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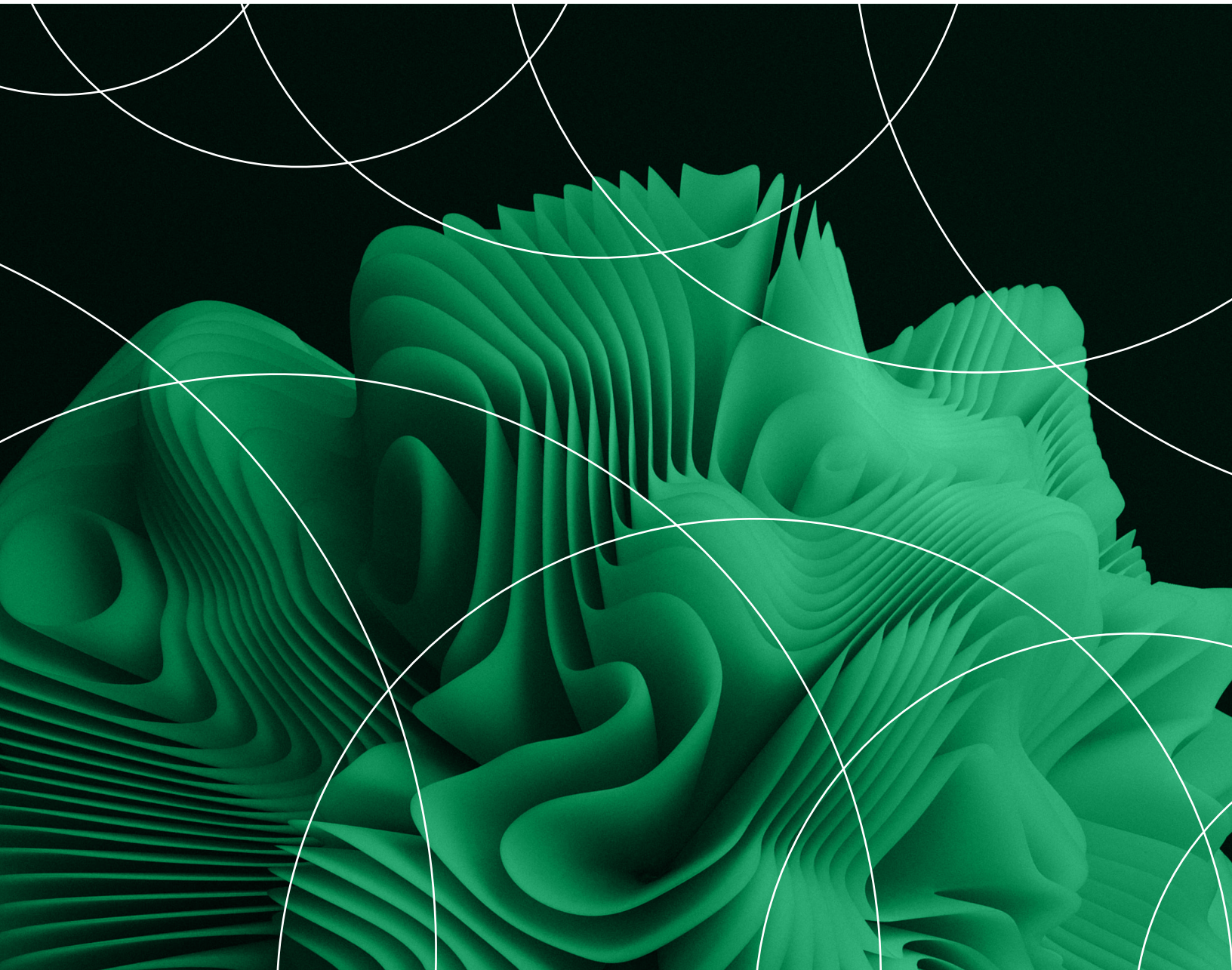
Cracking The Smart Buildings Code: A Spotlight On Healthcare

Results From The November 2023 Thought Leadership Paper, "Cracking The Code: Unleash Your Smart Buildings Strategy With The Power Of Facility Data"

