

Sector Analysis:

Manufacturing & Automotive

Manufacturing is a vast industry which further segments into sub-industries such as, Aerospace & Defence, Automotive, Chemicals, Industrial & General Manufacturing, Natural Resources & Mining and Process Manufacturing. Based on context, each sub-industry listed above, merits treatment as an industry by itself. Another classification tends to be discrete manufacturing and process manufacturing.

Owing to the need for rapid product launches, mastery of globalisation, quality and cost at scale, for several decades now, manufacturing industry has made extensive use of, several management principles, automation involving robots, controls, sensor, actuators, and so on. **The next generation of manufacturing is broadly called Industry 4.0, within which, trends can be viewed across three clusters:**

1. **Digital manufacturing** whose focus by segment tends to be:
 - Discrete manufacturing: speed-to-market, smart and connected products and services, mass customisation.
 - Asset-intensive industries: maximise time in use, smart and connected assets.
2. **Digital customer experience and Digital supply chain** which encompasses the move from products to services, B2B2C experience focused on strengthening existing B2B relationships and developing B2C direct selling capabilities and forming life-long relationships. Digital supply chain focuses on end-to-end performance using capabilities such as, demand-driven, granular visibility of demand and supply across the ecosystem, next generation of pick-pack-ship, and so on.

Products are increasingly digital and connected. Organisations are harnessing intelligent enterprise and Industrial IoT capabilities to deliver breakthrough levels of performance.



3. **Digital factories** build upon the earlier emphasis on connecting the top-floor, and shop-floor with digitalisation of the latter focused on self-organising, self-optimisation of shop-floor physical elements to streamline manufacturing operations, improve asset effectiveness, and realise a frugal cost structure. This is complemented by:

- New generation of robots that are flexible, equipped with image recognition capabilities to take on additional tasks and enhance flexibility.
- Additive manufacturing using 3D printing techniques to pave the way for ultra-customisation that caters to individual customer's needs, accelerating concept-to-market timelines, besides extension of product life based on spare parts availability.

Digital manufacturing, Digital customer experience, Digital supply chain and **Digital factories** are supported by the following capabilities:

- **Intelligent enterprise:**

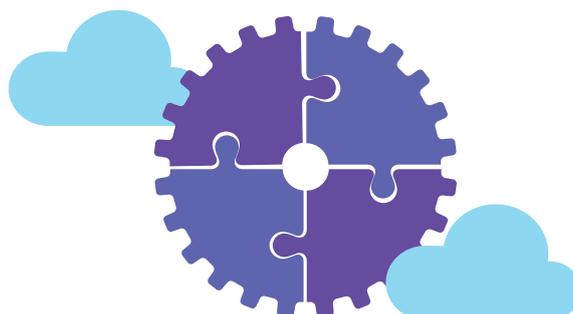
- AI/ML and analytics: that can be applied across a range of business use cases to make money from insights and decision making thereby fulfilling the promise implicit in the phrase, "data is the new oil".
- Digital twin and digital thread: focused on modelling physical products and assets to extend the business model from a one-time sale to ongoing service revenue.
- VR and AR technologies are being harnessed across digital prototyping, product definition, shop-floor operations, maintenance and after-sales service, and so on.

- **Industrial IIoT:** deployed on the shop-floor to make operations self-aware, self-organising (using Intelligent enterprise capabilities) to maximise flexibility, quality while minimising cost. This aspect of Industry 4.0, is sometimes called lights out manufacturing. IIoT is also deployed in the field in Asset Intensive industries.

The implication of these trends for organisations has been, the need to create or transform the enterprise's digital foundations, while simultaneously making their products smart and connected thereby enabling the transition from products to products and services.

This is best exemplified in the following industry examples:

1. Usage of Agile, DevOps, cloud and microservices to develop a market-first digital car key mobile application as part of the connected vehicle programme by an Automotive player. This also enables fleets and rentals to fully digitalise their business.
2. Usage of digital twin and ML for asset effectiveness in the field, based on early warnings, continuous prediction and dynamic optimisation, to deliver sizeable annual savings by an Aerospace and Defense equipment manufacturer.
3. Development of digital commerce solution by an Appliance Manufacturer to overcome disparate information of orders, repairs, maintenance service request, and so on. The solution based on customer journeys enabled a multi-brand business model and was developed using SAP UI5, Agile and incorporated usability testing. This resulted in 12% increase in online orders and better customer experience.
4. Usage of B2B commerce and field operations insights by a Manufacturer of Automation Products to drive resale revenue.
5. Full-scale digital transformation including digital design, digital factory, digital parts management and digital customer experience, by a Manufacturer of Electronic Products.
6. Implementation of an IoT platform by a Manufacturer of Heating Systems.
7. Joint development by SAP and a SI, on a suite for accelerating digital transformation for its' clients, with the following capabilities (built on SAP HANA and Leonardo):
 - Customer 360° for personalised interactions with customers and suppliers,
 - Digital Control Room for real-time operations visibility from shop-floor to top-floor,
 - Data Driven Responsive Supply Chain for end-to-end visibility and tracking, which in turn integrates with Manufacturing Integration & Intelligence and Integrated Business Planning,
 - Manufacturing Execution System to react in real-time with shop-floor execution to improve Overall Equipment Effectiveness (OEE),
 - IoT enabled machine health monitoring,
 - IoT enabled track and trace,
 - IoT based predictive maintenance, and
 - Worker's safety based on PPE (Personal Protective Equipment) monitoring.
8. A Medical Equipment manufacturer worked with an SI to implement Industry 4.0 for monitoring production performance in real-time based on KPIs, real-time integration with machines, faster data processing, analytics and a revamped quality control framework. The platform optimises and manages a fully integrated production process including a network of suppliers, customers, and post-sales services. The solution increased efficiency by approximately 15% and delivered a reduction in production lead-time, quality cost and production waste of approximately 10%.
9. A Process Manufacturer upgraded its application landscape based on Oracle implementation. The scope of effort spanned 37 legal entities, 20 plants, 500 inventory organisations, 20 Oracle modules, 15,900 customisation objects, 200 satellite system interfaces, and so on. The effort realised: simplification of Global Chart of Accounts for consolidation and streamlined reporting, usage of eBusiness Tax to replace complex customisation with standard tax engine solution across 23 tax regimes, 6,500 tax rules, and use of Warehouse Management System/ Mobile Supply Chain Application (WMS/MSCA) to enable real-time inventory tracking and process standardisation.



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