C3.ai

Enterprise AI for HealthTech

Global Supply Chain and Lead Time Visibility

A major global HealthTech company produces, distributes, and markets a portfolio of B2B and B2C products and services ranging across diagnostic imaging, image-guided therapies, sleep & respiratory care, mother & childcare, and oral health. The company strongly believes in the impact of innovation on improving people's lives, healthcare outcomes, and reducing healthcare costs. The company is aiming to increase the number of lives improved to 3 billion people by 2030, including 400 million in underserved communities with limited access to quality healthcare.

In the fight against the global COVID-19 pandemic, the HealthTech company was challenged with limited visibility into existing inventory, customer orders, and lead times regarding its mission-critical products such as respiratory ventilators. The company required an easy way to view and track its global ventilator inventory across numerous disparate systems accumulated from various business acquisitions over the years. Disjointed data sources also made it challenging to create holistic, relational data models required to perform descriptive historical analyses and generate predictive insights. To address these impending challenges and holistically transform its supply chain, the company selected C3 AI® and deployed the C3 AI Supply Chain Suite Applications.

In 4 weeks, C3 AI completed the initial configuration of C3 AI Supply Network Risk across the company's critical ventilator units, enabling supply chain planners and operators to gain real-time visibility across the ventilator inventory and movements globally. Following the initial configuration, the C3 AI team expanded deployment to additional SKUs and use cases. Today, C3 AI Supply Network Risk provides global real-time visibility, predicts customer order lead times, and surfaces potential OTIF risks for over 10,000 SKUs across multiple business units. Using C3 AI Supply Network Risk, the HealthTech company can reduce delayed sales orders by more than 35% through increased visibility and flexibility across finished goods inventory.

Building on the C3 AI Supply Network Risk deployment, the HealthTech company is also deploying C3 AI Inventory Optimization to further streamline and optimize its supply chain. C3 AI Inventory Optimization will help provide optimal reorder parameters to reduce excess raw materials inventory and optimize safety stock across finished goods inventory to better meet service levels.

Project Objectives

- Unify disparate supply chain data on the C3 AI Supply Chain Digital Twin deployed on the customer's environment

- Provide global real-time visibility into the inventory of select hospital products (e.g., respiratory ventilators) that are critical in the fight against COVID-19

- Accurately predict lead times for in-scope products from customer order entry to finished goods delivery

- Increase agility and service levels in response to changing supply chain dynamics

Results

4 **Weeks**

for initial production deployment

+35%

reduction addressable in delayed sales orders

+10,000

SKUs monitored by C3 AI Supply Network Risk

+50M

rows of data unified across four disparate systems

Challenges

The HealthTech company manufactures products in more than 35 facilities worldwide and ships products globally via an extensive production and distribution center network. Throughout its long history, the company has grown both organically and through many strategic acquisitions, which has resulted in a complex IT landscape with supply chain data spread across multiple disparate ERP kernels and other systems. Master data quality is an ongoing challenge to manage. For example, it has been challenging to maintain a common definition and calculation of customer lead times to ensure consistent reporting across different geographies and fulfillment centers.

The high degree of IT complexity hampers the company's ability to obtain critical business insights such as understanding (as a precursor to predicting) end-to-end customer lead times, as well as:

- What product lines / SKUs should be prioritized to help condense lead times?

- Where in the supply chain do parts or products get stuck (i.e., "lazy inventory")?

- What product lines / SKUs do not follow the safety stock inventory guidelines?

- What is the optimal allocation of inventory across distribution centers to maximize OTIF for each product line / SKU?

- Where and how in the supply chain can inventory be optimized (e.g., reducing excess inventory while meeting service level requirements)?

