LTIMindtree

Value-led DataOps in Manufacturing

Authors

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Introduction

Executive Summary

Manufacturing industry is at a critical inflection point, where traditional data operations and management can no longer keep pace with the scale and complexity of modern industrial data. As factories become smarter and supply chains become more dynamic, the demand for timely and quality data has risen sharply. Yet, many manufacturers are still stuck in reactive, cost-heavy data management models that inhibit innovation and slow decision-making.

This whitepaper presents a path forward: a shift from "Operate to Survive" to "Operate to Thrive." It introduces a scalable, AI-native framework that modernizes how manufacturers manage, govern, and extract value from their data assets in their ongoing Data operations. Readers will learn how to transition to a proactive, value-led Data operations model that emphasizes business alignment, observability, automation, and governance.

The paper addresses common challenges like fragmented data ownership, technical debt, and rising operational costs while outlining clear strategies to improve data trust, uptime, and adaptability. It also shows how manufacturers can build a resilient data foundation to support continuous improvement, regulatory compliance, and digital innovation.

This is a must-read for manufacturing CIOs, CDOs, and data leaders looking to future-proof their data operations and meet the demands of Industry 4.0. It provides practical guidance for delivering measurable business outcomes through intelligent data operations.

The urgency is clear: with rising data complexity and business pressures, the time to act is now.

Introduction

The global manufacturing industry is undergoing a rapid and multifaceted transformation, driven by technological advancements, economic uncertainty, shifting market dynamics, and a heightened focus on efficiency, sustainability and resilience. As the sector embraces Industry 4.0 principles, data has emerged as a vital asset that fuels process optimization, operational agility, and competitive advantage.

The unprecedented scale and velocity of modern data across the manufacturing landscape have rendered traditional data management and operations practices largely ineffective. Conventional approaches, designed for smaller and more structured datasets, are proving insufficient to handle the complexities and demands of today's expansive data environments.

To address these challenges, manufacturers must adopt a more agile, collaborative, and outcome-driven data management approach. This is where DataOps becomes essential. DataOps is not merely a set of tools or processes; it represents a cultural and operational shift that aligns data managers and consumers across the organization to deliver trusted, timely, and actionable insights.

By automating data pipelines, embedding governance, enabling observability, and fostering cross-functional collaboration, DataOps empowers manufacturers to unlock the full potential of their data assets.

This whitepaper explores how Value-led DataOps can serve as a strategic enabler for manufacturing enterprises, transforming data from a passive resource into a dynamic driver of operational excellence, innovation, and competitive advantage.

Emerging Trends in Manufacturing

Listed below are some of the most prominent trends reshaping the manufacturing landscape:

01 Industry 4.0 & Smart Manufacturing

02 Supply Chain Resiliency & Localization

03 Sustainability & Circular Economy

04 Servitization

Figure 1: Emerging trends in the manufacturing industry

01 Industry 4.0 and Smart Manufacturing

This overarching trend involves the integration of advanced technologies into manufacturing processes. Manufacturers are increasingly adopting digital tools across the entire value chain, from design and prototyping to production and supply chain management.

Smart factories leverage interconnected systems to collect and analyze real-time and historical data from machines. This helps anticipate machine failures, enables predictive maintenance, reduces production downtime, optimizes production schedules, and enhances quality control.

AR and VR technologies are finding applications in various aspects of manufacturing. These include remote assistance for maintenance, employee training, product design visualization, and factory layout planning. Such technologies enhance efficiency and reduce the need for physical presence.

While not new, additive manufacturing (3D printing) continues to evolve. It offers advantages in rapid prototyping, complex geometries, and on-demand production of specialized parts. This enables greater design freedom and can reduce material waste.

Edge analytics enables rapid decision-making without the need to send data to the cloud. This improves responsiveness and uptime.

The use of RPA, AGVs, AI, ML and Industrial IoT is becoming commonplace. These technologies lead to increased productivity and reduced human error.

02 ## Supply Chain Resiliency and Localization

Recent global events have highlighted the vulnerabilities in complex, geographically dispersed supply chains. Manufacturers are now prioritizing supply chain resilience through diversification, near-shoring, and onshoring strategies.

Moreover, supply chains are becoming increasingly data-driven, enabling better forecasting, risk analysis, and real-time tracking and visibility. This allows for greater transparency and enables proactive responses to disruptions across the entire supply network.

03 ## Sustainability and Circular Economy

Growing environmental concerns and regulatory pressures are pushing manufacturers toward more sustainable practices.

