Industrial Speedsters

How advanced technologies can turbocharge your speed to market

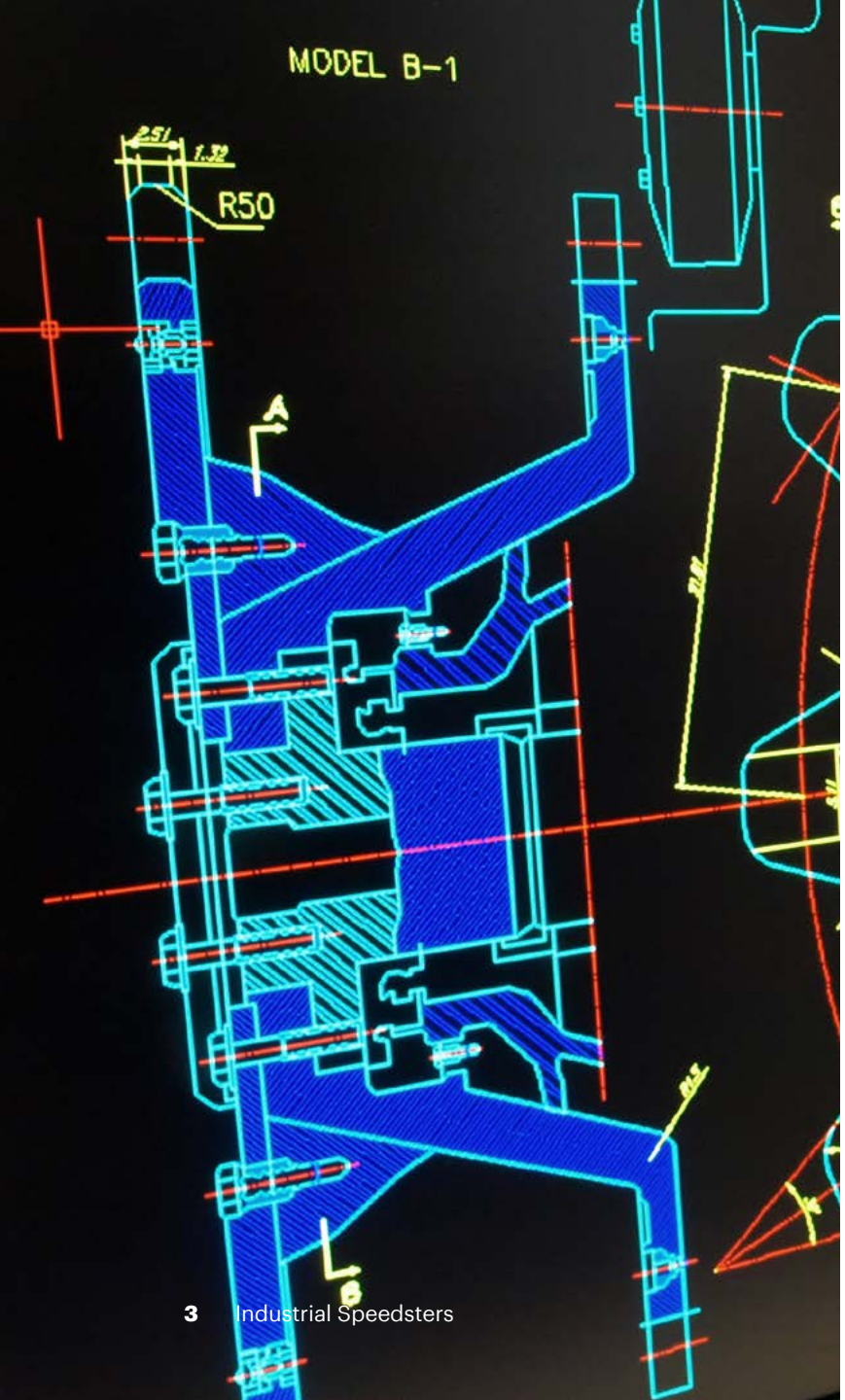
Introduction

Time-based competition

Looking at the current preoccupations of the C-suite for industrial enterprises (IEs), one theme is dominant—speed to market, and the need to compress the time it takes to design a product, develop it, manufacture it and have it in a customer's hands.

Companies want to innovate, and then produce and deliver more goods in less time, at lower cost. They need to be able to swiftly fulfill customer demand with the right product at the right time and place. From a strategic standpoint, time is the equivalent of money, and as critical as productivity, quality and even innovation.[1]

In a fast-moving environment, companies compete on their ability to sense and respond to change faster than others. Thus, we live in an era of time-based competition, in which those that make the best use of time can turbocharge their speed to market and gain a competitive advantage.



For example, if a company typically needs 19 weeks to design and develop a new product and could cut that time by 25%, it will not only generate a competitive advantage by quicker product launch times, but also free up valuable engineering capacity for other product developments and reduce overall product development costs significantly. Similar time and cost savings are possible in manufacturing and delivery processes.

Leading businesses are already investing heavily to increase speed to market. One European electrical and industrial equipment maker has shortened its product innovation cycle from three years to just eight months using connected machinery and equipment along with machine learning and data analytics—and it is aiming to reduce the cycle further.[2]

These kinds of time reductions are becoming a major competitive impetus. According to Maciej Kranz, Chief Technology officer at KONE, a global elevator and escalator leader, the company is explicitly focusing on accelerating its speed of innovation and execution. “At the end of the day, if we don’t master that, customers, competitors and partners will move on.”[3] It can be a challenge keeping up with the pace of rapid technological and market changes, customer desires and digital-native competition.

Some IEs are clearly outperforming their peers when it comes to increasing their speed to market. The question is, how are they doing this? And what technologies are helping them accelerate their development, manufacturing and delivery processes?

Breaking it down

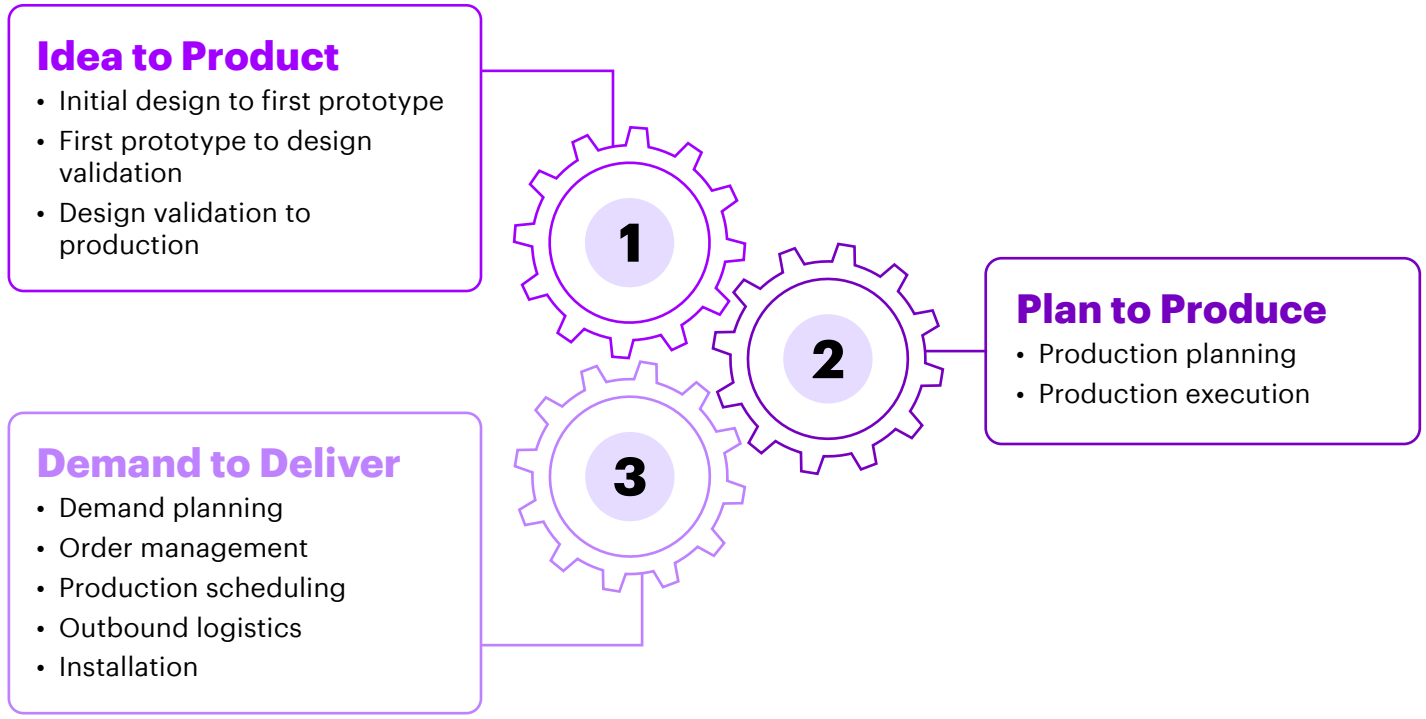
Analyzing three sub-processes within speed to market

