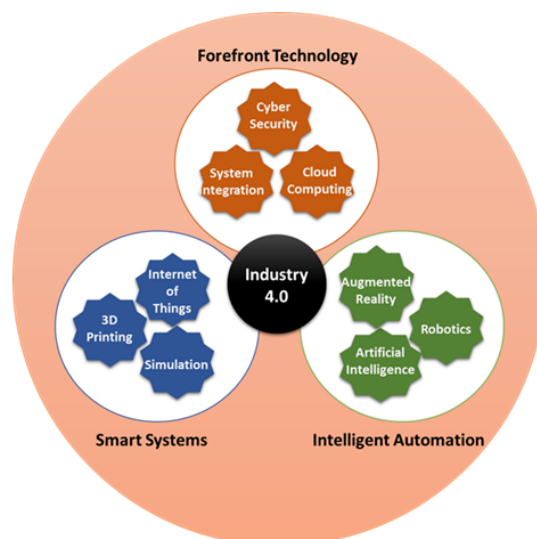


The first industrial revolution started in late 18th century in England, which transformed production from human/animal power to machine power. The second industrial revolution introduced assembly lines with the use of oil, gas, and electric power. Advancement in communication such as telephones and telegraphs helped mass production and transportation possible. The third industrial revolution began in the middle of the 20th century through the addition of computers and advanced telecommunications to enhance manufacturing and service processes. The fourth industrial revolution, otherwise known as **Industry 4.0**, is revolutionizing the way companies manufacture and distribute their products. By integrating various innovative technologies into their operations, firms are getting ready to improve their products. Industry 4.0 takes advantage of the integration and the synergies of both new and developing technologies.

The main expectation of Industry 4.0 is the growth of **smart factories**. A smart factory may be visualized as one equipped to collect data, analyze the collected data, and use the data to make intelligent operations decisions. A smart factory uses advanced technologies such as artificial intelligence (AI) and machine learning to analyze data, drive automated processes, and learn in a continuous fashion.



Source: Ganesh Vaidyanathan and Rene Ordóñez, Operations and Supply Chain Management, 1st Edition, Kendall-Hunt Publishers, 2023.

At its core, smart factories require the integration of forefront technology, smart systems, and intelligent automation as shown in the above figure. Businesses must keep up with these new trends to compete and even survive.

Implementing a smart factory is not always quite easy and straightforward. For many businesses, there are many challenges and risks to face. Making use of these new technologies is not always straightforward. Apart from the lack of knowledge of digitalization, computer skills, computer expertise, and lack of capital, the biggest problem many businesses face is **where and how to implement digital transformation**. Companies need the right expertise and resources to drive the digital transformation and change their businesses to use advanced technologies.

Industry 4.0

Industry 4.0 takes advantage of the integration of new and developing technologies and the interconnectivity of systems, artificial intelligence, and automation.

Smart Factory

A smart factory may be visualized as one equipped to collect data, analyze the collected data, and use the data to make intelligent operations

Digital Transformation

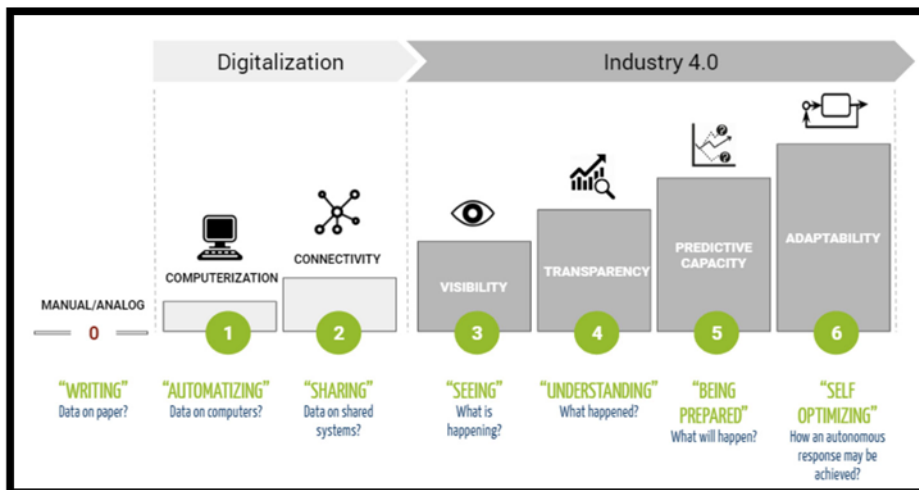
Digital transformation is the process of using digital technologies to create new business processes or modify existing business processes.

Research Insight

"Future industrial systems have been popularized in recent years through buzzwords such as Industry 4.0, the Internet of Things (IoT), and Cyber Physical Systems (CPS). Whilst the technologies of Industry 4.0 and likes have many conceivable benefits to manufacturing, the majority of these technologies are developed for, or by, large firms. Much of the contemporary work is therefore disconnected from the needs of small and medium-sized enterprises (SMEs)"

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Whirlpool Corporation initiated the “World Class Manufacturing” (WCM) in 2020 to digitally transform their end-to-end manufacturing. This American multinational manufacturer of home appliances, headquartered in Benton Charter Township, Michigan, is a Fortune 500 company with an annual revenue of approximately \$21 billion. According to Sam Wu, President, Asia, Whirlpool Corporation, the digital transformation has helped the company to make significant improvements in their product quality and productivity efficiency, to reduce waste and emission, and to make significant contributions to their sustainability goals. The introduction of innovative technologies and advanced data analytics have boosted their manufacturing and distribution network.



