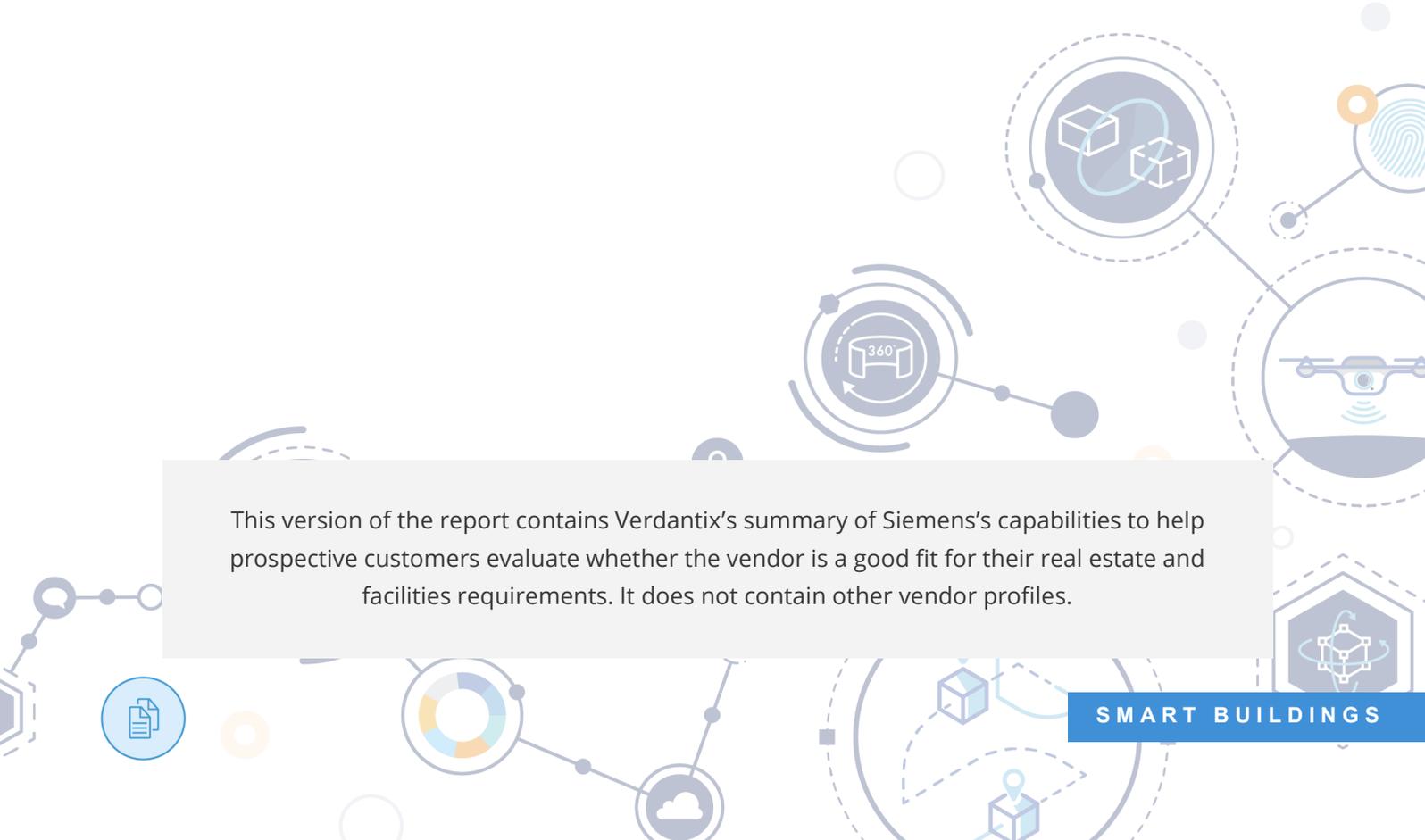


Green Quadrant: IoT Platforms For Smart Buildings 2022

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This version of the report contains Verdantix's summary of Siemens's capabilities to help prospective customers evaluate whether the vendor is a good fit for their real estate and facilities requirements. It does not contain other vendor profiles.

Green Quadrant: IoT Platforms For Smart Buildings 2022

This report provides a detailed fact-based comparison of the 17 most prominent Internet of Things (IoT) platforms for smart buildings available on the market today. Based on the proprietary Verdantix Green Quadrant methodology, the analysis brings together information from extensive live product demonstrations with vendors, their responses to a 154-point questionnaire and insights from a survey of 285 real estate executives. The analysis finds that leading vendors have expanded their capabilities to deliver more comprehensive applications across areas such as asset monitoring and maintenance, energy management, space monitoring, and building security. The evaluation of capabilities and market momentum reveals that four firms — JCI, Schneider Electric, Siemens and Spacewell — currently lead the market, whilst other providers have strong capabilities in specific areas. Corporate real estate executives and technology buyers should use this report to understand the leading offerings in the market and the vendors that will best meet their needs.

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ORGANIZATIONS MENTIONED

ABB, ABM, Accenture, Accor, Accruent, Accu-Tech, Adidas, Airthings, Airthinx, Ameriprise, Angus Systems, ASML, Atlassian, Atos, Automated Logic, AWS, AXA, Axonize, Axxerion, AZMM Hospital, BigBasket, Bosch, Boston Scientific, Carrefour, Carrier, CBRE, CDP, Clockworks Analytics, Comfy, Co-operative Group, Cushman & Wakefield, Deloitte, DEXMA, Disruptive Technologies, Drees & Sommer, EcoEnergy Insights, EdgePresence, EDGE Technologies, Energisme, ENERGY STAR, Enlighted, European Commission, Fortive, Gaw Capital, GHG Protocol, Google, GRESB, Haltian, Hamilton Health Sciences, Harvard University, HID Global, Homebase, Honeywell, Humber River Hospital, IBM, Indolytics, Infogrid, ING, Integral, Intel, Irisys, ISS, JLL, John Hopkins University, Johnson Controls (JCI), Kaiser Permanente, Kontent, L & T Technology Services (LTTS), Larsen & Toubro, Leapcraft, Lenel, Maersk, Massachusetts Institute of Technology (MIT), Melbourne Airport, Mercury Systems, Microsoft, Monnit, NABERS, National Health Service (NHS), Nemetschek Group, Neptune Automatic, Northbay Healthcare, Northzone, Planon, PointGrab, PointGuard, Polytechnic University of Catalonia, Primark, Quercus Technologies, Radisson, Red Hat, Resource Data Management (RDM), Rigado, SALTO, Santander, SAP, Schneider Electric, Science Based Targets initiative (SBTi), Shaw University, Siemens, SmartClean Technologies, SonicWall, Spaceti, Spacewell, Spica Technologies, SPIE, SUEZ, Switch Automation, Tampere University, Thing Technologies, ThoughtWire, T-Mobile, Travelodge, Trend, Tridium, Unibail-Rodamco-Westfield, University of Arizona, University of Birmingham, University of Iowa, University of Westminster, University Properties of Finland, US Department of Energy, UTC, VergeSense, Verizon, William Osler Health System, Yanzi.

The State Of The Market For IoT Platforms For Smart Buildings

The IoT describes a network of connected devices and systems that collect and share data. This connectivity of devices and systems opens up opportunities for firms to understand, model, manage and even control the health of equipment, so that it operates in a more effective manner. A huge range of 'things' can participate in the IoT network – such as sensors, meters, equipment and building systems like HVAC or boiler plants – so long as they can communicate over a network, including with each other. The IoT has a wide range of applications, ranging from supporting and managing utilities, to monitoring factory lines, optimizing residential property operation and even operating autonomous vehicles.

In the built environment, IoT platforms for smart buildings have a key role to play in helping firms effectively collect, collate and analyse building data from sensors, energy meters, incumbent systems such as building management systems (BMSs) and HVAC units, and other internal and external data sources. Over the past few years, building IoT platforms have helped deliver greater levels of automation to building management, leveraging data insights to optimize building operations. Moreover, larger IoT datasets have begun to have strategic impacts on businesses, driving real estate strategies through space usage trends and prompting capital expenditure plans by predicting asset or device failures ahead of time.

Although facilities and real estate directors are typically the main buyers and managers of these solutions, building IoT platforms have now grown to impact every building stakeholder, from landlords to building occupiers, many of whom interact directly or indirectly with these solutions regularly. This report provides the individuals responsible for selecting, implementing and extracting value from IoT platforms for smart buildings with a detailed benchmark of the 17 most prominent solutions available on the market. The research for this report answers specific supplier selection questions, such as:

- Which IoT platforms for smart buildings will meet the requirements of my organization?
- Which IoT platforms for smart buildings are leading the market?
- How do solutions on the market integrate with my existing organizational systems and solutions?
- How can I benchmark the functionality and depth of experience of IoT providers and assess their ability to deliver value?
- How can IoT platforms for smart buildings support my wider business strategy?

To answer these questions, Verdantix analysed 17 IoT platforms for smart buildings using a 154-point questionnaire and conducted three-hour live software demonstrations. We also analysed results from our global corporate survey of 285 real estate and facilities management executives and interviewed a panel of buyers of building software solutions to understand their experiences, demands and feedback on solutions in the market. The resulting analysis is based on the proprietary Verdantix Green Quadrant methodology, designed to provide an evidence-based objective assessment of suppliers providing comparable products and services.

IoT Vendors Are Delivering More Comprehensive Platforms

The establishment of the internet and smart devices at the end of the 20th century led to the term 'Internet of Things' being coined in 1999. Since then, the volume of building IoT solutions available on the marketplace has grown, with IoT platforms proliferating in the past three years. The current smart buildings market:

- **Remains a fragmented ecosystem with a wide range of suppliers.**

The building IoT marketplace comprises a plethora of vendors supplying different elements of the technology ecosystem, such as IoT sensors, connectors, devices, software and services. Firms implementing an IoT platform are likely to have to work with a varied set of vendors, encompassing sensor manufacturers such as Spaceti and VergeSense; gateway manufacturers such as Rigado; and solutions providers and systems integrators such as Accenture and Atos. With regard to IoT sensors, there is little uniformity around the network protocols that are used for data exchanges (see [Verdantix Six Best Practices To Strengthen Your Building IoT Analytics Programme](#)).

- **Boasts a growing number of comprehensive IoT platforms.**

Although the IoT space still offers plenty of point solutions and platforms that tackle single use cases, there is a growing number of vendors offering more comprehensive IoT platforms in the market. These solutions deliver functionality across multiple use cases, such as asset and maintenance management, sustainability and security, consolidating these offerings into one platform. Vendors such as Johnson Controls (JCI), Schneider Electric and Siemens offer integrated suites of solutions that cover almost all elements of building management, whilst others provide solutions that target multiple key use cases.

