ChainSys

Data-Driven Quality Control: Enhancing Manufacturing Performance with EDM Solutions

Executive Summary

Manufacturing quality is changing fast. Teams don't want to wait for end-of-line checks anymore; they want to see what's happening in the moment and fix issues before they become problems. ChainSys makes that possible. By bringing together machine signals, material data, process parameters, and every quality record into one clean, trustworthy stream, ChainSys gives manufacturers the clarity they've been chasing for years. With dataZap, dataZen, dataZense, and Smart App Builder working as one, data finally moves the way it should: steady, reliable, and ready for action.

What this means on the floor is simple: quicker decisions, fewer surprises, and a production line that feels far more predictable. This whitepaper shows how ChainSys helps manufacturers make that leap.

Fact Check:

Why Change Your Data Management Approach

45% of organizations have experienced data quality issues that led to financial loss (Gitnux)

Around 90% of enterprise data is "dark data"—underused and unstructured (TechRadar Pro)

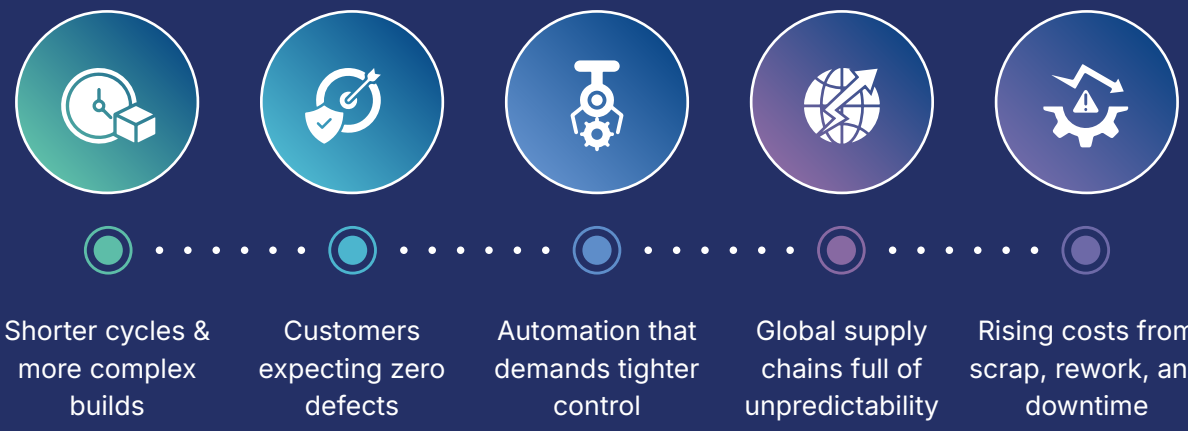
61% of organizations report data inconsistency issues impacting decision-making (Gitnux)

1. The Reality of Quality Management in Modern Manufacturing

1.1 The Evolving Demands of Manufacturing Operations

Manufacturing has become a high-pressure balance of productivity, precision, and agility. Plants must deliver consistent quality while constantly adapting to new product variants, shifting customer expectations, and tougher compliance mandates.

What's driving the pressure:



1.2 Six Hidden Barriers to Effective Quality Control

Even well-run factories hit invisible friction points that quietly erode quality and consistency. These barriers don't always show up on dashboards, but they shape every defect, delay, and deviation.

2. What "Data-Driven Quality Control" Actually Means

2.1 Turning Raw Industrial Data Into Quality Intelligence

Factories generate oceans of data, but intelligence comes only when that data is cleaned, connected, and contextualized. Here's the heart of it: quality teams stop guessing and start knowing.

Clean, structured data reveals defects earlier in the process.

Event streams from machines expose hidden performance drifts.

Contextual metadata links every error back to its true root cause.

Dashboards shift from static reports to live operational visibility.

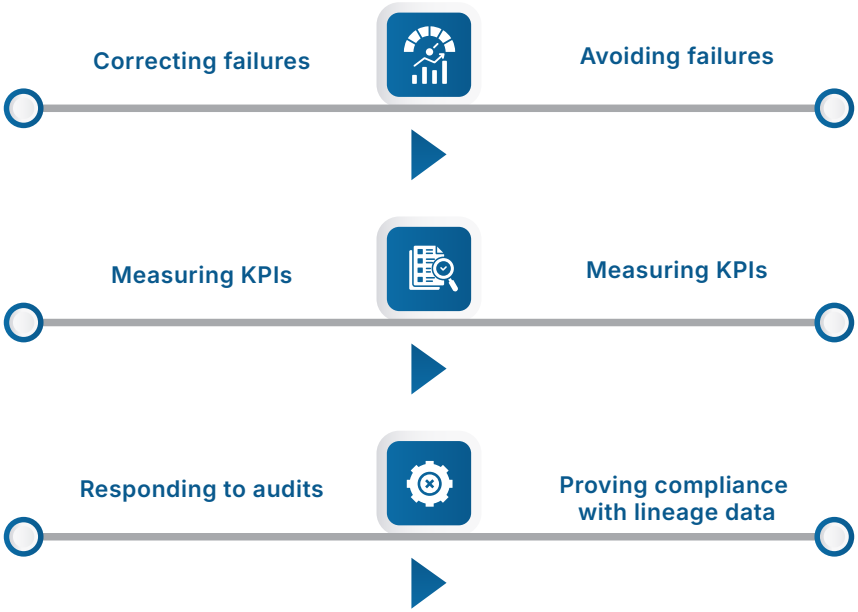
Outcome

Every quality decision becomes faster, sharper, and backed by evidence.

2.2 From Monitoring to Prediction: Quality Reimagined

Traditional quality control waits for something to go wrong. EDM flips that pattern. By unifying IIoT feeds, production logs, material histories, equipment parameters, and environmental conditions into a single governed ecosystem, EDM establishes a complete picture of how product quality behaves over time. The result?

