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Five factors to accelerate smart building transformation

Introduction

To maintain competitiveness, most building owners seek cost-effective options for modernizing building infrastructure and improving building performance.

According to Statista, the market size of commercial property remodeling in the United States alone will exceed $45 billion in 2022. These investments are being implemented for multiple reasons. The COVID-19 pandemic has contributed to changes in the way building assets are utilized (like office space being converted to research and development space). And trends like digitalization and Internet of Things (IoT) are making the deployment of smart buildings much more affordable. Many companies are recognizing that their buildings are becoming more and more critical to the operational success of the company.

Another significant factor that is driving building modernization is the accelerating change in the building management workforce. Many workers are retiring and taking their institutional wisdom with them. More gaps in building management expertise are emerging and those who remain are not sufficiently trained to manage these increasingly complex systems.

In traditional buildings, facilities engineers spend lots of time programming and trying to work around aging system bottlenecks. They often have little to show for their efforts in terms of significant system performance improvements. As a result, many building owners who have not yet invested in modernization are asking themselves important questions such as: how can we improve building performance with more tightly controlled environmental, comfort and security systems? How can our building become more profitable and competitive with a shortage of skilled labor? How can we take cost out of building operations while improving the occupant experience?

Modernization drivers

Key reasons to modernize buildings:

- **Energy efficiency and sustainability** – New building infrastructure technologies help to reduce energy usage by 20-30% without sacrificing comfort. Energy management software solutions are also translating those savings into validated carbon reduction emissions reports.
- **Employee productivity, health and safety** – High precision lighting, temperature, and ventilation controls are improving overall building occupant comfort while driving energy savings.
- **Regulatory compliance** – Better capture and analysis of data enables building owners to conform more quickly to regulatory standards.
- **Future business growth** – As buildings play a bigger role as business enablers, building performance more directly impacts corporate profitability.

Accelerating smart building transformation

Transitioning to a smart building environment is enabled by two key elements: connected devices to capture and collect performance data and software for analyzing and trending that data either on-site or in the cloud. However, modernizing to a new, smart building infrastructure is not like flipping a switch. As building owners undergo their modernization journey, there are some critical factors to success:

1 – Adopt proactive maintenance

Without proper servicing, the energy consumption of power distribution, HVAC and lighting infrastructure can increase dramatically – by as much as 10 to 20% as the system slowly goes out of adjustment. As facilities modernize and as the infrastructure becomes more automated and connected, maintenance planning and execution become critical success factors for rapidly servicing equipment and maintaining uptime.

In many instances, issues are often not detected until a breakdown occurs, causing a reactive chain of events. Contacting a service technician and identifying parts needed may cause costly downtime.

Smart buildings enable a predictive maintenance model. Maintenance work is scheduled based on remote diagnostic evaluations that determine when to perform service. Monitoring equipment conditions provides trending data to help anticipate future maintenance needs. When anomalies are detected, simple fixes can be administered before more catastrophic issues occur. New advancements in software and sensor technology allow for remote monitoring and diagnostics to be both affordable and precise. Such approaches help make the building more self-detectable and self-aware, without needing large teams of engineering experts on site.

As buildings increase in complexity, and as many organizations no longer have the technical expertise in place to handle the multiple layers of building automation, such levels of intelligence are critical to maintaining building uptime.

2 – Invest in sustainable modernization

According to the World Economic Forum, 80% of all buildings that will exist in 2050 already exist today. Retrofit and refurbishment projects are critical in the movement to decarbonize. For the United States, 80% of all buildings operate with a limited level of intelligence – waiting for new technologies to mature with easy integration. Adopting an interoperable system that can grow with emerging applications helps avoid obsolescence and reduces overall cost.

In the domain of efficient energy management and decarbonization, 40% of global energy consumption can be linked directly to buildings. The path to decarbonization of buildings involves a unique combination of energy-related data management, deployment of renewable energy sources, efficient building designs, infrastructure upgrades, and innovative digital solutions.

