THE POWER OF THREE

Deloitte. snowflake aws

Smart Factory Data Platform

Enabling manufacturing process efficiency gains by AI and data driven innovation

The Data & Analytics Platform for Smart Manufacturing powered by the Snowflake Data Cloud on AWS

Agenda

01 Data-driven Potentials for Manufacturing Processes

02 Data Ingestion Patterns enabling IT/ OT Convergence

03 Smart Factory Data Platform Architecture & Capabilities

04 Understanding Production Anomalies with an AI Co-Pilot

05 Questions & Answers

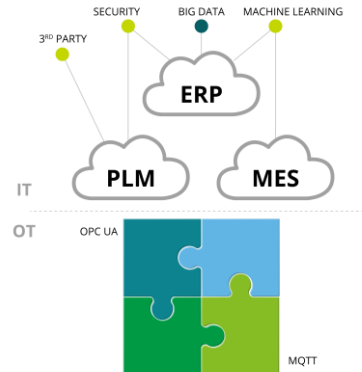# Manufacturing processes bear business potentials by data utilization...
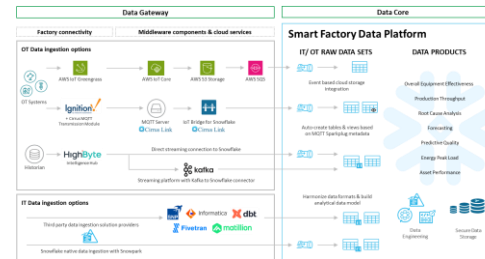
TRADITIONAL
Monolithic pyramid
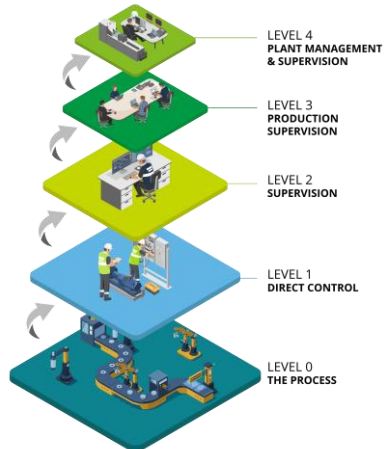
TODAY/TOMORROW
Converging IT and OT using a hybrid edge-to-cloud architecture

CENTRALIZED DATA
Unified access to manufacturing data

VALUE OF DATA INSIGHTS
Enhanced GenAI-driven manufacturing processes

...but face challenges

Data acquisition and management
Manufacturing data sets are often poorly utilized and inconsistent

