cisco Meraki IndustryWeek

RESEARCH REPORT

A Business Case for Smarter Manufacturing Spaces

Creating connected, secure, and intelligent work environments for more resilient, productive, and attractive workplaces

Table of Contents

Executive summary

Creating a more productive, safe, and healthy manufacturing industry has been an ongoing ambition of leaders for years. The pandemic and its effects on the industry have only put more attention on this ambition, even accelerating progress. The options for how to accomplish this have advanced significantly and become more complicated than ever. However, an emergent area of high potential is investments in the physical spaces—the manufacturing floor, shipping and receiving, administrative offices, and even home offices.

What if these spaces were smarter? Smart spaces leverage advanced technologies, sensors, and video to transform into more connected, safe, and productive environments to work. Leveraging sensor technology is nothing new for manufacturing. But using this kind of technology for physical space is a newer idea. This report makes clear that manufacturers around the world are investing in this technology, and with good reason.

Why this research was conducted:

The intention of this report is to provide an up-to-date glimpse of how the manufacturing industry is investing in the future, and how they are creating smarter spaces. Specifically, this report was created to provide more clarity on how manufacturers are:

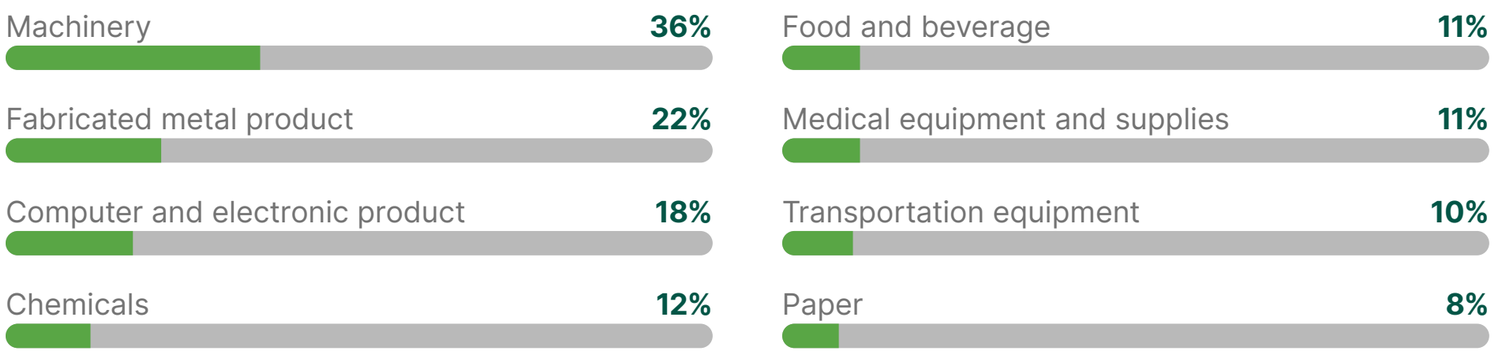
- Using space now and how they expect to in the future
- Ranking workplace safety, security, productivity, health, and compliance against other priorities
- Monitoring space now, and how they intend to in the future
- Finding valuable use cases for smart space technologies, and where they are on their smart space journey

cisco Meraki IndustryWeek

Part 1: Respondent details, state of performance, challenges to growth, and key investments for the future

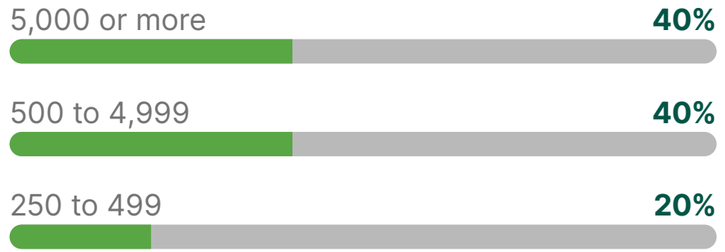
This report is written based on insights gathered from a survey conducted in February of 2022 that involved 157 respondents with businesses of 250 employees or more, 80% of which had employees of 500 or more. Eighty-five percent of respondents identified as manager-level or above who are primarily involved in information technology, operational and customer support roles, and represented a global perspective, as organizations were headquartered almost exactly evenly between North America, EMEAR, and APJC.

Which of the following best describes your company's primary product?



Base: All respondents (n=157). Only respondents who serve one or more of the listed industries were qualified to answer the survey. Respondents were required to work for companies with at least 250 employees.

What is the number of employees in your company across all locations?

