Rockwell Automation | PLEX

7TH ANNUAL
STATE OF SMART MANUFACTURING REPORT

Responding to market adversity with agility, improved processes, and technology adoption
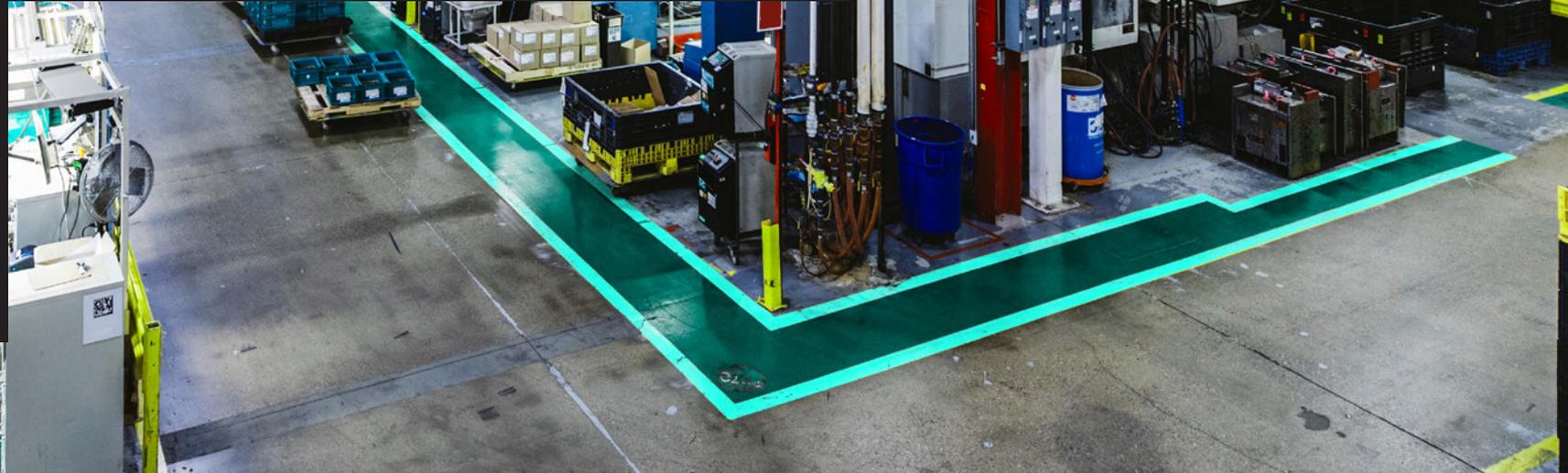
Participants in a recent global survey of 321 manufacturers communicated the need for agility, technology adoption, and improved processes to respond to market adversity.

The 2022 State of Smart Manufacturing Report is the most robust edition yet. While participants span the globe, the results reflect general consistency in major factors impacting manufacturers.

This study from Plex Systems, a Rockwell Automation company, in collaboration with Hanover Research, uncovers the current state of smart manufacturing, the challenges manufacturers are facing, and expectations for the future of the industry.

With the findings and recommendations in this report, as well as the accompanying checklist found on , you can create your own technology adoption action plan and embrace the future of smart manufacturing.

SMART MANUFACTURING:

The intelligent, real-time orchestration and optimization of business, physical, and digital processes within factories and across the entire value chain. Resources and processes are automated, integrated, monitored, and continuously evaluated based on all available information as close to real time as possible.

MESA International

SMART MANUFACTURING ADOPTION ACCELERATED BY 50%

Technology and automation are driving the next generation of manufacturing, and smart manufacturing adoption will continue to accelerate in 2022.

Modularization of software, which allows for incremental technology adoption, is gaining traction as manufacturers look to become more agile in the face of adversity.

- Smart manufacturing adoption **grew by 50% year over year.**
- Environmental, social, and governance (ESG) efforts are being more highly prioritized.
- Barriers to entry are lower, leading to a higher level of adoption and a more attractive ROI.

THE PANDEMIC EXPOSED 3 EVOLVING BUSINESS CHALLENGES

The 2021 and 2022 State of Smart Manufacturing Reports made clear that the pandemic exposed and exacerbated pre-existing conditions that manufacturers had previously tolerated or used band-aid solutions to address. Supply chain management, skilled worker shortages, and risk mitigation require a new approach.

- Modern supply chain management solutions need to account for the complexities of today.
- With over **800,000** unfilled manufacturing roles, a new approach is needed to solve for the skilled worker shortage.
- Risk mitigation continues to evolve, and it's essential to advance with it.

ONCE OVER-HYPED TECHNOLOGIES ARE SOLVING TODAY'S PROBLEMS

Technologies that were once viewed as over-hyped and unlikely to contribute in a meaningful way are now deemed vital to success. Cloud, industrial hardened devices, and process automation are helping companies overcome challenges with the skilled worker shortage, supply chain management, and risk mitigation. Additionally, augmented reality and wearables are gaining mainstream adoption by helping to quickly onboard new employees and attract fresh talent.

- **49%** of respondents — up nearly 20% year over year — are using some form of smart devices (AR, mixed reality, wearables).
- **75%** of respondents view technology as a key solution to address workforce challenges.
- Manufacturing enterprises that present themselves as tech-forward are more appealing to prospective employees.

83% of survey respondents believe smart manufacturing is a key to their organization's future success

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STAYING COMPETITIVE IN 2022 AND BEYOND

There's never been a more pivotal time in manufacturing. The pandemic exposed the depth of challenges that manufacturers are facing, including supply chain disruption, skilled worker shortages, and risk mitigation. Environmental, social, and corporate governance (ESG) has also emerged as a must-address component of the business. At the same time, the combination of data-driven insights, speed, and automation has never been more accessible. All of this is accelerating the adoption of smart manufacturing. Here are a few stats to think about from this report:

- Smart manufacturing adoption rates increased **50%** from 2021 to 2022, meaning **2 out of every 3** manufacturers are currently using some form of smart manufacturing component.

- Indecision due to an overload of technology investment options is a leading growth obstacle for the first time, with over **20%** of respondents selecting it.

- While **78%** of manufacturers have a supply chain planning point solution, **38%** of respondents said they plan to invest in supply chain planning, indicating that their current solution is not enough.

- Over **80%** of respondents for both the 2022 State of Smart Manufacturing Report and NAM's (National Association of Manufacturers) Outlook Survey stressed the importance of attracting and retaining a quality workforce.

The time for action is now. Forward-looking, informed leaders are making the decisions that will pave the way to success this year, while also stepping back to assess where those decisions will lead the company in five, ten, and fifteen years.

Plex's annual State of Smart Manufacturing Report has tracked the most pressing issues over much of the last decade. The skilled worker shortage, supply chain disruptions, and risk mitigation show up as key industry-level growth obstacles every year, but the reasons for each are ever-evolving. To solve for these problems and other dynamics yet unknown, technology – specifically smart manufacturing – is the key. Drivers like the increase in plant-level data, greater machine and human connectivity, the growth of Industrial IoT, and the practical use and affordability of once-hyped technologies are changing manufacturing and expanding human possibility.

This report will help you benchmark your technology usage and uncover best practices to help your organization stay competitive and thrive not just today or tomorrow, but next year and every year thereafter. **Start your journey today.**

Sincerely,

Tessa Myers

Vice President and General Manager

Plex Systems, a Rockwell Automation Company

THE CURRENT STATE OF SMART MANUFACTURING

Technology and automation are powering the leaders in today's manufacturing space while driving the next generation of manufacturing innovation. This year's survey results build on Plex's previous reports, reaffirming that technology adoption continues to accelerate, and previously over-hyped technologies are now solving the industry's critical challenges.

INDUSTRY OBSTACLES AND OUTLOOK

It's impossible to describe the current state of manufacturing without addressing one of the biggest factors impacting the world — 2020 and 2021 were defined by the devastating ripple effects of COVID-19.

The survey results from the last two years make this abundantly clear through the responses that ranked the pandemic as far and away the biggest obstacle facing manufacturers. **But both surveys also made clear that the pandemic exposed and exacerbated pre-existing conditions.**

Growth obstacles

2021 Report — occured during the worst part of the pandemic

2022 Report — respondent's view at time of survey (Oct 2021)

COVID-19

Shortage of skilled workers

Security risks

Supply chain disruption

Q: Which of the following are the biggest obstacle(s) to your organization's current growth as of calendar year Q3 2021? (n=321)

> Digital manufacturers benefited from a **26%** increase in their revenue performance index (RPI) and a **27%** increase in their profit performance index (PPI), whereas nondigital manufacturers experienced decreases of **9%** in RPI and **2%** in PPI.

—Reid Paquin

Research Director, IDC Manufacturing Insights

IDC Technology Spotlight, sponsored by Plex, The Importance of Manufacturing Automation for Digital Transformation, doc #US48798322, January 2022

THE ACCELERATION OF SMART MANUFACTURING ADOPTION

While adoption accelerated in the wake of the pandemic, this survey shows that it acted as a catalyst to force decisions along with the speed of adoption.

50% year over year increase in smart manufacturing adoption rates

60% of all companies are now using either a fully integrated solution or have some components of smart manufacturing in adoption

75% of organizations will have some components of smart manufacturing in adoption by the end of 2022

■ *2021*   ■ *2022*   ■ *projected 2023*

	2021	2022	projected 2023
No plans	5%	2%	2%
Interest	15%	10%	5%
Evaluating	40%	28%	18%
Adopted or executed	40%	60%	75%
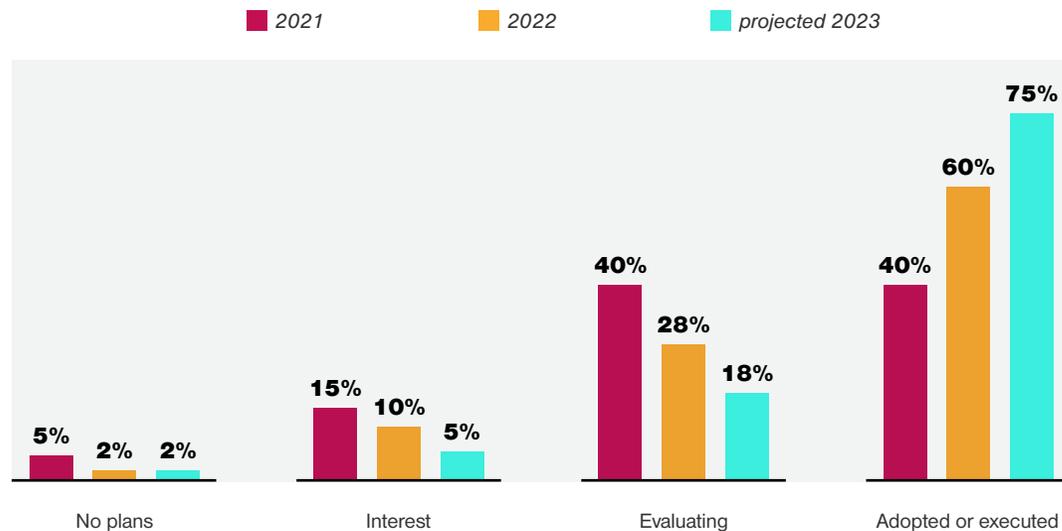
Q: To what extent has your organization adopted smart manufacturing? (n=321)

KEY SOLUTIONS

Enterprise Resource Planning (ERP) automates front- and back-office processes, including financial management, revenue management, human capital, order management, billing, and inventory.

Manufacturing Execution System/Suite (MES) tracks and documents the transformation of raw materials into finished goods, providing real-time production management to drive enterprise-wide compliance, quality, and efficiency.

Quality Management System (QMS) standardizes and automates quality documentation, processes, and measurements.

Supply Chain Planning (SCP) combines data from multiple departments across the business to sync demand and supply forecasting to improve inventory accuracy and production management.

Production Monitoring provides seamless connectivity to machines on the plant floor, delivering transparent, real-time operational KPIs and dashboards to drive continuous improvements.

Asset Performance Management (APM) combines process, operational, and machine-level data through dashboards to monitor machine and plant health, ensuring optimal uptime, throughput, and maintenance needs.

MES Automation and Orchestration connects your MES to the plant edge to control information flow, processes, and workcenter setup.

Smart manufacturing adoption timeline for those in consideration

12%	32%	42%
Next 6 months	Next 7–11 months	Next 1–2 years

Q: When does your organization plan to adopt smart manufacturing? (n=125)

Adoption is coming. Today, **28%** of manufacturers are evaluating smart technology adoption but haven't started their digital transformation yet.

