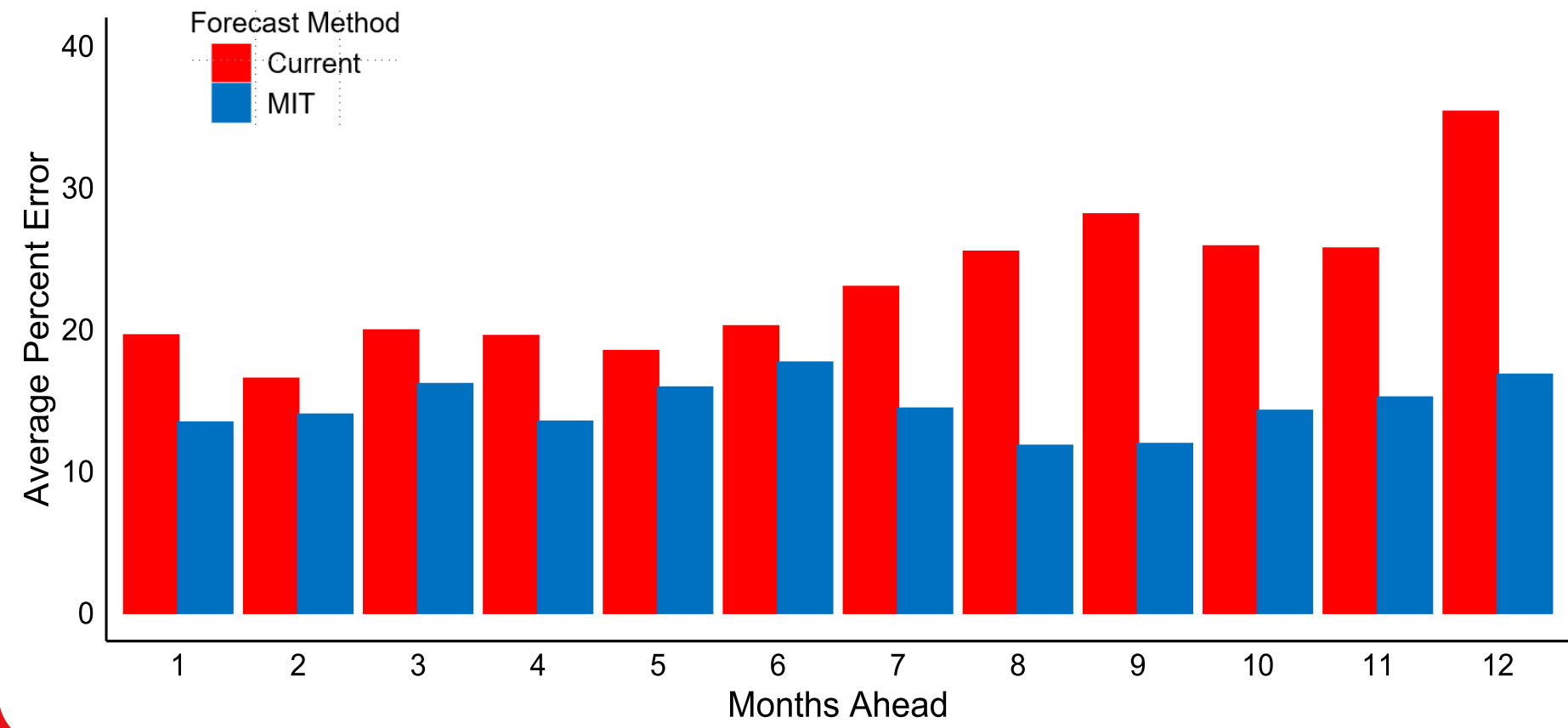
Structural time-series methods that do not require exogenous variables



Models include Seasonal-Trend Decomposition using Loess and Holt-Winters Exponential Smoothing