Data product management
Interoperability between IT and OT data sets is difficult to achieve
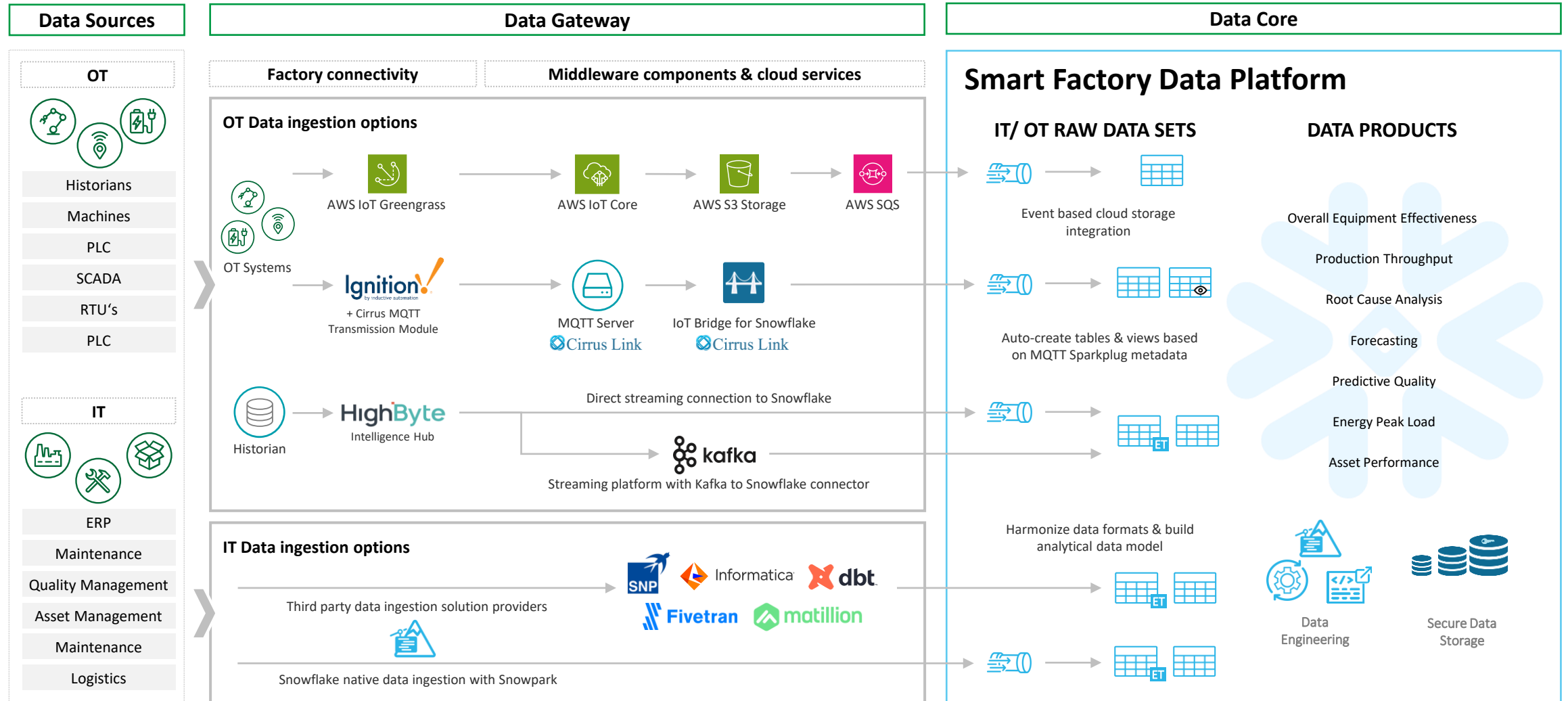
Access to requisite skills
Required services that build the foundation for data & analytics

Time to value
Executives often struggle with realizing ROI on smart manufacturing initiatives

Smart Factory IT/ OT data ingestion options

Snowflake and its' ecosystem partners offer comprehensive options for IT/ OT data ingestion into a single cloud data platform

Data Sources	Data Gateway	Data Core

OT

- Historians
- Machines
- PLC
- SCADA
- RTU's
- PLC

IT

- ERP
- Maintenance
- Quality Management
- Asset Management
- Maintenance
- Logistics

Data Gateway

Factory connectivity	Middleware components & cloud services

OT Data ingestion options

OT Systems

AWS IoT Greengrass → AWS IoT Core → AWS S3 Storage → AWS SQS

Ignition! by inductive automation
+ Cirrus MQTT Transmission Module → MQTT Server (Cirrus Link) → IoT Bridge for Snowflake (Cirrus Link)

Historian → HighByte Intelligence Hub

Direct streaming connection to Snowflake

kafka

Streaming platform with Kafka to Snowflake connector

IT Data ingestion options

Third party data ingestion solution providers

SNP · Informatica · dbt · Fivetran · matillion

Snowflake native data ingestion with Snowpark

Smart Factory Data Platform

IT/ OT RAW DATA SETS

Event based cloud storage integration

Auto-create tables & views based on MQTT Sparkplug metadata

Harmonize data formats & build analytical data model

DATA PRODUCTS

- Overall Equipment Effectiveness
- Production Throughput
- Root Cause Analysis
- Forecasting
- Predictive Quality
- Energy Peak Load
- Asset Performance

