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Advisory Outlook

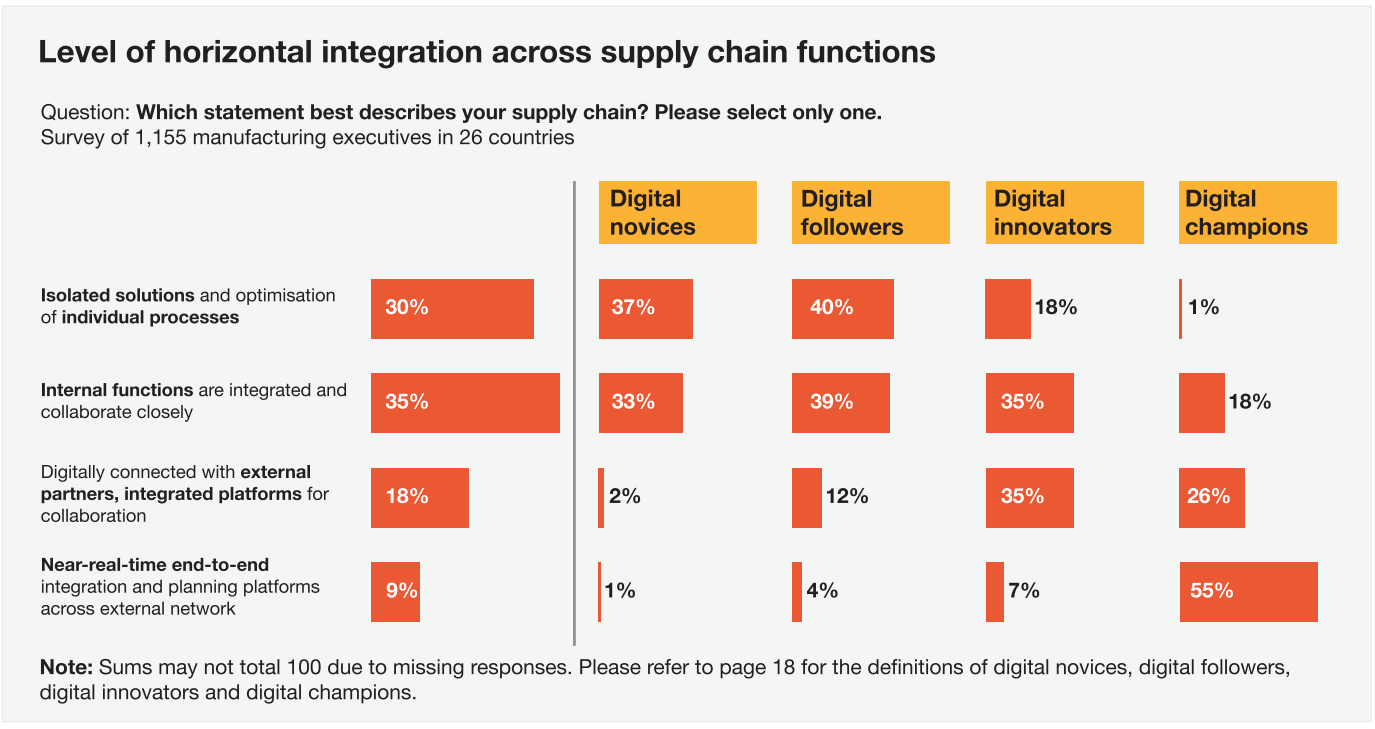
Why digitisation is reshaping the manufacturing industry

Manufacturers around the world face growing pressure from customers, governments, competitors and emerging technologies to digitise their organisations. Consumers increasingly want higher-quality, digitally enabled products at a lower cost that are adapted to their specific needs. In response, companies are having to develop and manufacture customised, digitised products on tighter deadlines and budgets, while retaining sufficient flexibility to meet constantly changing design specifications.

New regulations are also pushing manufacturers to accelerate digitisation initiatives in order to remain compliant. For example, digital monitoring and data analysis help companies meet track-andtrace requirements for products and sustainable development goals in areas ranging from product design to energy-efficient manufacturing. Advances in information technology are reinforcing the pressure on manufacturing organisations to digitise so they can avoid falling behind the new breed of market-leading 'digital champions.'1 In recent years, sophisticated software and communication tools have enabled remote real-time collaboration on a multitude of both simple and complex industrial tasks. On the shop floor, the use of IoT sensors eliminates frequent status inspections and facilitates process-control automation. The collection and analysis of large volumes of data can also increase the efficiency of manufacturing equipment and reduce bottlenecks.

Against this backdrop the rapid introduction of digital applications and tools in manufacturing is disrupting traditional corporate hierarchies and roles. Manufacturers increasingly value data scientists, software engineers and computer science graduates, and digitisation is dissolving barriers between functions within organisations. For example, the progressive digitisation of product development and production means manufacturing, supply chain and design functions are becoming more integrated, as we explain in PwC's 2018 Global Digital Operations Study. Tasks such as Design for Manufacture (DfM) and Design for Assembly (DfA) are being transformed by advanced CAD (computer-aided design) and CAM (computer-aided manufacturing) software, which make the designer more efficient while improving the product's quality and design.

