General Motors: OnStar Re-Marketing
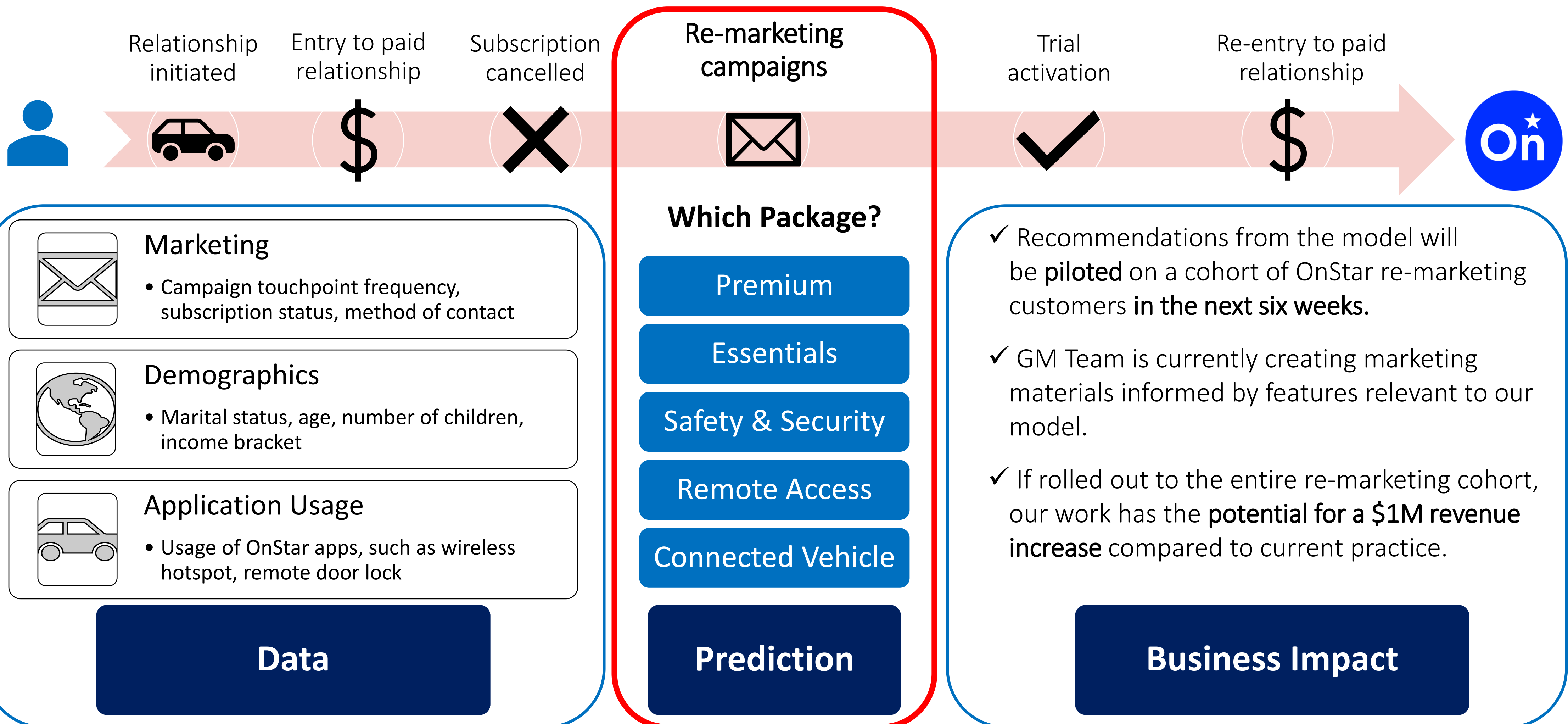
MIT MANAGEMENT SLOAN SCHOOL — **gm**

