Ready-Made AOMs: Supply Chain Execution Optimization Suite (SCX)

🧩 1. AGENTIC FORECASTER (RAF)

1.1 Problem It Solves
Traditional forecasting methods rely on fixed statistical models that cannot adapt to real-time changes in market conditions, product mix, or external factors like promotions and weather. The **Agentic Forecaster** solves this by autonomously selecting and blending the best forecasting algorithms per SKU, learning continuously from performance feedback, and integrating causal variables to enhance prediction accuracy. It minimizes overstocking, understocking, and waste while improving service levels and profit margins.

1.2 What It Produces

- SKU-level, customer-level, or product-level demand forecasts
- Forecast accuracy metrics (MAPE, RMSE, WAPE, Bias, Tracking Signal)
- Scenario simulations (e.g., promotions, price changes, weather)
- Explainable visual dashboards showing model selection rationale and performance
- Optional integration outputs (CSV, API, or Control Tower dashboard feed)

1.3 Demo Access

- **URL:** https://raf.optiu.ai/login
- **Username:** coal
- **Password:** X430crACc7vE

1.4 Input Data Model

File	Description	Key Fields	Example
materials.csv	Defines each material and its classification	material_id, material_name, category, subcategory, level_3–5, unit_of_measurement	USR-000012, THERMAL COAL GRADE A, RAW_MATERIALS, COAL, THERMAL_COAL, HIGH_GRADE, POWER_GENERATION, MT
historical_demand_ts.csv	Historical monthly demand data per material	material_id, date, demand_quantity, time_bucket	USR-000012, 2024-01-01, 73456, month

1.5 Data Requirements

- Minimum 15 months of history per material
- Quantity in Metric Tons (MT)
- Date format: YYYY-MM-DD
- Matching material_id across files

🧩 2. REPLENISHMENT ORCHESTRATOR (RO)

2.1 Problem It Solves
Conventional replenishment systems rely on static reorder rules and batch planning cycles that fail under volatility in demand, production, and transport costs. The **Smart Replenishment Orchestrator** dynamically determines optimal shipment sources and destinations in real time—balancing inventory, cost, and SLA adherence. It eliminates stockouts, reduces redundant transfers, and ensures network-wide synchronization between plants and distribution centers.

2.2 What It Produces

- Replenishment Order Proposals (ROPs)
- Transfer Order Suggestions (TOs)
- Redirect Plans (alternative plant sourcing)
- Stockout Risk Alerts with mitigation plans
- Cost and service-level dashboards visualizing DC risk and transport efficiency

2.3 Demo Access

- **URL:** https://replenishment-orchestrator-production.up.railway.app/login
- **Username:** demo
- **Password:** Demo@2024$SCX!

2.4 Input Data Model

File	Description	Key Fields	Example
distribution_centers.csv	Defines DCs requiring replenishment	id, name, latitude, longitude, capacity, priority_level	DC001, North Regional Distribution Center, 40.7128, -74.0060, 50000, 1
shipping_locations.csv	Defines source warehouses and fulfillment centers	id, name, latitude, longitude, inventory_capacity, shipping_capacity_per_day, default_lead_time_days	WH001, Central Warehouse, 39.7392, -104.9903, 100000, 20000, 3
materials.csv	Catalog of products used in replenishment	id, name, category, is_perishable, shelf_life_days, unit_cost, unit_price, weight_kg, volume_m3	MAT001, Premium Widget A, Electronics, false,, 45.00, 89.99, 0.5, 0.002
Inventory_batches.csv	Catalog all the batches available with their expiry date	**shipping_location_id, material_id, batch_number, batch_stock, manufacture_date, expiry_date**	**shp482,** lub67429, batch847293, 8000, 2025-06-20, 2028-06-20

2.5 Data Requirements

- Consistent IDs for materials and DCs across all files
- Location coordinates for distance and cost computation
- Quantity and cost fields standardized in consistent units

🧩 3. DYNAMIC LEAD TIME INJECTOR (LTI)

3.1 Problem It Solves
Static ERP lead times are often outdated and fail to represent real-world supplier performance, leading to inaccurate plans and late deliveries. The **Dynamic Lead Time Injector** computes real lead times per vendor-SKU pair using statistical analysis of historical purchase orders and vendor reliability. It ensures that every purchase order is created with a realistic delivery window, eliminating downstream chaos.

3.2 What It Produces

- PO Delivery Date Predictions with 90% confidence intervals
- Lead Time Adjustment Alerts
- Fallback Recommendations for SKUs with no history
- Volatility Flags for high-risk vendors
- Supplier reliability dashboards

3.3 Demo Access

- **URL:** https://scx-po.optiu.ai/login
- **Username: demo**
- **Password:** OptiU@2024#Secure

3.4 Input Data Model

File	Description	Key Fields	Example
Historical_orders,csv	Historical lead time performance per vendor-SKU	Order_id, order_type, vendor_name, plant_id, material_id, material_name, order_date, delivery_date, requested_date, quantity, unit_price, total_value, static_lead_time_days, actual_lead_time_days, delay_days, season, year, season, year, source	V001, MAT003, 12, 3, 0.95

3.5 Data Requirements

- At least 12 months of PO history
- Mean and standard deviation calculated from delivery gaps
- Mapping consistency between vendor and SKU IDs

🧩 4. CONFIGURE-TO-PROMISE SCHEDULER (CTP)

4.1 Problem It Solves

In highly configurable, make-to-order (MTO) or engineer-to-order (ETO) environments, planners often overpromise or underdeliver because they lack real-time visibility into component availability and production routing. The **CTP Scheduler** determines the earliest feasible and most profitable commit date using real-time data on inventory, capacity, lead times, and BOM alternates.

