Increasing Business Won and Reducing Turnaround Time by Modifying ArcBest's Bid and Proposal Processes

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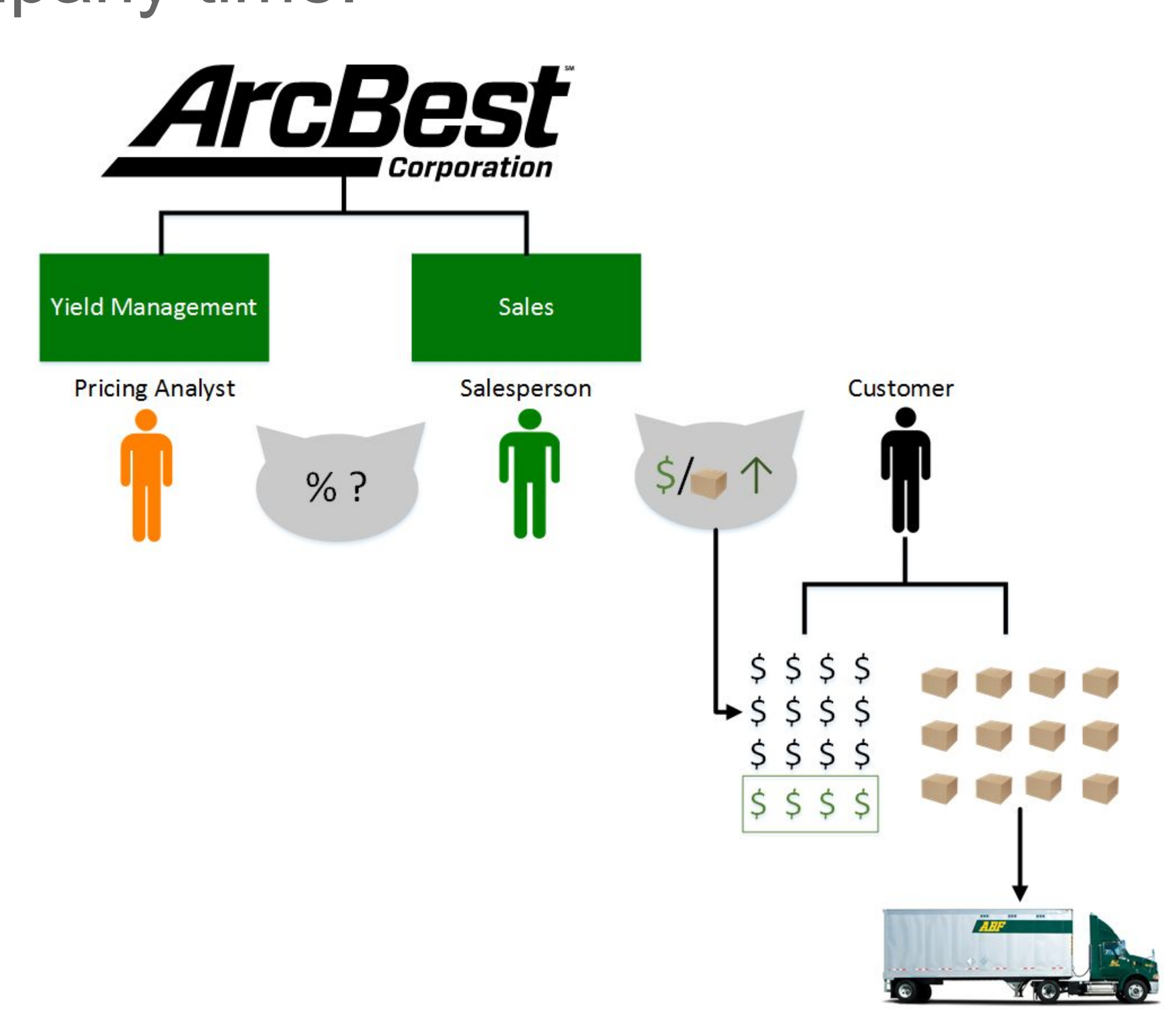
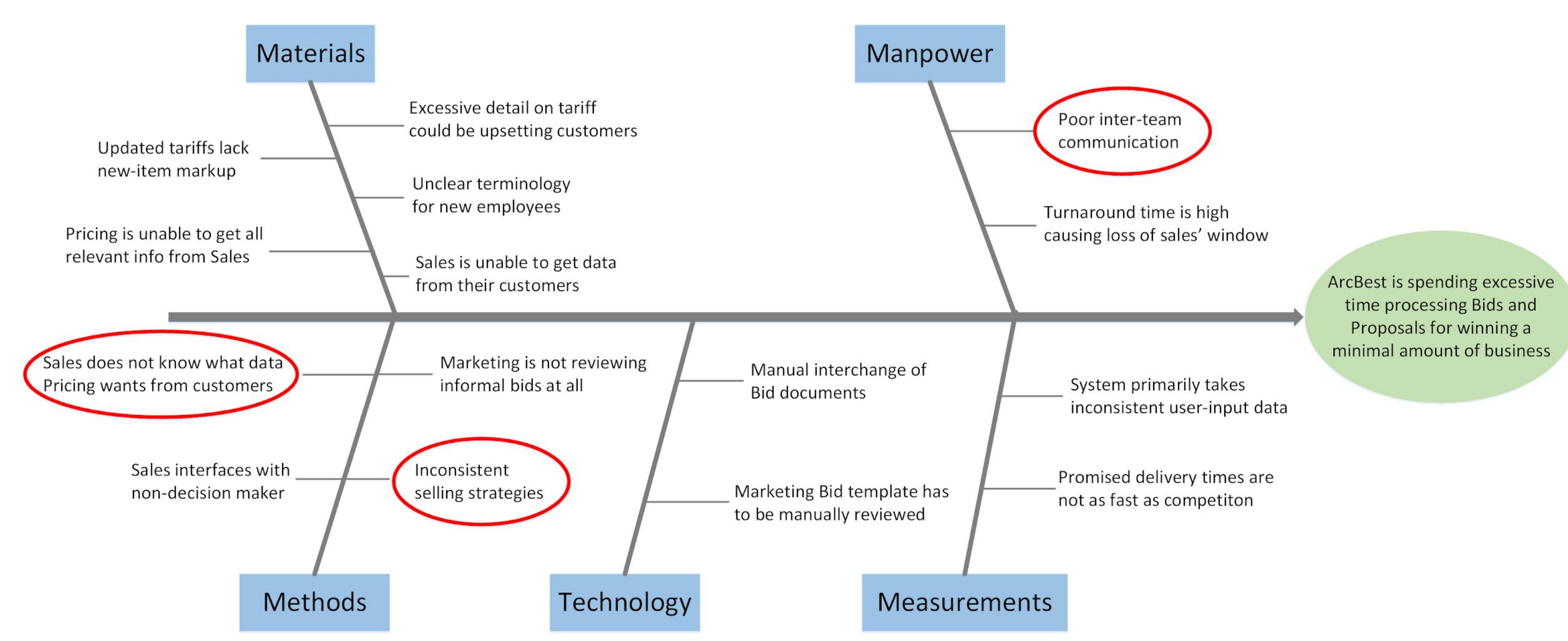
Overview