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The GM OnStar Capstone Project developed a personalized product offer strategy for OnStar customers to increase free trial activation rates, the first step in gaining a paying customer.
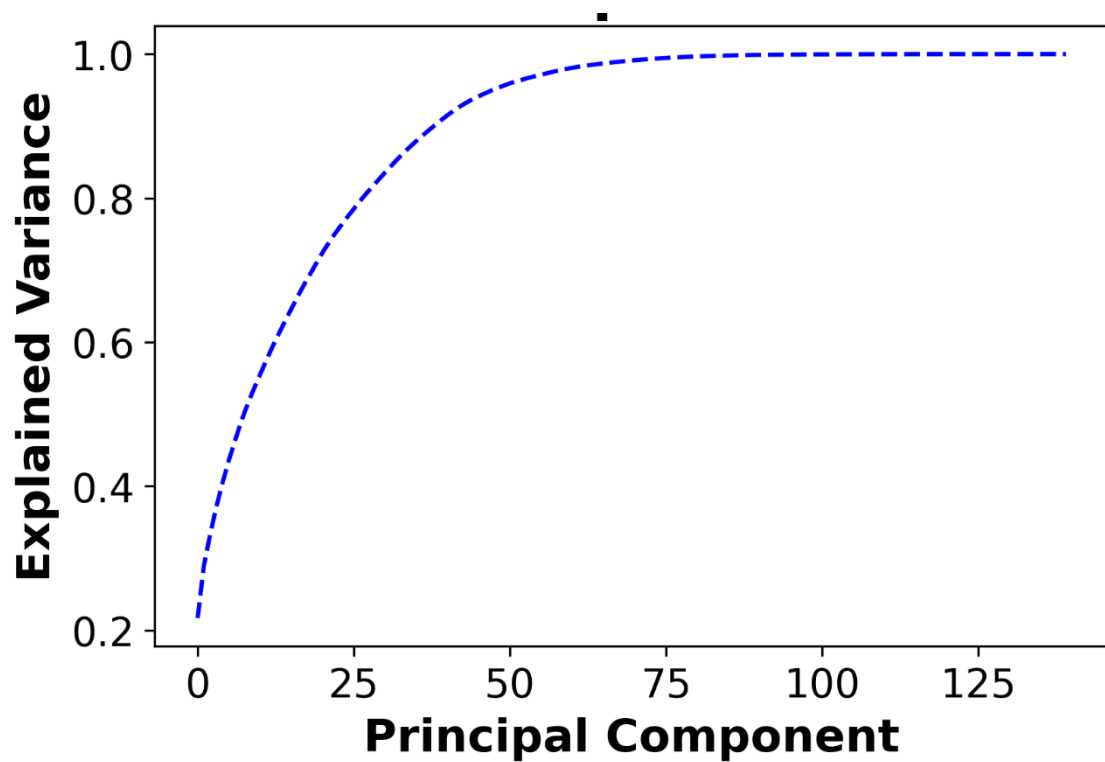
Relationship initiated → Entry to paid relationship → Subscription cancelled → **Re-marketing campaigns** → Trial activation → Re-entry to paid relationship → On★

Data

Marketing
- Campaign touchpoint frequency, subscription status, method of contact

Demographics
- Marital status, age, number of children, income bracket

Application Usage
- Usage of OnStar apps, such as wireless hotspot, remote door lock

Prediction

Which Package?
- Premium
- Essentials
- Safety & Security
- Remote Access
- Connected Vehicle

Business Impact

✓ Recommendations from the model will be **piloted** on a cohort of OnStar re-marketing customers **in the next six weeks.**

✓ GM Team is currently creating marketing materials informed by features relevant to our model.

✓ If rolled out to the entire re-marketing cohort, our work has the **potential for a $1M revenue increase** compared to current practice.

