NAVIGANT
RESEARCH

The Evolution of Intelligent Buildings in Retail

Transforming Technologies for a Connected Enterprise:

An Entouch Controls Sponsored White Paper

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SMART BUILDING SOLUTIONS

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Section 1
INTRODUCTION

Information technology (IT) has transformed the management of commercial buildings. Building automation and control systems have been improving the operations of large commercial buildings for many years. These complex systems provide engineering and operations staff with tools for maintaining schedules and managing systems such as heating, ventilation, and air conditioning (HVAC) and lighting. These legacy solutions are, however, costly, cumbersome to deploy, and often underutilized because of their complexity. Beginning around 2005, IT triggered an evolution in the building technologies market, driven with the introduction of software-driven building energy management systems (BEMSs). A BEMS provides applications to analyze equipment operations and deliver key information for improving energy efficiency and generating other cost savings. These solutions have greatly expanded the market for energy and operational improvement into smaller buildings and to customers unwilling or unable to deploy traditional automation and control alternatives.

BEMSs have been the foundation of the developing intelligent buildings market. The introduction of BEMSs was initially disruptive to the business of facilities management because these tools give stakeholders new insight into the bottom-line impacts of equipment operations and space use from both inside one building and across an enterprise. These software-centric tools translate more data into actionable information that helps users make better decisions. Using BEMSs, executives can see the correlation between operations and energy costs, facilities managers see the correlation between maintenance approaches and hot and cold calls, and even occupants can see how their behaviors affect sustainability goals.

Another phase of market transformation is unfolding with the continued advancement of IT for facilities management, specifically the development of the Internet of Things (IoT). Low-cost wireless devices for data collection, communications, and control—the foundational infrastructure of IoT—are allowing for a transition away from individual point solutions for energy and maintenance toward a platform approach to building optimization in the form of comprehensive intelligent building solutions that enable a connected enterprise. This next phase of market transformation parallels the disruption of other technology markets. In the same way that smartphones have transformed how individuals access information and manage personal tasks, IoT-enabled intelligent building solutions are transforming the way commercial buildings are operated and even viewed as business assets. Retail store owners, for example, can utilize intelligent building technologies to make strategic decisions on equipment replacement and product placement because of the data they can access on system and space use.

These intelligent building solutions enable customers to pool data from multiple sources to monitor and analyze entire building portfolios. Seamless integration of data from existing technologies—such as computerized maintenance management systems (CMMS), utility billing systems, and new IoT devices—provide unprecedented and comprehensive visibility into facility infrastructure and operations through a single lens.

As IoT devices gain traction in the market, many BEMS providers are redefining the value proposition for potential customers to capture the benefits of cloud platforms and intelligence from the IoT devices for holistic building management for a connected enterprise. This Entouch-sponsored white paper highlights findings from a recent retail customer survey and provides an overview of the continued evolution of the intelligent buildings market.

Section 2
## MARKET DEVELOPMENT: THE EVOLUTION OF BUILDING AUTOMATION

Intelligent building software utilizes data streams from automation and controls infrastructure—whether from a traditional building automation system or a lighter IoT platform—alongside weather, utility, and occupancy data to create actionable information for business decision makers. Intelligent building software can translate this kind of comprehensive data set into distinct sets of information for different business objectives, including energy efficiency, comfort, proactive repair and maintenance, and even productivity. The result is comprehensive insight that changes management strategy. IoT intelligent building systems deliver actionable insights from real-time data and support services that help customers optimize performance across building portfolios. For example, facility teams can shift from reactive processes that tackle individual alerts and system faults to proactive maintenance and direct strategic decision-making to improve performance across all company stores.

Ongoing reliance on legacy systems and tools has been one of the biggest challenges to the development of the intelligent buildings market. Customers often rely on homegrown spreadsheets and databases as well as aging automation and controls infrastructure, which can lead to redundancy and underperforming system operations. Utilizing the capabilities of legacy technologies can be extremely time consuming and overwhelming. Many facility managers do not have bandwidth to manage the vast amounts of data and act on this information in real time because they operate in fast-paced, reactionary working environments.

The new intelligent buildings solution models make energy management simple. In retail facilities, an intelligent building technology provider can install smart thermostats, controllers, and sensors that are managed by a team of dedicated third-party data specialists who rely on cloud-based software. The benefits often extend far beyond energy savings to include significant reductions in maintenance costs and data-driven decision-making to meet corporate business objectives. IoT-enabled intelligent building solutions can automate reporting processes for sustainability compliance or provide ongoing key performance indicators (KPIs) for finance teams. The integrated and comprehensive view of operations means the data is available and ready to be transformed to answer specific questions from distinct business interests from operations to finance, sustainability, and energy. Furthermore, while the user-specific benefits of IoT-enabled solutions ensure business unit profitability, the integrated approach utilizing cloud analytics also ensures business wide profitability.