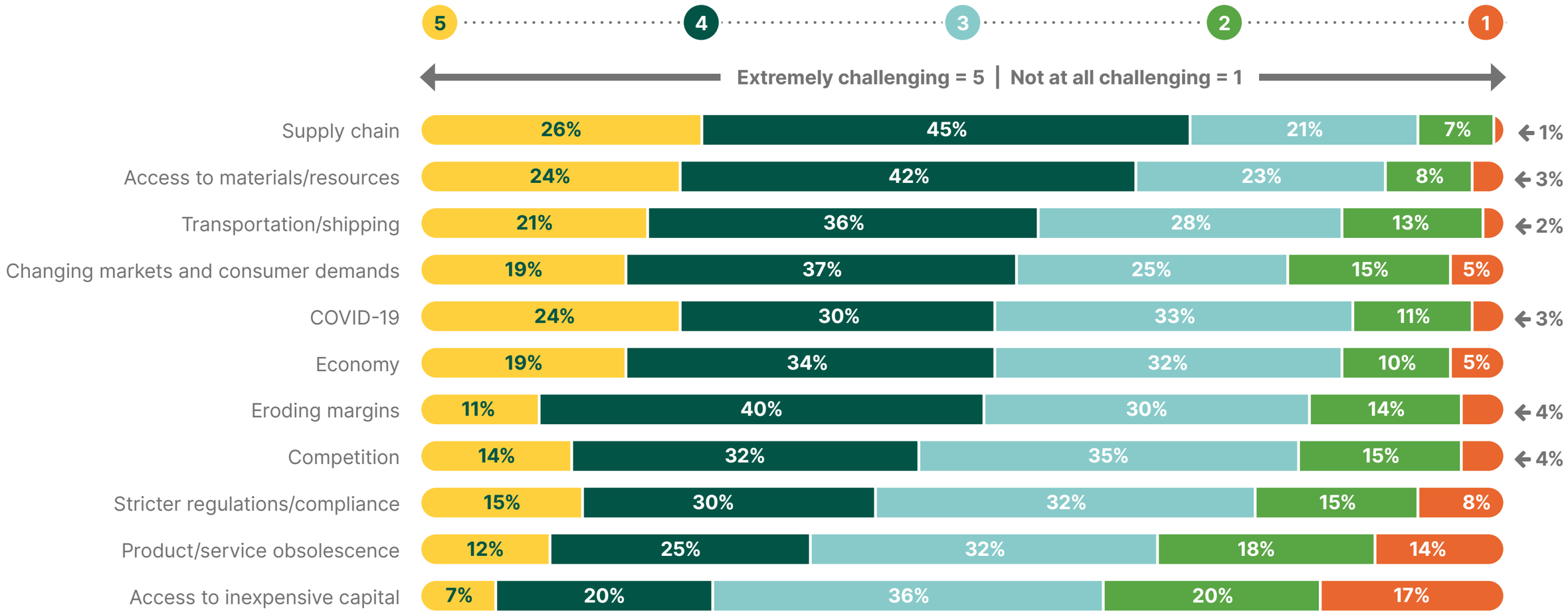


The majority of respondents, 86%, indicated that their organization is performing in line with projections or above, with one-third sustainably performing beyond projections. Not surprisingly, supply chain ranked as the top external challenge to growth, along with access to materials and transportation. However, changing markets and customer demands, COVID-19, the economy, and eroding margins ranked high for many respondents as well. As for internal challenges to growth, access to workforce was by far the biggest challenge to growth, followed by organizational silos, culture, and technology infrastructure.

How would you describe the current state of your organization's performance?

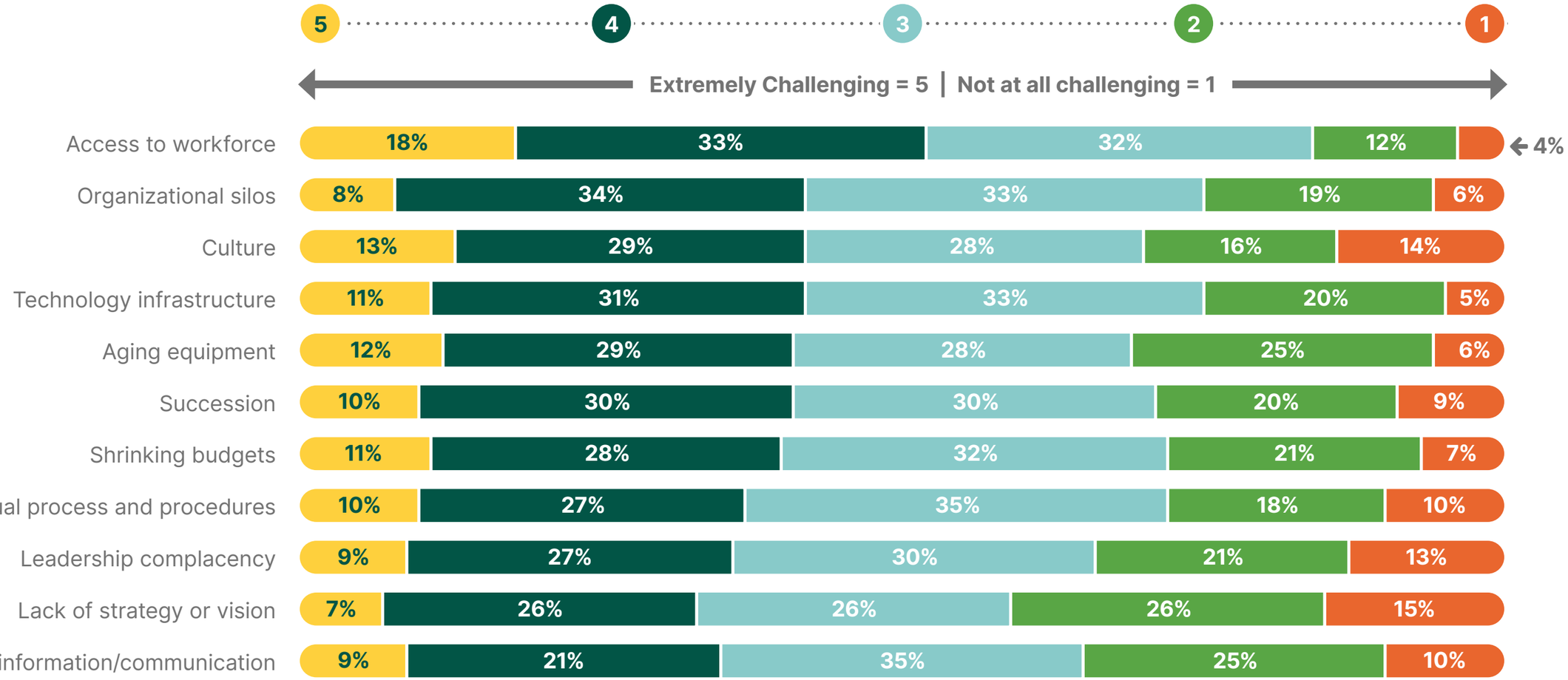
Base: All respondents (n=157). One-third of respondents indicate that their organization is performing beyond expectations and expect this performance to continue. Respondents are unlikely to indicate their organization is performing below projections.

What are the biggest external challenges to the growth of your company?



Base: All respondents (n varies from 154 to 157). Supply chain, access to materials/resources, and transportation/shipping are the biggest challenges that companies are facing. Changing markets and consumer demands, COVID-19, the economy, and eroding margins are also a challenge (rate 4 or 5) to a majority of respondents.

What are the biggest internal challenges to the growth of your organization?