Accenture recently surveyed 1,200 industry experts to investigate the relative speed to market of their companies. To better understand the main drivers of speed to market, we structured the survey along three distinct speed to market processes and their sub-processes (see Figure 1).

Idea to Product
includes all steps from idea generation, concept planning and prototyping, testing, design validation and requirement development to prepare for the start of production.

Plan to Produce
includes production planning, production scheduling and production execution (i.e., manufacturing operations).

Figure 1: Speed to market processes and their sub-processes

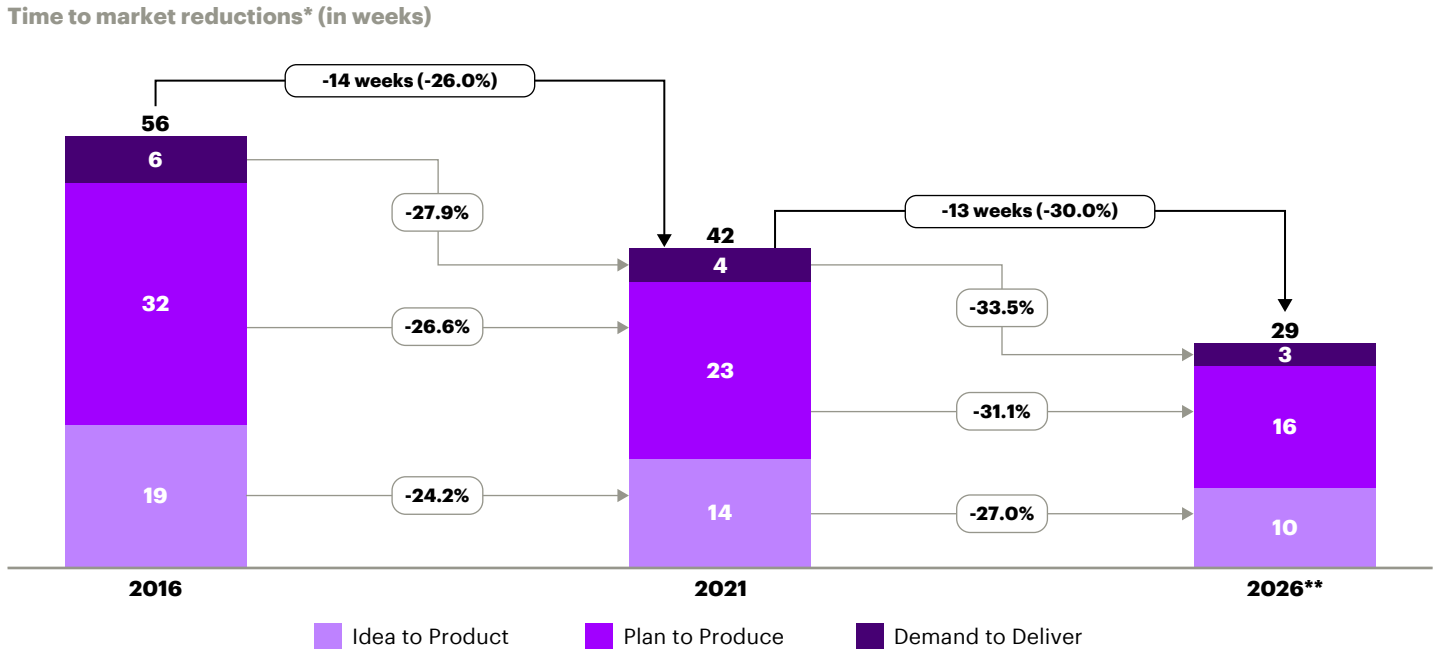


Demand to Deliver
includes all steps from demand and sales planning, to order intake and scheduling, to final distribution and installation and commissioning at the client.

Overall, we found that IEs increased their speed to market over the past five years by reducing their time to market from 56 to 42 weeks on average and are looking for further reductions (from 42 to 29 weeks) over the next five years (see Figure 2). But which companies are performing best when it comes to increasing their speed to market, and which are most in need of improvement?

To find out, we determined which respondents accelerated their speed to market the most within each of the three processes and combined this information with an analysis of each company's technological leverage and cost reductions achieved in parallel. From there, we were able to define three "speed levels." The companies with highest speed to market, and biggest time and cost reductions from 2016 to 2021 were labeled "Speedsters," followed by "Accelerators" and "Starters."

Figure 2: Time to market in weeks, all survey participants



* n=1200
** Projections based on survey participants

The Speedster advantage

The difference between top and bottom performers in speed to market is dramatic. Across Idea to Product, Plan to Produce and Demand to Deliver, Speedsters have been significantly faster and more cost efficient over the past five years than the other two groups.

Additionally, our analysis found that Speedsters are outperforming Starters in terms of financials. Their revenue CAGR from 2016 to 2021 was 18% higher than that of Starters. At the same time, Speedsters demonstrated 10% higher profitability than Starters in 2021. The fact that Speedsters bring new products to market faster and reduce costs in the process are factors contributing to their better financial performance. Based on the projections of all survey respondents, we also see that trend is likely to continue in the next five years. Furthermore, Accelerators and Starters will be unable to reduce the gap between them and the Speedsters (see Table 1).

