# HARMONIZING FORECAST & INVENTORY OPTIMZATION STRATEGIES

## Driving Value With Artificial  Intelligence

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**BLUEPRINT 2⬤19**
**PLANNING FOR A FLEXIBLE FUTURE**

# OUR PHILOSOPHY

## PRACTICAL, APPLIED AI

Add differentiating value to SCP

- Techniques that analyze data and desired outcome

- Produce the model that provides best actionable recommendations

# DEMAND PLANNING USE CASES

## INCORPORATE OUTSIDE-IN 3RD PARTY DATA

## APPLIED AI THAT OBSERVES AND LEARNS

**1** From weather data to form correlations to selling patterns

**2** From user interaction with demand exceptions

**3** Consumer behavior that can result targeted promotion and pricing

**4** Consumer search trends that aid new assortment decisions

**5** Better forecasting precision in a wider range of demand behavior

# ANALYTICS USE CASES

- Comprehensive Segmented Inventory Strategy Dashboard

- Natural Language Processing
  - Spoken commands to embedded analytics

# INVENTORY OPTIMIZATION USE CASES

## CONTINUOUS LEARNING – DYNAMICALLY ADJUSTS OPTIMAL COMBINATIONS OF FORECAST AND INVENTORY OPTIMIZATION POLICIES

- Forecasting models aided by AI and Machine Learning techniques

- SKU analysis and classification that makes intelligent assignment

- Results in…Comprehensive Segmented Inventory Strategy

# THE OPPORTUNITY

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

### CLASSIFY DEMAND

There are multiple classifications of demand behavior and SKU attribution that require different forecast and inventory optimization strategies
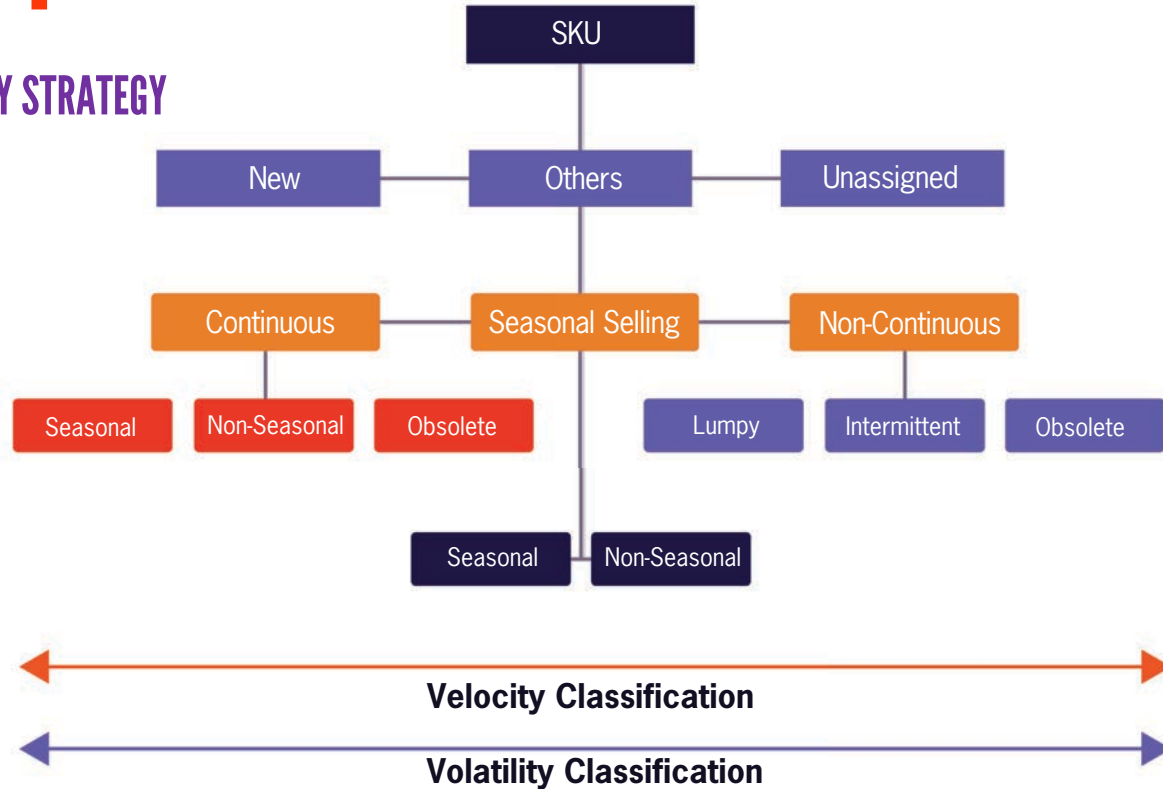
# THE OPPORTUNITY

