TREDENCE
Beyond Possible

Point of view

Unlocking Supply Chain & Manufacturing Efficiencies with an AI/ML-based Command Center for Life Sciences

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How Creating a Supply Chain Command Center Unlocks Resiliency and ROI

Pharmaceutical companies have experienced years of supply chain disruptions, which has harmed their ability to deliver drugs to healthcare organizations (HCOs), clinicians, and patients who need them. The U.S. Food and Drug Administration lists 98 drugs currently experiencing shortages,[1] down from a high of 295 in 2022.[2] In the U.S., the average drug shortage impacts at least half a million consumers and leads to higher drug prices.[3] These issues are experienced by countries and healthcare systems globally.[4]

Drug shortages hurt everyone in the ecosystem. Pharmaceutical companies can't guarantee a supply of new drugs and treatments to clinical trial patients, increasing the risk they may drop out. They may also struggle to deliver a steady supply of commercialized drugs to patients and pharmacies due to supply chain snarls. Consumers then go without vital treatment and may require emergency care if their conditions worsen. HCOs similarly postpone or cancel healthcare services that improve patient outcomes and achieve value-based care goals.

Emerging Trend: The Rise of Global Capability Centers[5]

Healthcare and Life sciences companies are setting up global capability centers (GCCs) to access expert talent pools, centralize and speed innovation, and scale the commercialization of new drugs and therapies. These GCCs provide domain and technical leadership and development services, adopting advanced technologies to transform end-to-end processes, including:

- **Data management**
- **Patient recruitment**
- **Regulatory compliance**
- **Biostatistics and programming**
- **Clinical data science**
- **Supply chain management services**

Fast fact: 85% of healthcare and life sciences GCCs are located in India.

1 FDA Drug Shortages, webpage, US Food and Drug Administration, accessed 11/22/2024

2 Berkeley Lovelace Jr., "How one U.S. drugmaker contributed to the escalating drug shortage crisis," NBC News, July 16, 2023

3 Impact of Drug Shortages on Consumer Costs, Report to Congress, U.S. Department of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation, May 2023, page 34,

4 Here's why some countries are experiencing medicine shortages—and what can be done to ensure supply," World Economic Forum, February 20, 2023

5 "Yashasvi, "Healthcare Innovation in India: The Rise of Global Capability Centers," article, Inductus GCC, July 29, 2024

Drug shortages also hurt pharmaceutical companies, which miss out on the opportunity to accelerate drug development processes, maximize product availability and sales, serve HCOs and consumers, and contribute to improving patient and population outcomes. It costs a pharmaceutical company an average of $2.6 billion to bring a drug to market, considering capital costs and drug development failures,[6] and the lion's share of the spoils goes to those who are first or fast to market. Even when demand persists, an inability to get drugs to market can mean billions of lost sales—as the soaring but only partially fulfilled demand for weight loss drugs, such as Wegovy and Ozempic—attests.[7] In contrast, generic drug manufacturers profit from volume-based sales of low-cost medications, so shortages can cause significant losses—and even cause them to exit the market.[8]

Emerging Trend: Using Command Centers to Optimize Clinical Supply Chains

Clinical supply chains are smaller scale, compared to health and life sciences' global operations. Yet, they play a vital role, enabling companies to develop new medications, conduct trials, and gain the regulatory approvals needed to launch new products.

6 Lori Solomon, "Mean Cost of Bringing New Drug to U.S. Market Is $879.3 Million," Drugs.com, updated July 2, 2024

7 Brian Bushard, "Shortage of Weight-Loss Drugs Like Wegovy and Ozempic Persist—And Could For 'Some Years', Forbes, September 16, 2023,

8 Arthur Allen, "Drugmakers Are Abandoning Cheap Generics, and Now US Cancer Patients Can't Get Meds," KFF Health News, June 21, 2023

Leading companies are adapting supply chain command centers to handle these processes. Key requirements include:

Managing unpredictable demand

Teams must estimate the exact quantities of early-stage drugs, which may fluctuate due to patient enrollment and trial success rates.

Maintaining cold chain controls

Providing continuous temperature monitoring and following protocols for any exclusions.

Overseeing adaptive trials

Evolving clinical supply processes to accommodate trial design or enrollment criteria changes.

Enabling direct-to-patient models

Being able to deliver drugs directly to clinical trial participants.