About the HealthTech Company

- +$22 billion revenue in 2020

- Over 1.5 billion lives improved

- +80,000 employees

- 35 manufacturing sites worldwide

- Over 1,000 new patent filings in 2019

Project Highlights

- +500 Million rows of data unified from three disparate source systems, including purchase and sales orders, item material master, end of day inventory, and other critical supply chain data

- Built a scalable production data pipeline that integrates with the company's existing data lake

- Created a fully extensible supply chain data model on C3 AI Supply Chain Digital Twin with over 60 logical objects

- Trained 11 supply chain planners on C3 AI Supply Chain Suite Applications and created a comprehensive user guide

Approach

C3 AI team first targeted the inventory visibility challenge across the company's respiratory ventilator products. Over the course of 4 weeks, C3 AI configured the C3 AI Supply Network Risk application for 42 critical ventilator SKUs that the HealthTech company delivered to hospitals globally in response to the COVID-19 pandemic.

The team began by unifying disparate supply chain data on the C3 AI Supply Chain Digital Twin, the common unified data model serving as a foundation across all C3 AI Supply Chain Suite Applications. C3 AI team ingested and unified 18 months of historical supply chain data comprised of more than 500 million rows of data extracted from two SAP kernels and a Transportation Management System (TMS). Source data are ingested daily into the company's existing cloud-based data lake and mapped to a unified, federated data image on the C3 AI Supply Chain Digital Twin. C3 AI Supply Chain Digital Twin provides full data lineage from a source system to end-point metrics for end-to-end data governance visibility, transparency, and auditability. Leveraging the unified data image, the C3 AI team configured five dashboards on the C3 AI Supply Network Risk application to provide end users with a global real-time view across the supply chain.

Following the 4-week sprint to address the visibility challenge, the C3 AI team configured machine learning algorithms and the application logic to predict order lead times and surface potential OTIF (on-time-in-full) delivery risks for over 10,000 SKUs. Using C3 AI Supply Network Risk, users can view projected lead times for individual order lines, detect potential order-level OTIF risks, and mitigate future supply chain disruptions via timely action.

C3 AI Supply Network Risk was successfully configured and deployed into production in collaboration with a truly cross-functional team across the HealthTech company and C3 AI. With team members from supply chain management, enterprise IT, and business analytics at the HealthTech company, and a total of 15 C3 AI product managers, delivery specialists, data analysts, and developers spread across three time zones providing 24/7 coverage, the entire project was delivered remotely.

Building on the C3 AI Supply Network Risk deployment and the C3 AI Supply Chain Digital Twin foundation, the C3 AI team will deploy the C3 AI Inventory Optimization application to help optimize finished goods and raw material inventory. C3 AI Inventory Optimization will help provide optimal reorder parameters to reduce excess raw materials inventory and optimize safety stock to meet service levels.