A FORRESTER CONSULTING THOUGHT LEADERSHIP PAPER COMMISSIONED BY JOHNSON CONTROLS, FEBRUARY 2024

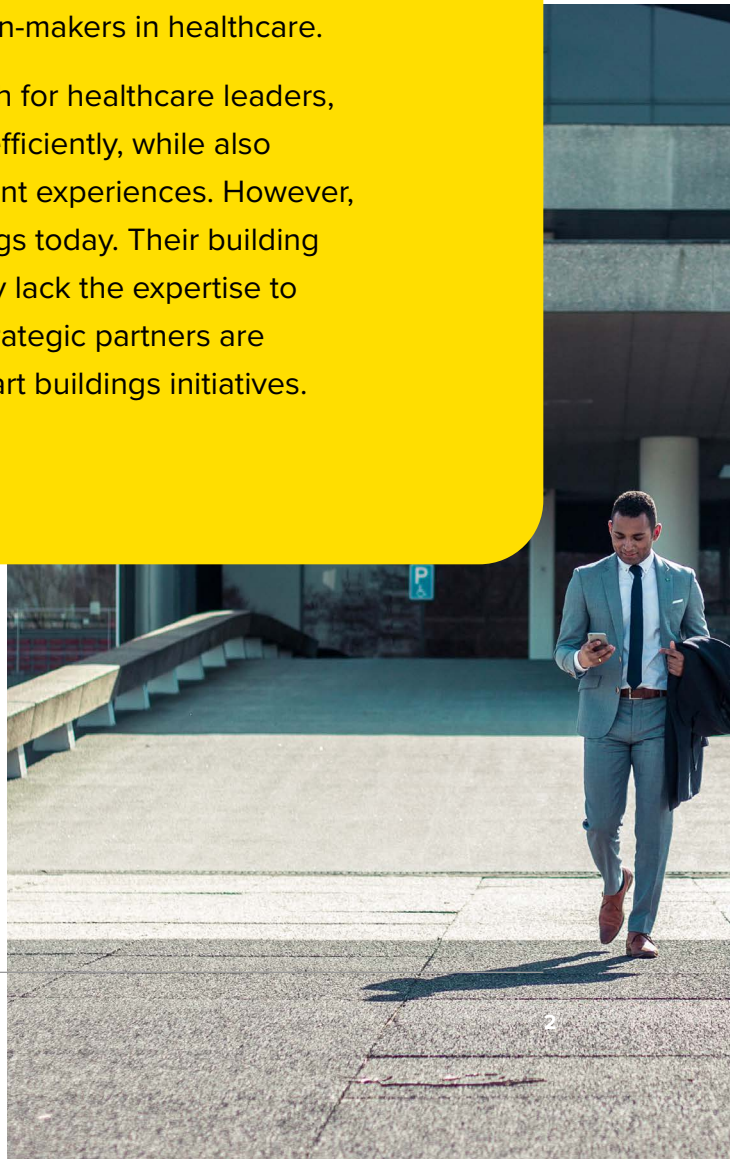


Executive Summary

In 2023 alone, 30% of US rural hospitals were at risk of closing due to financial instability.[1] As the healthcare industry continues to adjust to the aftermath of the COVID-19 pandemic, major obstacles abound like record-low operating margins and an increasing number of cyberattacks and natural disasters. Leaders need to find ways to operate more efficiently to reduce costs and drive growth while delivering the best care outcomes possible. Savvy healthcare leaders realize investing in making their facilities smarter through better integration, automation, and intelligence can help.

In August 2023, Johnson Controls commissioned Forrester Consulting to evaluate the state of smart buildings. Forrester conducted an online survey with 3,445 smart buildings leaders to explore this topic. All leaders were asked high-level smart buildings strategy questions and then more granular questions depending on their level of responsibility for sustainability, security, and/or building environmental systems. For this spotlight, Forrester focused on a subset of 300 smart buildings decision-makers in healthcare.

We found that smart buildings offer a path to growth for healthcare leaders, enabling them to reduce costs by operating more efficiently, while also improving building sustainability, security, and patient experiences. However, few healthcare organizations operate smart buildings today. Their building systems and data are not fully integrated, and many lack the expertise to leverage building system insights. Technical and strategic partners are needed to help fill expertise gaps and advance smart buildings initiatives.



Key Findings

Smart buildings offer a path to organizational growth. Smart buildings not only help healthcare leaders attain sustainable, secure, and efficient outcomes; they also enable healthcare facilities to deliver the best care outcomes possible while driving growth and reducing costs.

Only 7% of healthcare leaders say their building systems and equipment are fully integrated, and it's costing them time, people, and money. While many leaders use some building insights, their decisions are rife with risk due to limited data painting an incomplete picture. This lack of integrated data and insight is causing reduced efficiencies (68%), reduced patient loyalty (66%), and increased regulatory penalties (58%).

Building insights are vital to achieving sustainability, security, health, safety, and optimization goals for healthcare leaders. We found that many departments (e.g., security, sustainability, facilities, experience teams, CEO) rely on building data to inform decisions.

Healthcare leaders seek smart buildings partners offering deep integration abilities, the most advanced technology, and easy-to-use platforms. Smart buildings solutions unite data from all systems and equipment, automatically alerting and adjusting environments for safety and efficiency. These solutions also make it easier for leaders to leverage captured insights to guide decisions and recommendations. Selecting a third-party partner with appropriate integration, technology, and platform expertise is often needed for seamless enablement.

Building Insights Are Vital For Healthcare Leaders, But Many Struggle To Use Them

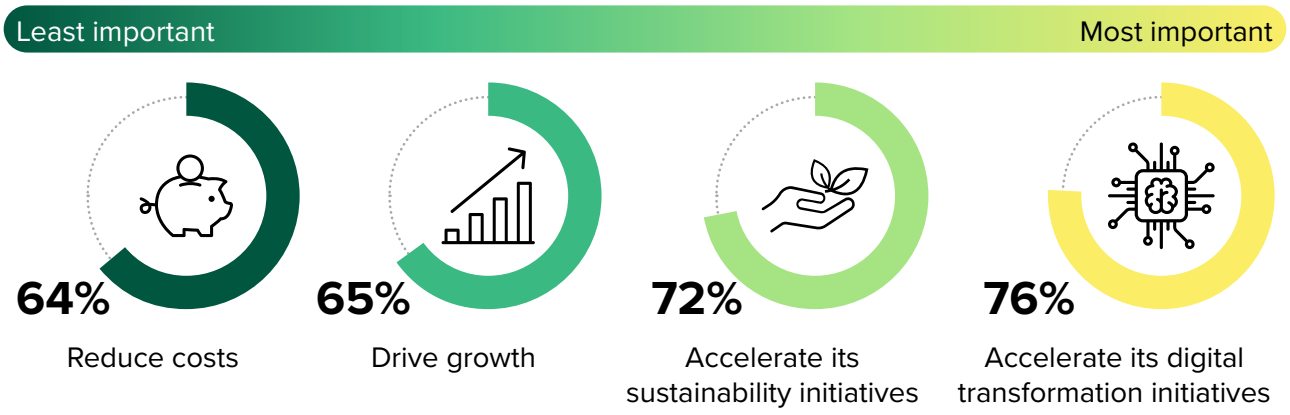
Smart buildings provide healthcare leaders with a clearer picture of what's going on inside their facilities, helping them better manage, monitor, and create an efficient, sustainable, healthy, and safe environment for patients and visitors. They also enhance efficiency and productivity of healthcare professionals. For the purposes of this study, we defined smart buildings as those that converge information from various connected systems in a facility (e.g., HVAC, lighting, security, etc.) to provide data-driven insights and measurable information that can be shared across multiple operational technology (OT) and information technology (IT) systems. In surveying 300 smart buildings strategy leaders in healthcare, we found that:

- **Smart buildings help accelerate digital transformation and sustainability initiatives, drive business growth, and reduce costs in healthcare facilities.** More than three-fourths of healthcare leaders say smart buildings are important to achieving the goal of accelerating digital transformation efforts. They also help leaders accelerate their sustainability initiatives, drive growth, and reduce costs (see Figure 1).

