

Predicting Shipping Time with Machine Learning

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The presenters

Florian Krempl



Prior to coming to MIT, Florian worked at LKW Walter managing full truck loads for Amazon and Yusen Logistics all over the EU. In his Bachelor program at the University of Economics in Vienna, he specialized in Logistics and Finance.

Antoine Jonquais



Before being a student at MIT, Antoine worked as an account analyst at Hasbro and as a logistics project manager in France. He holds a Master's degree in Logistics Engineering from ISEL - Université Le Havre Normandie.

A.P. Møller-Mærsk A/S

- Largest container shipping company in the world
- Serves 343 ports worldwide, employs 80,000 people
- Operates ships, terminals and tow-boats
- Manufactures containers



MAERSK

- Motivation
- Model Description
- Performance
- Predicting in practice



90% of non-bulk cargo is transported by container

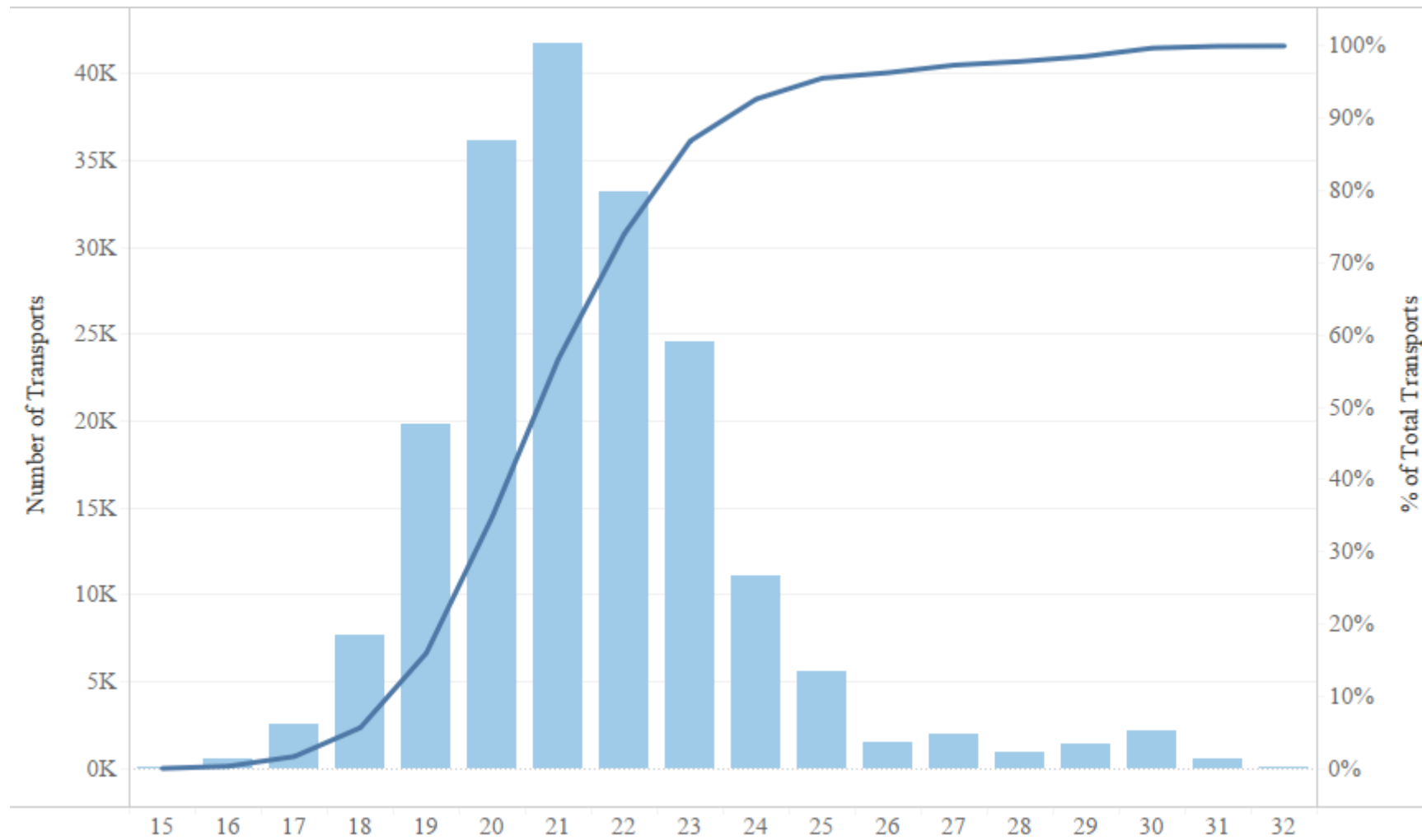


Only 50% of ships arrive within 24h of their ETA



Schedule unreliability increases costs across the supply chains

Motivation

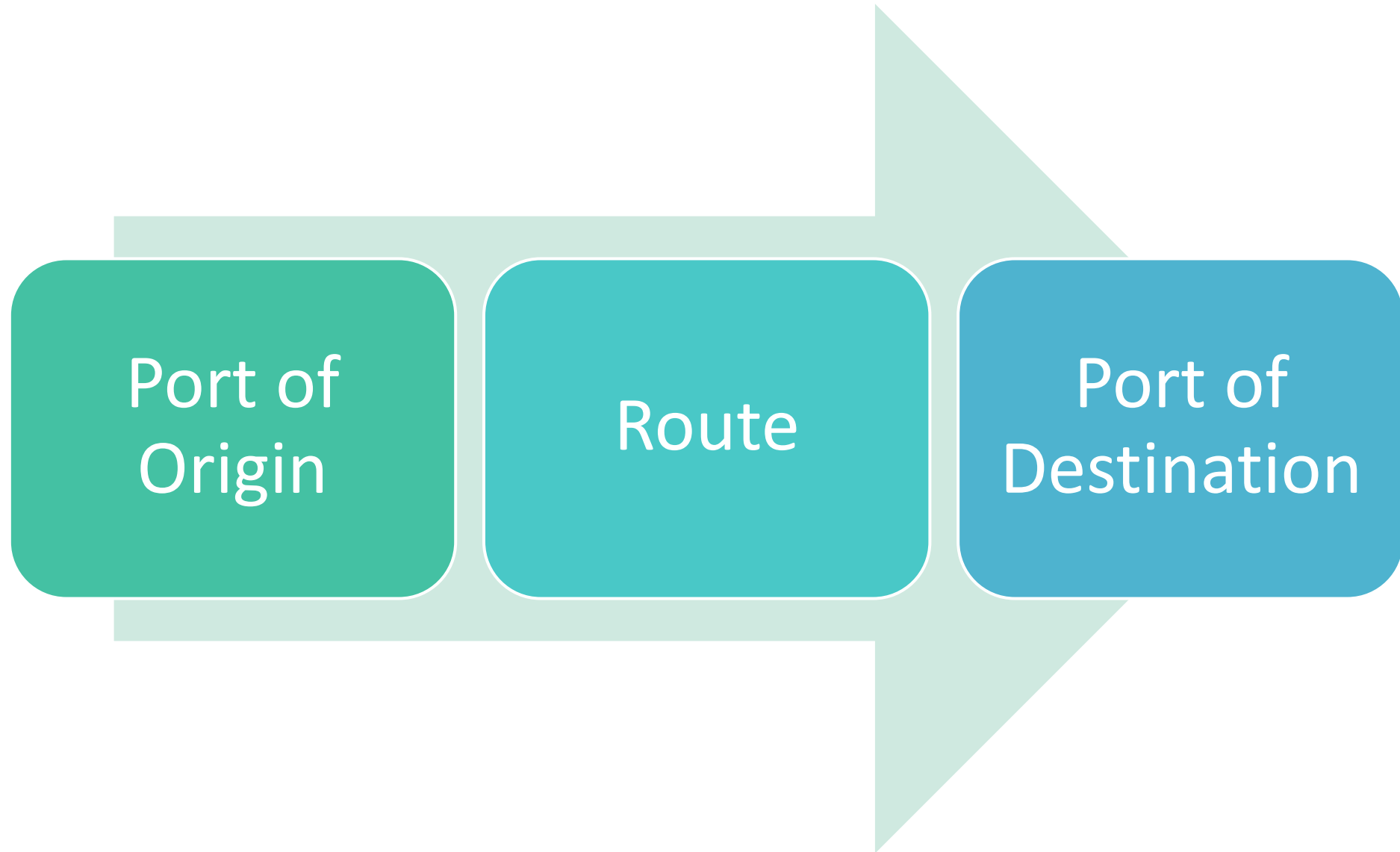


Transit time in days from Ningbo, China to Long Beach, CA

- Best case scenario: deterministic transit times
- Get more insights about actual transit times