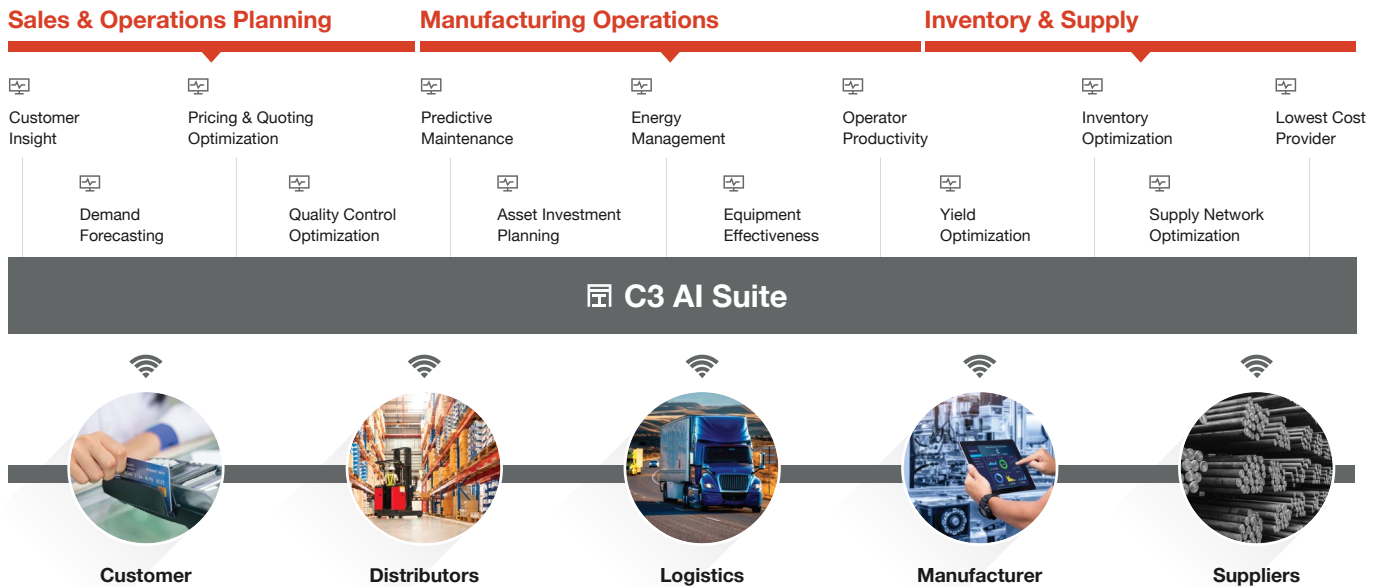## Solution Architecture

Source Systems
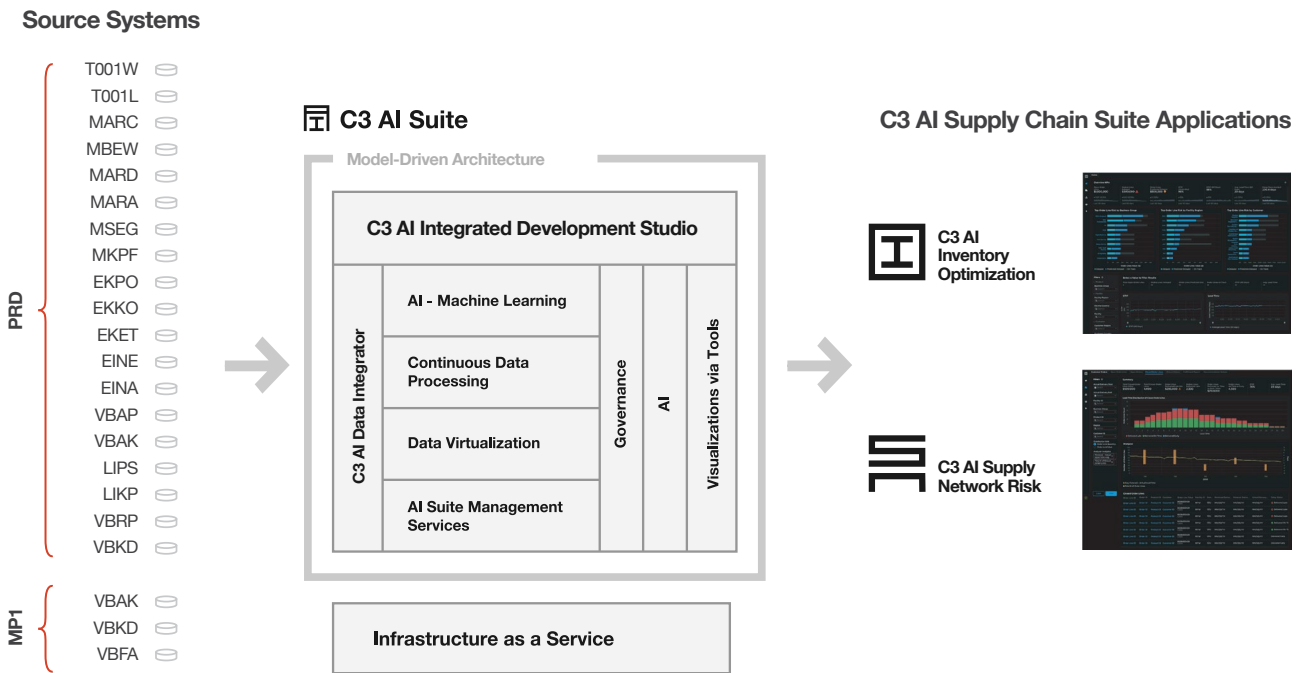
Benefits

The HealthTech company unlocked significant benefits with the deployment of C3 AI Supply Chain Suite Applications, including:

