



Digital Transformation in Manufacturing:

Creating Intelligent and Connected Businesses

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Manufacturing at the Heart of Digital Transformation's Perfect Storm

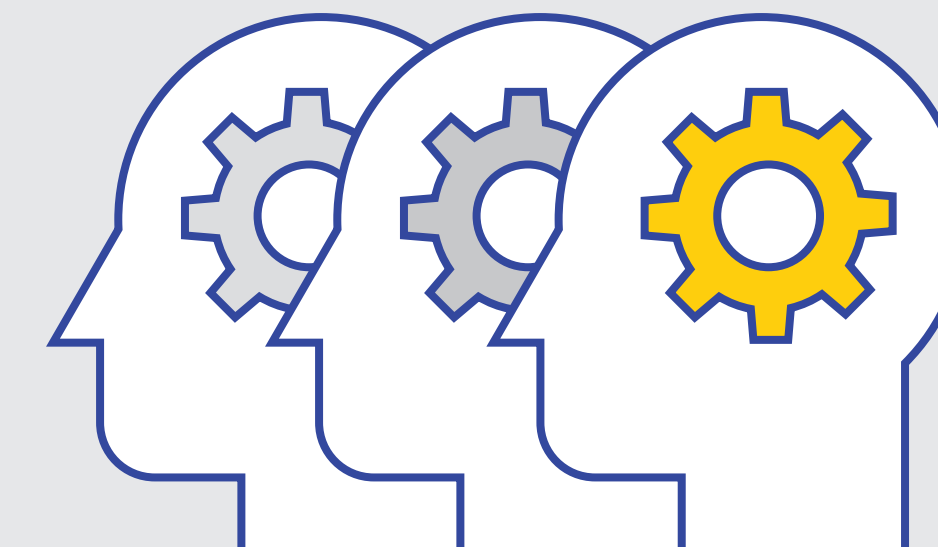
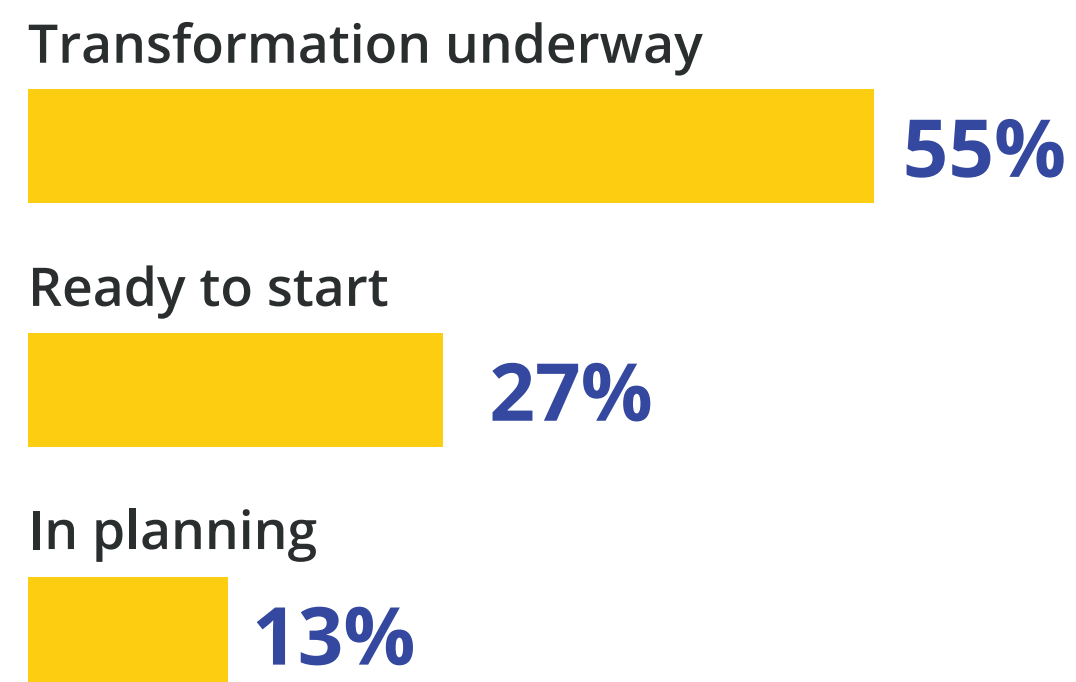
IDC research shows that manufacturers worldwide are rapidly embracing new technologies to transform their business models and operations to improve agility, customer engagement, profit and sustainable competitive advantage.

They are at the heart of the perfect storm, both living with and seeking to exploit, disruptive information technologies such as cloud, big data, AI-assisted analytics and the Internet of Things (IoT), while facing increasing IT security challenges, regulatory pressures and a changing workforce. In the face of new and disruptive competitors, they are changing their businesses radically to offer value-added services and leverage tightly linked ecosystems.

It should be no surprise then that a clear majority of manufacturers are actively planning bold transformation of information architecture, operating models and more. In fact, three quarters of manufacturing companies see digital transformation as an opportunity more than a risk. They are seeking to build the factory of the future, employing advanced enterprise information management (EIM)¹.

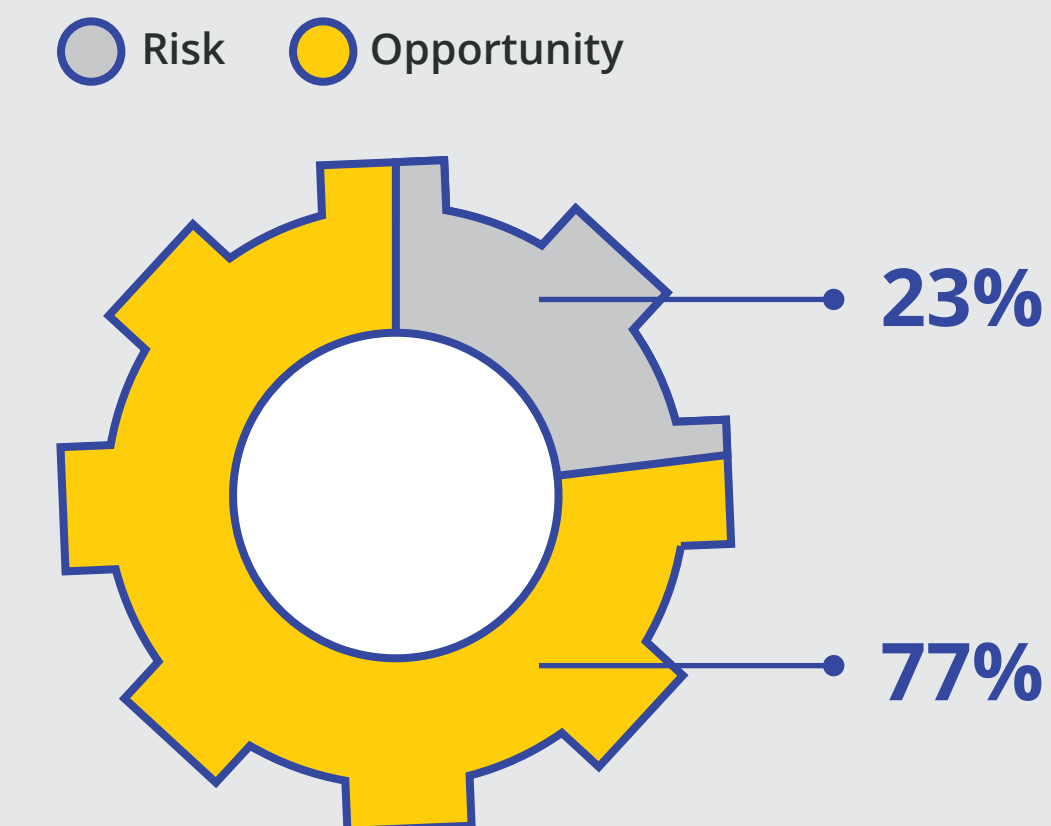
¹ Enterprise information management (EIM) is an integrative discipline for acquiring, structuring, describing, governing and accessing information assets, both structured and unstructured, in a secure, collaborative and easy way across organizational and technological boundaries. EIM improves efficiency, transparency, business insight, decision making and customer engagement to deliver better business results in the new digital economy.