Manufacturers must report against environmental and social governance (ESG) benchmarks with increasing accuracy and frequency. Data is essential for tracking and optimizing energy consumption, reducing emission and waste, and implementing circular economy principles, such as designing for durability, reuse, and recycling.

They are also adopting greener materials and processes. Manufacturers now use virtual replicas of physical systems (digital twins) to simulate performance, test changes, improve productivity, and make more sustainable, data-driven decisions without disrupting operations.

04 ## Servitization

Manufacturers are increasingly shifting from merely selling products to offering services alongside them. This includes providing maintenance, data-driven insights, and performance optimization as part of a comprehensive solution. It fosters stronger customer relationships and opens new revenue streams.

These trends collectively point toward a future where manufacturing is more agile, data-driven, sustainable, and responsive to market demands.

Impact On the Data and Analytics Ecosystem

The profound shifts in the manufacturing industry have a direct and significant impact on the D&A ecosystem.

The sheer volume, velocity, and variety of data generated by connected devices, automated processes, and digitalized supply chains have rendered traditional data management and operations paradigms largely ineffective.

Deriving timely insights or adapting to continuous changes has become increasingly difficult. This demands a more sophisticated approach to data management and ongoing operations.

01 Explosion of Data Volume and Variety

02 Real-time Data Processing & Analytics

03 Increased Demand for Advanced Analytics and AI/ML

04 Data Integration Challenges

05 Data Governance and Security Imperatives

06 Focus on Actionable Insights

Figure 2: Impact of the manufacturing trends on the D&A ecosystem

Explosion of Data Volume and Variety

Industry 4.0 technologies, particularly IoT sensors embedded in machinery and production lines, are generating data at an unprecedented scale. This information appears in multiple forms: structured (sensor readings, production logs), semi-structured (log files, social media feeds), and unstructured (images, surveillance videos, audio from machinery). Extracting insights from such varied sources necessitates a robust big data infrastructure designed to manage both volume and complexity.

Real-time Data Processing and Analytics

Applications such as predictive maintenance, quality assurance, and adaptive production scheduling depend heavily on real-time information. Operational decisions are increasingly made using instant updates from the shop floor. Manufacturers require stream processing capabilities supported by low-latency data pipelines that handle input as it arrives. This enables immediate decision-making and proactive interventions. Delivering on this need calls for advanced edge computing systems coupled with scalable, cloud-based analytical platforms.

Rising Demand for Advanced Analytics and AI/ML

Descriptive statistics are no longer sufficient. Today's manufacturers need advanced analytical tools, such as predictive analytics (e.g., forecasting failures and demand), prescriptive analytics (e.g., suggesting ideal production settings), and AI/ML models for tasks like anomaly detection, process tuning, and quality forecasting. Intelligent algorithms are crucial for automating decisions and surfacing hidden patterns within complex datasets. As analytical use cases expand, agile and version-controlled workflows for deploying data models and assets are increasingly critical.

Complexities in Data Integration

Fragmented systems remain a key challenge. Data is generated from a wide range of platforms such as ERP, MES, SCADA, CRM, CAD/CAM applications, IoT networks, and third-party supply chain systems. This creates isolated data pockets and limits the ability to generate unified, accurate insights. Achieving cohesive data integration across these disparate systems is difficult yet vital. Manual workflows are no longer viable. Automated pipelines, data lake or warehouse solutions, and orchestrated processes must be embedded to ensure scale, consistency, and accuracy.

Imperatives for Data Governance and Security

Today, 75% of executives don't trust their own data10. Sound decision-making relies on data that is both trusted and secure. As the volume of sensitive operational data grows, establishing robust governance frameworks becomes critical. This includes managing data quality, maintaining data lineage, enforcing master data management practices, and complying with privacy regulations. In parallel, cybersecurity must be prioritized to safeguard OT networks and intellectual assets from potential cyber threats.

Focus on Actionable Insights

The primary goal of data and analytics in manufacturing is to deliver insights that lead to measurable outcomes, such as reduced downtime, improved product quality, optimized inventories, enhanced customer experience, and increased margins. To achieve this, data insights must be tied directly to operational execution.

This demand for informed decision-making now extends beyond data professionals to engineers, plant managers, and frontline operators. The evolving analytics environment in manufacturing is defined by complexity, urgency, and a clear need for actionable intelligence. This has accelerated the adoption of Data Operations (DataOps) as a critical enabler of success.

Value-led DataOps

Value-led DataOps emerges as a pivotal discipline, bridging the gap between data generation and business impact.

DataOps aims to foster a culture of collaboration where every stakeholder in the data value chain contributes to delivering reliable, timely, and actionable insights, more efficiently and at scale.

