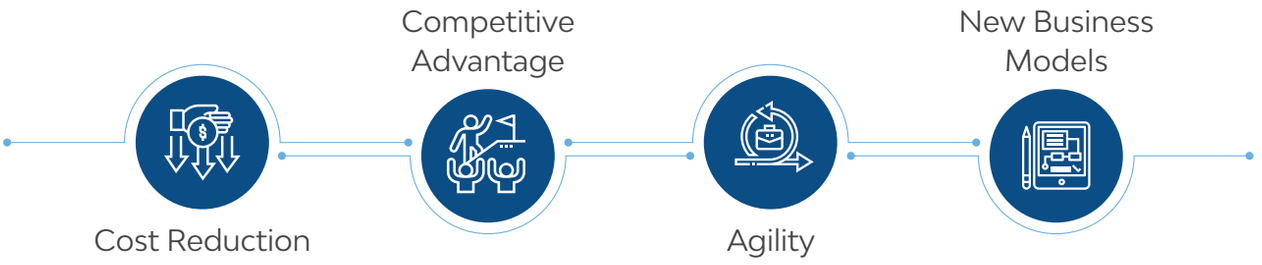
Whitepaper

Digital Transformation in Manufacturing

Digital Transformation is the need of the hour for all large or small enterprises. Businesses must learn to be competitive and relevant in this new ecosystem as the world becomes increasingly digital. Digital Transformation has become one of the most popular buzzwords these days. However, many business leaders are still perplexed by what Digital Transformation actually entails. How to go about doing it? What are the steps to follow in the transformation process? Is it worth the effort?

This paper tries to answer some of the most frequently asked questions about digital transformation, focusing on helping manufacturing executives identify the purpose and process of digital transformation.

The purpose can be segregated into four broader areas:



This paper is broken down into the below sections to provide clarity to executives considering Digital Transformation in manufacturing and how CXOs can achieve this objective during this era of disruption.

Breaking the Myth

The rapid rate of change in the technology world has given rise to several deceptive and harmful myths surrounding Digital Transformation in relation to an organization's overall vision.

Myth #1: Digital Transformation is only for large corporations, not small and medium-sized businesses

Reality: The notion that Digital Transformation is not appropriate for small and medium-sized businesses is a slipup. Of course, the degree of application and adoption will vary depending on the company's size but failing to embrace digital technologies is a surefire way of going extinct. Instead of simply watching what is happening in the market, companies of all sizes should begin assessing how best they should plan for adopting digital technology.

Purpose: An increasing number of small-sized manufacturing firms that have implemented Digital Transformation seem to already *have a competitive advantage* over others.

Myth #2: Digital is merely a support function aimed at improving gains marginally

Reality: Many companies are moving away from seeing technology solely as a support role and instead as a revenue generator. Companies that have integrated digital technologies into their operations have been effective in increasing efficiencies and diversifying their revenue streams, competing against digital natives, and surpassing competitors.

So, organizations should take a holistic view and should not consider Digital Transformation as a mere support function.

Purpose: Organizations like HILTI have added *new business models* by adding fleet management to their field service portfolio.

Myth #3: Organizations are going to lose employees as a result of digital transformation

Reality: Businesses are better off when they introduce digital technology that supports and suits the workforce's existing skills. Technology can automate specific processes, giving employees more time to focus on strategic work such as creative planning, which can't be done with technology.

Purpose: By adopting digital technologies, organizations reduce the *cost of operations* and enhance employees' skills as per the business strategy, allowing them to focus on the core business values.

Myth #4: The digital agenda is all about IT

Reality: Thinking of digital technologies as a stand-alone IT agenda without active business involvement or stakeholder participation is as distant a thought from reality as it can get. The key to Digital Transformation is the convergence of business and technology. Digital technologies can only genuinely contribute value to an organization if business executives understand and collaborate with technology executives. There is no single digital strategy that will work for all firms that can be implemented by the IT department alone. For successful execution, Digital Transformation necessitates rigorous planning and cross-functional participation.

Purpose: Firms have become more *agile* and have drastically increased their *speed to response* by aligning their IT and business strategies to an integrated vision.

Myth #5: Digital Transformation can wait

Reality: When myths like the above hinder an enterprise from taking a leap of faith, it's easier to put off digital change. However, the longer the delay, the more the business will fall behind. Digital Transformation can also be used to respond to changing market demands. Loyal customers are intangible assets that contribute significant value to a company, and their requirements should be satisfied and attended to religiously.

