

MANUFACTURING OPERATIONS TRANSFORMATION

WHITE PAPER

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From optimising asset performance, to raising productivity, to elevating quality, there are countless reasons to pursue Manufacturing Operations Transformation (MOT). It is the continuation of transformational activities that align manufacturing IT systems across the business to provide both operational and business improvements.

Improvement requires changing processes and systems, and continually training the workforce. This often requires replacing paper and legacy systems with software that provides automation, and ensures work processes are in-line with targets.

This whitepaper discusses the drivers of digital transformation in manufacturing, and how multi-site enterprises can ensure consistent processes, reporting and analysis that ultimately unlock the true value of their business.

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Business transformation

Back in the nineties there was an influx in ERP implementations, and companies invested in rolling out SAP or other ERP systems to standardise their business processes. Those companies are now leveraging previous technology investments to redefine how they run their businesses through global transformation initiatives. These initiatives are meant to give businesses the agility they need in their operating processes to be able to adapt to fast changing markets and competitive forces. A recent KPMG survey showed that 93% of US based multinational corporations are either currently initiating transformation or have already implemented it, and these are major investments often running into the \$100M range.¹

Business transformation is closely connected to the digital transformation happening everywhere which is changing both B2B and B2C relationships and related expectations in user experience and services. But with all that, business transformation, like ERP implementations before, gets stopped at the gates of the plant, which is where the businesses' primary value creation occurs.

Manufacturing Operations Transformation (MOT)

All industrial manufacturing companies have started their transformation journey with plant and machine automation and the gains of productivity and process repeatability that brings.

Plant equipment automation minimises the amount of manual operations and maximises the physical throughput. To further improve the utilisation of equipment, plant operations have matured into using IT and software applications as the basis for improvement strategies such as replacing paper-based work instructions and data collection.

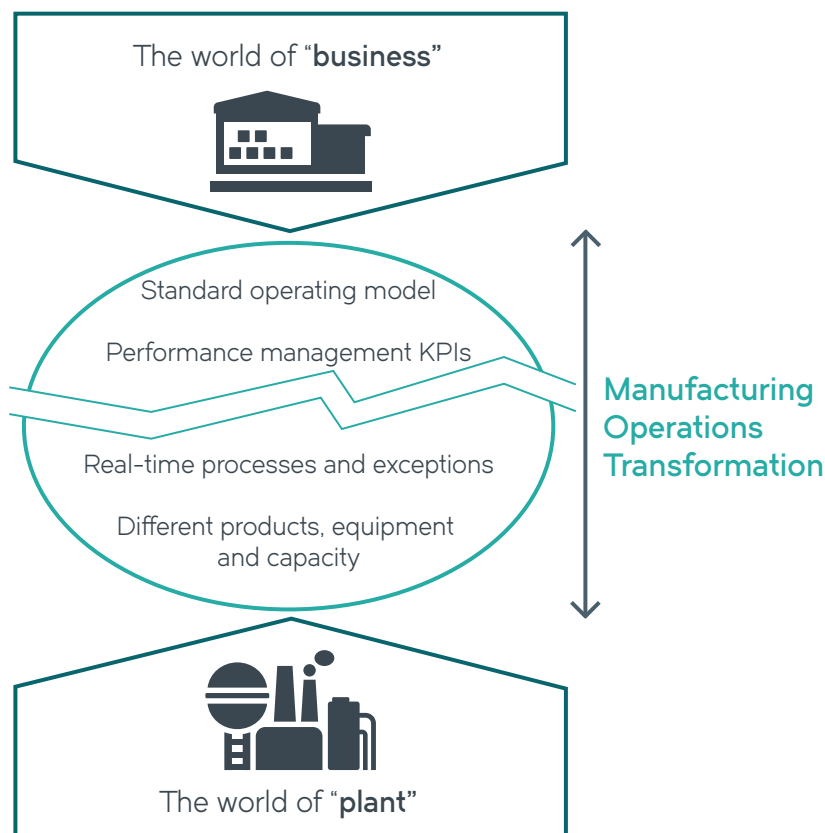
First generation software and information technology (IT) adoption

The use of software and IT, such as manufacturing execution systems (MES) has provided more benefits than increased operational efficiency through core application functionality. Historical data and modern big data analytics offer additional payback opportunities by providing optimisation insights and facilitation of continuous improvement. Visibility of operational execution and inventory status based on automatic data exchange with enterprise systems in near real-time enables better decision making and collaboration between plant and enterprise functions.

The return (ROI) on these plant MES investments has been and continues to be based on improvements to operational efficiency and quality, both directly impacting bottom line results.