With high-quality data feeding analytics and AI models, plants shift from:



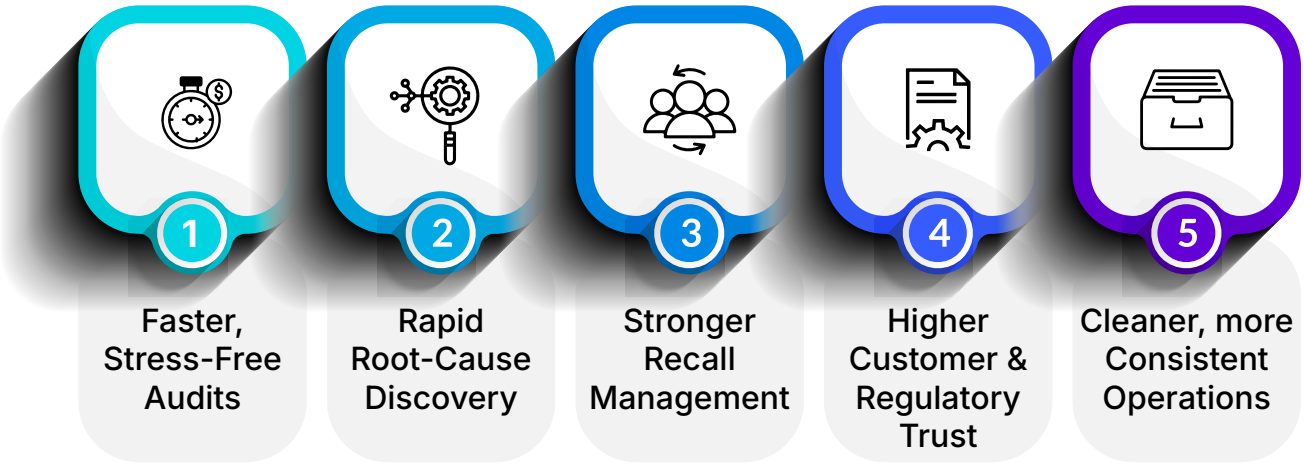
2.3 Data Governance as the Backbone of Manufacturing Performance

Every manufacturer wants better performance, higher OEE, fewer NCRs, stable yields, and cleaner audits. But performance doesn't improve when data is messy, duplicated, delayed, or misaligned. Governance is what brings order to chaos. Below is a clearer view of how EDM governance shows up in day-to-day manufacturing:

Governance Capability	What It Fixes on the Shop Floor
Standard definitions for defects, yields, lots, and events	Eliminates inconsistent reporting across shifts, lines, and plants
Real-time validations on every data flow	Catches wrong entries, missing values, and bad sensor data before dashboards see them
Automated quality and business rules	Ensures every shift follows the same standard without manual policing
Version control for specs, SOPs, and master data	Ends confusion over which document, limit, or recipe is current
Data stewardship and ownership models	Removes ambiguity on who fixes data issues and owns quality decisions

2.4 Traceability, Lineage, and Audit Readiness in Modern

Traceability is no longer optional; it's the foundation of trust. Manufacturers need to know where every component came from, how it moved through the plant, what conditions it experienced, and which decisions were made along the way. With Complete Traceability and Lineage in place, you gain:



3. ChainSys: The Data Engine Behind Smarter Manufacturing

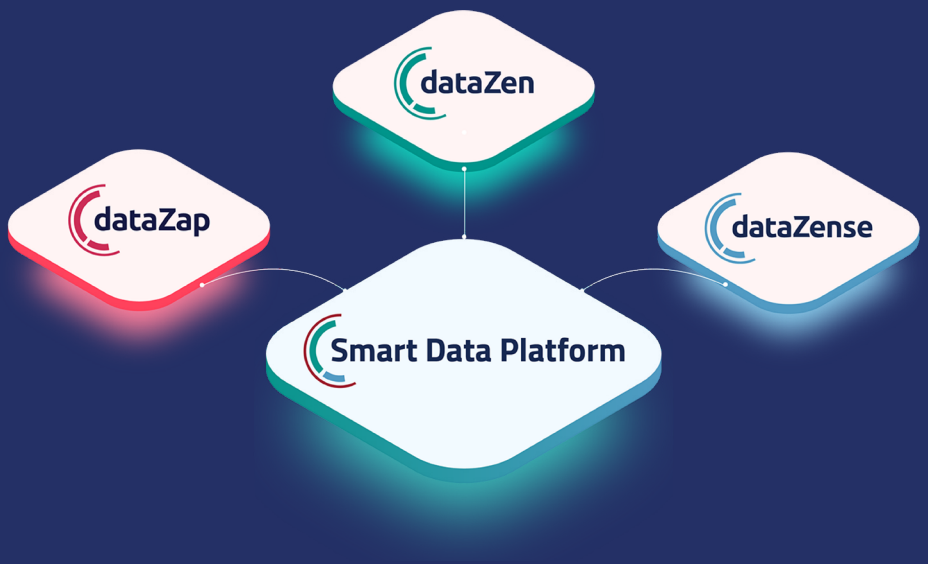
3.1 What is a Smart Data Platform?

The ChainSys Smart Data Platform is an advanced, all-in-one solution designed to manage, integrate, govern, and analyze enterprise data across diverse systems, including Oracle, SAP, and other major ERP platforms. With a suite of intelligent tools and pre-configured templates, the platform empowers organizations to harness the full potential of their data while ensuring compliance, accuracy, and security. Whether it's data quality management, data integration, or advanced analytics, the Smart Data Platform provides a comprehensive and scalable framework to support your enterprise data initiatives.

- Simplified & Rapid ETL/ELT
- Smart Migration
- Seamless Data Ingestion

- Comprehensive Data Governance
- Top-notch Data Quality Management
- Multi-Domain MDM Implementation

- Scalable Data Discovery & Cataloging
- Customized Visualization
- One Platform→ Analytics to Security



3.2 Why is ChainSys Smart Data Platform the Market Leader?

	Description	Chainsys	Other Tools
Data Assessment	• Data Health Check for various DQ Dimensions providing Valuable insights into Data Quality • Out of Box configurable DQ Dashboards for various data domains	✅ ✅	❌ ❌