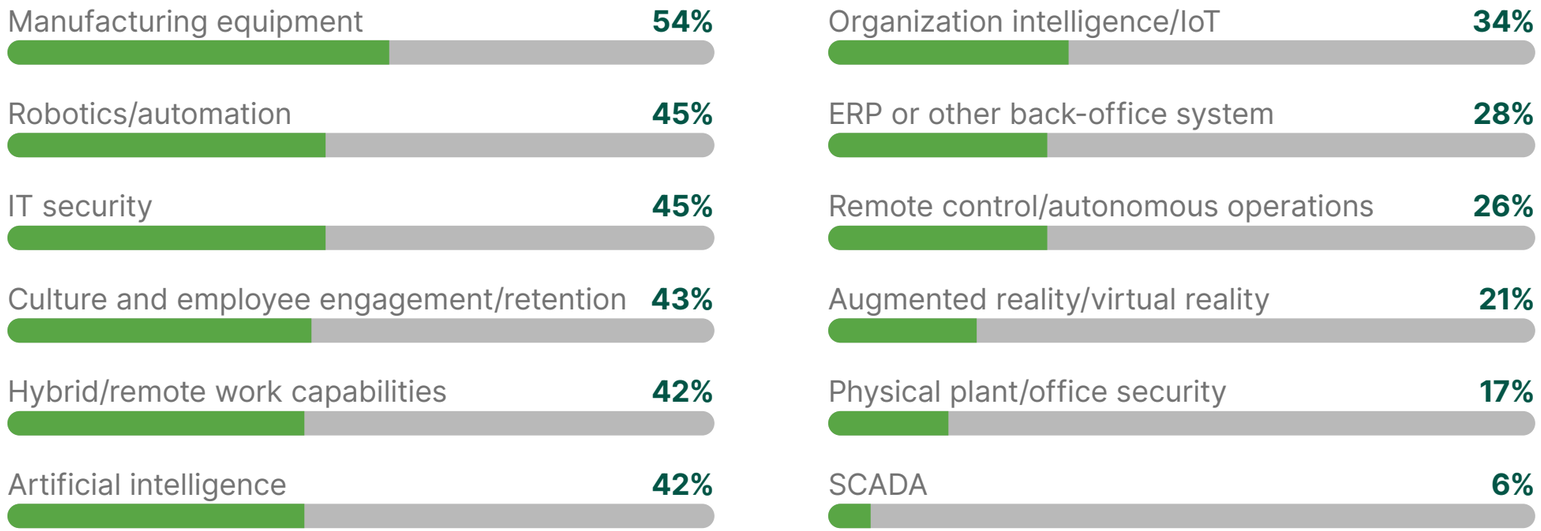


Base: All respondents (n varies from 153 to 157). Respondents are not likely to face as many internal challenges as external challenges. In fact, access to workforce is the only internal challenge rated as 4 or 5 on a 5-point scale by a majority of respondents.

Interestingly, the top three internal challenges relate to human resources, including how to get access to new employees, creating healthy cultures to keep those employees, and breaking down walls between functional teams and departments within the organization to maximize the interactions among them. This is again reinforced by the fact that culture and employee engagement and retention rank among the top strategic investments respondents expect to make in the next 24 months.

Other top-ranked strategic investments were focused on technology, such as robotics, automation, and IT security. Productivity investments include organizational intelligence/IoT, remote control, and autonomous operations. Workforce enablement was also a theme, including things like hybrid/remote work capabilities, smart offices and factories, and physical plant and office security.

What overall strategic investments are you looking to make in the next 24 months?

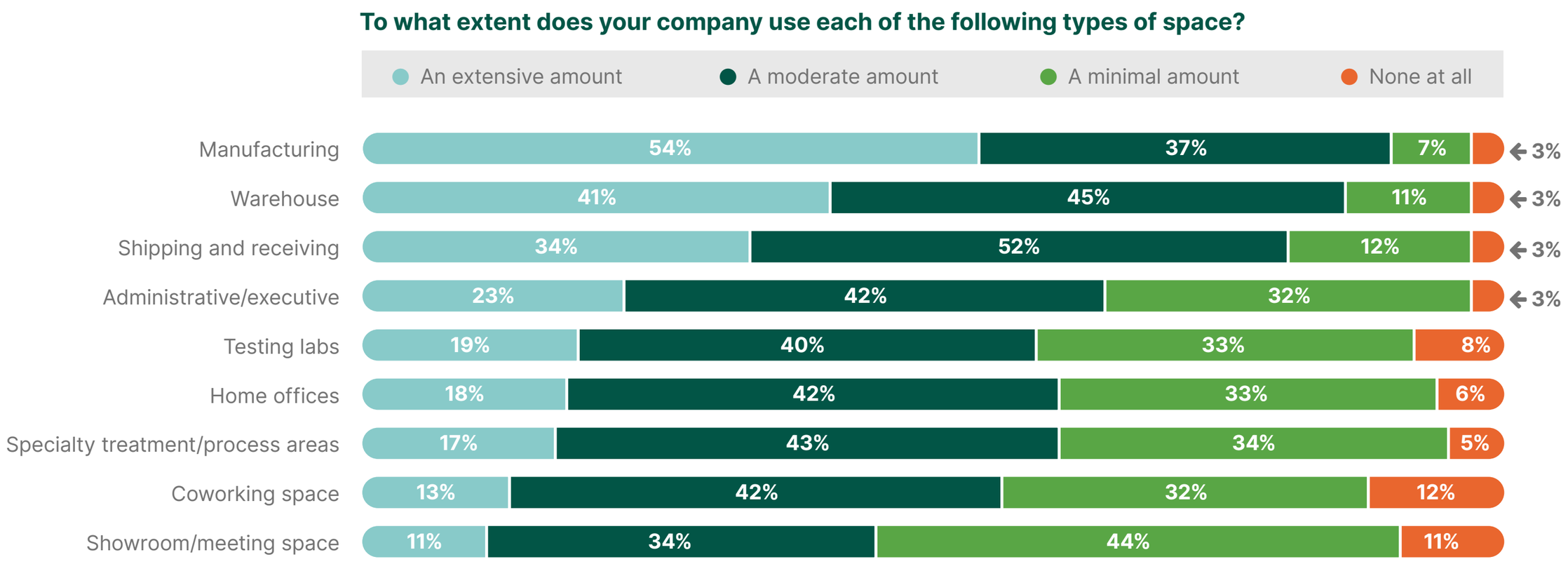


All respondents (n=156). Multiple answers allowed. Respondents are most likely to make investments in manufacturing equipment, robotics/automation, and/or IT security in the next 24 months.