Manufacturing organizations undertaking digital transformation efforts



Two-thirds of European CEOs see digital transformation as a top business priority

Is digital transformation a risk or an opportunity for your manufacturing organization?

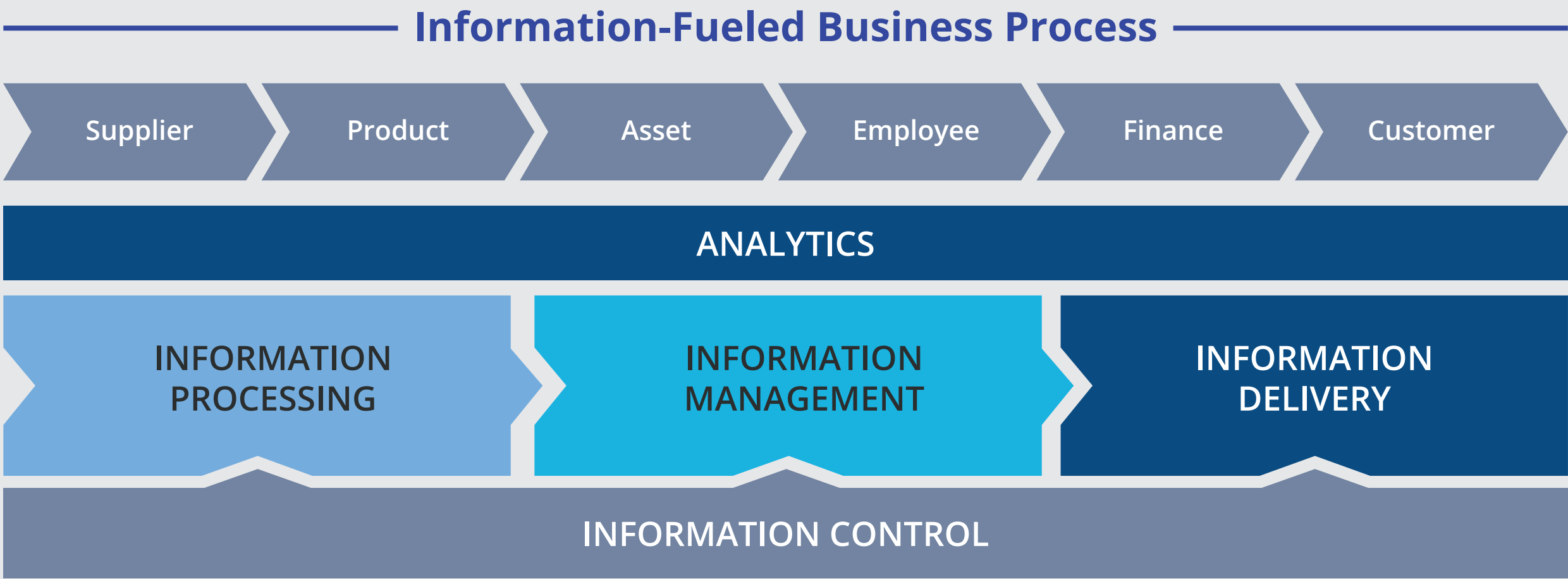
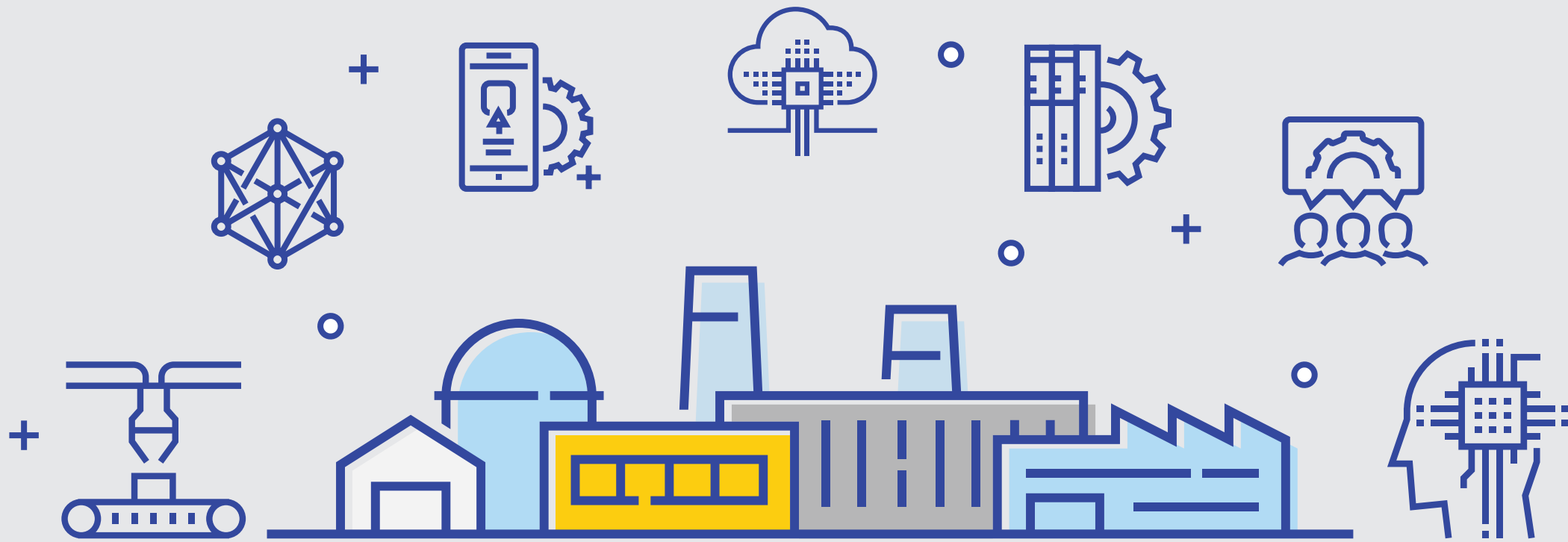


Source: IDC Vertical Insights surveys 2018

Information is at the Center of Business Processes – and the Key to Process Improvement

Technologies including cloud, mobile, big data and AI enable new services and models such as intelligent predictive maintenance and as-a-service, outcome-based business models. In this digital economy, information and analytics are fueling every business process.