- Today, Maersk has a descriptive analytics tool: Harmony
- Our project's goal is predicting accurately when a shipment will arrive

- **Identifying** external factors that explain transit time variability
- **Converting** historical data to predictor variables
- **Training** machine learning models
- **Testing** performance against real transit time
- **Build** a prototype that predicts the transit time in real time

Legs of the Journey



Port of Origin Features

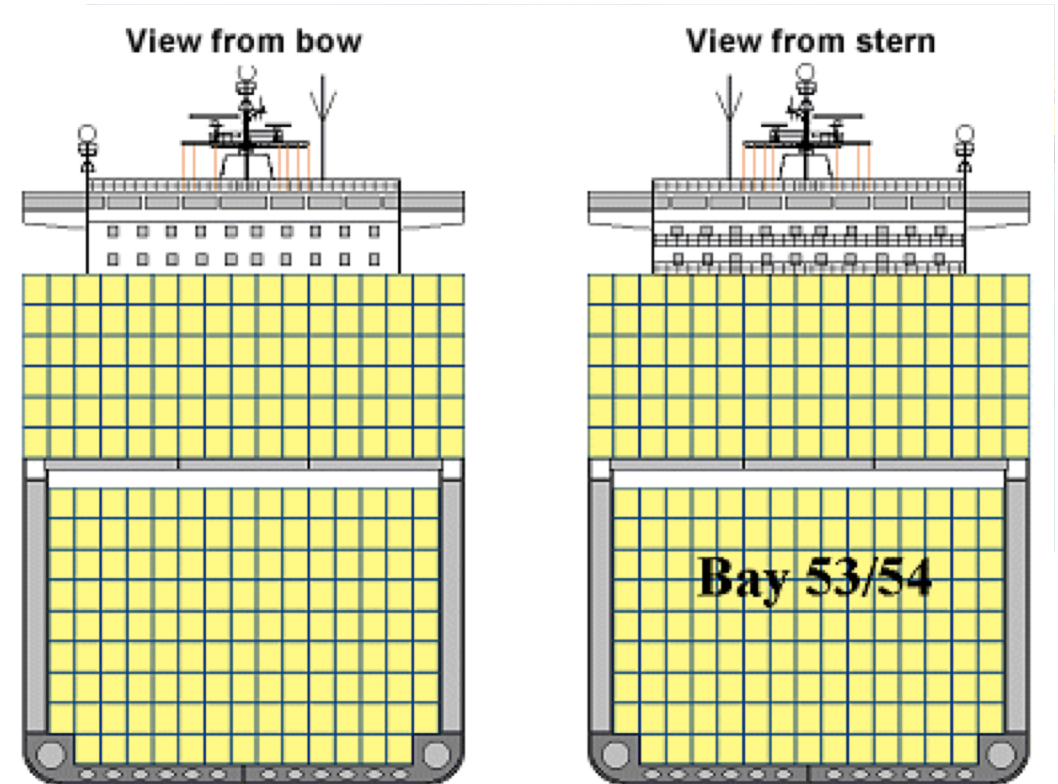
- Expected Time to port
- Average time spent at Port of origin
- Standard deviation of time spent at Port of origin
- Origin Service
- Holiday
- Goods received late
- Late departure

