happiest minds
The Mindful IT Company
Born Digital . Born Agile

WEAVING THE DIGITAL THREAD
IN A MANUFACTURING SETUP

RELEVANCE OF TECHNOLOGY IN THE MANUFACTURING SECTOR

The advent of new technology and lean manufacturing processes have strengthened the industrial sector. Manufacturers have already begun relying on technology to optimize processes, adopting the latest developments to ensure continued growth and profitability. Clearly, considering the rapid innovation in the industrial sector, technology cannot be sidelined. It has automated processes and made work faster and easier.

Industrial Internet of things (IIoT) has been transforming the way industries work, creating autonomous systems that replace tedious manual work. IIoT has found its place across all functions in the product lifecycle, including manufacturing, supply chain monitoring, logistics and distribution. It has been, helping industries manage their supply chain using IoT devices, such as robotics, connected medical devices and software-defined production processes to run the production cycle economically and efficiently.

Technology has increased mobility in industries and has eased an array of challenges faced by the Manufacturing Sector. However, many manufacturers are yet to leverage the full potential of the latest technologies and optimize processes.

CHALLENGES FACED BY THE MANUFACTURING SECTOR

AN AGING AND TECHNOLOGICALLY-CHALLENGED WORKFORCE

Advancing technology makes it imperative for manufacturers to employ people with advanced skill sets. However, building and maintaining such a skilled workforce remains one of the top challenges that manufacturers face today. With the baby boomer generation reaching retirement age, there is a noticeable skills gap in the workforce. Though firms are doing their best to attract the right talent and train staff members, a wide gap remains to this day.

LACK OF VISIBILITY

In the current competitive environment, it is important for manufacturers to have complete visibility into their inventory and operations to gain the winning edge. Transparency throughout the supply chain enables them to track equipment, and meet their own compliance as well as of their suppliers. Visibility with the right insights can help with regular preventive maintenance, keeping machinery functioning at all times which is an important part of running a manufacturing facility.

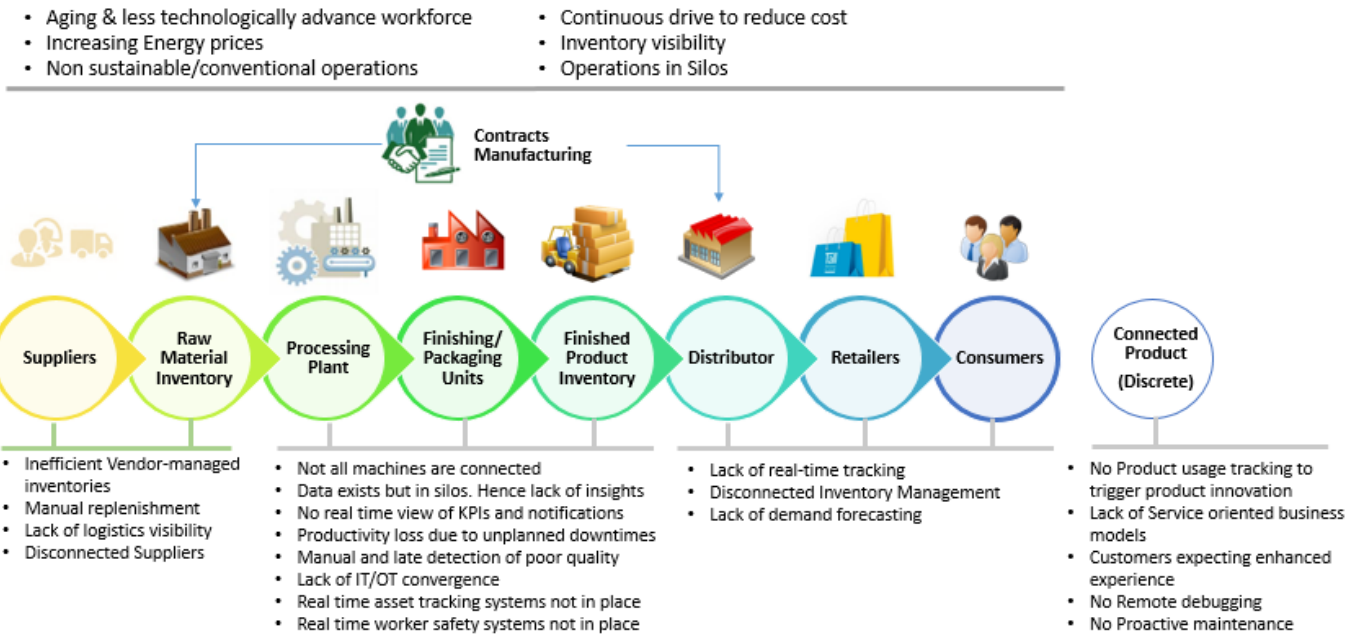
NON-SUSTAINABLE, CONVENTIONAL OPERATIONS

