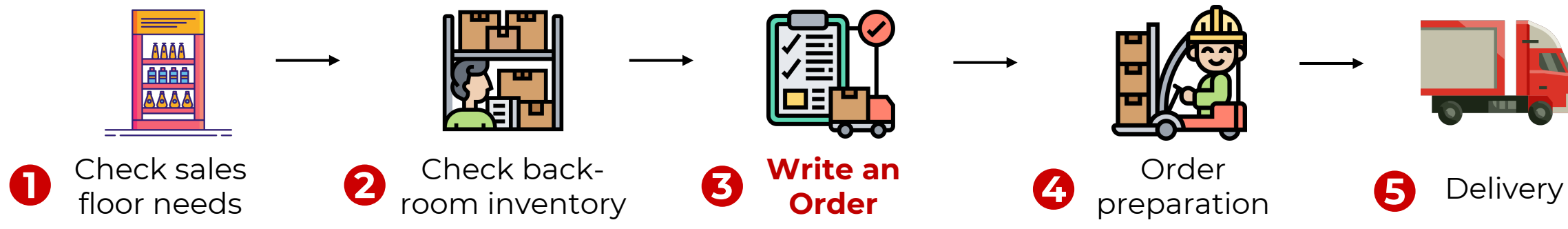


Problem Statement

Context: Order-taking is a core process at CCSWB, where frontline employees check stores inventory and formulate orders using an Order Suggestion Tool. Orders quality directly impacts CCSWB's business and operational efficiency.

Order-taking Process Overview



Current pains

- Average suggestions**
→ Mental calculations & adjustments
- Experience-dependent**
- Time-consuming**

Opportunities

- Improve Order Suggestions:**
- Can we account for **trends & seasonality**?
 - Can we facilitate **operations**?
 - Can we support **volume growth**?

Goal
Develop a **Customer Suggested Ordering** solution that enhances **CCSWB's sales & efficiency**

Data

Scope: 4700 Home Market Stores in the Dallas-Fort Worth area (DFW)

7 Trade Channels:

- Superette
- Convenience Store
- Club Store
- Supermarket
- General Merchandiser
- Hyper-Merchandiser
- Mass-Merchandiser

1200 SKUs in 10 Categories:

- Core Sparkling
- Dairy/Soy Beverages
- Packaged Water
- Enhanced Water Beverages
- Fruit/Vegetables Still Drinks
- Juices/Nectars
- Energy Drinks
- Sport Drinks
- Coffee
- Tea

1.4M Eq sold weekly

93M Rows in sales data

Available data:

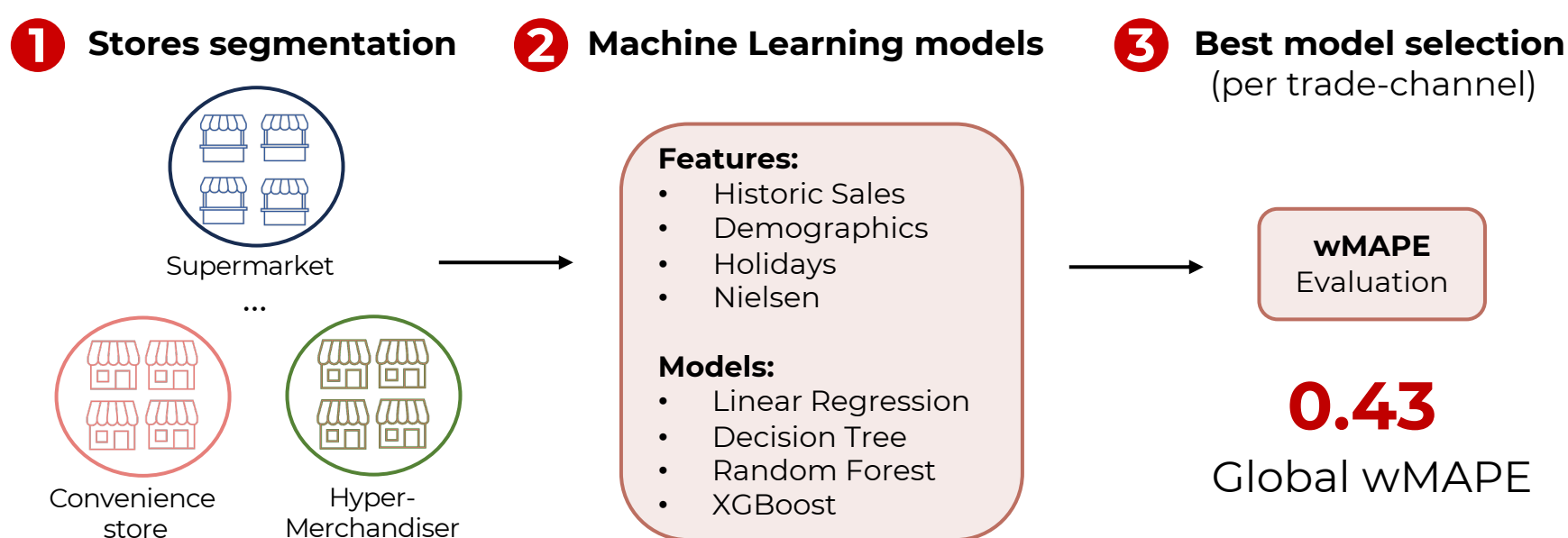
- Demographic:** Census data for Gender, Race, Income, Education, Population
- Stores:** ID, Location, Trade-Channel, Brand
- Internal Sales:** 2 years of orders, with Store ID, SKU ID, Date, Quantity
- Nielsen:** Market Share and Size per beverage category, Location
- Out-of-stocks:** Out-of-stock indicator, Store ID, SKU ID, Date
- SKUs:** ID, Brand, Package, Size, Eq Per Case, Units per Case, Units per Layer