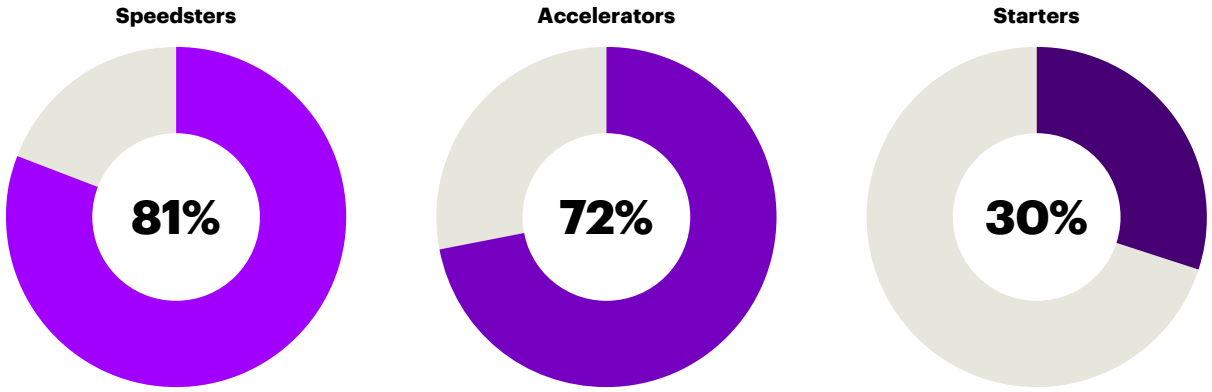
Table 1: Time to market and time and cost reductions across the three speed levels

	Speedsters						Accelerators						Starters					
	Time				Cost		Time				Cost		Time				Cost	
			Annual reduction (achieved and planned)						Annual reduction (achieved and planned)						Annual reduction (achieved and planned)			
	2016 (weeks)	2026 (weeks)	2016–2021	2021–2026	2016–2021	2021–2026	2016 (weeks)	2026 (weeks)	2016–2021	2021–2026	2016–2021	2021–2026	2016 (weeks)	2026 (weeks)	2016–2021	2021–2026	2016–2021	2021–2026
Idea to Product	14.3	5.8	**9.5%**	**7.8%**	**5.1%**	**5.5%**	17.1	8.6	**6.6%**	**6.6%**	**2.3%**	**2.8%**	19.9	11.7	**4.5%**	**5.8%**	**0.4%**	**1.2%**
Plan to Produce	19.1	6.3	**10.4%**	**10.5%**	**2.7%**	**3.0%**	31.5	12.9	**7.5%**	**9.5%**	**2.2%**	**1.9%**	34.9	19.7	**4.9%**	**6.2%**	**0.0%**	**0.8%**
Demand to Deliver	5.7	2.0	**10.9%**	**9.1%**	**5.0%**	**4.5%**	4.8	2.1	**7.2%**	**8.5%**	**4.1%**	**3.8%**	6.6	3.4	**5.3%**	**7.5%**	**0.1%**	**0.9%**

But why have Speedsters pulled ahead of the other two groups? According to our analysis, 81% of the time reduction achieved by Speedsters between 2016 and 2021 was achieved via technology. Starters, on the other hand, achieved only a 30% time reduction through technology (see Figure 3).

In essence, the more effectively an IE has leveraged technology, the more successful it has been in compressing time to market and improving financial performance. That's the Speedster advantage.

Figure 3: Degree of technology leverage (in %) to achieve time reductions between 2016 and 2021



Idea to Product

Some IEs struggle at the Idea to Product stage for a number of reasons. Often, customer insights and product and operational data are not included in the early stages of product development due to a lack of integration across systems—which also impairs the automation of information flows, requires excessive effort to move data across systems, and leads to siloed engineering and product development teams.

In addition, the limited use of virtual collaboration and engineering tools increases reliance on physical prototypes, which drives long test cycles for new products. Overall, these issues lead to bottlenecks, delays, and engineering processes and teams that have difficulty keeping up with new ideas and designs.

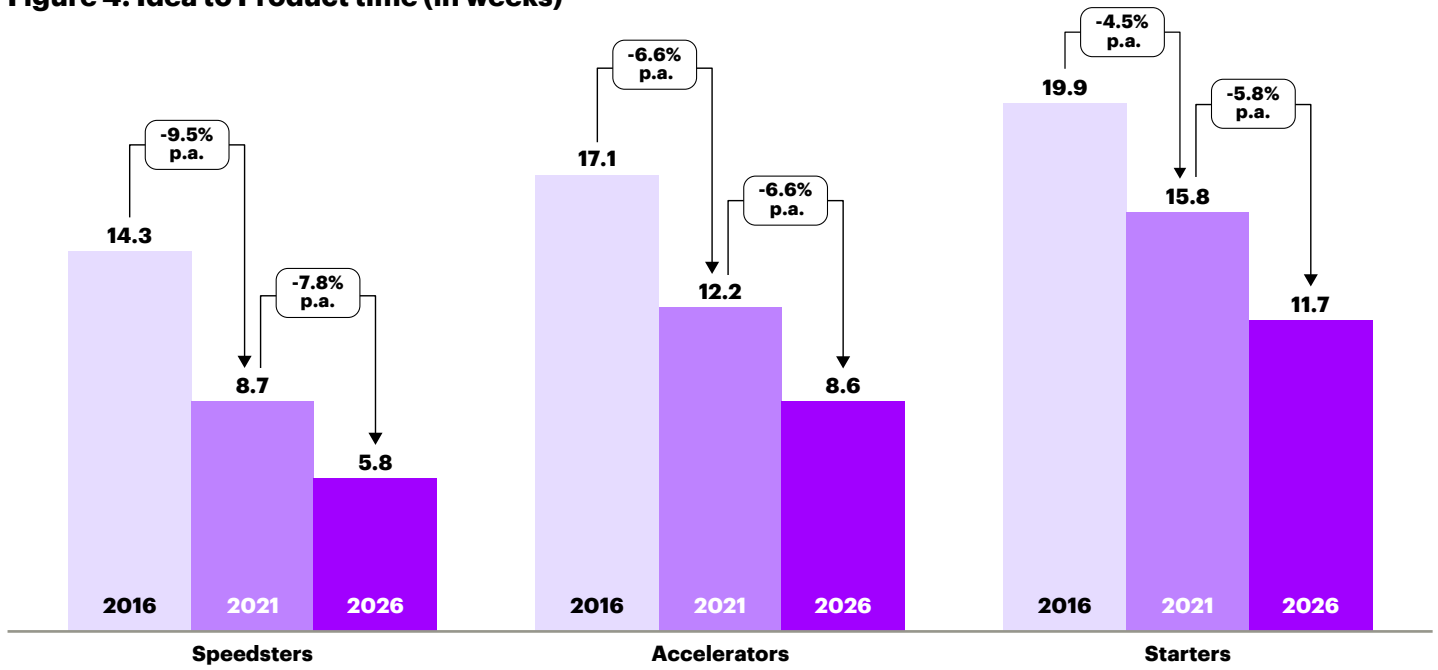
What does a healthy Idea to Product process look like? Typically, it focuses on continuous refinement of requirements in parallel with the engineering process. It takes an agile approach to requirements gathering and product development. And it has a high degree of automation in design and testing to strip away manual intervention points that may lead to costly errors and redesign that extend the design process.

Those factors are reflected in the way that Speedsters approach the Idea to Product process. For example, they employ digital simulation and modeling tools that eliminate the need for physical prototypes, and agile and iterative engineering methods to avoid starting over if something does not work out as planned, thus saving time in the overall product development process.

And they employ these tools and methods to a higher degree than Accelerators and Starters. The impact of such approaches is evident in the numbers (see Figure 4).

Speedsters reduced Idea to Product time by 9.5% annually over the past five years—, compared to 6.6% for Accelerators, and 4.5% for Starters over the past five years—and they expect to continue this trend in the coming five years.