Smart manufacturing initiatives in consideration for adoption

Enterprise Resource Planning (ERP)

Quality Management System (QMS)

Manufacturing Execution System (MES)

Supply Chain Planning (SCP)

Industrial IoT (IIoT)

Production Monitoring

Advanced Analytics

Asset Performance Management (APM)

Enterprise Asset Management (EAM)
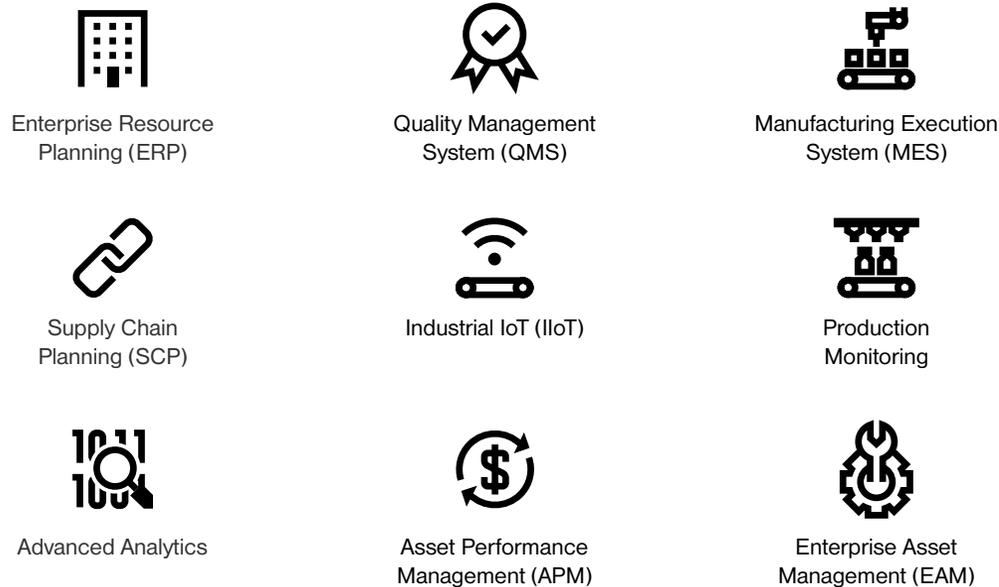
APAC leading the charge for adoption

Percentage of respondents that are evaluating adoption and plan to adopt in the next 7–11 months

48%
APAC
(Asia-Pacific)

20%
North America

33%
EMEA
(Europe, Middle East, and Africa)
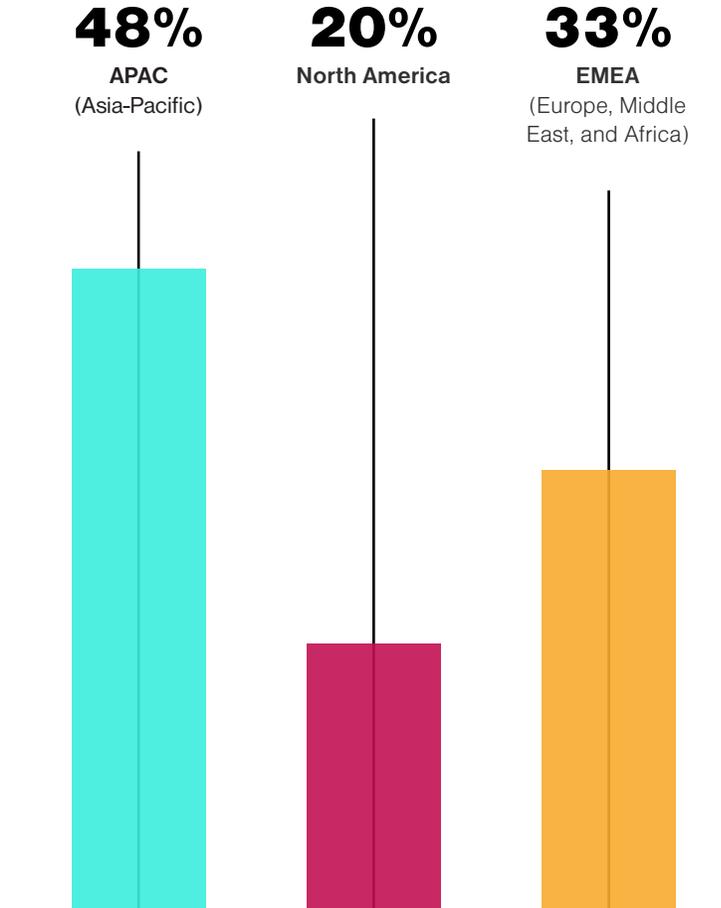
PRODUCTION MONITORING AND SUPPLY CHAIN PLANNING ARE CRITICAL TO OPERATIONAL SUCCESS

While all aspects of smart manufacturing are similarly desired, production monitoring and supply chain planning took the top ranks as "mission critical components" that organizations need to operate successfully.

Solutions like these can also bring quick time-to-value and help set the stage for a manufacturing execution system (MES) and/or enterprise resource planning (ERP) implementation.

The current trend of modularization of technology makes it possible to incrementally adopt solutions and achieve value quickly.

As manufacturers look to streamline processes and solve today's challenges, they place value on demonstrating the success and financial viability in live operations.

How do smart manufacturing solutions rank?

■ A lot — It plays a significant role in our operations   ■ Mission-Critical — Our organization could not successfully operate without this

	A lot	Mission-Critical
Enterprise Resource Planning	49%	19%
Production Monitoring	42%	24%
Quality Management System	44%	21%
Supply Chain Planning	40%	22%
Asset Performance Management	46%	16%
Manufacturing Execution System	41%	21%
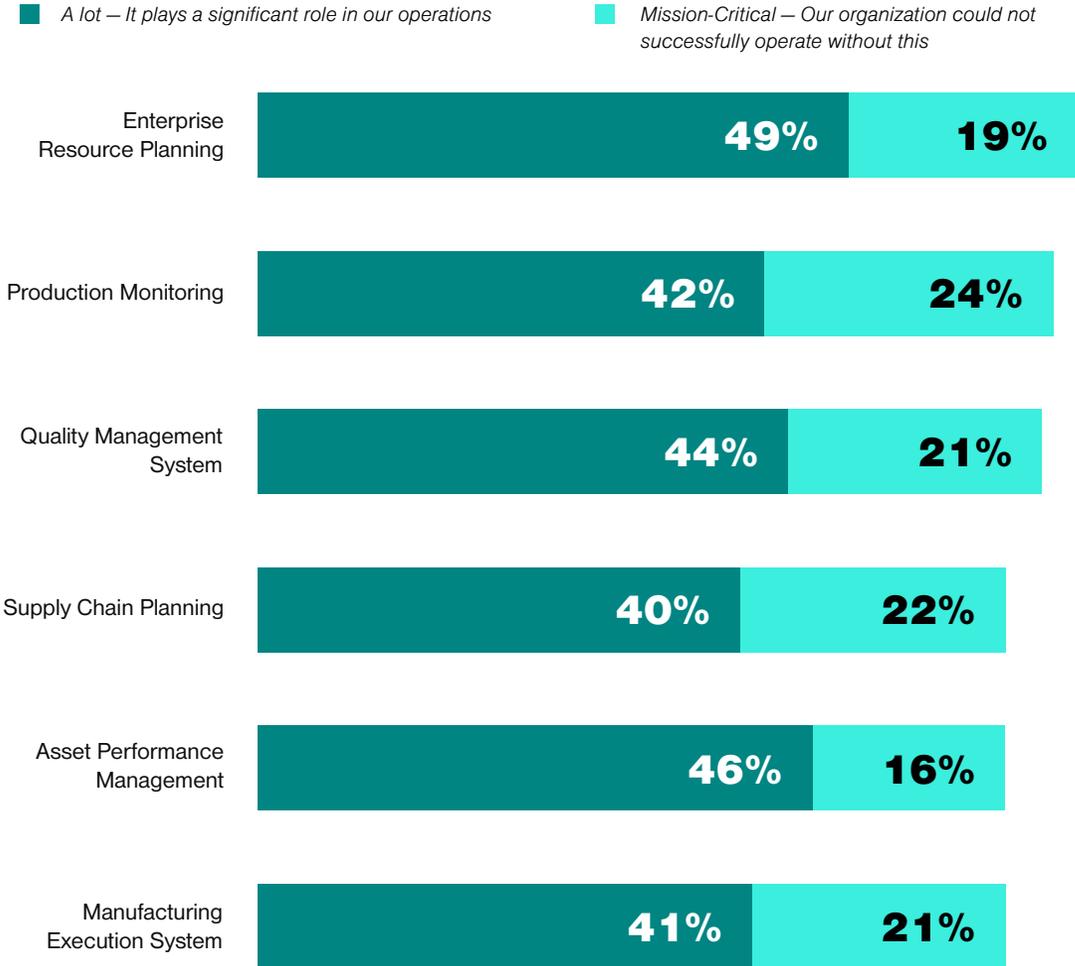
Q: Over the last year, how big of a role has each of the listed components of smart manufacturing played in your organization's operations? (n=321)

MANUFACTURERS' STRATEGIES FOR MITIGATING RISK

Of the 321 manufacturing respondents for this survey, roughly half reported they are adopting cloud technologies and managing cyber security risks to ensure business continuity.

Manufacturers' strategies for mitigating risk

48%	46%	41%	39%	36%
Managing cyber security risks	Adopting cloud technologies	Ensuring data accuracy for reporting and informed decision making	Developing a plan in case of operational disruption	Evaluating critical suppliers
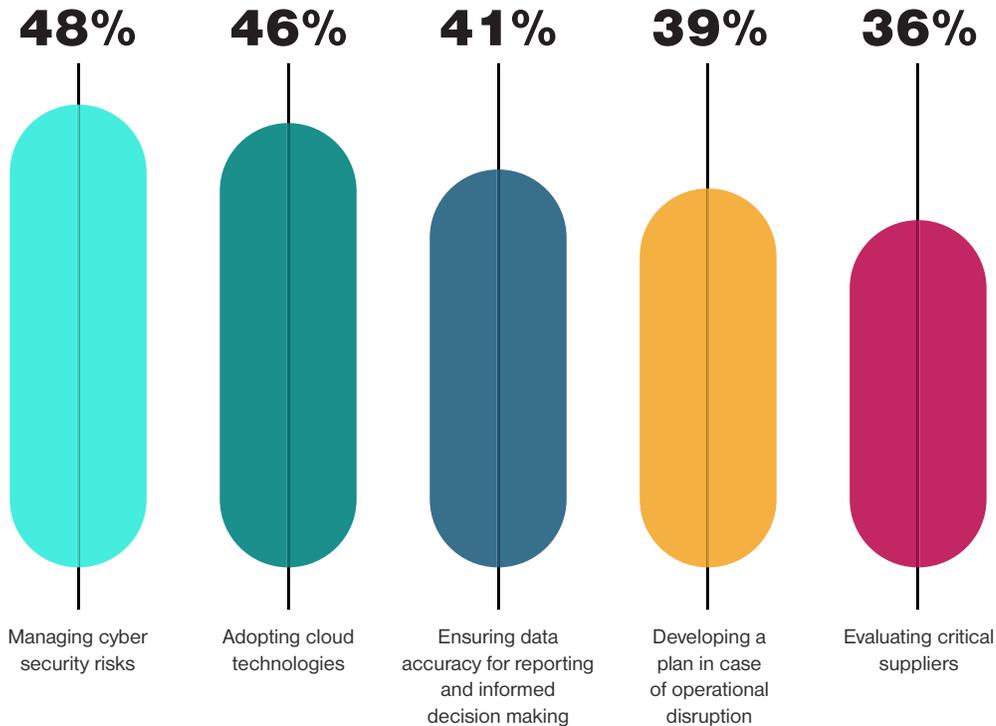
Q: How is your organization currently mitigating risk? (n=321)

> "The impact of COVID-19 underscores the necessity for more pervasive access and control, and the benefits of cloud-based solutions in not only enabling the new "work from anywhere" paradigm, but as a fundamental next-generation technology enabler."

—Gartner®, Cloud Computing in Manufacturing Is Foundational Today and the Requirement to Operate in the Future, Rick Franzosa, 29 October 2020

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ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) EFFORTS

This year's respondents overwhelmingly demonstrate the increasing focus on sustainability and ESG, motivated by the desire to show better stewardship, community leadership, and competitiveness.

Current efforts around ESG

97% stated that they have a formal or informal policy in place

- We have a formal, company-wide ESG or sustainability policy in place to guide our investments and strategic initiatives
- Some of our locations have a formal ESG or sustainability program
- We have informal programs in place but not an official stance
- We do not have any ESG/ sustainability policies in place
- I don't know
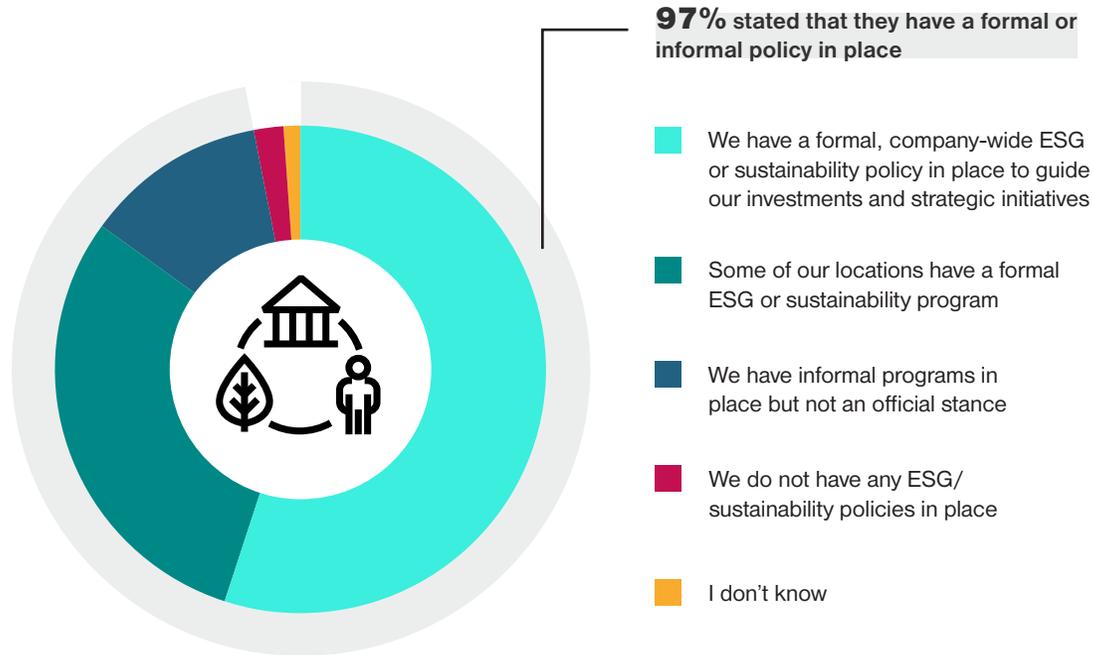
Q: Which of the following best describes your organization's current efforts around ESG/sustainability? (n=321)