- **Is consolidating as vendors aim to deliver more complete solutions.**

To further enhance the completeness of IoT platform offerings, vendors are pursuing aggressive acquisition and integration strategies to fill gaps in their capabilities, as well as to consolidate different elements of building management and capitalize on innovation. For example, integrated workplace management system (IWMS) firm Planon acquired IoT platform vendor Axonize in June 2021, enabling enhanced insights into asset and building performance through connected assets and digital twins.

- **Brings together vendors from a diverse set of business heritages.**

The vendors included in this report have entered the building IoT platform space from different heritages, such as asset and maintenance management, energy management, space and workspace management and BMSs. For example, EcoEnergy Insights (part of Carrier) has built out an IoT platform from an energy management background, while Schneider Electric has extended from a heritage in building controls. This report covers firms that deliver IoT applications aimed at the built environment and therefore does not consider vendors that only focus on other areas, such as IoT infrastructure or IoT devices and networking.

- **Delivers a range of use cases, with the capacity to support new usage scenarios.**

Building IoT platform vendors have developed a set of well-established use cases. Some elements of functionality are traditional, such as energy or security management, whilst others, such as space analysis, have garnered interest more recently. IoT platforms are delivering value when it comes to new usage scenarios too, fulfilling customer needs as they emerge. For example, following COVID-19, IoT functionality around remote building management, space optimization, smart cleaning and occupant health and wellbeing has proved very useful for users. IoT platforms are now also going beyond day-to-day operations; collated building datasets can offer more strategic insights into businesses, which can impact and inform decisions around business strategy, such as real estate sizing or sustainability.

- **Is benefiting from cheaper and more reliable sensors and solutions.**

One of the factors driving adoption of IoT solutions is the lowering costs of IoT sensors and solutions, breaking down one of the key barriers to entry. Sensors are also becoming more reliable and easier to deploy, helping to overcome some of the teething problems previously seen in the industry. For example, Infogrid was able to deploy thousands of sensors from Disruptive Technologies to hundreds of global Verizon sites in just six weeks (see [Verdantix Infogrid Empowers The Rapid Deployment Of Building Intelligence At Scale](#)).

Advanced Analytics And Improving Connectivity Will Drive Future Adoption Of Building IoT Solutions

The IoT platforms for smart buildings market comprises a range of vendors from different heritages, leading to increasing choices for buyers. These platforms are also fulfilling new use cases across different verticals, broadening the adoption of IoT solutions. In the future, the market for IoT platforms for smart buildings will be shaped by the:

- **Emergence of edge computing, driving IoT adoption by industries such as manufacturing.**
Edge computing allows data to be managed and processed closer to the source, enabling quicker responses to incidents and reducing the volume of data sent to the cloud. The reduced latency and data-intensity allow industries that are typically underserved by IoT, such as manufacturing, to access IoT platforms for their buildings. These firms can now receive real-time insights without hindering time-sensitive processes or responses. Vendors are angling to combine edge computing with IoT to target these customers. For example, in May 2020 IBM announced Cloud Satellite, a service that runs IBM Cloud from any edge location, whilst in October 2020 Schneider Electric partnered with Accu-Tech and EdgePresence to deploy edge data centres in the US to support IoT applications.
- **Establishment of 5G connectivity, supporting more data-intensive use cases.**
The deployment of 5G networks, including private networks, will enable firms to pursue more data-intensive IoT use cases, such as digital twins, as well as achieve greater global coverage and scale out solutions more effectively. One-third of real estate executives intend to use private 5G networks in the next few years to support their facilities and real estate activities (see [Verdantix Global Corporate Survey 2021: Smart Building Technology Budgets, Priorities & Preferences](#)). Solutions providers are pursuing 5G partnerships to enhance their offerings, appealing to industries that require the improved data bandwidth for data-intensive operations, such as manufacturing. In February 2021 Siemens announced a collaboration with IBM to combine the former's industrial IoT platform Mindsphere with the Red Hat OpenShift hybrid cloud platform.
- **Increasing momentum behind AI and machine learning.**
With IoT no longer a nascent technology, demand for more advanced solutions is growing. Improving analytics that take advantage of AI and machine learning capabilities are enabling vendors to offer increasingly sophisticated solutions. For example, innovative video management solutions for building security can apply machine learning to rapidly identify and store still images of an incident from video streams, facilitating the work of security teams when identifying bad actors or threats. AI and machine learning also help deliver advanced use cases such as predictive modelling through digital twins and predictive maintenance, which can help real estate executives and facilities managers with maintenance efforts and capital spending planning.
- **Greater scrutiny around cybersecurity across smart buildings solutions.**
While cybersecurity has been a constant item on the CIO's agenda, the topic is achieving increasing visibility in the realm of building technology. This reflects the fact that building systems are getting smarter, with embedded sensors and connectivity, introducing new risks of cyber-attacks. In addition, laws around cybersecurity are becoming more common, with regulations such as the US's IoT Cybersecurity Improvement Act of 2020 and the EU Cybersecurity Act now in place. With one report by cybersecurity solutions firm SonicWall stating that IoT cyber-attacks grew by 66% in 2020, buyers and vendors both have a responsibility to implement robust cybersecurity strategies. For example, solutions providers need to follow strict cybersecurity frameworks and employ strategies such as zero trust

networks and decoy edge devices (see [Verdantix Six Best Practices To Strengthen Your Building IoT Analytics Programme](#)). Buyers should ensure that new deployments align with existing security protocols and hire dedicated individuals to maintain cybersecurity.

- **New interest around sustainability, hybrid working and occupant health.**

In the last 18 months, the COVID-19 pandemic has caused firms to drastically change their ways of working. With a shift to more hybrid working, businesses are focused on encouraging employees to return to the office – requiring technology tools to both engage with occupants and to ensure their health and wellbeing. The new working model has also shone a light on space utilization, with many businesses identifying an opportunity to rationalize their real estate portfolios. Sustainability, driven by new regulations and increased social interest around net zero carbon, has also solidified as a key business strategy for many firms. All these use cases are propelling interest around IoT solutions, which can fulfil these requirements both in the short and long term.

- **Continuing digitization journeys.**

As was the case 24 months ago, building digitization remains a journey for most. As many firms lack the resources to purchase a full suite of solutions via IoT platforms, they instead opt for additive solutions, which can be scaled as required. Therefore, firms are continuing to seek long-term digital partners that can begin by extracting value from existing systems – in some cases, bringing legacy systems online – and deliver recurring value. Moving forward, these partners can then identify, support and execute new use cases to generate further value.

Firms Are Increasingly Leveraging IoT To Tackle Key Strategic Objectives

To gain a better understanding of customer perspectives around IoT platforms for buildings, Verdantix leveraged and analysed data from our 2021 global corporate survey of 285 corporate facilities and real estate executives (see [Verdantix Global Corporate Survey 2021: Smart Building Technology Budgets, Priorities & Preferences](#)). To support these insights, Verdantix conducted a series of interviews with a panel of buyers.

Cost Reduction, Occupant Wellbeing And Building Decarbonization Are The Foremost Real Estate Strategy Drivers

To better understand the overall strategic priorities of corporate real estate executives, Verdantix asked them to highlight their main real estate strategic objectives over the next three years. Facilities and real estate executives are looking to:

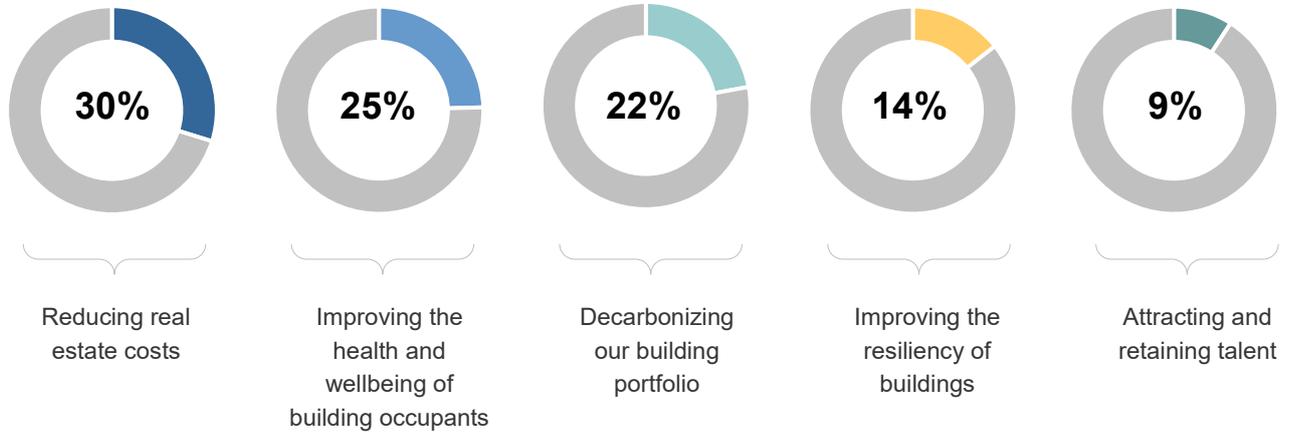
- **Reduce real estate costs in an era of post-pandemic cost management.**

The number one priority amongst real estate executives over the next three years is to reduce real estate costs, with 30% ranking it as their top priority (see **Figure 1**). Primarily driven by the COVID-19 pandemic, firms remain concerned about the uncertainty surrounding their businesses and are therefore looking to optimize costs such as energy and maintenance. The shift towards a hybrid working model also presents an opportunity for firms to review their real estate portfolios and rationalize their space and spending to fit a more modern and efficient way of working. To achieve this, firms are prioritizing investment in IoT platforms to monitor space usage, as well as tools to facilitate workplace activities such as booking services.

FIGURE 1

Real Estate Executives' Top Strategic Priority Over The Next Three Years

“What is your firm’s number one priority in real estate management over the next three years?”



Source: Verdantix Global Corporate Smart Building Survey 2021

N = 285

- **Improve building occupant health and wellbeing.**

The health and wellbeing of building occupants is the second most significant priority for real estate executives overall. A quarter of respondents consider it to be their top priority over the next three years. Following the COVID-19 pandemic, businesses are trying to persuade employees back to the office. Despite more homeworking, most businesses still plan to retain some form of office working to support key business initiatives such as organizational culture and collaboration. To achieve this, firms are looking to improve occupant health and wellbeing, with the aim of instilling confidence in employees that the workplace is a safe and comfortable place to work. Thirty-nine per cent of executives intend to focus on air quality and building health even after COVID-19 vaccines have been widely adopted.

- **Decarbonize their portfolios to better meet sustainability goals and regulations.**

Interest around sustainability, driven by increased regulations and social awareness, is reigniting executive focus following COVID-19. Twenty-two per cent of executives ranked the decarbonization of their building portfolios as their top strategic objective for their businesses over the next three years. Many firms are setting ambitious targets, such as shopping mall operator Unibail-Rodamco-Westfield, which intends to cut carbon emissions in half across the value chain over the next decade. Nearly half of executives plan to newly invest in tools to report building ESG data to stakeholders and investors in the next 12 months, demonstrating the prominent focus around sustainability.