Figure 4: Idea to Product time (in weeks)



Idea to Product: Key Technologies

What they've done

In their efforts to accelerate the Idea to Product process, IEs focused primarily on machine learning and analytics, agile and iterative engineering, and engineering in the cloud. The research shows that these technologies and methods collectively account for 44% of the time saved for Speedsters and they work together to enable shorter development cycles in several ways:

Machine learning and analytics
when combined with high performance computing (HPC), enhance the ability to analyze large amounts of data stored in the cloud to identify patterns. They can also help accelerate the analysis simulations and testing results.

Agile and iterative engineering methods
let organizations respond rapidly to new customer requirements and changing market environments. IEs no longer need two years to finalize a new product, only to realize that customer or market needs have changed in the interim. Through agile methods, changes can be made in much shorter intervals, and IEs can quickly create minimum viable products (MVPs), bring them to the next level or even to the market, and improve them gradually over time by leveraging actual usage data. These methods also let product developers work in parallel with different product components, instead of in a sequential manner, thus helping to significantly reduce overall development time. Speedsters are generally quite advanced in their use of agile and iterative engineering methods; Accelerators and Starters, however, have a lot of work to do to catch up.

Engineering in the cloud
has been based on global product lifecycle management (PLM) platforms for collaborative engineering and the tighter integration with simulation through the PLM in the last five years. This makes it possible to gather large amounts of data in one place and allow different entities to use it to work together. It also creates a foundation for the future use of digital twins, which can accelerate processes through the enhanced simulation of products. Furthermore, it also enables all entities involved in product development (e.g., hardware and software engineers/developers, manufacturing experts, service technicians) to work together simultaneously. Over the past five years, Speedsters used PLM platforms leveraging cloud-based engineering tools to reduce time by 5.1% (three times more than Starters) and costs by 4.6% (8.3 times more than Starters).

Where they're going

Over the next five years, Speedsters intend to continue investing in technology in the Idea to Product process. And they identified digital twins, harmonized and integrated systems and HPC as being key.

Digital twins
use comprehensive data about products to simulate those products for rapid prototyping and testing. Digital twins can also help reduce or eliminate iterations in the approval of production parts. Speedsters called out digital twins as one of the top technologies across all three processes for the next five years, highlighting their importance.

Harmonized and integrated systems
help to eliminate data and organizational silos and enable seamless data flows and access.

High-performance computing (HPC)
makes machine learning faster and enables the processing of more data/big data for simulations and tests using digital-twin product prototypes. This requires a move to the cloud, which enables processes to scale much faster versus limited on-premise HPC clusters. Engineers will receive the results of analyses and simulation more rapidly and they will be able to (re)train machine learning models faster. Among Speedsters, HPC had the highest impact on the time saved over the last five years, and it is expected to play an important role in the next five years as well.

Dover Fueling Solutions was developing a digital content delivery solution to support video advertising at their fuel pumps.

They leveraged IoT Intelligence and a cloud platform to reduce their time to market from several years to a few months. They also increased efficiency and can now provide a better customer experience.[4]

Idea to Product: Imperatives

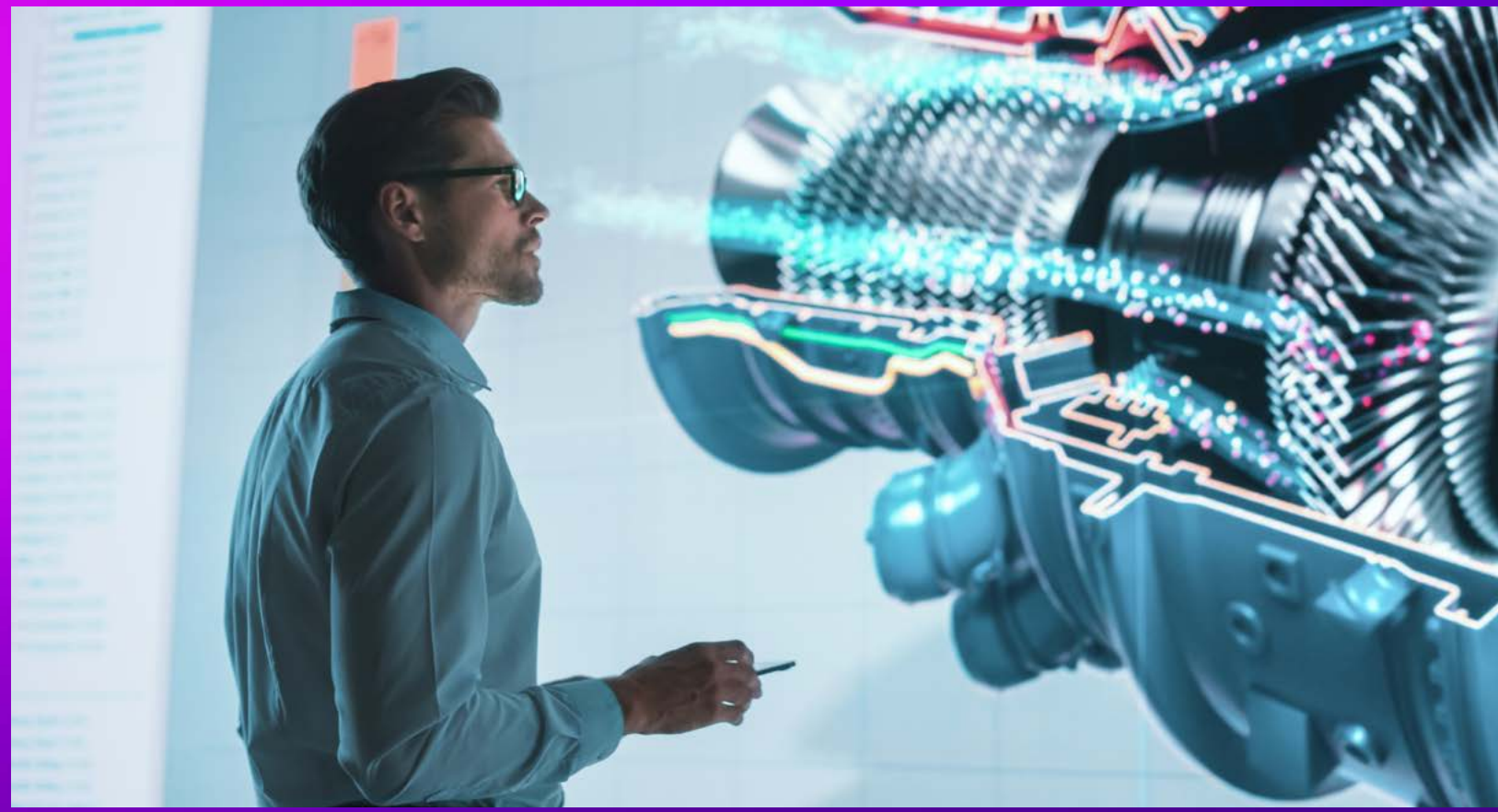
The research points to a number of steps that IEs can take to improve the Idea to Product process, beginning with the harmonization and integration of systems and tools to enable seamless communication and data sharing. Building on this, they can use global PLM and asset lifecycle management platforms for collaborative, cross-domain engineering and establish closed engineering feedback loops by using feedback and data from digital product twins and connected products to improve products, software and services based on real-time usage data.

In addition, leveraging additive manufacturing and 3D printing to a higher degree will allow them to quickly produce physical prototypes based on their virtual engineering efforts. Processes and mindsets should also support agile and iterative product engineering to enable rapid adaptation to changing customer needs.