Results

Revenue forecasts for 'No Forecast' client bucket in Site A



Short-term

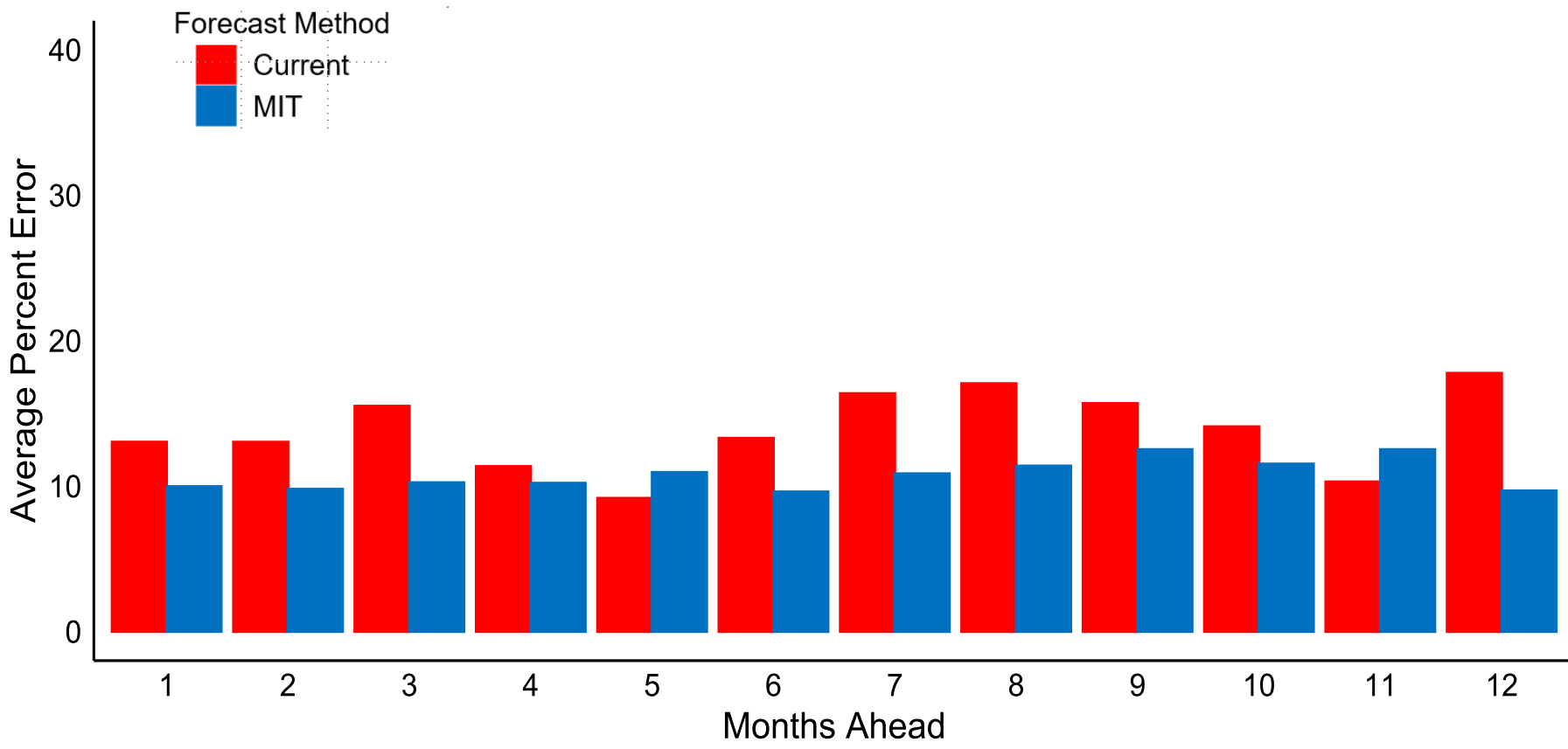
Revenue Job step
21% 17%

Long-term

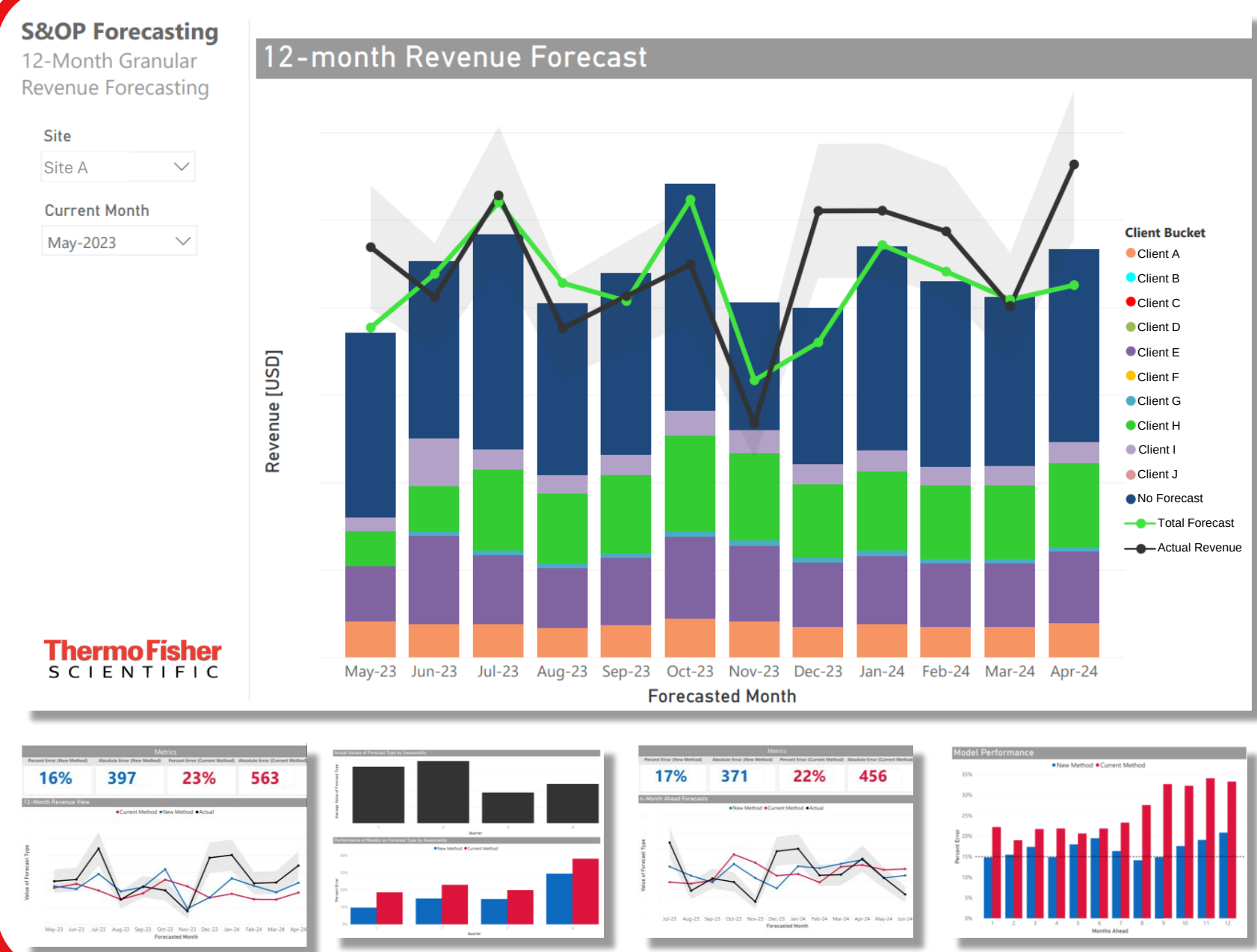
Revenue Job step
43% 22%

Relative % improvement over current method

Job step forecasts for 'All Clients' in Site A

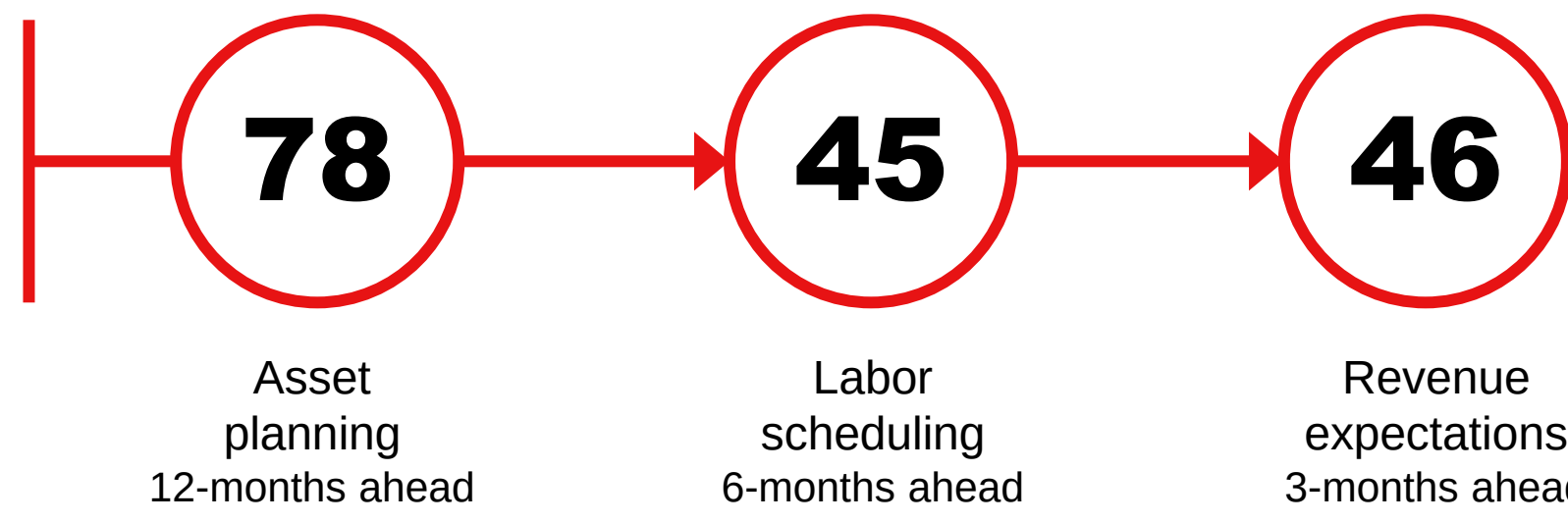


Reporting



Impact

Relative % decrease in operating costs from forecast improvements



10%

Reduction in monthly working hours for senior demand planners due to automated system



Nicole Barker, senior demand planner

"This tool saves us hours of time in manual work each month and it allows us to more accurately forecast our customers' demand to ensure we are well equipped to meet their needs."