In the digital era, where everyone is moving at lightning speed, to stay current, it is important for manufacturers to innovate and keep up with the pace. Quicker time to market also means that manufacturing companies need to give up conventional operations and adopt a modern approach to manage their operations and innovation. Implementing processes that leverage the latest in technology are key to attaining manufacturing success.

ESCALATING COSTS AND THE CONTINUOUS DRIVE TO REDUCE COSTS

Intense competition, rising costs and an economic downturn have been forcing industries to impose a control on expenses and reduce costs to ensure profitability. Manufacturers are exploring all possible avenues of cutting cost, including motivating the workforce to work with a higher productivity. However, the focus should be on implementing automation and cutting down manual labor, thereby reducing costs.

These are just a few of the challenges faced by the manufacturing sector. The below figure offers a bird's eye view of key challenges faced across the product lifecycle



RESUSCITATING THE MANUFACTURING SECTOR WITH THE DIGITAL THREAD

Irrespective of the sector, today, data has become one of the most valuable assets. Meaningful insights derived from data have been driving growth. In the industrial sector, the right insights have been helping enhance quality, bring down costs, improve productivity, reduce time-to-market, improve traceability, enhance visibility, facilitate predictive maintenance, and improve profitability. How are these insights derived? How will they help realize the benefits? Well, relevant data needs to be separated from the noise and then refined and piped to the right people as and when they need it.

To enjoy the benefits that data and information offer, manufacturers need to implement the Digital Thread and the Digital Twin. The Digital Thread, as the name suggests, connects the entire product lifecycle digitally. It is the digital illustration of the value chain right from research & development (R&D), product conceptualization and design, to manufacturing, distribution, retailing, customer feedback gathering, to servicing, maintenance, and product-in-use. Digital thread implementation is promising. It is not limited to internal entities alone and connects the organization's third-party partners too.

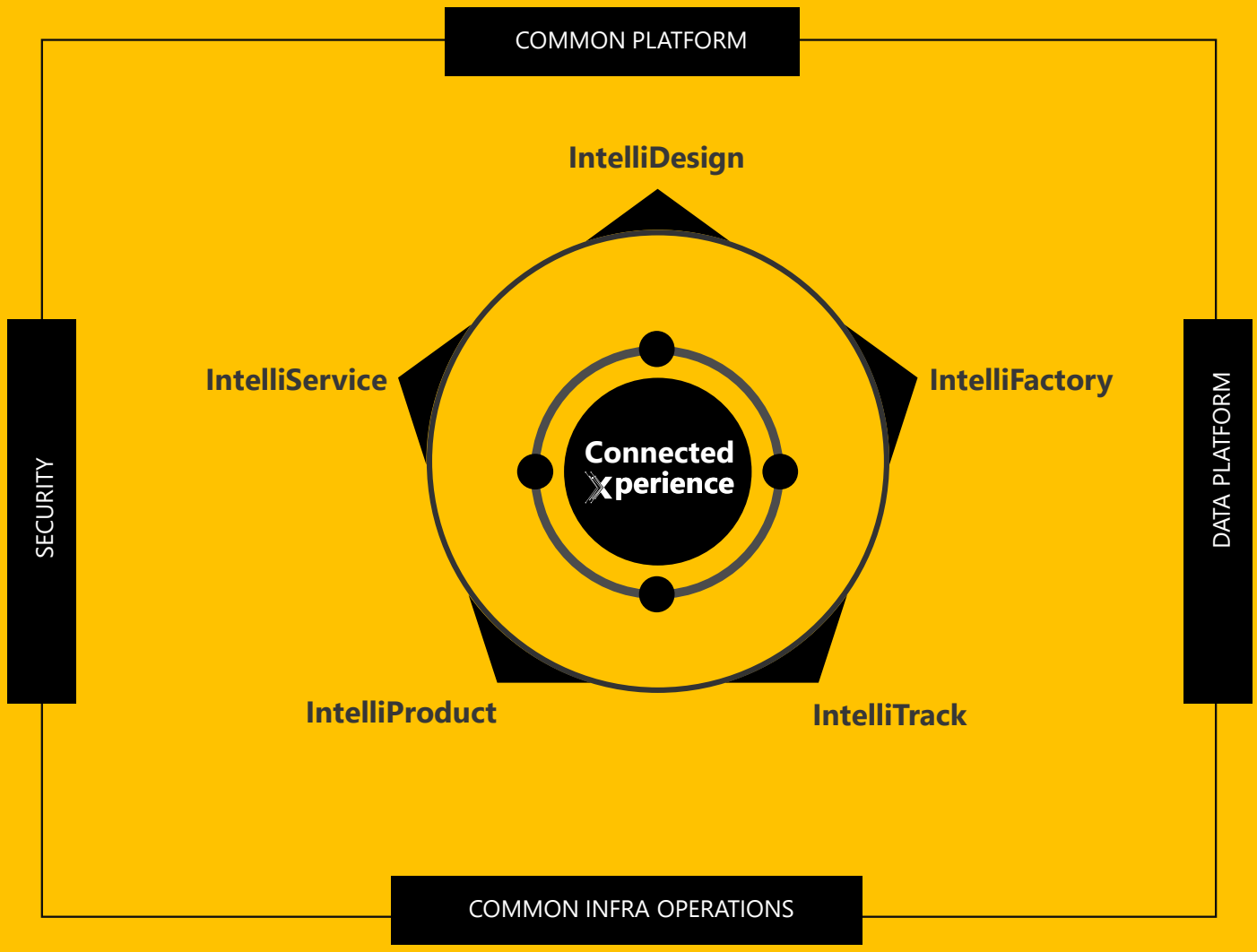
The digital twin is a virtual duplication of a physical asset, with all the required specifications and information. In the industrial sector, considering equipment wear & tear, etc., replicating the behavior of product and plants can offer a host of benefits. The digital thread and the digital twin make this a reality!