Motivation for pursuing ESG

42%
To address social inequalities

42%
Fosters a collaborative environment

41%
To build our presence in the community

41%
To address potential environmental issues

39%
A competitive differentiator

39%
A desire to do good
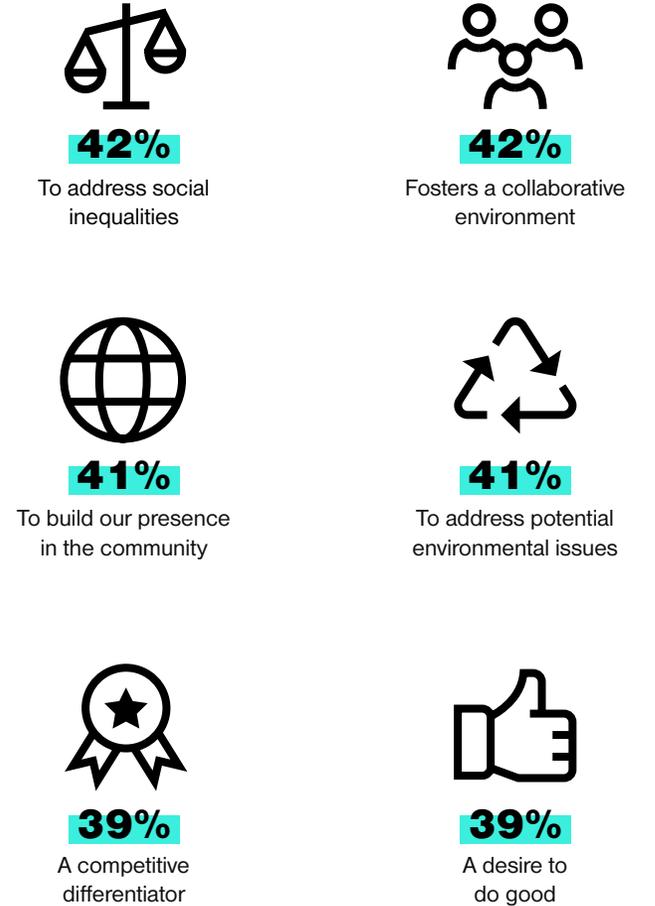
Q: Which of the following drives or motivates your organization to pursue ESG/sustainability? (n=321)

Top processes in manufacturing ESG/sustainability programs

Process	Percentage
Energy management	**47%**
Recycling	**42%**
Commitment to "eco-friendly" processes	**42%**
Supplier selection criteria	**42%**
Carbon offsetting/ carbon neutral	**40%**
Water conservation	**38%**
Community investments	**31%**
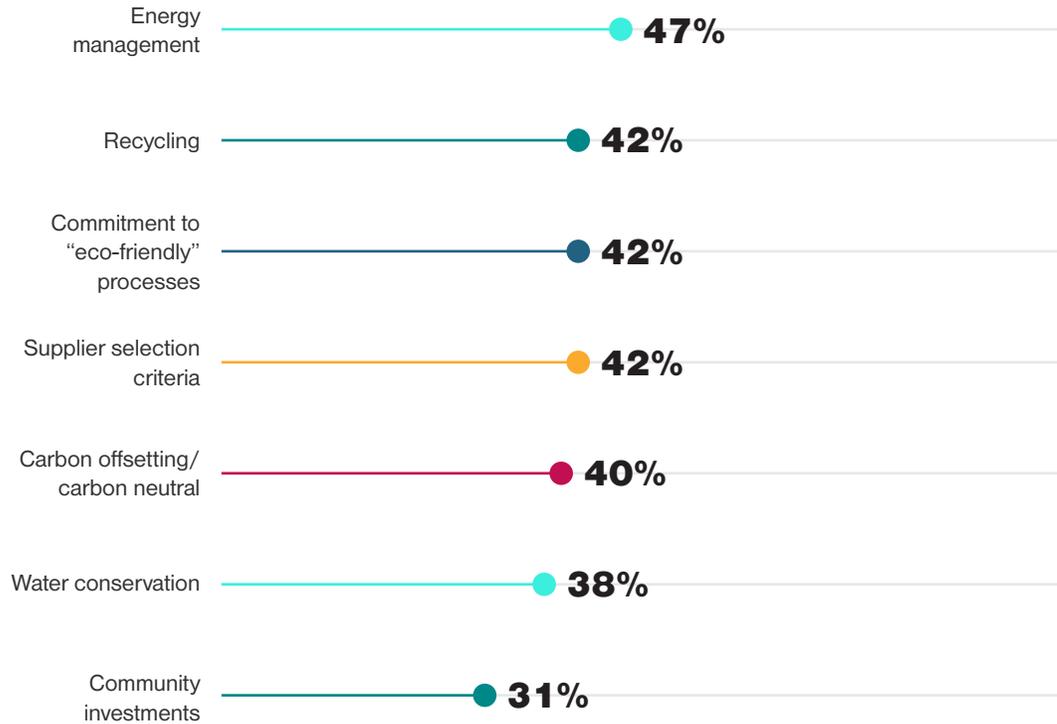
Of the items included in manufacturer ESG programs, energy management, recycling, and commitment to "eco-friendly" processes ranked as the top three steps for action.

Q: Which of the following are included in your organization's ESG/sustainability program? (n=311)

"Technology eliminates hundreds of thousands of pounds of paper waste. Using our own advanced automation technology, we reduced paper job packets for our engineered-to-order (ETO) products by 70%.

—2021 Sustainability Report, Rockwell Automation

System investment to support ESG efforts
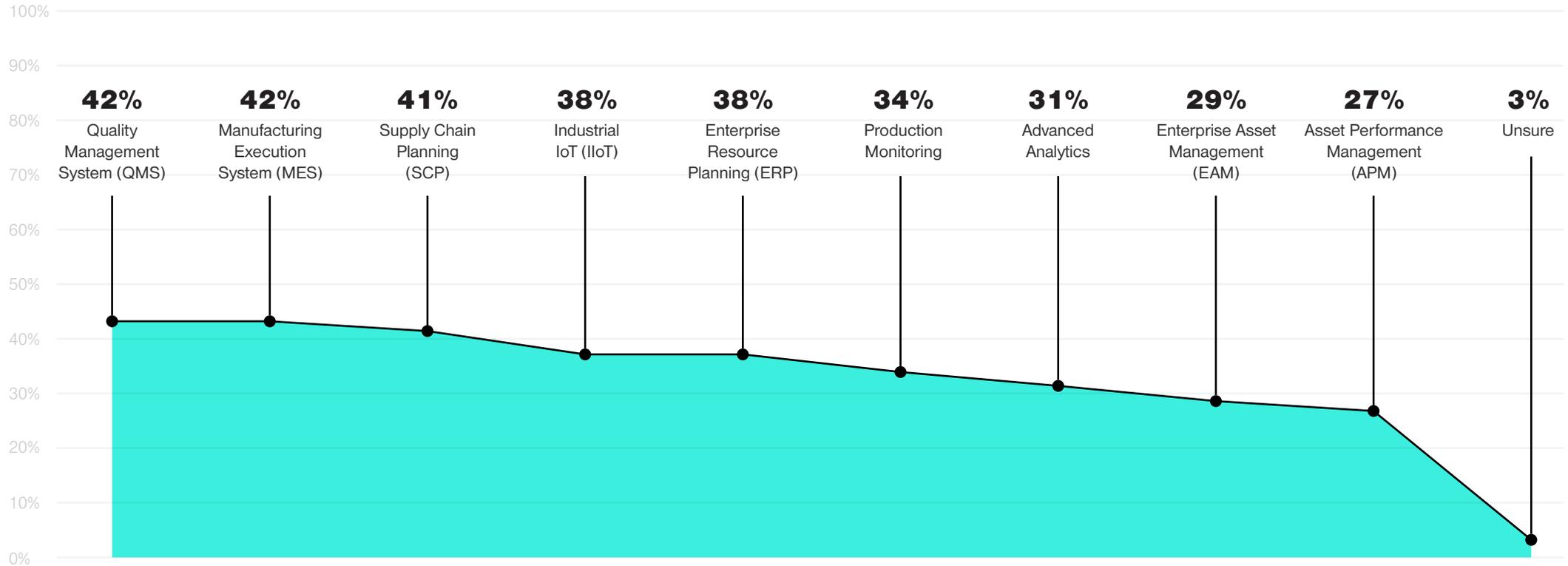
	QMS	MES	SCP	IIoT	ERP	Production Monitoring	Advanced Analytics	EAM	APM	Unsure
%	42%	42%	41%	38%	38%	34%	31%	29%	27%	3%

- 42% — Quality Management System (QMS)
- 42% — Manufacturing Execution System (MES)
- 41% — Supply Chain Planning (SCP)
- 38% — Industrial IoT (IIoT)
- 38% — Enterprise Resource Planning (ERP)
- 34% — Production Monitoring
- 31% — Advanced Analytics
- 29% — Enterprise Asset Management (EAM)
- 27% — Asset Performance Management (APM)
- 3% — Unsure

Q: What technologies has your company invested/does your company plan to invest in that you feel directly support your organization's ESG/sustainability efforts? (n=321)

When asked about systems for investment to support these ESG efforts, respondents focused heavily on MES, QMS, and supply chain planning. By using these systems, companies are able to address many of their top ESG efforts. More efficient technology, processes, and planning enabled by these systems reduce waste and maximize output. These systems also enhance agility, whether it is pivoting to a new product line or providing a temporary social good, like producing masks and ventilators. Efficiency, adaptability, and accountability are becoming core to stakeholder value.

MANUFACTURING'S BIGGEST CHALLENGES

The COVID-19 pandemic has exposed the depth of lingering obstacles in the manufacturing industry and made it impossible to ignore them any longer. It has also exposed the brittle nature of systems, processes, and supply chain solutions that had historically measured as "good enough" until the test of global change.

REVEALING MANUFACTURING'S UNADDRESSED ISSUES

Each year, this report has consistently shown supply chain disruption, skilled worker shortage, and security/risk management as the top challenges for business. Now the industry is dealing with extremes in each of these areas along with the unique adversity created by a lingering pandemic.

OBSTACLES TO GROWTH

To build a business fit for resiliency, manufacturers must identify these pain points in the light, assess the degree of severity, and determine how best to solve these problems.

With smart manufacturing in place, organizations can prevent, address, and solve major business challenges and growth obstacles, including unexpected complications and developments.

Growth obstacles for the year 2022

■ *2021*　■ *2022*

*Technology paralysis ranked as a first time growth obstacle at **24%***
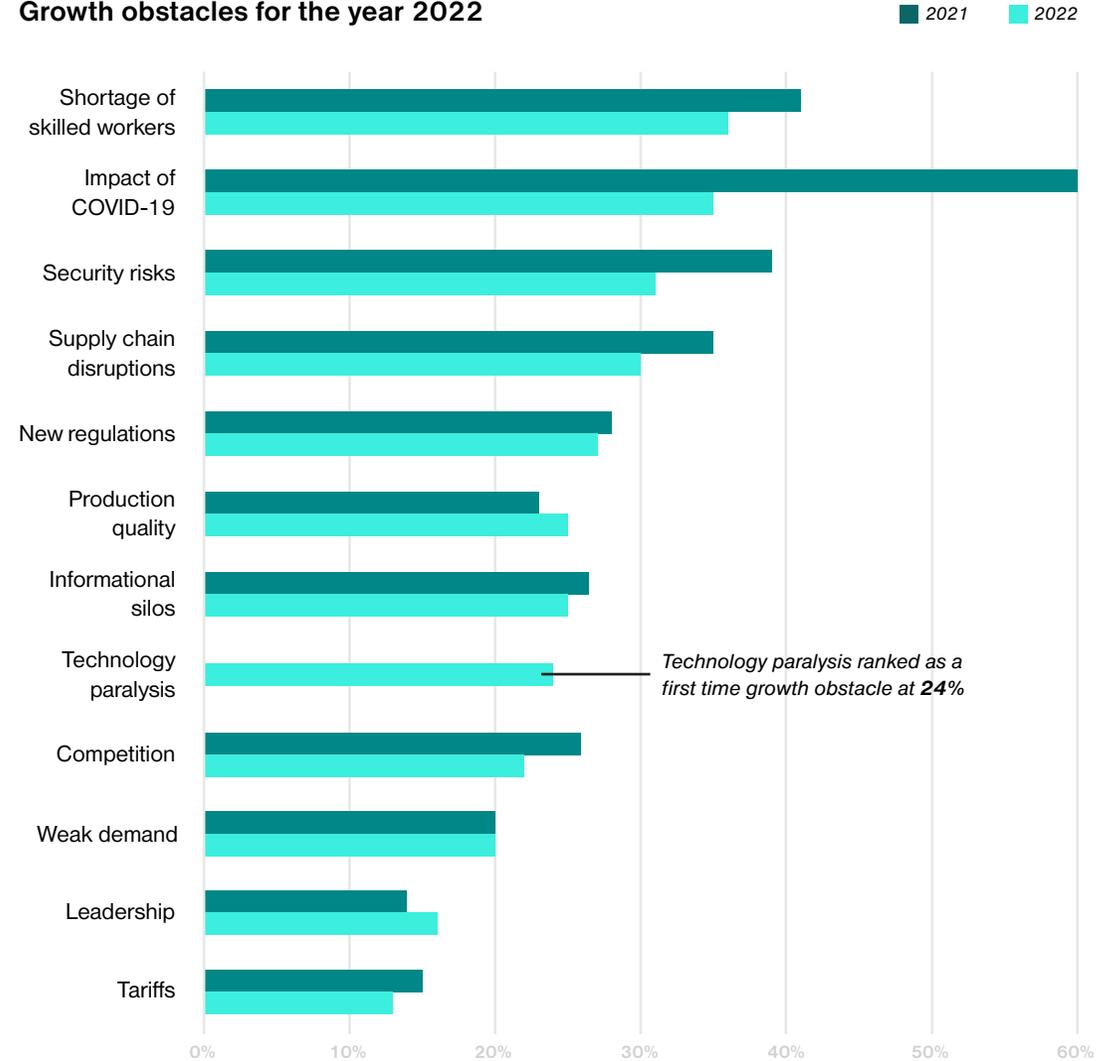
Q: What do you see as the biggest obstacle(s) to your organization's growth next year (calendar year 2022)? (n=321)

EMPLOYEE AND LEADERSHIP OBSTACLES

The current workforce shortage, especially for skilled workers, presents challenges to today's manufacturers. A technologically advanced workplace is an attractive feature for prospective employees, especially those in younger generations. Regardless of what challenges arise, it will be difficult — if not impossible — to develop a cohesive, actionable plan without strong leadership and skilled employees. While smart manufacturing does many things, it cannot function optimally without continuity, accountability, and communication — both human-to-human and human-to-machine. Change management is a critical component to smart manufacturing and should be kept at the forefront when moving towards adoption. As our survey identified, employee and leadership obstacles create organizational challenges across the board, regardless of technology adoption.