The cloud-based software as a service approach can unify operations and management by utilizing the data streams of any legacy system with new devices that have the goal of offering customers "a single pane of glass" solution for building optimization. The evolution in building technologies is transforming the facilities management paradigm because of the insight generated by real-time data, analytics, and services. The new view into the facility and across the portfolio drives action that directly affects the bottom line. This evolution of building management solutions is presented in Figure 2.1 below.

Figure 2.1   Building Automation to Optimization
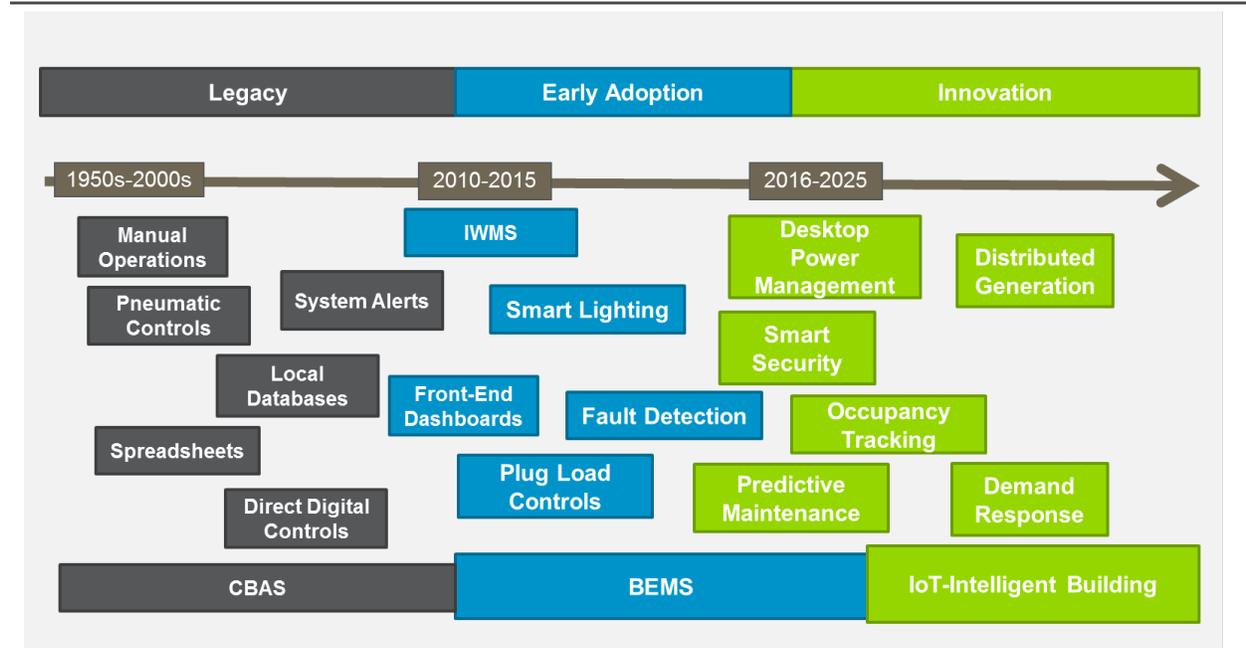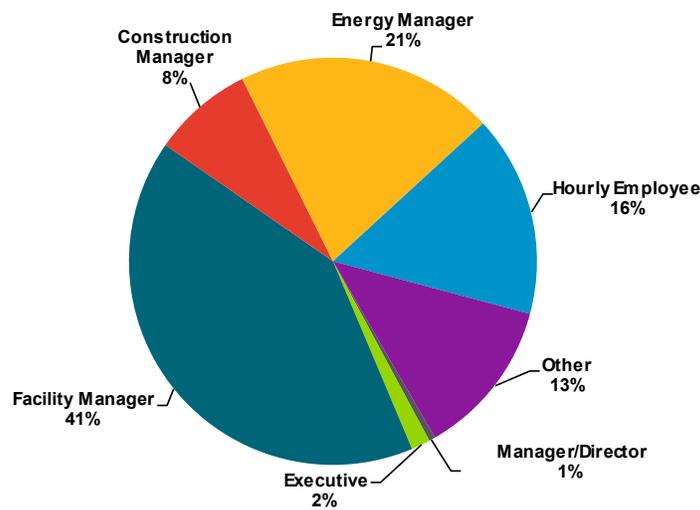

(Source: Navigant Research)

