Data-Driven Manufacturing: Enabling Emerging Technologies Through Governance

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Introduction

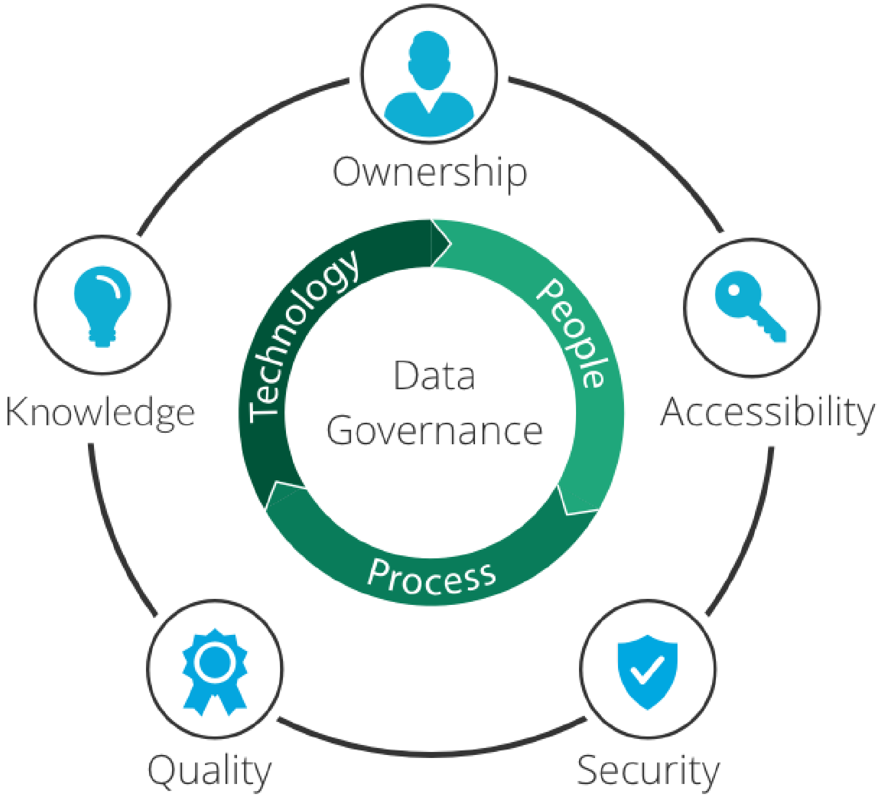
In today's data-driven manufacturing landscape, proper data governance ensures quality, compliance, and operational excellence across all processes.

Data governance unlocks the full potential of Industry 4.0, enabling smart decisions, predictive maintenance, and continuous improvement.

Essential as a strategic key enabler to accelerate digital transformation, powers predictive analytics and AI applications, and supports continuous improvement and lean manufacturing.

Data governance is the key enabler and foundation to unlock full potential through strategic data management for emerging technology.

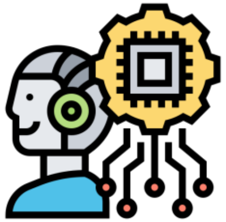
Data governance acts as a key enabler in manufacturing, facilitating informed decision-making and operational efficiency. It promotes collaboration among stakeholders and supports the integration of advanced technologies like AI and analytics.



Emerging Technologies in Manufacturing

Predictive Analytics

- Utilizes historical data and statistical algorithms to predict future outcomes.
- Helps in forecasting demand, maintenance needs, and quality control.
- Increases efficiency by minimizing downtime and optimizing resource allocation.



Machine Intelligence

- Integrates algorithms that allow machines to learn from data.
- Enables automation of complex processes and tasks.
- Enhances productivity through real-time data processing.

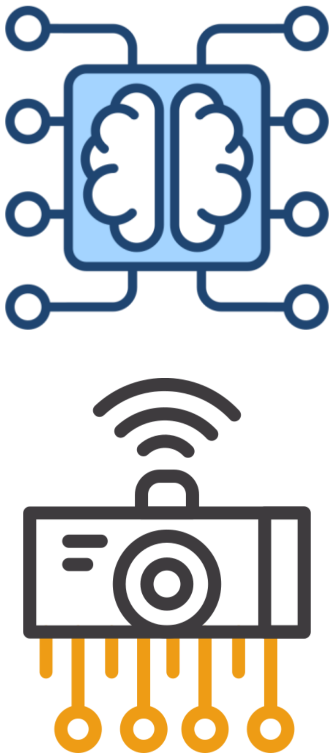
Artificial Intelligence (AI)

- Applies advanced algorithms to mimic human intelligence.
- Powers innovations like robotics, computer vision, and natural language processing.
- Enhances decision-making and supports advanced manufacturing processes

Garbage in, garbage out.
Your model is only good as your data.
Data quality and governance matters.

Improperly normalized and modeled data can lead to significant issues, as inaccurate data can negatively affect decision-making and hinder analytics.

The Need for Robust Data Governance in Manufacturing



- Machine learning algorithms require clean, consistent data to deliver accurate predictions
- Predictive analytics models fail without standardized, quality assured datasets
- IoT sensor data becomes meaningless noise without proper classification and structure
- Edge computing requires governed data pipelines for real time processing
- Advanced analytics platforms can’t function without siloed and inconsistent data structures.

Quality data is essential for leveraging advanced technologies; without it, machine learning, predictive analytics, IoT, edge computing, and analytics platforms cannot deliver accurate insights or drive effective decision-making.