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- Traditional supply chain planning regarded demand forecasting and purchasing/inventory optimization as separate things
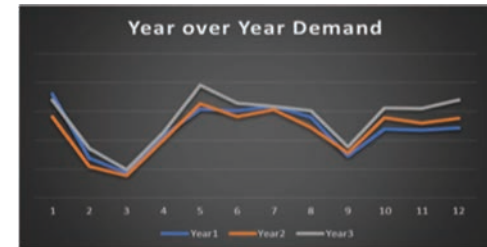
# THE OPPORTUNITY

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- Different SKUs require different Forecasting & Replenishment policies for optimal results, i.e. one size does not fit all
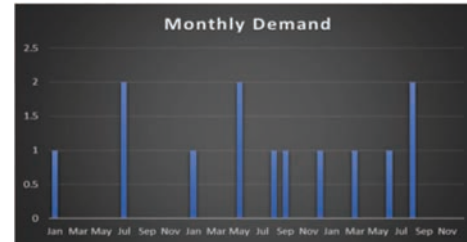
### CONTINUOUS



### CONTINUOUS REPETITIVE



### SEASONAL SELLING
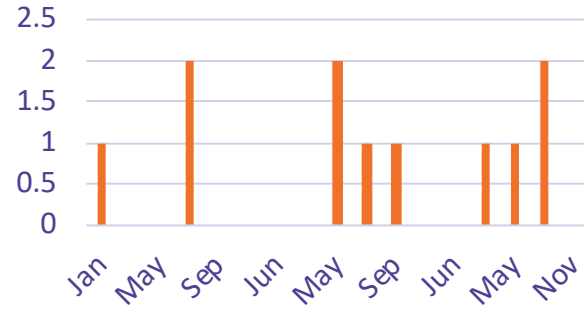


### INTERMITTENT



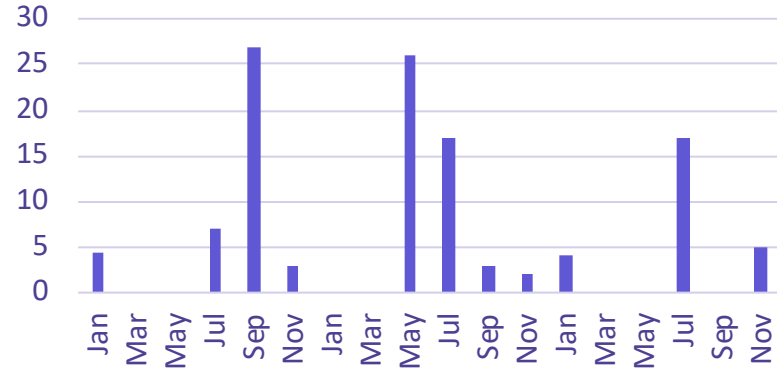### LUMPY

# THE OPPORTUNITY

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- SKUs with Intermittent Demand are a prime example of the need for different combinations of forecasting and purchasing strategies
- Not limited to intermittent demand (slow moving SKUs)

**Monthly Demand**



**Monthly Demand**

# THE SOLUTION: ANALYSIS

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- A predictive and prescriptive analytics process that analyzes SKU attributes and recommends the best forecast and replenishment strategy for various classes of SKUs
  - Applied Artificial Intelligence / Machine Learning