Today, maintaining low carbon emissions can easily be influenced through the selection of high efficiency building infrastructure technologies that allow for monitoring, measurement and improvement of energy flows across the building.

3 – Leverage sensors and communicating field devices

A core component of a smart building is ensuring critical physical assets and spaces are upgraded with sensors and smart controllers that are properly connected for data analysis.

The new generation of sensors are wireless for plug-and-play installation anywhere and are capable of transmitting data over standard protocols like IP networks. Adding sensors provides new data points, which helps strengthen the precision of building environmental measurements, enabling faster, more accurate, and more profitable building operational decisions.

Together, these connected devices monitor what's going on in the building and physically change how the building is operating. The latest generations of sensors not only determine air temperature and air quality, but are also capable of self-diagnostics, detecting whether the readings they are producing are correct or not. They can be combined with actuating valves and dampers, which enables measuring all variables throughout the building with fast connectivity and complete transparency to operations.

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4 – Put data to work

Building automation systems generate vast amounts of data, and typically, no one has the time to tackle the labor-intensive data analysis needed to quickly translate into actionable information. Many buildings may not have facilities teams with the capacity to interpret all the of data streaming in. To address the data analysis challenge, artificial intelligence (AI) tools and platforms enable building owners to manage the data better. Modern building automation platforms are equipped with AI algorithms that can quickly assess large data volumes and identify behavioral trends.

The data now feeds into automation and integrated software platforms, and control logic makes decisions based on the sensor-fed information. As a result, valves and actuators are automatically opened, closed, or readjusted to maximize both energy savings and occupant safety and comfort. Window blinds are adjusted when the light coming in is producing too much heat in the room or when free natural light is needed to reduce artificial lighting costs. A fan consuming more energy than normal may indicate the likelihood of a dirty filter that needs replacing.

Such energy-saving and human-comfort decisions are made in real time. The building automation platforms synchronize the various physical infrastructure devices across the building, assessing how the building is running and then optimizing performance.

Performance data from one building can then be compared to benchmarks either within or outside of the enterprise to view whether the building is outperforming the standard. In some cases, such data can be used to maximize the value of building assets should the owner choose to sell the building later.

Smart buildings that are equipped to operationalize data such as energy usage, emissions data, and connect systems are more future-proof. Enhanced data analytics help to proactively maintain systems, achieve decarbonization goals and reduce costs. The use of digital twins can improve decision modelling and efficiency during construction, operation, and maintenance.

5 – Harden building systems

While building owners may have addressed cybersecurity within the IT systems, a smart building infrastructure requires a more holistic cyber approach. As core systems get connected to both internal and external systems, the cyberattack surface widens for potential hackers. But connecting to such systems is imperative in order to maintain profitability, sustainability, and building performance.

The natural progression of integrated infrastructure has to be supplemented by policies that support cybersecurity best practices and that deploy the proper firewalls. Maximum success can only be achieved by striking the right balance between interoperability of systems and safeguarding the infrastructure that underpins all key facility processes and procedures.

Conclusion

As buildings become more integral to the core business of organizations, building performance, sustainability and safety are critical success factors.

Workforce challenges also make it more difficult to maintain sound building operations without smart, predictive systems in place.

By combining field-tested energy management technologies, new building energy generation technologies, and energy storage environments, Siemens is fulfilling what it views as its mission and responsibility: to enable what's possible, to demystify how these technologies can work together, and to provide building owners with a holistic approach that minimizes energy spend while maximizing comfort and security. Siemens offers building owners AI-driven solutions that optimize energy consumption and that enable high efficiency HVAC and modern building management.

Discover how Siemens smart infrastructure technology enables faster, more informed operational decisions while optimizing building systems uptime. Using advanced analytics, digital twin, predictive maintenance and IoT capabilities, Siemens helps make building systems more intelligent and cyber secure. By providing quality field devices, along with high performance building automation controllers and monitoring software, building owners can shift to a more predictive maintenance diagnostic approach.

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