FIGURE 1

Importance Of Smart Buildings Initiatives To Meet Top Business Priorities

(Showing "Important" and "Critical")



Base: 156 to 235 smart buildings decision-makers at the director level or higher in healthcare
Note: Showing top 4 business priorities
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

FULL BUILDING SYSTEM INTEGRATION

7%

Average for healthcare

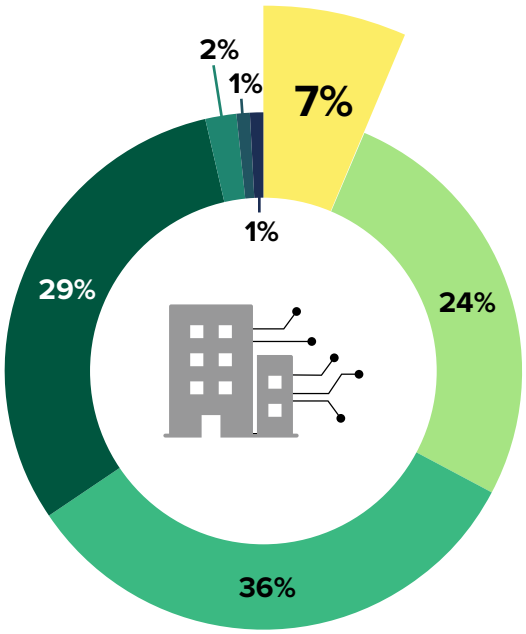
10%

Average across all 18 industries surveyed

- **Security, space optimization, modernization, sustainability, and reducing costs are top smart buildings investment drivers.** Healthcare leaders identified multiple drivers propelling investments to make their buildings smarter. Top drivers include improving security operations (65%), improving physical security (51%), optimizing space management (41%), modernizing buildings (40%), and reducing carbon emissions (39%). Reducing energy energy/ operating costs is also a driver for more than one in three leaders (36%).
- **Only 7% of healthcare leaders say their building systems and equipment are fully integrated.** A smart building is only as smart as the infrastructure that supports it. Comprehensive smart buildings connect all relevant systems and data. However, due to the diverse array of connected building systems, managing many partners and achieving necessary technology integration is challenging. On a scale of 1 (not at all integrated) to 7 (fully integrated), only 7% of healthcare leaders report their systems and equipment are fully integrated today compared to 10% across all 18 industries surveyed (see Figure 2).

FIGURE 2

"How well integrated are the digital systems, solutions, services, and connected equipment in your organization's buildings?"



Base: 300 smart buildings decision-makers at the director level or higher at global enterprises in healthcare
Note: Percentages may not total 100 due to rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

- **Managing the many partners involved with healthcare facilities is also complicated.** More than two-thirds of surveyed leaders work with multiple partners — each specializing in specific types of building systems — to get required insight into their healthcare facilities. Many leaders also face misalignment between their partners (51%) or struggle to get accurate and useful information from them (61%). In addition to working with a diverse array of partners, most (72%) of healthcare leaders also struggle with using captured insights to optimize their building systems and achieve their top goals.
- **Lack of healthcare facility data integration is costing organizations time, people, and money.** In 2024, Forrester predicts that smart technologies used in hospitals will increase significantly (15%), but hospitals will struggle in creating consistencies in the patient experience due to the complexity of integrating and connecting these systems.[2] Gaps in captured building data and integrated building systems have negative impacts on healthcare operations, revenues, and brand perception. For example, many leaders say their organizations face decreased operating efficiencies (68%), decreased patient loyalty (66%), increased regulatory penalties (58%), decreased revenue (52%), and decreased brand reputation (47%). Forrester's research finds that improving access to insights to unlock the value of data is a critical priority for 42% of leaders at future-fit/modern healthcare organizations, compared to just 14% of traditional organizations.[3]
- **Healthcare leaders need smart buildings partners with breadth and depth of expertise.** Deploying a smart building often requires engaging with partners that have a breadth and depth of expertise to advance smart buildings initiatives. Leaders in this study seek partners that use the latest technology, have experience in the healthcare industry, enable smart buildings platforms used by cross-departmental stakeholders, offer one digital platform across all sites and use cases, and enable seamless integration into all building systems (see Figure 3). Forrester's research also finds that healthcare leaders at future-fit healthcare organizations are more than three times as likely as those from traditional healthcare organizations to say that optimizing strategic vendor partnerships is among their five most important actions over the next 12 months.[4]

FIGURE 3

Importance Of Smart Buildings Partner Attributes

(Showing “Valuable” and “Extremely valuable”)

Base: 300 smart buildings decision-makers at the director level or higher at global enterprises in healthcare
Note: Showing five responses
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

Sustainability In Healthcare Requires Technical And Strategic Smart Buildings Partners

Managing environmental sustainability in healthcare presents unique challenges, such as managing waste and air pollution from healthcare facilities while delivering high-quality, affordable care.[5] Smart buildings can help healthcare leaders advance building sustainability goals without sacrificing the quality of service and capabilities offered to patients. We found that:

2030 CARBON REDUCTION GOAL OF 75%+

70%

Average for healthcare

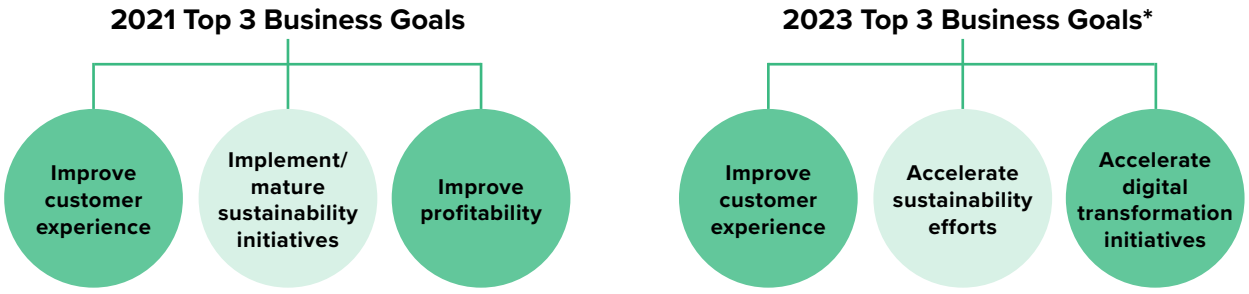
64%

Average across all 18 industries surveyed

- **Urgency to address sustainability in healthcare continues to accelerate.** Comparing 2023 healthcare survey respondent results to healthcare results from the 2021 study commissioned by Johnson Controls show that sustainability remains a top business priority in this sector.[6] Although the healthcare sector currently faces a more volatile economic and political climate across the globe, there continues to be an urgency to accelerate sustainability efforts (see Figure 4). This momentum is driven by regulatory pressures and efficiencies realized from prior