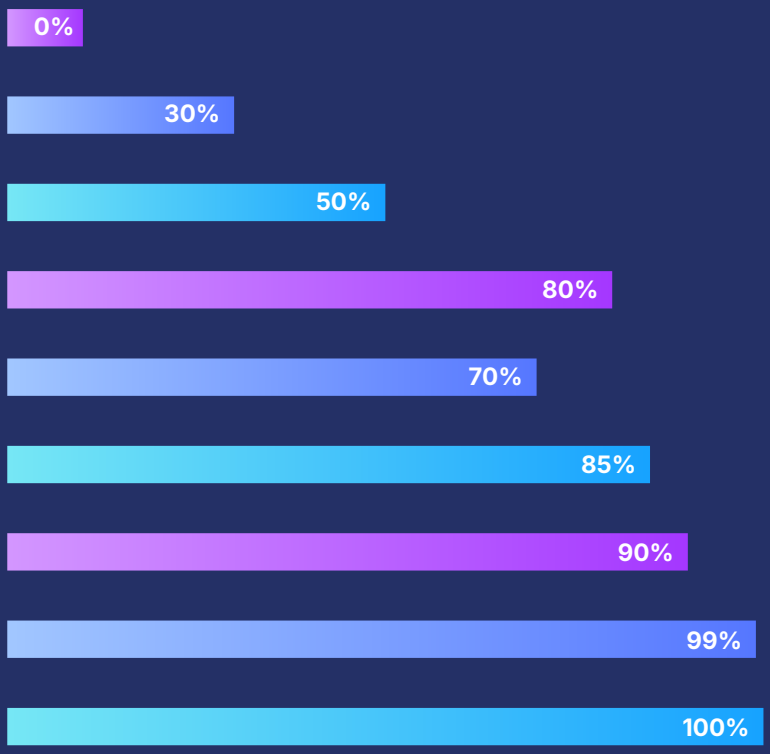
	Description	Chainsys	Other Tools
 **Data Preparation**	• Enhance data quality through Automated Cleansing and enrichment using 3rd Party service providers • Optimize collaboration and resource utilization from Business by leveraging User Friendly Dashboards	✓ ✓	✗ ✗
 **Data Migration**	• Significant time reduction for application Setup with low-code platform • Ready to use Adapters for major ERPs like Oracle Fusion, SAP etc. for extraction and Loading including Setup Migrations • Comprehensive Data Reconciliation & Functional Reconciliation	✓ ✓ ✓	✗ ✗ ✗
 **Master Data Governance**	• Ongoing Data Governance capabilities as Multi-Domain MDM • Integration Capabilities to extract and ingest the data into multiple systems as part of Hub & Spoke architecture • Comprehensive Approval Workflow & Audit Capabilities to implement data governance policies	✓ ✓ ✓	✗ ✗ ✗
 **Data Archival**	• Data assessment to accurately assess where data volumes are unnecessarily high for effective Archival & Purging Solution • Pre-configured templates for archiving the data from major ERPs like Oracle, SAP etc.	✓ ✓	✗ ✗
 **Data Security & Protection**	• Comprehensive platform for all SOX, GDPR, CCPA, PII & other GRC requirements • Ability to mask or scramble PII and other sensitive data for enhanced Data security during Data Movement	✓ ✓	✗ ✗

	Description	Chainsys	Other Tools
 **Enterprise Data Mgt**	• Centralizing data across legacy and cloud systems, unifying discrete data models & object sets • Data cataloging to make data searchable and maintain data lineage, entity relationships, business glossary and data virtualization • Ingest the Structured as well Non-Structured Data leveraging OCR Capabilities from various sources	✓ ✓ ✓	✗ ✗ ✗
 **Data Visualcation**	• Pre-configured dashboards for Spend Analytics, Supplier 360, Customer 360, Product 360, Product Profitability, HR Headcount and C-Suite Analytics • Data Profiling on structured and unstructured data along with Data Reporting using visualization	✓ ✓	✗ ✗
 **Custom Application Build**	• No-Code to Low Code Application Development (PaaS Solution) with Rapid Application Development (RAD) Framework • Prebuilt Integration Data Templates for Major Applications (ERPs)	✓ ✓	✗ ✗
 **Data Maintenance**	• Bulk Data Loading Capabilities with Scaling up to 100 Million records • Pre-validate data in Bulk before load to ensure high data quality • Automated regression testing, load testing, and performance testing	✓ ✓ ✓	✗ ✗ ✗
 **Performance and sustainability**	• Distributed Computing Model to support parallel high volume data handling & movement • Vertical and horizontal scalability of the application based on infrastructure	✓ ✓	✗ ✗

3.3 What Makes ChainSys EDM Different from Generic Tools

Capability	ChainSys EDM	Generic Tools
Manufacturing Data Understanding	✓ Built for BOMs, genealogy, sensors	✗ Generic tables only
Traceability & Lineage	✓ Full lineage + audit trails	✗ Limited
Prebuilt Industry Templates	✓ Ready-made manufacturing models	✗ None
Data Quality at Scale	✓ AI-driven rules and cleansing	✗ Basic profiling
Integration Coverage	✓ 200+ connectors incl. ERP/MES/QMS/IoT	✗ Generic APIs
Compliance Support	✓ Built for BOMs, genealogy, sensors	✗ Generic tables only
Governance	✓ Full lineage + audit trails	✗ Limited
Deployment Speed	✓ Ready-made manufacturing models	✗ None
Multi-Plant Scalability	✓ AI-driven rules and cleansing	✗ Basic profiling
Total Cost of Ownership	✓ 200+ connectors incl. ERP/MES/QMS/IoT	✗ Generic APIs