- Operational Efficiency – increased asset performance and plant throughput, faster product changeover, increased productivity
- Increased Quality – enforcement of product and process specifications, reduced waste and rework, detailed traceability, indications and management of nonconformance, effective recalls

Manufacturing Operations Management (MOM) and supporting Manufacturing Execution System (MES) software have made great strides in bringing order, but unless they are easy to use and model the real-world dynamics of the plant, they may not be used to their fullest potential. Manufacturing Operations Transformation (MOT) is the continuation (or beginning) of transformation activities that align these manufacturing IT systems across the business to provide both operational and business improvements.



According to McKinsey,² digital manufacturing technologies will transform every link in the manufacturing value chain, from research and development, supply chain, and factory operations to marketing, sales, and service. Digital collaboration among designers, managers, workers, consumers, and physical industrial assets will unlock enormous value and change the manufacturing landscape forever.

Drivers of digital transformation in manufacturing:

- Technological advances in big data and predictive analytics, business process management, mobile applications, and augmented reality are enabling manufacturers to empower operators and decision makers to make sense of operational data.
- Newer platform and integration technologies like cloud, IOT, IIOT, smart and edge devices are driving down the cost of digital transformation in the manufacturing sector.

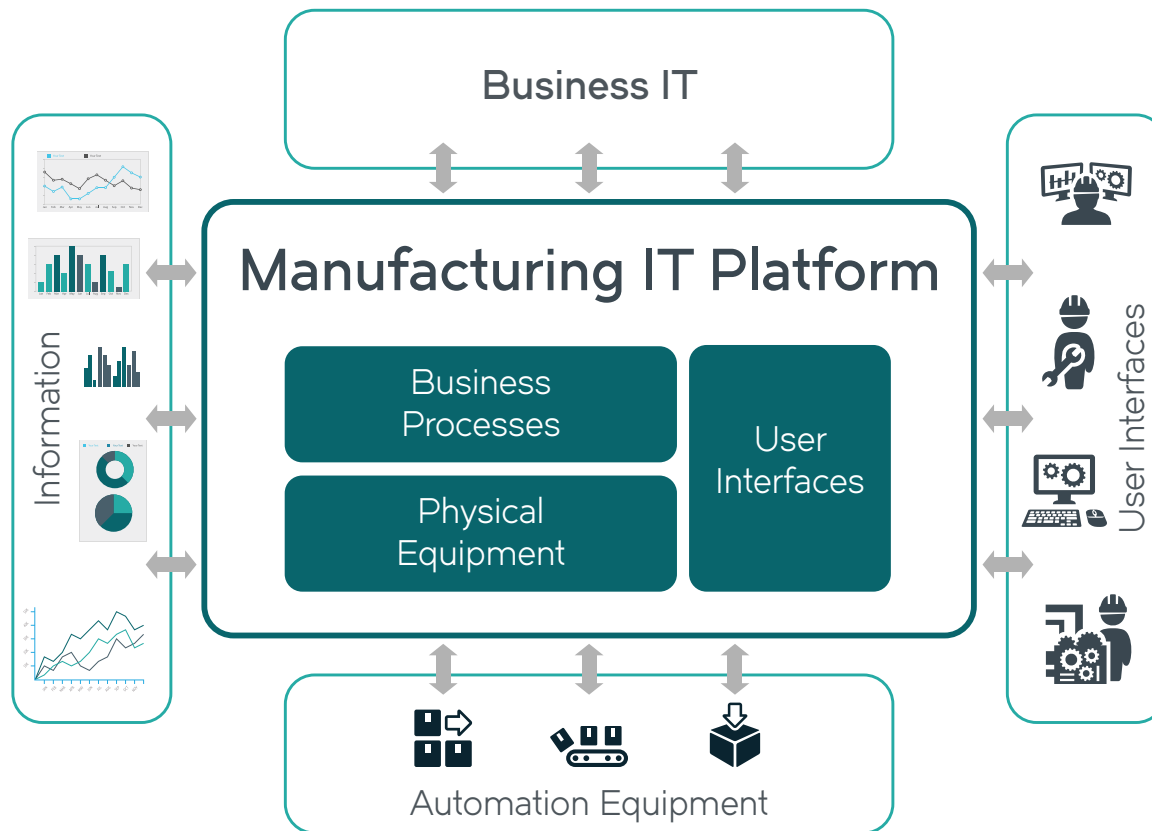
Plants have fallen behind in digital transformation of business processes

Plant operations are traditionally set up as multiple functional domains operated by separate teams and with separate systems for inventory, production, quality and maintenance activities (using the ISA 95 segmentation of operational activities in manufacturing).³ Software to manage operations in these domains exists on the plant and enterprise level but for collaboration across these domains, knowledge and experience are still required for operating and maintaining plant or manual approaches. Such approaches are too inconsistent and isolated and, when analysed, prove to be inefficient. Collaboration is also challenging with traditional methods, and when the experts retire or change jobs their expertise goes with them.