Part 2: How space is used now, anticipated changes, and the importance of smart spaces

As expected, most of the space used by respondents was dedicated to the manufacturing floor, followed by warehouse and shipping and receiving. However, there was more of an even split between administrative, testing labs, home offices, and specialty treatment areas. It is interesting to note that home offices were used an extensive or moderate amount by almost 60% of respondents—something that probably would not have even ranked three years ago.

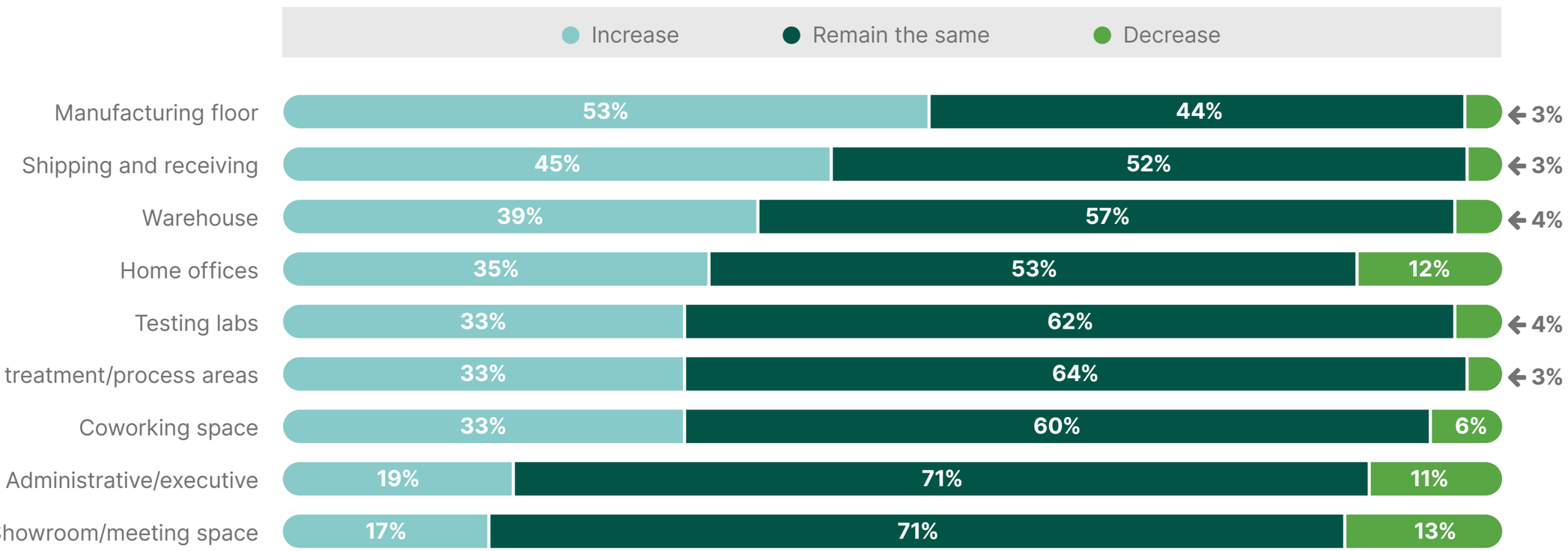
To what extent does your company use each of the following types of space?



(n varies from 154 to 156). Respondents are likely to use an extensive amount of manufacturing floor space. Warehouse and shipping and receiving space are also likely to be used by respondents.

But even more important to note is that 88% of respondents estimated that home office use would increase or remain the same over the next two years, while 93% estimated that coworking space needs would grow or stay the same. As far as the biggest space need for the future, 53% of respondents estimated the need for more manufacturing floor space, followed by shipping and receiving, and warehouse space.

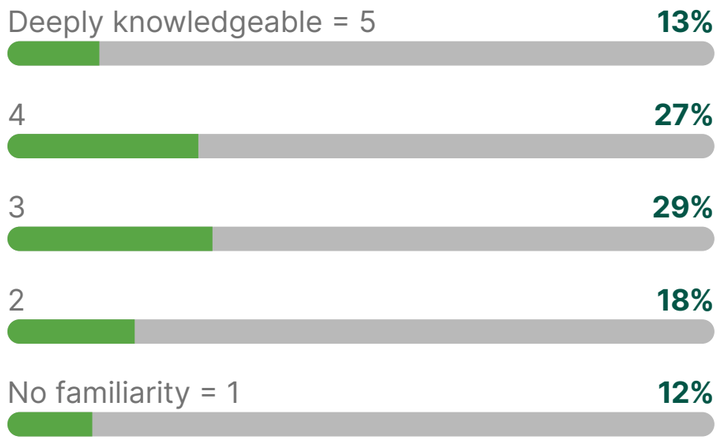
In the next two years, will your need for each of the following types of space increase, remain the same, or decrease?



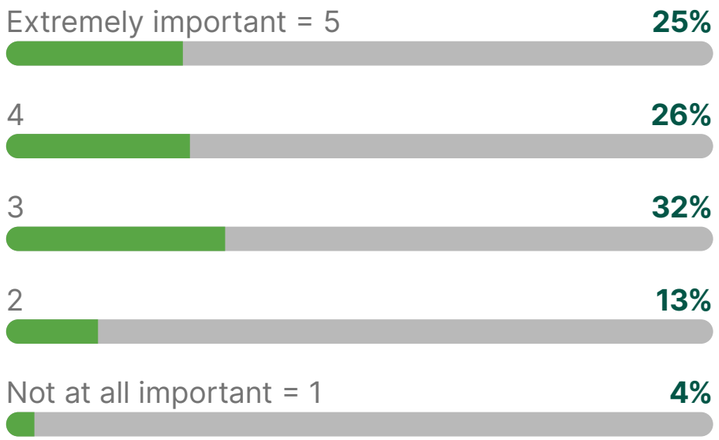
(n varies from 154 to 156). The majority of respondents expect their manufacturing floor space needs to increase. Forty-five percent of respondents expect an increase in the need for shipping and receiving space and 39% expect to see an increase in the need for warehouse space.