3.4 Business Value Delivered Across Plants and Product Lines



0% Data Breaches

30% Faster Enterprise Data Migrations

50% Improvement in Operational Efficiency

80% Reduction in Manual Effort

70% Increase in Data Processing Efficiency

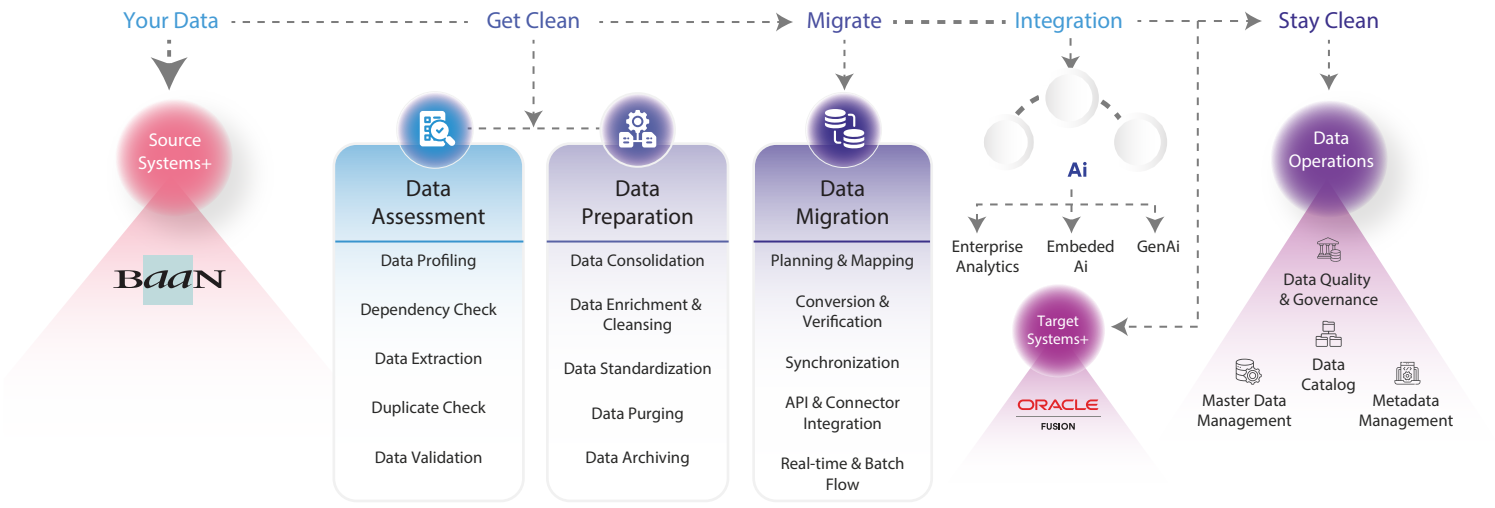
85% Reduction in Duplicate Records

100% Compliance with GDPR, HIPAA, and Other Regulatory Standards

99% Data Quality Improvement

90% Reduction in Security Risks

4. The ChainSys Approach



4.1 Data Assessment & Ingestion — Establishing Data Truth

Objective

Build an accurate understanding of all source systems and bring in high-quality data through disciplined ingestion pipelines.

How It's Done

- **Source System Profiling** — Analyze ERP, MES, QMS, PLM, LIMS, historian, and IIoT structures to understand data behavior
- **Ingestion Pipeline Engineering** — Use dataZap to create batch, real-time, and event-driven ingestion flows.
- **Early Quality Gatekeeping** — Validate completeness, consistency, duplicates, and anomalies before data lands.

Outcome

Trusted, validated input data
Early detection of quality risks
Zero guesswork about data accuracy

4.2 Data Storage & Harmonization — Creating the Manufacturing Data Core

Objective

Centralize and standardize all manufacturing, supply chain, engineering, and operational data into one governed environment.

How It's Done

- **Unified Lakehouse Creation-** Consolidate structured, semi-structured, unstructured, and IIoT data streams.
- **Metadata-Driven Modeling-** Apply dataZense models to standardize materials, batches, machines, suppliers, and parameters.
- **Cross-Plant Harmonization-** Normalize deviations, naming standards, units of measure, and code sets.

Outcome

A single manufacturing data core
Faster analytics and cross-line comparisons
Harmonized data ready for AI and quality insights

4.3 Data Privacy — Protecting Sensitive Operational Intelligence

Objective

Ensure secure access to operational and product data without slowing collaboration or regulatory compliance.

How It's Done

- **Role-Based Access Controls-** Define permissions for operators, supervisors, QA, auditors, and leadership.
- **Data Masking & Redaction-** Secure sensitive fields during sharing, reporting, and external audits.
- **Compliance Enforcement-**Apply GDPR, FDA, GxP, IATF, and ISO-aligned privacy frameworks.

Outcome

Protected operational intelligence
Lower risk of unauthorized exposure
Audit-ready privacy controls

4.4 Data Cataloging & Governance — Making Data Trustworthy

Objective

Deliver complete transparency, control, and quality assurance across the entire manufacturing data lifecycle.

How It's Done

- **End-to-End Lineage Mapping-** Track how data flows across machines, batches, routes, and processes.
- **Automated Quality Rules-** Apply KPI-driven validations.
- **Continuous Testing Framework-** Validate data changes without disrupting plant operations.

Outcome

Fully traceable, governed datasets
Decision-making backed by verified data
Stronger compliance and audit posture

4.5 Data Visualization & Advanced Analytics — Turning Data Into Quality Intelligence

Objective

Turn raw data into real-time visibility, predictive signals, and deep quality insights for operations.

How It's Done

- **Operational Dashboards-** Live OEE, FPY, downtime, waste, yield, SPC, and cost-of-quality views.
- **Predictive Models-** AI-driven defect prediction, drift detection, and anomaly spotting.
- **Discovery Analytics-** Identify root causes, patterns, correlations, and optimization opportunities.

Outcome

Real-time quality intelligence
Predictive visibility into failures and drifts
Faster improvement cycles across lines and plants

4.6 Business Consumption — Enabling Action, Not Just Insight

Objective

Convert insights into corrective actions, workflows, and continuous improvement outcomes.

How It's Done

- **Quality Workflow Apps-** NCR, CAPA, deviations, inspections, and approvals built on Smart App Builder.
- **Role-Based Interfaces-** Tailored screens for operators, engineers, QA, supervisors, and managers.
- **Closed-Loop Feedback-** Route insights back into ERP, MES, QMS, and shop-floor systems.

Outcome

Immediate corrective actions
Stronger consistency in quality execution
A closed-loop system that keeps improving

5. Implementation Roadmap

5.1 ChainSys Rapid Value Model

The fastest wins in manufacturing come from proving value early. ChainSys follows a rapid value model that helps plants see measurable outcomes in weeks, not months. Instead of long blueprint cycles, the focus is on activating trusted data flows, key governance rules, and priority-quality use cases first.