Purpose: Organizations such as Kodak made a mistake by not adapting to the digital disruption at the right time and thus had to pay a considerable price and in turn, lost their *competitive advantage*.

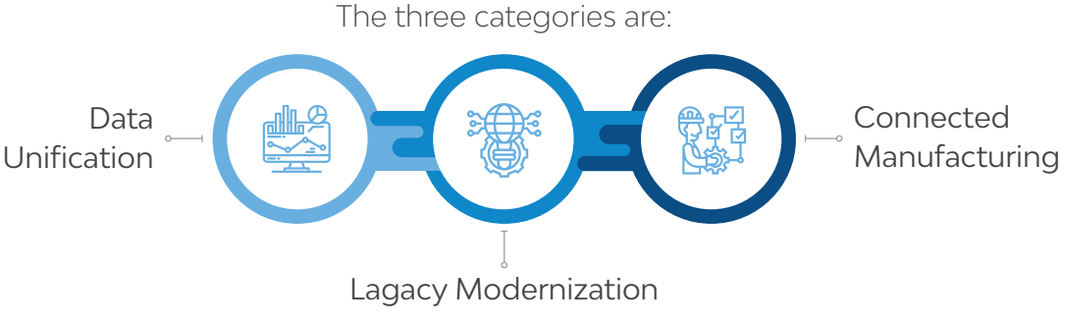
What is Digital Transformation?

As we have addressed the myths and how technology helps manufacturing organizations identify the purpose of any digital transformation, let us now try to answer some common questions such as what Digital Transformation is and how it can be incorporated?

The integration of technology into all verticals of a business, fundamentally changing how it runs and offers value to customers, is known as Digital Transformation. It also means a cultural shift that requires organizations to challenge the status quo and be open to new ideas.

Three Areas of Digital Transformation in Manufacturing

Any transformation is only successful if acceptable transformation areas have been identified by adopting a strategy that uses technology to improve the ethos which aligns with the business, boosts revenue, and reduces cost.



Legacy Modernization

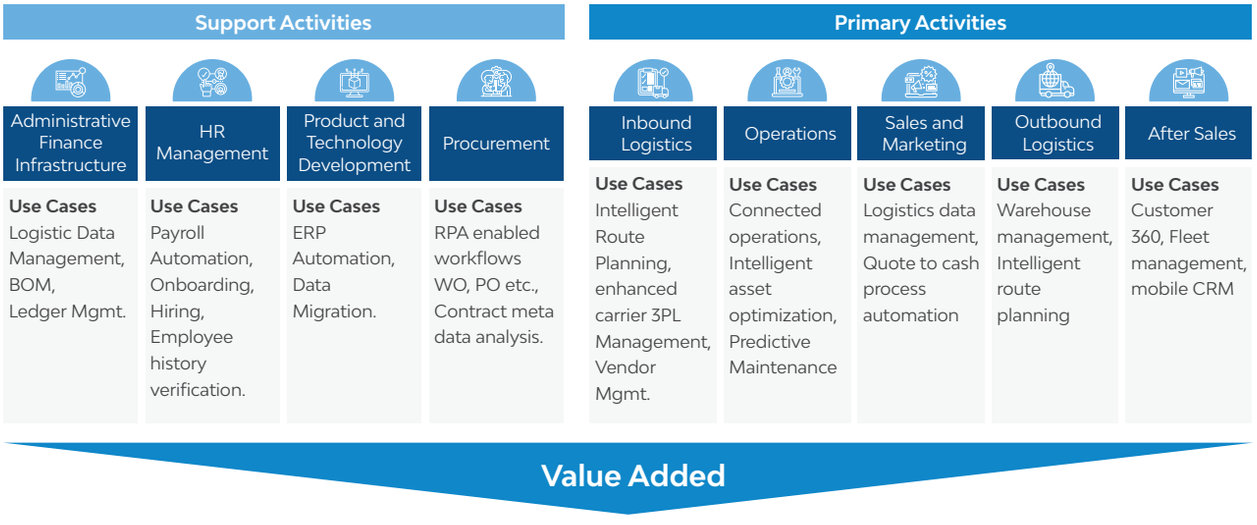
Another component of what is holding back many firms today from transformation is the legacy systems. Legacy systems are prone to be single points of failure. They're not only non-scalable and have limited commercial usefulness but are also expensive to run and have extensive development cycles. Organizations must examine their IT systems closely and do a thorough cost-benefit analysis to determine which technologies are effective and inefficient. Based on the modernization drivers, they can choose to tolerate, delete, or reform them. The drivers, for example, maybe reducing expenses, increasing efficiency, or compliance. Once the cost-benefit analysis is done, these factors would impact their priorities in the phase-wise modernization journey to maximize the benefit and reduce the risk.