The High Cost of Pharmaceutical Company Supply Chain Disruptions

Drug shortage supply chain disruptions can be caused by geopolitical issues, inflationary pressures, raw material shortages, supplier plant quality issues or closures, cold chain failures, logistics snarls, unexpected product demand or drops, or more. While pharmaceutical companies can't control every issue, they can develop mitigation strategies. That's why many market leaders are developing supply chain command centers, which provide end-to-end visibility into and control over these processes. These solutions use predictive and prescriptive analytics, artificial intelligence (AI)- powered scenarios and recommendations, and automation to identify risks and opportunities and optimize outcomes.

9 By Hillary Dukart, Laurie Lanoue, Mariel Rezende, and Paul Rutten, "Emerging from disruption: The future of pharma operations strategy," article, McKinsey, October 10, 2022

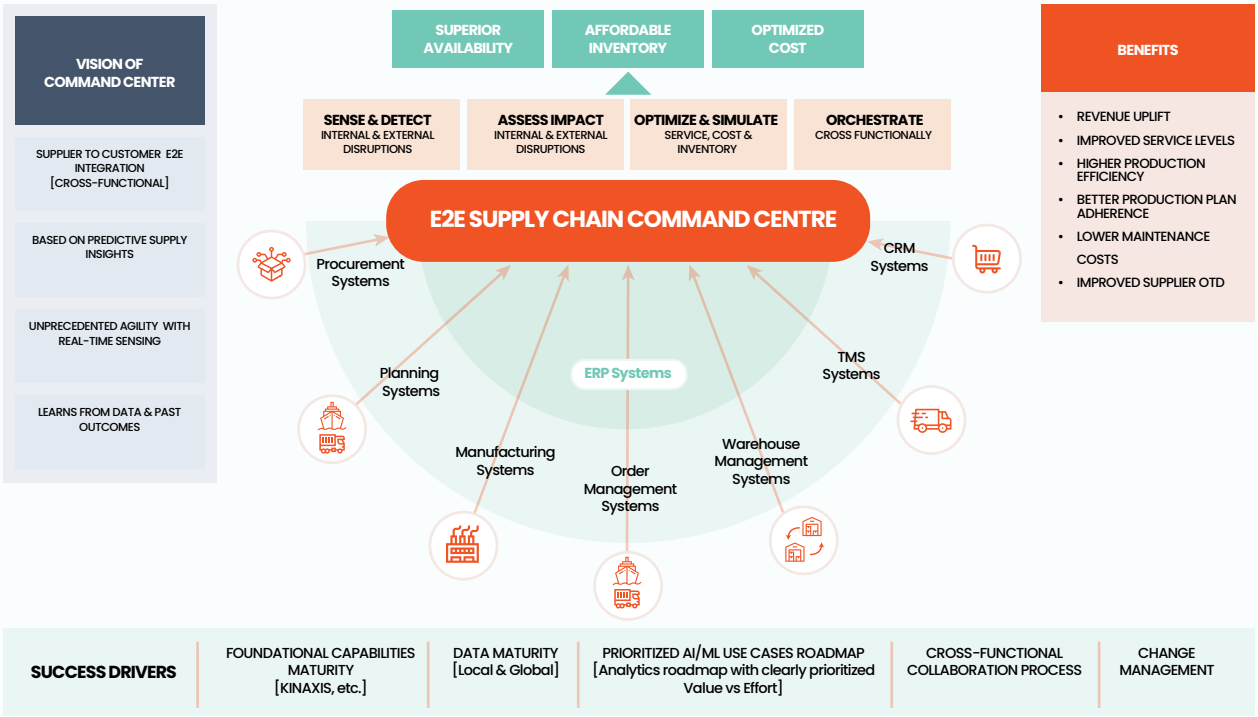
10 Impact of Drug Shortages," ibid.

What a Supply Chain Command Center is – and What It Enables

Gartner defines a supply chain command center as "**a tool consisting of existing and new technologies combined with near-real-time data from the business ecosystem.**" According to Gartner, such a center: [11]

1. **Mirrors the physical supply chain digitally in near-real-time.**
2. **Provides insights into past, present, and future situations and performance.**
3. **Monitors trends, gauging their business impact.**
4. **Weighs risks against opportunities.**
5. **Recommends the right course of action.**

Deploying an integrated supply chain and manufacturing command center enables end-to-end agility, responsiveness, and efficiency



[11] Christian Titze, Alexander Hoeppe, Innovation Insight: Supply Chain Command Centers, report, Gartner, June 3, 2022. Not available on Gartner website. Only available as vendor asset.