Methodology

1. Sales Forecast

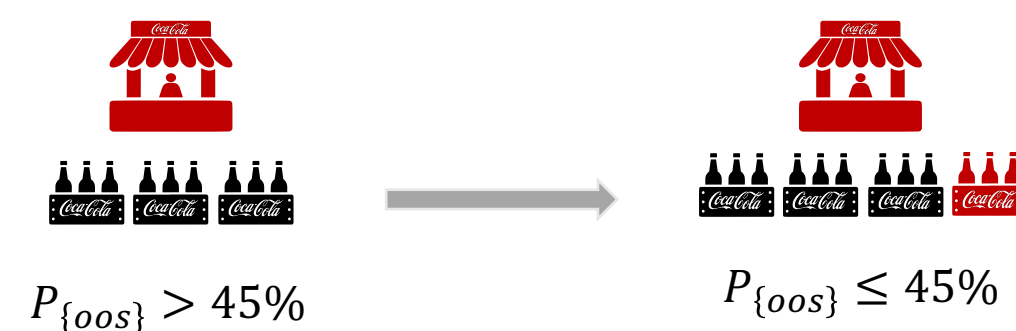
- Challenges:**
- Different schedules & visits frequency
 - Different SKUs sold at each visit & store
 - Different trade channels
 - Order quantities sparsity

Forecast at the **store-week-SKUs** grouping level
One model per **trade-channel**



2. Out-of-Stocks (OOS) Prevention

- Out-of-stock Data Extraction**
Features: Out-of-stock records, sales of the past 4 weeks, calendar
- Logistic Regression Modeling**
Estimate **probability of out-of-stock** for each SKU and store given past sales and next week forecast.
- Reducing risk of Out-of-stock**
Increase suggestions when probability of out-of-stock exceeds 45%