Leading IoT Use Cases Reflect The Most Prominent Strategic Priorities

Cost reduction, hybrid working and decarbonization are the key trends shaping real estate strategies today. How do building IoT platforms factor into these strategic objectives? Our survey found that IoT solutions are being used to:

- **Monitor space utilization, in line with leading business priorities.**

The leading use of IoT solutions within facilities management is space utilization monitoring, where 75% of firms are currently using the technology (see **Figure 2**). Forty-one per cent of firms are also using IoT solutions to some extent to support hotdesking or agile offices. Driven by the COVID-19 pandemic, businesses are turning to IoT tools to facilitate the transition to new working models. These investments will support employees, through functionality such as room or desk booking, as well as management looking to optimize space usage. Thirty-eight per cent of executives are evaluating or trialling IoT solutions to support hotdesking or agile offices.

- **Track asset compliance and energy consumption across different assets.**

The third most popular use case for IoT is capturing temperature data to support compliance around systems such as refrigeration and ovens, as well as legionella monitoring. This process sees significant use of IoT by 19% of firms, with a further 28% employing some degree of IoT capabilities in this area. Compliance is a key management process across industries such as retail, manufacturing and healthcare. Forty-seven per cent of firms also use IoT to some or a significant extent to support energy management, with a further 46% currently evaluating or trialling IoT solutions. With the impetus around building decarbonization and sustainability growing rapidly, IoT solutions are a key stepping stone to supporting firms with their early efforts around energy data collection, tracking and management.

- **Support more proactive asset and maintenance management efforts.**

Building management use cases around asset monitoring – such as leak and fault detection, asset condition monitoring and continuous asset commissioning – also see the use of IoT in more than 40% of cases. In these areas, advanced IoT solutions deliver predictive maintenance and real-time monitoring capabilities to minimize business disruption, enabling more measured and coordinated responses ahead of major faults. For example, the CORTIX platform from EcoEnergy Insights provides actionable maintenance recommendations to prevent equipment failures before they manifest themselves.

- **Deliver improved building security outcomes.**

Forty-four per cent of real estate executives are using IoT in some capacity to monitor physical security risks, transforming a traditional building process to become nimbler and more effective. Around a third of executives are also evaluating or trialling IoT security solutions around this application. Firms have invested in a range of IoT-enabled security solutions, such as video analytics, cloud-based access control and cloud-based video surveillance. These three security tools are also the IoT technologies with the most ongoing interest – more than a third of executives are currently evaluating or trialling these technologies (see **Figure 3**).

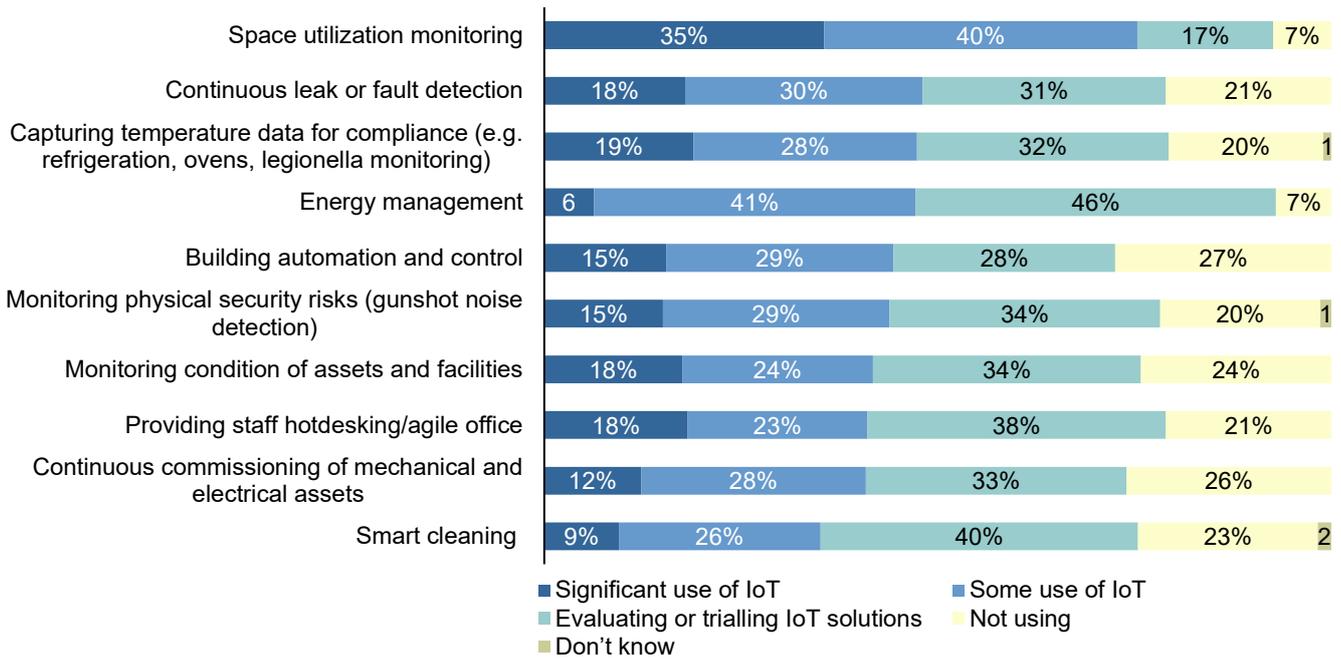
Building IoT Platform Investment Levels Will Soon Catch Up With Other Major Software Technologies

Firms are planning investments in IoT platforms that provide enhanced insights across areas such as space utilization, energy management and maintenance. How does the use of IoT platforms stack up against other technology categories such as computer-aided facility management (CAFM) or IWMS? Our survey shows that:

FIGURE 2

IoT Deployment Levels For Facilities Management Processes

“Do you currently use, or plan to use, IoT solutions for the following facilities management processes?”



Note: Data labels are rounded to zero decimal places; chart is ranked by first two responses; percentages less than 7% are written as numbers

Source: Verdantix Global Corporate Survey 2021: IoT Platform Investment Plans By Industry

N = 285

- IoT platform implementation is catching up quickly with other key software technologies.**

Thirty-seven per cent of firms have building IoT platforms implemented at all or some of their sites, with a further 29% currently evaluating, trialling or planning to invest in these (see **Figure 4**). Deployments of IoT monitoring platforms for buildings are rapidly catching up with other, more traditional, software technologies, such as IWMSs and BMSs. This is a sharp uptick on 2020, where IoT platforms severely lagged all other software categories, with more than two-thirds of firms exhibiting no intention to invest (see [Verdantix Global Corporate Survey 2020: Smart Building Technology Budgets, Priorities & Preferences](#)).

- Investment in IoT platforms is set to continue.**

Building IoT platforms are behind only IWMS solutions in terms of increased investment compared with pre-COVID spending levels (see **Figure 5**). Thirty-one per cent of executives will boost their investment in IoT platforms by up to 5% going into 2022, with a further 13% increasing investment by more than 5%. This elevated level of spending highlights how firms have been turning to IoT platforms in the last 18 months to support their most pressing objectives, such as occupant health and wellbeing – a trend that is set to continue into 2022.

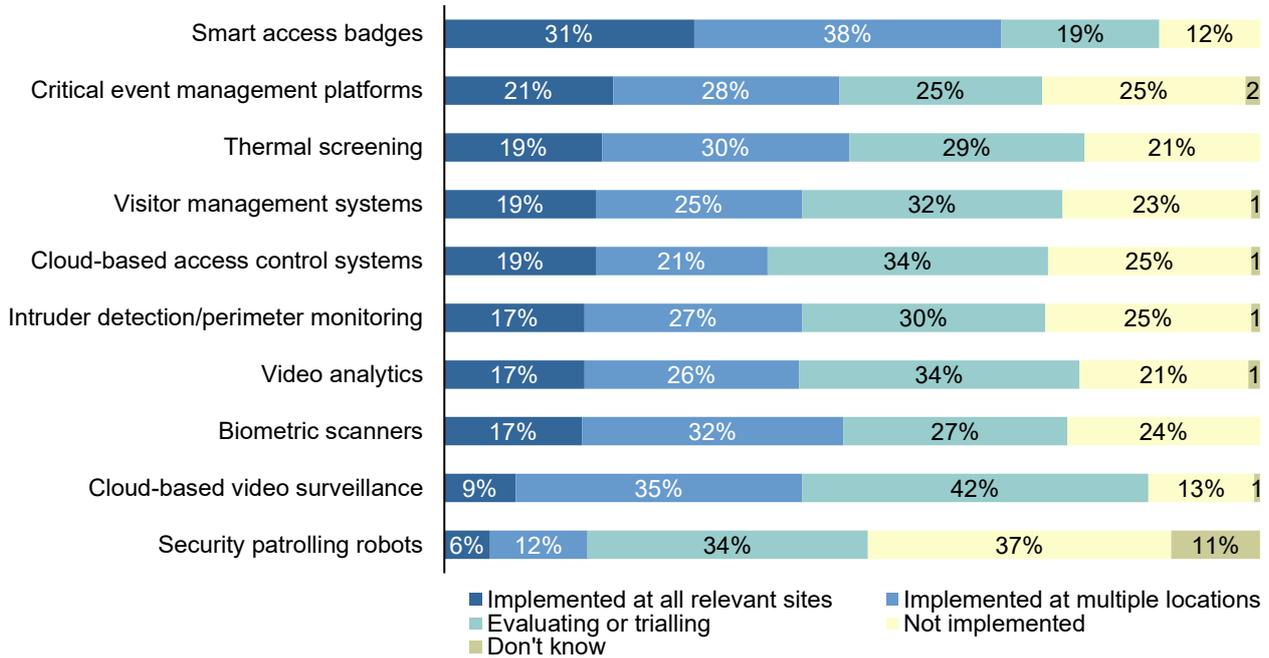
- Customers are continuing to pursue different deployment options.**

As was the case in 2019, real estate and facilities executives are targeting different visions for organizing their technology landscape. More than a quarter of executives plan to use a few solutions that have broad functionality, such as for workplace management, or for energy, assets and maintenance, whilst 19% intend to use a single integrated solution for most of their real estate needs (see **Figure 6**). Meanwhile, some vendors are still pursuing a strategy of point solutions. This scattered approach demonstrates the diversity in technology strategies across the market. Flexible solutions that can operate within these different strategies – for example, through integrations – will be likely to perform better.

FIGURE 3

Smart Building Security Hardware And Software Deployments

“To what extent do you use the following building security hardware & software technologies?”