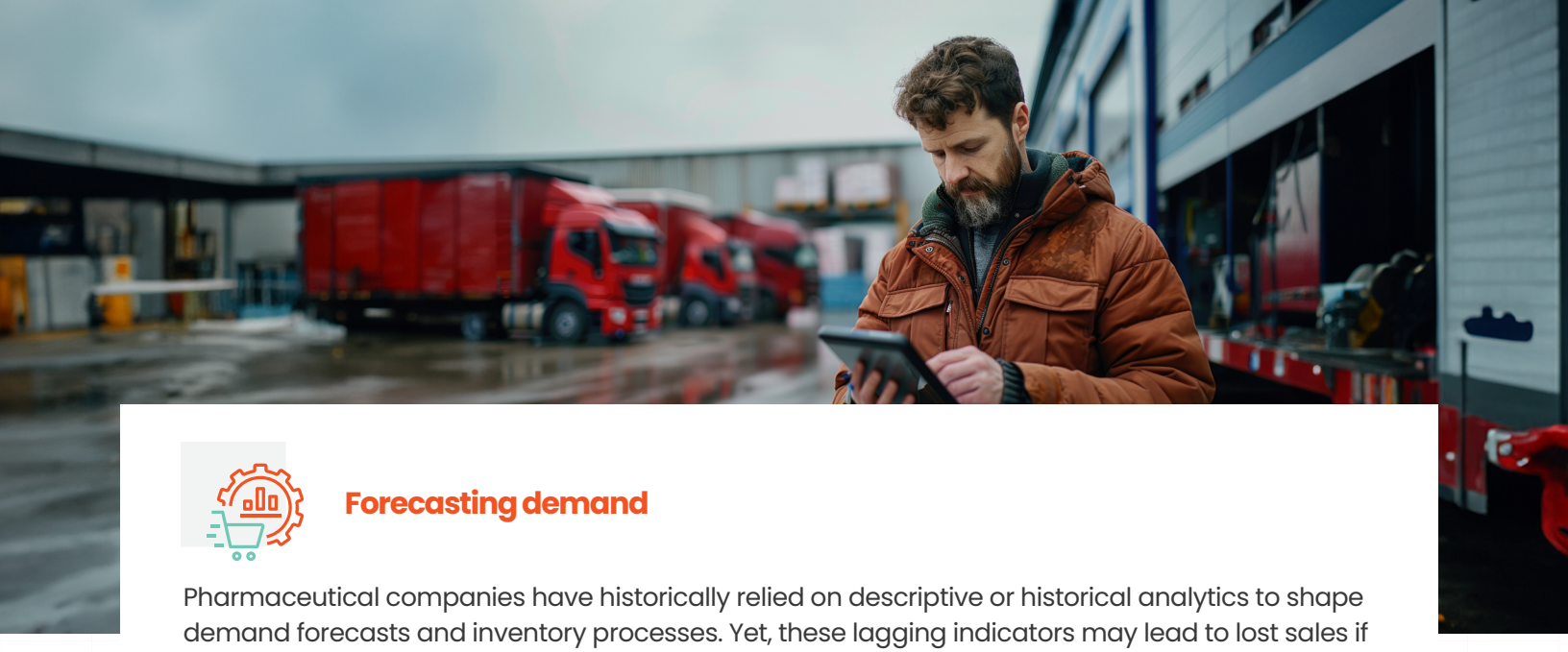
Combatting the Challenges of Global Supply Chain Disruptions

Command centers can help pharmaceutical companies address the business impacts of supply chain issues. These issues include:

Addressing complexity

Supply chains involve myriad processes and partners. Pharmaceutical companies need to be able to proactively identify and mitigate downstream issues, such as raw material shortages or logistics snarls, to identify other partners, shift production or transport, and prevent stockouts. Visibility challenges, disconnected applications, and manual processes can impede those efforts.

Command centers integrate internal and external data from various sources, enabling supply chain teams to review business conditions in near-real-time. Teams gain visibility into end-to-end performance, seeing how supply chain issues impact key performance indicators (KPIs) such as cash-to-cash cycles, product development costs, inventory management, stock-keeping unit (SKU) costs, and operating profit margins. As a result, teams can identify and quantify risks, model different scenarios to mitigate them, and use an optimization engine to choose the best results. They can also use automation and self-healing to increase responsiveness to solving routine issues.



Forecasting demand

Pharmaceutical companies have historically relied on descriptive or historical analytics to shape demand forecasts and inventory processes. Yet, these lagging indicators may lead to lost sales if demand is underestimated or excess inventory if the opposite is true. In addition, pharmaceutical companies need to model the impact of other factors, such as regulatory changes, payer coverage, provider and population growth, and growing care needs.

Supply chain teams can use predictive and prescriptive analytics to forecast demand changes and model scenarios to optimize revenues and profitability. That may mean ramping up production of top-selling products; shifting production to areas of better supply and demand; or even exiting low-selling, high-cost business areas.