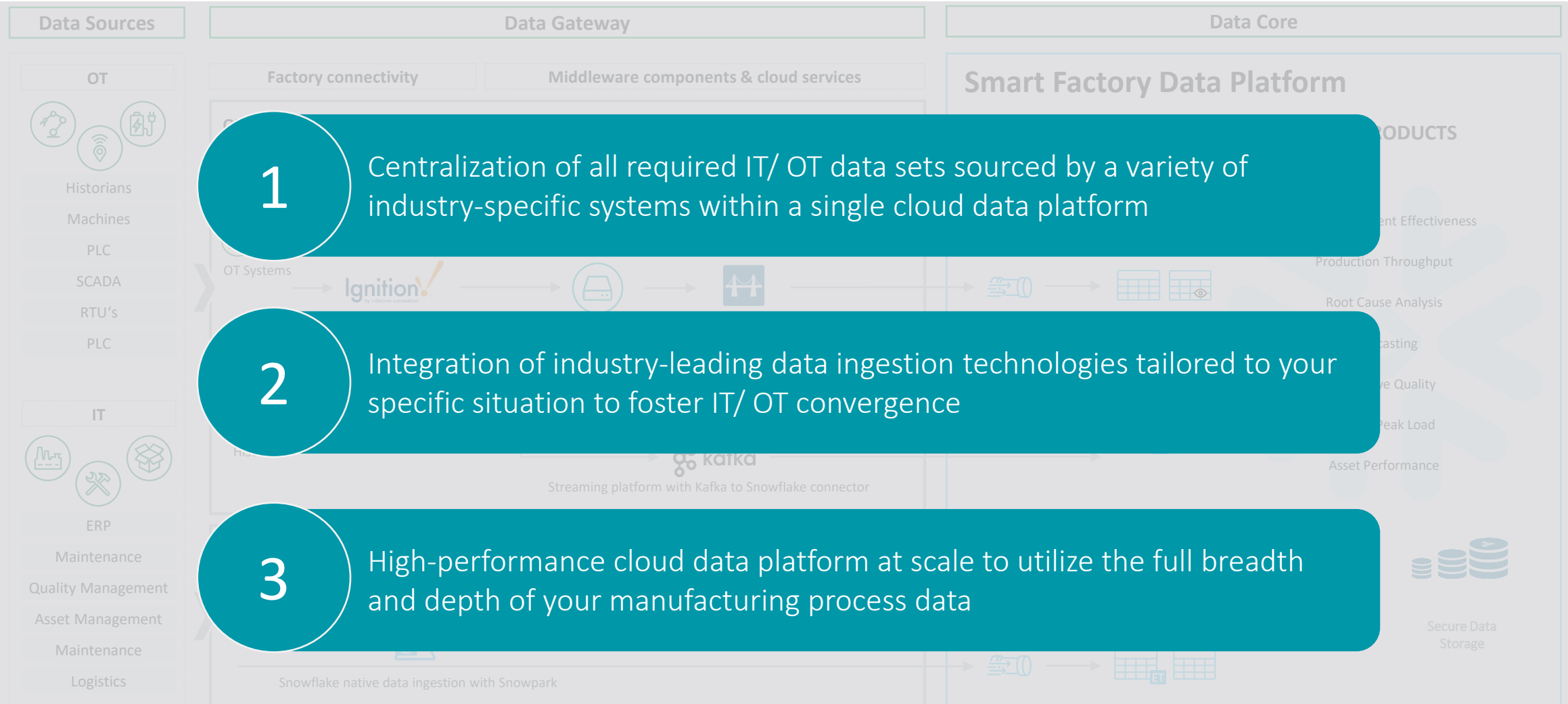