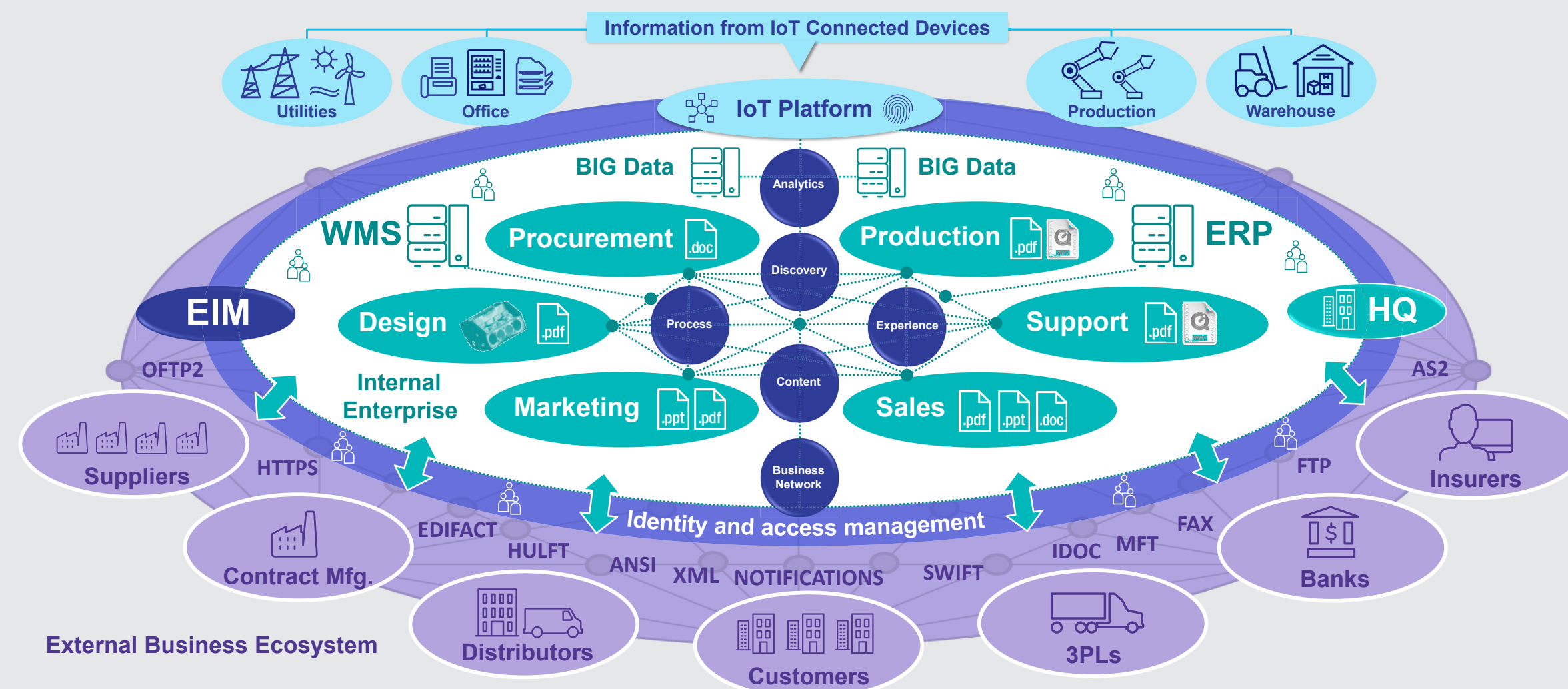
Information is delivered across business processes, from supplier engagement, manufacturing, logistics and asset management to HR, finance and sales and marketing, always as a part of a larger system of ecosystem applications.



Source: © Open Text 2018

Companies Need to Pursue an Integrated Information Management Approach

To be effective, information has to flow in many directions: top-down, bottom-up, from inside out and outside in, between employees... business departments and across the business network. Companies must integrate data analytics, transactional content and content-related services, and provide strong reporting on activities such as content created and received via easily-accessible dashboards.

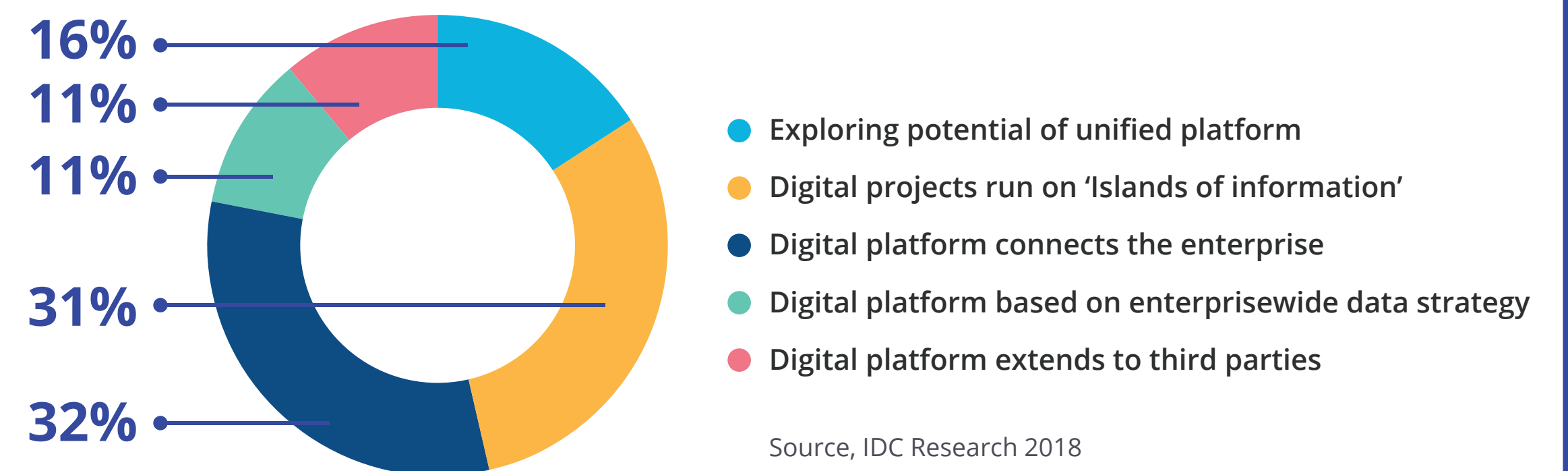


However, most business applications — as originally conceived — excel at managing silos of information, but lack the capability to seamlessly hand data and information to other business processes and applications. In order to effectively cover intra-enterprise processes, companies often need to rely on expensive and cumbersome custom applications or on error-prone manual processes.

Enabling a unified data platform is central to empowering business to work smarter with information to improve productivity, completeness and customer experience, driven by better business insight.

- To digitize, harmonize and improve business operations
- To develop and market digitally enriched or enabled products and services
- To engage with digital customers