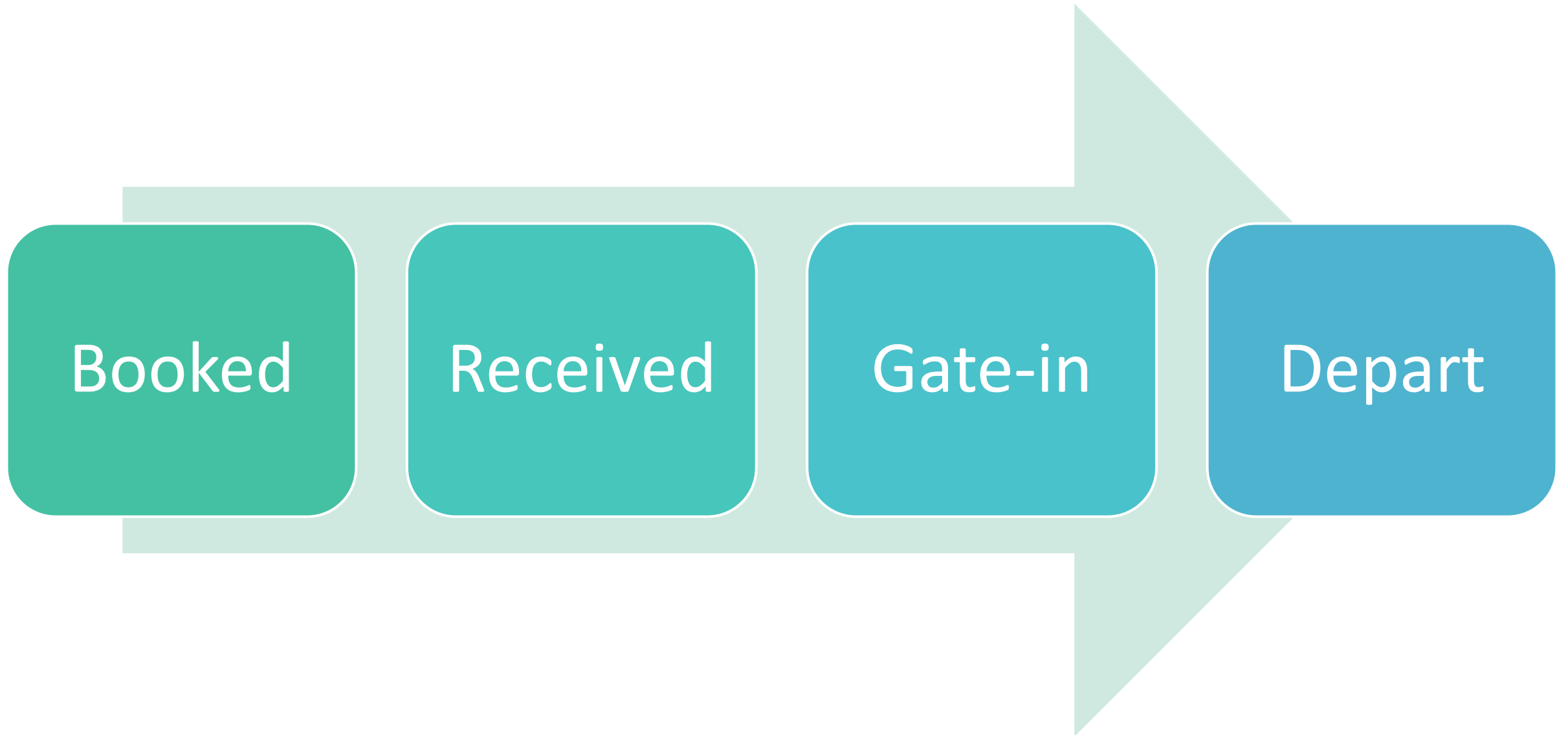


- Schedule
- Average time spent per Route
- Seasonal Variability
- (Weather)
- (Stops on the Route)
- (Type of Vessel)