Our Solution

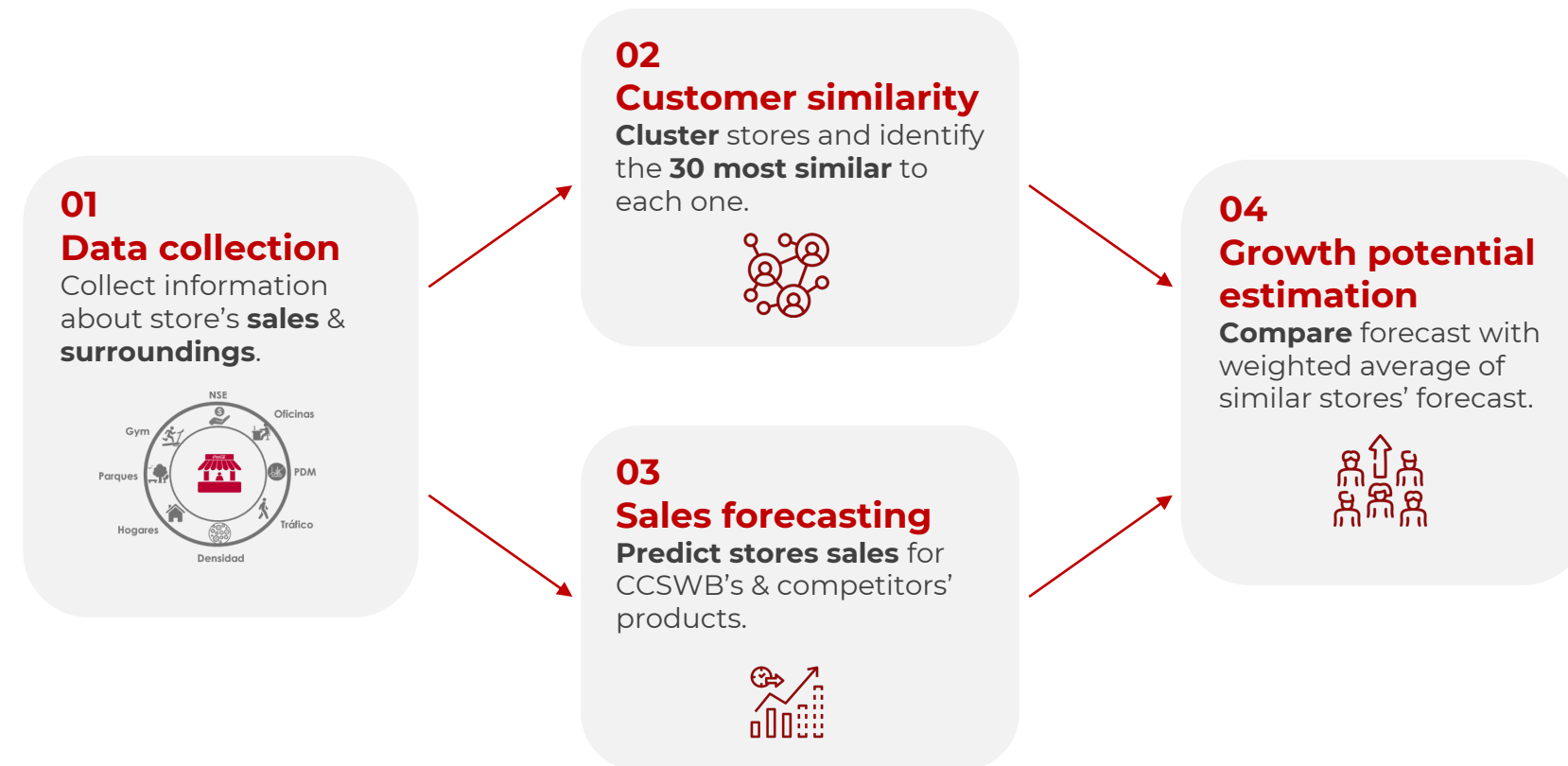
+70 Features

- Sales forecast**
per store, week & SKU groupings
How much will stores buy next week?
- OOS prevention**
Is there enough to avoid out of stocks?
- Growth potential exploitation**
Are stores exploiting their full sales potential?
- Suggestion disaggregation**
per store, day & SKU
How much to order at each visit?

Order suggestions

3. Growth Potential Exploitation

- Estimate stores' growth potential**
Leveraging the potential model developed by a previous CCSWB-MIT Capstone project



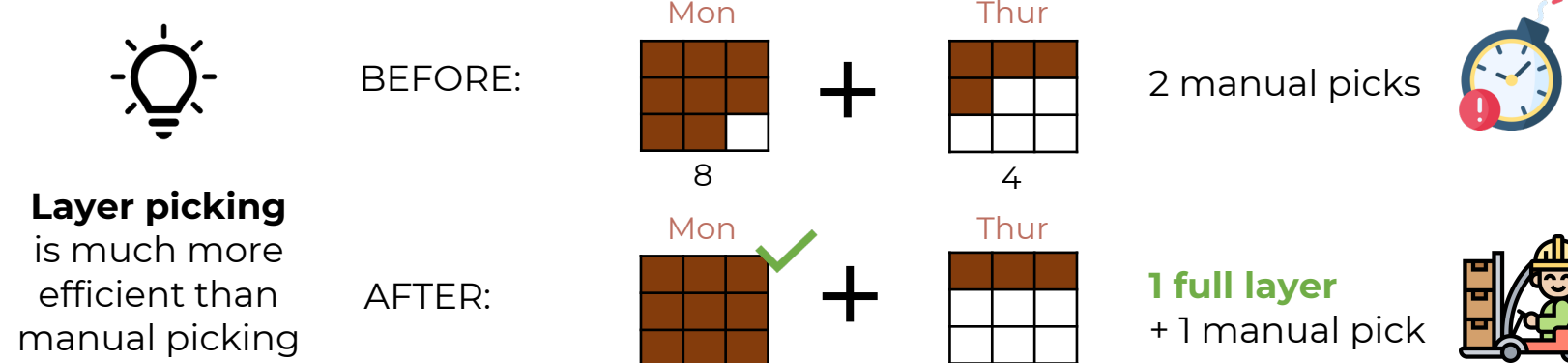
- Exploit growth potential**, up to 30% suggestion increase