Note: Data labels are rounded to zero decimal places; percentages less than 3% are written as numbers

Source: Verdantix Global Corporate Survey 2021: Smart Building Technology Budgets, Priorities & Preferences

N = 285

Real Estate Managers Face Prominent Challenges Around Data Integration And Cybersecurity

With the adoption of building IoT platforms on an upward trajectory, Verdantix probed executives about the biggest challenges they encounter when implementing building technology projects. The key difficulties firms face are:

- Integrating with incumbent data sources and systems.**

Customers are increasingly demanding that new technology investments interact with and generate value from incumbent solutions. Rather than a ‘rip and replace’ approach, firms are keen to drive further value from existing implementations, such as BMSs, energy meters and security solutions, by bringing these systems together and extracting data. IoT platform vendors are focusing efforts on this aspect of implementation by developing building connectors and working with customers to connect to legacy systems – as well as other implementations that may exist – and break down data silos.

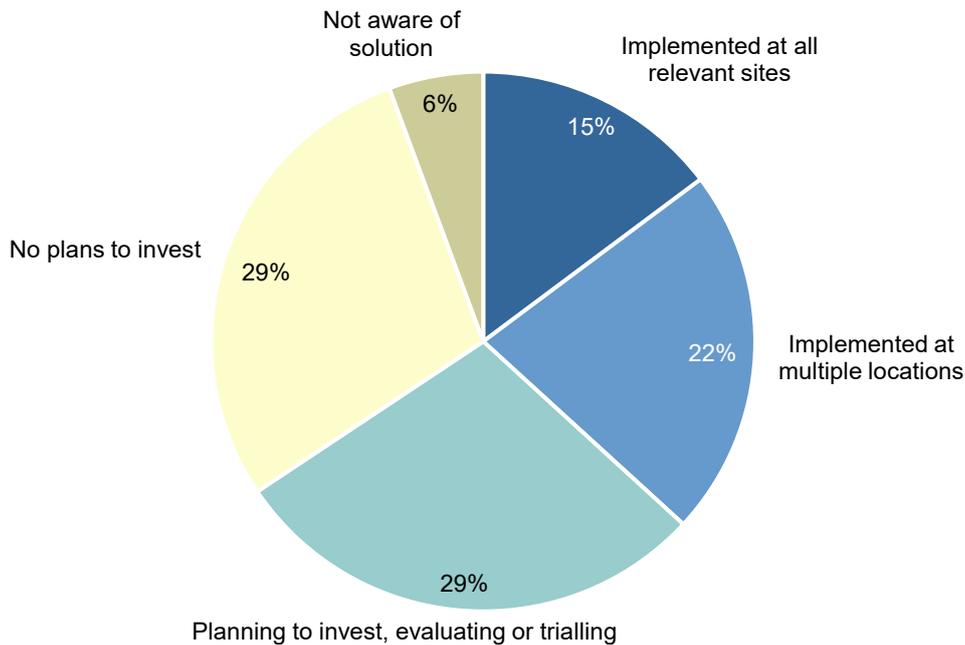
- Making data and tools accessible and easy to use for all stakeholders.**

In addition to leveraging legacy systems and data sources, customers are seeking to improve the experience for all stakeholders in real estate ecosystems. For example, firms would like to simplify building management processes for building and facilities managers, whilst also enhancing the occupant experience. One of the challenges that stems from this is how to maximize building occupant engagement. Firms are increasingly turning to mobile solutions to achieve this. Forty-seven per cent of real estate executives consider an increasing use of mobile applications as a high priority in the next 12 months. When evaluating real estate and facilities management software, 92% of executives ranked the

FIGURE 4

Software Investment By Type Of Software

“To what extent do you use IoT platforms for smart buildings?”



Note: Data labels are rounded to zero decimal places

Source: Verdantix Global Corporate Smart Building Survey 2021

N = 285

quality of mobile apps as important or very important, making this the most significant factor in their purchasing decision.

- **Ensuring a robust cybersecurity strategy.**

Enhancing cybersecurity risk management is a high priority over the next 12 months for 47% of real estate executives, highlighting the growth in importance of cybersecurity in the last two years. Multiple respondents on our customer panel noted the importance of cybersecurity in their technology decisions, with one interviewee stating that it was the reason for disregarding 80% of relevant vendor solutions. With the proliferation of building technology solutions, firms are only now catching up on the cybersecurity front, and many are faced with the challenge of applying a standardized framework and approach to incumbent solutions. Going forward, we expect firms to increasingly factor cybersecurity into every technology decision, to ensure that new vulnerabilities are not introduced into the business.

Cutting Costs And Improving Efficiency And The Occupant Experience Lead The Business Case For IoT

With investment in building technology a strategy that businesses are increasingly adopting, what are the outcomes buyers are focusing on when developing business cases? The data show that:

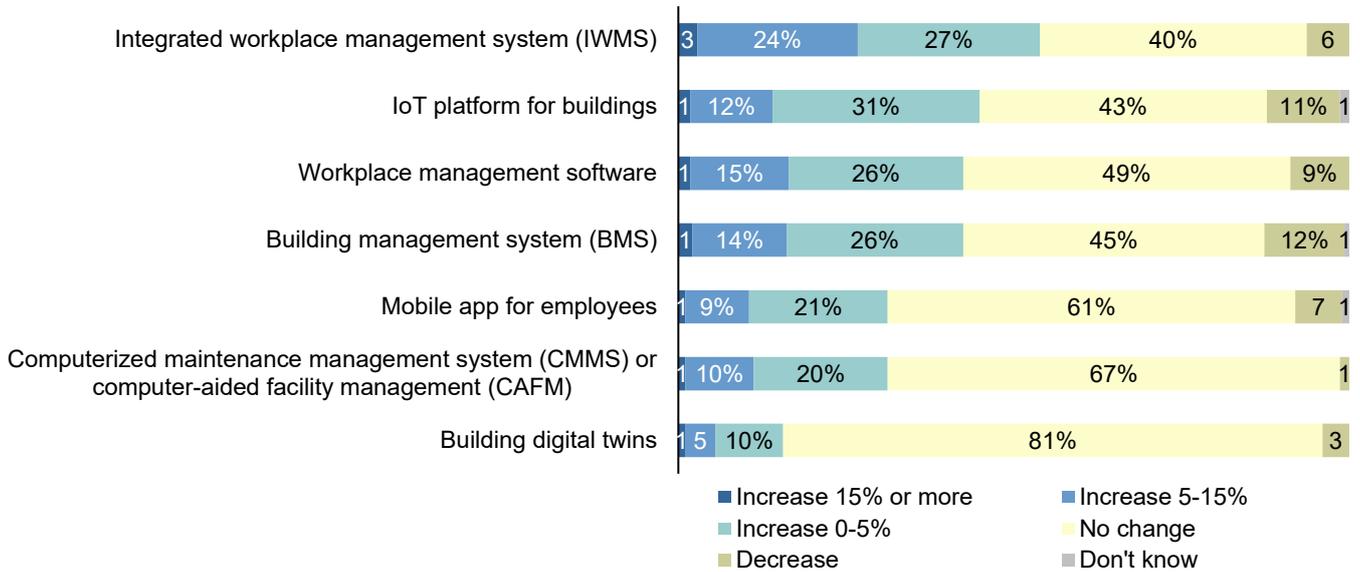
- **Cost reduction and business efficiency remain key drivers.**

Reducing business costs and increasing operational efficiency – two long-running focal points in facilities management – remain key elements of the business case for investing in building technology. A primary focus for cost optimization is maintenance: 43% of real estate executives either plan to extend or replace

FIGURE 5

Smart Building Technologies Expenditure Changes For 2022

“From a 2019 baseline (pre-COVID-19), how do you expect your spending to change across the following categories of software?”



Note: Data labels are rounded to zero decimal places; percentages less than 8% are written as numbers; chart is ranked by first three response options

Source: Verdantix Global Corporate Survey 2021: Smart Building Technology Budgets, Priorities & Preferences

N = 285

their current deployment, or newly invest in software for asset and maintenance management, to help maximize asset uptime and reduce business disruption. For example, the University of Iowa used Schneider Electric’s EcoStruxure Building Advisor solution at its campus of 49 buildings, leading to 17% of HVAC workorders being completed via predictive maintenance and resulting in \$0.6 million in energy savings in one year.

- **Occupant experience and wellbeing are vital elements of the business case.**

Following COVID-19, many businesses have shifted towards a hybrid working model, with a greater focus on workplace wellbeing. As such, both occupant experience and wellbeing have become major factors in the business case for building technologies. Tools that maximize occupant wellbeing, through methods such as optimizing airflows, enforcing health questionnaires and smart cleaning, as well as making information available to customers on screens and through mobile apps, are becoming more commonplace, with the aim of increasing employee confidence. Firms are also seeking seamless mobile experiences that include features such as access control, booking and catering services, to enhance the user journey and minimize touchpoints.

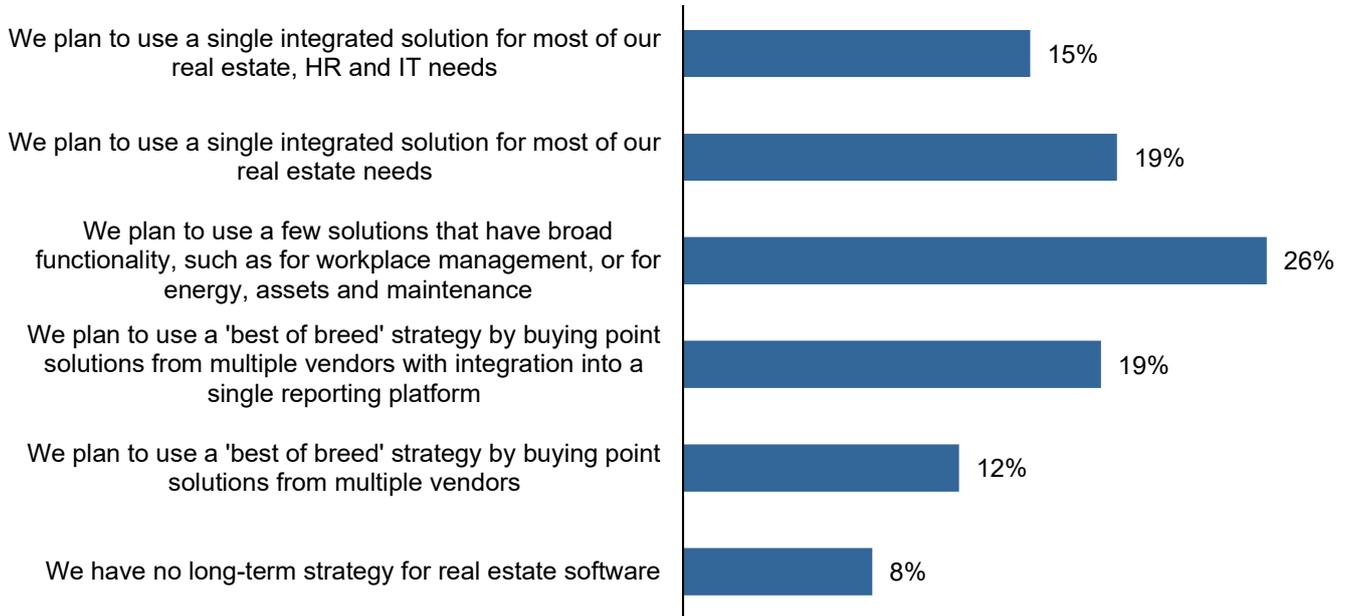
- **Fast return on investment increases the appeal.**

With few firms able to pursue wide-ranging technology enhancements due to budgetary constraints, executives are looking for the most tangible and impactful use cases to target first. Use cases that can be deployed quickly and deliver rapid return on investment (ROI) are thus the focus of executives, with the success of these initial deployments supporting the business case for future, more expansive technology investments. IoT solutions that replace or optimize labour, such as remote security management offerings, typically represent an easy ROI. The upfront costs of IoT investment are also steadily decreasing, as IoT sensors become cheaper and as more vendors adopt open systems that can integrate and connect with other solutions through application programming interfaces (APIs).