2.1   A Maturing Market

The goal of intelligent building technologies is to provide flexible, scalable, and customized tools that meet the distinct needs of different customers. Intelligent building optimization is achieved when comprehensive building energy management is supported by managed services that direct building equipment operations to reduce energy and improve repair and maintenance processes. The vision is a partnership through 24/7 data-driven analyst support for remote monitoring and alerts of equipment performance. Wireless sensors and cellular technology can monitor refrigeration, HVAC, lighting, and energy use, and this data is analyzed on an ongoing basis with cloud-based analytics. The market is beginning to mature, and more customers are utilizing intelligent building technologies to improve their facilities' performance and bottom lines.
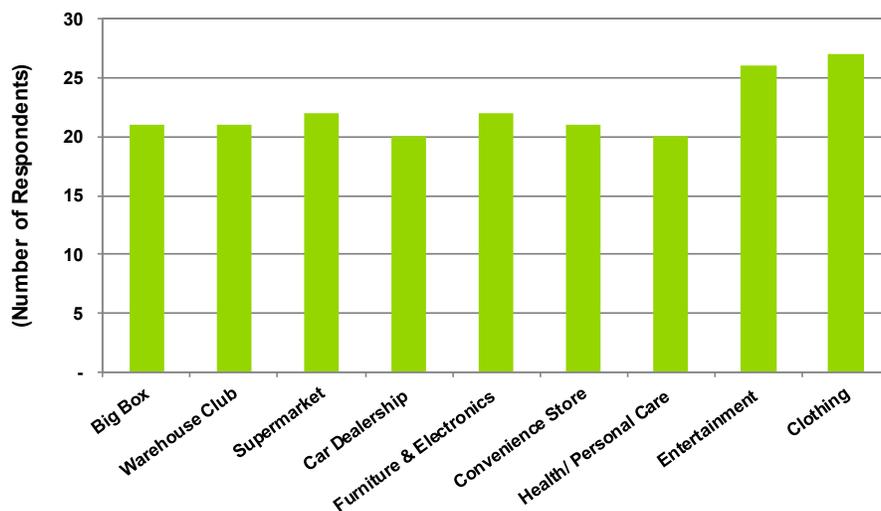
2.2 Customer Point of View

In November 2016, Navigant Research and Entouch launched an online survey of 200 stakeholders in the US retail market. The goal of this survey was to acquire perspectives on the market outlook for intelligent building technologies, new business models for energy management, and the leading business challenges for facility managers and infrastructure and operations executives. Respondents reflect the potential retail customer base across six main job categories and nine sub-segments, as illustrated in the charts below.

Chart 2.1   Retail Survey Demographics by Job Category

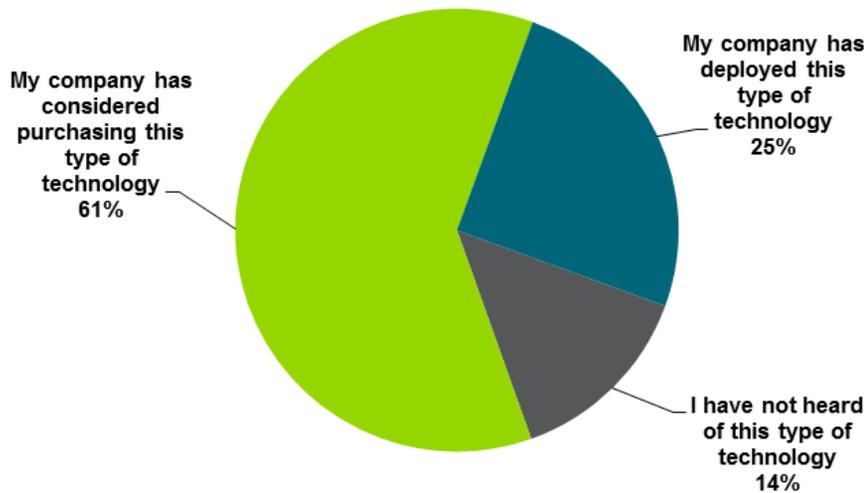*(Source: Navigant Research)*

Chart 2.2   Retail Survey Demographics by Sub-Segment

(Source: Navigant Research)

Survey respondents provided insight into the customer point of view and outlook on market adoption of intelligent building technologies. The findings validate Navigant Research's bullish outlook on long-term investment in intelligent buildings. The first point of interest is the broad awareness of the technology. Respondents were asked, "How familiar are you with Smart Building Technology for facilities management (IoT-powered devices and cloud-based software)?" As illustrated in Chart 2.3 below, less than 15% of survey respondents reported that they were unfamiliar with intelligent building technology.