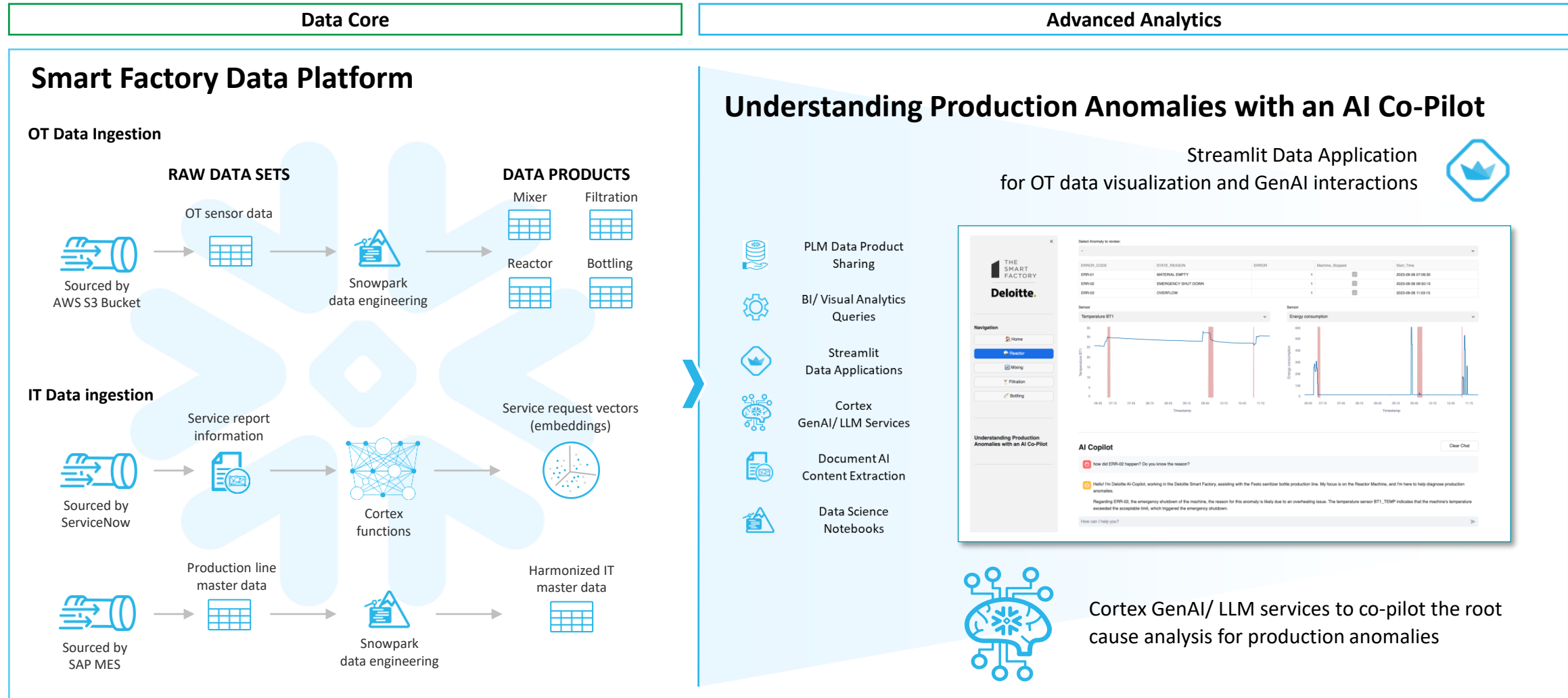Data Engineering

