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USE CASE 2: OTIF MANAGEMENT (ON-TIME, IN-FULL DELIVERY)



For businesses operating distributed warehouses, dark stores, or multiple fulfillment partners, delivery failures rarely happen at the last mile alone. Missed or partial deliveries are often caused by inventory imbalances, poor demand visibility, delayed replenishment, or suboptimal order routing across locations. These failures directly impact customer satisfaction, penalties from retail partners, and operational costs.



This use case focuses on improving **OTIF (On-Time, In-Full) performance** by continuously monitoring inventory levels, incoming orders, demand forecasts, and fulfillment constraints across the network. By predicting where OTIF risks are likely to occur, the system enables operations teams to rebalance inventory, reroute orders, or trigger replenishment actions in advance, shifting OTIF management from firefighting to proactive planning.



INTRODUCTION: THE PROBLEM WITH TRADITIONAL OTIF PROCESSES

WHY WE NEED A NEW PROCESS

Current setup detects problems too late (alerts ≠ action)



Humans can't optimize thousands of trade-offs in real time

Network is now distributed (dark stores, multi-warehouse) → old linear planning breaks



Cost of firefighting (expedites, cancellations) is too high

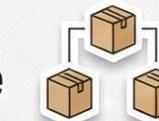


WHAT'S THE CURRENT PROBLEM

Reactive: dashboards tell you OTIF will fail, but don't fix it



Siloed decisions: warehouse, transport, inventory don't coordinate



Central planning doesn't scale with rapid demand spikes



No self-correction when disruptions happen (traffic, stockouts, delays)

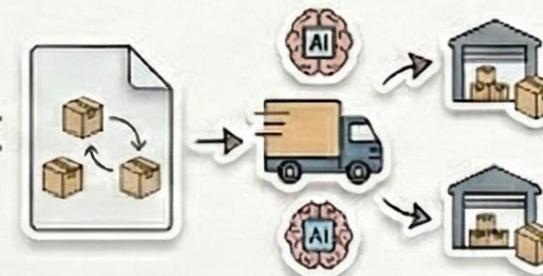


WHAT THE NEW PROCESS CHANGES

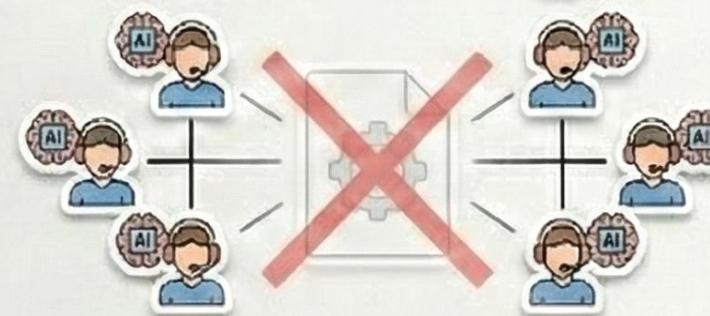
Movers from Reactive actions →
Predictive Optimistic Approach



System automates the process of stock management
via trained ML model



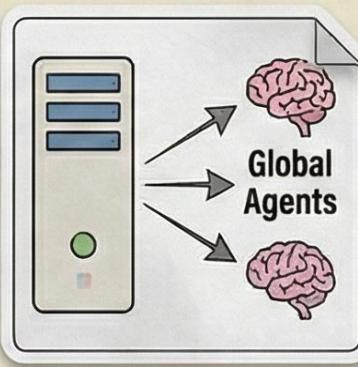
Decisions are local + coordinated (AI agents), not slow central approvals



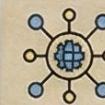
MARL ARCHITECTURE FOR RESILIENT SUPPLY CHAIN



CENTRALIZED TRAINING (CTDE)



Deployment



DECENTRALIZED EXECUTION (DEPLOYMENT)

Independent Learning Agent (Local Observation)



Independent Learning Agent (Local Observation)



Redistribute Inventory



Redirect Orders



Throttle Capacity



RESILIENT, SELF-MANAGING SYSTEM
(Shared Goal: Service Level, Cost)

Agents learn from global view & shared metrics.

Agents act autonomously, coordinate responses, & anticipate disruptions.

IMPACT & BENEFITS (DUE TO MARL ARCHITECTURE)

IMPACT



Predicts & fixes risks early, preventing failures.



Handles complex, distributed networks with real-time coordination.

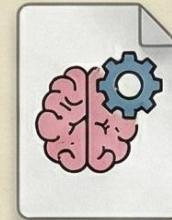


Self-corrects inventory and routing, reducing firefighting costs.

BENEFITS



Proactive action prevents stockouts, delays, and partial deliveries.



Autonomous local decisions replace slow central planning.



Enables smart rebalancing, boosting overall resilience.

ANY QUESTIONS?



Thank you for your time.

Q/A?



THANK YOU!