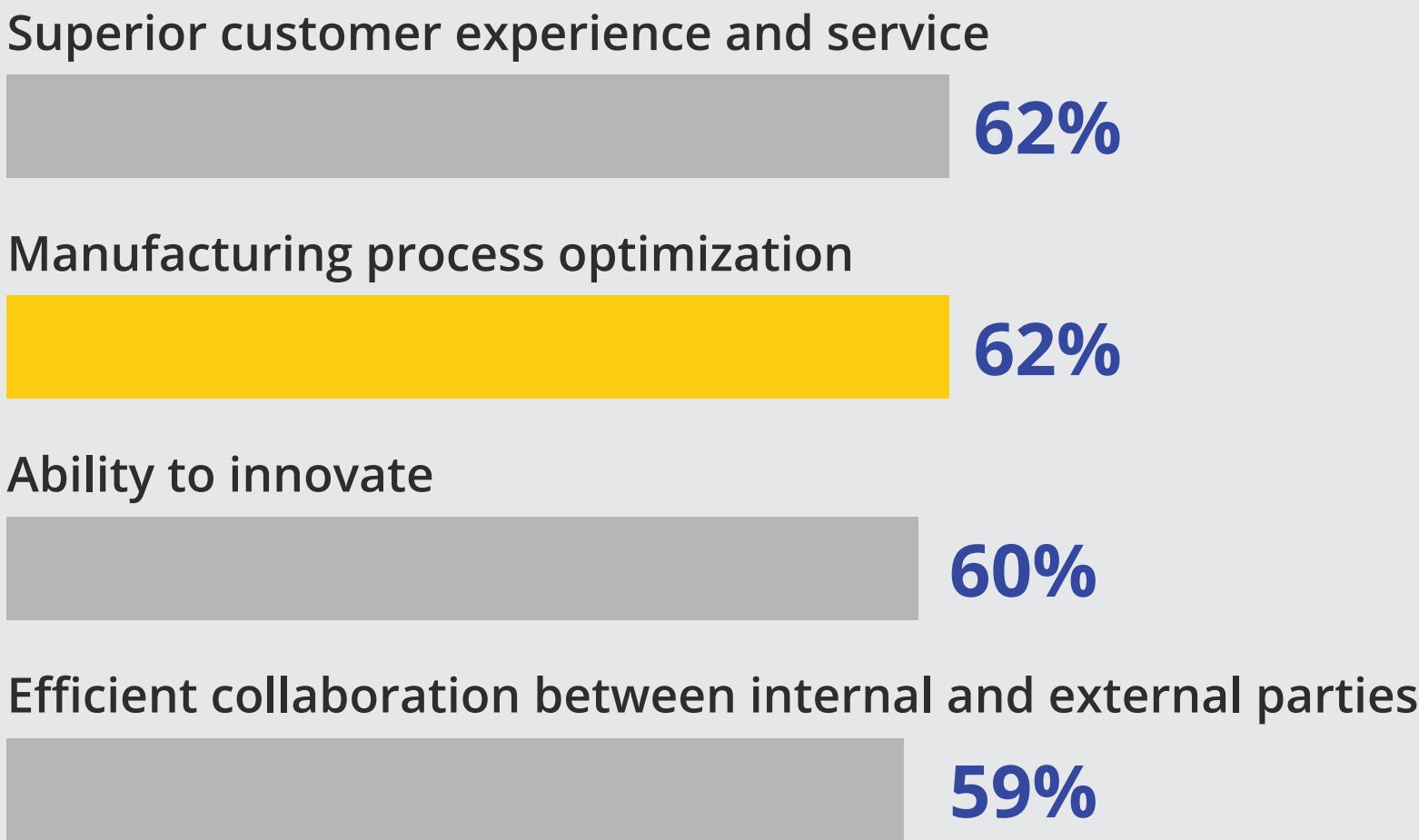
Use of a unified data platform to support digital transformation



An Example of Enterprise Information Management: The Shop Floor

To ride the digital transformation wave, with its emphasis on innovation at scale and building new relationships within their ecosystems, companies must transform their manufacturing processes.

Top outcomes sought by manufacturing businesses looking to digitally transform

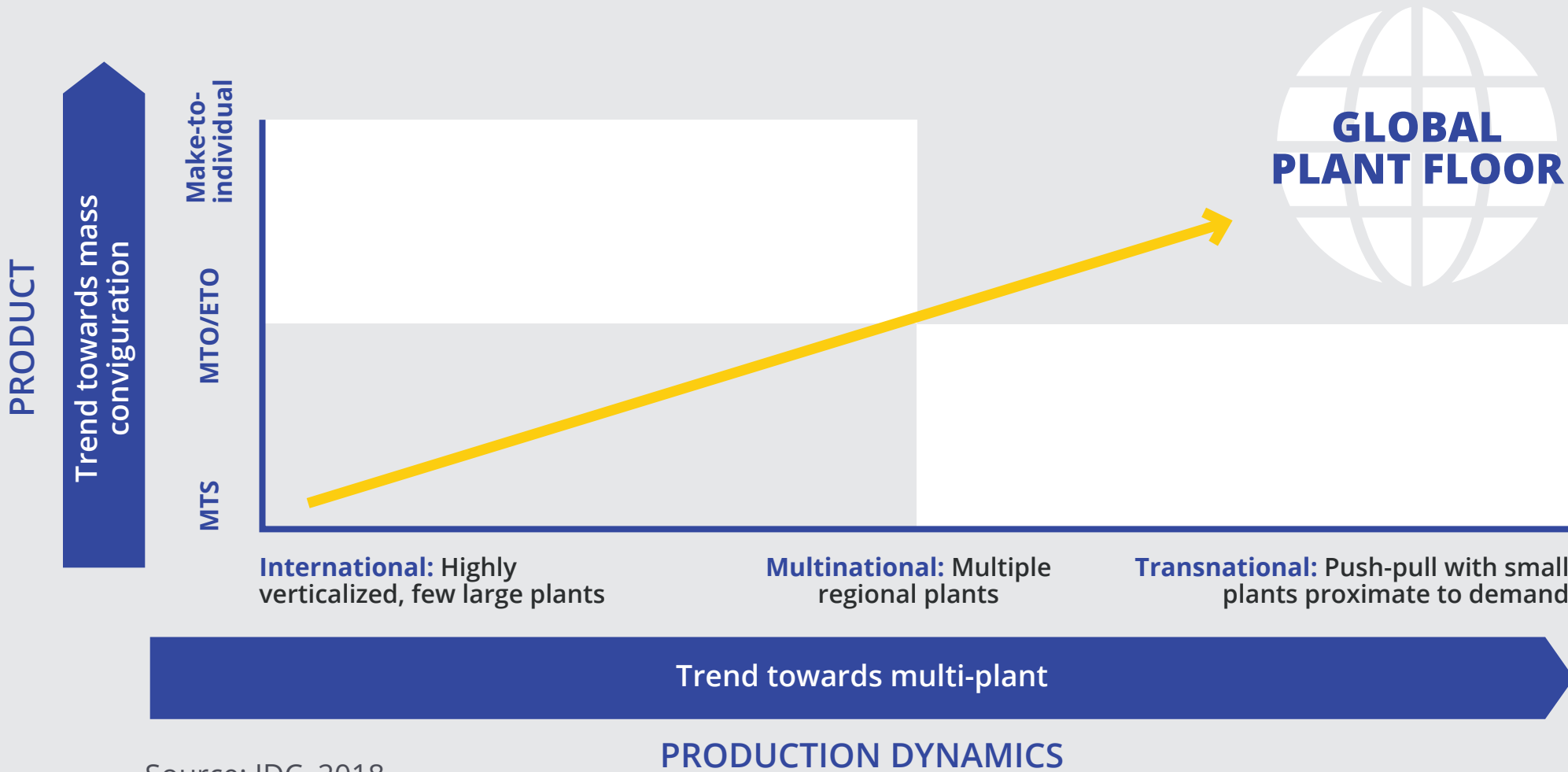


Source: IDC Research, 2017

Indeed, they must set up a network of factories and manage them as a single, virtual factory that consolidates the number of different manufacturing plants in terms of resources, processes and products. They need the ability to harmonize, supervise and coordinate execution activities across the company's and suppliers' manufacturing operations with a greater level of real-time visibility.

In this context, business leaders must seek to couple digital technologies with organizational, operational and business model innovation to create new ways of operating, communicating and growing businesses.

Centers of Operational Excellence (COE) and shop-floor IT are essential to this transformation, and information integration is the key business enabler for creating a platform that helps businesses better share information and manage the bigger picture.” The information itself — not the business applications such as ERP/PLM/MES — moves to center stage.