FIGURE 4

Top Business Goals In 2021 Vs. 2023 For Healthcare



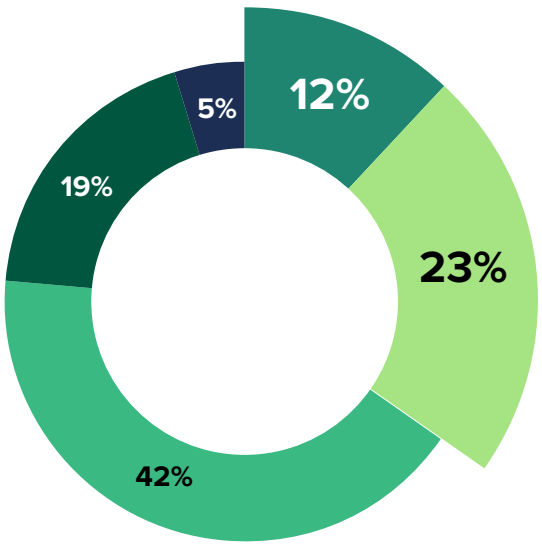
Base: 119 sustainability decision-makers at global enterprises prioritizing corporate sustainability in retail and commercial real estate
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, September 2021
*Base: 300 smart buildings decision-makers at the director level or higher at global enterprises in retail and commercial real estate
*Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

sustainability efforts. Achieving 2030 carbon reduction goals is also driving sustainability momentum among healthcare organizations. The 2023 study shows 70% of leaders say their healthcare organizations set their carbon reduction goal above 75% across their portfolio of buildings by 2030. This result is above the overall average of 64% across all 18 industries surveyed.

- **Siloed data and a lack of operational integration threatens to derail progress toward sustainability goals among healthcare organizations.** Roughly two-thirds of healthcare leaders are on track to meet their organization's aggressive 2030 carbon reduction goals, but notably another 33% worry their organization is underperforming on the path towards meeting these goals (see Figure 5). While we don't have a large enough sample to analyze at the industry level, in the broader study, we found there are also discrepancies between stakeholders participating in these sustainability initiatives. While 49% of respondents with a sustainability title say their organization has a carbon reduction goal of 75% or more across their portfolio of buildings, 80% of IT leaders and 67% of CEOs report the same. These significant differences indicate there is a lack of a single source of truth for many organizations when it comes to visibility of this high-level sustainability goal, let alone more granular sustainability metrics.

FIGURE 5

Performance Toward Meeting 2030 Carbon Emissions Reduction Goal

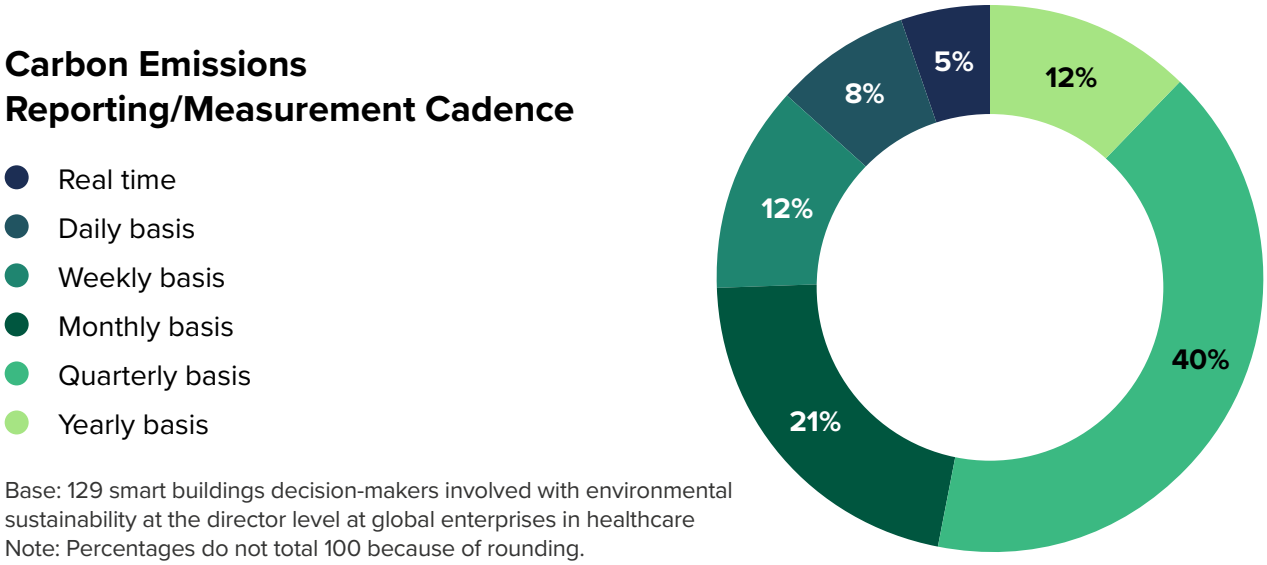


Base: 129 smart buildings decision-makers involved with environmental sustainability at the director level at global enterprises in healthcare
Note: Not showing "Don't know"
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

- **Healthcare stakeholders demand progress and transparency in reporting.** Study results show customer-required reporting, country-required reporting, and supply chain compliance reporting are the most common reporting types in healthcare. However, most organizations can only measure and report on carbon emissions once a year or quarter, which limits reporting of incremental progress (see Figure 6). Measuring carbon emissions in near real time is key to identifying accurate recommendations to optimize building systems and to adjust processes to reduce carbon emissions.