ArcBest is a multi-billion dollar logistics company with an extended history of delivering creative solutions to their customers. Their less-than-truckload subsidiary, ABF Freight, is seeking to improve their new business decisions process to increase the amount of business won and reduce the turnaround time for the bid and proposal processes. Currently, the premium carrier only wins a small proportion of shipping opportunities. The main objectives of this project are to improve the communication between ArcBest teams and better identify and prioritze business opportunities. Root cause analysis, interviews, surveys, and data analysis were conducted to evaluate the existing bid and proposal systems within ArcBest. The recommended changes to the process are expected to generate $31,214.87 annually for a 0.1% increase in offers won and likely reduce the turnaround time by five days, which will free an estimated 1,890 hours of company time.



Methods

Root cause analysis, including interviews and surveys with ArcBest stakeholders, was conducted to evaluate the current bid and proposal system.

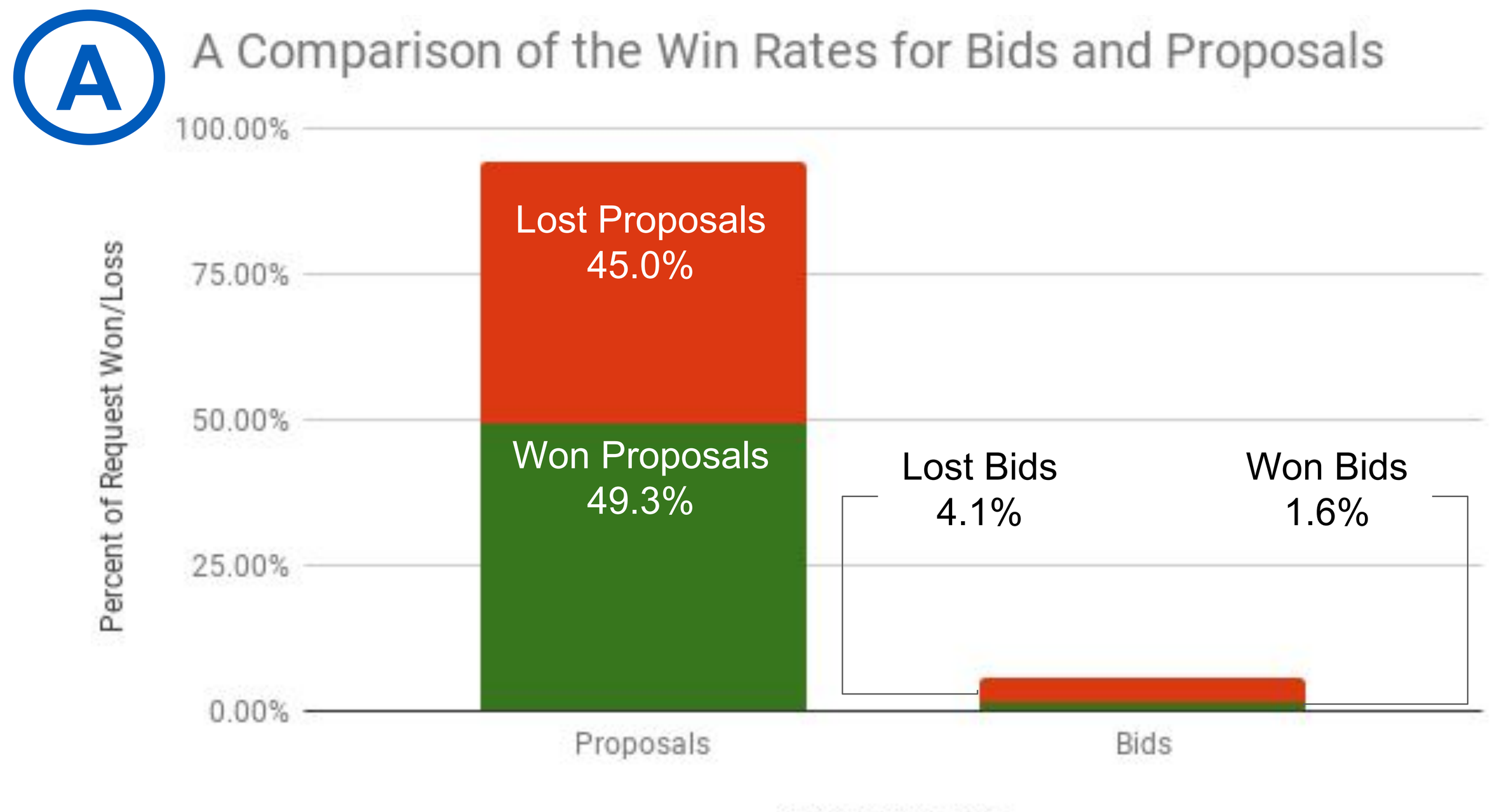


Data Analysis

Initial data analysis indicated that ArcBest is losing a large proportion of each type of deal [See Figure A]. Several techniques were utilized to evaluate the data.

- **Linear Regression** was unable to provide sufficient predictive power from the data [See Figure B].
- **Random Forest** was able to describe more variation in the data but would be too costly to implement for a result with low predictive power [See Figure C].
- **Logistic Regression** was able to describe the most variation. These models have around 70% predictie power [See Figure D].
- **K-Fold Cross Validation** was used to test how well the logistics regressions will hold in practice. The model for business won is around 67% accurate while the profitable model is around 88% accurate [See Figure E].