Segmentation Model – Grouping Together Similar Customers

*We implemented two segmentation methods, an unsupervised and a supervised approach. The **unsupervised model utilized principal component analysis (PCA) and Gaussian mixture clustering,** and the **supervised approach implemented decision trees.***
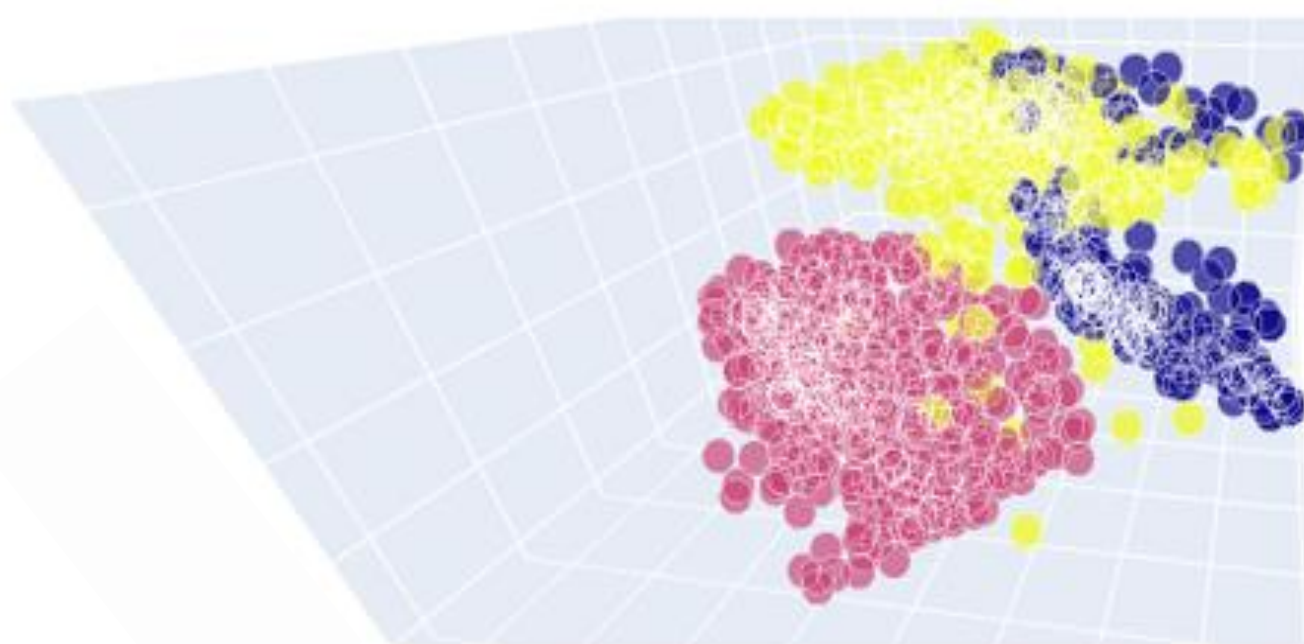
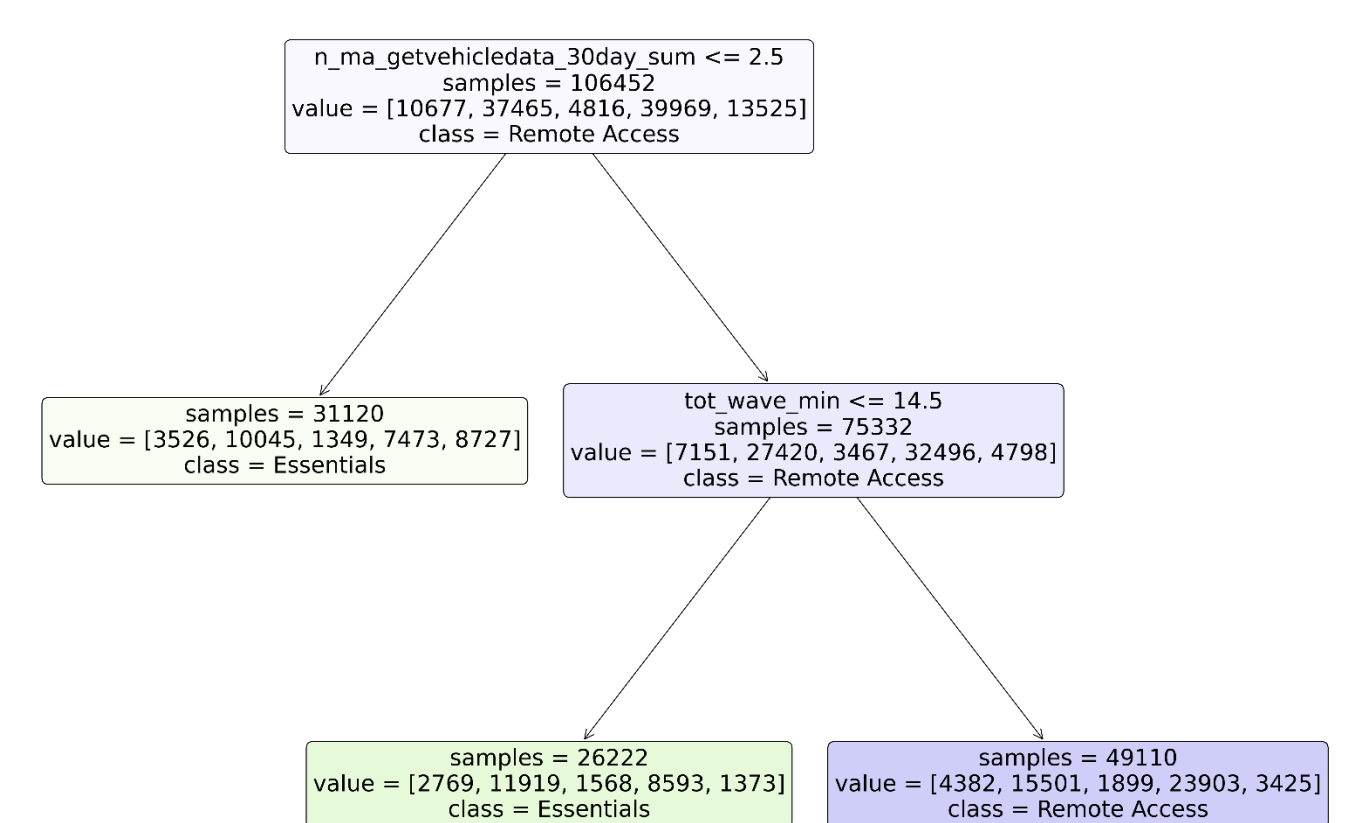### PCA + Clustering