FIGURE 6

Carbon Emissions Reporting/Measurement Cadence

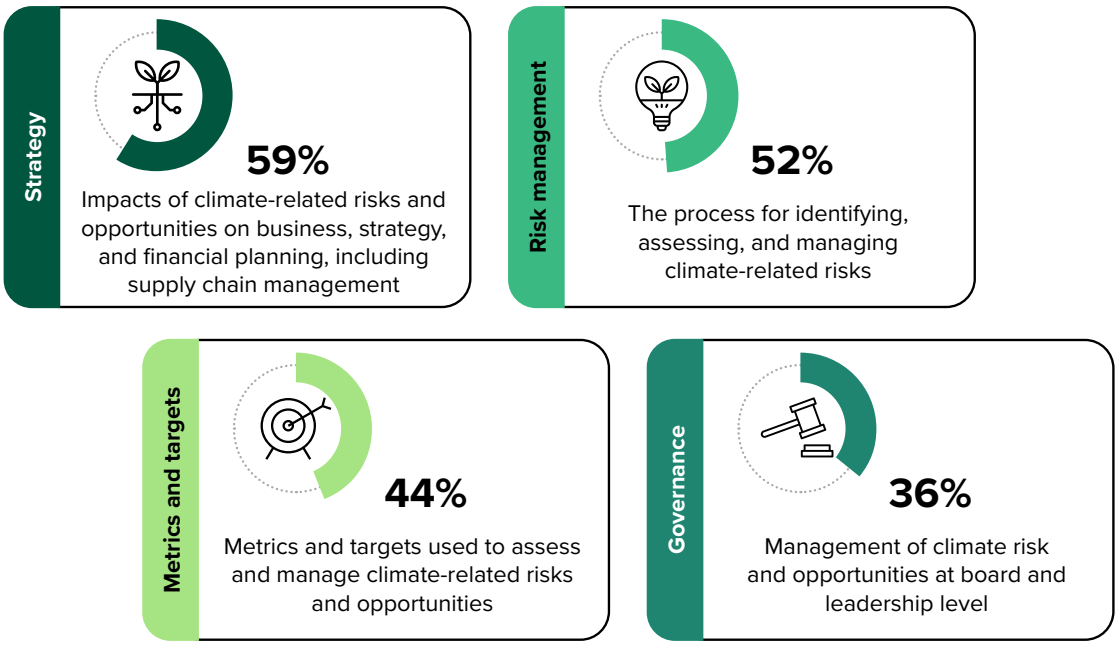


Base: 129 smart buildings decision-makers involved with environmental sustainability at the director level at global enterprises in healthcare
Note: Percentages do not total 100 because of rounding.
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

- **Environmental impact reporting in healthcare is fragmented and lacks a commonly used standard.** Healthcare organizations use many different types of reporting options. The Global Reporting Initiative (GRI) standard is used most often and provides healthcare organizations with more reporting flexibility compared to other reporting frameworks. Among healthcare organizations with climate transition plans in place, only 1% can report on all four Task Force on Climate-Related Financial Disclosures (TCFD) areas of governance; strategy; risk management; and metrics and targets (see Figure 7). This result shows reporting is far from standardized and remains fragmented.

FIGURE 7

"Which of the following does your company report on/plan to report on relating to its climate transition plan?"



Just 1% say their company reports on all four categories.

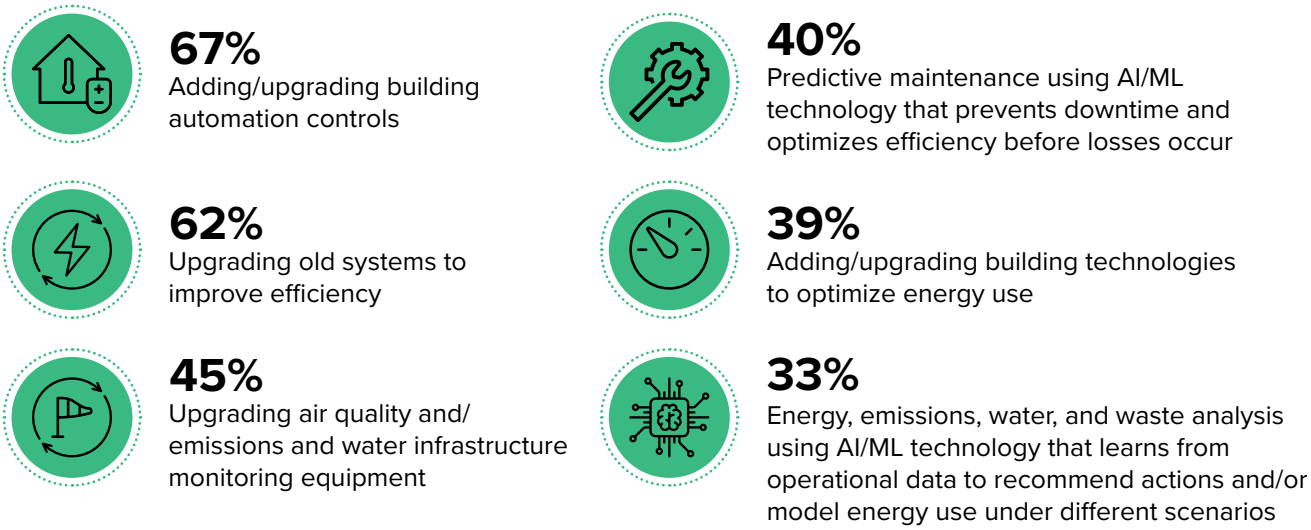
Base: 118 smart buildings decision-makers involved with environmental sustainability at the director level or higher at global enterprises in healthcare that have a climate transition plan in place or are developing one
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

- **Technical and strategic partners are often needed to help fill expertise gaps.** Seventy-eight percent of healthcare sustainability leaders say their organizations lack the technical expertise to optimize building systems using insights collected; and 39% lack internal skills to measure their organization's environmental impact. Other top challenges include not understanding what the next most impactful steps are to meet sustainability goals (55%); struggling with competing organizational priorities (58%); and the high costs of executing on sustainability priorities (40%). To digitally transform buildings successfully and achieve sustainability goals, healthcare organizations need partners to fill internal expertise gaps and strengthen their foundation and roadmaps to reduce carbon emissions.