Fig. 1: Digitisation is dissolving barriers between functions within manufacturing organisations

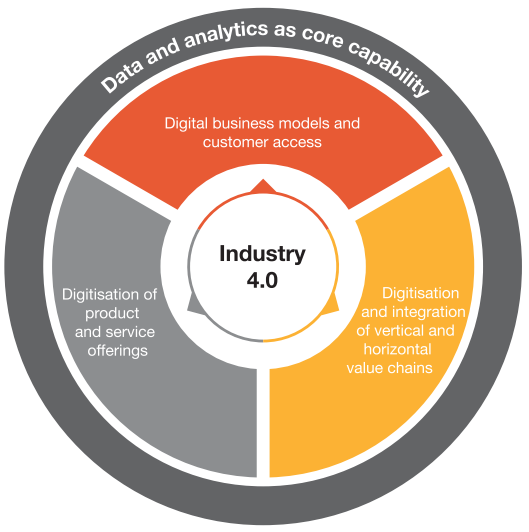


Digital and other emerging technologies are also transforming the performance and mind-set of manufacturing employees, as PwC noted in its 2017 study The workforce of the future: The competing forces shaping 2030. Overall, the expanding role of data, analytics and AI at every operational level is changing assumptions about what constitutes routine work and what skills are critical. Many tasks will become automated, and the best workers will need to combine technology skills with problem solving and innovation.

How digitisation is changing the DNA of manufacturing organisations

Digitisation will have a sustained impact on operational and business processes as emerging digital technologies enable the creation of new processes, products and business models — and ultimately forge digital enterprises For example:

- Manufacturing execution systems (MES) are enhancing automation, traceability and centralised control.
- Digital twinning and simulators are facilitating more efficient and cheaper product development and creating models for new services.
- Predictive maintenance and smart robots allow operations to monitor and manage their own health and order spare parts in good time.
- Digital inventories and radio frequency identification (RFID) tags are improving production control, leadtime analysis and capacity planning.



Understanding the future of industrial digitisation

In 2014, the first PwC Industry 4.0 study highlighted how the integration of horizontal and vertical value chains would not only enhance efficiency and innovation, but also affect the way industrial organisations operated. The 2016 PwC survey Industry 4.0: Building the digital enterprise identified the key building-block digital technologies and explained why digitisation would transform horizontal and vertical processes within industrial organisations, as well as product design. We also analysed why data is the new currency and why people skills and corporate culture are the key drivers of Digital IQ, which measures an organisation's ability to harness and profit from new technology.

Our research from that time, which was supported and validated in 2018–19 by the eight case study examples, drew on key insights about the early stages of digitisation summarised below: Digital skills and processes must be embedded throughout an organisation and not isolated in centralised or specialised groups.

- A range of corporate and shop-floor jobs will increasingly require IT and OT skills.
- The shortage of these emerging skills means that organisations that invest in digital training of their workforce will enjoy a competitive advantage.
- The convergence of IT and OT is changing corporate governance and driving organisations to restructure.
- More frequent development and sharing of apps across functions such as maintenance, operations and IT creates synergies and encourages further integration.

Our analysis of the latest case studies in this paper highlights two additional developments:
First, increasing horizontal and vertical integration, driven by digitisation, will in turn require several key operational changes. These relate to the management of internal functions such as product and process design and engineering; then, to end-to-end procurement, supply chain, distribution and aftersales; and finally, to the availability of data paired with advanced planning tools and further enabled by digital twinning to integrate and optimise all operational functions.
Second, digitisation increasingly adds value for customers through improved delivery of products and services or by using data and software to develop a new business model.

Successful digitisation — a four-point agenda for CEOs

Responding to the significant changes demanded by digitisation requires leadership and accountability from the top in four distinct areas.

1. CEOs will need to drive organisational changes that address new digital capabilities and streamlined digitised processes. The Japanese auto supplier and the Indian bearings manufacturer are particularly relevant case studies in this respect.
2. CEOs must overhaul recruitment to ensure more hiring of software and IoT engineers and data scientists. Meanwhile, existing employees must receive the right training to become a digitally smart workforce, capable of using the new technologies. The German chemicals company, the European maintenance-services company and Obeikan offer instructive illustrations of how an organisation can expand and integrate such skills.
3. Industrial companies will need to acquire more of the attributes of software businesses, with the ability to develop use cases quickly and turn them into software products. The European maintenance company and Obeikan have both successfully accomplished this transition.
4. Technology investments that enable digitisation must extend beyond IT to include significant OT such as track-and-trace solutions, asset management and digital twinning. The CEO with an overview of both technology and operations is best placed to drive these investments, rather than a traditional CIO. Among our case studies, the MENA aerospace supplier and the European oil and gas company demonstrate the need for this broad strategic vision in leading the digital change.

On their own, none of these initiatives is sufficient to achieve the successful digitisation of a manufacturing organisation. Yet in combination they form an indispensable agenda for CEOs aiming to lead companies that are digital champions.

Download the full report **Defining the new DNA of industrial digital organisations: The CEO's agenda** here https://www.pwc.com/gx/en/industries/industrial-manufacturing/publications/defining-new-dna.html

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