4. Suggestion disaggregation

- Disaggregation**
Goal: Suggestions per week & grouping → Suggestions per day & SKU

Grouping	Mon	Tue	Wed	Thur	Fri	Sat	Sun
SKU 1	%	%	%	%	%	%	%
SKU 2	%	%	%	%	%	%	%
SKU 3	%	%	%	%	%	%	%
...

- Layers adjustments**
Goal: Promote **full layers** sales to facilitate warehouse operations



Example

- Week:** June 5, 2023
Grouping: Glaceau Smartwater 23.7 OZ Plastic Bottle
Store: El Rio Grande
- Weekly Sales Forecast: 4.4 eq
 - + OOS Prevention model: 5.1 eq (+16%)
 - + Growth Potential model: 6.6 eq (+30%)
 - After disaggregation: ...

Results

Solution Back-testing for June 2023

- Better forecast performance**
Our Forecast: **0.43**
Baseline: 0.55
- 22% Global wMAPE

- +3.3%** Expected sales captured

+ 230k Eq weekly with oos prevention (+2%)

+ 110k Eq weekly with growth potential (+1%)

- Simplified operations**

62%

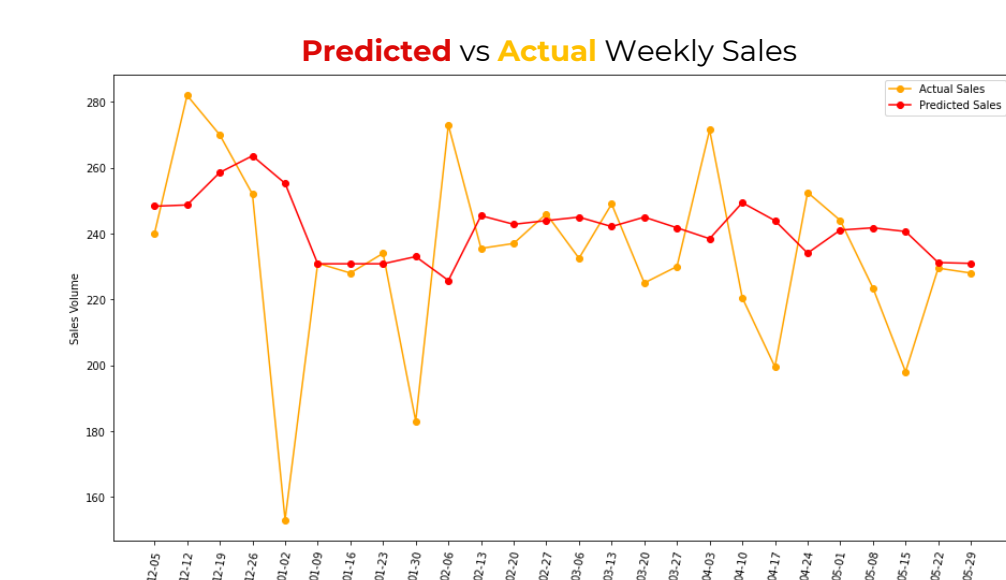
Suggested volume can be delivered in **full layers**



Zoom on Sales Forecast

Trade Channels	# Stores	Baseline wMAPE	Our wMAPE
Hyper-Merchandiser	162	0.34	0.22 (-35%)
Mass Merchandiser	21	0.54	0.45 (-16%)
General Merchandiser	699	0.60	0.52 (-13%)
Convenience Store	3241	0.65	0.53 (-21%)

Example: Dec 2022 - May 2023 Walmart Diet Coke 12Oz Can



Impact

By suggesting more accurate and efficient order quantities, we are ...



Impacting core processes

- Enhancing stores sales & inventory control
- Facilitating warehouse operations and distribution



Improving the frontline experience

- Less pressure on frontline workers
- Dedicating more time to value-adding activities



Supporting business growth

- Optimizing product availability
- Capturing additional sales opportunities