Respondents were then asked about their familiarity with the concept of smart spaces and reported moderate familiarity. After that question, respondents were then offered a definition of smart spaces as: “Spaces where the application of IT and IoT technologies are used to enhance connectivity, security, and intelligence.” With that definition, more than 50% indicated that creating or enhancing smart spaces was either extremely important or important to their organization. Diving deeper, we see those with the most familiarly also ranked its importance higher. It’s not too far of a leap to say that the concept of smart spaces may be less understood—and potentially undervalued—by the manufacturing industry. There is a clear advantage for those who are knowledgeable and, as a result, investing more.

To what degree are you familiar with the concept of smart spaces?



To what degree is creating or enhancing smart spaces important to your company?

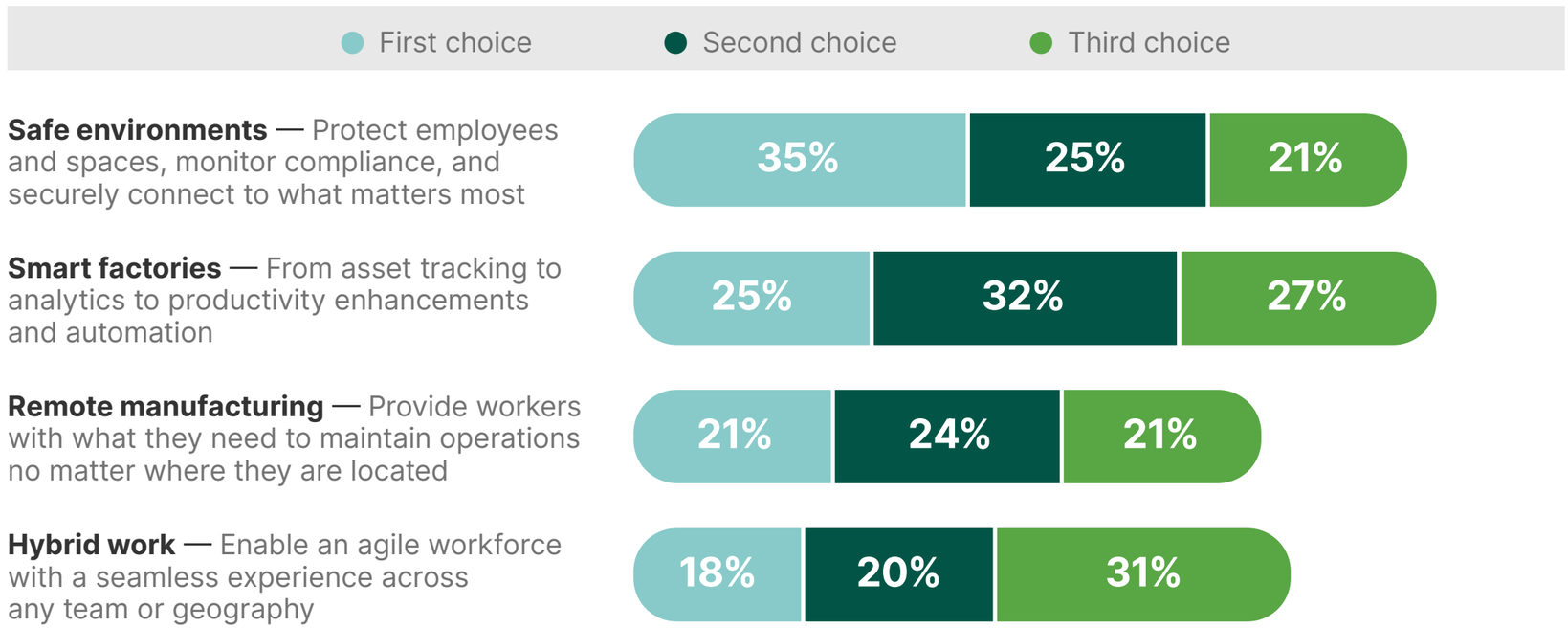


All respondents (n=157). Respondents initially reported a moderate familiarity with the concept of smart spaces. After smart spaces were defined as: “Spaces where the application of IT and IoT technologies are used to enhance connectivity, security, and intelligence,” the majority of respondents reported that creating or enhancing smart spaces is important to their company (rate 4 or 5 on a 5-point scales).

When asked which aspects of smart space technologies are most valuable, safe environments—technologies that protect employees and spaces, monitor compliance, and securely connect to what matters most—ranked most valuable. It's also notable that those most challenged by increasing compliance and regulations and attracting workforce ranked smart space investments as more important. Smart factories and remote manufacturing also ranked highly as the most valuable aspects of smart space technologies. As before, those more familiar with the concept of smart spaces ranked the importance of smart factories more highly.

Not ranked as highly but still seen as valuable is using smart space technology to enable hybrid work, specifically enabling work to be done more seamlessly across any team or geography. This supports earlier evidence in the research that suggests that home offices, coworking spaces, and a remote/hybrid work reality is here to stay, at least for the next few years.

Which of the following aspects of smart space technologies are most valuable for your company?



All respondents (n=157). Safe environments are considered the most valuable aspect of smart space technologies, followed by smart factories and remote manufacturing.