Improving efficiency and quality

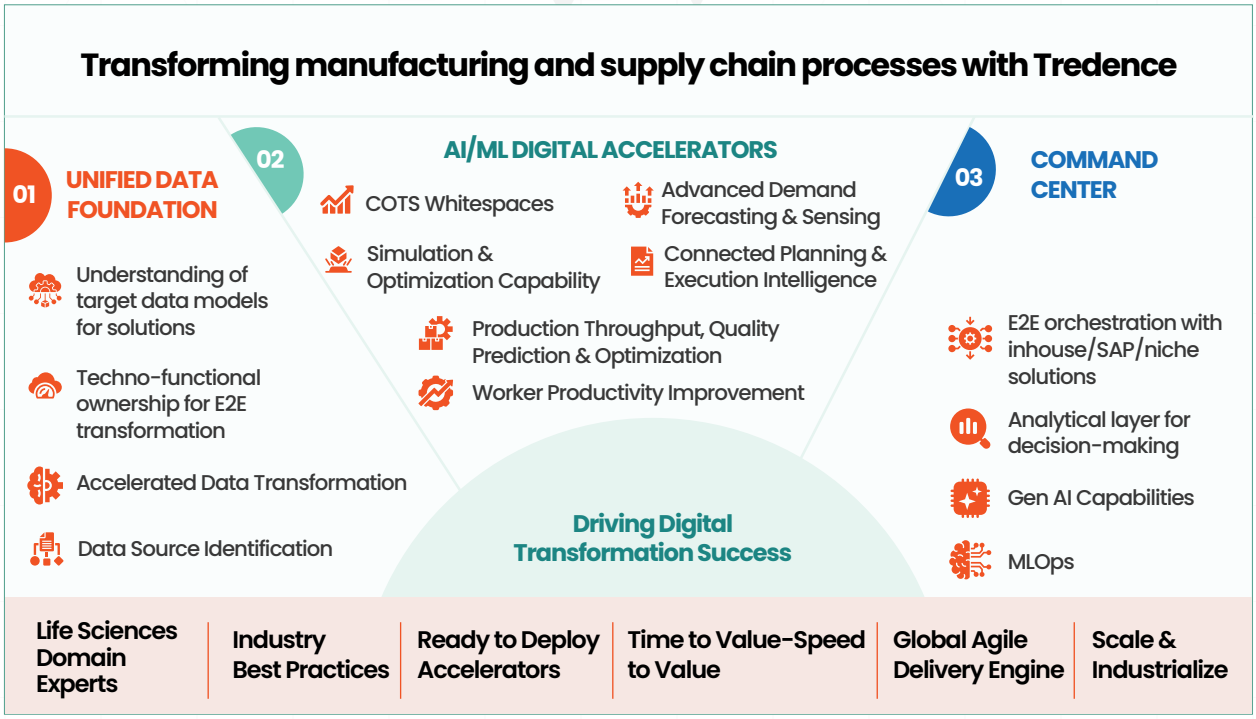
Pharmaceutical companies must ensure that they and their suppliers adhere to rigorous standards and can track and trace quality issues. By swiftly addressing quality issues, they can minimize HCO and patient impacts, meet regulatory requirements, and reduce remediation costs.

Teams gain early insights into quality issues thus minimizing the scope and cost of addressing them later on. That may mean taking production offline to address quality issues, switching suppliers, solving cold chain issues, or initiating recalls.

3 Steps to a Successful Command Center Implementation

Tredence works with pharmaceutical companies to develop and deploy a command center that optimizes their businesses end-to-end. We design solutions modularly and provide accelerators you deploy as your intellectual property.

You can achieve end-to-end visibility and control by creating a unified data foundation, deploying AI and machine learning (ML) digital accelerators, and developing a command center in three steps:



01

Design and discover

Tredence will map your processes, discover and map your data, standardize documentation, and create a customer-centric user flow and wireframes.

In six to eight weeks, you'll see how analytics, scenarios, recommendations, and automation can transform your supply chain processes.

02

Customize and deploy

We will implement prebuilt AI/ML algorithms, including industry-standard data models and external API connections. We will also provide a prebuilt KPI library and aggregation layer.

You gain a scalable data foundation that enables real-time streamlining of data from diverse sources, a medallion architecture that progressively improves data as it moves throughout zones, and curated data sets at varying quality levels to empower business users. You also improve insight into how your supply chain performs against metrics that matter to your business.

03

Test and rollout

Finally, we will perform unit, user, acceptance, and integration testing before turning over the new tool. We'll then perform a dry run, system testing, and training to ensure a seamless rollout.

