Digitization, Digitalization, and the Digital Transformation of the Factory Floor

As the adoption rate of digital transformation within the manufacturing industry increases, many still struggle with differentiating between digitization and digitalization. Although both terms sound similar, that's where the similarities end.

Many who use digitization and digitalization interchangeably end up confusing the technological partners they intend to work with. Thus, to eliminate the confusion associated with digitization and digitalization, the factors differentiating both concepts will be provided here.

So, what is the difference between digitization and digitalization? The short answer is:

Digitization is defined as the conversion of physical data to digital format which a computer can process. These physical data sets could include texts, sound, and pictures. Digitalization is defined as the integration of digital technology into everyday activities to improve them. The longer answer is what this post is about.

What is Digitization?

As stated earlier, the process of converting information or data into digital formats is digitization. To accomplish digitization, digital technologies are used. For example, inputting sales data into an Excel Sheet, an application that can be run on a computer, is digitization.

The digitization process includes the use of digital technology which in the above example is the Excel Sheet used to capture physical sales data. The benefits of this conversion are obvious. A digitized copy cannot be destroyed by the weather elements or other physical factors thus, making it an excellent medium for storing information.

Other important benefits of digitization include providing computers with the data they require to execute certain processes, the reduction of time-consuming, manual labor when reusing data, and ensuring accurate data collection.

What is Digitalization?

Defining digitalization is where many get confused. First and foremost, digitalization has no clear cut definition but we can gain insight into its definition by analyzing how experts define it. According to Gartner, digitalization is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities.

Adding parts of Gartner's definition of digitalization to what we initially defined, digitalization becomes the application of digital technologies to optimize business processes. For example, utilizing digital technologies to capture customer demand data and analyzing the captured data to create demand forecast explains the role of digitalization.

Digitalization relies on simplified digital technologies to capture data and leverages advanced digital technologies to analyze aggregated data to improve business processes. Thus, digitalization expands the digital processes associated with digitization which is why both terms are sometimes used interchangeably.

Digitization, Digitalization, and Digital Transformation

Digital transformation can be defined as the application of digital technologies to transform business process and services. This description highlights the similarities between digitalization and digital transformation. In fact, digitalization and the digital transformation or business process can be used interchangeably.

Going forward, digitalization will be used as a verb that highlights actions relating to applying digital transformation initiatives.

The digitalization of the factory floor is the foundation required to deliver Industry 4.0 business models. The digitalization process starts with data capture and within the context of the manufacturing industry; data is captured from manufacturing equipment, operations, and assets.

Once manufacturing data is captured, the manufacturer can apply digital technologies to process captured data with the intent of gaining insight or solving complex problems. The ability to apply digital transformation to solve problems means every manufacturer must decide how they intend to apply it to improve processes for themselves.

The popular applications of digital transformation to optimize traditional manufacturing processes include:

- Predictive maintenance – Predictive maintenance involves the analysis of historical shop floor and equipment data to develop proactive maintenance schedules. Predictive maintenance means equipment is serviced or repaired before an unexpected breakdown happens. Digitalization technologies are used to capture the historical data and analyze them to develop accurate proactive maintenance schedules. The application of predictive maintenance reduces unplanned equipment downtime by 75%.
- Data-driven plant optimization – The ability to capture data from the factory floor makes it possible to assign KPIs to plant operations. To optimize plant operations, these KPIs must be understood and analyzed. With understanding comes the ability to recreate the conditions to deliver optimized performances. Thus, data-driven plant optimization eliminates the traditional process of relying on tribal knowledge for analyzed insight when making important decisions.
- Capacity planning and resource allocation – The fluctuating demands from customers' means manufacturing facilities must be prepared to develop flexible manufacturing processes to react to market forces in real-time. Digitalization technologies such as simulation modeling software enable manufacturers to leverage data to develop optimized plans, decide the number of resources required and properly allocate these resources.
- Risk-based scheduling – Digital transformation of the factory floor assists manufacturers to deal better with changes that occur to manufacturing processes. Unlike traditional scheduling, risk-based scheduling takes risk as a constraint and produces real-time schedules iteratively to ensure the production process continues without downtime.
- Agile Manufacturing – Agile manufacturing processes refer to the utilization of digital technology to develop strategies and train staff to respond in real-time to customer demand and other market forces. Digital technology helps with connecting the manufacturing floor to external processes such as the supply chain or demand data. Thus, the effect of changes to these external factors can be evaluated and responded to.

Conclusion

The final analysis is that manufacturers digitize information to create digital data, digitalize manufacturing processes to improve operations, and apply digital transformation strategies to react better to change. Each concept is necessary and relies on the other to deliver sustainable transformation to age-old processes. Finally, while digitization and digitalization are all about data and technology, digital transformation leverages them to satisfy the customer.