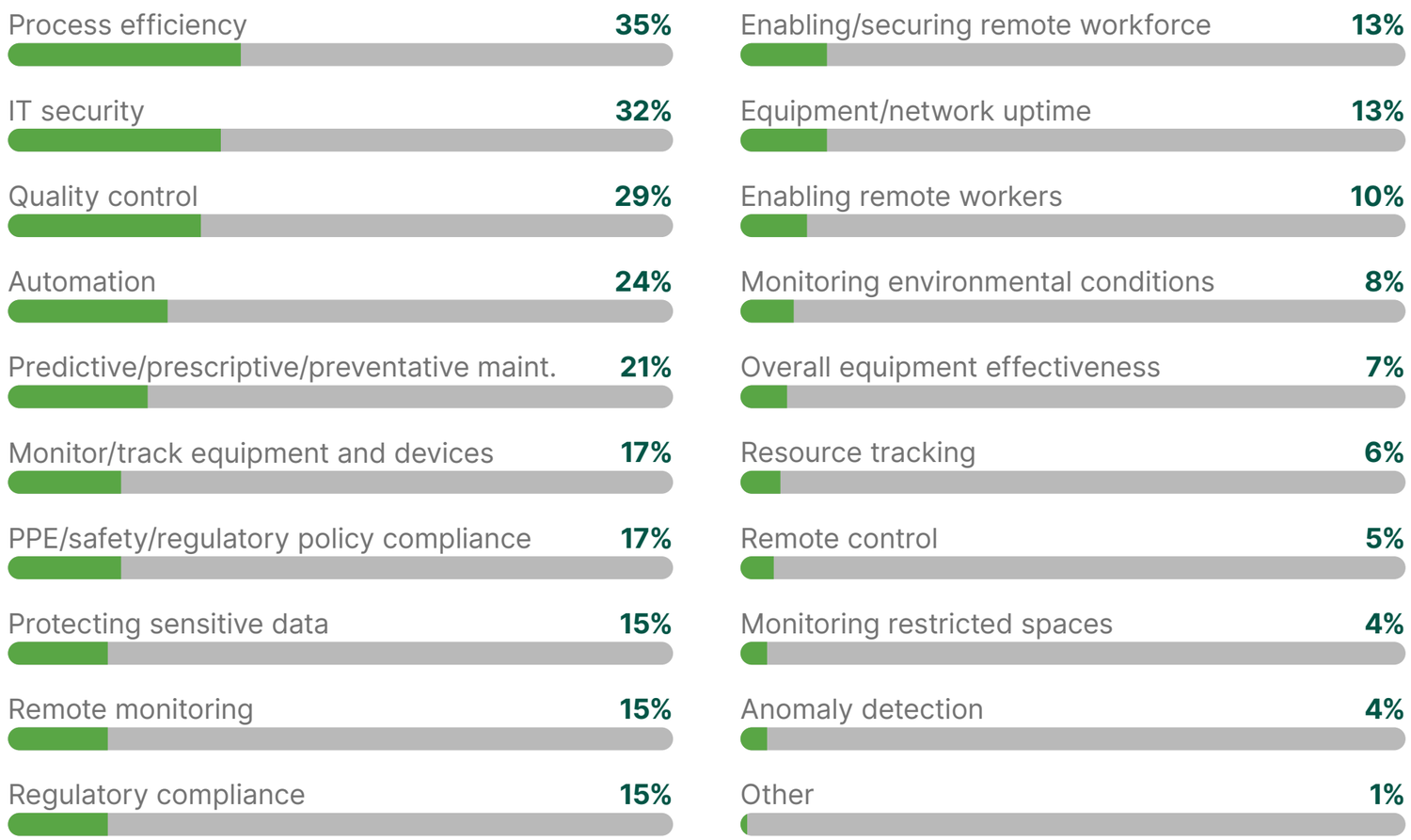
Part 3: Use cases for smart space technology, types of sensors used now, and anticipated use

With significant advancements in sensors and monitors and the ever-increasing complexity of manufacturing operations, the use cases for smart space technologies are endless. When asking respondents which use cases rose to the top, process efficiency, IT security, quality control, and automation were indicated. However, in looking down the list, there are some clear use case themes that emerge, such as:

- **Safety:** Securing remote workers, monitoring environmental conditions, and safety and regulatory compliance
- **Security:** Tracking equipment, monitoring restricted spaces, anomaly detection, and protecting sensitive data
- **Productivity:** Automation, preventative maintenance, remote control, process efficiency, and enabling remote workers

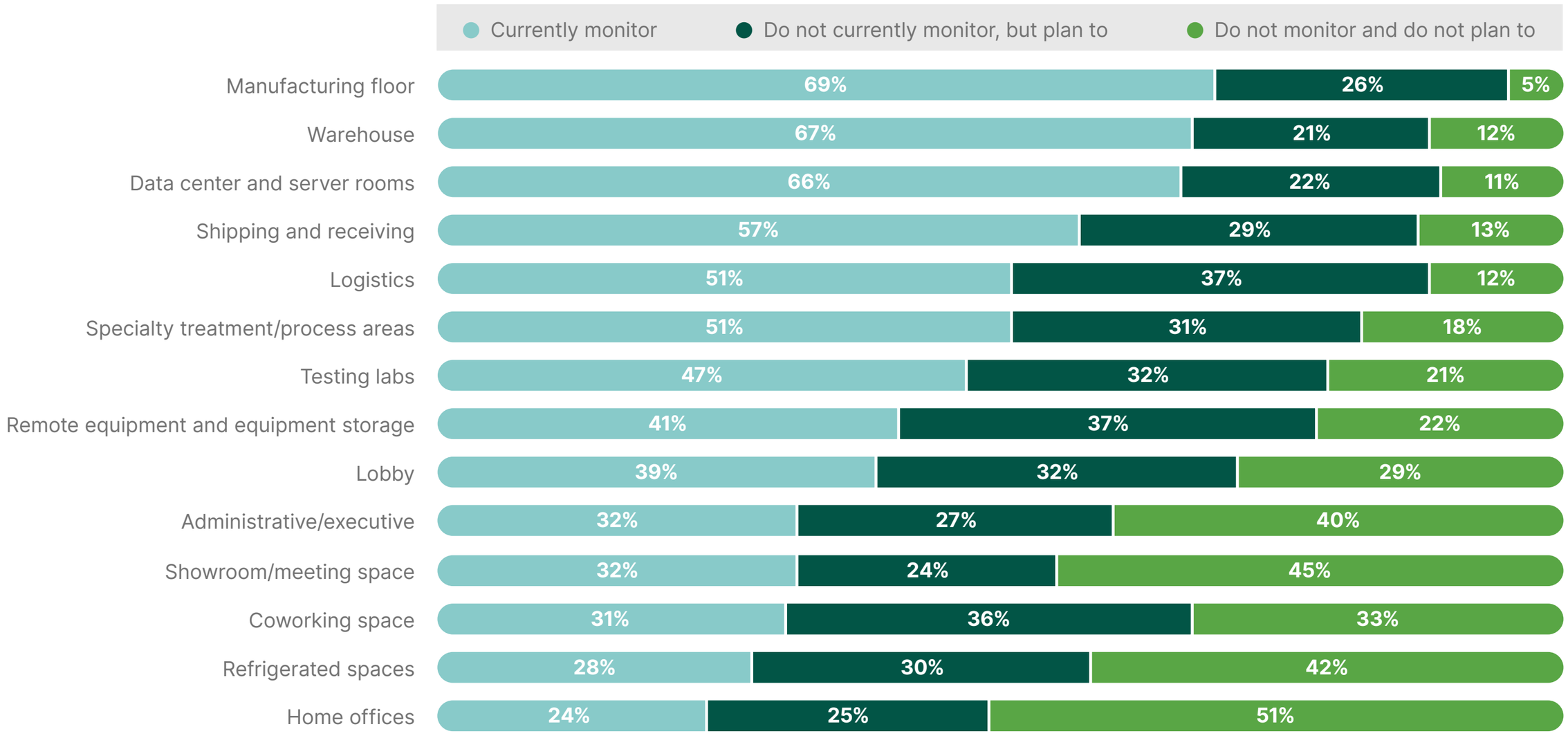
When asked which areas of the organization are currently being monitored or are planned to be, it lines up closely to how manufacturing space is generally allocated, with the notable exception of data center and server rooms, which ranked much higher here.