Largest employee obstacles

- Difficulty finding skilled employees
- Training current employees on updated processes
- Increased dependency on automation
- Employee retention
- Aging workforce

Largest leadership obstacles

- Lack of continuity
- Lack of accountability
- Lack of communication
- Inability to keep up with a changing market
- Poor organization within leadership
- Leadership siloed by departments
- Resistance to change

Q: Which of the following are the biggest employee obstacle(s) your organization faces? (n=133)

Q: Which of the following are the biggest leadership obstacle(s) your organization faces? (n=45)

SKILLED WORKER SHORTAGE LIMITING ABILITY TO COMPETE

The lack of skilled workers has been a common theme in every edition of this report. How can manufacturers find and retain the best employees and support them to develop into the leaders they need for tomorrow?

Companies are addressing the skilled workforce issue by leveraging innovation, technology, and their ability to use data to make decisions. Employers that can equip employees with the right tools while also supporting the path for learning and development will be best positioned for the future.

Lacking areas in competition

Technology

Speed

Innovation

Skilled workers

Ability to use data to make decisions

84% of respondents ranked employee retention as "very" or "extremely" important

"Digital transformation is not just about technology... Basic objectives such as cost optimization and process improvement can no longer be the ultimate aim. Leaders must inspire and empower their entire organization to boldly reimagine their work environment, customer needs, product offering, and even the purpose of the enterprise.

4 Principles to Guide Your Digital Transformation, Harvard Business Review

Q: Please read the statement below and select the answer options that apply to your organization. "My organization lacks the _____ to outpace the competition." (n=321)

SOLVING FOR SUPPLY CHAIN PLANNING CHALLENGES NOW AND IN THE FUTURE

While adoption of supply chain planning solutions has increased, it's important to assess whether your current solution accounts for the increasingly complicated supply chain going forward.

30% of respondents in 2017 were using a supply chain planning solution

60% of respondents were projected to use a supply chain planning software point solution by 2022

78% of respondents in 2022 are using a supply chain planning software point solution
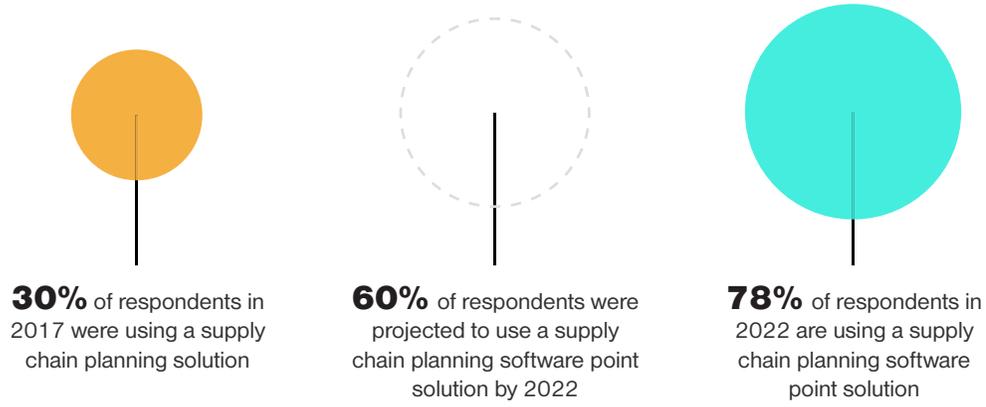
Cost was cited as the top barrier to adopting a supply chain planning software solution. However, as the headlines have shown over the past year, many companies have borne the burden with expedited shipping costs, production delays, and decreased customer satisfaction that likely far outweigh the cost of a system implementation.

35%
Cost/expense

32%
Lack of skill set to manage smart manufacturing implementation

28%
Employee resistance to technology adoption and change

26%
Difficult to replace/ upgrade legacy system
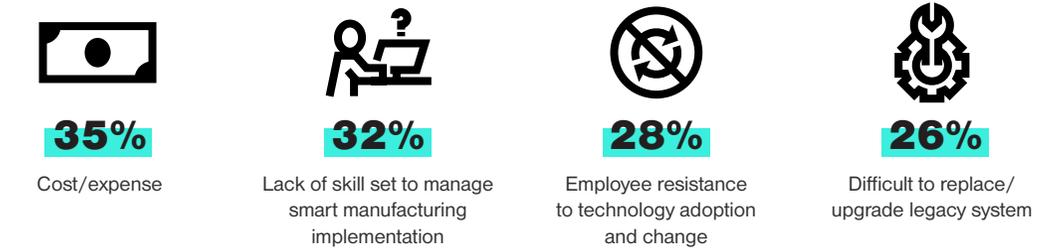
> "Before adopting a cloud-based supply chain planning solution from Plex Systems, we were often in danger of overestimating our inventory and short-shipping a customer, or underestimating inventory and building more product unnecessarily. Now we get accurate inventory which has had a huge effect on our bottom line."

—Jeff Bender

Materials Manager, Coastal Automotive

PRIORITIZING SECURITY AND RISK MITIGATION

Most organizations approach security similarly to how a person might view going to the doctor. Some people adhere to regular check-ups to ensure good health and catch potential issues. Others opt for the wait-and-see approach. Which side does your organization prefer when it comes to risk mitigation and security? Is your system health a top priority? How important are data protection, processes, and uptime?

Manufacturers may be underestimating risk, especially around cyber security.

Resources like SecurityScorecard.com are valuable for manufacturers looking to evaluate their own risk level and that of any vendors they use.
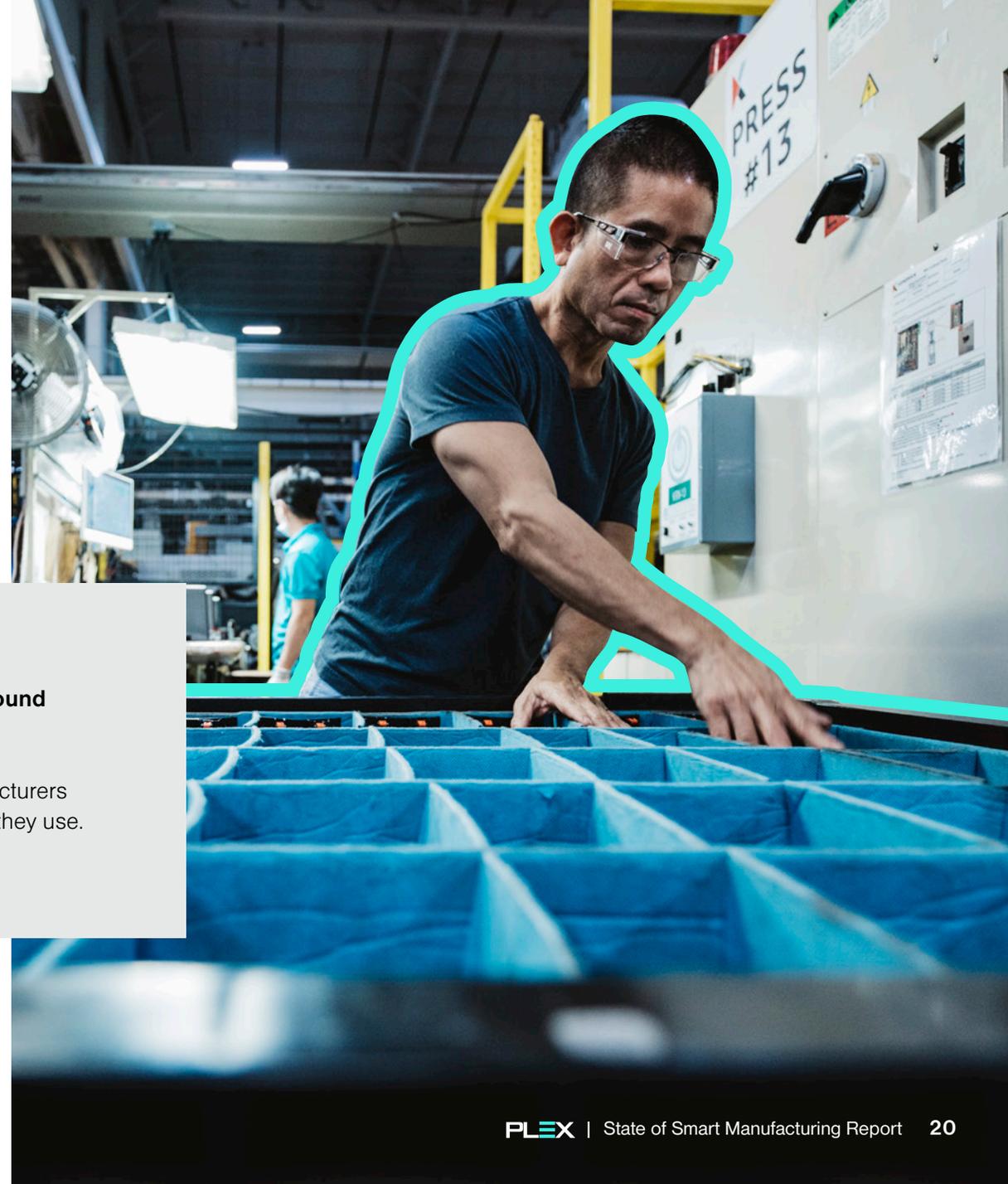
Current strategy for mitigating risk

48%
Managing cyber
security risks

36%
Evaluating critical
suppliers

46%
Adopting cloud
technologies

39%
Developing a plan in
case of operational
disruption

41%
Ensuring data accuracy
for reporting and informed
decision-making
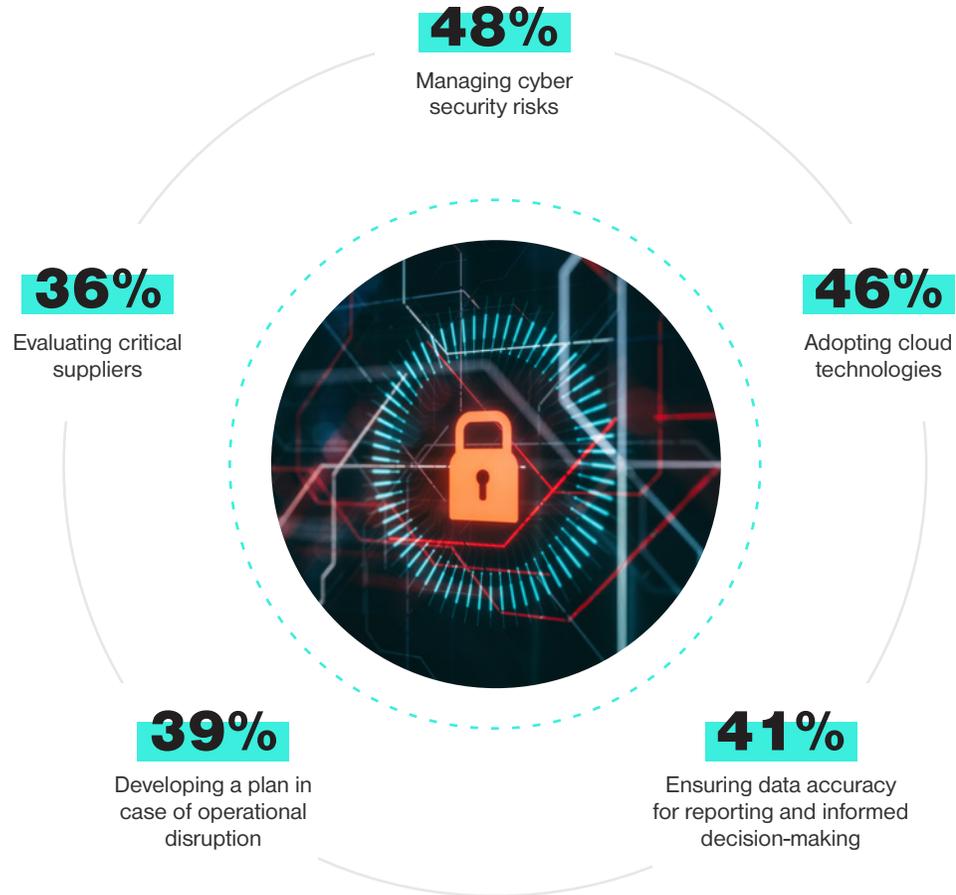
Q: How is your organization currently mitigating risk? (n=321)

In the last few weeks of 2021, manufacturers faced unprecedented levels of ransomware attacks. Though some larger companies publicly disclose these attacks, many more go unreported at smaller organizations. Small companies often bear more risk because they may not be able to afford to pay ransoms. Every organization should be vigilant and have a proactive security plan to avoid or minimize risks of attacks.

⚠ **61%** of respondents do not have a risk mitigation plan in place

THE PANDEMIC'S ENDURING IMPACT

While manufacturers grapple with continuing challenges, they are also taking advantage of opportunities for change, particularly staffing and working arrangements. This pivot is opening a wider talent pool and creating a more retention-friendly environment. As remote work spreads, cloud technology will be a vital component to power this agile approach to work.

Staffing arrangement changes due to COVID-19

- Greatly decrease the number of employees
- Somewhat decrease the number of employees
- No change to the number of employees
- Somewhat increase the number of employees
- Greatly increase the number of employees

5%	28%	38%	24%	5%

Working arrangement changes due to COVID-19

56%
increased remote work

50%
Further spacing between employees

47%
Increase dependency on automation
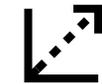
36%
Increase square footage of workspace

36%
stagger days in office

3%
no changes

Q: Which of the following staffing changes has your organization made/does your organization plan to make because of the COVID-19 pandemic? (n=321)

Q: Which of the following working arrangement changes has your organization made/does your organization plan to make because of the COVID-19 pandemic? (n=321)

PERCEIVED BARRIERS TO SMART MANUFACTURING ADOPTION

If smart manufacturing technology is the answer to the industry's biggest challenges, what's stopping some companies from adopting it? Manufacturers are already dealing with a limited talent pool and shifting business priorities due to challenges across the workforce and supply chain, all the while trying to balance the right approaches to risk mitigation.