Collaboration across people and systems

A key factor for future manufacturing operations improvements is the effective collaboration of people and systems in a digital, automated and integrated fashion. The element that can bring these together in industrial operations is Business Process Management (BPM) technology integrated with a manufacturing IT platform to connect with plant floor processes, people, data and systems.

Digital transformation of operational processes using a business process management system (BPMS) can be used to capture and transform best practices into electronic workflows, to connect assets and systems, establish systematic people and system collaboration and to empower the mobile and next generation workforce. It can orchestrate process across functional domains (horizontal integration) and can integrate with business functions (vertical integration). Enforcing consistency of operational procedures and the automation of workflows with electronic records of manufacturing execution activities and data preserves the investments in existing plant systems while offering significant operational efficiency improvement potentials.

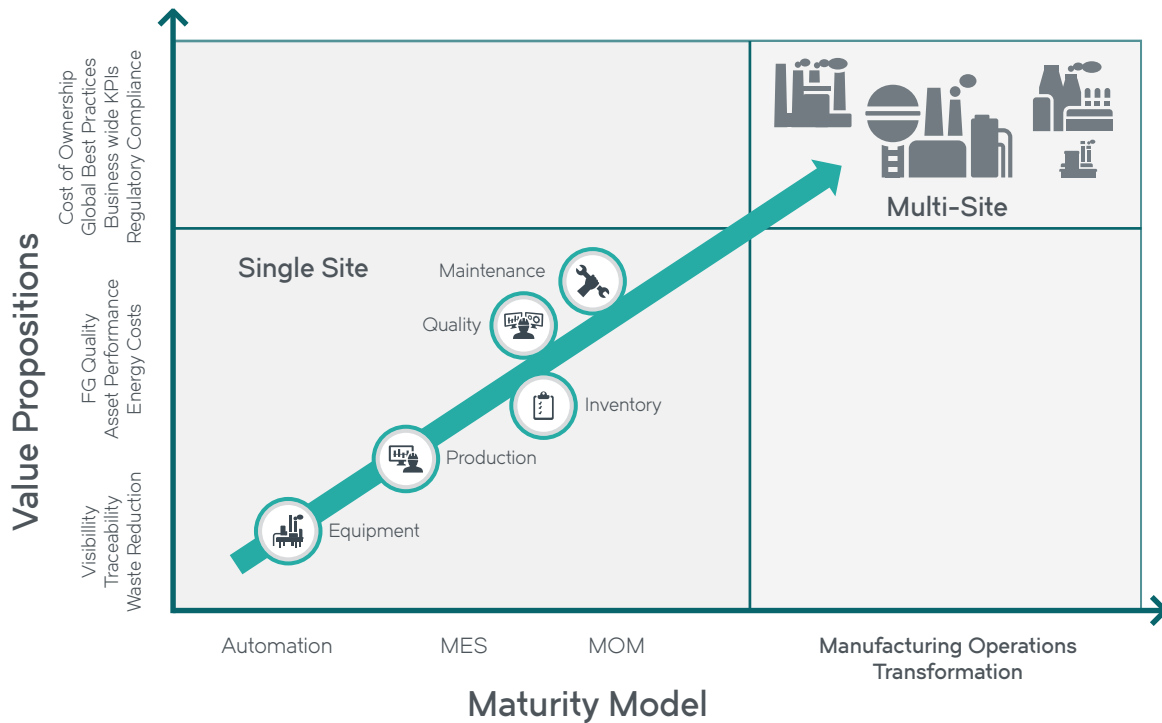


Multi-site Manufacturing Operations Transformation

Many manufacturing businesses have grown by mergers and acquisitions, becoming large national, multinational or global organisations. These companies are now equipped with multiple production plants across regions for producing the same, similar or variations of products. These plants often represent very heterogeneous plant system landscapes and varying practices for similar operational activities and business targets.