Cumulative Explained Variance

Cluster Assignment Using Gaussian Mixture

* 3-dimensional plot of first 3 principal components with color noting cluster assignment

➤ PCA to reduce dimensionality
➤ 65% of variance explained
➤ Clustering on principal components
➤ Non-spherical shape detection

Decision Tree

➤ Predicting package preference
➤ 9 trees trained constraining number of leaves from 2 − 10

Predictive Model – Predicting True Package Preference

*We iterated on several models to determine the predictive approach for this task. Our final iteration was a **LightGBM** model under an unsegmented scenario. Hyperparameters were tuned using an automated optimization tool (HyperOpt) in Python with 5-fold cross validation. Our final model **improved accuracy by 14.8%** against baseline and had an **AUC of 0.74.***

Out-of-Sample ROC Curve
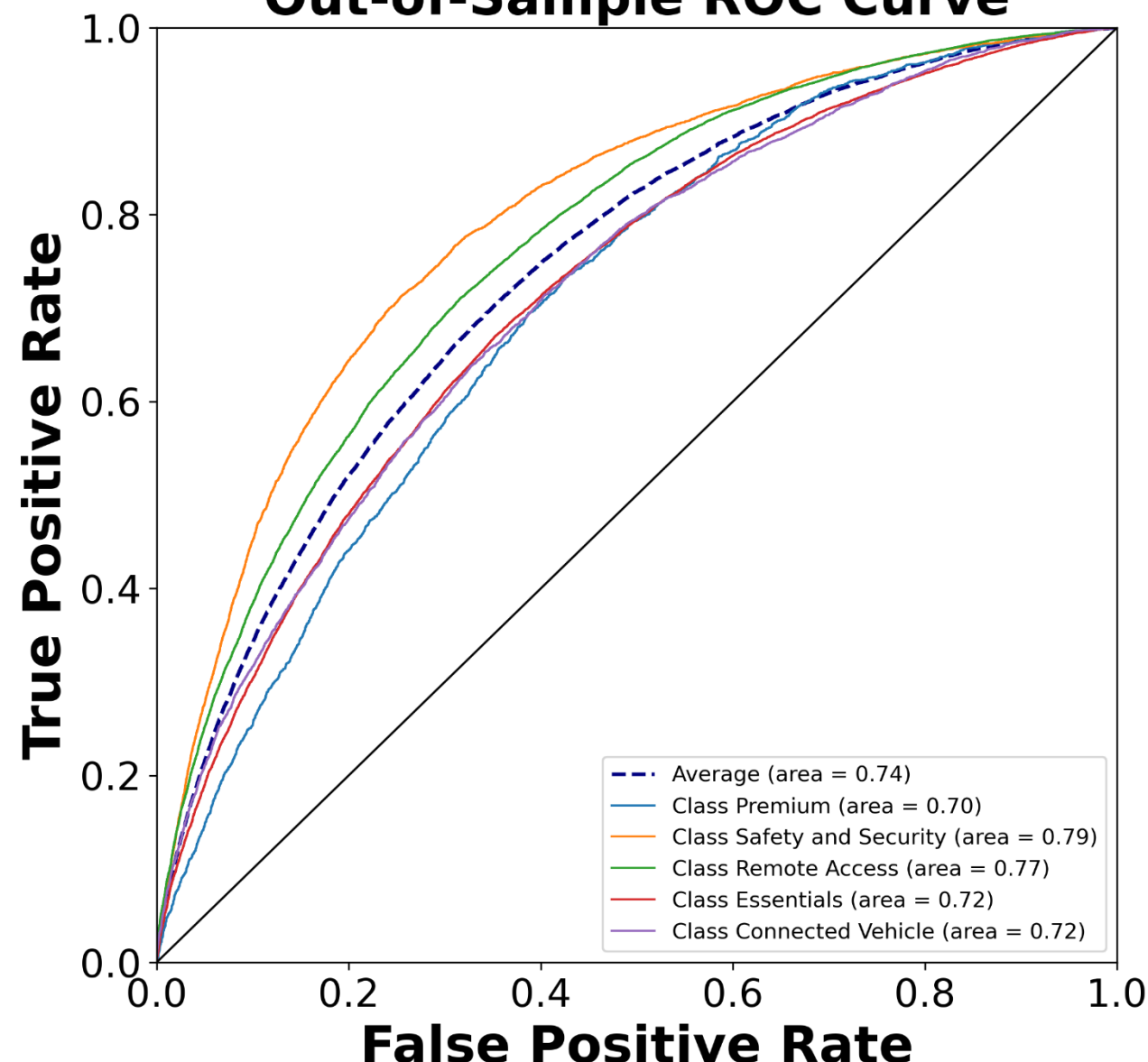
Metric	Training	Testing
Accuracy	0.5715	0.5331
Bal. Accuracy	0.3773	0.3446
F1	0.5371	0.4988
Recall	0.5715	0.5331
Precision	0.5786	0.5036

➤ Key features include: Remote Start, Get Vehicle Data, Number of Marketing Touchpoints

➤ Feature usage insights used by GM Marketing for pilot copy

SHapley Additive exPlanations (SHAP)