Benefits of Effective Data Governance in Manufacturing

- **Quality Control & Defect Reduction**
  - Reduction in quality defects
  - Improved traceability and RCA capabilities
  - Enhanced statistical process control with reliable data streams

- **Predictive Maintenance Excellence**
  - Reduced unplanned downtime through better asset performance insights
  - Optimized maintenance scheduling base don real-time equipment data
  - Properly governed manufacturing data improves predictive maintenance accuracy

- **Production Optimization**
  - Real-time visibility into manufacturing processes through integrated data systems.
  - Enhanced overall equipment effectiveness (OEE)
  - Data driven production scheduling and capacity planning

Seamless Data Sharing and Interoperability

Standardize Data Formats & Protocols

- Data standards implementation
- Implementation of unified namespaces
- Implement common data models across all systems
- Protocol harmonization

Build Integrated Data Architecture

- Invest in technical infrastructure
- Invest in system integration such as MES,ERP, SCADA through standardized interfaces

Establish Data Governance Framework

- Create a governance structure
- Create data quality standards and monitoring processes
- Implement change management procedures

Start with standards, build the pipes, govern the flow.
Implement in phases starting with critical system connections before expanding to emerging tech.

Data Governance Flow and Lifecycle

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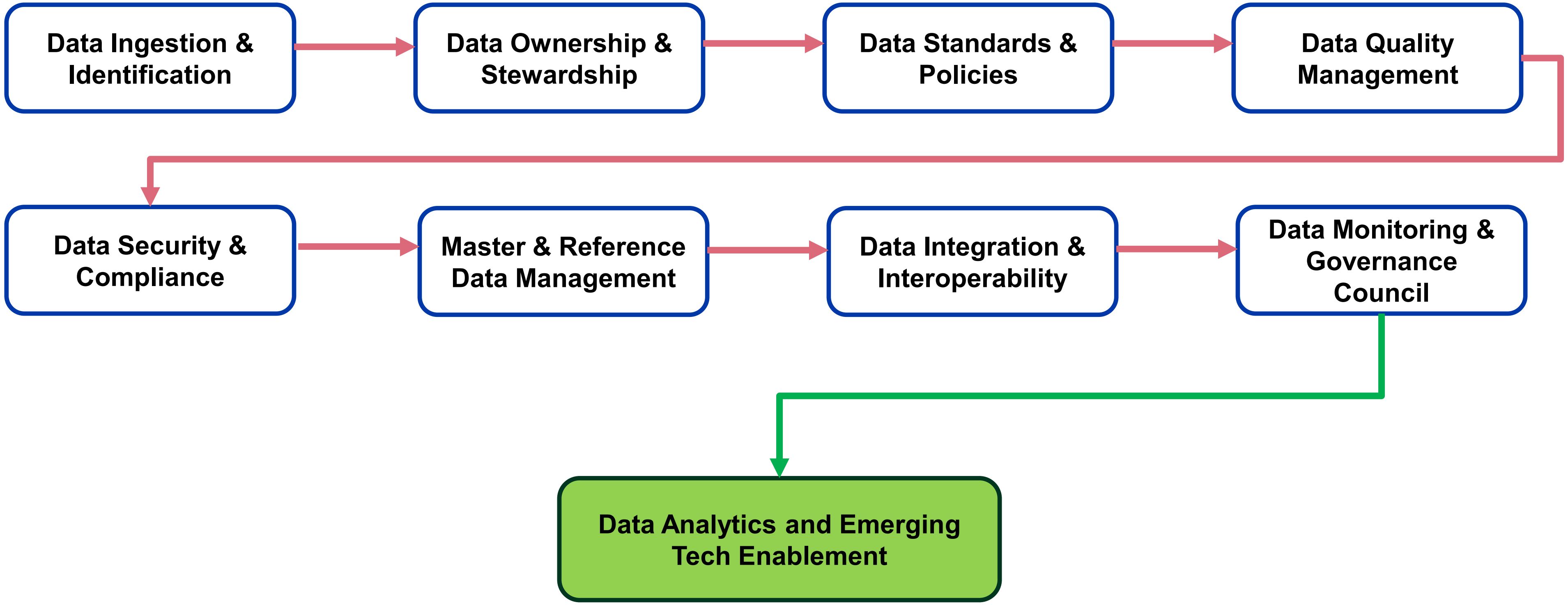

Challenges & Key Success Factors

Challenges

- Legacy system data integration
- Real-time data quality at scale
- Cross functional data silos
- Security versus accessibility
- Skills gaps and change management
- Resistance to change

Key Success Factors

- Technical foundation through standardized data architecture supporting both legacy and emerging systems
- Organizational alignment and cross functional collaboration
- Continuous improvement

Success in data governance requires treating legacy integration, real-time quality, and cross-functional silos as interconnected technical problems that need coordinated solutions, not isolated IT projects.

Summary

- **Critical Role of Data Governance**
- **Impact on Advanced Technologies**
  - Requires clean, consistent data for accurate predictions.
  - Relies on standardized, quality-assured datasets to function effectively.
  - Demands governed data pipelines for real-time processing.
  - Fail to deliver insights without cohesive data structures.
- **Consequences of Poor Data Management**
  - Inconsistent or inaccurate data can lead to flawed decision-making.
  - AI and predictive models fail without reliable data, resulting in wasted investments.
  - Bottlenecks and chaos from ungoverned data hinder operational efficiency and actionable insights.

Investing in robust data governance is crucial to harnessing the true potential of advanced technologies, enhancing decision-making, operational efficiency, and innovation in the manufacturing sector.

Questions?

Thank you for attending the presentation!