Secure Data Storage

Smart Factory IT/ OT data ingestion options

Snowflake and its' ecosystem partners offer comprehensive options for IT/ OT data ingestion into a single cloud data platform

Data Sources

Data Gateway

Data Core

OT

Factory connectivity

Middleware components & cloud services

Smart Factory Data Platform

Historians
Machines
PLC
SCADA
RTU's
PLC

OT Systems

Ignition

PRODUCTS

...ent Effectiveness
Production Throughput
Root Cause Analysis
...casting
...ve Quality
...Peak Load
Asset Performance

1 Centralization of all required IT/ OT data sets sourced by a variety of industry-specific systems within a single cloud data platform

2 Integration of industry-leading data ingestion technologies tailored to your specific situation to foster IT/ OT convergence

IT

ERP
Maintenance
Quality Management
Asset Management
Maintenance
Logistics

kafka

Streaming platform with Kafka to Snowflake connector

3 High-performance cloud data platform at scale to utilize the full breadth and depth of your manufacturing process data

Secure Data Storage
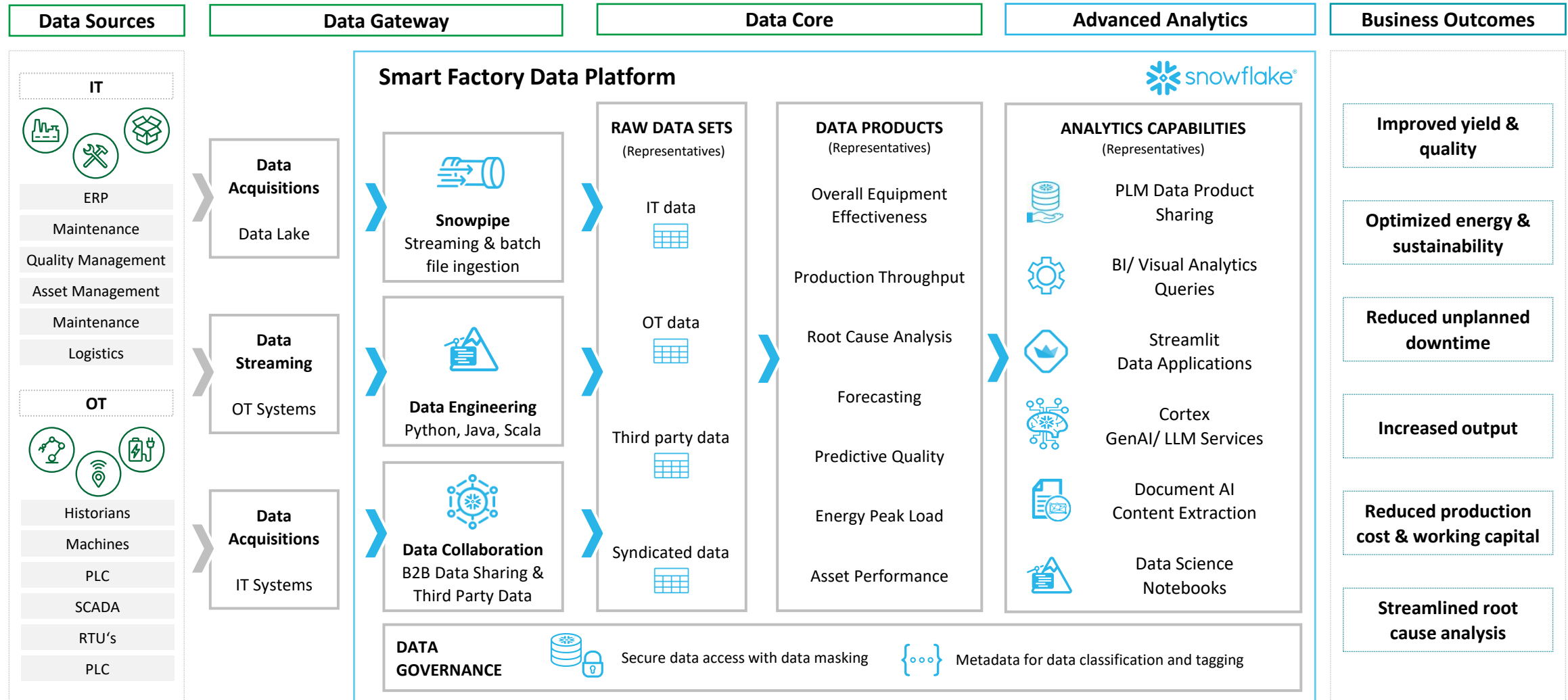
Snowflake native data ingestion with Snowpark