- **High-impact healthcare facility sustainability initiatives often start with upgrading, digitizing, and automating systems to improve efficiency.** Sixty-nine percent of healthcare leaders say smart buildings are important to accelerating their firm's sustainability initiatives. Leaders indicate replacing old equipment to improve efficiency and cost savings; adding/upgrading building automation controls and digital technologies; and upgrading air-quality/emissions monitoring equipment have significant impact on their organizations' ability to improve sustainability of owned or leased spaces. Comparing these results to the 2021 study commissioned by Johnson Controls shows many organizations started their smart buildings sustainability journeys by upgrading old equipment to improve efficiency and enabling air-quality and emissions monitoring.[7] With the foundation in place, artificial intelligence (AI) insights can be used to drive further efficiency and give leaders access to more actionable sustainability insights. Roughly 40% of healthcare leaders say their firm currently invests in AI for predictive maintenance, and 33% invest in a holistic view of resource use to accelerate their firm's progress toward carbon reduction goals (see Figure 8).

FIGURE 8

Upgrading, Digitizing, And Automating Systems Set The Foundation For Smart, Sustainable Buildings



Base: 129 smart buildings decision-makers involved with environmental sustainability at the director level at global enterprises in healthcare
Note: Showing smart building investment initiatives with most significant impact on improving building sustainability
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

Optimizing Building Environments In Healthcare Requires Smart Buildings Partners

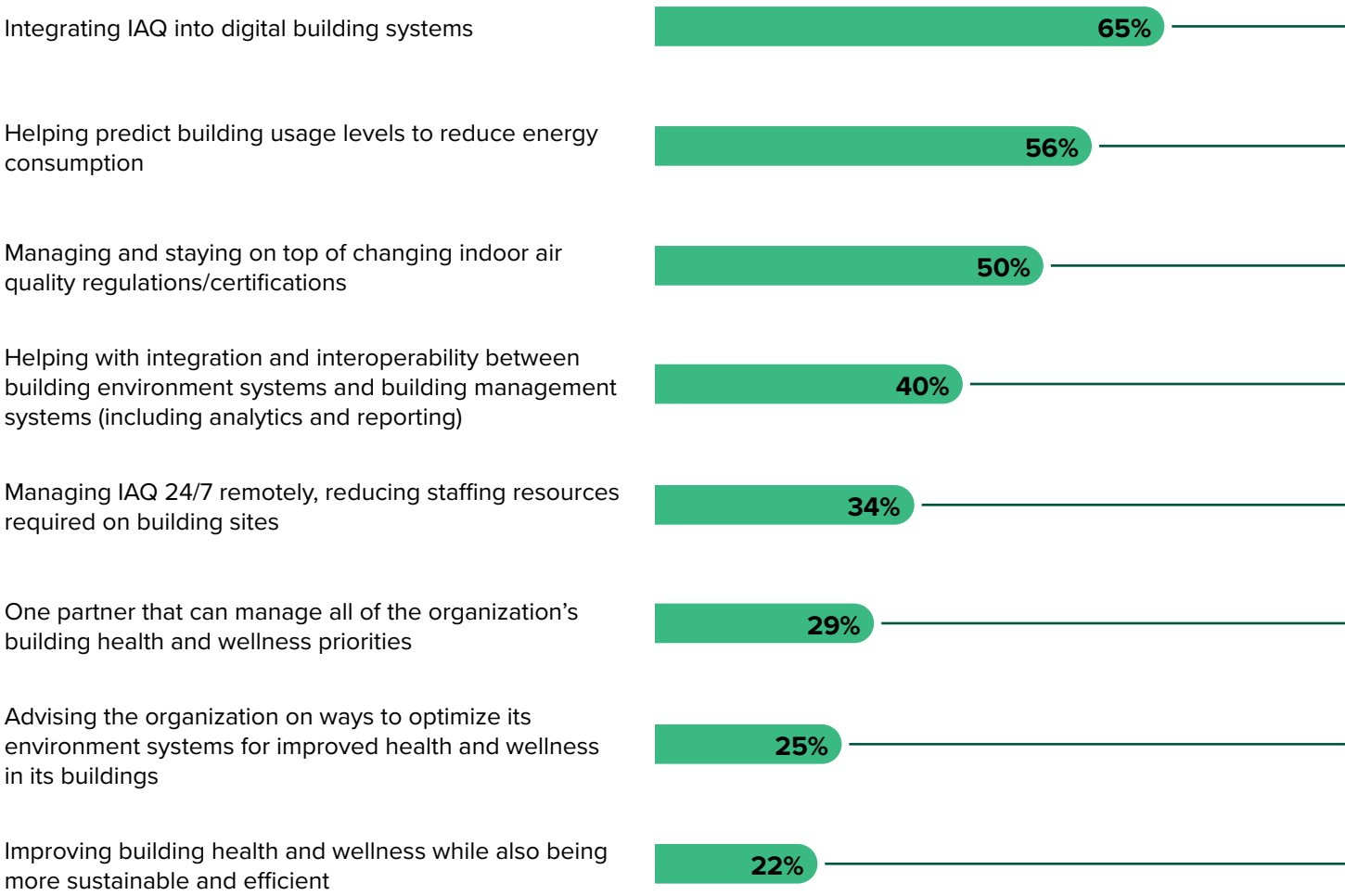
Preventing the spread of diseases; providing sterile operating environments or flexible spaces; and keeping patients comfortable and safe are all initiatives enabling healthcare facilities to deliver on their most basic purpose to deliver patient care. Smart buildings can help healthcare leaders manage and optimize facilities, but many need third-party partner assistance to realize the full potential of smart buildings. We found that:

- **Improving patient safety or patient experience, attaining health and wellness certifications, and optimizing operational efficiency are top healthcare building environment system priorities.** To address these priorities, leaders are most focused on initiatives to improve energy efficiency (62%), address physical security (60%), design flexible building operating models (56%), and assess indoor air quality (IAQ) (44%).
- **To meet their goals, healthcare leaders need help monitoring and improving air quality and predicting building usage levels.** Leaders indicate their organizations are most challenged with optimizing asset performance/efficiency (44%), monitoring outdoor air quality (28%), optimizing/replacing HVAC/heating/ventilation systems (28%), and monitoring and improving IAQ (25%). Healthcare organizations particularly need help integrating IAQ into their digital building systems and predicting building usage levels to reduce energy consumption (see Figure 9).
- **Ownership of building environment system priorities in healthcare is spread across departments, requiring tailored analytics and standardized reporting on shared metrics.** Different parts of the healthcare organization own different building systems initiatives. For example, facilities departments are most commonly identified as owners of improving patient morale/well-being, reducing carbon footprint, and addressing compliance. Safety departments are the most common owners of priorities to improve patient health; and environmental health and safety departments are the most common owner of patient safety

improvements. To ensure insights are relevant and useful, healthcare firms should tailor analytics and reporting to accommodate department needs and standardize the reporting on shared metrics and goals.