To keep pace with the shifts in manufacturing and their influence on data ecosystems, organizations must activate five key DataOps levers that enhance agility, dependability, and measurable business value:

Figure 3: Value-led DataOps levers

01 **Automated Data Pipelines and Orchestration**

Automated pipelines streamline the journey from fragmented data sources to consolidated target systems like warehouses, data lakes, or lakehouses. These systems draw data from varied enterprise platforms, transforming and organizing it into usable formats. Orchestration ensures that data workflows are executed in the right sequence and at the correct times, based on triggers, dependencies, and predefined logic. This enables accurate, consistent data availability to support both analytics and operations.

02 Observability and Monitoring

Data Observability provides real-time insights into the health, performance, and behavior of data systems and pipelines. It detects bottlenecks, anomalies, and latency issues, enabling quick remediation. This proactive visibility ensures reliability, compliance, and timeliness, thereby reducing both operational and regulatory risks.

03 Metadata-driven Governance

Metadata-driven governance uses metadata, data about data, to manage quality, security, compliance, and organizational trust. It involves classifying, tracking, and controlling data assets based on their attributes. This approach ensures uniform enforcement of policies, enhances auditability, and aligns data assets with their business context. In doing so, it improves lifecycle management and increases the enterprise value derived from data.

04 Cross-Functional Collaboration

Eliminating silos between teams engaged in the data lifecycle is vital. Data engineers, DataOps professionals, data scientists, product owners, and business leaders must collaborate to enhance transparency, accelerate delivery, and promote innovation. This shared ownership model supports better communication, faster problem-solving, greater adaptability, and a stronger culture of data responsibility.

05 Outcome-Driven Measurement

This approach shifts focus from technical outputs to business outcomes. Rather than counting pipelines or dashboards, organizations assess the actual impact on performance and efficiency.

Output	Outcome
▸ How many pipelines are built?	▸ Is this pipeline reducing production downtime?
▸ How many dashboards are deployed?	▸ Has this dashboard helped lower scrap rates?
▸ How many maintenance alerts are triggered?	▸ Are maintenance alerts reducing equipment failure?

Linking DataOps metrics to real business outcomes helps validate investment, build trust, improve adoption, and foster continuous improvement.

Integrating AI into DataOps practices promises even greater value. Intelligent monitoring tools, AI assistants, agents, and bots can increase agility and reliability throughout the data lifecycle. These capabilities enable organizations to scale insights faster and realize a stronger return on their data investments.

Operate to Thrive Framework

Operate to Thrive (O2T) is LTIMindtree's AI-native framework for modern data operations. It is modeled to replace traditional D&A application maintenance with proactive, outcome-driven models. O2T helps enterprises reduce operational costs, improve resilience, and accelerate DataOps transformation.

The framework incorporates AI-driven interventions to optimize operations, innovate continuously, and generate value in a dynamic and complex D&A ecosystem. It focuses on minimizing downtime and automating repetitive tasks. It also enhances cloud economics, accelerates innovation, and elevates the business user experience through personalized support and rapid provisioning of data.

The four pillars O2T are as follows:

Figure 5: Operate to thrive strategic pillars

O2T Pillars	Description	Key Interventions
Ensure Resilience	Focuses on minimizing downtime while providing scalable, adaptive, secure, and highly available workloads.	▸ Predict-to-prevent (AI/ML-based anomaly detection) ▸ Pre-emptive nudges (automated alerts for potential issues) ▸ Resilience engineering (process design to reduce failures)
Improve Efficiency	Aims to shorten resolution time and optimize cloud economics through automation and knowledge-driven assisted resolution.	▸ Complete automation (for recurring issues) ▸ Cloud economics (cost optimization and performance tuning) ▸ Assisted resolution (using knowledge repositories and Gen AI) for faster issue resolution)

Accelerate Innovation & Change	Emphasizes the adoption of new technologies and processes to meet evolving business challenges while leveraging operations teams for value-driven innovation.	▶ Modern engineering (landscape rationalization and automation) ▶ Ways of working (data quality dashboards, Gen AI for test case generation) ▶ User adoption (demand management, onboarding, and mentoring)
Drive Growth	Focuses on enhancing business user experience and enabling transformation led by business and experience.	▶ Persona-centric support (Gen AI based self-service) ▶ Portfolio management (automated DevOps workflows and high-value use case identification) ▶ Business agility & experience (marketplace for reusable assets and decision fluidity)

The strategic pillars of the O2T framework are purposefully aligned with the Value-led DataOps levers. This reinforces the idea that adopting O2T inherently enables the implementation of core Value-led DataOps. Each O2T pillar maps directly to a key DataOps lever.