Source: Luigi La Morgia, VP Integrated Supply Chain, EMEA, Whirlpool Corporation. The Advantages of A Digital Factory Amidst a Global Pandemic, Sep 30, 2020.

According to Luigi La Morgia, VP Integrated Supply Chain, EMEA, digital transformation provides a natural evolution to Industry 4.0. It is important to use the right combination of technology, expertise, and skills at each stage as shown in the above figure to become a smart factory and realize the potential of Industry 4.0. Whirlpool started their WCM program using a collaborative network of universities, research institutes, and tech companies.

Cooperative human-robot workstations, advanced sensing technologies, collation and effective use of data, remote monitoring, augmented reality enabled training stations, and real time key performance indicators are all part of the digital transformation to achieve Industry 4.0 promise.

Whirlpool is continuing to realize the fruits of the smart factory and Industry 4.0 dreams by leveraging remote working, agile manufacturing and many innovative applications. The company has proven that Industry 4.0 is the best-in-class solution for the future of their industry.

Practical Insight

"As a manufacturer with a reputation for skating the cutting edge of technology, Whirlpool Corp. leverages relationships with organizations and researchers globally to uncover emerging technology capable of transforming its operations."

The Benton Harbor-based appliance manufacturer can look closer to home to find these emerging technologies thanks to an Industry 4.0 accelerator program created last year, a collaboration of three Michigan-based, manufacturing technology-focused entities. "

[Click for More Details](#)

"To help organizations realize the future of manufacturing, Deloitte had teamed up with an ecosystem of renowned solution providers and technology innovators to create The Smart Factory @ Wichita experience. The experience brings the digital, physical, and experimental together so that manufacturers can test advanced manufacturing methods and technologies up close."

Housed in a 60,000-square-foot net-zero impact building powered by a renewable energy smart grid, the space features an end-to-end smart production line, space for smart ecosystem sponsors, and experiential labs. Coupled with workshops that help demonstrate what's possible with smart factory applications, the experience is designed to help manufacturers walk away with a customized road map tailored to their digital transformation goals. "

[Watch the video](#)

What is digital transformation? The prime driver of smart factories is the digital transformation. Digital transformation is the process of using digital technologies to create a new business process or modify an existing business process to streamline the operations, supply chain, and other functions of a business.

Why is digital transformation important? Take, for example, Blockbuster Video, the popular video rental store in the early 2000s. Blockbuster owned more than 9,000 video-rental stores in the United States alone with more than 65 million registered customers worldwide. By 2010, the company declared bankruptcy. What happened? Netflix. The trend in this industry was to stream video content over the Internet, an example of digital transformation. Blockbuster did not implement digital transformation and Netflix did that. Netflix started out with renting DVDs to customers through regular mail and moved on to stream video content online to customers.

The components of forefront technology include cloud computing, cyber security, and system integration. Computer and telecommunication technology have helped industrial revolutions in the past and that is no exception to Industry 4.0. The Internet of Things (IoT), 3D printing, and simulation are the components of smart systems. Smart systems use the forefront technology to enable smart factories to process their operations. The future of manufacturing is about smart, autonomous, and linked systems to produce custom and smart products. Augmented reality, artificial intelligence, and robotics are the components of intelligent automation.

It is important for the current and the future managers to know about the latest advances in technology in order to be ready for digital transformation, smart factories, and Industry 4.0.

Look forward to the Next Issue on:

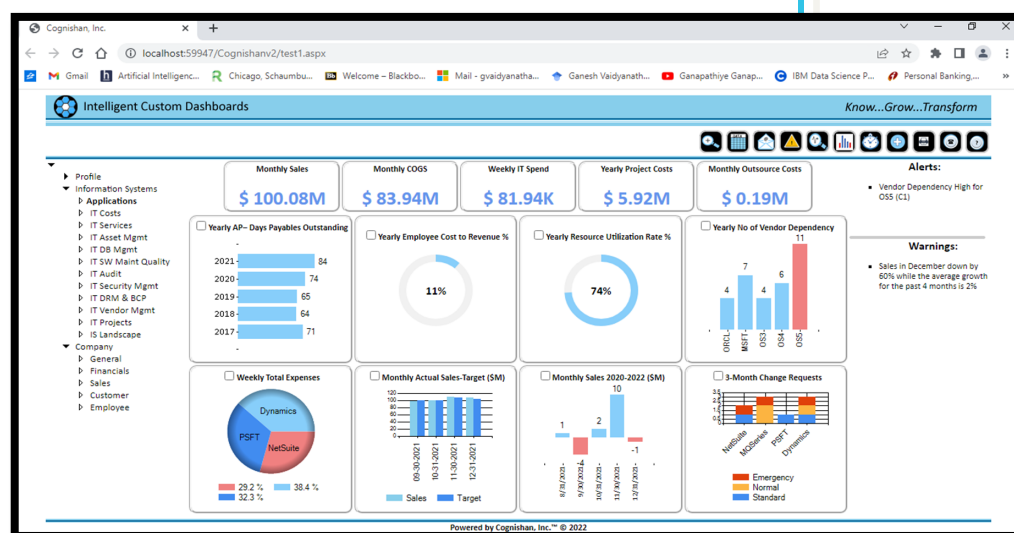
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