In the near future, IEs should take advantage of cloud-based HPC and quantum computing to support simulations that can accelerate process optimization. The industrial metaverse will enable even broader collaborative engineering, while artificial intelligence and sophisticated knowledge graphs will allow new levels of engineering automation.

Plan to Produce

Plan to Produce is where the planning and execution processes come together—and IEs sometimes run into problems integrating and coordinating these activities. Often, this stems from inconsistent data being used in different parts of the process, which impairs accurate production planning and activities such as predictive maintenance. A lack of good data also makes it difficult to create a digital twin of the production process for planning and optimization.



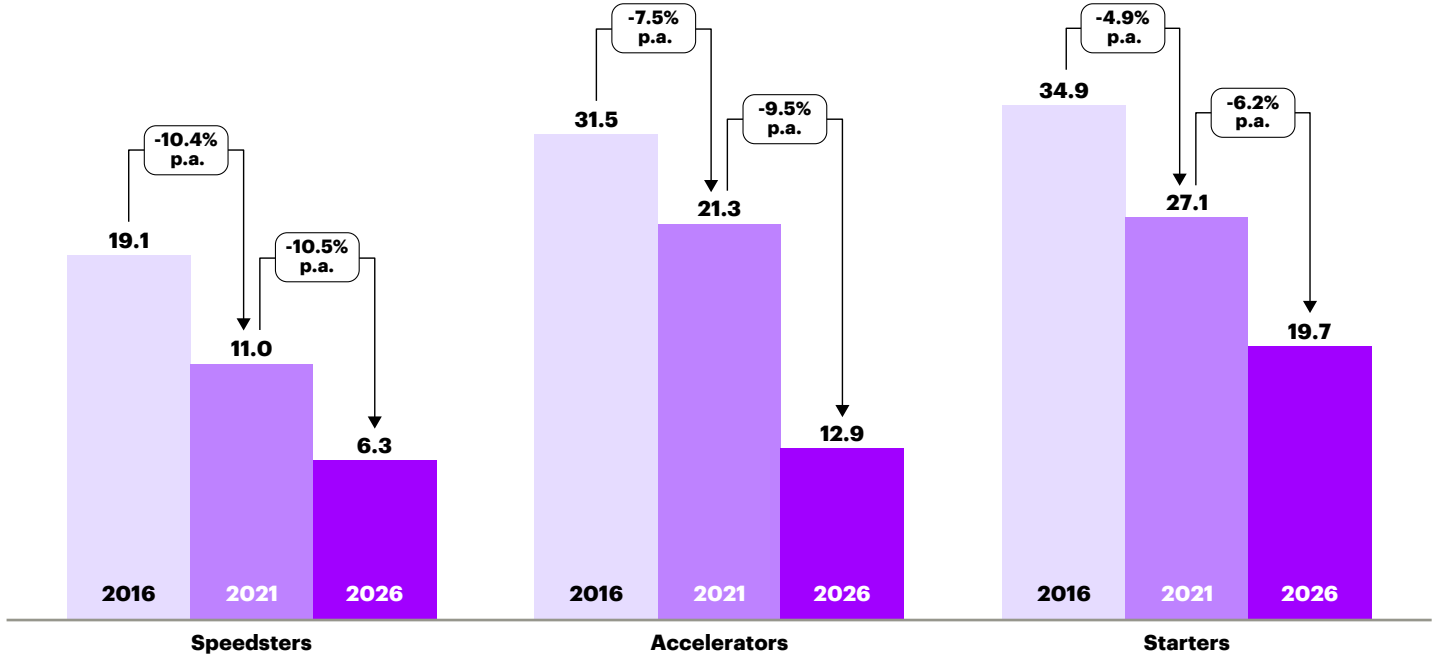
At the same time, IEs may have only limited visibility into the conditions of machinery and equipment, making them slow to respond to—or predict—production and supply chain disruptions. And they frequently struggle to find employees that have the right production skills, such as the ability to operate advanced machinery.

There are several actions that IEs in the research have taken to improve the process. In production planning, Speedsters have focused on material planning and logistics planning as their top two priorities to reduce time, whereas Accelerators and Starters have focused on scheduling of production capacity, along with material planning. In production execution, Speedsters prioritized inventory operations management as their top area of focus, achieving a 48% reduction in time in that sub-process. Accelerators and Starters focused on unplanned maintenance operations management, achieving 38% and 26% time reductions, respectively, in that sub-process. Looking at the entire Plan to Produce process, Speedsters have reduced time over the past five years by 10.4% annually, compared to 7.5% for Accelerators and 4.9% for Starters (see Figure 5).

Over the next five years, Speedsters and Starters plan to focus on production build planning, while Accelerators will continue to prioritize material planning. Overall (including both the past five and the next five years), material planning is expected to be the top focus area and to have the greatest impact on time reduction in production planning.

In production execution, Speedsters and Starters plan to target unplanned maintenance operations management, whereas Accelerators will target production operations management.

Figure 5: Plan to Produce time (in weeks)



Plan to Produce: Key Technologies

What they've done

IEs pointed to two basic technologies that have helped them reduce their Plan to Produce time over the past five years—automated guided vehicles and connected machinery and equipment. The use of these two technologies accounted for almost a quarter of the total Plan to Produce time reduction for Speedsters.

Automated Guided Vehicles (AGVs)
bring increased efficiency and intelligence to internal logistics. They provide employees with the materials and components they need at each workstation and enable automatically optimized delivery processes. AGVs also reduce accidents and keep the disruption of delivery processes to a minimum. Over the past five years, Speedsters have used AGVs to reduce time by 4.9% (four times more than Starters) and costs by 3.1% (27 times more than Starters).

Connected machinery and equipment
help companies gather usage and operational data, which they can use to perform predictive and prescriptive maintenance to avoid unplanned machine downtime. Connecting machinery and equipment is also key to the real-time monitoring of production for optimization and increased responsiveness to problems. Here, Speedsters used the technology to reduce time by 4.6% and costs by 2%, while Starters reduced time by 1.3% but did not reduce costs. Over the next five years, Speedsters plan to use connected machinery and equipment to reduce time by 4.2% and cost by 2.6%; Starters plan to reduce time by 1.9% and costs by 0.6%.

Where they're going

Looking ahead to the next five years, Speedsters plan to continue to invest in AGVs. In addition, other technologies are becoming increasingly vital:

Centralized real-time monitoring of equipment and manufacturing processes
is crucial to workers being able to understand the status of machines, equipment and workflows and to address problems early on or even proactively, as well as to managing autonomous manufacturing workflows and processes with minimal human intervention. It is also key to the creation of digital twins of manufacturing processes (see below) since digital twins are built on real-time data coming from production.