Source: IDC, 2018

The Factory of the Future Has a Layered Approach to Information

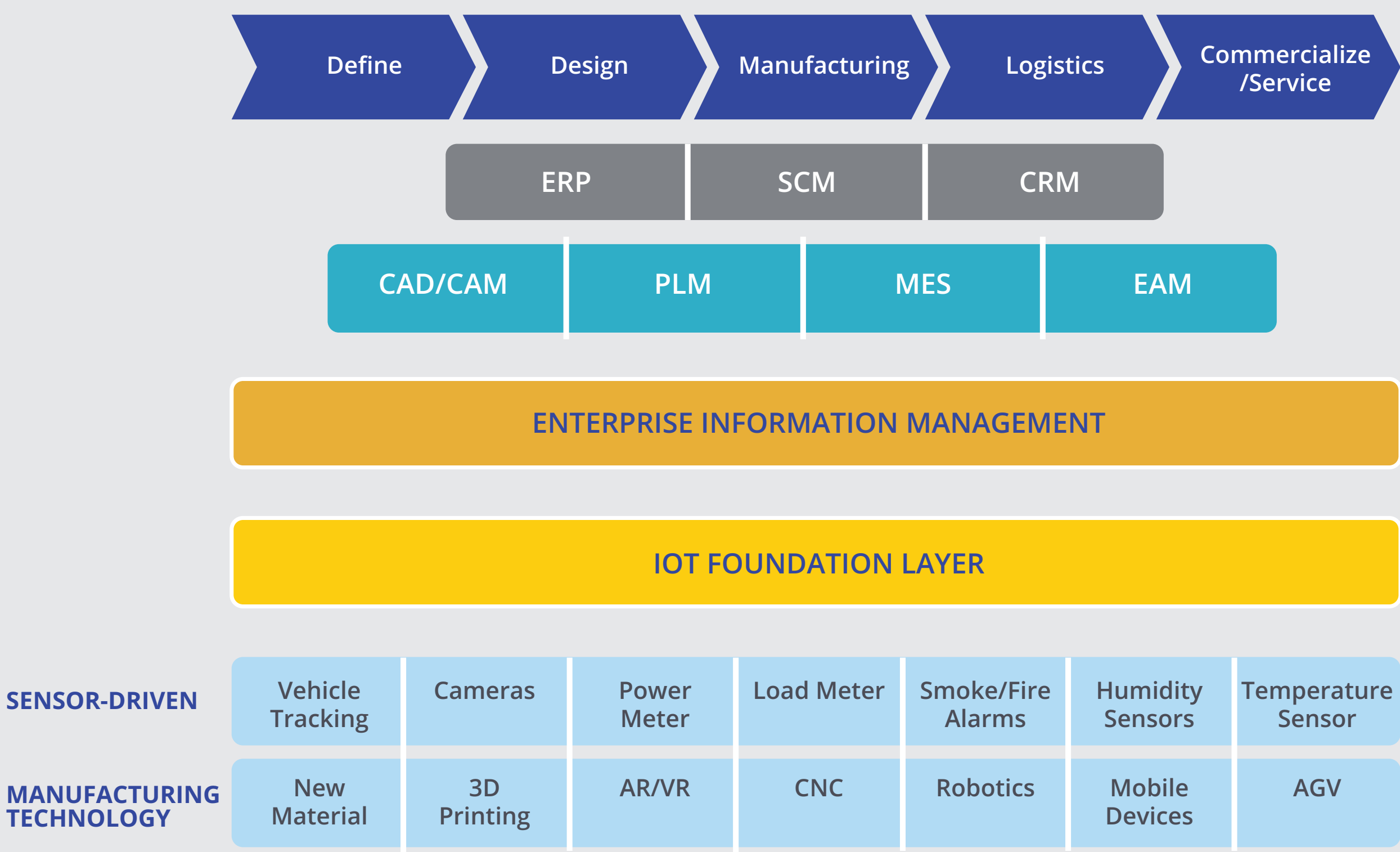
In the Factory of the Future, the foundation layer will be automation intensive: all production processes will be highly or completely automated with few or no people involved in production operations. Digital technologies will make continuous improvement a transactional exercise, allowing people to focus on business reinvention.

This transformation will provide a further growth opportunity for companies deploying advanced automation that will cover all the processes where humans cannot bring any added value.

An IT intensive operational layer will create real-time decision-making environments. The connection between factory technology and enterprise systems is based around an IoT layer supporting the seamless transition from operation technology (OT) to IT systems. This entails dismantling the traditional organizational boundaries that have OT and IT as separated domains.

Above all it will be information-intensive to support people’s decision making. People will be at the center of the Factory of the Future as they provide the degree of flexibility and decision-making capabilities that are required to deal with increasing complexity.

EIM will be the facilitator that eases the exchange of information transparently across organizational boundaries. EIM acts as the information highway assisting the transmission of data between OT and IT for better business outcomes.



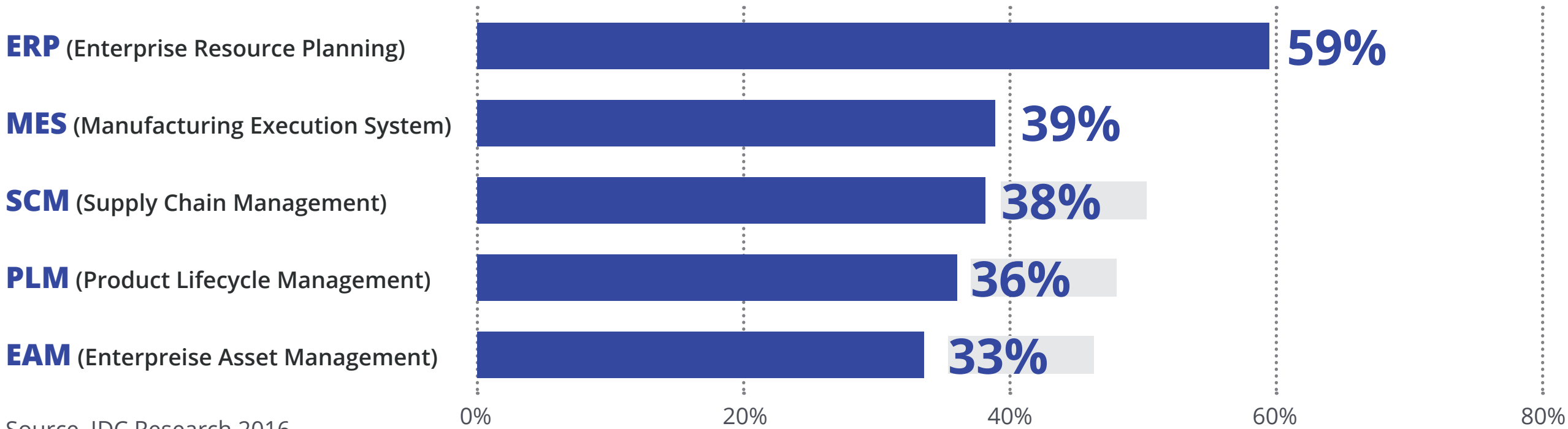
Source: IDC 2018

The Factory of the Future Ecosystem will Leverage Multiple Data Sources with AI-Assisted Analytics

Digital transformation of manufacturing means a highly interconnected supply chain and increased expectations around quality, logistics and security. Digital transformation requires not just integrated processes in a factory, but a tight coupling between suppliers, customers and the manufacturing organization to give greater closeness to the customers and better control over WIP and raw materials; however, the expectations will be towards greater flexibility and agility in the ecosystem.