A A Comparison of the Win Rates for Bids and Proposals



B

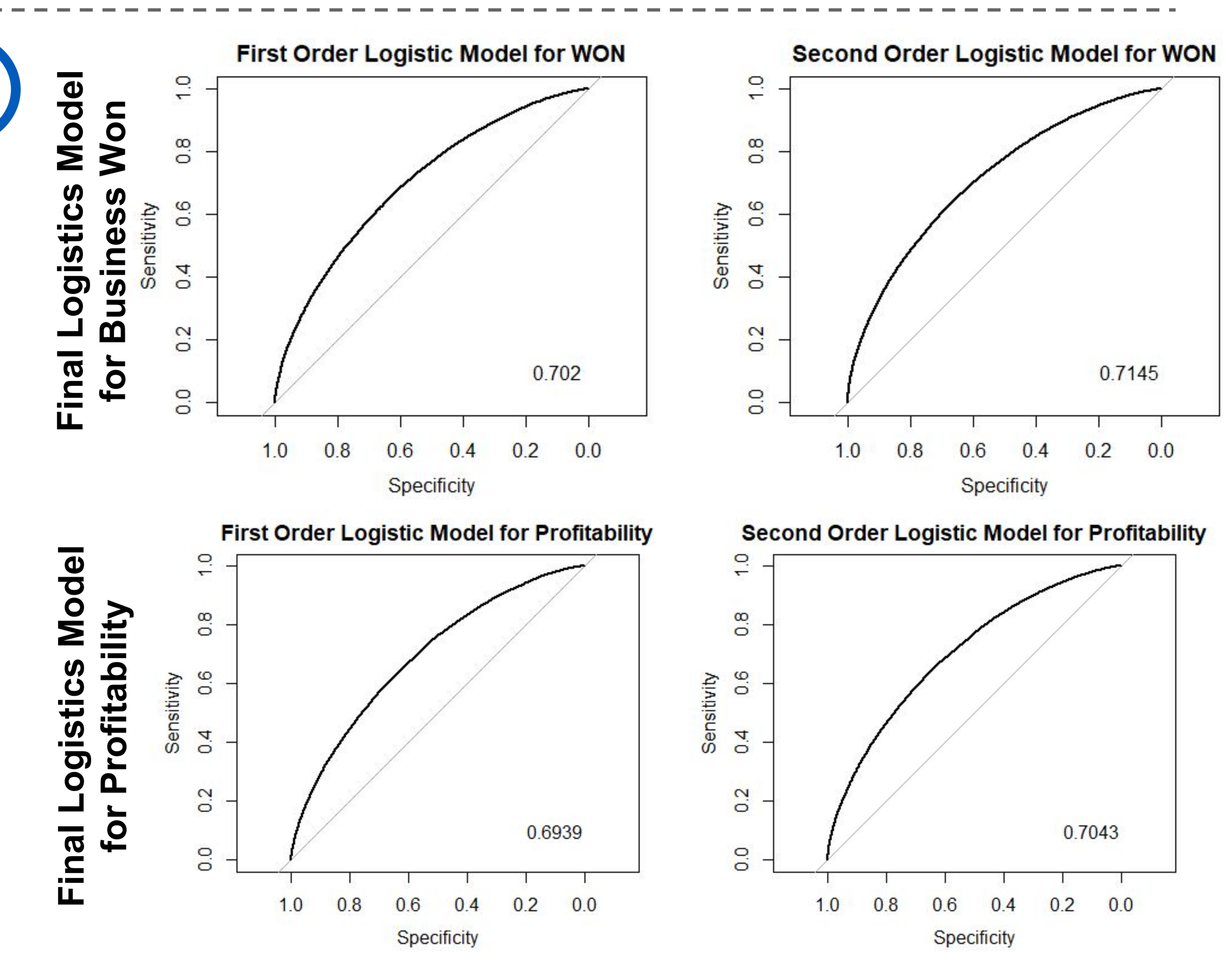
Final Linear Model for Won Business	
Residual Standard Error	0.4639 on 71529 DF
Multiple R-squared	0.1224
Adjusted R-Squared	0.1059
P-Value	< 2.2e-16

Final Linear Model for IOR	
Residual Standard Error	23.98 on 28202 DF
Multiple R-squared	0.1228
Adjusted R-Squared	0.08484
P-Value	< 2.2e-16

D

Random Forest Regression for IOR	
Number of Trees	200
Number of Variables Tried at Each Split	7
Mean Squared Residuals	331.82
% Variation Explained	47.19