These multi-site enterprises are changing to a broader transformative view of manufacturing to make use of new significant ROI opportunities that are unique on a business-wide basis:

- Business-wide scorecards and consistent KPIs for transparency in cost, capacity and inventory across the enterprise
- Operational excellence, lean and continuous improvement cultures that need to collaborate and share best practices
- A consistent, documented approach to regulatory compliance to minimise risks
- A connected enterprise for visualisation and accessibility of information anywhere and anytime, to increase business agility and the ability to innovate faster
- Reduced cost of ownership while reducing the number of applications across the business to facilitate standardisation in IT and operations



Standardisation of processes, KPIs and plant integration across a multi-site business

The primary enabler of an effective multi-site Manufacturing Operations Transformation is the enterprise-wide standardisation of operational processes, enabled through the standardisation of information technologies. Such IT harmonisation is the foundation to digitally model, integrate, execute, and govern operational processes and related information flow consistently across multiple plants. Standardisation of operational processes is possible with the following components:

- **An open engineering and runtime platform**, leveraging Business Process Management capabilities, hardened for industrial use and designed for enabling integration of business, manufacturing operations and production processes and data.
- **A broad suite of industrial applications** scaling from rapid ROI equipment performance optimisation to full manufacturing operations management functionality.
- **A reusable operations process modeling approach**, which standardises all operations, simplifies deployment of processes to equipment, systems and people.

Ensuring consistency across varied plants

The physical attributes and even the level of automation of manufacturing plants in an enterprise may vary, but what standardisation strives for is a common way of monitoring and measuring operational efficiency for decision support and interacting with each manufacturing location for process execution.

The role of a manufacturing IT platform is to provide adaptability to local plant nuances and a plant asset model which applications can use to blend human and automated activity in the execution of standardised processes and business rules. The platform adapts to individual local physical equipment and automation, while maintaining the data and information models of the processes and flow of data to other applications and towards the enterprise.

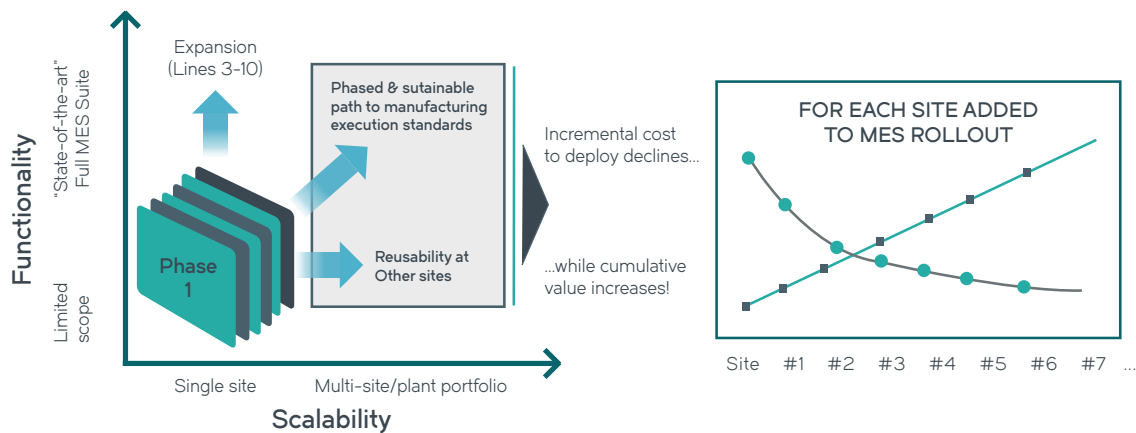
A configurable, model-driven approach to work processes and related user interfaces enables reusability of captured best practices and enforces operational procedures as corporate standards which can be quickly implemented and sustained for adopting change in a version controlled fashion for each plant connected through the manufacturing IT platform.

This ultimately enables manufacturing industries to make operational improvements and digitally transform operations consistently across multiple sites, with adaptability to the site specific nuances abstracted in a digital plant information model.



How to get started on your Manufacturing Operations Transformation journey

Multi-site digital and operational transformation must happen incrementally, in phases that align with your business strategy.



There are several factors to consider when choosing a partner in your MOT journey. First, you need a trusted solution; finding a provider that offers industry leading technology and domain expertise will improve deployment time and help you get started while minimising business disruption. This is a journey, so you want to find a company that will provide services to support your transformation.

Connectivity is also key - your solution should have built-in connectivity to existing plant floor systems, devices and equipment automation. It is vital to ensure an easy-to-use, accessible user interface for a process-based approach to manufacturing operations management. If you are a global manufacturing organisation, finding a supplier with global program management, support, and a system integrator network is a must.

To find out how AVEVA's approach to Multi-Site Manufacturing Operations Management can help transform your business, please visit www.aveva.com.⁴

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About AVEVA

AVEVA is a global leader in engineering and industrial software driving digital transformation across the entire asset and operational lifecycle of capital-intensive industries.

The company's engineering, planning and operations, asset performance, and monitoring and control solutions deliver proven results to over 16,000 customers across the globe. Its customers are supported by the largest industrial software ecosystem, including 4,200 partners and 5,700 certified developers. AVEVA is headquartered in Cambridge, UK, with over 4,400 employees at 80 locations in over 40 countries.

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