FIGURE 9

Capabilities Organizations Rely On External Partners For



Base: 144 smart buildings decision-makers involved with building environment systems at the director level at global enterprises in healthcare
Note: Showing top 8 responses
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

Smart Buildings Help Enable Secure Healthcare Facilities

Healthcare security leaders are dealing with a record number of threats and — whether physical or cyber in nature, or a blend of both — these threats pose a very real and increasing threat to patient life. Between 2016 and 2021, the number of cyberattacks on US hospitals more than doubled.[8] These attacks are increasingly affecting the ability to deliver patient care leading to, for example, postponed or cancelled surgeries and ambulance diversions. Forrester predicts that in 2024 alone the number of patient deaths linked to cyberattacks will double.[9] Many healthcare organizations need help beefing up their physical and cybersecurity preparedness initiatives; in fact, 76% of healthcare business and technology professionals report that improvements in security and privacy are a top IT priority over the next 12 months.[10] We found that:

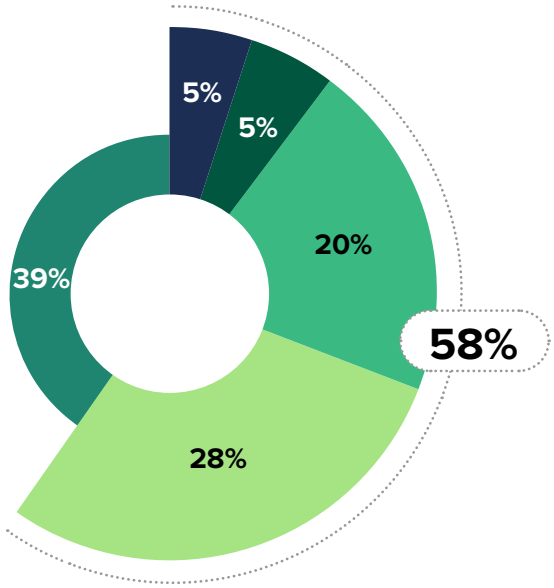
- **Integrated security operations centers (SOCs) and systems are needed to better detect and respond to threats against healthcare facilities.** Cyberattacks are multidimensional, yet most healthcare security teams lack visibility into all those dimensions. Physical and cyber teams often report to different parts of the healthcare organization. In fact, most healthcare leaders (61%) say their organization lacks 24/7 visibility into all security systems. This leads to many issues with getting information from all necessary systems, often preventing appropriate understanding and response to facilities threats (see Figure 10). Both physical and cybersecurity insight is needed because attacks may target both systems. For example, disabling cameras before breaking into a building, or stealing or copying an employee's badge, using it to enter a healthcare facility, and planting malware on a machine or using a USB drive to steal data off a system.
- **Smart buildings can help healthcare security teams improve operations in a sustainable manner.** A significant gap exists between security and sustainability. Sustainability is a healthcare organization goal; however, only 31% of security leaders collaborate with sustainability teams today (see Figure 11). To address this gap, 52% of security leaders

say they must collaborate more with sustainability stakeholders, and 61% say they must find ways to improve security operations while also being sustainable. Smart buildings can help stakeholders achieve these goals. Smart lighting and motion sensors can drive energy efficiencies, while improving threat deterrence and detection. More broadly, physical security systems can provide occupancy data insights; if organizations know where people are spending time in a building, they can manage the use of energy, power, and lighting in a sustainable manner. Participating in enterprisewide smart buildings and sustainability objectives can help security leaders get the funding and resources necessary to protect facilities and patients.

FIGURE 10

Most Organizations Lack 24/7 Visibility Into All Security Systems

- The team does not have access to alerts/ monitoring from building systems
- The team has access during business hours to alerting/monitoring from most building systems, but not all
- The team has access during business hours to alerting/monitoring from all building systems
- The team has 24/7 access to alerting/monitoring from most building systems, but not all
- The team has 24/7 access to alerting/ monitoring from all building systems



63%

My organization often struggles with getting information from all necessary systems for full context of security threats.

55%

My organization's security teams struggle to understand the full context of threats/risks to facilities.

Base: 111 smart buildings decision-makers at the director level or higher for secure buildings at global enterprises in healthcare
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

FIGURE 11

"Which department(s) does your security organization work with today? Which should your organization work with more?"

Base: 111 smart buildings decision-makers at the director level or higher for secure buildings at global enterprises in healthcare
Source: A commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, August 2023

Key Recommendations

Building systems offer healthcare leaders spanning many roles the ability to capture actionable insights to enhance operational processes, optimize the health and safety of employees and patients, and address sustainability initiatives. Forrester's in-depth survey of 300 healthcare smart buildings leaders about their building initiatives and priorities, including sustainability, security, and building environmental initiatives, yielded several important recommendations:

Treat smart buildings in healthcare as strategic assets to differentiate patient experience and achieve strategic priorities like reducing operating costs.

Smart buildings in healthcare can address a range of strategic priorities including ensuring patient, visitor, and employee safety; enhancing patient health and wellness; optimizing operational efficiency to reduce costs; and improving sustainability. Initial smart buildings initiatives often focus on energy management, waste management, air quality management, water management, and ensuring the physical security and well-being of patients, visitors, and healthcare professionals. Consider the role of smart buildings initiatives to address critical building priorities and top strategic healthcare initiatives.

Ensure stakeholders representing critical roles identify opportunities to capture and leverage smart buildings insights.