Data Unification

When it comes to digital transformation, many companies today contend with data silos as the principal bottleneck. Consider a company that receives data from various sources and then organizes it according to function and relevance. Many companies have done it for years with little consequence until now, when everyone is using analytics. Without all the data being **integrated** and **harmonized**, it is impossible to draw meaningful conclusions and understand the broader picture. Data unification is the first step toward transforming a reactive, intuition-based decision-making system into a proactive, even predictive, and data-driven decision-making system powered by AI.

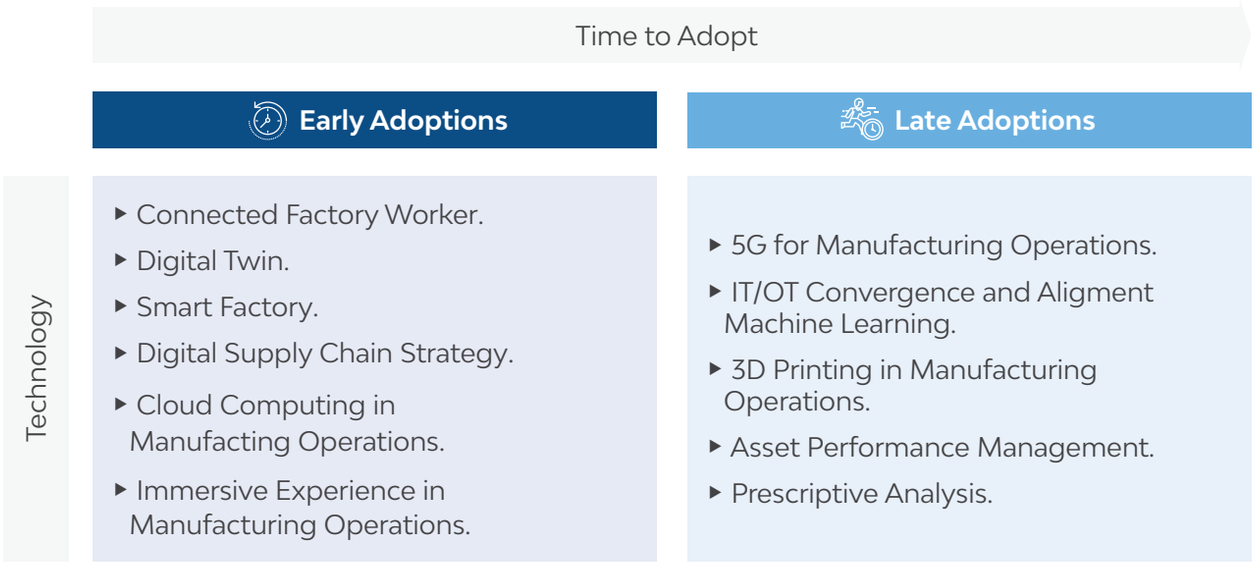
Connected Manufacturing

The concept of connected manufacturing or the connected factory (one of the essential tenets of Industry 4.0) is perhaps the most exciting and rewarding of all the transformation initiatives. This is the point at which you enter a cyber-human environment, where devices act as your employees, monitor status, analyze patterns, and predict intelligent business insights in real-time. By converting real-time data from sensors and devices into actionable insight, digital technology solutions may help manufacturers become more responsive and predictive rather than reactive. Such is the digital transformation's potency and the future that Industry 4.0 promises.



Technologies Driving Digital Manufacturing

As we understand what Digital Transformation is and where to start, let us look at the technology enablers and how the manufacturing industries can adopt these technologies. The technology adoption matrix below talks about the time taken to adopt new technologies in manufacturing in both the short and the longer term. It helps an organization understand where it needs to build its competencies and why, more importantly, how it can align its manufacturing processes and overall strategy to Industry 4.0 concepts.



Technology Adoption Matrix

Adoption in a Short time

a) **Digital Twin:** A digital twin is a virtual version of an entity, such as an asset, person, or process created to help businesses achieve their goals. Discrete, composite, and organizational digital twins are the three forms of digital twins. The model, rules, relations, and data attributes are all part of the digital twin class. Model data, unique one-to-one association, and monitorability are all elements of a digital twin instance.