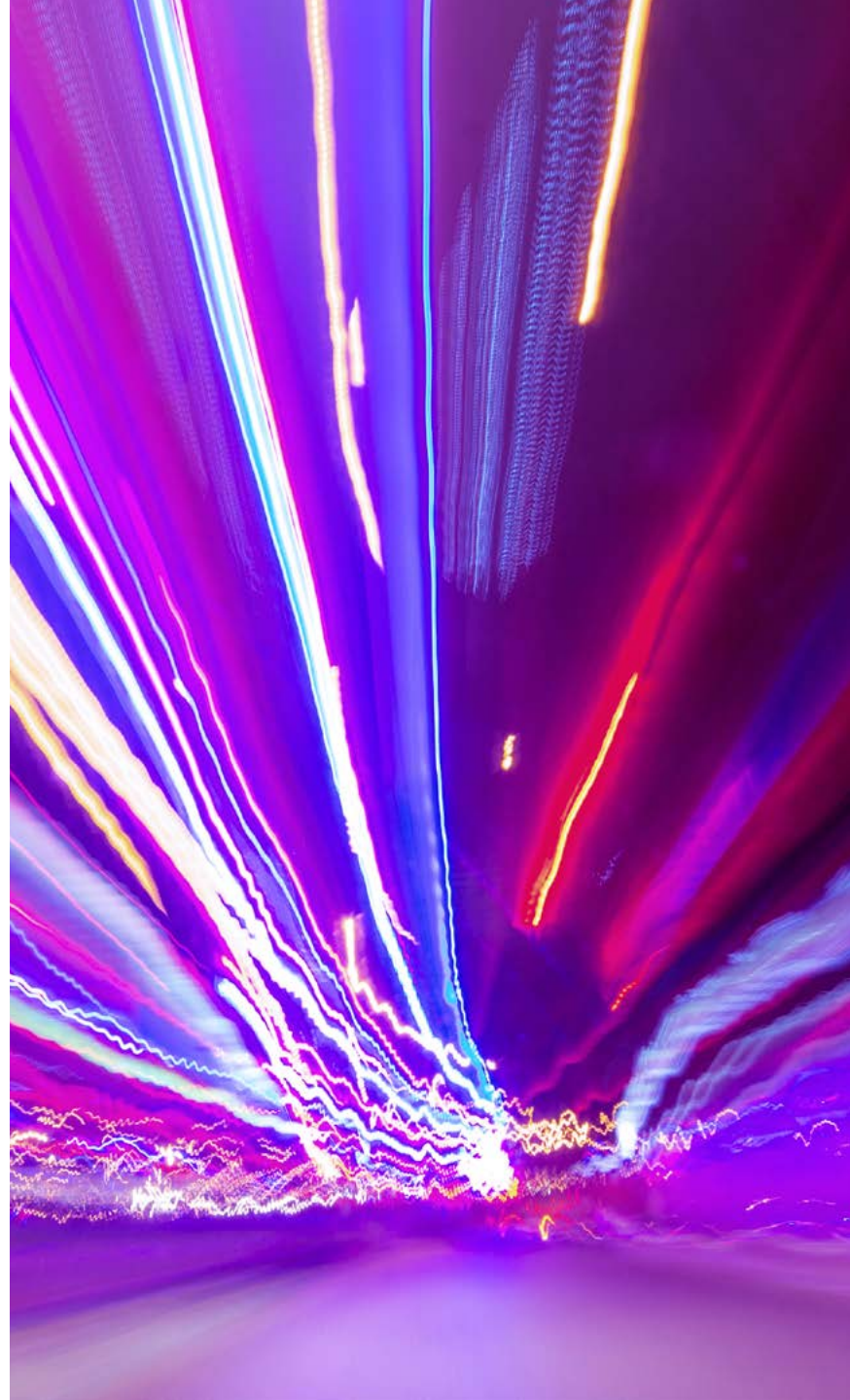
Digital twins
of manufacturing processes, which draw on data from connected smart production machinery, are virtual replicas of actual processes. Digital twins can be used to identify opportunities to increase efficiency and optimize and speed up workflows, as well as simulate and test new processes and manufacturing setups. Efficiencies identified in the digital world can easily and quickly be implemented in the real world.

Kuka, a robot manufacturer, has been investing in enabling technologies in Plan to Produce. Working with two partners, it recently launched a "Smartfactory as a Service" offering, which the three alliance partners say will shorten time to market for new products by up to 30%.[5]

Plan to Produce: Imperatives

There are several technology-related steps that IEs should consider in order to improve the Plan to Produce process going forward. For example, they should use technology to enable product engineering to work concurrently with production engineering, using tools such as simulation and virtual commissioning. They should tighten integration of quality and logistics systems and data with key suppliers. And they should create digital twins of production processes that can help them optimize operations for Overall Equipment Effectiveness, yield and efficiency on an ongoing basis.

Looking further ahead, IEs should be prepared to take advantage of AI-enabled predictive supply chain and production management, based on the real-time monitoring of equipment and manufacturing processes. Extended reality (XR) and the industrial metaverse will open up new opportunities for more effective training and guidance for production employees. And AI will enable highly flexible "Lot Size One" production at the same cost as mass production.



Demand to Deliver

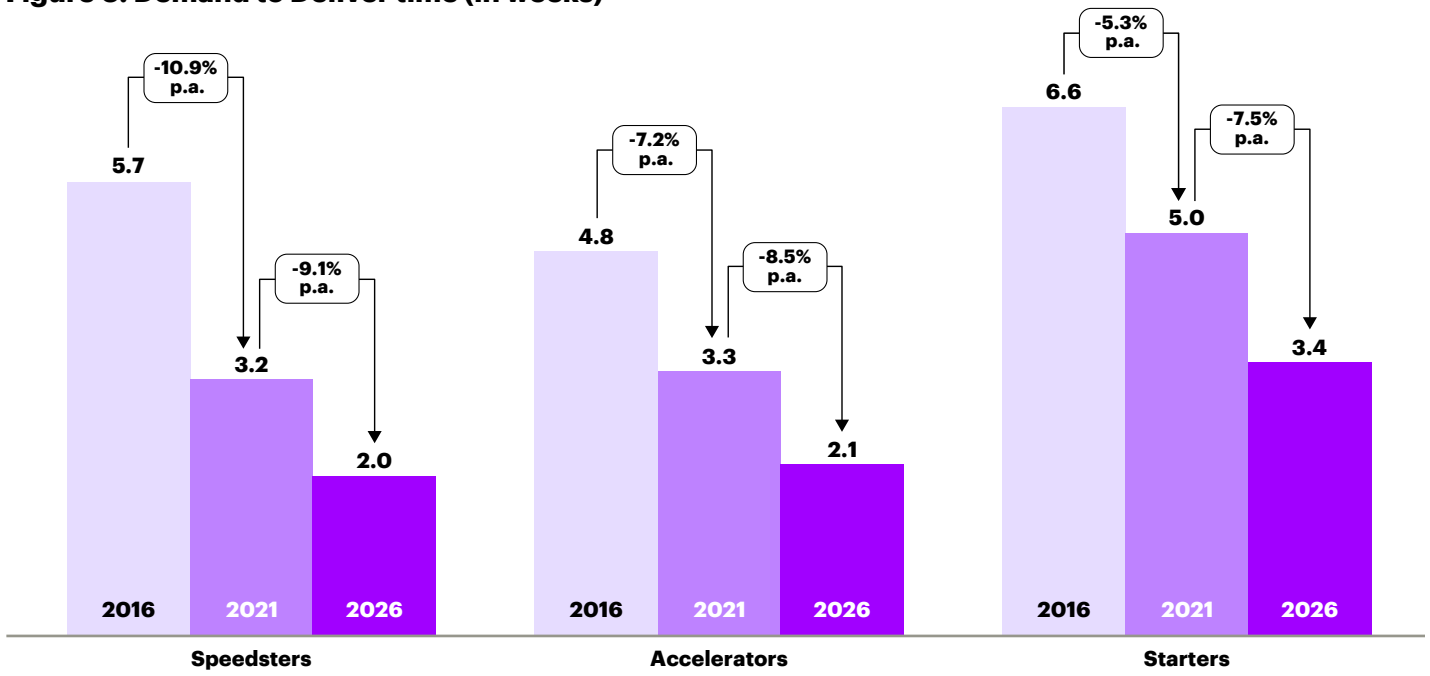
The Demand to Deliver process extends from the time a customer asks for a product to the time that product gets to the customer. It is fundamental for IEs, but many nevertheless find that their efforts to improve it are hampered by a lack of standardized ordering and delivery processes and workflows—and much of that work is done manually, leading to delays and errors. IEs may also have limited coordination across organizations such as sales planning and production planning, so customer needs are not efficiently identified or met; or among operations, which makes it difficult to predict and address supply chain disruptions.