- Ensure resilience is supported by robust observability and monitoring, which enable proactive issue detection and system reliability.

- Improve efficiency is driven by automated data pipelines and orchestration, which streamline data flow and reduce manual overhead.

- Accelerate innovation and change is empowered by metadata-driven governance, ensuring trusted, compliant data that fuels experimentation and transformation.

○ Drive growth is realized through cross-functional collaboration and outcome-driven measurements, which foster shared accountability and align data efforts with tangible business impact.

This synergy ensures that organizations embracing O2T are modernizing their Data Operations and embedding the principles of Value-led DataOps into their culture and workflows.

Case Study Spotlight

A global leader in technology and advanced manufacturing, spanning aerospace, industrial automation, and building solutions faced a complex, fragmented D&A landscape. Escalating licensing costs, underutilized investments, frequent downtimes, recurring system incidents, and limited self-service capabilities hindered agile decision-making and efficient resource allocation.

Partnering with LTIMindtree, the client adopted targeted interventions from the Operate to Thrive framework. Key initiatives included automating data pipeline management, strengthening monitoring and observability, enabling self-service analytics, and optimizing data platform investments. These measures delivered significant impact resulting in a 48% reduction in incident tickets, USD 175K in license cost savings, 10% lower technical debt, and 100% on-time KPI data availability.

Today, their modernized DataOps environment supports faster decision-making, better resource utilization, and sustained innovation. This showcased how O2T's value-led approach can transform even the most complex manufacturing data landscapes.

Implementing Value-led DataOps in manufacturing

Value-led DataOps drives significant impact across various common functional areas in manufacturing. The figure below illustrates its effect:
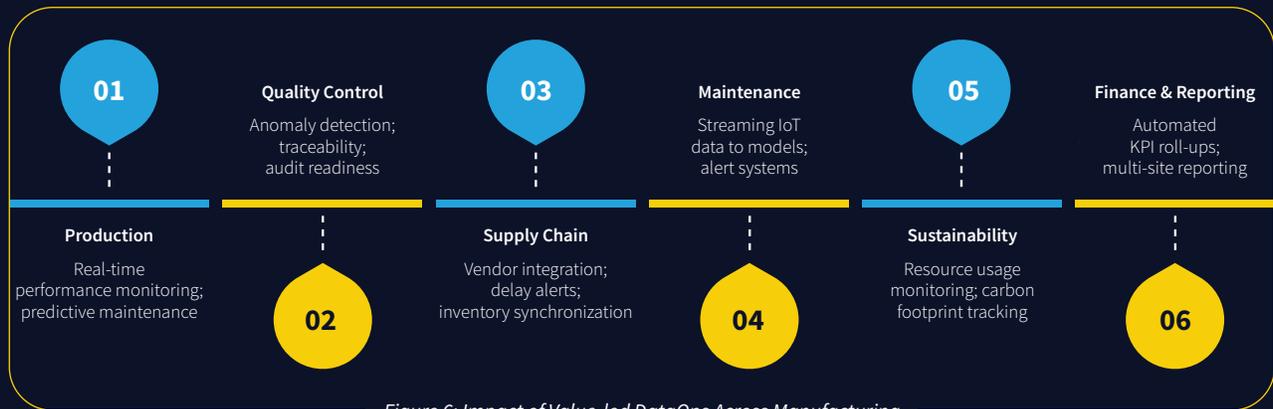