- Analyzes multiple SKU attributes that include profitability, volume, importance relative to the SKU mix, customer demographics
  - Data internal to SCP
  - Data external to SCP

# THE SOLUTION: DEMAND PLANNING

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- Draws from multiple forecast model families including
    - Auto Regression library
    - Neural Network library
    - Advanced Adaptive Models
    - Intermittent Demand Forecasting library

# THE SOLUTION: REPLENISHMENT

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- Multiple replenishment optimization models include:
    - Economic Order Quantity
    - Intelligent Min/Max (Bootstrapping)
    - Multi Echelon Inventory Optimization
    - Allocation

# HOW DOES AI / CSIS HELP?

## AI / COMPREHENSIVE SEGMENTED INVENTORY STRATEGY

- Harmonizes the optimal forecasting & inventory investment strategy for every SKU

- Reduces or eliminates need for manual user intervention for difficult to forecast and replenish SKUs particularly those with severe intermittent demand

- Feedback loop informs (AI learning) models and enables them to adapt and provide new models

- Configurable visualization dashboard enables users to drill into the most impactful metrics by classification

# PORTAL

NEW ITEMS

|  | LOW | MEDIUM | HIGH |
|---|---|---|---|
| **FAST** | 614 Count of SKUs<br>$420,000 Sales Last Period<br>97% Forecast Accuracy<br>$100,000 Inventory<br>25 Days of Supply<br>99% Service Level | 938 Count of SKUs<br>$200,000 Sales<br>93.5% Forecast Accuracy<br>$75,000 Inventory<br>28 Days of Supply<br>98.5% Service Level | 1301 Count of SKUs<br>$170,000 Sales<br>89% Forecast Accuracy<br>$70,000 Inventory<br>35 Days of Supply<br>97% Service Level |
| **MED** | 905 Count of SKUs<br>$85,000 Sales<br>96% Forecast Accuracy<br>$60,000 Inventory<br>27 Days of Supply<br>96% Service Level | 1251 Count of SKUs<br>$63,000 Sales<br>92% Forecast Accuracy<br>$50,000 Inventory<br>30 Days of Supply<br>95% Service Level | 2840 Count of SKUs<br>$58,000 Sales<br>90% Forecast Accuracy<br>$45,000 Inventory<br>45 Days of Supply<br>95% Service Level |
| **SLOW** | 5096 Count of SKUs<br>$41,000 Sales<br>95% Forecast Accuracy<br>$35,000 Inventory<br>60 Days of Supply<br>92% Service Level | 7080 Count of SKUs<br>$33,000 Sales<br>85% Forecast Accuracy<br>$32,000 Inventory<br>84 Days of Supply<br>90% Service Level | 16000 Count of SKUs<br>$8,000 Sales<br>N/A Forecast Accuracy<br>$19,000 Inventory<br>120 Days of Supply<br>N/A Service Level |

**VOLUME**

**KEY ITEMS**

**ADAPTIVE, AR / EOQ, MEIO**

**IDF FORECASTING / EOQ, MEIO**

**TOP-DOWN FORECAST / ALLOCATION OR EOQ**

**BOOTSTRAPPING, INTELLIGENT MIN/MAX**

LOW　　　　　MEDIUM　　　　　HIGH　　　　VOLATILITY

# AI/CSIS – BUSINESS SCENARIOS

- High to Medium volume, various demand variability behaviors
    - Adaptive, Auto Regressive Forecast models /MEIO, EOQ
    - Profit optimization

- Slower Volume, intermittent/lumpy demand variability behaviors
    - Intermittent demand forecast models / MEIO, EOQ

- Severe demand intermittency
    - Bootstrapping, intelligent min/max

- Severe demand intermittency
    - Top down forecasting / Push Allocation

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# COMPREHENSIVE SEGMENTED INVENTORY STRATEGY DIFFERENTIATORS

- Prescriptive Analytics engine analyzes every SKU and recommends best combined strategy

- Forecasting and Replenishment policies are part of a unified strategy

- Avoids siloed or disjointed forecasting & replenishment strategy decisions

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