Barriers to adopting smart manufacturing

36%
Cost/expense

32%
Lack of skill set to manage smart manufacturing implementation

32%
Difficult to replace/ upgrade legacy systems

31%
Employee resistance to technology adoption and change

30%
Lack of knowledge on smart manufacturing technology and benefits

27%
Lack of skill set to take advantage of smart manufacturing

16%
No sustained leadership support
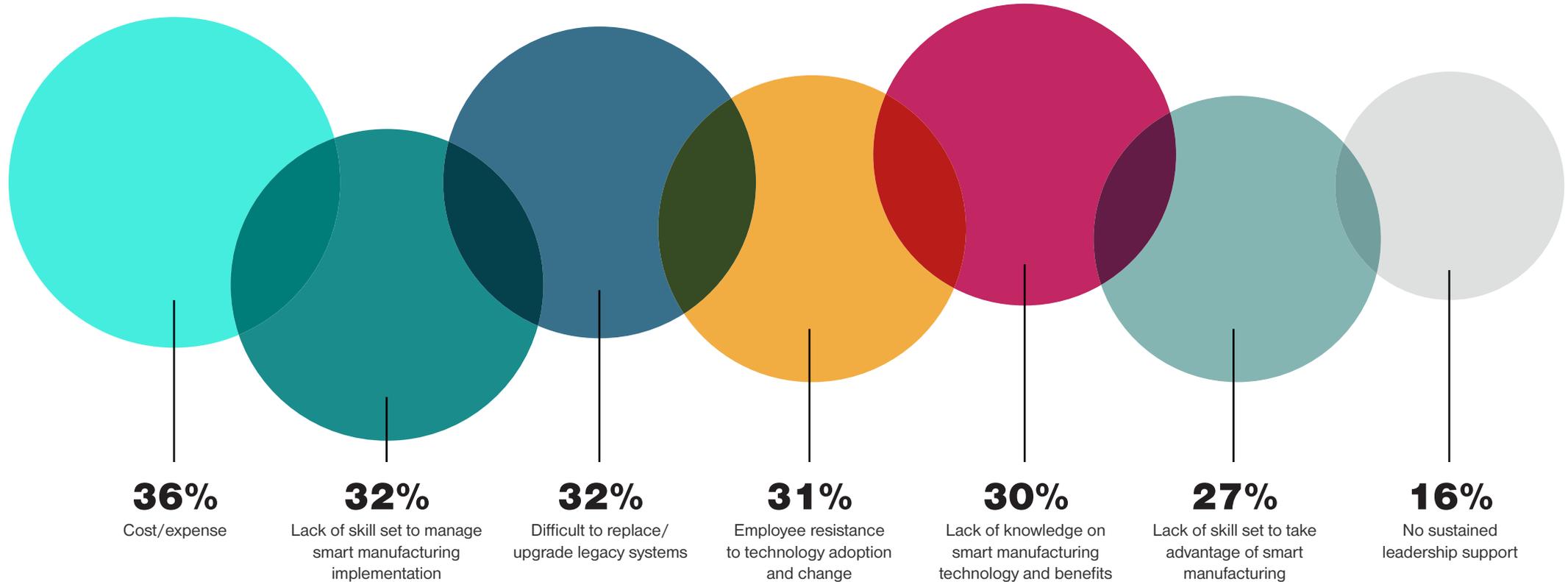
Q: What are the barriers to adopting smart manufacturing? (n=321)

Are the barriers to adoption as insurmountable as companies assume?

With increasingly modular smart manufacturing technology options available, investment and implementation can be:

simple

seamless

cost-effective

These incremental investments unlock value quickly and can be used to fund subsequent projects, acting as building blocks for smaller manufacturers or those without large capital investment plans.

Additionally, newer cloud options have opened up opportunities for manufacturers to take advantage of pre-built, turn-key solutions that don't require a high level of knowledge or time investment from their limited resources.

"In my opinion, doing an ERP implementation requires cross-functional alignment and it takes commitment. Our management teams were part of the process. They made it a priority, and they wanted to get it done—which is critical for the success of this type of endeavor. Partnering with Plex Systems for smart manufacturing solutions, deployment and adoption, resulted in a very efficient experience for us. We couldn't have done it without them and their dedicated staff to create a project plan and walk us through, step-by-step.

—Virginia Palinsky

CFO, Hausbeck Pickles & Peppers

THE FUTURE OF SMART MANUFACTURING

On the surface, it's not always clear how beneficial a new technology will be. It just takes the right business case. Today, technology that was previously considered over-hyped is now solving some of the major challenges manufacturers face.
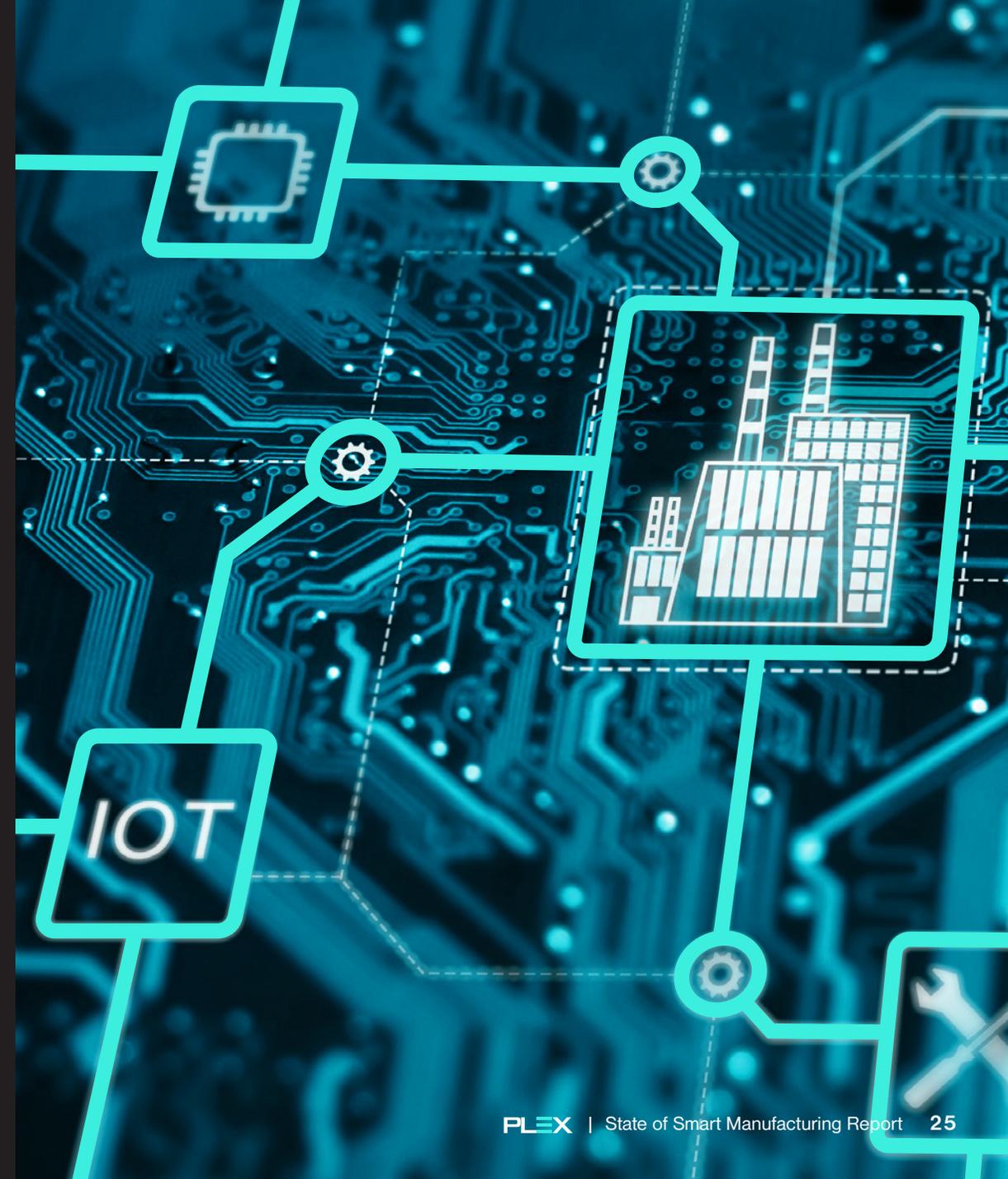
KEEPING PRIORITIES ALIGNED FOR OPTIMAL BUSINESS PROGRESS

Automation and other smart technologies can eliminate manual tasks and free up more workers' time for value-adding tasks that promote growth.
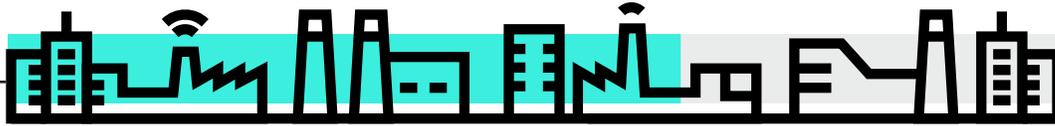
64% of organizations agree that technology can reduce hiring challenges and fuel growth in the next five years

System investments to address workforce challenges

42%	41%	40%	39%
Manufacturing Execution System (MES)	Quality Management System (QMS)	Industrial IoT (IIoT)	Supply Chain Planning (SCP)

Q: What systems has your company invested/does your company plan to invest in that you feel directly address workforce challenges? (n=321)

TOP SMART MANUFACTURING CAPABILITIES

☑ **Automatic machine control**

☑ **Automating business processes**

☑ **Delivery of analytics/business intelligence**

☑ **Enterprise integration platform/ open standards for integration**

☑ **Real-time asset performance visibility and in-line quality**

☑ **Remote access (to machines, data, production processes)**

☑ **Scalability to meet fluctuating demand**

☑ **Smart machines, sensors, and tooling**

☑ **Tracking data from "plant floor to top floor"**

Q: Survey respondents were asked to select and rank their most important smart manufacturing capabilities. The list above represents their top 9. (n=321)

ADDRESSING THE SKILLED WORKER SHORTAGE WITH TECHNOLOGY AND AUTOMATION

Manufacturers are focused on leveraging technology to deliver benefits through automation. When asked about the top investments to address workforce challenges, the overwhelming response focused on technologies to accomplish this.

By implementing technologies that streamline processes and automate less attractive job functions, manufacturers attract workers. That automation creates opportunities for more value-adding work rather than repetitive tasks that can be handled by smart technology.

75% of organizations think technology is highly helpful in addressing workforce challenges

Technology investments to address workforce challenges
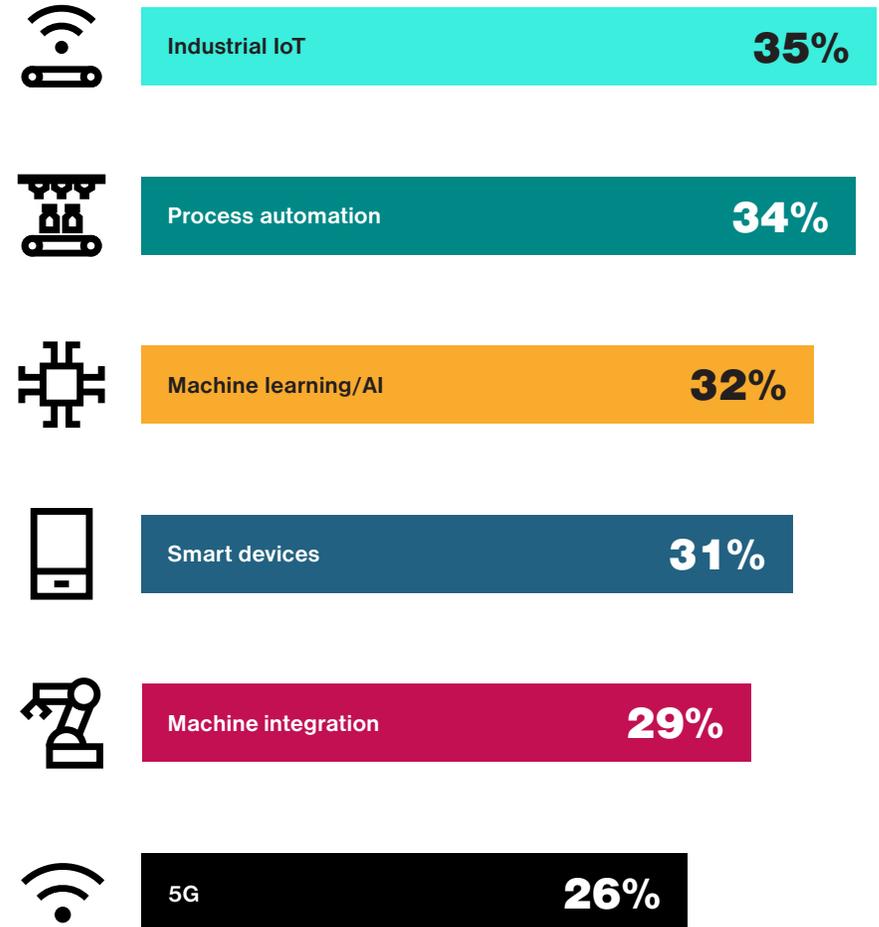
Technology	Percentage
Industrial IoT	35%
Process automation	34%
Machine learning/AI	32%
Smart devices	31%
Machine integration	29%
5G	26%

Q: What technologies has your company invested/does your company plan to invest in that you feel directly address workforce challenges? (n=321)