01

Quality Control
Anomaly detection;
traceability;
audit readiness

03

Maintenance
Streaming IoT
data to models;
alert systems

05

Finance & Reporting
Automated
KPI roll-ups;
multi-site reporting

Production
Real-time
performance monitoring;
predictive maintenance

02

Supply Chain
Vendor integration;
delay alerts;
inventory synchronization

04

Sustainability
Resource usage
monitoring; carbon
footprint tracking

06

Figure 6: Impact of Value-led DataOps Across Manufacturing

The D&A architecture incorporating the Value-led DataOps levers, through the O2T framework, for the manufacturing industry would be structured as outlined below:
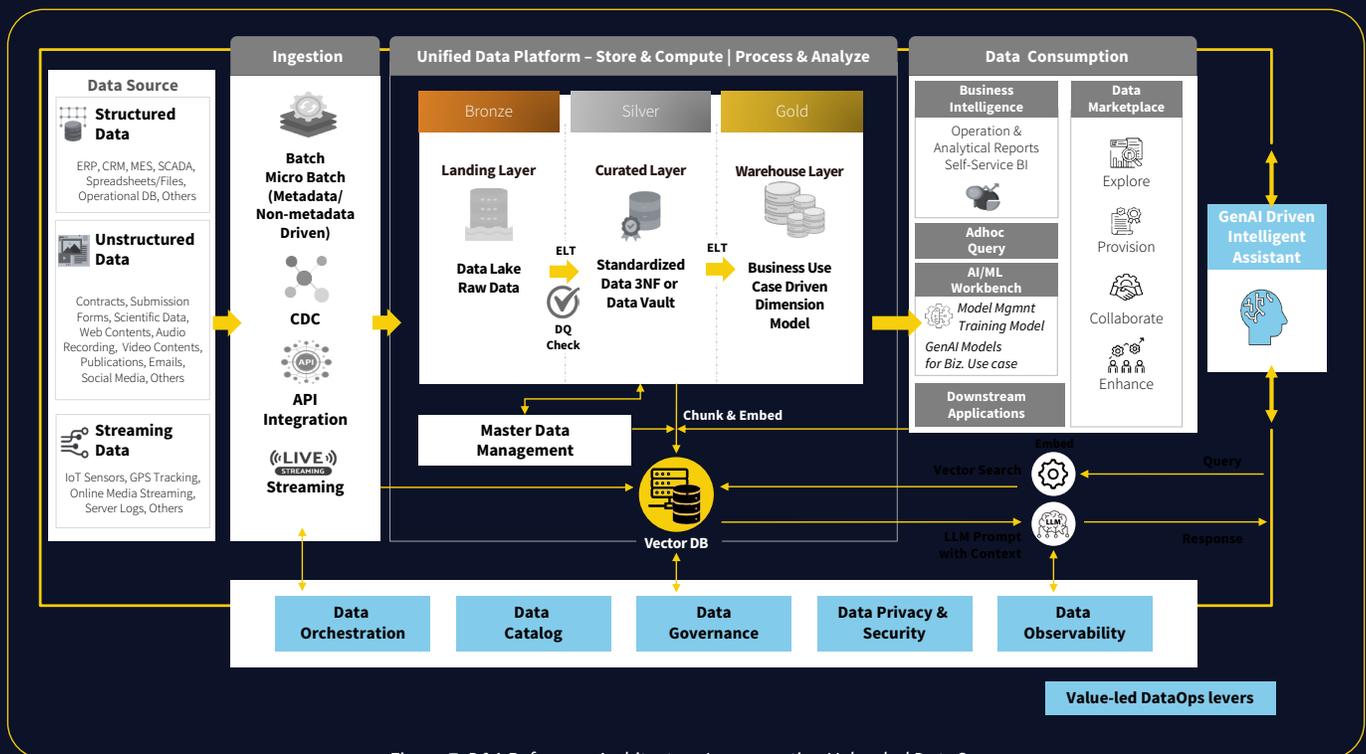
Figure 7: D&A Reference Architecture Incorporating Value-led DataOps

Conclusion

The manufacturing sector is undergoing a profound transformation. Data is no longer a byproduct but a strategic enabler of innovation, efficiency, and resilience.

By fostering collaboration among data stakeholders, automating complex workflows, and embedding governance and observability into the data lifecycle, DataOps enables manufacturers to derive timely, trusted, and actionable insights. This shift from output-centric to outcome-driven practices ensures that every initiative aligns with measurable business value.

The O2T framework exemplifies this evolution. Its AI-native, outcome-focused approach redefines operational excellence. It minimizes downtime, enhances agility, and accelerates innovation. O2T enables organizations to move from reactive data management to a proactive, value-centric model. This supports continuous improvement and strategic growth.

In an era where the shelf life of data-driven insights is increasingly short, operationalizing data at scale and speed is not merely a competitive advantage, it is a necessity. Manufacturers that embrace Value-led DataOps will be best positioned to lead in a dynamic, data-intensive future.

Glossary

Abbreviation	Full Form
AGV	Autonomous Guided Vehicle
AI	Artificial Intelligence
AR	Augmented Reality
BI	Business Intelligence
CAD	Computer Aided Design
CAM	Computer Aided Manufacturing
D&A	Data and Analytics
ERP	Enterprise Resource Planning
Gen AI	Generative Artificial Intelligence
IoT	Internet of Things
O2T	Operate to Thrive
OT	Operational Technology
MES	Manufacturing Execution Systems
ML	Machine Learning
RPA	Robotic Process Automation
SCADA	Supervisory Control and Data Acquisition
VR	Virtual Reality

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Srikarthick brings over 20 years of experience in driving data modernization and leading greenfield implementations across the Data & Analytics landscape. Alongside heading Operate to Thrive offering, he also oversees Data & Analytics delivery for one of the organization's key industry verticals.