What it focuses on

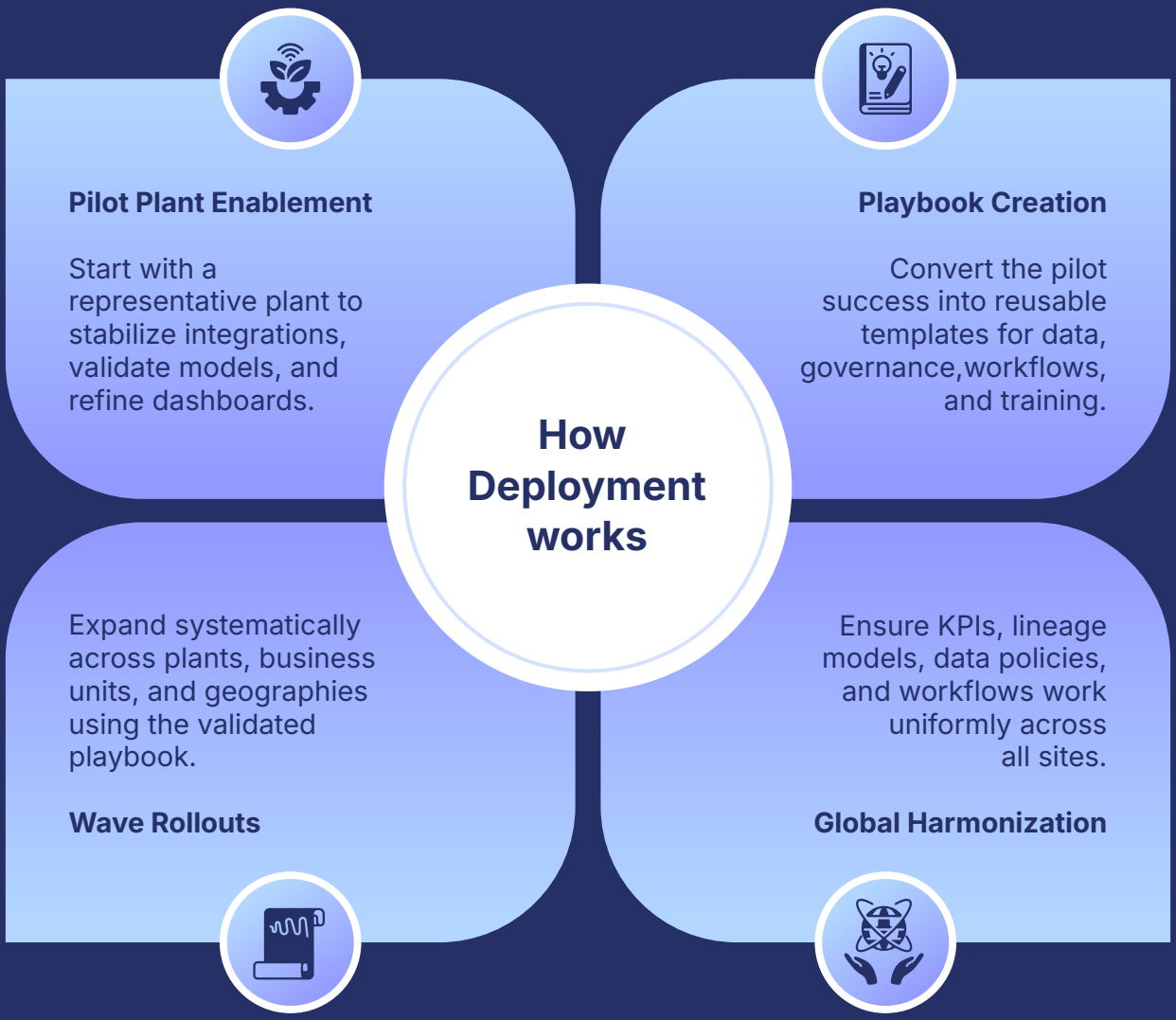
- Identify high-impact quality bottlenecks where clean data unlocks immediate gains

- Stand up ingestion pipelines for core systems (MES, ERP, IIoT, LIMS)
- Apply baseline governance rules for master data, specs, batches, and events
- Deliver the first analytics-ready quality dataset in under 4–6 weeks
- Validate improvements with real production data before the next phase scale

5.2 Phased Deployment Across Plants

Every plant operates differently, with different machines, lines, maturity levels, and data cultures. The phased rollout model respects these realities while ensuring enterprise-wide consistency.

How deployment works



5.3 Governance Operating Models for Quality Leaders

ChainSys provides a governance structure that aligns with quality leadership, plant operations, and compliance teams.

Key governance components includes:

Data Ownership & Stewardship Roles
Clear responsibilities across QA, engineering, supply chain, and IT.

Lineage-Driven Controls
Understanding how data flows from machines to reports.

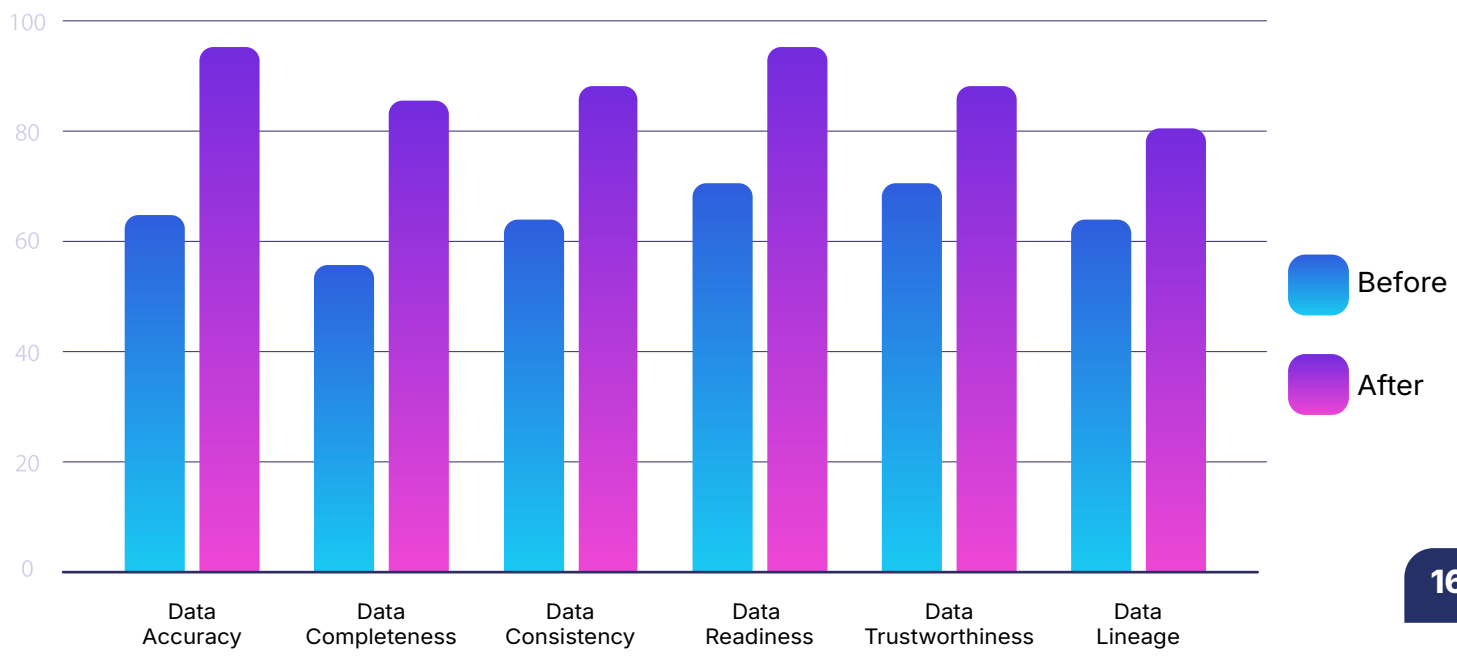
Quality Rule Libraries
Pre-defined validations tied to industry KPIs like FPY, OEE, Scrap Rate, and Deviation Rate.

Change Management Guardrails
Every update, threshold change, or master data edit is approved, logged, and auditable.

Compliance Frameworks
Built-in support for FDA, GxP, ISO, IATF, automotive PPAP, electronics traceability, and more.