Smart Factory Data Applications

Based on Snowflake's advanced analytics capabilities we utilize GenAI/ LLM services to understand production anomalies in our use case demonstration

Data Core	Advanced Analytics

Smart Factory Data Platform

OT Data Ingestion

RAW DATA SETS

OT sensor data

Sourced by AWS S3 Bucket → Snowpark data engineering

DATA PRODUCTS

Mixer   Filtration

Reactor   Bottling

IT Data ingestion

Service report information

Sourced by ServiceNow → Cortex functions

Service request vectors (embeddings)

Production line master data

Sourced by SAP MES → Snowpark data engineering

Harmonized IT master data

Understanding Production Anomalies with an AI Co-Pilot

Streamlit Data Application
for OT data visualization and GenAI interactions

- PLM Data Product Sharing
- BI/ Visual Analytics Queries
- Streamlit Data Applications
- Cortex GenAI/ LLM Services
- Document AI Content Extraction
- Data Science Notebooks

Cortex GenAI/ LLM services to co-pilot the root cause analysis for production anomalies
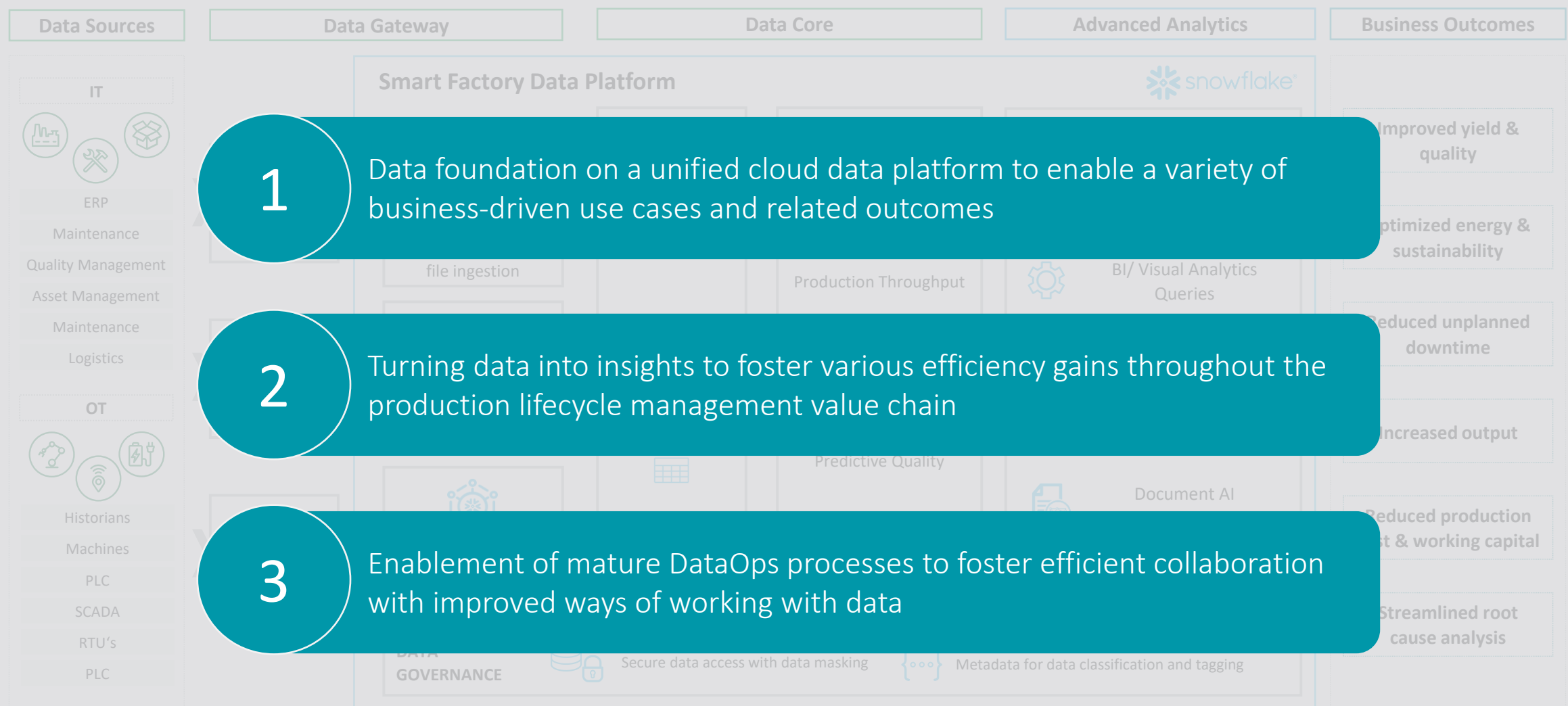
THE POWER OF
THREE