C



E

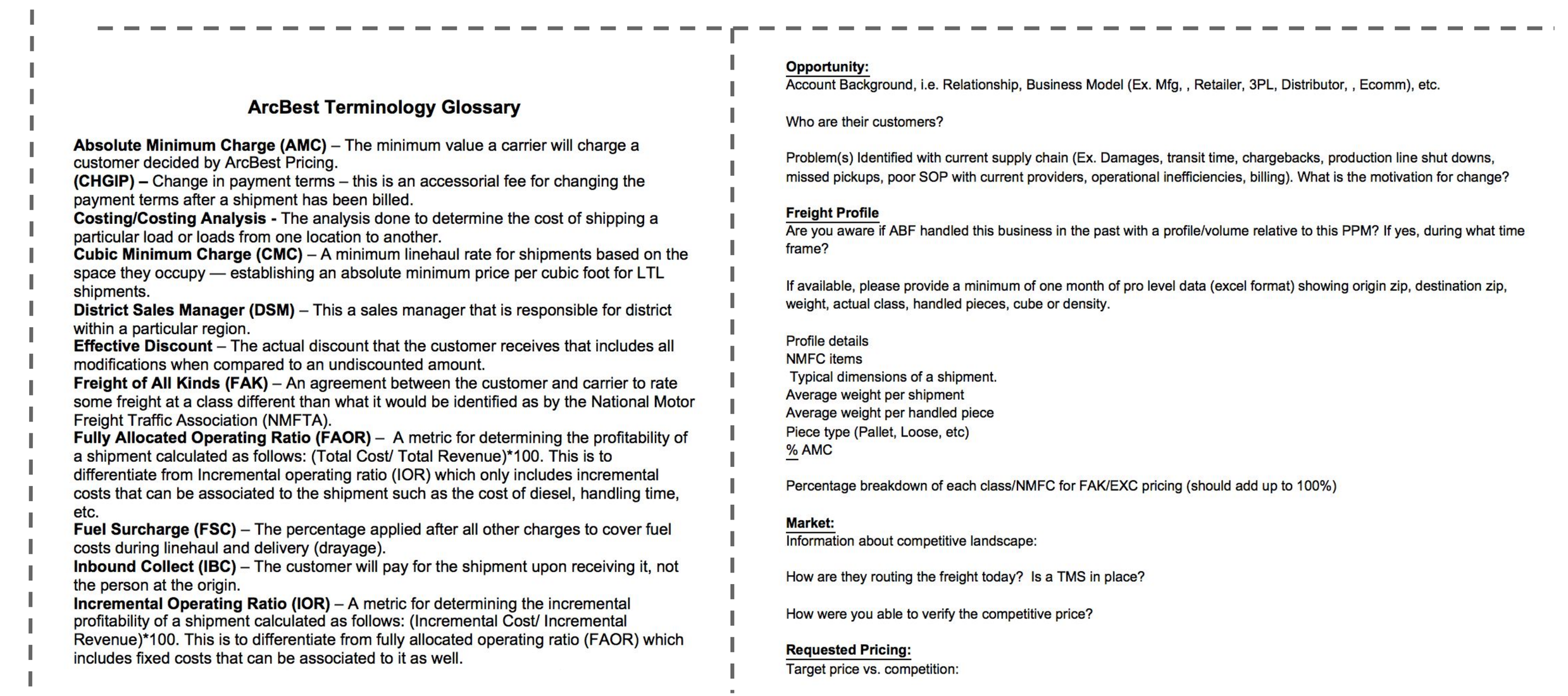
```
> confusionMatrix(data=pred, data$WON)
Confusion Matrix and Statistics

          Reference
Prediction     0     1
         0 36296 16307
         1  7155 13118

               Accuracy : 0.6781
                 95% CI : (0.6746, 0.6814)
    No Information Rate : 0.5962
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.296
 Mcnemar's Test P-Value : < 2.2e-16
```