Business results you can expect to achieve with a full rollout of a supply chain command center include:

700+	Gaining predictive comprehensive diagnostic and predictive KPIs
$100M	Recovering significant lost sales, depending on business model and size
5%–8%	Reducing cost to serve
100%	Achieving total automation between data sources and real-time insights
10%–15%	Improving forecast accuracy
3%–5%	Improving overall service levels

Case Study: Developing the Digital Pharmaceutical Plant of the Future

The Challenge

A multi-national Fortune 100 pharmaceutical company was experiencing gaps in understanding asset performance, reasons for production loss, and high maintenance costs. The company sought to develop a digital factory to enable cutting-edge processes, precise intelligence, and operational efficiency—all to drive yield.

The Solution

Tredence centralized the company's IT and operational technology data on Azure and Databricks to enable multiple analytics cases and develop multiple data products to improve plant operations. The solution discovered patterns and correlations, tracked early symptoms, and provided a comparative asset performance analysis across sites to optimize preventive maintenance.

12%
Reduction in the mean time to failure

7%
Decrease in asset maintenance costs

12%
Increase in asset throughput

Why Work with Tredence

Tredence provides pharmaceutical companies with the expertise, solutions, and transformation capabilities to deploy command centers successfully.

Tap our domain and industry experience

Tredence teams combine domain and industry expertise to solve complex problems for our healthcare clients. Our talent bench includes 2,000 data science and engineering staff and 500 certified professionals.

Successful transformation expertise

With our hyperscale partners, we have developed and deployed data modernization, patient360, digital transformation, predictive analytics, supply chain command centers, revenue growth management, GenAI-powered clinician tools, and other solutions for eight of the top 20 Fortune 500 US health and life sciences companies. Our partners include AWS, Databricks, Microsoft Azure, and Snowflake.

Leverage our AI ecosystem

ATOM.AI, Tredence's ecosystem of AI and ML accelerators, provides a supply chain data model, smart sourcing, smart manufacturing, resilient supply chain, customer service and sales execution, and sustainability solutions. It also has 300+ pre-built KPIs and the data pipelines to activate them. Pharmaceutical companies can customize and deploy these solutions within weeks, speeding up time to value.

Prebuilt digital accelerators covering all facets of the Manufacturing & Supply Chain Command Center

SMART SOURCING

- Spend Analytics
- Sourcing & Inbound Control Tower
- Supplier Collaboration & Traceability
- Smart Negotiation
- Vendor Management

SMART MANUFACTURING

- Predictive Maintenance
- Throughput Prediction
- Yield Optimization
- Digital Twin
- Manufacturing Energy Reduction
- Prescriptive Machine Settings
- Asset Traceability
- Batch Genealogy
- Quality Prediction
- Edge.ai
- Downtime & RUL Prediction
- Process Anomaly Detection

SUSTAINABILITY

- Sustainability KPI Reporting, Race to Zero
- War on Waste/AI-based Scrap Reduction
- Pack with Purpose
- Trace.ai

RESILIENT SUPPLY CHAIN

- Inventory Control Tower
- Logistics Control Tower
- Labor Planning & Scheduling
- Service Level Prediction
- DC & Freight Capacity Forecasting
- Network Optimization & Simulation
- Lead Time & Risk Sensing
- Real-time Tracking & Monitoring
- Load Consolidation
- Dynamic Order Fulfillment & Stock-out Prediction
- Dynamic Inventory Planning & Cold Chain Management
- Intelligent Demand Forecasting, Sensing & Adaptive Trails

CUSTOMER SERVICE & SALES EXECUTION

- Assortment Planning & Optimization
- Next Best Action
- KOL Mining
- Dynamic Route and Routine Planning

Ready to Learn More?

Work with Tredence to deploy a supply chain command center, gain the insights and tools to anticipate risks and opportunities, and drive better outcomes with every decision.

Schedule a 60-minute complimentary discovery call with a Tredence expert to explore improving supply chain ROI with command-and-control capabilities that enable precise decision-making, unlocking greater revenues and profitability.

About Tredence Inc.

Tredence is a global data science and AI solutions provider focused on solving the last-mile problem in AI – the gap between insight creation and value realization. Tredence leverages strong domain expertise, data platforms and accelerators, and strategic partnerships to provide tailored, cutting-edge solutions to its clients. Tredence is 2,500-plus employees strong with offices in San Francisco Bay Area, Chicago, London, Toronto, and Bengaluru, with the largest companies in Retail, CPG, Hi-tech, Telecom, Healthcare, Travel, and Industrials as clients.

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