Let's understand digital thread a little more. Digital thread is the foundation for driving analytical maturity in the product lifecycle. It refers to the communication framework that facilitates a connected data flow–delivering the "the right information to the right place at the right time". It offers all players in the lifecycle an enriched, connected experience.

The digital thread is a rich powerhouse of information comprising all versions of data, inferences, insights and decisions from every level of the product lifecycle. It offers an integrated view of a product's data throughout its lifecycle. The digital thread allows a company to connect data generated by several functions. Through a common platform, it creates a connected experience, integrating the manufacturing, distribution, product and service functions.

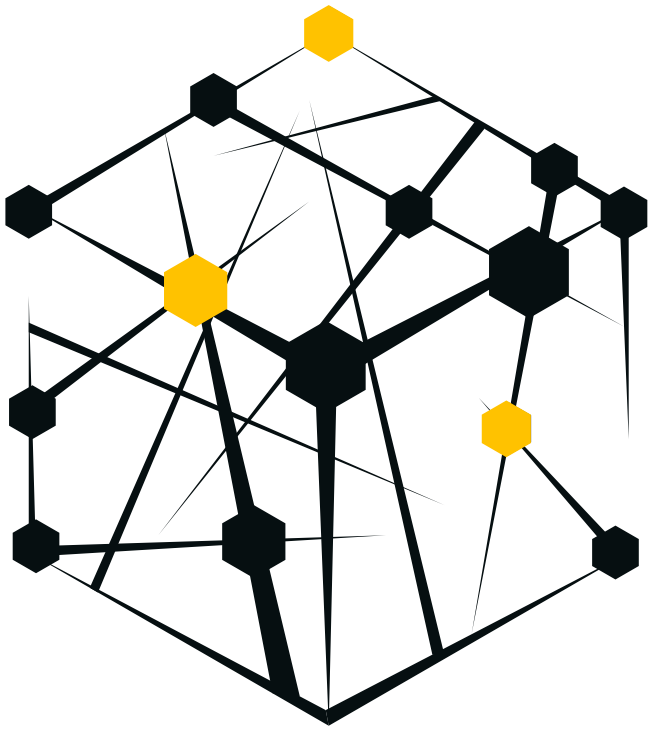
DIGITAL THREAD – HOW IT HELPS TIE UP YOUR DIGITAL JOURNEY

Implementing the digital thread gives access to a connected IoT platform that provides a uniform view across functions, processes, and plants in various locations. The platform is accessible by various users across the organization including operators, administrators and business heads with different levels of control. Digital thread ensures connected logistics with smart warehouse and delivery tracking; factory monitoring with timely alerts and notifications; efficient asset management with predictive maintenance and condition monitoring; connected operations with energy monitoring; batch traceability and operational intelligence; and quality reporting among others.