Areas of planned investment

39%
Cloud technology

38%
Supply chain planning

33%
Security

37%
Automation of business process

34%
Automated process enforcement

35%
Plant floor automation
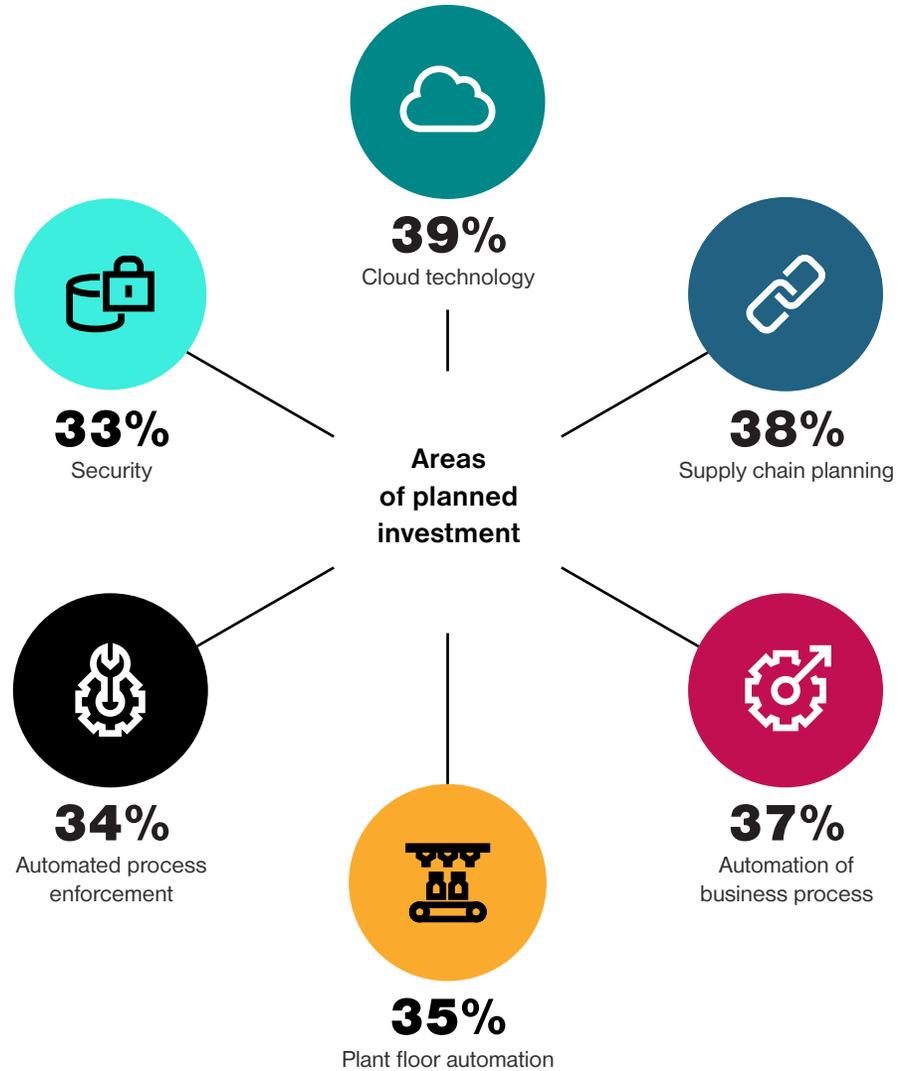
Q: Which of the following areas does your organization plan to invest in as a result of the COVID-19 pandemic? (n=321)

> "The initial concerns for moving to the cloud have nearly vanished. Globally, we see data latency dropping, availability increasing, and security provided by cloud-hosting services is often better than what is available from the manufacturer's own IT departments. The risk concerns have also been diminished as manufacturing professionals are using other cloud-based applications and streaming services in their daily lives without disruption."

—Gartner®, Cloud Computing in Manufacturing Is Foundational Today and the Requirement to Operate in the Future, Rick Franzosa, 29 October 2020

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MITIGATE RISK WITH CLOUD ADOPTION CONTINUITY

IT roles are among the hardest to fill globally. By using a multi-tenant cloud SaaS solution, you gain a software, hardware, and security support team that is in the business of protecting your company and data — far more professionals and experts monitoring your system than you could independently hire, train, and manage.

The advancement of cloud combined with hybrid cloud where data analytics are processed closer to the customer edge further demonstrates the need for flexible cloud applications.
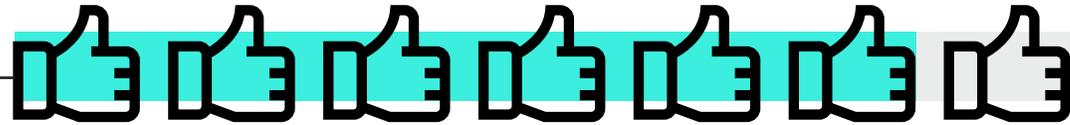
85% of respondents communicated their overall optimism for smart manufacturing

WHY USE CLOUD TECHNOLOGY

☑ **Relieve the strain on hiring for IT**

☑ **Free up resources for more value-adding business functions**

☑ **Enable business continuity**

☑ **Provide risk mitigation and high-grade security**

☑ **Widen access to skilled workforce with remote accessible data**

## THE SHORTCOMINGS OF TRADITIONAL SUPPLY CHAIN SOLUTIONS

70%

of respondents are using supply chain planning systems that rely on spreadsheets and manual processes

However, that won't be enough going forward. No matter how sophisticated these types of solutions might be, they cannot handle the level of computation that a dedicated supply chain technology tied to machine learning can.

Supply chain planning specific solutions pull in data from multiple sources in real time to provide the most accurate information possible. This will help them better meet changing needs and keep pace with supply chain nuances, from the cost of materials coming in to reforecasting and shipping out.

41%

of respondents use supply chain planning solutions to meet ESG specific initiatives through greater efficiency and less waste

Q: What technologies has your company invested/does your company plan to invest in that you feel directly support your organization's ESG/sustainability efforts? (n=321)

An effective supply chain planning solution will:

☑ Take in machine learning and generate a better/optimal forecast

☑ Connect machine data for scheduling and executing
that plan in the most optimal manner

Supply chain planning with machine learning creates a closed loop that is constantly improving
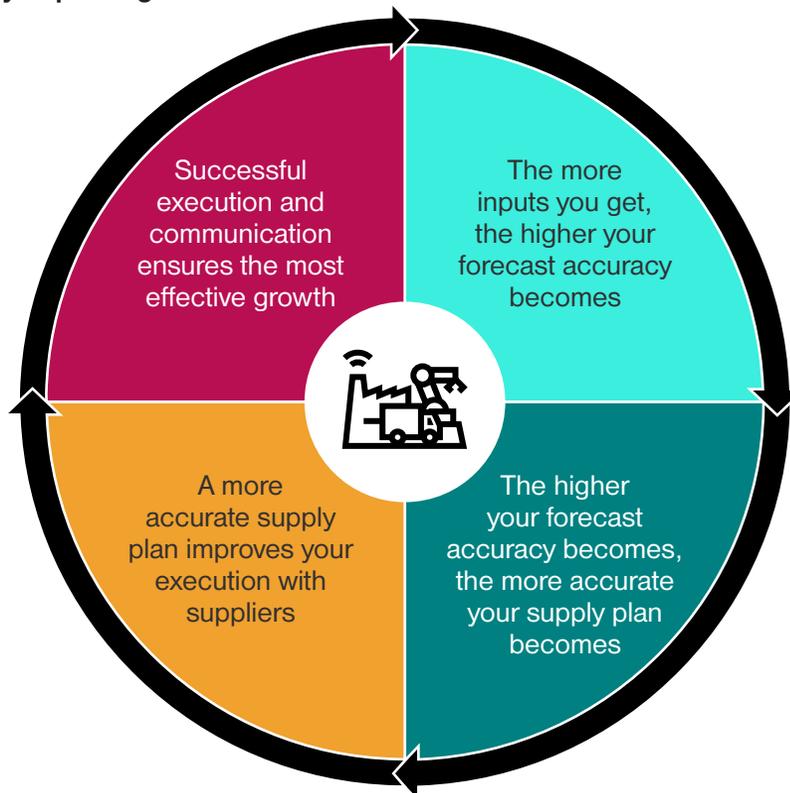
> "The coming months could turn out to be critical for supply chain leaders. Some companies will build upon the momentum they gained during the pandemic, with decisive action to adapt their supply chain footprint, modernize their technologies, and build their capabilities. Others may slip back, reverting to old ways of working that leave them struggling to compete with their more agile competitors on cost or service, and still vulnerable to shocks and disruptions."

McKinsey & Company:
How COVID-19 is reshaping supply chains
November 23, 2021

Authors:
Knut Alicke is a partner in McKinsey's Stuttgart office, Richa Gupta is an associate partner in the New Jersey office, and Vera Trautwein is an expert in the Zurich office

UNLOCKING THE FUTURE OF MANUFACTURING WITH TECHNOLOGY

The discussion around technology is evergreen — leaders and operating professionals want to adopt the technology that will make their business better, provide an edge against the competition, and deliver an enhanced experience to customers.

Along this path, previously "over-hyped" technology has often grown to be essential to business. Take the internet, for example. Did every business expect that the internet would be essential for business when it was in its infancy? Likely not, because there were no practical use cases, availability and adoption varied, and many people didn't see a sensible correlation between AOL/dial-up internet and business as they knew it.

But here we are, living in the age of cloud computing (once considered over-hyped itself), beginning to see the correlation of next-generation technology that is pushing through the hype to find mainstream use cases and adoption due to lower barriers to entry in availability, durability, and usability.

Organization's software usage objectives

80%
To connect people, systems, machines, and supply chains

79%
To automate processes

77%
To track plant floor production data

77%
To gain analytics and insights into the business

75%
To track corporate data (e.g., financials, human capital management)
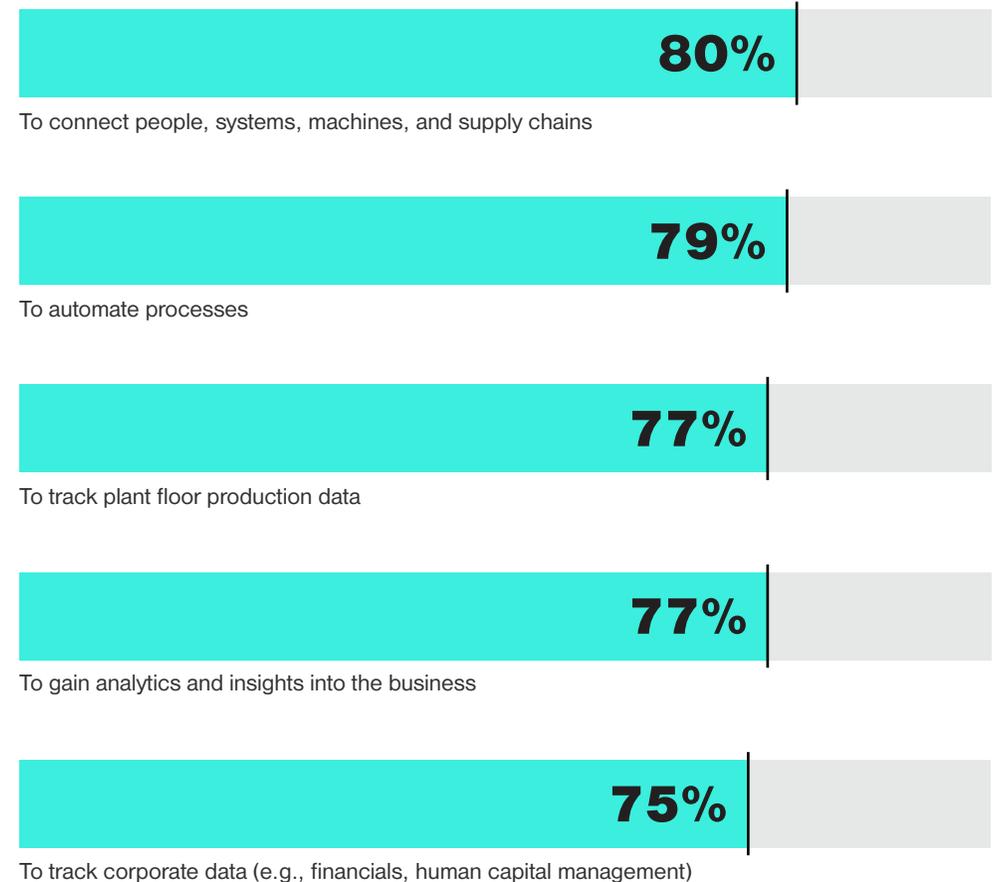
Q: For which of the following business or operational activities has your organization used software (e.g., enterprise resource planning systems, manufacturing execution systems, Industrial IoT, supply chain planning, analytics, quality management system) and/or hardware (e.g., sensors, servers, gauges) in the last 12 months? (n=321)

Technologies in-use, planned for use, or considered over-hyped
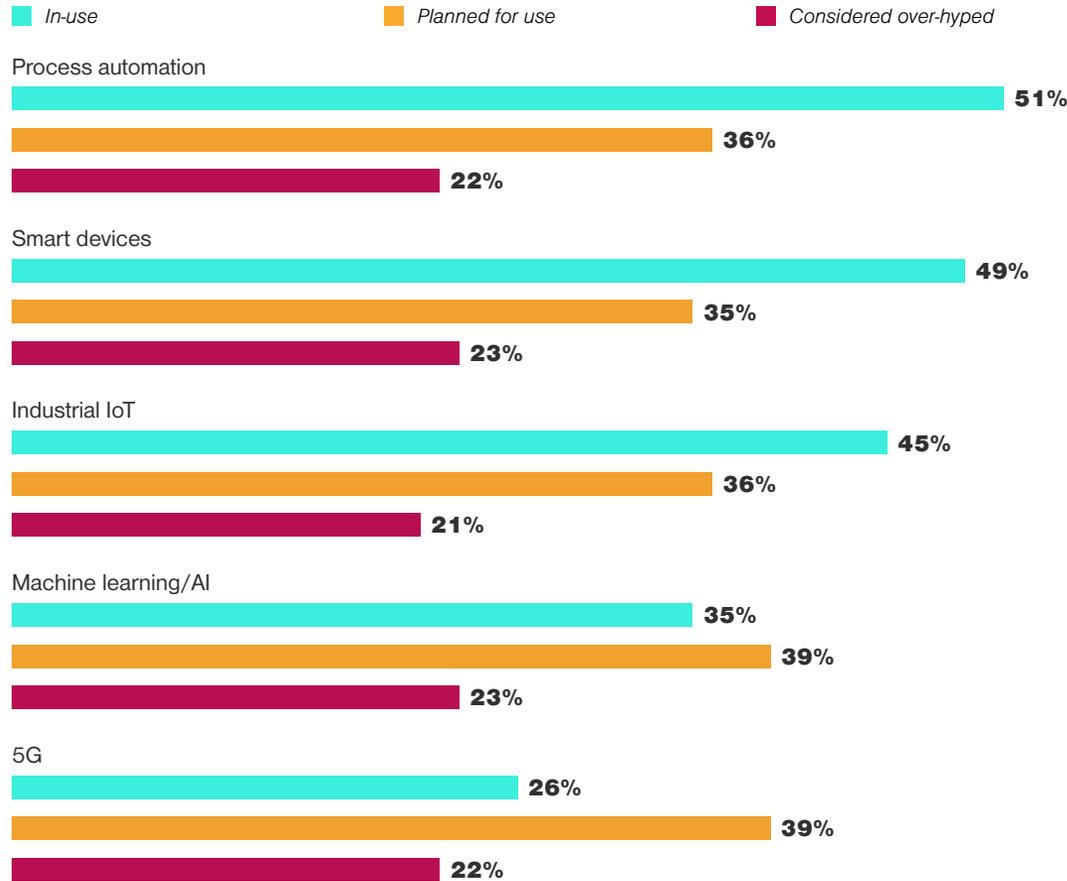
■ *In-use*   ■ *Planned for use*   ■ *Considered over-hyped*