6. Quantified Impact & ROI

6.1 Performance Improvements Achieved with ChainSys



6.2 Manufacturing KPI Transformation Table

KPI	Before ChainSys	After ChainSys	Improvement
Quality Incident Rate	High, inconsistent	Predictable and declining	✅ 30–50% reduction
Scrap & Rework Cost	High and rising	Controlled with predictive alerts	✅ 25–40% reduction
Time to Prepare Audit Data	Days	Minutes/Hours	✅ 80–90% reduction
Reporting Latency	6–24 hours	Near real-time	✅ 2–3x faster
Integration Failure Rate	10–15%	<3%	✅ 65–75% reduction
New Plant Data Onboarding	Weeks/Months	Days/Weeks	✅ 3x faster
MDM Workflow Cycle Time	Long, manual	Automated and governed	✅ 50–70% faster

7. Manufacturing Use Cases Powered by ChainSys

7.1 Transforming Enterprise Data with ChainSys: Empowering a Global Leader in Designing, Building, and Servicing Critical Infrastructure for Data Centers!

Client Overview

A global leader in designing, building, and servicing critical infrastructure that supports vital applications for data centers, communication networks, and commercial and industrial facilities. Operating in over 130 countries, it offers a comprehensive portfolio of power, thermal, and infrastructure management solutions, enabling the world's leading enterprises to achieve their mission-critical goals.

Project Scope

Extensive Data Migration

The project required the migration of data from over 35 legacy systems and 10 new platforms into a centralized Hadoop Data Lake and an integrated Oracle Cloud environment. This encompassed critical business data across the client's global operations.

Multi-Region Data Cleansing

Executed a thorough data cleansing process across 17 countries, ensuring compliance with regional regulations such as GDPR. The initiative involved meticulous data profiling and governance for over 2,000 databases.

Cross-Platform Integration

Integrated data seamlessly from 40+ legacy systems, including SAP, Oracle EBS, and Mainframes, into the new cloud ecosystem using over 1,000 pre-built adaptors. This integration ensured compatibility and smooth transitions to the Oracle Cloud platform.

Compliance Focus

Managed the sensitive migration of data, ensuring strict adherence to GDPR across EMEA, Asia, and North America, supporting the client's global operational standards.

Business Situation

The client needed to modernize its data infrastructure by migrating from a complex legacy system environment to a centralized cloud-based solution. The goal was to enhance operational efficiency, improve data governance, and ensure compliance with global regulatory standards. The project required a solution that could handle the scale and complexity of the client's global operations, involving multiple regions and legal entities, while minimizing disruption to ongoing business activities.

Technical Situation

The migration involved consolidating data from a vast array of legacy systems, each with unique data structures and governance requirements. The technical challenge was to ensure data accuracy and integrity throughout the migration process, especially given the sensitive nature of the data and the need for compliance with regional regulations like GDPR. Additionally, the project required seamless integration across diverse platforms, including SAP, Oracle EBS, and Mainframes, into a unified cloud environment.

Solutions

Automated Data Migration with dataZap

ChainSys deployed dataZap to automate the extraction, transformation, and loading of data from legacy systems into the new Oracle Cloud environment. The solution utilized over 1,000 pre-built adaptors to manage complex data structures and ensure smooth transitions.

Data Cleansing and Governance with dataZen

dataZen provided advanced data cleansing and governance capabilities, ensuring that all migrated data was accurate, compliant, and of the highest quality. The tool also supported ongoing data governance post-migration.

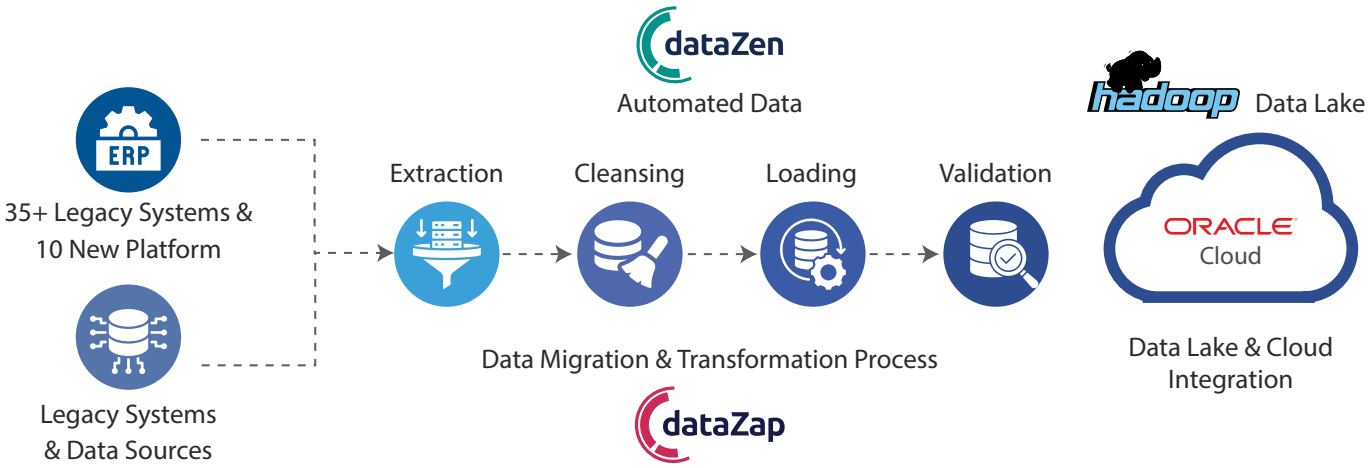
Pre-Built Templates for Accelerated Migration

Utilized over 240 pre-built templates to streamline data migration processes, reducing manual intervention and enhancing data accuracy. These templates allowed for faster rollouts and more efficient management of complex data transformations.

Compliance and Data Governance

Implemented rigorous data cleansing protocols and governance frameworks to maintain global data quality standards, ensuring compliance with GDPR and other regional regulations throughout the migration process.

Illustration



Benefits

Superior Data Accuracy:
Successfully migrated over 50 critical data objects, including Material Masters, BOMs, and Customer Master data, with an accuracy rate exceeding 99.9%, ensuring data integrity post-migration.

Faster Rollouts:
Reduced migration timelines by 60% through the use of 240+ pre-configured templates, streamlining complex data transformations and minimizing manual intervention.