Intelli-Design	Intelli-Factory	Intelli-Track	Intelli-Product	Intelli-Service
Component Vendor Design Validation	Material Logistics	Fleet Tracking	Condition-Usage Monitoring	Remote Troubleshooting
Product Design Simulation	Batch Traceability	Consignment Tracking	Device Lifecycle Management	Field Force Management
Product Design Specification	Connected Production Line	Cold Chain Monitoring	Edge Intelligence	Field Repairs (AR/MR)
Product Design Validation	Quality Management	Inventory Monitoring	Predictive Maintenenace	Field Repairs (AR/MR)
Historic data of product design trials	Connected Workers / Assets		Business Workflow (Replenishment)	
	Energy Management		Usage Insights / Analytics	
	Predictive Maintenance			

Let's look at the role of the **digital thread at various stages in the product lifecycle:**



RESEARCH AND DEVELOPMENT

The digital thread starts here with product R&D. It encompasses the implementation of CAD/CAM models and different software, and then incorporates the digital twin concept to perform R&D for a product. Powered by the digital thread, digital twins can enable manufacturers to accurately understand how production will actually work on the shop floor before giving the green light. The digital twin becomes the test dummy that allows designers and developers to identify and address spot product problems before it is too late . During this research and development phase, all product quality data too gets aggregated in the data platform.

BACKEND SUPPLY CHAIN MANAGEMENT

After product conceptualization, the digital thread passes through the next phase involving retrieval of the raw material for the product. Tracking raw material—monitoring time to delivery, etc.—in the backend supply chain requires a lot of connected devices. Digital thread, with the IoT infrastructure, connects the all components of the backend supply chain to allow monitoring of the product and its performance.

MANUFACTURING

Here, all the raw material is put together to develop the product. The industrial sector obviously deals with the development of large, complex products and machinery. The manufacturing process involves robotics and robotic process automation (RPA) at different stages within manufacturing. Here, Artificial Intelligence (AI) enables intelligent testing of the product. Digital thread, with the help of multiple sensors, also enables: workforce optimization to monitor time taken to produce a product and reduce that time, process optimization and automated transfer of tasks from one process to another ensuring minimal lag, worker time optimization to ensure greater productivity, optimal time management by introducing an intelligent schedule, etc. Digital thread has tremendous scope in the manufacturing process-gauging if product performance is at its peak, highlighting if any equipment needs refurbishment or maintenance, etc.

DISTRIBUTION

Once the product is ready, it is distributed to different OEMs, wholesalers, and other relevant partners. In this phase, logistics is automated. Each machine, product and product solution is tracked. Connected logistics in the supply chain comprises all necessary information such as the exact location coordinates of the product, the route it will take to reach the destination, time to delivery, delivery details, etc.

RETAIL

In-built sensors help determine: the retail shop the product is in, if the product is getting sold, merchandising details, if more products are required, how long the product has been in the shop, product shelf life, etc. Digital thread offers real-time insights enabling automated product replenishment and retail inventory optimization.

AFTER-SALES

Once a product is sold to the customer, the distribution network knows if the customer is happy with the delivery time, if the product reached the customer in proper condition, etc. When the user begins using the product, in-built sensors allow tracking of product performance, understanding usage pattern, determining product issues, etc. These insights go back to the retailer, and leveraging this information, it is possible to enhance the retail sales strategy , incorporating opportunities for cross-selling, up-selling and more. Digital thread enables suppliers, manufacturers and R&D teams too to perform more advanced product research and modify product design and manufacturing based on gathered customer data.

SERVICE

On the basis of customer feedback and product information gathered directly from the product, even the servicing team is able understand how the customer is responding to the product. Should there be any issues, the servicing team is able to proactively check and confirm the presence of issues and offer the customer the right kind of service. Product replacement and maintenance can be taken up, as needed, in a hassle-free manner.

Digital thread offers a connected experience that starts from R&D and travels through to servicing, and each process transforms into a smart process.

WHY SHOULD YOU IMPLEMENT THE DIGITAL THREAD?

Digital thread aims at providing a good level of analytical maturity to the industrial sector. Its implementation offers a host of benefits to all players in the sector:

01

Proactively detecting and predicting issues with the help of digital twins and data help enhance product and process quality.