Process automation

In-use: 51%
Planned for use: 36%
Considered over-hyped: 22%

Smart devices

In-use: 49%
Planned for use: 35%
Considered over-hyped: 23%

Industrial IoT

In-use: 45%
Planned for use: 36%
Considered over-hyped: 21%

Machine learning/AI

In-use: 35%
Planned for use: 39%
Considered over-hyped: 23%

5G

In-use: 26%
Planned for use: 39%
Considered over-hyped: 22%

Q: Which of the following technologies, processes, etc. does your organization employ in its manufacturing operations today? (n=321)

Q: Which of the following technologies, processes, etc. does your organization plan to use in its manufacturing operations in the next five years? (n=321)

Q: What do you think is the single most over-hyped technology or innovation in the manufacturing industry? (n=321)

> "Our leadership has been ecstatic with how far our business has come in the last two years. We've gained significant capacity and generated far more revenue without having to increase headcount at the same rate. We've seen consistent growth without the expense and hassle of building a new production facility."

—Marcus Merchant

Director of IT - Olde Thompson

TODAY'S TECHNOLOGIES ARE ESSENTIAL TO ACHIEVE TOMORROW'S POTENTIAL

Is your factory using smart devices? For this survey, we defined "smart devices" as augmented reality, mixed reality, and wearables.

Like any technology, adoption has to address a business problem, and manufacturers are increasingly finding that smart devices are doing just that.

Wearables deliver hands-free access and information capture, allowing the user freedom of movement — a perfect fit for manufacturing.

The practicality of leveraging wearables, augmented reality, and mixed reality for expedited onboarding, quality inspections, and hands-free material tracking makes perfect sense if organizations can create the business case for the benefits of adoption vs. cost.

36%
of respondents in 2015 hoped to adopt smart devices but were not there yet

35%
of respondents in that same 2015 survey stated that smart devices were over-hyped
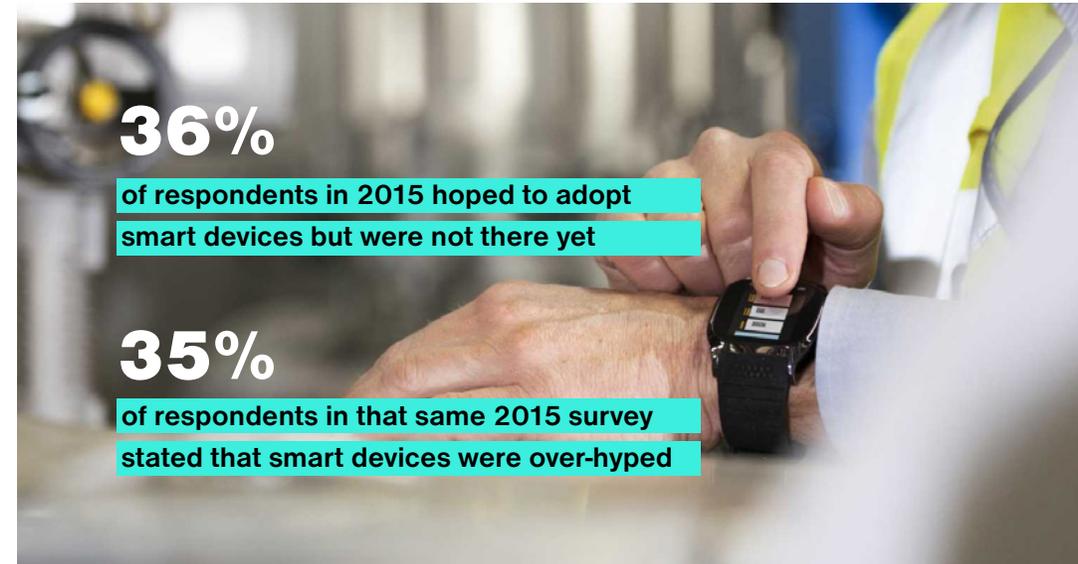
49%
of participants in 2022 responded that they are actively using smart devices in manufacturing operations

Connected devices currently employed in manufacturing operations

54%
Industrial hardened devices

49%
Smart devices

49%
Sensors

44%
Consumer devices

37%
Optical quality scanners
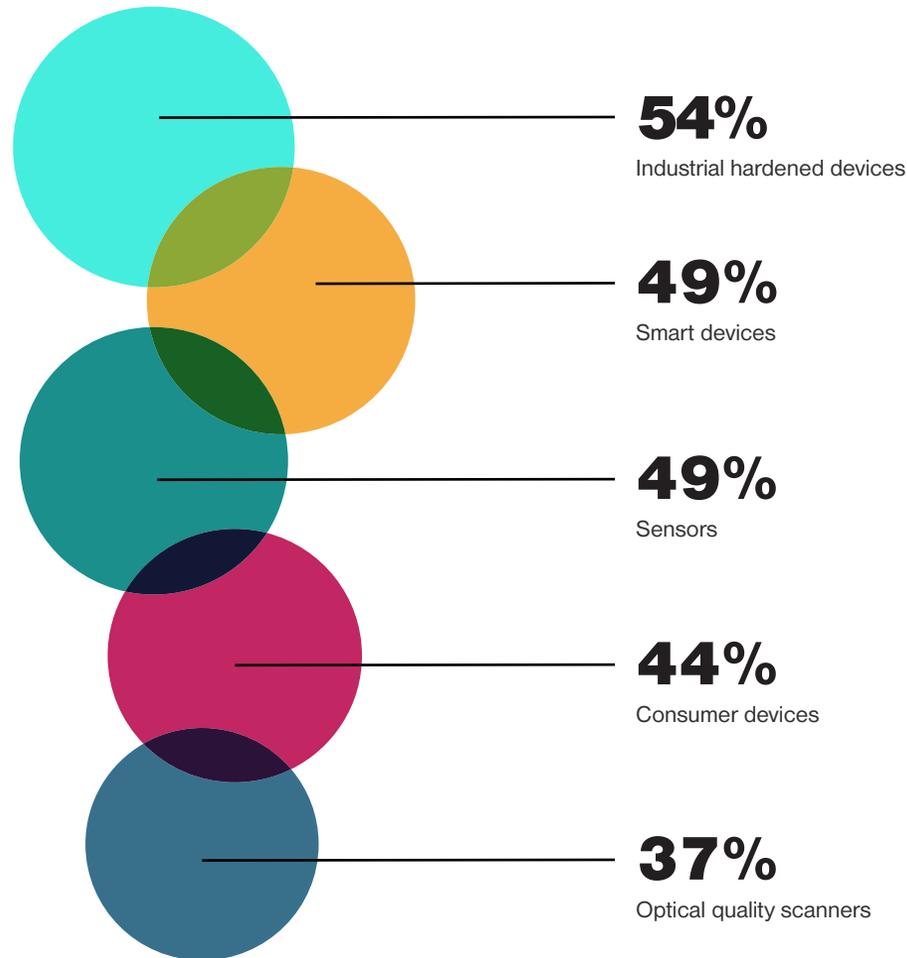
Q: Which of the following connected devices does your organization employ in its manufacturing operations today? (n=321)

"Sanoh has always been forward looking, and we've believed strongly in tying our IT and OT together. We've always seen the value of connecting technology and plant floor equipment. Our Plex smart manufacturing solution seamlessly provides that and adds additional value of a flexible system that not only normalizes our processes and equipment, but also provides strong logic and visuals for real time analysis and shop floor execution."

—Tim Marsell

IT/IS Department Manager - Sanoh America, Inc

TAKING ACTION

Smart manufacturing enables manufacturers to adapt to a changing market and unlock long-term opportunities by connecting and automating their business.

Use the information in this report to help your business — and your people — regardless of where you are in the technology adoption process.
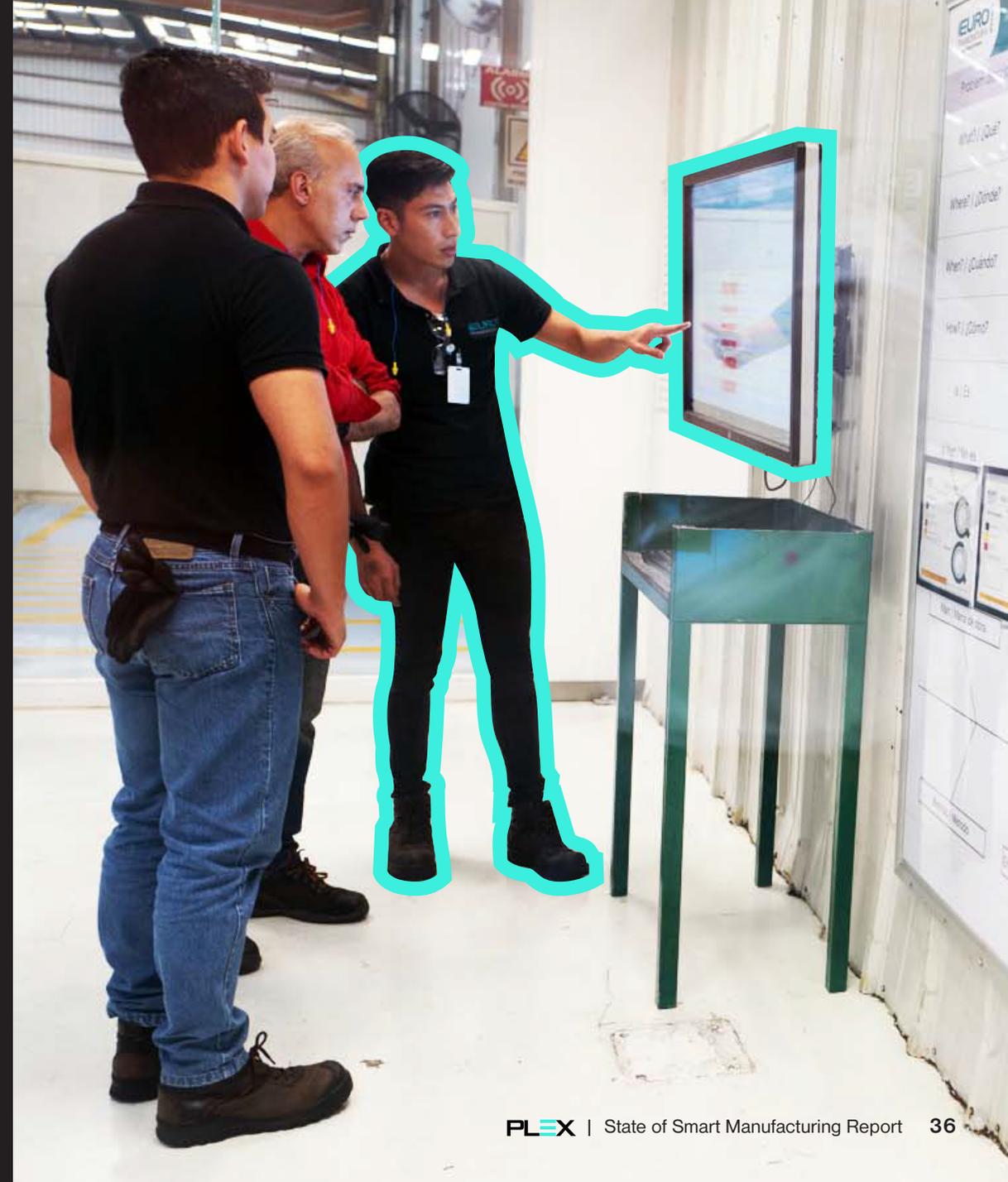
GETTING STARTED GUIDE

Identify key stakeholders and agree on your greatest need

Make the business case for investment

Research and select your solution(s)

Design and deploy the solution(s)

Manage change and drive adoption

STEP 1

IDENTIFY KEY STAKEHOLDERS AND AGREE ON YOUR GREATEST NEED

Gather the people connected to this change – both decision makers and system users. Diverse perspectives clarify the solutions needed, whether disconnected systems, people, processes, supply chains, unexpected downtime, poor quality, lack of visibility, control, and/or something else.

KEY QUESTIONS TO ANSWER:

☑ Where are your information gaps?

☑ Have you assembled the key stakeholders?

☑ What are the operational challenges you're trying to solve?

STEP 2
MAKE THE BUSINESS CASE FOR INVESTMENT

Develop your business case by highlighting increased control, efficiency, and savings gained. Gather requirements and include the importance of adaptability, security, and risk mitigation.

KEY QUESTIONS TO ANSWER:

☑ **What does success look like?**

☑ **What risks should be considered and mitigated?**

☑ **Which use cases offer the right balance of value creation and time-to-value?**

STEP 3
RESEARCH AND SELECT YOUR SOLUTION(S)

Do the work. There are many solutions available, and it is important to do your research. Narrow your potential solutions and review the following questions with the key stakeholders.