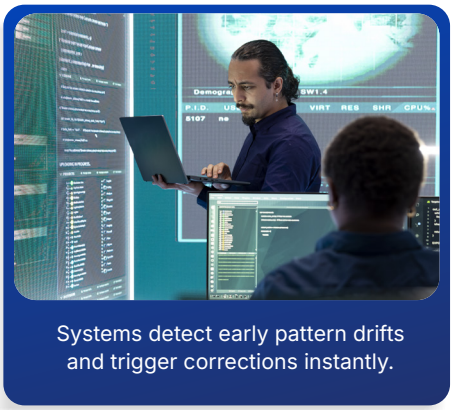
Operational Excellence:
Enabled advanced operational reporting and analytics, enhancing the client's ability to make data-driven decisions with integrated Customer 360, Spend Analytics, and C-Suite reporting across the new cloud platforms.

Enhanced Predictability:
Delivered a highly reliable and repeatable migration process, ensuring predictable outcomes across multiple phases of migration. This was supported by real-time dashboards for data validation and reconciliation.

Global Data Governance:
Maintained global data quality standards through rigorous data cleansing and governance protocols, significantly improving the integrity of the client's transactional data across its newly integrated cloud platforms.

8. The Future of Data-Driven Quality

8.1 Autonomous Quality Systems — Quality That Runs Itself



Systems detect early pattern drifts and trigger corrections instantly.

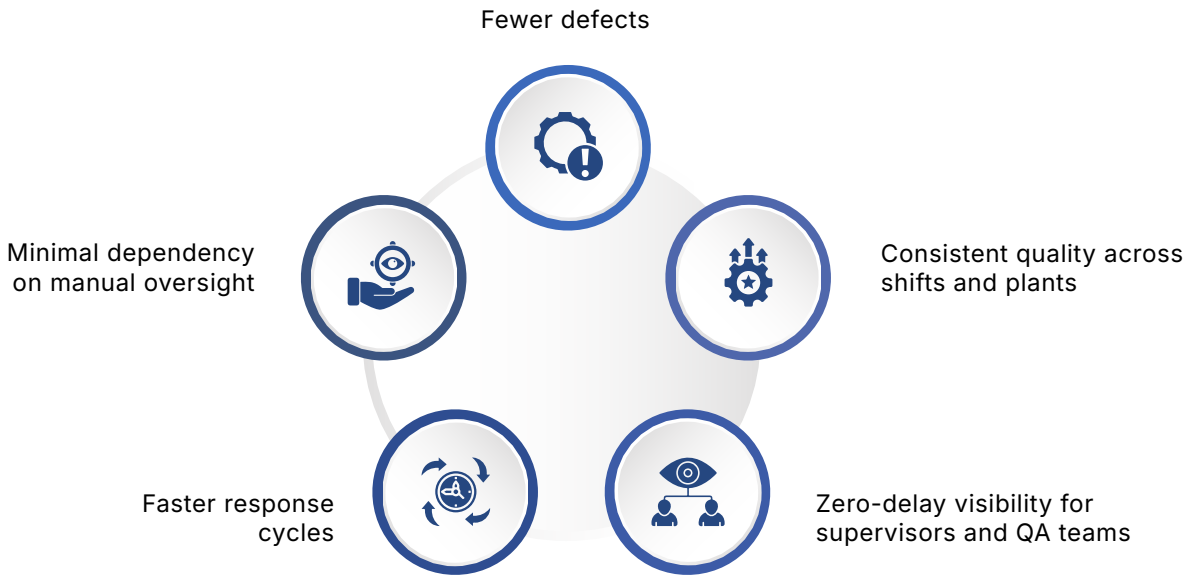
Real-time rules validate data the moment it's created or captured.

NCRs and deviations auto-route to the right teams without waiting on manual triage.

Machines adjust their own parameters based on predicted defect likelihood.

Quality becomes proactive instead of reactive.

Why it matters



8.2 EDM as the Backbone of the Smart Factory

Dimension	ChainSys EDM
Future Direction	Quality systems evolve into self-governing layers that monitor, diagnose, and correct issues without human delay. Machines,
Key Capabilities	• Autonomous anomaly detection • Machine-level micro-adjustments • Real-time validation of batch / material / process parameters • Self-triggered NCR and CAPA workflows
Operational Benefits	• Reduced scrap, rework, and waste • Minimal manual intervention • Stable, repeatable manufacturing performance • Faster response to deviations
Strategic Value	• Consistency across multi-plant operations • Greater trust in automation due to EDM-quality data • Moves manufacturers closer to lights-out operations

9. Conclusion

EDM Is No Longer Optional — It's the Foundation of Modern Manufacturing

What this really means is simple: without disciplined EDM, quality becomes reactive, reporting becomes slow, and operational decisions rely on guesswork. A mature EDM program turns that chaos into clarity.

Manufacturers get stable master data, trustworthy production records, real-time visibility into quality risks, and a single source of truth that keeps plants synchronized. This is the bedrock on which digital factories are built.

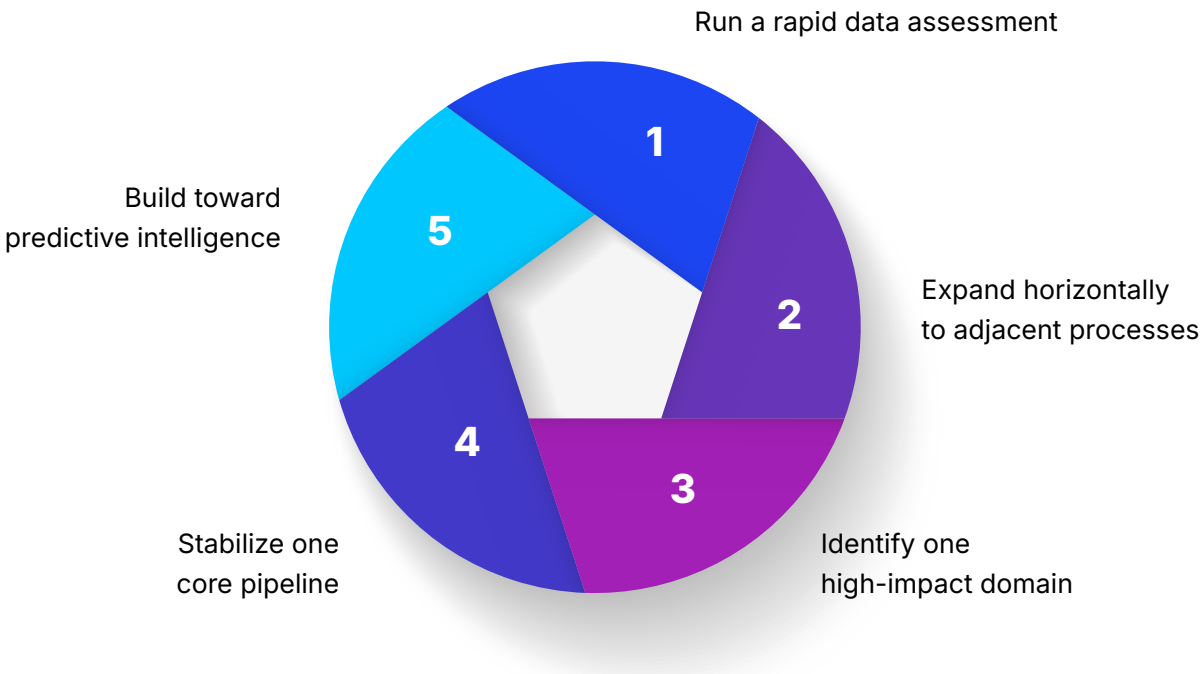
Why ChainSys Becomes the Clear Choice

ChainSys rises above the crowd because the platform doesn't just manage data — it makes it usable, trustworthy, and ready for advanced manufacturing intelligence.