FIGURE 6

Strategies For Real Estate And Facilities Software Over The Next Five Years

“Which of the following statements best describes your strategy for real estate and facilities software over the next five years?”



Note: Data labels are rounded to zero decimal places

Source: Verdantix Global Corporate Smart Building Survey 2021

N = 285

Green Quadrant For Smart Building IoT Platforms 2022

Based on the insights gathered from our surveys, customer panel and in-depth interviews with suppliers, Verdantix has developed an outline of smart building IoT platforms (see **Figure 7**). Verdantix defines IoT for smart buildings as:

“A software platform made up of a communication layer for capturing sensor, asset, building management system, and external data; a database layer, for storing the data; and an application layer for analysis and reporting, monitoring, and analysing and controlling building services, such as occupant comfort, space utilization, energy, maintenance and security.”

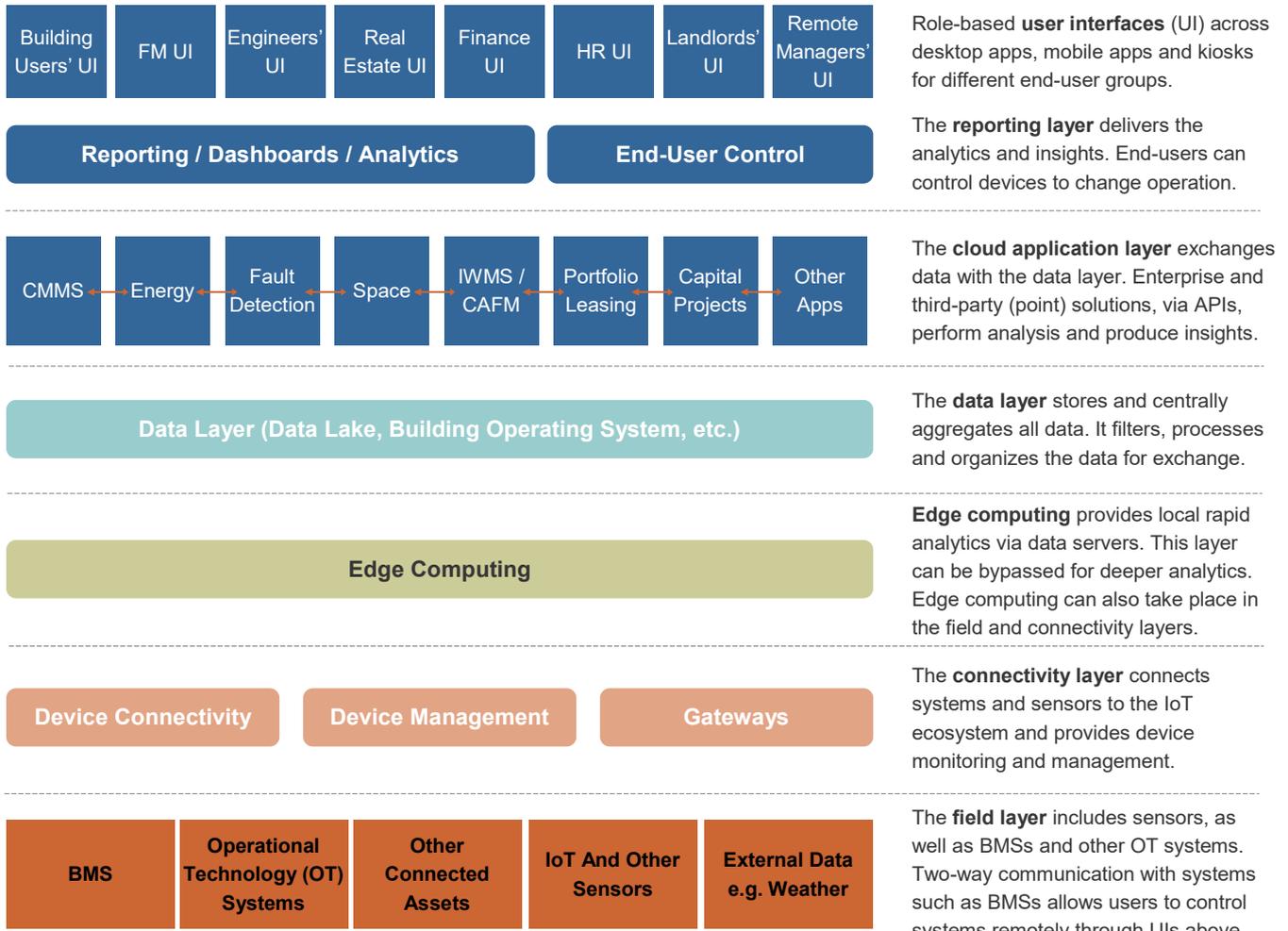
We note that there is a broad range of vendors that offer IoT infrastructure platforms, which typically consist of networking and communications hardware and/or software, including middleware, but which do not contain their own applications. These solutions fall outside the scope of this study and will be covered in future Verdantix research.

Green Quadrant Methodology

The Verdantix Green Quadrant methodology provides buyers of specific products or services with a structured assessment of comparable offerings across vendors at a specific point in time. The methodology supports purchase decisions by identifying potential suppliers, structuring relevant purchase criteria through discussions with customers and providing an evidence-based assessment of the products or services in the market. To ensure the objectivity of the study results, the research process is defined by:

FIGURE 7

Building IoT Platform Technology Stack



Note: Different buildings will employ different technology stack configurations, depending on size, incumbent systems and operating processes. Other components exist beyond those shown.

Source: Verdantix analysis

- **Transparent inclusion criteria.**

We analysed all providers that would qualify for inclusion in this research. For those providers that declined our invitation or failed to respond, we worked to include them based on publicly available information, which provides an impression of those firms’ market positioning.

- **Analysis from a customer’s perspective.**

We spoke with a panel of customers who have bought or plan to buy a building IoT platform to understand the relevant buying criteria. These discussions informed how we weighted the evaluation criteria in the model that drives the Green Quadrant analysis graphic. Additionally, we utilized data from Verdantix corporate surveys of real estate and facilities management decision-makers.

- **Reliance on professional integrity.**

As it is not feasible to check all data and claims that providers make, we emphasized the need for professional integrity. Correspondingly, competitors and existing customers can check each participant's assertions as they are placed in the public domain through this report.

- **Scores based on available evidence.**

To assess the expertise, resources, business results and strategies of individual providers, we collected evidence from public sources and conducted interviews with multiple representatives of each solution, as well as industry experts. When providers claimed to be 'best in class', we challenged them to present related evidence.

- **Comparison based on relative capabilities.**

We constructed measurement scales for each assessment criterion, ranging from 'worst in class' to 'best in class' for performance at a certain point in time. A provider's position in the market can change over time depending on how its offering and success evolves compared with its competitors. This means that even if a provider adds new capabilities, makes a strategic acquisition or receives new investment, its Quadrant positioning may not improve relative to other service providers, if these competitors also enhance their offerings. Verdantix repeats a Green Quadrant analysis for a product or service market annually, or every two years, to capture these transitions over time.

Inclusion Criteria For The IoT Platforms For Smart Buildings Benchmark

To ensure the Green Quadrant analysis only compares firms providing a similar breadth of functionality at a comparable level, we defined inclusion criteria. The 17 IoT platform suppliers included in this study were selected because their applications have:

- **Functionality for at least two smart building processes through an integrated platform.**

Mirroring the buying trends for IoT platforms for smart buildings, this study only includes suppliers whose solutions deliver applications that can manage at least two smart buildings processes, out of eight defined processes. This eliminated solutions that provide a single functionality, such as asset or energy management.

- **At least 25 customers on their IoT platform.**

As this is our second IoT Platforms for Smart Buildings Green Quadrant, with a proliferation of vendors and buyers over the past 24 months, we decided only to consider vendors with at least 25 customers on their IoT platforms – excluding customers that may be using other, non-IoT products offered by the vendor. This increased number, from 15 in the last study, is to ensure that the solutions compared are well-established in the market.

- **Ability to support enterprise-scale architecture.**

This study only considers solutions designed to scale up to support large-scale operations in a multi-site deployment configuration upon request. This does not mean that all customers of the vendors covered in this Green Quadrant are this large, but it does indicate that the IoT platforms covered in the study can support customers of this size.

Based on these inclusion criteria, this report looks in depth at 17 IoT platforms for smart buildings vendors: Accruent, Carrier, Clockworks Analytics, Energisme, Honeywell, Infogrid, Johnson Controls (JCI), L & T Technology Services (LTTS), Planon, PointGuard, Schneider Electric, Siemens, Spacewell, Spica Technologies, Switch Automation, Thing Technologies and ThoughtWire (see **Figure 8**). Fifteen IoT platform suppliers included in this

study actively participated through interviews, product demonstrations and responses to a 154-point detailed questionnaire. Carrier provided a product demonstration. Siemens was scored based on publicly available information and information from the firm's submission to the 2019 Green Quadrant study. Bosch, EDGE Technologies, IBM and Microsoft qualified for this study, but declined to participate. These vendors may be included in future Green Quadrant IoT for Smart Buildings studies.

Evaluation Criteria For IoT Platforms For Smart Buildings Providers

Verdantix developed the evaluation criteria within the Green Quadrant through a combination of interviews with practice managers and customers, desk research and general industry knowledge. Additional insights were taken from the 2021 global corporate survey of real estate decision-makers, which contained specific questions on customer preferences for functionality and building management processes, as well as the purchase criteria these decision-makers use when selecting a provider with which to work. In full, this Green Quadrant analysis compared offerings from 17 IoT platform providers, using a questionnaire with 30 weighted sections. Of these, 23 measured the strength of each participant's solution capabilities. The remaining seven measured each participant's forward momentum in the market. Individual metrics were classified as:

- **Capabilities metrics.**

This dimension, captured in the vertical axis of the Green Quadrant graphic, measures each software supplier on the breadth and depth of its software functionality, differentiators against other providers, and proven experience in each area. To assess performance on this dimension, Verdantix collected data on 132 criteria grouped into 23 areas across platform and applications. Platform capabilities cover data input; IT systems integration; database design; master data management; configurability; code base consistency; application development environment; implementation options; business intelligence; mobile applications; user interface; internationalization; and application and data centre cybersecurity. Application capabilities cover asset management, monitoring and control; energy management; space monitoring and analysis; occupant health and wellbeing; workplace services; facilities management services; building security; sustainability and ESG; reporting; and breadth of customer focus.