Solution architecture Smart Factory Data Platform

Centralized IT/ OT data in Snowflake's data cloud drive smart factory and manufacturing business outcomes enabled by advanced analytics capability

| Data Sources | Data Gateway | Data Core | Advanced Analytics | Business Outcomes |

Smart Factory Data Platform — snowflake®

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- ERP
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Data Acquisitions — Data Lake

Data Streaming — OT Systems

Data Acquisitions — IT Systems

Snowpipe — Streaming & batch file ingestion

Data Engineering — Python, Java, Scala

Data Collaboration — B2B Data Sharing & Third Party Data

RAW DATA SETS (Representatives)
- IT data
- OT data
- Third party data
- Syndicated data

DATA PRODUCTS (Representatives)
- Overall Equipment Effectiveness
- Production Throughput
- Root Cause Analysis
- Forecasting
- Predictive Quality
- Energy Peak Load
- Asset Performance

ANALYTICS CAPABILITIES (Representatives)
- PLM Data Product Sharing
- BI/ Visual Analytics Queries
- Streamlit Data Applications
- Cortex GenAI/ LLM Services
- Document AI Content Extraction
- Data Science Notebooks

Business Outcomes
- Improved yield & quality
- Optimized energy & sustainability
- Reduced unplanned downtime
- Increased output
- Reduced production cost & working capital
- Streamlined root cause analysis

DATA GOVERNANCE — Secure data access with data masking — Metadata for data classification and tagging

Solution architecture Smart Factory Data Platform

Centralized IT/ OT data in Snowflake's data cloud drive smart factory and manufacturing business outcomes enabled by advanced analytics capability

Data Sources | **Data Gateway** | **Data Core** | **Advanced Analytics** | **Business Outcomes**

Smart Factory Data Platform

snowflake

IT

ERP
Maintenance
Quality Management
Asset Management
Maintenance
Logistics

file ingestion

Production Throughput

BI/ Visual Analytics Queries

Improved yield & quality

Optimized energy & sustainability

Reduced unplanned downtime

OT

Historians
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PLC

Predictive Quality

Document AI

Increased output

Reduced production cost & working capital

Streamlined root cause analysis

DATA GOVERNANCE — Secure data access with data masking — Metadata for data classification and tagging

1 Data foundation on a unified cloud data platform to enable a variety of business-driven use cases and related outcomes

2 Turning data into insights to foster various efficiency gains throughout the production lifecycle management value chain

3 Enablement of mature DataOps processes to foster efficient collaboration with improved ways of working with data

Understanding Production Anomalies with an AI Co-Pilot

01 PROBLEM

Data is kept in silos across plants and manufacturing facilities which limits innovation and analytical capabilities.

02 CHALLENGE

Variety of IT/ OT data sources with a need for different integration scenarios to scale the generation of data insights at scale.

03 SOLUTION

Data Gateway
- Cloud connectivity to enable access to production data sets

Data Core
- Unified data model for IT & OT driven data product creation and utilization

Advanced Analytics
- Standardized solutions on a single platform insights generation

USE CASE DESCRIPTION

For the digitalization of industrial processes, the access to data from various departments contributing to the entire product lifecycle is crucial to realize the digital thread and to raise potentials for cost reduction and operational efficiency. An integrated data platform supporting the convergence of IT/ OT data builds the foundation for further insights generation. Our use case provides an overview for monitoring manufacturing machines and enables the automated detection of production anomalies. Generative AI capabilities act as a copilot for a guided research of historic incident data to resolve the issue in operations.