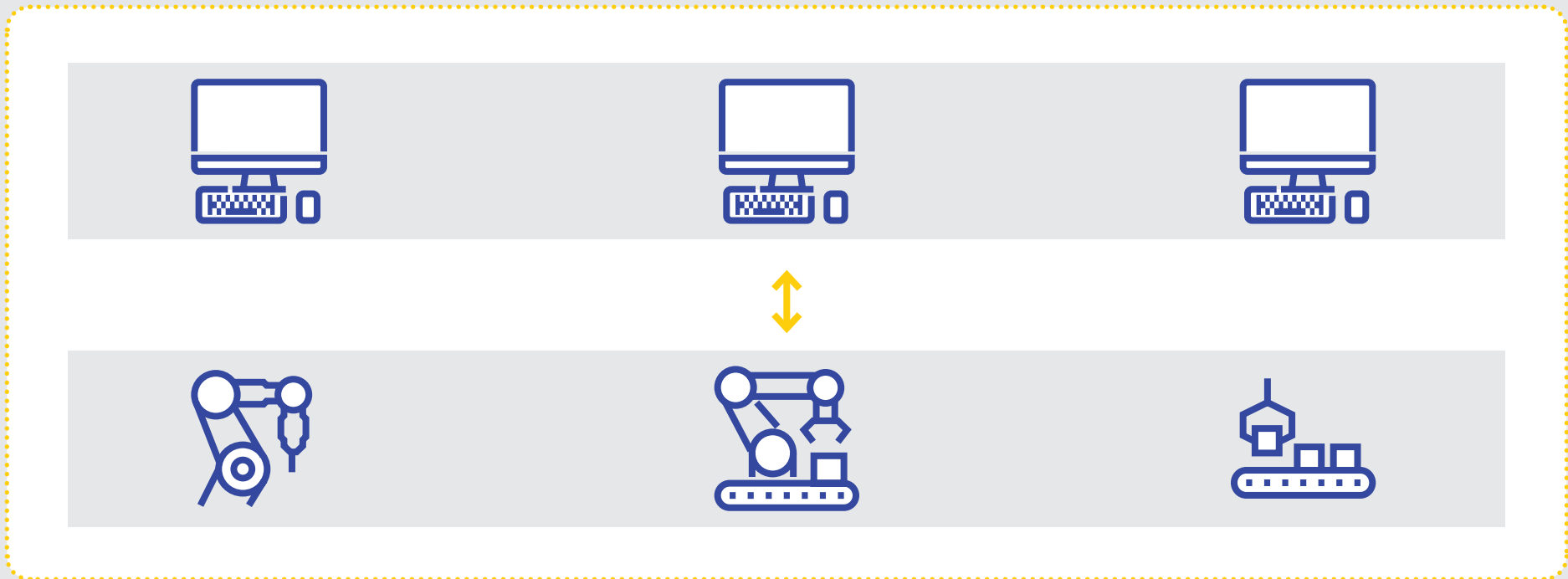
This implies a unified information strategy across the organization and extending across the supply chain. Information sharing will be absolutely vital to support this.

Where manufacturing organizations are seeking to leverage transactional and operational data with advanced analytics:



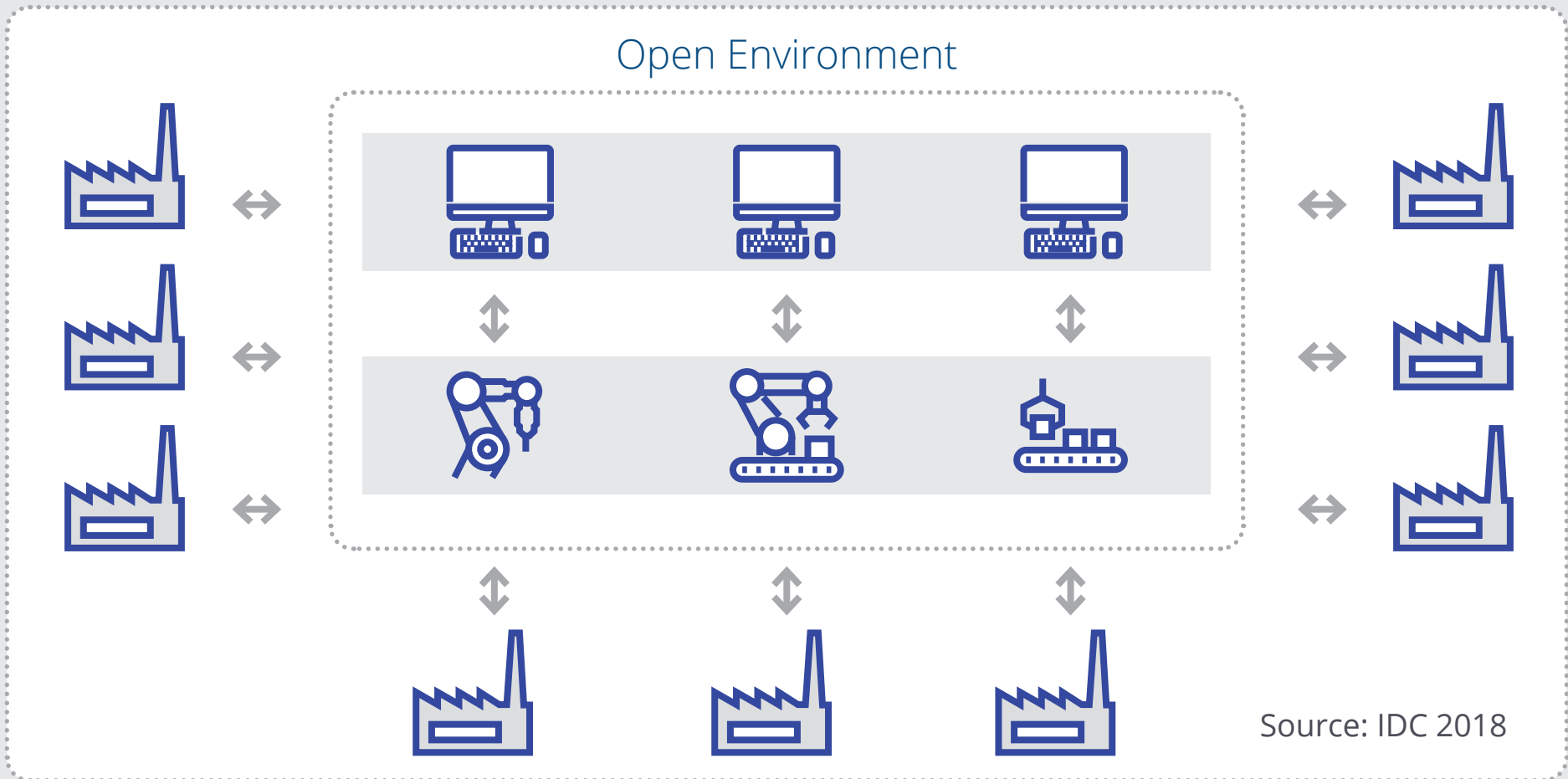
OLD FACTORY

Closed Environment



FACTORY OF THE FUTURE

Open Environment



Source: IDC 2018

Once information is created, it can reach multiple audiences. Mixing advanced analytics of enterprise business data with operations technology data is central to delivering better, more powerful business applications.