4.2 What It Produces

- Commit Date Proposals with confidence levels
- Substitution and Alternate Routing Plans
- Procurement Triggers for missing components
- Gantt-based visualization of feasible assembly schedules

4.3 Demo Access

- **URL:** https://config-to-promise-production.up.railway.app/login
- **Username: demo**
- **Password : Demo@2024$SCX!**

4.4 Input Data Model

File	Description	Key Fields	Example
Modules.csv	Modules names and description and category	Module_id, name, description, category, weight_kg, shared_module	FG100, COMP12, COMP12A, suoerconductor, 3t supercondecrot, core comp, 4500, False
substitutes.csv	Defines substitutes relation	Original_module_id, substitute_module_id, similarity, performance_ratio, cost_ratio, availability_improvement	MRI-MAG-CORE, MRI-GRAD-COIL, 1, 2,1,0
System_modules.csv	Systems-module mapping	System_id, module_id, quantity, is_critical	MRI-ADVANCED-3T, MRI-MAG-CORE, 1, TRUE
systems.csv	System definition	System_id, name, description, industry, base_price	TV-OLED-77, 77' OLED TV, Premium OLED display screen, Electornics, 8500
Vendor_lead_times.csv	Vednors lead time distribution	Vendor_id, module_id, p50, p80, p95, p99, distribution_type, last_update	V001. MRI-MAG, 45, 58, 72, 85, normal, 1/1/2025
Vendor_modules.csv	Vendor module mapping	Vendor_id, module_id, price_per_unit, availability, preferred_vendor	V001, MRI-MAG-CORE, 85000, medium, TRUE
Vendors.csv	Available vendors	Vendor_id, name, location, country, capabilities, reliability, industry_focus	V001, siemens, munich, Germany, medical imagining, 0.96, healthcare

4.5 Data Requirements

- Real-time or near-real-time data refresh
- Component availability aligned with supplier updates
- Validated routing definitions for each FG/Users/nourdesouki/configure-to-promise/config-to-promise/data/system_modules.csv

🧩 5. RESILIENCE OPTIMIZER (RO) – COMING SOON

5.1 Problem It Solves
Supply disruptions—whether supplier delays, plant breakdowns, or logistics interruptions—often create cascading failures across production and fulfillment. The **Resilience Optimizer** autonomously detects disruptions, simulates response actions, and recommends mitigation paths such as rerouting production, triggering emergency POs, or releasing buffer stock.

5.2 What It Produces

- Disruption Detection Alerts and Impact Reports
- Emergency Procurement Triggers
- Production Reroute Plans
- Customer Impact Alerts (SLA breach probability)
- Risk heatmaps across suppliers, plants, and SKUs

5.3 Demo Access

- **URL:** COMING SOON
- **Username:** COMING SOON
- **Password:** COMING SOON

5.4 Input Data Model

File	Description	Key Fields	Example
supplier_disruption_profile.csv	Supplier risk levels and recovery rates	vendor, sku, disruption_rate, avg_recovery_time, risk_index	V005, MAT008, 0.15, 5, High
production_routing_matrix.csv	Alternate plant options for rerouting	sku, original_plant, backup_plant, setup_time_delta	MAT008, PlantA, PlantB, 1.5
disruption_event_log.csv	Records active disruption events	timestamp, event_type, affected_sku, eta_recovery, confidence	2024-10-01, Supplier Delay, MAT008, 3, 0.85
customer_risk_feed.csv	Orders impacted by disruptions	order_id, customer, sku, predicted_delay, revenue_impact	ORD22, CUST10, MAT008, 2 days, 12000

5.5 Data Requirements

- Event stream must be updated hourly or daily
- Historical disruption data for training agent behavior

🧩 6. ALLOCATION MAXIMIZER (AM)

Problem It Solves
In industries with constrained supply or fluctuating demand, allocation plans often fail because customers consume unevenly or price signals change mid-cycle. The **Allocation Maximizer** dynamically reallocates stock among customers, adjusting based on consumption velocity, storage limits, and pricing trends to maximize margin and service levels.

6.1 What It Produces

- Allocation Risk Alerts
- Reallocation Proposals (from low-use to high-demand customers)
- Buffer Stock and Throttling Recommendations
- Price-Triggered Allocation Adjustments
- Regional and customer-level allocation dashboards

6.2 Demo Access

- **URL: https://web-production-e199.up.railway.app/login**
- **Username:** demo
- **Password:** Demo@2024$SCX!

6.3 Input Data Model

File	Description	Key Fields	Example
Allocation_data.csv	Defines customer tiers and SLAs	dc_id, dc_name, dc_location, dc_region, dc_priority, sku_id, sku_name, sku_category, customer_id, customer_name, customer_tier, customer_region, current_inventory, forecasted_demand, historical_demand, revenue_per_unit, cost_per_unit, margin, sla_level, risk_score, substitution_sku_id, date, allocated_quantity, fulfillment_rate, lead_time_days, min_order_quantity, safety_stock	DC001, Chicago DC, Chicago IL, North America, 5, SKU-NET-001, Network Switch 48-Port, Networking, CUST-001, TechCorp Inc, Strategic, North America, 500, 450, 420, 1250, 950, 24, Gold, 0.15, SKU-NET-002, 10/14/2024, 400, 88.9, 3, 10, 50

Data Requirements

- Rolling allocation and consumption data per month
- Integrated price forecasts for margin-sensitive reallocation decisions