Stakeholders from many departments benefit from building system data and insight. Ensure you proactively engage with key stakeholders representing critical processes across the organization including healthcare operations, facility management, sustainability, compliance, and physical and cybersecurity to identify opportunities to enhance patient safety and well-being, optimize critical processes, inform strategic decisions, enhance daily operations, and address sustainability goals.

Establish a roadmap of near-term to long-term healthcare building initiatives and impacts.

Leaders in healthcare organizations must establish a roadmap of smart buildings initiatives and priorities based on factors including optimizing use of critical systems. For example, smart lighting and motion sensors can drive energy efficiencies and contribute to sustainability goals while improving threat deterrence and detection. Other initiatives could focus on enhancing patient well-being by replacing old equipment to improve efficiency, or adding building automation controls, or IAQ or emissions monitoring equipment to improve sustainability in healthcare facilities. Longer-term initiatives build on these foundational initiatives by using AI analytics to enhance critical building system efficiency, provide actionable sustainability insight, and accelerate the process for meeting carbon reduction goals.

Seek partners to assist with capturing relevant building system data and insight.

Integrating smart buildings data into actionable insight is complex, requiring seamless integration across buildings systems, healthcare operations, and security systems. User-friendly dashboards highlighting relevant insight and intelligence to automatically optimize sustainability initiatives and key operational processes are also important characteristics. Look for partners with demonstrated technology expertise, a single digital platform spanning all sites, easy-to-access insights for healthcare and operations stakeholders, and seamless integration into all building systems.

Appendix A: Methodology

In this study, Forrester conducted an online survey of 3,445 decision-makers at organizations in 18 industries across 25 countries, including 300 healthcare decision-makers to evaluate the current state of building system integration, data connectivity, and the ability to share and leverage data collected across the organization for building system optimization. Survey participants must have indicated decision-making authority in smart buildings in addition to building environmental sustainability, building security, and/or building environment systems. Questions provided to the participants asked high-level smart buildings questions and then asked more granular questions depending on the leader's level of responsibility for building sustainability, building security, and/or building environment systems. Respondents were offered a small incentive as a thank-you for time spent on the survey. The study was conducted in a double-blind fashion. The study began in July 2023 and was completed in August 2023.

To read the full results of the 2023 study, please refer to the Thought Leadership Paper commissioned by and developed in collaboration with Johnson Controls titled, "Cracking The Code: Unleash Your Smart Buildings Strategy With The Power Of Facility Data."

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Appendix B: Demographics

REGIONS	
North America	**37%**
Central Europe	**9%**
South Korea	**6%**
Hong Kong	**6%**
Latin America	**6%**
Southeast Asia	**6%**
India	**5%**
Australia and New Zealand	**5%**
Middle East and Africa	**5%**
Japan	**4%**
United Kingdom and Ireland	**4%**
China	**3%**
Singapore	**3%**

INDUSTRY	
Healthcare	**100%**

ORGANIZATION SIZE	
2 to 499 employees	**2%**
500 to 999 employees	**26%**
1,000 to 4,999 employees	**38%**
5,000 to 19,999 employees	**22%**
20,000 or more employees	**12%**

TITLE	
C-level executive	**17%**
Vice president	**37%**
Director	**45%**

DEPARTMENT	
IT	**39%**
Facilities (e.g., energy management, procurement, real estate, environmental health and safety)	**21%**
Operations	**7%**
Employee experience (e.g., HR, workplace experience)	**9%**
CEO/office of president	**8%**
Governance/risk/compliance	**6%**
Sustainability	**5%**
Finance/accounting	**5%**
Sales/marketing	**1%**
Customer experience	**0%**

BUILDING RESPONSIBILITY AREA	
Building environment systems and strategy	**48%**
Building environmental sustainability strategy	**43%**
Building security systems and strategy	**37%**

Note: Percentages may not total 100 due to rounding.

Appendix C: Supplemental Material

RELATED FORRESTER RESEARCH

"The Future Of Healthcare: Success In 2030 Hinges On Customer Obsession And Agility," Forrester Research, Inc., February 1, 2024.

"Predictions: 2024 Healthcare," Forrester Research, Inc., November 1, 2023.

"The Future Of Experiences In Healthcare" Forrester Research, Inc., July 14, 2023.

"The State Of Cloud In Healthcare, 2023," Forrester Research, Inc., May 9, 2023.

"The Top 10 Trends In Edge Computing And IoT, 2023," Forrester Research, Inc., December 8, 2023.

"IoT Solutions Transform Smart Buildings Into Strategic Productivity Assets," Forrester Research, Inc., August 2, 2021.

ADDITIONAL RESOURCES

Shannon Germain Farraher, Bobby Cameron, Kara Wilson, Rachel Kwon, and Michael Kearney, "Healthcare Ranks Eighth Out Of 10 Industries In Future Fitness," Forrester Blogs.

January 25, 2024, "Predictions 2024: Healthcare," Webinar.

Michele Pelino and Alexander Soley, "The Top 10 Edge Computing And IoT Trends That Matter In 2023," Forrester Blogs.

Appendix D: Endnotes

[1] Source: "The Future Of Healthcare: Success In 2030 Hinges On Customer Obsession And Agility," Forrester Research, Inc., February 1, 2024.

[2] Source: "Predictions: 2024 Healthcare," Forrester Research, Inc., November 1, 2023.

[3] Source: "The State Of Future Fit In Healthcare," Forrester Research, Inc., July 11, 2023.

[4] Ibid.

[5] Source: Aroa Molero, Michele Calabrò, Maguelone Vignes, Bernard Gouget, and Damien Gruson, "Sustainability in Healthcare: Perspectives and Reflections Regarding Laboratory Medicine," National Library Of Medicine, March 1, 2021.

[6] Source: "The Race To Decarbonization," a commissioned study conducted by Forrester Consulting on behalf of Johnson Controls, November 2021.

[7] Ibid.

[8] Source: Hannah T. Neprash, PhD; Claire C. McGlave, MPH; Dori A. Cross, PhD; et al. "Trends in Ransomware Attacks on US Hospitals, Clinics, and Other Health Care Delivery Organizations, 2016-2021," JAMA Health Forum, December 29,2022.

[9] Source: "Predictions: 2024 Healthcare," Forrester Research, Inc., November 1, 2023.

[10] Ibid.