TECHNOLOGY HIGHLIGHTS

- AWS IoT Core to enable factory connectivity
- AWS S3 for raw data set storage
- Snowflake Snowpipe Streaming to gain near real-time data availability within a unified IT/OT data model
- Snowflake Data Cloud as single data platform for all manufacturing data products
- Snowflake Streamlit for easy to use and scalable standard data applications
- Snowflake Cortex to enable GenAI driven forecasting, anomaly detection & LLM service integration
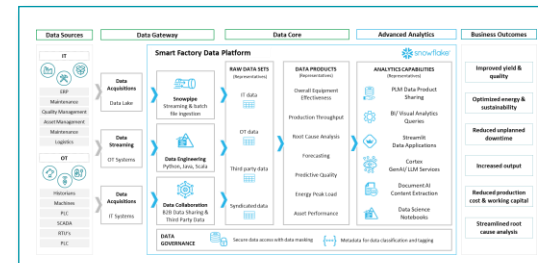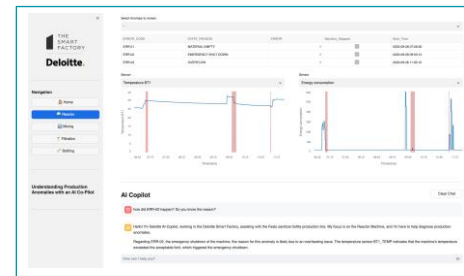
IMPACT

(Near) real-time data availability of integrated IT/OT data

Scalable platform for a variety of data & analytics use cases

Standardized visualizations for fast data insights

AI assisted data analysis including GenAI enablement

SHOW CASE

Use case presentation with Snowflake on AWS platform available for demonstration

Start generating sustained value today

Smart Manufacturing transformations are about more than adding new technology. Organizations must integrate solutions into their daily operations while driving user adoption, ensuring change management, and gaining workforce buy-in.

Deloitte's value-add supporting your journey

- Manufacturing professionals and industry experts
- Proven methodology and innovative thinking
- People-first, user-centric mindset
- Scalable AI+Data solutions that fit with your existing technology, powered by our *Smart Factory Data Platform*

Our *Smart Factory Data Platform* accelerates the deployment of smart manufacturing solutions, leveraging your existing technology landscape and growing with you as your organization transforms
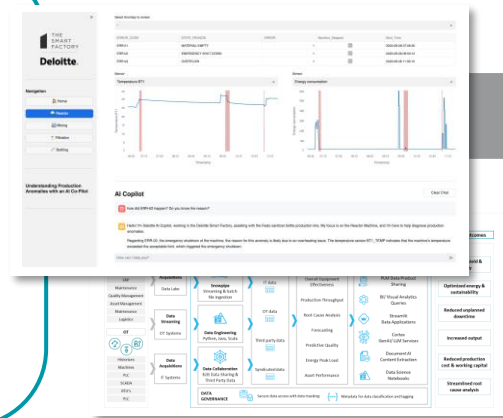
Our *Smart Factory Data Platform* offering provides:

- Analytics foundation to enable improved production operations and efficiency, and cost savings, at scale
- Real-time and historical data-driven actionable insights to produce measurable results
- Extendable platform to provide client-focused data visualizations and applications
- IT/OT data integration solutions to drive advanced analytics creating intelligent insights
- Integration with industry-leading technologies to drive industry expertise

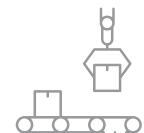### We offer a growing library of ready-to-deploy use cases
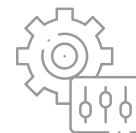
| OEE | Production Monitoring | Loss Reasons | Equipment Fault Code | Line Balance Monitoring |

Contacs

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