- **Market momentum metrics.**

This dimension, captured in the horizontal axis of the Green Quadrant graphic, measures each software supplier on a range of strategic success factors, covering publicly announced customers, geographic coverage and internal financial performance. We collected 22 criteria grouped into seven areas: market vision and product strategy; customer time to value; partnerships; installed customer base; deal sizes; organizational resources; and financial resources.

Verdantix weighted each primary criterion and sub-criterion based on its importance within the individual capabilities and momentum dimensions. We developed the weightings based on customer survey data regarding what IoT platform functionality is most widely used, along with Verdantix analyst perspectives about the broader IoT platforms for smart buildings landscape. Verdantix defined success measures for each sub-criterion and scored each participant's performance on each sub-criterion from zero to three. For example, energy management is a criterion considered in the capabilities section and is composed of nine weighted sub-criteria that determine the overall score. All sub-criteria are scored between 0 and 3. Subsequently, each high-level criterion is allocated a percentage weighting which then determines how much that score contributes to the overall score. The combination of high-level criteria scores in the capabilities and momentum sections generates the Green Quadrant graphic. **Figure 9** and **Figure 10** provide details of the study criteria; **Figure 11** and **Figure 12** provide the scoring for all participants against the criteria. The figures also present the weighting of each primary criterion, shown inside the parentheses. **Figure 13** provides the Green Quadrant graphic summarizing the positioning of all service providers in this benchmark study.

FIGURE 8

Suppliers And Software Assessed

| Vendor | IoT Platform/Apps |
|----------------------------------|---|
| Accruent | EMS, vx Observe |
| Carrier | Abound, CORTIX platform, CORTIXEDGE, EnergyReports, IntelliSuite, MyWay, WebCTRL |
| Clockworks Analytics | Clockworks |
| Energisme | N'Gage |
| Honeywell | Enterprise Buildings Integrator, Honeywell Forge, Tridium |
| Infogrid | Infogrid |
| Johnson Controls (JCI) | Connected Equipment, OpenBlue Active Responder, OpenBlue Central Utility Plant, OpenBlue Companion, OpenBlue Enterprise Manager, OpenBlue Location Manager, OpenBlue Risk Insight |
| L & T Technology Services (LTTS) | i-BEMS |
| Planon | Axonize, Planon Universe, Planon Workplace Insights, Smart Building Edition |
| PointGuard | Assurance, Building Healthcheck, Enterprise, Goldilocks, Insights Report, Pro+, RCx, The Snapshot |
| Schneider Electric | EcoStruxure Asset Advisor, EcoStruxure Building Advisor, EcoStruxure Engage Enterprise App, EcoStruxure For Retail Integrated Management Platform, EcoStruxure Microgrid Advisor, EcoStruxure Resource Advisor, EcoStruxure Security Expert, Planon Workplace Insights, Planon Smart Building Edition |
| Siemens | Building Twin, Comfy, Desigo CC, Enlighted, MindSphere, Navigator, Siveillance |
| Spacewell | Axserion, Cobundu, DEXMA |
| Spica Technologies | GemEx Engine Environment Monitoring, GemEx Engine Healthy Water, GemEx Engine Smart Cleaning, GemEx Engine Workspace, Luna |
| Switch Automation | Switch Digital Layer, Switch Dx ³ , Switch Platform |
| Thing Technologies | Thing-it, Thing-it Mobile App |
| ThoughtWire | @WorkApp, Early Warning System, Nerve Center, Notification Center, Patient Transport and Logistics, PrecisionHub, ThoughtWire Digital Twin, ThoughtWireOS |

Source: Vendor data

FIGURE 9-1

Capabilities Criteria For IoT Platforms For Smart Buildings

| Capabilities | Questions |
|--|--|
| Data Input (6%) | What functionality is provided to integrate with and capture data from different sensors, electricity meters, building management systems, building equipment and security systems deployed in buildings? What is the range of indoor positioning systems into which your solution can integrate? What functionality is provided to capture data from a site's IT system and network, external sources, building occupants and other data feeds? |
| IT Systems Integration (3%) | What functionality is provided to integrate with computer-aided design (CAD) and building information modelling (BIM) or import the relevant data, other enterprise systems, third-party real estate, energy and facilities information management systems, and online third-party worker collaboration tools? |
| Database Design (3%) | What scalability/clustering can the vendor demonstrate with customer deployments? How does the IoT platform handle large volumes of data? What functionality is provided to support data audits, ensure and enhance data quality, and deal with data gaps? How does the solution provide extensible, flexible and interoperable data access to customers? |
| Master Data Management (3%) | What functionality is provided to define and/or upload the organizational structure and hierarchy? How are users able to configure and reconfigure the organizational hierarchy data? How does the system enable users to aggregate data in a data warehouse? |
| Configurability (3%) | How can elements such as forms and metric libraries in the system be changed or reconfigured? How can business rules, workflows, role definitions and other elements be changed, reconfigured or added to? What tools and processes are available to version, package and promote changes across systems? |
| Code Base Consistency (1%) | How many different product architectures do you offer? How many applications are included? How many programming languages is your product based on? |
| Application Development Environment (2%) | What development tools can clients use to customize the application? What development tools can clients use to develop new apps/modules? What is the development environment? |
| Implementation Options (2%) | What are the multi-tenant-hosted, single-instance-hosted and on-premises offerings? Does the offering provide edge computing capabilities? |
| Business Intelligence (3%) | Does the app have its own business intelligence (BI) tool or is it sold with a third-party BI tool? How can a customer export data to their own BI tool? What tools are available for benchmarking, dashboarding, forecasting, geospatial analysis and digital twin analysis? |

Figures in brackets represent the weighting given to each criterion in the flexible multi-criteria model that generates the Green Quadrant graphical analysis.

Source: Verdantix analysis

FIGURE 9-2

Capabilities Criteria For IoT Platforms For Smart Buildings

| Capabilities | Questions |
|--|--|
| Mobile Applications (2%) | What functionality is offered via mobile app? How many active monthly users of the mobile app are there? What architecture and security framework does the app have? With which operating systems is the mobile app compatible? |
| User Interface (3%) | What is the usability/user-friendliness of the enterprise and mobile app interfaces? |
| Internationalization (2%) | How many user interface (UI) languages are provided out of the box? What is the extent of the multi-currency functionality? How does the software manage multiple time zones? |
| Application & Data Centre Cybersecurity (4%) | What vulnerability assessments are performed and when? What is the security framework for enterprise and mobile apps? How does your software support customers in their need to be GDPR-compliant? To which standards and certifications does your hosting environment adhere? |
| Asset Management, Monitoring & Control (11%) | What functionality is provided for asset monitoring and condition assessments, automated identification and diagnosis of equipment faults through FDD, continuous optimization of assets and asset lifecycle management? What functionality is provided for managing data on facility assets, controlling building assets in real time or changing automation parameters, and locating and tracking assets? |
| Energy Management (9%) | What functionality is provided for energy monitoring, analysis, reporting and targeting? What functionality is provided to leverage IoT data for utility bill management? What functionality is offered to help firms track the success and payback of various energy efficiency projects? |
| Space Monitoring & Analysis (7%) | What functionality is provided for leveraging IoT data to monitor how space is used? What functionality is provided to better understand, plan, organize and use space, and to support workspace right-sizing and redesigns? What functionality is provided around footfall and dwell time tracking, social distance tracking and heat-mapping for crowd monitoring? |
| Occupant Health & Wellbeing (5%) | What functionality is provided for leveraging IoT data to monitor environmental conditions such as temperature, CO ₂ , humidity and other factors? What functionality is provided for monitoring and tracking occupant health and wellbeing? Does the solution allow users to adjust conditions for greater comfort? |
| Workplace Services (7%) | What are the capabilities to provide self-service applications to building occupants for reserving space and workstations and lockers? What functionality is provided for occupants for real-time wayfinding and occupant feedback? What functionality is provided to deliver amenities to building occupants, including parking services? What functionality is provided to support data collection and reporting to different standards for wellbeing? What functionality is provided to integrate with indoor positioning systems to deliver location-based services? |

Figures in brackets represent the weighting given to each criterion in the flexible multi-criteria model that generates the Green Quadrant graphical analysis.

Source: Verdantix analysis

FIGURE 9-3

Capabilities Criteria For IoT Platforms For Smart Buildings

| Capabilities | Questions |
|--------------------------------|---|
| FM Services (4%) | What functionality is provided to enhance FM services such as matching cleaning services to usage? What functionality is provided to leverage IoT data as part of monitoring, analysing and reporting on FM performance? What functionality is offered to ensure service level agreement (SLA) adherence? |
| Building Security (7%) | What functionality is provided around access control, visitor and contractor management, video surveillance and management, remote and central security management, alarm management and critical event management? |
| Sustainability/ESG (6%) | What functionality is provided to automatically or intermittently collect and manage ESG data, analyse sustainability performance and support carbon and other forms of reporting? |
| Reporting (3%) | What functionality does the solution offer that allows users to view, chart and analyse data? Does the solution support automatic reporting submissions? How does it facilitate the reporting process? |
| Breadth Of Customer Focus (4%) | To what extent have you developed specific functionality or out-of-the-box workflows to support the needs of corporates, service providers, investors and end-users? |

Figures in brackets represent the weighting given to each criterion in the flexible multi-criteria model that generates the Green Quadrant graphical analysis.

Source: Verdantix analysis

FIGURE 10

Momentum Criteria For IoT Platforms For Smart Buildings

| Capabilities | Questions |
|--------------------------------|--|
| Vision & Strategy (15%) | What is the firm's vision for the evolution of customer requirements over the next 3 years? What is the firm's strategy to meet the needs of customers and develop its product over the next 2 years? What is the current product development roadmap? |
| Customer Time To Value (5%) | What is the average implementation time for a typical customer deal and the approach adopted for implementation? |
| Partnerships (5%) | With which software and hardware vendors does the firm have a formal relationship? |
| Installed Customer Base (20%) | What is the total number of firms using your building IoT software? Describe the typical size of customers by revenue or square footage. |
| Deal Sizes (25%) | How many building IoT software deals did the firm sign in the past 12 months or past reporting period? What was the breakdown of those deals by size? What was the average deal size in 2020, including software (licences, subscriptions) and implementation? |
| Organizational Resources (15%) | In how many countries does the vendor have offices and host the application? How many in-house employees are dedicated to the IoT platform business? |
| Financial Resources (15%) | What were the revenues from building IoT software in the past 12 months? By how much did the total building IoT revenues grow in 2020 compared with 2019 or in the last reporting period? How much capital was raised in 2019/20/21? What is your customer retention rate? |

Figures in brackets represent the weighting given to each criterion in the flexible multi-criteria model that generates the Green Quadrant graphical analysis.