Moving Information from Factories to the Supply Chain through Enterprise Information Management

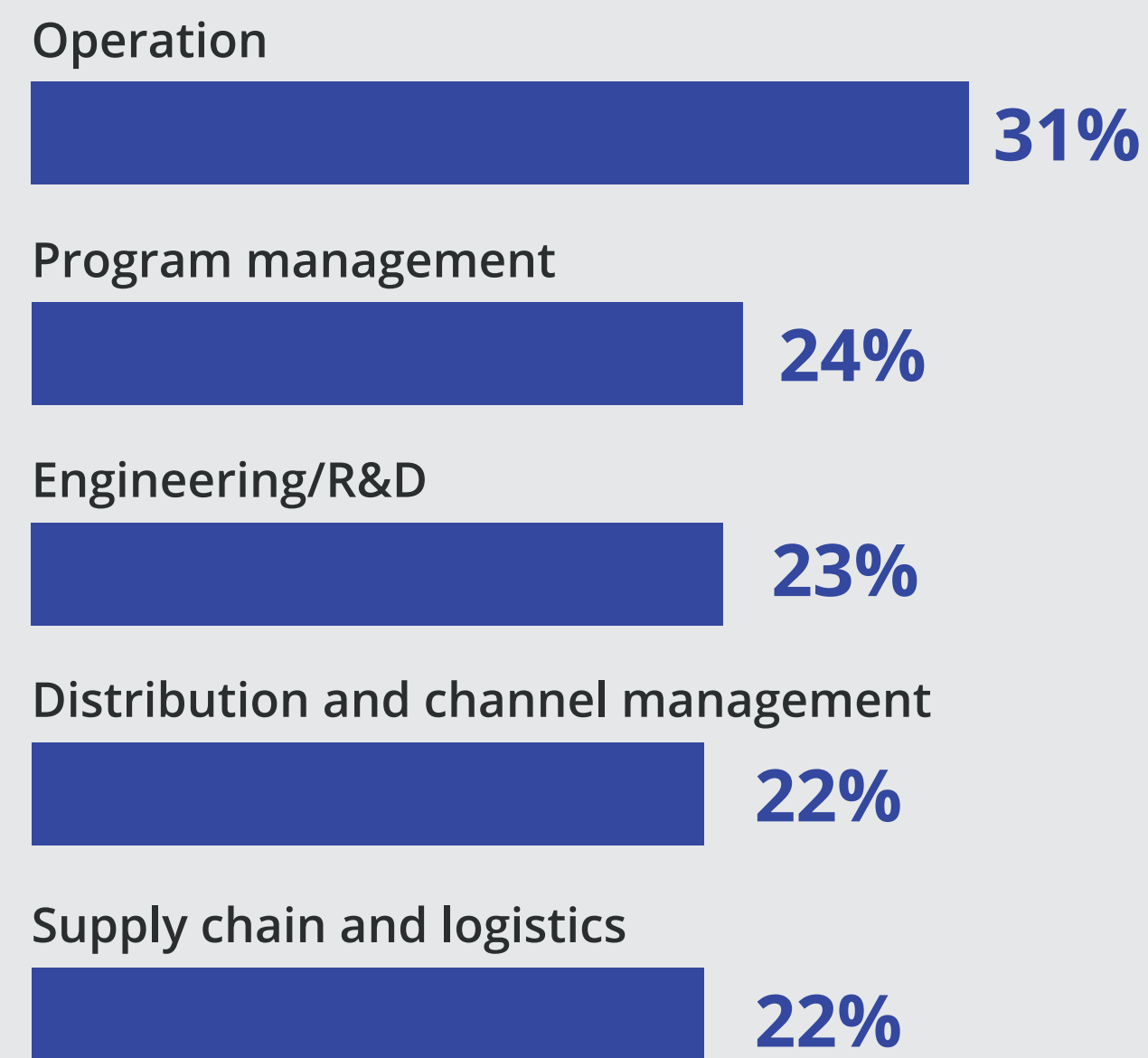
Smart manufacturing leverages innovative technologies and world-class concepts and solutions. EIM capabilities around content management, process management and transaction management, along with big data analytics, can deliver insightful productivity and governance benefits across the board.

Category	Use Case	EIM Enablement
Connected assets/ smart manufacturing	Production optimization/ flexibility	Reading and archiving unstructured data (big data) and using analytics for better equipment management including diagnostics, performance tuning and predictive maintenance
Factory management	Energy management Environment/security management	Storing and analyzing information to support optimization initiatives and regulatory compliance
Connected supply chain	Inventory management Item traceability	Connecting shop floor to top floor: link with ERP and component/material sourcing Supporting traceability by enabling drill-down analysis on processes and B2B transactions
Connected products	Warranty service	Understanding the data journey across the life cycle assisting the customer experience. New revenue streams through value-added content in the form of information.

Cloud — the Essential Underpinning for a Unified Information Management Strategy Across all Business Units

Unified information platforms across IT and OT and across industries will need to rely on hybrid approaches. While data storing will be managed on premise, there is certainly an opportunity to move APIs to a secure, cloud-based environment. Digital transformation is implicitly linked to changed relationships between manufacturers and their partners, suppliers, and customers. Cloud-based storage and processing is the natural consequence of this, while also giving agility, scalability and cost-effectiveness. Furthermore, the synergy between cloud and big data analytics, amplified by the widespread distribution of mobile tools, will prove to be key. Companies realize the short-term opportunity of using cloud to analyze information and create shop floor visibility across the organization.

Manufacturing functions that will benefit from cloud



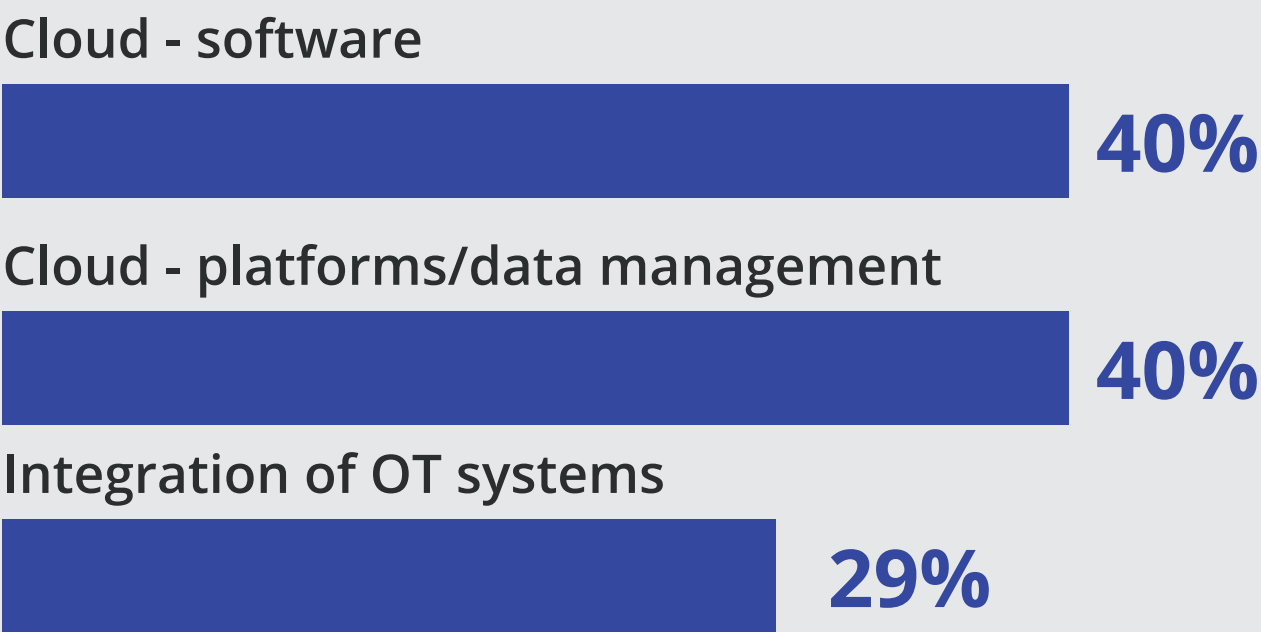
Source: IDC 2018



Cloud — the Essential Underpinning for a Unified Information Management Strategy Across all Business Units (continued)

Cloud investment and integration of operational technology with information technologies will take a high priority among operational technology investments, with more than 40% of companies prioritizing investments in cloud software and platforms to support their OT processes. This far exceeds investments in pure hardware, sensors and connectivity.