Port of Destination

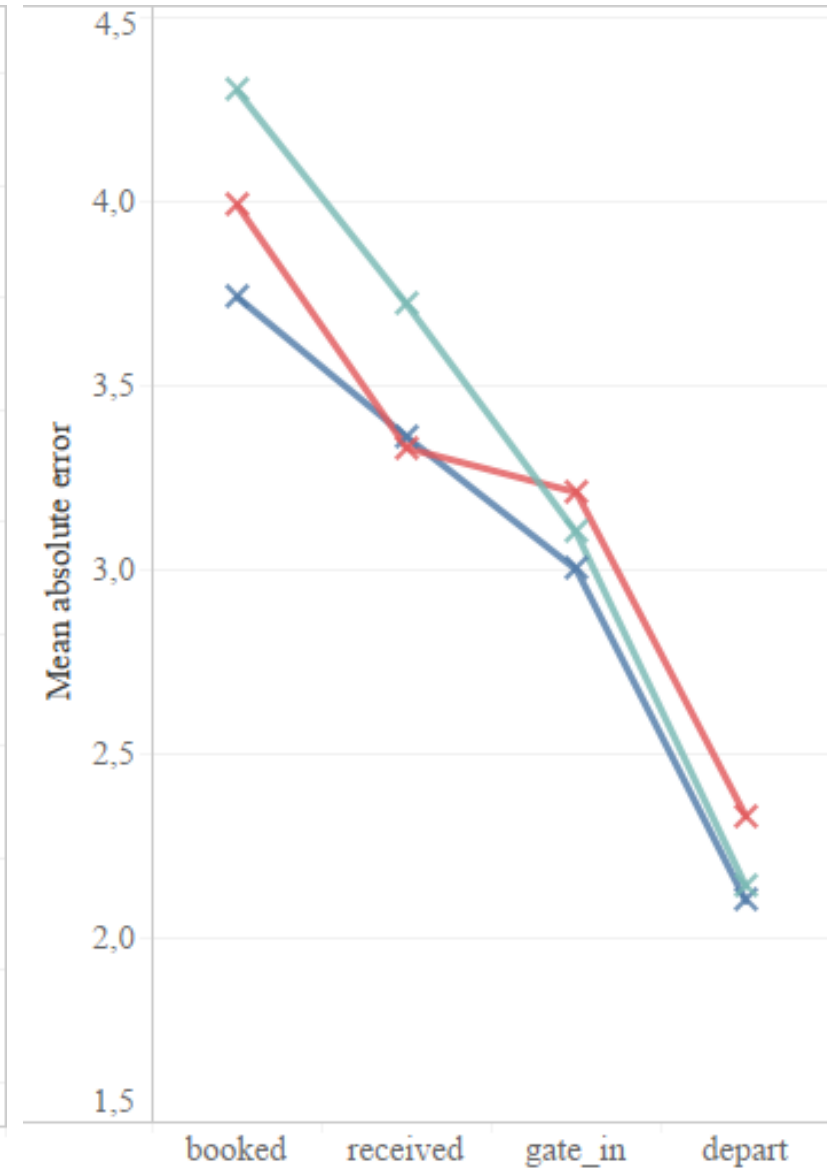
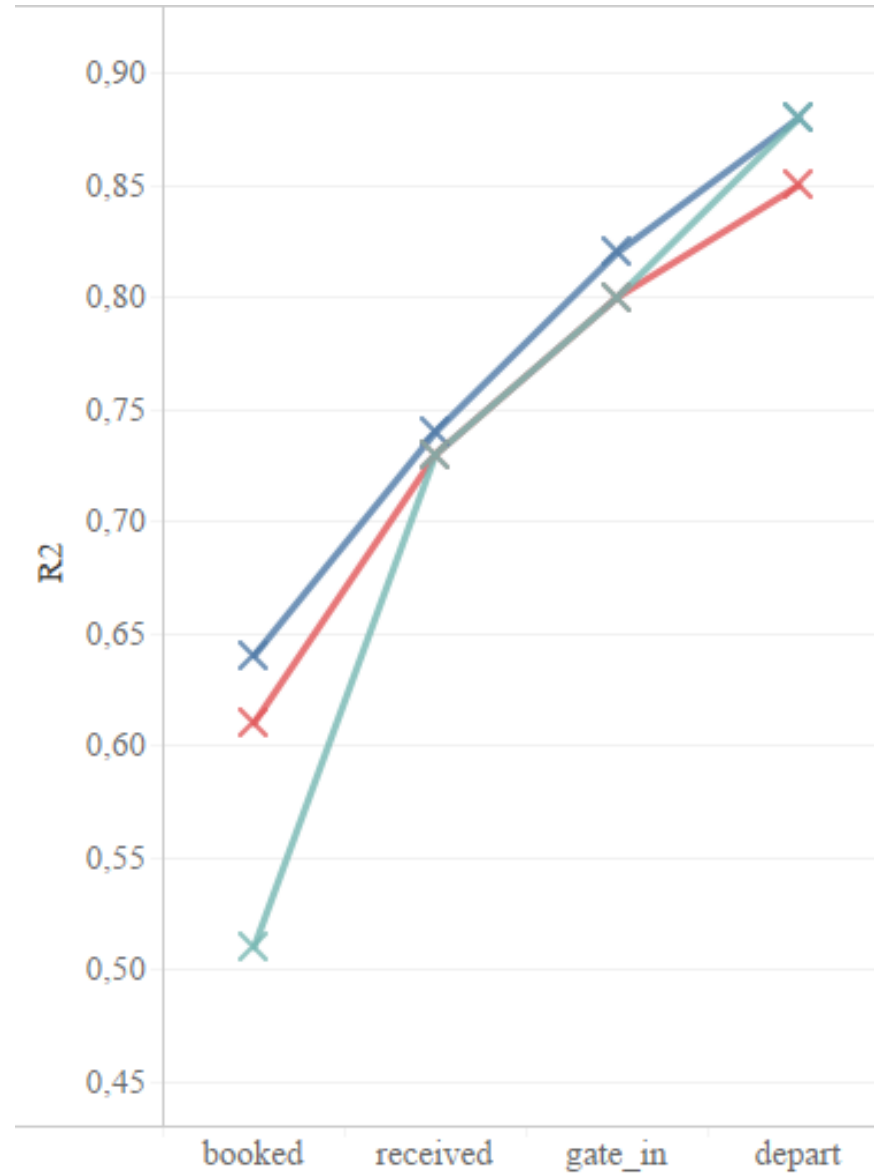
- Capacity of port of destination
- Average time spent at Port
- Standard deviation of time spent at Port
- (Position of the container on the vessel)





Comparison of Metrics

- Baseline
- Neural Network
- Random Forest



- Booking Date
- Carrier
- Shipper
- Route
- Expected time of receipt
- Origin Service

- Route
- Carrier
- Shipper
- Earliest Date of Arrival
- Expected Date of Arrival
- Latest Date of Arrival

Carrier	MAEU
Shipper	ALLTRADE TOOLS LLC
Original Port Of Loading	YANTIAN
Final Port Of Discharge	LOS ANGELES
earliest	2019-06-24 00:00:00
Container Unload From Vessel-Estimated	2019-07-01 00:00:00
latest	2019-07-04 00:00:00

- Machine Learning is a valid use to tackle this issue
- Adding new selected features to the model could improve its accuracy
- Next steps for Maersk is to couple our prototype with Harmony
 - Transition from descriptive analytics to predictive analytics



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Supply Chain
MANAGEMENT

Thank you for your attention