• Real-time global visibility into inventory levels and lead times of hospital ventilator products throughout its network

• Reduced delayed sales orders by +35% via redirecting available inventory

• SKU-level inventory trends to enable faster decision-making and intervention

• Significantly reduced time spent manually gathering and analyzing data

• Rapidly analyzed order-level lead time trends, allowing for accelerated mitigation of potential issues

• Historical views of key metrics such as supplier and customer order delays to guide preemptive action

• A flexible and extendable data model for developing additional enterprise AI applications

Enterprise AI for Manufacturing

The C3 AI Suite provides the necessary comprehensive capabilities to build enterprise-scale AI applications 18-26x faster than alternative approaches. The C3 AI Suite enables manufacturers to rapidly integrate petabyte-scale data from any/all enterprise systems, operational sources, sensor networks, and external providers to power machine learning models that generate predictive insights to solve previously unsolvable problems.

Many global manufacturers are already using the C3 AI Suite to drive digital transformation efforts, generating results such as: reducing inventory by as much as 35%, lowering waste caused by quality defects by over 20%, and generating hundreds of millions of dollars in economic value annually.

Sales & Operations Planning		Manufacturing Operations			Inventory & Supply	
Customer Insight	Pricing & Quoting Optimization	Predictive Maintenance	Energy Management	Operator Productivity	Inventory Optimization	Lowest Cost Provider
Demand Forecasting	Quality Control Optimization	Asset Investment Planning	Equipment Effectiveness	Yield Optimization	Supply Network Optimization	

⊞ C3 AI Suite

Customer **Distributors** **Logistics** **Manufacturer** **Suppliers**

C3 AI manufacturing applications are built on the C3 AI Suite and use AI at scale to provide ever-smarter actionable insights for business-critical challenges. These applications include:

C3 AI Reliability

Increase operations, process, and equipment uptime by anticipating process upset conditions and equipment risks using a system of systems approach. Unsupervised deep-learning algorithms leverage the unified data to identify anomalies and recommend prescriptive actions. Actionable insights increase production, reduce unplanned downtime, and improve safety in operations.

C3 AI Inventory Optimization

Reduce inventory holding costs, improve cash flow and supply chain visibility, and increase the productivity of inventory analysts. C3 AI Inventory Optimization uses advanced machine learning to analyze variability in demand, supplier delivery times, quality issues, and product line disruptions to build real-time recommendations for users to optimize operations by confidence level and receive real-time notifications and root cause analysis.

C3 AI Production Optimization

Optimize planning and scheduling across manufacturing and distribution operations using advanced AI and machine learning. C3 AI Production Schedule Optimization generates dynamic manufacturing and distribution plans and optimal industrial schedules using a holistic view of customer demand, supply chain, manufacturing, and distribution.

C3 AI CRM for Manufacturing

Grow revenues, maximize customer lifetime value, prevent customer churn, and increase customer satisfaction. C3 AI CRM for Manufacturing unifies all available enterprise and extraprise data and uses advanced machine learning algorithms to prioritize leads, recommend new product offers, detect clients at risk of churn, and drive more accurate revenue and product forecasts.

C3 AI Yield Optimization

Improve throughput and product quality by applying advanced machine learning to complex discrete, batch, or process manufacturing data in order to pinpoint process opportunities to identify defects early on and improve production yield.

C3 AI Energy Management

Reduce energy costs through real-time tracking, analytics, and optimization. C3 AI Energy Management uses machine learning techniques to enable accurate forecasting, benchmarking, demand response, and anomaly detection to lower costs, improve operations, and meet energy efficiency and sustainability goals.

Proven Results in 8-12 Weeks | Visit C3.ai/get-started