Source: Verdantix analysis

FIGURE 11-1

Vendor Capabilities Scores

| | Accruent | Carrier | Clockworks Analytics | Energisme | Honeywell | Infogrid | JCI | LITS | Planon |
|---|----------|---------|----------------------|-----------|-----------|----------|-----|------|--------|
| Data Input | 1.8 | 1.8 | 1.1 | 1.7 | 1.8 | 1.4 | 1.9 | 1.2 | 1.9 |
| IT Systems Integration | 1.6 | 1.4 | 0.7 | 1.6 | 0.9 | 0.1 | 2.2 | 0.4 | 2.0 |
| Database Design | 1.5 | 1.7 | 2.0 | 2.0 | 1.7 | 1.5 | 1.5 | 0.5 | 2.0 |
| Master Data Management | 2.0 | 1.7 | 1.7 | 2.0 | 2.0 | 2.0 | 2.3 | 1.3 | 2.7 |
| Configurability | 1.9 | 1.3 | 1.5 | 2.0 | 1.1 | 1.5 | 1.9 | 0.7 | 2.2 |
| Code Base Consistency | 1.3 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| Application Development Environment | 0.8 | 1.6 | 0.8 | 1.4 | 0.6 | 1.2 | 1.6 | 0.8 | 2.2 |
| Implementation Options | 1.3 | 1.5 | 1.0 | 1.5 | 2.0 | 1.0 | 1.8 | 1.3 | 1.8 |
| Business Intelligence | 1.3 | 1.6 | 1.3 | 2.3 | 1.2 | 1.3 | 1.9 | 0.9 | 2.0 |
| Mobile Applications | 1.9 | 1.4 | 0.0 | 1.8 | 1.6 | 0.3 | 2.2 | 1.9 | 2.7 |
| User Interface | 1.5 | 1.3 | 0.7 | 2.0 | 2.0 | 1.2 | 2.6 | 1.4 | 2.2 |
| Internationalization | 3.0 | 2.0 | 3.0 | 2.3 | 2.3 | 1.7 | 2.3 | 1.7 | 3.0 |
| Application & Data Centre Cybersecurity | 1.9 | 2.0 | 0.7 | 1.7 | 2.2 | 1.9 | 1.8 | 1.6 | 2.1 |
| Asset Management, Monitoring & Control | 2.0 | 2.1 | 1.7 | 2.0 | 1.8 | 1.1 | 2.5 | 1.0 | 2.2 |
| Energy Management | 1.8 | 2.1 | 1.3 | 2.1 | 2.0 | 0.6 | 2.0 | 0.9 | 0.9 |
| Space Monitoring & Analysis | 1.2 | 1.0 | 0.0 | 0.5 | 0.9 | 1.7 | 1.5 | 1.6 | 2.0 |
| Occupant Health & Wellbeing | 1.0 | 1.8 | 1.0 | 0.8 | 1.8 | 2.0 | 2.0 | 1.0 | 1.5 |
| Workplace Services | 1.1 | 1.3 | 0.0 | 0.0 | 1.3 | 1.1 | 2.1 | 1.1 | 1.9 |
| FM Services | 2.3 | 1.3 | 0.0 | 1.3 | 1.0 | 1.7 | 1.3 | 1.3 | 2.3 |
| Building Security | 0.1 | 2.0 | 0.0 | 0.0 | 2.3 | 0.3 | 2.3 | 0.9 | 0.6 |
| Sustainability / ESG | 0.0 | 1.0 | 1.2 | 1.8 | 0.6 | 0.6 | 1.2 | 0.8 | 1.0 |
| Reporting | 1.5 | 1.5 | 1.5 | 2.0 | 1.0 | 1.0 | 2.0 | 1.0 | 2.0 |
| Breadth Of Customer Focus | 1.6 | 1.4 | 1.2 | 1.4 | 1.6 | 1.6 | 2.0 | 1.6 | 2.0 |

Scoring Framework

- 3 Vendor provides evidence of market-leading functionality, supported by a broad set of references to customer examples
- 2 Vendor provides evidence of strong functionality, supported by a broad set of references to customer examples
- 1 Vendor provides evidence of moderate functionality, with limited references to customer examples
- 0 No response provided or available publicly, or supplier has a weak offering

Source: Verdantix analysis

FIGURE 11-2

Vendor Capabilities Scores

| | PointGuard | Schneider Electric | Siemens | Spacewell | Spica Technologies | Switch Automation | Tring Technologies | ThoughtWire |
|---|------------|--------------------|---------|-----------|--------------------|-------------------|--------------------|-------------|
| Data Input | 1.5 | 2.2 | 2.1 | 2.0 | 1.2 | 2.1 | 1.7 | 2.2 |
| IT Systems Integration | 0.6 | 1.7 | 1.9 | 2.3 | 1.6 | 0.9 | 1.9 | 1.4 |
| Database Design | 1.2 | 2.2 | 2.0 | 2.0 | 1.8 | 1.7 | 1.7 | 1.5 |
| Master Data Management | 1.7 | 2.3 | 2.3 | 1.7 | 2.3 | 2.0 | 2.0 | 1.7 |
| Configurability | 1.5 | 1.7 | 2.0 | 2.3 | 1.2 | 1.6 | 2.1 | 1.7 |
| Code Base Consistency | 2.0 | 2.0 | 2.0 | 1.7 | 2.0 | 2.0 | 1.7 | 2.0 |
| Application Development Environment | 1.6 | 2.0 | 1.6 | 2.0 | 1.0 | 1.6 | 1.4 | 2.0 |
| Implementation Options | 1.8 | 1.8 | 1.5 | 1.3 | 1.5 | 1.5 | 1.3 | 0.8 |
| Business Intelligence | 1.3 | 2.1 | 2.2 | 1.8 | 0.9 | 1.8 | 1.9 | 2.0 |
| Mobile Applications | 0.3 | 1.4 | 2.3 | 2.4 | 2.2 | 1.1 | 2.2 | 1.6 |
| User Interface | 1.3 | 2.3 | 2.0 | 2.4 | 2.5 | 1.6 | 1.8 | 1.8 |
| Internationalization | 1.7 | 2.7 | 3.0 | 2.7 | 1.7 | 2.0 | 2.0 | 1.7 |
| Application & Data Centre Cybersecurity | 1.6 | 2.1 | 2.0 | 2.3 | 2.2 | 2.0 | 2.1 | 2.1 |
| Asset Management, Monitoring & Control | 2.2 | 2.0 | 1.8 | 1.4 | 0.0 | 2.0 | 1.5 | 2.0 |
| Energy Management | 1.6 | 2.4 | 2.1 | 2.4 | 0.0 | 1.9 | 1.0 | 1.4 |
| Space Monitoring & Analysis | 0.5 | 1.4 | 1.9 | 2.2 | 1.6 | 1.5 | 1.9 | 1.6 |
| Occupant Health & Wellbeing | 2.0 | 1.5 | 1.8 | 1.8 | 1.8 | 1.3 | 1.0 | 2.0 |
| Workplace Services | 0.3 | 1.7 | 1.9 | 2.3 | 1.9 | 0.3 | 2.0 | 2.0 |
| FM Services | 1.7 | 1.3 | 1.3 | 2.3 | 1.7 | 1.7 | 1.7 | 1.3 |
| Building Security | 0.0 | 1.9 | 1.9 | 0.3 | 0.3 | 0.3 | 0.4 | 1.4 |
| Sustainability / ESG | 1.2 | 2.4 | 1.6 | 1.2 | 0.0 | 1.6 | 0.6 | 1.0 |
| Reporting | 2.0 | 2.0 | 2.0 | 2.0 | 1.5 | 1.0 | 1.5 | 1.5 |
| Breadth Of Customer Focus | 1.6 | 2.0 | 1.8 | 2.1 | 1.8 | 1.6 | 1.6 | 1.6 |

Scoring Framework

- 3 Vendor provides evidence of market-leading functionality, supported by a broad set of references to customer examples
- 2 Vendor provides evidence of strong functionality, supported by a broad set of references to customer examples
- 1 Vendor provides evidence of moderate functionality, with limited references to customer examples
- 0 No response provided or available publicly, or supplier has a weak offering

Source: Verdantix analysis

FIGURE 12

Vendor Momentum Scores

| | Accruent | Carrier | Clockwork Analytics | Energisme | Honeywell | Infogrid | JCI | LTTTS | Planon |
|--------------------------|----------|---------|---------------------|-----------|-----------|----------|-----|-------|--------|
| Vision & Strategy | 1.7 | 1.3 | 1.3 | 1.7 | 1.3 | 2.0 | 2.0 | 1.0 | 1.7 |
| Customer Time To Value | 2.0 | 2.0 | 1.0 | 2.0 | 1.0 | 3.0 | 2.0 | 1.0 | 1.0 |
| Partnerships | 1.0 | 1.5 | 0.5 | 0.0 | 1.5 | 2.0 | 3.0 | 2.5 | 2.0 |
| Installed Customer Base | 2.0 | 2.0 | 2.8 | 1.8 | 2.0 | 2.0 | 2.8 | 1.3 | 2.0 |
| Deal Sizes | 1.3 | 2.5 | 0.7 | 0.7 | 1.5 | 1.3 | 2.3 | 1.2 | 0.8 |
| Organizational Resources | 1.7 | 2.0 | 1.3 | 1.3 | 2.3 | 1.7 | 2.3 | 2.3 | 2.0 |
| Financial Resources | 1.9 | 1.8 | 1.7 | 1.5 | 1.5 | 2.2 | 2.2 | 1.7 | 1.7 |

| | PointGuard | Schneider Electric | Siemens | Spacewell | Spica Technologies | Switch Automation | Thing Technologies | ThoughtWire |
|--------------------------|------------|--------------------|---------|-----------|--------------------|-------------------|--------------------|-------------|
| Vision & Strategy | 1.7 | 2.0 | 2.3 | 2.3 | 2.0 | 1.7 | 1.7 | 1.3 |
| Customer Time To Value | 1.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 2.0 | 2.0 |
| Partnerships | 1.0 | 2.0 | 1.5 | 3.0 | 2.0 | 1.0 | 2.5 | 3.0 |
| Installed Customer Base | 1.3 | 2.8 | 2.8 | 2.8 | 1.3 | 1.0 | 2.0 | 1.3 |
| Deal Sizes | 0.7 | 2.2 | 2.8 | 1.3 | 1.3 | 1.3 | 0.8 | 1.2 |
| Organizational Resources | 1.0 | 2.3 | 2.0 | 1.7 | 1.0 | 2.0 | 1.3 | 1.7 |
| Financial Resources | 1.8 | 2.2 | 2.2 | 2.2 | 1.6 | 1.5 | 1.8 | 1.3 |