Collaboration is key to an effective Demand to Deliver process, but siloed data pools often prevent or restrict the ability of groups to work together effectively.

In their efforts to improve the Demand to Deliver process, the IEs in our research have often focused on order-fulfillment models, and the mix of on-the-shelf/sell-from-stock, amend/assign-to-deliver and build to order (BTO) models. This has been a particular area of interest for Speedsters, who have been building more available-to-promise, next-best-match and suggested-products capabilities to support their shift from on-the-shelf models to BTO models. Speedsters have been adopting these industrial-consumerization concepts on the front end to become more "Amazon-like", and they are now two times more mature in BTO capabilities than Starters.

This shift in models is reflected in the time reductions achieved by Speedsters. They reduced their Demand to Deliver times by about 10.9% annually—more than twice as much as Starters—and they plan to reduce it by another 9.1% in the next five years (see Figure 6). If the projections of both groups hold true, in five years Speedsters will be performing the Demand to Deliver process 72% faster than Starters. This will give them the ability to make changes in production or products closer to the current market conditions at any given time, typically with lower working capital requirements. With time-based competition becoming more important, this will be a significant competitive advantage. Five years ago, Speedsters actually had longer Demand to Deliver time than Accelerators, but they have been able to leverage technologies and tools efficiently and effectively, allowing them to surpass that group. (Interestingly, these reductions extend across Speedsters' product lines, including their complex offerings, so the improvement is not simply due to an increased focus on simpler products). For their part, Starters are now roughly five years behind Speedsters in terms of Demand to Deliver time reductions—and the gap appears set to grow even more.

Figure 6: Demand to Deliver time (in weeks)



Demand to Deliver: Key Technologies

What they've done

More than a quarter of the time savings achieved in Demand to Deliver by Speedsters was attributable to two technologies:

Automated packaging and commissioning

Most IEs are automating as many steps as possible in the warehousing processes to make them faster and more efficient. In the last five years, automated packaging and commissioning had the greatest impact on Demand to Deliver time savings for all three groups. However, Speedsters performed 4.5 times better than Starters.

Warehouse Augmented Reality (AR)/Virtual Reality (VR) tools

For warehouse processes that can't be automated, these tools can enable workers to be more effective, helping accelerate their work and reduce errors in their activities, ultimately saving time and lowering costs.

Where they're going

Looking ahead, Accelerators and Starters both plan to continue to focus on automated packaging and commissioning. This is likely due to the fact that they have been unable to generate as much time savings as Speedsters with this technology, and thus see value in expanding its use. Having achieved significant time savings with this technology, Speedsters now plan to focus on digital twins and AI-enabled controls, while continuing to make better use of inspections and warehouse AR/VR tools.

Digital twins

Speedsters were the only IEs that cited digital twins among their top three priority technologies in the last five and in the next five years. Digital twins will be increasingly feasible as more tasks are automated in the coming years. As in the Idea to Product and Plan to Produce processes, digital twins will help IEs develop more efficient and faster processes and solutions in Demand to Deliver, particularly in warehouses. They will also enable companies to take a huge step forward towards creating fully autonomous warehouses in the future.

AI-enabled controls and inspections

The use of AI-enabled quality control in packaging processes is the next logical step in automating human tasks to increase warehouse speed. AI-enabled controls and inspections were among the top three cost-saving technologies in the last five years for nearly all groups, and they expect to maintain that focus in the next five years as they continue to look for both time and cost savings.

Warehouse AR/VR tools

Speedsters are the only group that appears to recognize the significant value of Warehouse AR/VR tools. They and Accelerators both ranked these among their top three technologies over the last five years, but only Speedsters plan to maintain that focus.

Demand to Deliver: Imperatives

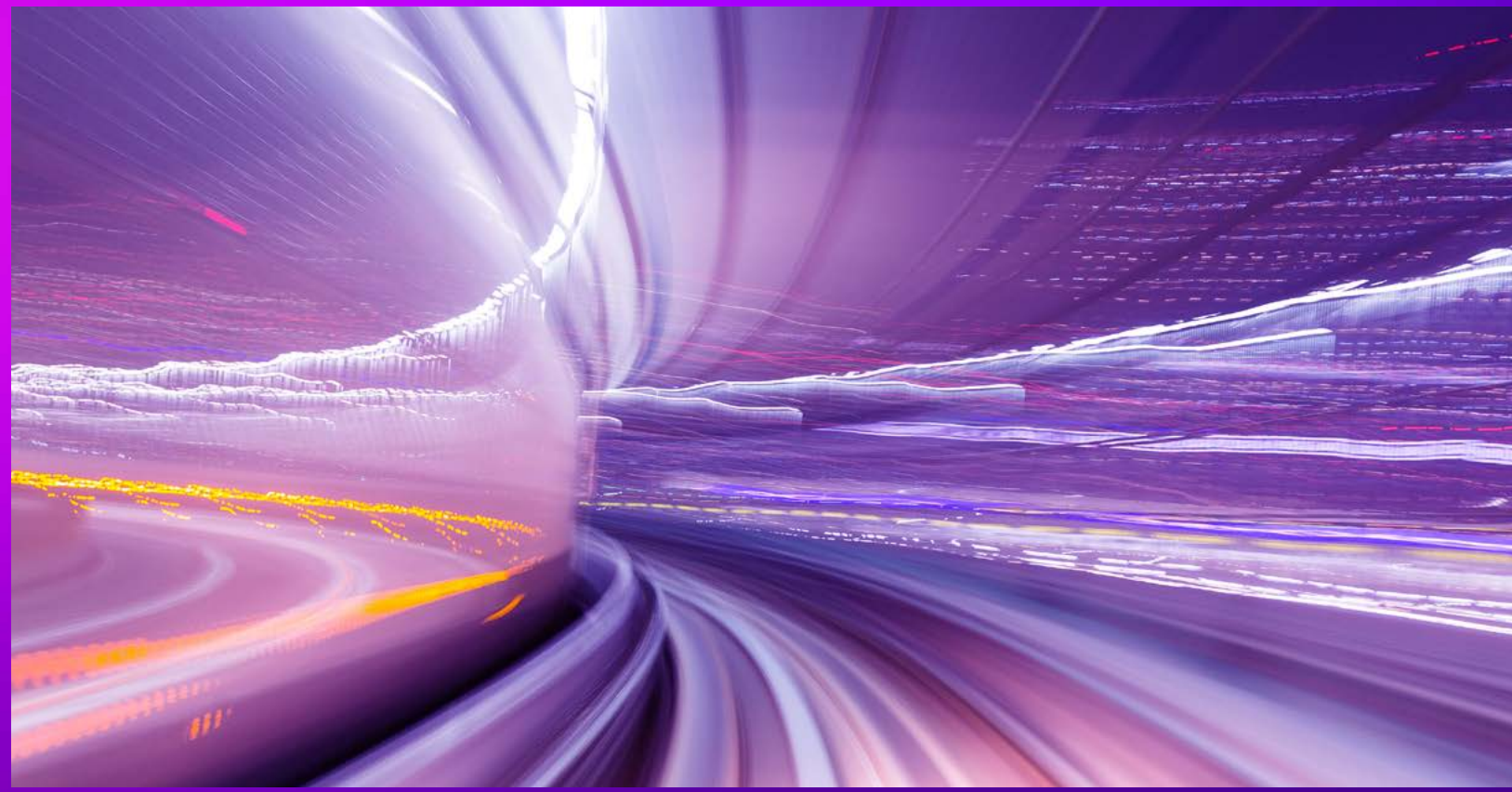
To improve the Demand to Deliver process, IEs should focus on integrating manufacturing with the supply chain to create a “digital thread” that enables the seamless flow of data across organizations and silos; enables better distribution and supply chain network optimization; and opens the door to creating digital twins of products and operations to support collaboration in the value chain.