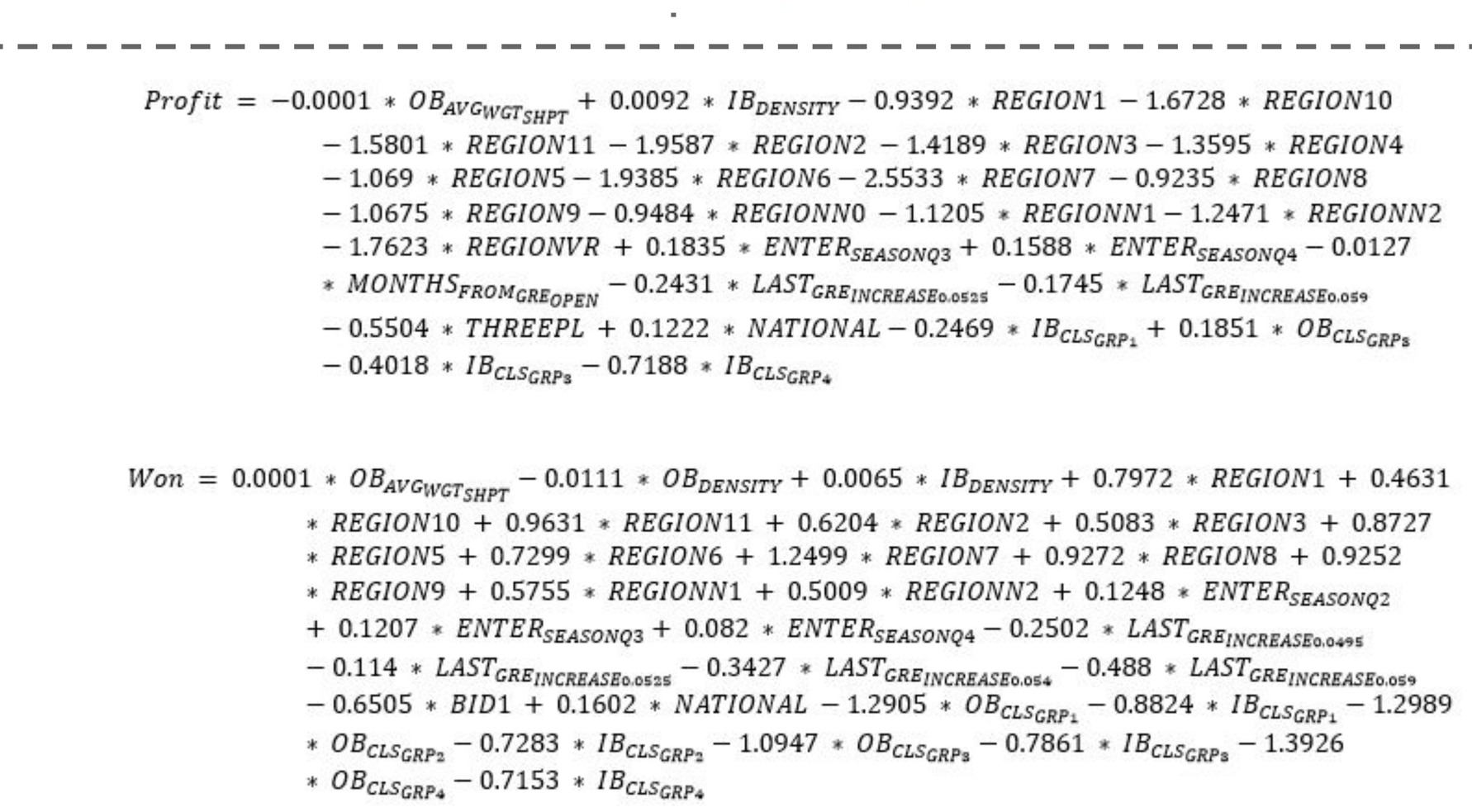
```
> confusionMatrix(data=pred, data$PROFITABLE)
Confusion Matrix and Statistics

          Reference
Prediction     0     1
         0   108    44
         1  3196 26077

               Accuracy : 0.8899
                 95% CI : (0.8863, 0.8934)
    No Information Rate : 0.8877
    P-Value [Acc > NIR] : 0.1203

                  Kappa : 0.0531
 Mcnemar's Test P-Value : <2e-16
```

Deliverables

ArcBest's main objectives of improving inter-team communication and better prioritizing business requests can be accomplished with the following deliverables:

1. **Glossary** of unfamiliar terms and pricing calculations to speed interactions between sales and pricing
2. **Justification Form** for bids and proposals to collect pertinent information from customers upfront
3. **Prioritization Model** formulation for implementation inside the pricing systems





Recommendations

In oaddition to the deliverables above, the following items are also recommended:

- **Improve Data Collection Methods:** Current data collection methods are prone to user input error. The SCAC code field for example should provide a drop down menu for possible answers.
- **Provide users with success metrics** Each user should be able to view his or her performance.