A few things set ChainSys apart:

- A unified platform built for industrial complexity
- Proven accelerators for manufacturing ecosystems
- Deep lineage, governance, and AI-driven quality signals
- Zero-disruption implementation
- Credible outcomes

ChainSys isn't another tool. It's the operational intelligence layer that holds the factory together. The first move is usually the simplest: pick one area where data inconsistency slows the business, and let that become the anchor for the EDM roadmap. A practical starting path looks like this:



amazon · Expedia · knowles · SIEMENS · CATERPILLAR

BIOMARIN · TOYOTA · Baker Hughes · COMCAST

ARRIS · VERTIV · CDM Smith (listen. think. deliver.) · Bell

epredia · salesforce · Canon · KROLL

GE Healthcare · GE APPLIANCES

Fortune Brands (A home and security company) · JACOBS

دائرة التمكين الحكومي
DEPARTMENT OF GOVERNMENT ENABLEMENT

World's leading Brand

Trust

Our Data Solutions

Chainsys Unveiled

Places

People

1500+ Data Professionals Worldwide

1000+ Data Engineering Experts (Development, QA, services on our DevOps, Security & Support) Team

300+ Enterprise Applications Experts

90% Employee Retention Rate

Process

Hub & Spoke Architecture

Data Management Accelerators with 10000+ templates

GDPR COMPLIANT · CMMI APPRAISED · DSS · SOC 1 TYPE II CERTIFIED · SOC 2 TYPE II CERTIFIED

Projects

50+ Ongoing Engagements

Completed 500+ Data Management Projects Worldwide.

We offer value added services on our products for our customers:

1. Advisory 2. Architecture
2. Implementation
3. Training 4. Support

Product

Manage your Business

ElasticX™ · Smart BOTS · Smart App Builder™

Manage your Data

Smart Data Platform

dataZap · dataZen · dataZense

Partnership: SAP · IBM DB2 · ORACLE · salesforce · Microsoft · SYBASE · snowflake · dun & bradstreet

Technology: cloudera CONNECT · mongoDB · Java · android

Our Differentiators

10000+
Smart Data Templates for 200+ Applications

70%
Cost & Time Reduction in Data Ingestion Migration

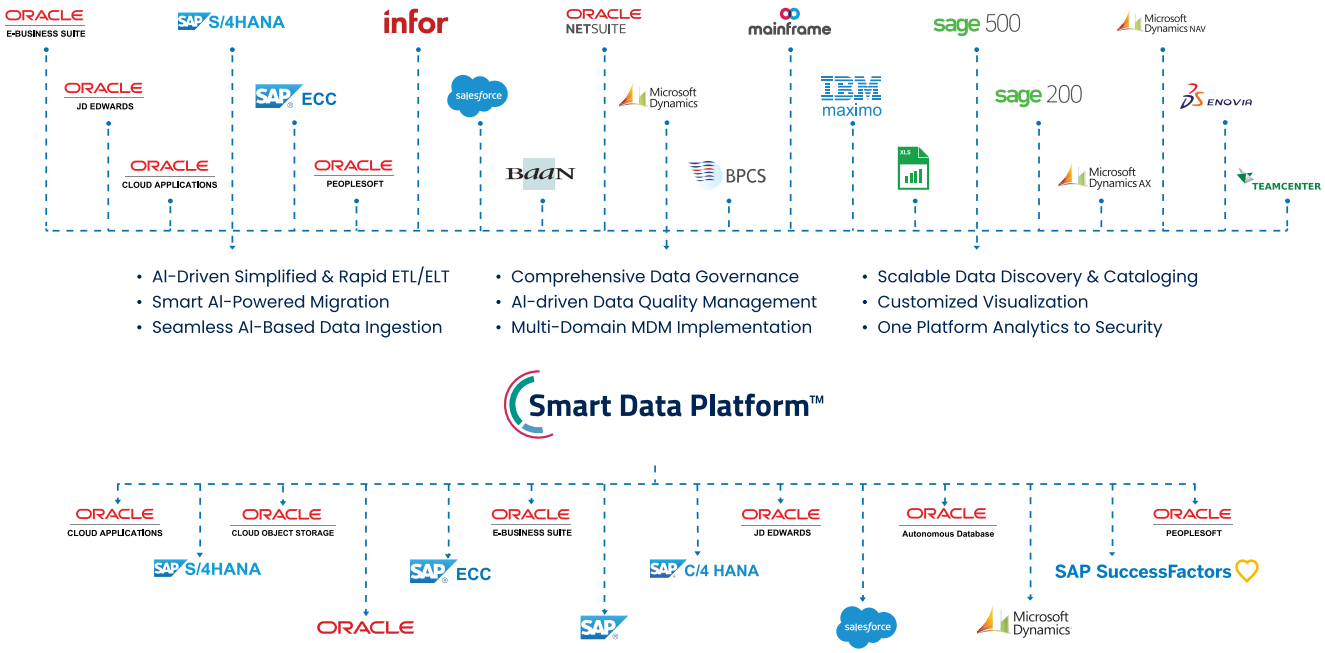
99.9%
Data Quality Improvement

360°
Perspective with Automated Governance Protocols

Low / No code
Approach for ease of Development & Rapid Deployment

Effortless Connection with Smart Data Platform

Migrate or integrate data seamlessly from any source to any destination ensuring 99% quality and governance.



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"I am honored to serve as ChainSys's CEO during this remarkable era of Digital transformation, as ChainSys is on an exciting trajectory to support this shift and help customers design, implement, and deploy the latest innovations in enterprise data management. We are honored to have a great customer base, hard-working & multi-skilled employees across the globe, and a respectful position in all the markets where we compete.

Sundu Rathinam Founder/ CEO/ CTO, ChainSys

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