02

Operational improvement is achieved by increasing production throughput, improved program timing and streamlining performance issues.

03

Improved responsiveness helps minimize turnaround time for maintenance and facilitates improved coordination within teams.

04

Enhanced visibility helps track and reduce energy consumption by optimizing usage.

05

A connected supply chain ensures seamless supply of material by connecting raw material requirements to suppliers.

06

Real-time insights allow modification and implementation of new production and delivery schedules.

07

Product issue insights via monitoring and keeping track of health diagnostics enable predictive maintenance, facilitating hazard management.

08

Digital twins significantly reduce rework and errors by identifying them before mass production, with the help of data.

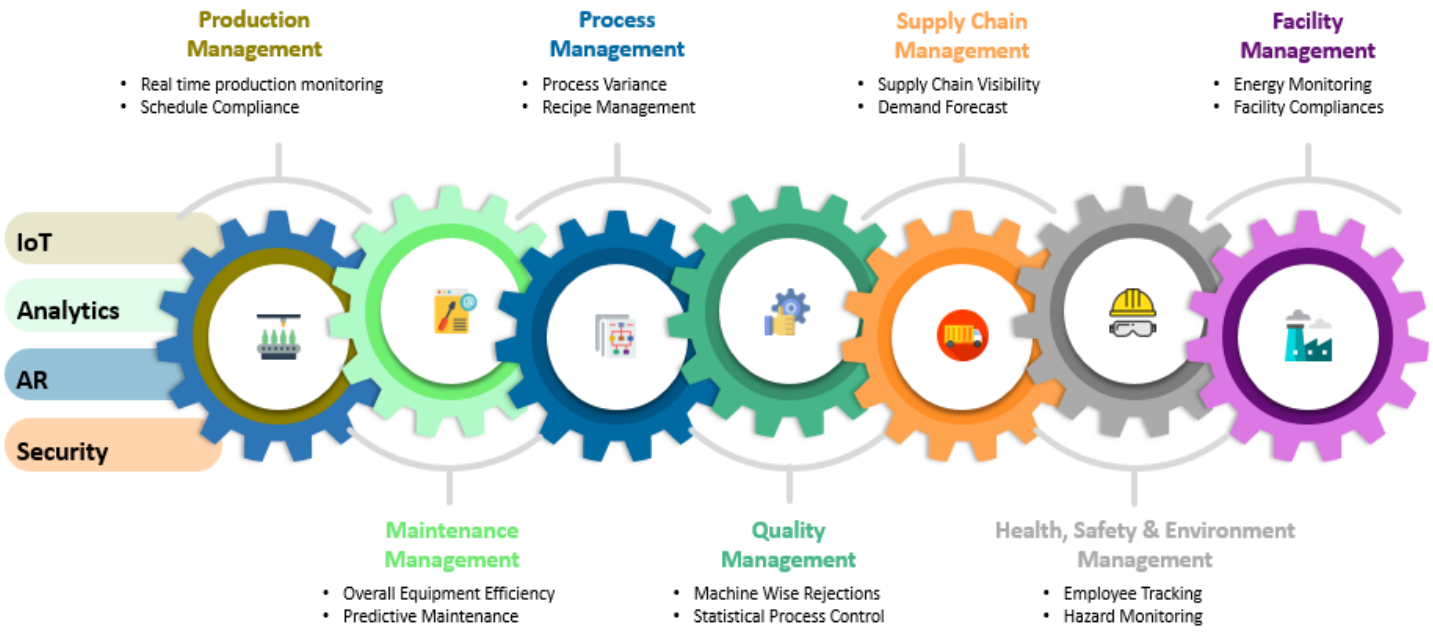
CHALLENGES IN DIGITAL THREAD IMPLEMENTATION

Only 23 percent of manufacturers admit to having a corporate-wide strategy for their digital transformation according to a survey by Jabil, a manufacturing solutions provider. An organization-wide digital transformation strategy is the first step in the journey toward digital thread implementation.

Digital thread projects are implemented in a heterogenous application landscape. There are challenges in implementing new technologies in a setup where traditional methodologies are deployed. In cases where the application landscape varies across design and manufacturing functions, interoperability challenges could come in the way of digital thread implementation. There needs to be interoperability between various towers of engineering, manufacturing, distribution, and customer experience, which often work in silos. As the digital thread is still in the initial stages of development, plug-and-play software solutions from ISVs are not available yet for such situations. Bringing all these legacy applications onto a single platform has been posing as a challenge.