Within your operating technology (OT) budget for 2018, what are your top three priorities for investment?



Source: IDC Research 2018

An increasing number of companies are therefore establishing an enterprise-wide cloud strategy. They see cloud as the fabric to establish a companywide platform enterprise information architectures, taking information from the shop floor to create actionable information for decision-makers.

Status of cloud



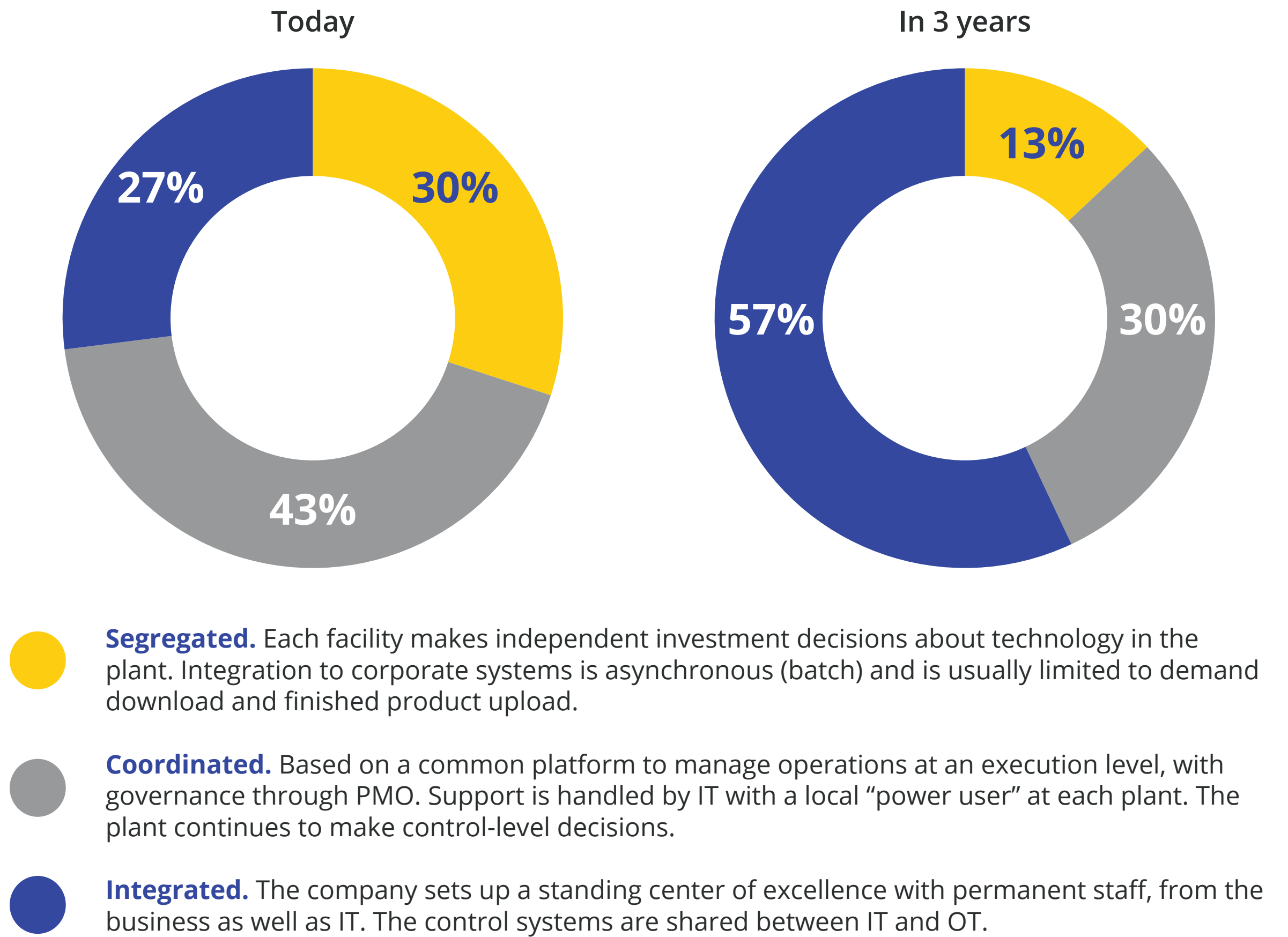
Source: IDC Research 2018

A Drill-Down on IT/OT Integration

Too many companies have a segregated approach to IT/OT integration, where each plant makes independent investment decisions about technology in the plant through execution and plant scheduling. Integration with corporate systems is asynchronous (batch) and is usually limited to demand download and finished product upload. However, things are changing. We see more and more companies looking at coordinated integration models as they create a common platform to manage operations at an execution level. The trend will be for companies to achieve an integrated vision enabled by standing centers of operational excellence with permanent staff.



Status of OT/IT Integration



Source: IDC Research 2018

Intelligent and Connected Manufacturing Directions Enable Smart Manufacturing

Ultimately, the move to smart manufacturing requires movement along multiple dimensions and enterprise information management is tracking these to become a modern state-of-the-art digital backbone for the smart manufacturer.

Investments around the 3rd platform, which is cloud-centric, have been a business imperative in recent years. These investments now pave the way for future innovation and set the stage for a smooth transition to the 4th Platform, which is based on cognitive and AI-based operations



Essential Guidance

Being a digital company is more than having the right technologies.

- Manufacturers are on the verge of a revolution in the way they use information. Everybody will need to access information through cloud, mobile tools and even wearables. Be aware: the more information that is available, the more it will be requested by shop floor users and other business units.
- Users will want a continuous stream of information from integrated applications. In order to be relevant to the business, CIOs will need to find a way to bridge the gaps between business applications as well as to continuously update existing applications for the latest and greatest functionality.
- Make sure you have the necessary technical and organizational foundation for smart manufacturing in place before starting the initiatives, specifically looking at how IT/OT functions need to be integrated.

Enterprise Information Management impacts every manufacturing process. Companies need end to end information management tools and concepts.

- Enterprise applications, content and document management, master data management and IoT will all converge to create this integrated information and process flow.
- Carefully plan the transformation steps to avoid delays. Before achieving seamless, real-time and bidirectional data and information flows, there will be many changes and disruptions to roles and processes.
- Consider the concrete outcomes to be a higher priority than eliminating information silos. Every single piece of information has to be delivered to multiple audiences, but with the right script and context around it.

Manufacturing organizations must look to implement an integrated governance model — this will be the norm within 5 years

- Clearly define the value that is sought through the adoption of modern technologies. Relevant business cases must be sold throughout the manufacturing organization, starting from the plant floor.
- The fundamentals of a smart manufacturing initiative will require secure plant floor connectivity – for IP equipment and mobile devices, analytic capabilities (either in-house or sourced), robotic skills (hardware & software), system integration from shop floor to top floor and possibly customer to supplier, and IT/OT integration.
- An evolving and ever-tightening regulatory and IT security environment must also be considered. Business and IT must work together — it's too important to be left to IT alone.

Bottom Line Every company has to learn that new technology in an old organization just makes the old organization more expensive.

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