For what purpose are your top smart technology investments?



Base: All respondents (n=157). Up to three answers allowed. Respondents are most likely to invest in smart technology to improve process efficiency, IT security, and quality control.

Do you monitor or plan to monitor the following spaces?

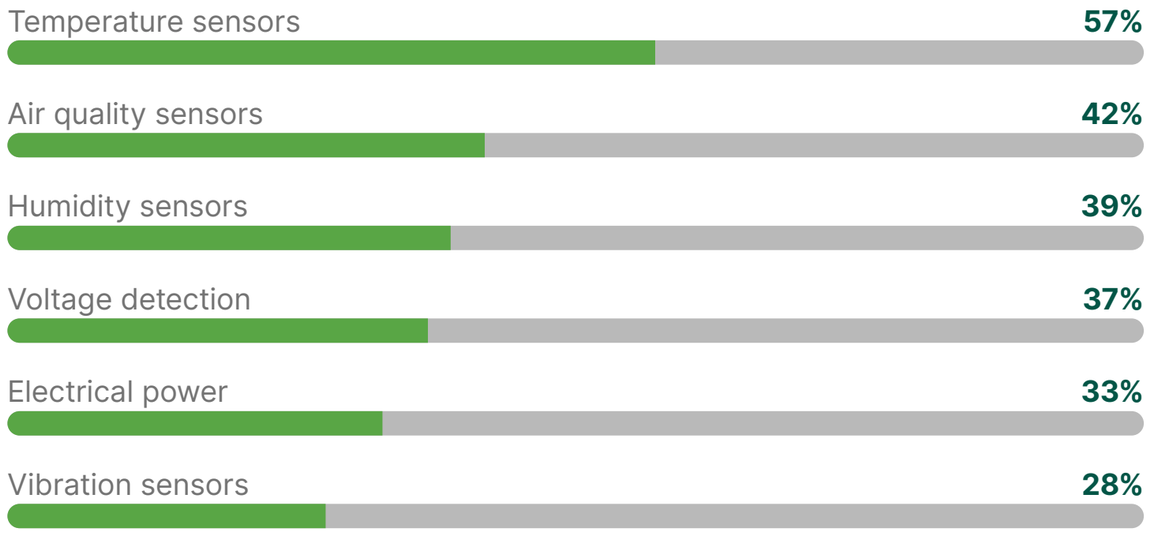


(n varies from 154 to 157). Monitoring is common among respondents. Currently, two-thirds of respondents monitor manufacturing floors, warehouses, and/or data center and server rooms. Aside from home offices, a majority of respondents either currently or plan to monitor each space listed.

As far as which type of sensors are being used, temperature sensors ranked at the top, followed by air quality, humidity, electrical power, vibration, and water detection.

The survey revealed not just the type of sensors, but also the underlying sensor technology that is not only used today but is ranked at or near the top of the list for use in the future. These include sensors that are digital (79%), wireless (68%), cloud-managed (54%), and video (42%). Percentages indicate how many respondents currently use and plan to use more of these technologies in the future. All these underlying technologies enable a much broader and deeper application of sensor types, so as these underlying technologiecontinue to advance, we can expect sensor utilization to expand simultaneously.

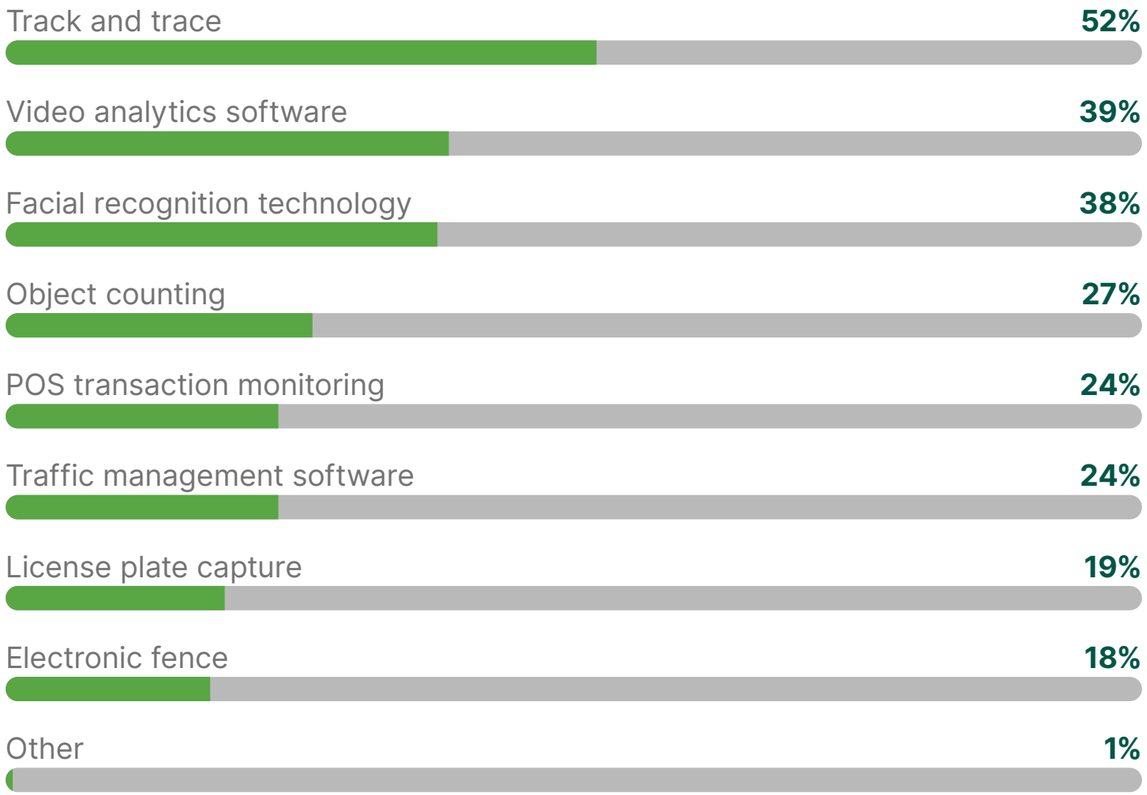
What kinds of sensors are you currently using?