HAPPIEST MINDS' DIGITAL JOURNEY OFFERINGS FOR THE INDUSTRIAL SECTOR

OUR DIGITAL THREAD STRATEGY



Happiest Minds' digital thread strategy delivers on two key business drivers

Optimizing the product lifecycle: We deliver a connected experience by bridging the gap or closing the loop between upstream and downstream operations. We optimize the complete lifecycle of hardware and supplies products, ensuring all players are on the same page—right from the stage during which material inputs are needed for production to the stage where the products get produced and distributed.

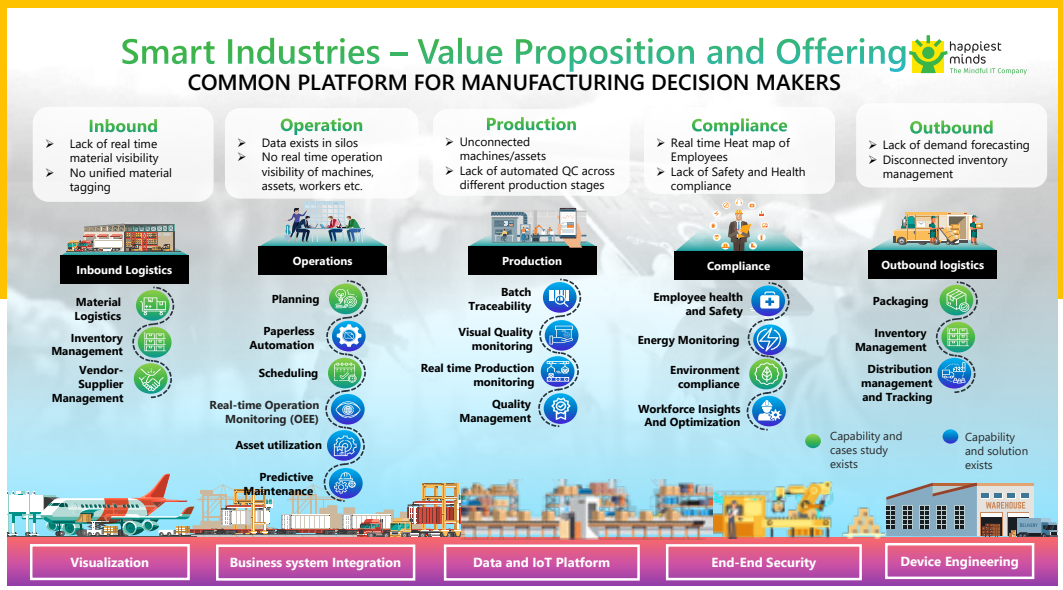
Optimizing fleet management: We trigger and generate new business insights by collating data from every stage in the lifecycle across a managed fleet of devices. This data supports operations throughout the product lifecycle. Digital Twins come in handy in the initial Design phase, and traditional BI assists in the Deliver and Return phases. Advanced analytics and machine learning support the Test, Make, QA, Operate, and Service phases.

Digital thread helps in fulfilling largely inward-facing insights, and is an engine for innovation, enhancing customer experience, operational excellence, the organization and culture.

VALUE PROPOSITION AND OFFERING FOR SMART INDUSTRIES

Happiest Minds offers customized solutions, and we build platforms best-suited to our clients' requirements. Our solutions cover various functions of the manufacturing industry, including procurement of raw materials, operations, production, compliance and outbound inventory management. We have the expertise to address all issues faced by conventional industries that do not use analytics in their day-to-day operations.

Happiest Minds' IoT solution provides a uniform view across plants in various locations. The solution is accessible by various users across the organization including operators, administrators and the business heads with different levels of control.



THE FUTURE OF DIGITAL THREAD

The digital thread is promising. It has been born from a powerful convergence of enabling technologies and can help unite the manufacturing enterprise in a way that hasn't been achieved ever before. However, it is essential for manufacturers and other players in the industrial sector to understand the challenges as well as associated rewards before implementing the digital thread. Manufacturers should explore the complete potential of the digital thread and capitalize on this emergent technology, not ignoring the growing opportunity and disruption that digital thread implementation offers.

Digital twin along with the digital thread has begun revolutionizing the way industries develop products. It has begun changing the way products are manufactured, distributed, sold and maintained. The future of digital thread is exciting!