KEY QUESTIONS TO ANSWER:

☑ **Will the solution provide the desired efficiency?**

☑ **Will it be able to support you in the future?**

☑ **Does the solution meet your requirements and business objectives?**

STEP 4
DESIGN AND DEPLOY THE SOLUTION(S)

Select an implementation partner and create the map that you will follow for a successful process. Once created and agreed on by your key stakeholders, begin deployment.

KEY QUESTIONS TO ANSWER:

☑ **Does the design fit your needs?**

☑ **Is there a timeline and achievable ROI?**

☑ **Have the key stakeholders reviewed and agreed on the plan?**

STEP 5
MANAGE CHANGE AND DRIVE ADOPTION

To effectively integrate the change that smart manufacturing will bring into your culture, you will need sponsorship, messaging, and accountability.

KEY QUESTIONS TO ANSWER:

☑ **Who will be your adoption champion(s)?**

☑ **What is your adoption communication/ messaging plan?**

☑ **How will you adapt your culture through change management?**

CONCLUSION

To achieve positive, enduring change, be thoughtful about your approach. Set and track goals for continuous improvement and decide how you will best measure adoption success early in the process. Each organization is different, and the points laid out here will help to ask the right questions in pursuit of answers that will guide your mission.

ABOUT PLEX

Plex Systems, a Rockwell Automation Company, is the leader in cloud-delivered smart manufacturing solutions and has been helping manufacturers improve their businesses for decades. Plex has resources and deep industry expertise in defining business value from technology, and we're ready to assist manufacturers in adopting smart manufacturing technology and processes to achieve their business goals.

Learn how to achieve your business goals using smart manufacturing at Plex.com

TEN STEPS TO TECHNOLOGY ADOPTION [CHECKLIST]

Check:	Steps:	Notes:
	Identify key stakeholders and agree on your greatest need	
	Establish effective governance with key stakeholders	
	Make the business case for investment by aligning technology, strategy, and metrics/KPIs	
	Create a communications plan that will sustain the vision for future desired outcomes	
	Research and select your solution(s)	
	Assess your current capabilities, risks, and opportunities; benchmark yourself against your competitors	
	Design and deploy the solution(s)	
	Prioritize changes that address the problem(s) you are solving, have the best ROI, and/or eliminate the most risk	
	Establish and implement an organizational change management program and drive adoption	
	Adopt a continuous improvement mindset and support it with messaging that highlights what you've learned, what can be more efficient, and how people drive change	

WHAT DOES THE FUTURE OF SMART MANUFACTURING LOOK LIKE IF THE TRENDS FROM THIS REPORT CONTINUE?

Let's take a look at this hypothetical but not-so-futuristic story through the lens of Plex CTO and Co-founder, Jerry Foster:

As head of operations at a major manufacturing facility, Maria was conflicted about introducing sweeping technology and automation changes but knew that the old way of doing things would not position the company for future success. With labor shortages, supply chain disruption, and increasingly more agile competition, the status quo would lead to decreased profits, if not outright failure.

As part of a pilot program, Maria's company had recently invested in a new fleet of autonomous guided vehicles (AGVs) that move product around the plant floor, cutting out repetitive, tedious, and dangerous tasks and filling roles that her company had been struggling to fill for years.

Her company also owned and operated factories around the world. Though skeptical at first, her colleagues in Indonesia and company leaders at headquarters had changed their tune when testing a remote assistance capability that eliminated an ongoing issue without the need for a specialized technician to be on-site. By using augmented reality devices, an engineer from Maria's plant was able to diagnose the persistent issue, coordinate with on-site technicians to produce an adapted part through 3D printing, and install the new part to resolve the issue permanently in under a week – a task that would have previously taken months or have been altogether impossible.

The technology investments described here required upfront cost, careful planning, and change management. Within a year, the systems paid for themselves with almost immediate payback. Within two years, Maria's company had saved $1.3 million dollars from the efficiencies gained, including:

- Resource redeployment from artificial intelligence-assisted scheduling

- Material reductions from a new generative design process

- Supply chain adjustments utilizing an industry-driven blockchain

- Task and process automation conducted by connected systems

While Maria's world may seem far-fetched, many of these technologies are already in-use and powered by cloud-based software solutions supporting enterprise resource planning (ERP), manufacturing execution systems (MES), quality management systems (QMS), production monitoring, IIoT, and supply chain planning (SCP). Some concepts presented here are awaiting a next-phase development including availability, durability, and/or cost improvement to gain widespread adoption. Like in Maria's case, technology adoption decisions are not an-all-or-nothing choice, but rather a willingness to take one step towards improving business, and then another step, and still another step.

Start your journey today and see where it will take you tomorrow.

# SURVEY DEMOGRAPHICS AND FIRMOGRAPHICS

SURVEY DEMOGRAPHICS AND FIRMOGRAPHICS

All survey data collected in October 2021

Industry

23% Electronics

21% Industrial Machinery

10% Automotive

10% Consumer Packaged Goods

9% Food and Beverage

9% Plastics/Rubber Manufacturing

6% Precision Metalforming

4% Medical Devices Manufacturing

3% Aerospace

3% Packaging

2% Pharmaceuticals
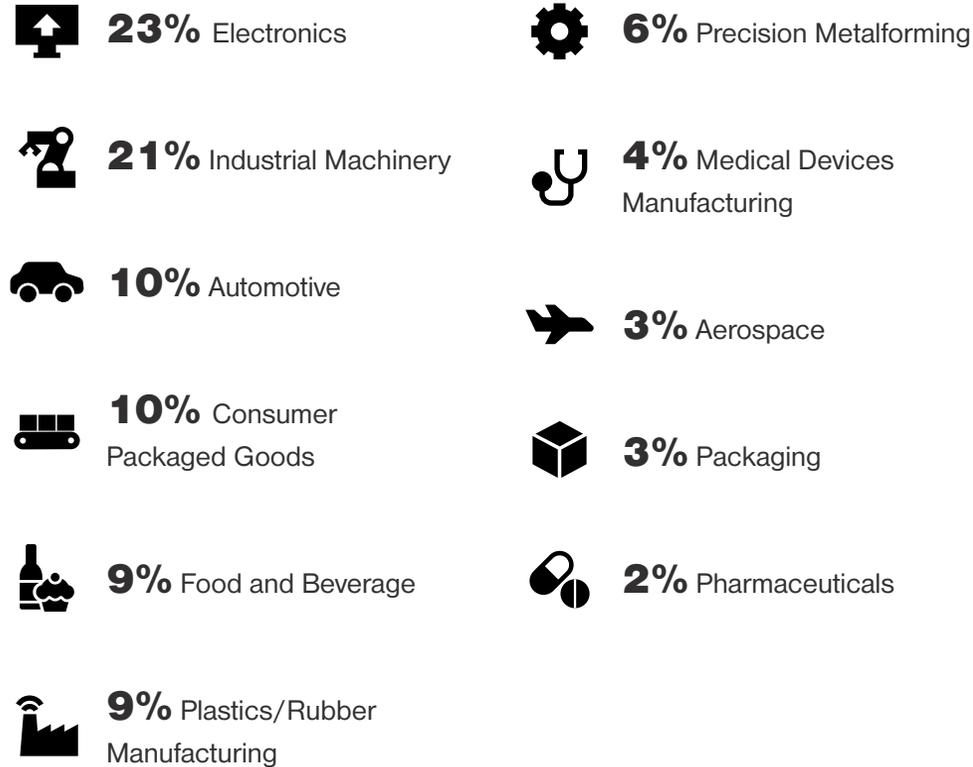
Organization's annual revenue

- 12%
- 17%
- 26%
- 28%
- 17%

Legend:
- $10M–$24M
- $25M–$149M
- $150M–$499M
- $500M–$999M
- $1B or greater

Organization size

- 7%
- 12%
- 21%
- 37%
- 13%
- 5%
- 1%
- 2%
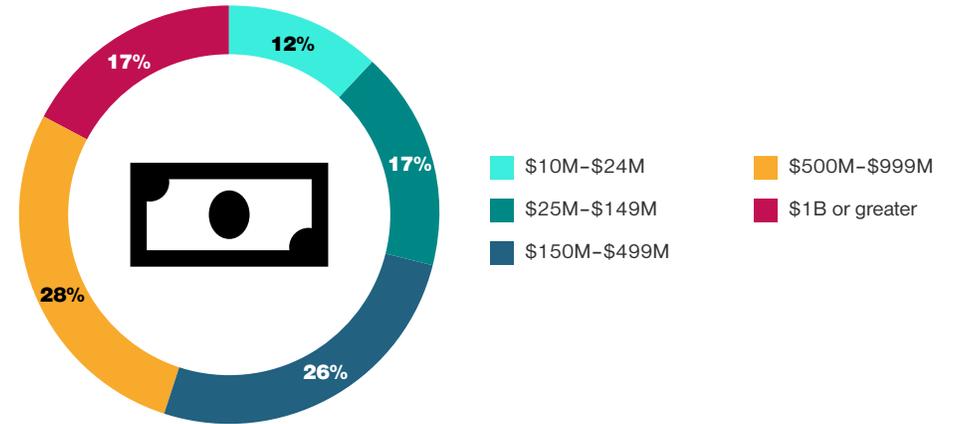
Legend:
- 0–49 employees
- 50–99 employees
- 100–249 employees
- 250–499 employees
- 500–999 employees
- 1K–4.9K employees
- 5K–19.9K employees
- 20K+ employees
- Not sure
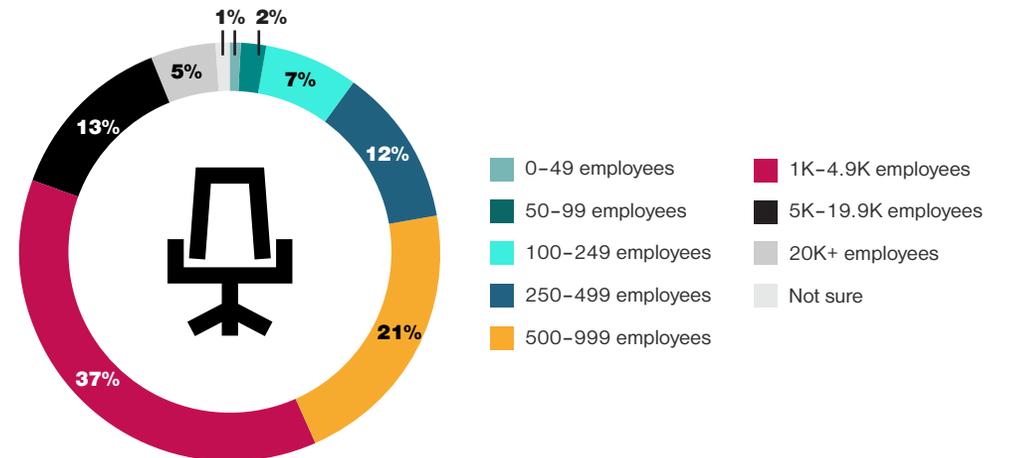
Job title
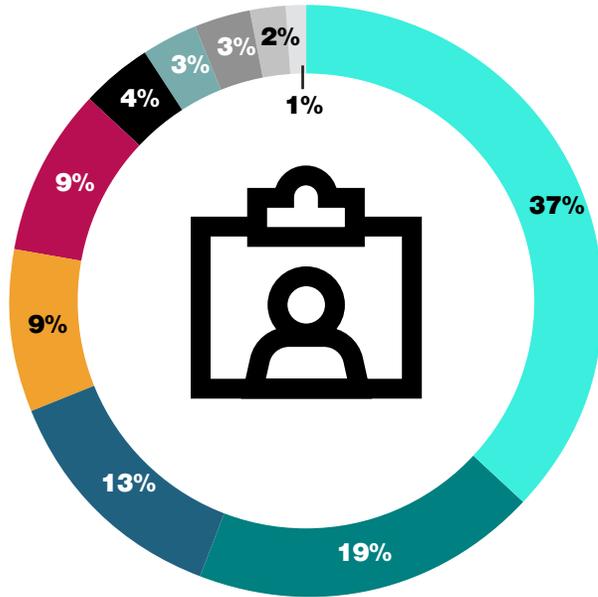
- IT
- Manufacturing
- Operations
- Supply chain
- Engineering
- Quality
- Marketing
- Human resources
- Sales
- Other

37%
19%
13%
9%
9%
4%
3%
3%
2%
1%

Job level
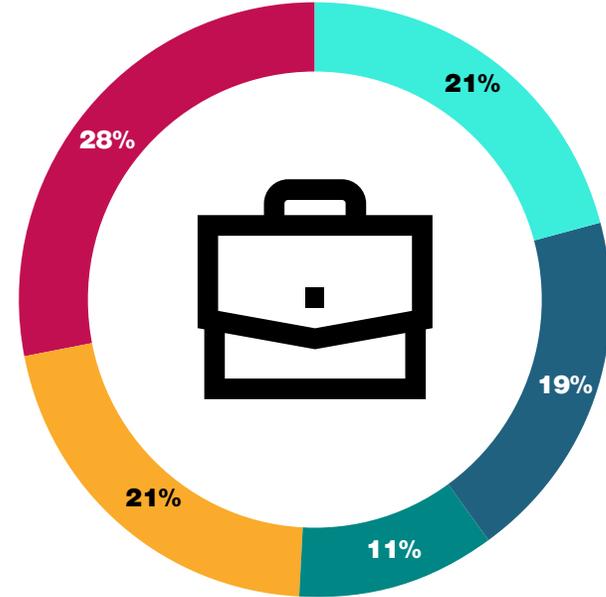
- C-Suite
- Manager
- Vice President
- Director
- Head of Department

21%
19%
11%
21%
28%

SURVEY DEMOGRAPHICS AND FIRMOGRAPHICS

International regions served

61% **29%** **58%** **26%** **54%**

18%

- North America
- Europe
- Asia-Pacific
- Latin or South America
- Middle East
- Africa

Organizational reach

31% Regional

51% National

42% International

Number of plants

12%
11%
17%
10%
20%
6%
7%
16%

- 1 plant
- 2 plants
- 3 plants
- 4 plants
- 5-9 plants
- 10-14 plants
- 15-19 plants
- 20+ plants