All respondents (n=155). Multiple answers allowed. Respondents are most likely to currently use digital and/or temperature sensors. The chart lists the top types of sensors used out of a list of 30.

cisco Meraki IndustryWeek

If you were to deploy advanced video technologies, which capabilities are most valuable for your company?



Base: All respondents (n=157). Multiple answers allowed. Respondents are most interested in advanced video technologies that provide track and trace capabilities. Video analytics software and facial recognition technology are each valuable to four in ten respondents.

One underlying technology that benefits from the others is video. Its application and use cases are rapidly expanding, so we asked respondents specifically about it. What ranked at the top for use of video was track and trace, video analytics software, and facial recognition. Since some of these technologies are emerging and perhaps not as familiar to the industry, they can be defined as:

- **Track and trace:** A capability that utilizes video technology to identify objects like vehicles or boxes and can trace their movements across one or multiple cameras over time.

- **Video analytics (VA):** Also known as video content analysis (VCA), VA is a solution that automatically analyzes video to detect and determine temporal and spatial events like motion, object, and shape recognition as well as flame and anomaly detection.

- **Facial recognition:** A technology that uses biometrics to map facial features from a video and compares the information with a database with known faces to find a match.

Independently, these technologies are powerful. Combined, these technologies offer unprecedented opportunities to gain insight into how space is used, how things move through that space, threats to safety and compliance, and the ability to anticipate problems over time. The integration of these technologies along with other sensor types is truly an exciting field of possibility for the future and utility in the present.

Part 4: The smart space journey and stories from the field

The best way to think about creating smart spaces within your organization is as a journey. When asked, respondents indicated that the majority are at the beginning stages of the journey with one in four reaching the implementation phase. When asked how they compared to their peers, by and large respondents indicated they were in line with their industry. What this suggests is that this truly is an emerging opportunity, one with potential that the industry has barely scratched the surface of.

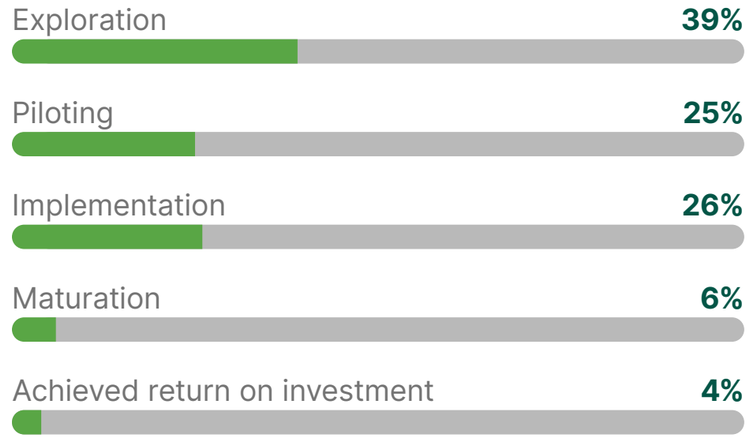
To provide even richer context, below are direct quotes provided by survey respondents about how they are using—or how they plan to use—smart space technologies. We are only able to share a few here because of space; however, the sheer volume and depth of responses is a clear indication of how much the topic resonated with respondents.

Respondent statements:

- Be able to automatically enhance connections to enable remote work in labs from offices. Also, to appropriately plan parking arrangements
- Connecting our three US manufacturing sites and create digital workplaces for engineers among sites
- Continuous improvement by monitoring data
- Direct trucks at the shipping/receiving docks
- Enables digitization and streamlining of various work processes that could never be done before
- Enhancing productivity by implementing preventive measures for better performance of the staff separate for every department
- Improve space usage
- To monitor the environmental conditions within our plant, particularly from the aspect of pollution and impurity control
- A more secure workspace, reducing energy costs
- Remotely monitor our production process from product completion to dispatch
- Use sensors and cameras for quality control for high volume production
- Enhancing our cost control and management
- For our company growth and environmentally friendly working culture
- Testing parts and ensuring the quality much earlier in the process in order to pick up problems as soon as possible.

Respondent statements are verbatim from survey participants.

In what phase are you on your smart space journey?



Base: All respondents (n=156). The majority of respondents are in the beginning stages of their smart space journey, while about one in four respondents are in the implementation stage. One in ten respondents are in the advanced stages of their smart space journey.

Conclusion

As this research makes clear, access to workforce, technology infrastructure, and culture rank as the biggest challenges to growth and, as a result, investments in IT security, employee engagement, and hybrid work capabilities are of the highest priority. The business case for leveraging those investments to create more connected, secure, and productive spaces is also clear, with 90% of respondents either exploring, piloting, or implementing smart space technologies.

However, that is just the beginning of the smart space story. With rapid advancements in sensor and video technology and remote, wireless, and cloud-based connectivity, the possibilities are endless. As the industry continues to relentlessly pursue more productive, safe, and healthy work environments, creating smarter spaces are a vital part of that endeavor.