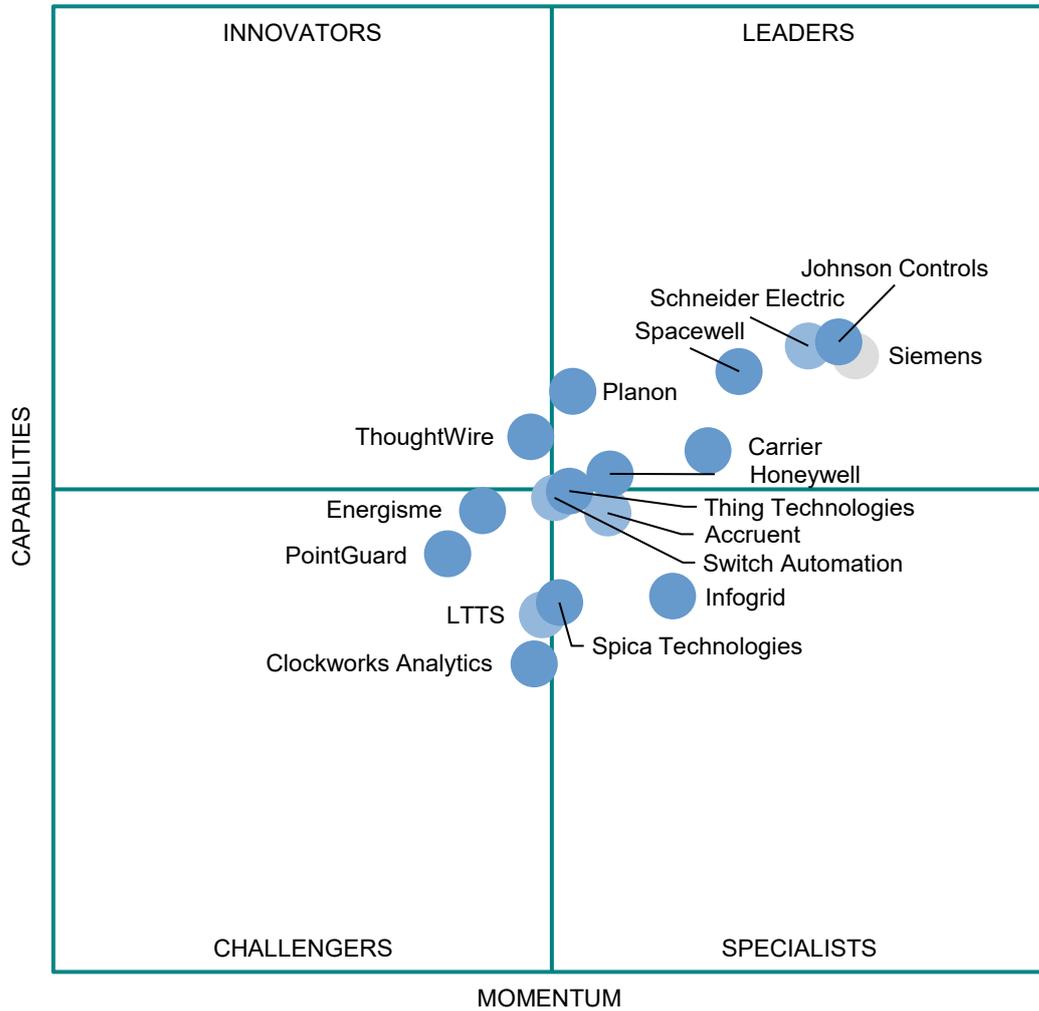
Scoring Framework

- 3 Vendor provides evidence of market-leading functionality, supported by a broad set of references to customer examples
- 2 Vendor provides evidence of strong functionality, supported by a broad set of references to customer examples
- 1 Vendor provides evidence of moderate functionality, with limited references to customer examples
- 0 No response provided or available publicly, or supplier has a weak offering

Source: Verdantix analysis

FIGURE 13

Green Quadrant IoT Platforms For Smart Buildings 2022



Capabilities This dimension measures each software supplier on the breadth and depth of its software functionality across 23 capability areas, as outlined in Figure 9.

Momentum This dimension measures each software supplier on seven strategic success factors, as outlined in Figure 10.

Note: A grey plot indicates a non-participating vendor, light blue shows an overlapping plot

Source: Verdantix analysis

Siemens's Comfy App Deepens Space Monitoring And Workplace Services Offerings

Siemens is a global industrial powerhouse that targets the building Internet of Things (IoT) space through its Siemens Smart Infrastructure group, headquartered in Zug, Switzerland. Siemens offers a comprehensive suite of IoT solutions for smart buildings. Navigator is a cloud-based analytics platform that collects, organizes, visualizes and analyses building data, mostly for energy, sustainability, space management and asset performance. Siemens also offers Comfy for workplace experience and analytics; Enlighted for smart sensors; the Siveillance product line for building security and access control; the Desigo CC building management system (BMS); and Building Operator for remote monitoring and operations of small to medium-sized buildings. Building Twin is the common layer for building information data from construction plans and live building data, such as from sensors, delivering digital twin capabilities. The MindSphere IoT operating system, designed to connect assets and support the integration and analysis of monitoring data in the cloud, complements these solutions. With its software portfolio and digital services offering, Siemens supports several thousand customers globally with tens of thousands of facilities and handles hundreds of millions of building data points daily.

Strengths And Differentiators

Based on the Green Quadrant analysis, Verdantix finds that Siemens has strengths in:

- **Energy management of buildings and assets.**

Siemens's Navigator offering, which scores 2.1 out of 3.0 for energy management in our benchmark, is an energy analytics platform that firms can use to manage energy data. In addition to supporting the ingestion of utility bill data, Navigator allows users to perform energy monitoring and targeting, such as cost and budgetary comparisons for usage, and analysis of asset performance and faults affecting consumption. The solution also provides a Performance Assurance dashboard, where costs savings can be measured and verified, which can be used to track the success of energy management projects.

- **Workplace services delivered through an intuitive mobile app.**

Driven primarily by its Comfy solution, Siemens scores highly for its space monitoring and analysis capabilities (1.9/3.0). Comfy is an intuitive workplace mobile app offering users easy access to workplace services. It delivers an advanced level of space booking, where users can book space based on equipment availability and reviews provided by colleagues. With the Neighborhoods feature, occupants can book an area and add co-workers, so that teams can sit in proximity. The app also offers the ability to book parking spots, provide wayfinding capabilities, manage the lighting and temperature of spaces and submit work order requests. Building managers can also configure health questionnaires and other forms to manage occupants.

- **Space monitoring and analysis functionality.**

Siemens scores 1.9 out of 3.0 for space monitoring and analysis. With its Enlighted IoT solution, users can install a sensor network in lighting fixtures or on surfaces. Once connected to the cloud, these sensors collect and stream real-time data on motion, which can be provided on heat maps, as well as data on lighting and power consumption. Comfy can track utilization on a granular level, using both sensor and booking data to understand how spaces and resources are being used. By combining these insights, building managers can tackle strategic elements of space management, such as portfolio right-sizing and workspace redesigns. Comfy also offers the ability to designate 'Space Traits', where building managers can create trait labels, such as 'close to toilets', which can be tagged to spaces. Combining utilization and booking data with these traits can identify patterns in employee preferences, providing further opportunities to improve space design.

Improvement Opportunities

Based on the Green Quadrant analysis, Verdantix finds that Siemens could improve by:

- **Providing more extensive ESG functionality.**

Despite strong energy management capabilities, Siemens has room to improve its ESG offering. Although Navigator is capable of handling energy data and providing tracking of Scope 3 carbon emissions, Siemens currently lacks extensive capability to collect and manage social and governance data – the importance of which is growing as the momentum behind ESG increases. Forty-seven per cent of real estate executives plan to newly invest in tools to support the reporting of building ESG data to stakeholders and investors in the next 12 months (see [Verdantix Global Corporate Survey 2021: Smart Building Technology Budgets, Priorities & Preferences](#)). Siemens should look to enhance its ESG offering to match this market intention.

- **Developing its environmental condition monitoring features.**

Although building occupants and managers can control climate conditions such as temperature and lighting within workspaces, Siemens could improve its environmental monitoring capabilities further. In the past 18 months, the impetus behind healthy buildings has grown significantly and many vendors are building dashboards and aggregated scoring systems to track and manage building health on temperature, humidity, airflow, volatile compounds and CO₂ levels. To complement the space monitoring and workplace service features of Comfy, Siemens should look to build out a comprehensive environmental monitoring tool, which could be used by building managers and occupants alike to track indoor conditions.

Selection Advice For Buyers

Considering all supplier offerings assessed in the Green Quadrant analysis, we believe that Siemens should be included on shortlists by the following buyers:

- **Firms looking to drive more value from their office portfolios in the hybrid era.**

Organizations that hold large amounts of corporate real estate, such as firms in business services, finance and technology, should consider leveraging Siemens's Comfy for their space management and workplace services needs. In addition to empowering employees with services through their own mobile devices, features such as utilization insights and the 'Space Traits' tool help building managers understand how their workspaces are being used. As businesses return to the office, these tools enable building and portfolio managers to make more informed real estate decisions, optimizing space usage whilst boosting worker productivity.

- **Complex organizations such as life sciences and healthcare institutions.**

Firms with complex building portfolios, such as healthcare institutions, hospitals and life sciences firms, should consider Siemens's suite of solutions to deliver comprehensive building management capabilities. The vendor's offering provides tools to support asset monitoring and maintenance, energy management, space management and building security at an enterprise level. For firms in healthcare, Siemens offers specific capabilities such as real-time location tracking of assets (through Enlighted) and control capabilities (primarily through Desigo CC), to ensure that specialized areas – such as operating rooms, patient rooms and pressurized rooms – are kept in the right conditions. Siemens also provides targeted tools for laboratories and other life science facilities.

- **Educational campuses seeking to optimize energy and maintenance processes.**

University campuses and other educational facilities should consider Siemens's IoT-enabled building management tools. By leveraging Siemens's offerings, these organizations can track their energy consumption, including their Scope 3 carbon emissions, manage building maintenance through fault detection and diagnostics (FDD) and configured alerts, and implement robust security solutions. Siemens already has a history of success in this space. Witness the University Properties of Finland, which owns and maintains the buildings of Tampere University, and leveraged Siemens's offerings to improve building maintenance, leading to 70% of visual inspections being replaced by data analytics, and 50% fewer user complaints. The University of Birmingham also recently began an engagement with Siemens, rolling out 23,000 Enlighted IoT sensors from August 2021, to support its modernization efforts.



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WHY VERDANTIX?

Verdantix is an independent research and advisory firm with expertise in digital strategies for **Environment, Health & Safety, ESG & Sustainability, Operational Excellence** and **Smart Buildings**. Our mission is to anticipate the insights and data that our clients need so you can succeed with growth strategies, invest wisely and optimize performance.

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