The adoption of digital twins is in line with Internet of Things (IoT) trends. For equipment users in factories, hospitals, utilities, and other facilities, near-term use includes minimizing maintenance costs and enhancing asset uptimes. Product differentiation, business model differentiation through new product-service models, and gathering customer data are all near-term uses for Original Equipment Manufacturers (OEMs).

Gartner's 2019 enterprise survey shows that 13% of respondents claim to already use digital twins, while 62% are either in the process of establishing the technology or plan to do so in the next year [4].

b) **Internet of Things — Manufacturing Operations:** The Internet of Things (IoT) is a critical component of digital businesses and platforms. It's a network of specialized physical devices with embedded technology that allows communication, detection, and interaction among similar devices within the system or the outside world.

   Assets, communication protocols, apps, and data and analytics are all part of the IoT ecosystem. Using IoT to supplement various Operational Technologies (OT) in manufacturing activities has become a fundamental building component for future digital supply chains and smart factories, in line with Industry 4.0 expectations.

c) **Immersive Experience in Manufacturing Operations:** Immersive experience refers to the ability to perceive being physically present in a nonphysical environment or enhancing people's physical presence with virtual world material. Immersive experiences can be divided into three categories: Augmented Reality (AR), Virtual Reality (VR), and Mixed Reality (MR).

   COVID-19 has elevated the importance of immersive experience, significantly altering how manufacturing workers view and interact with the digital world.

Adoption in a long period

a) **Machine Learning:** Machine learning is possibly the most fantastic thing in the IT world right now. As an application of artificial intelligence (AI), it allows your system to learn and improve on its own without having to be explicitly programmed. It makes it possible for software applications to become more accurate in predicting outcomes.

   Machine learning tools and platforms now assist manufacturers in developing new business models, fine-tuning product quality, and optimizing shop floor processes. The competitive realm of industrial robots provides gains such as minor reductions in equipment failures, better on-time deliveries, equipment enhancements, and faster training times.

   Machine learning (ML) can be used in industrial operations to detect patterns and correlations using accessible data and algorithms. They can also forecast outcomes, determine the best courses of action, and manage processes.

b) **5G for Manufacturing Operations:** 5G for industrial operations refers to next-generation mobile broadband and cellular standard data services adapted to the industry's needs. 5G covers a spectrum of 3mm wavebands (low, mid, and high frequency). Manufacturing 5G service capabilities will be initially provided through new focused supply chain data and communications services offered by Communication Service Providers (CSPs).

   The emergence of 5G for manufacturing activities is still in its early stages. The priority and allocation of resources for maintaining private/campus 5G networks and larger-scale mobile networks will determine how quickly CSPs can supply certain data services.

c) **3D Printing in Manufacturing Operations:** In manufacturing, 3D printing (3DP) refers to the use of 3D printers to create a finished object, subassembly, or intermediate product. It can also print equipment, fixtures, dyes, and molds for completed goods. 3D printing allows for increased supply chain mobility, flexibility, and adaptability by enabling consumers to determine demand while lowering prices and waste. Companies no longer have to gamble on estimating consumer demand; 3D printing gives endless flexibility to manufacture what is needed.

d) **Prescriptive Analysis:** The term "prescriptive analytics" refers to a collection of analytical capabilities that determines the best course of action to achieve a specific goal, such as increasing revenue or lowering costs. Optimization approaches such as linear programming, rule-based decision making, and heuristics are the most prevalent instances of prescriptive analytics. Differing from descriptive, diagnostic, and predictive analytics, the objective of prescriptive analytics is a suggested action.

   Supply chain companies have traditionally utilized prescriptive analytics to handle strategic or tactical time-horizon concerns, including network architecture, sourcing strategies, and production planning. Prescriptive analytics is now being used in near-real-time decision-making in restocking, pricing, and efficient planning.

Conclusion

In every sector of the economy, Digital Transformation is changing the way people do business. Businesses will need to evolve into digital organizations to succeed, and this transformation will require far more than simply investing in cutting-edge technology. Digital Transformation is essential for some businesses to stay afloat, and while others may not go bankrupt without it, they will still have to settle for a low-margin business strategy. Business leaders must move away from industry stereotypes, understand technologies, and help firms ride this wave with a competitive advantage by developing a successful transformation roadmap.

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