IEs can also integrate PLM and Enterprise Resource Planning (ERP) systems to support configure, price and quote tools (CPQ) and implement sales and operations planning and available-to-promise tools.

In the longer term, IEs should explore AI-enabled RFP/RFT processing, and the use of the commercial metaverse in digital sales processes.

Turbocharge your speed to market

This research clearly highlights the key role that technology can play in helping IEs to accelerate the speed to market in all three processes. Looking forward, IEs have a growing array of technologies to consider – from cloud, AI driven analytics and virtual reality to digital twins, a prerequisite for the industrial metaverse.

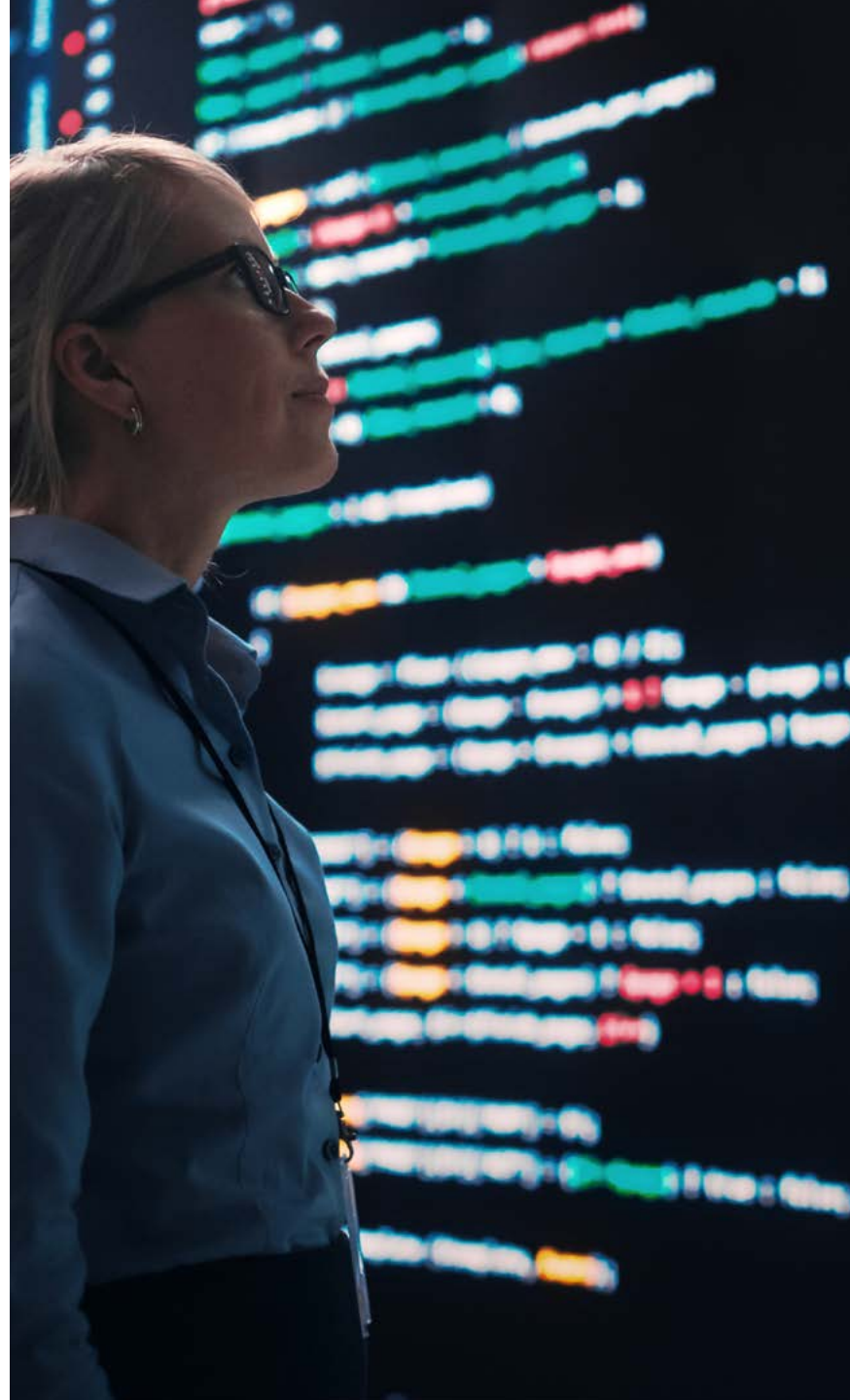


But the technology does not operate in a vacuum, and to make effective use of it, IEs need to approach it in the context of the processes it enables. For example, processes should be improved to take advantage of technology to reduce manual work and errors and increase quality and speed, while technology solutions should be designed to enable processes that best meet the needs of the business. The two should be developed together, with one constantly informing the other.

At the same time, improvement efforts should also encompass the people who operate those processes. This will mean not only change management and training, but also the use of XR, simulation, and other technologies to help people collaborate and work more effectively. And it will require new agile and iterative methods of working that enable shorter learning and implementation cycles—as well as a culture of innovation, experimentation and speed that will make it all work.

In essence, the technology needs to be addressed in concert with people and processes to create new operating models that will allow IEs to keep cutting time out of processes.

The experience of the Speedsters in this research provides valuable insight into how technology can be brought to bear to create a new foundation for those operating models. It provides an opportunity to learn from businesses that are leading the way, which can help IEs across the board accelerate their time to market and succeed in an era of time-based competition.



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Research Methodology

We conducted an online survey with 1,200 participants. Respondents completed the survey in December 2021 and January 2022 and included 72% C-level executives. We covered 13 countries (USA, Japan, China, UK, France, Spain, Finland, Sweden, Norway, Denmark, Italy, Switzerland and Germany) and four industries (Industrial and Electrical Equipment, Heavy Equipment, Automotive Suppliers, and Consumer Durables). We focused on four groups within each company: R&D and Engineering; Manufacturing; Supply Chain and Logistics; and IT/Digital Strategy. We analyzed the respondents and identified clusters combining the relative time reduction and the efficiency in leveraging technologies and methodologies to increase their speed to market. Based on this clustering, we analyzed the other survey questions and drew our conclusions. Clusters include Idea to Product, Plan to Produce and Demand to Deliver. The Plan to Produce segment covers both production planning and production execution. Production planning includes material planning, logistics planning, production build planning and pre-planning/scheduling of production capacity. Production execution includes production operations.

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