Chart 2.3   *Customer Awareness of Smart Building Technology*

(Source: Navigant Research)

Furthermore, customers are not only aware of but interested in the technology. When asked to rate their interest in a comprehensive energy management and managed services offering, 44% reported to be "very interested" (with a ranking of 4 or 5 on a five-point scale). Another 32% scored their interest as a 3, which may indicate even broader opportunity with additional marketing, education, and outreach on the business benefits of these solutions. Today there is a chasm between the maturity of the market from a technology and user standpoint. Technology has advanced, especially with the development of IoT, to tackle complex challenges of data integration, real-time systems monitoring and alerts, and even control. Customers, on the other hand, may still struggle to understand how investment in intelligent building solutions will change their day-to-day jobs and help them achieve their most significant business objectives. The continued success of pilot programs and demonstration of impacts with early adopters will help promote investment and increase market maturity.

2.3 Diving into the Technology: Building Energy Management and Managed Services

The ubiquity of unstructured and real-time data streams has the potential to revolutionize business. Consumers expect technology to make their homes more comfortable, their schedules more productive, and their travel more efficient. The unyielding pressure to be connected is beginning to transform expectations for how commercial buildings operate. The challenge now is to align occupant and business expectations with customer realities.

IoT characterizes the ongoing technology evolution of devices, software, and services that transform commercial buildings into data-rich environments. IoT is conceptualized as a platform approach to data creation, communications, aggregation, and analysis; this is the next generation of the intelligent building. IoT creates a data profile—a comprehensive view of what is happening inside the walls of a commercial facility—to help business stakeholders make better decisions. The ability to translate data into information that resonates across business units and stakeholder points of view is what makes IoT impactful for operating commercial buildings. In other words, one IoT intelligent building solution can address big business pain points—energy efficiency for the head of sustainability, predictive maintenance for the head of engineering—while also generating enterprisewide KPIs for the C-suite. The data-driven operational insights help facilities management and engineering teams be more strategic with operations processes and budgets, which influence the executive KPIs while demonstrating their significance to the larger organization.

Customers are indeed looking for broad capabilities when considering intelligent building energy management and managed services—solutions that can support stakeholders across an organization. One of the objectives of the online survey was to identify the top three applications or functions of an intelligent building solution that could tip the scales for customer adoption. Respondents were asked "How valuable are the following capabilities for a building energy management offering?" The results reflect interest on a scale of 1 to 5, where 1 is "unimportant" and 5 is "extremely important." Rather than three specific capabilities that are far and away most valuable, customers are looking for flexible solutions with many benefits.

Chart 2.4   *Retail Survey Demographics, Job Categories and Sub-Segments*
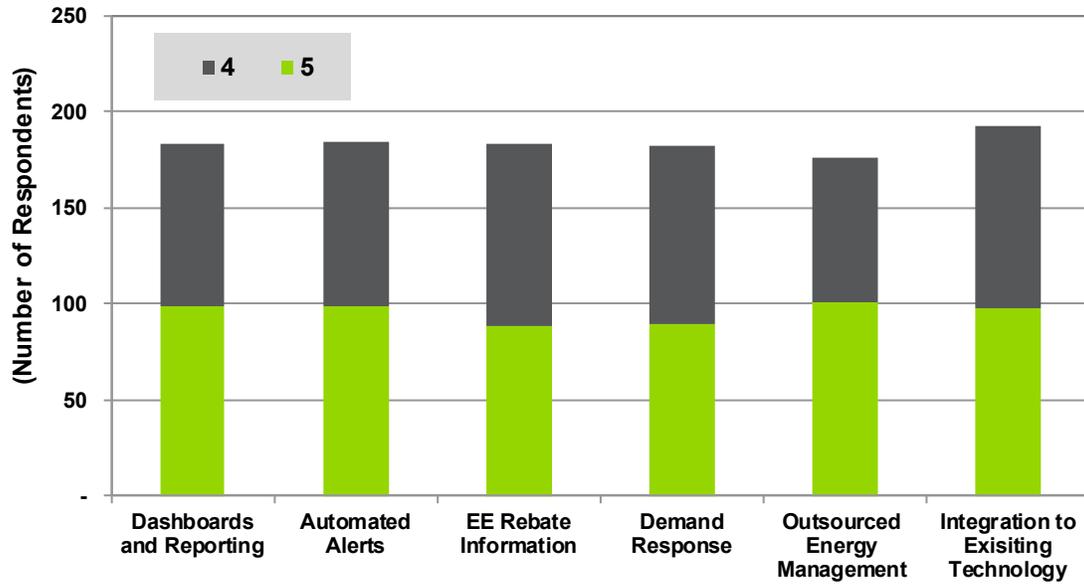
(Source: Navigant Research)

The results of the survey align with the development of the intelligent building IoT solutions available in the market. These technologies can be described in four main categories: visualization and reporting, fault detection and diagnostics, predictive maintenance and continuous improvement, and optimization. Some suppliers focus on one area of these offerings, while others provide more comprehensive solutions with multiple applications across several categories.

Figure 2.2   Intelligent Building Technology Offering Complexity
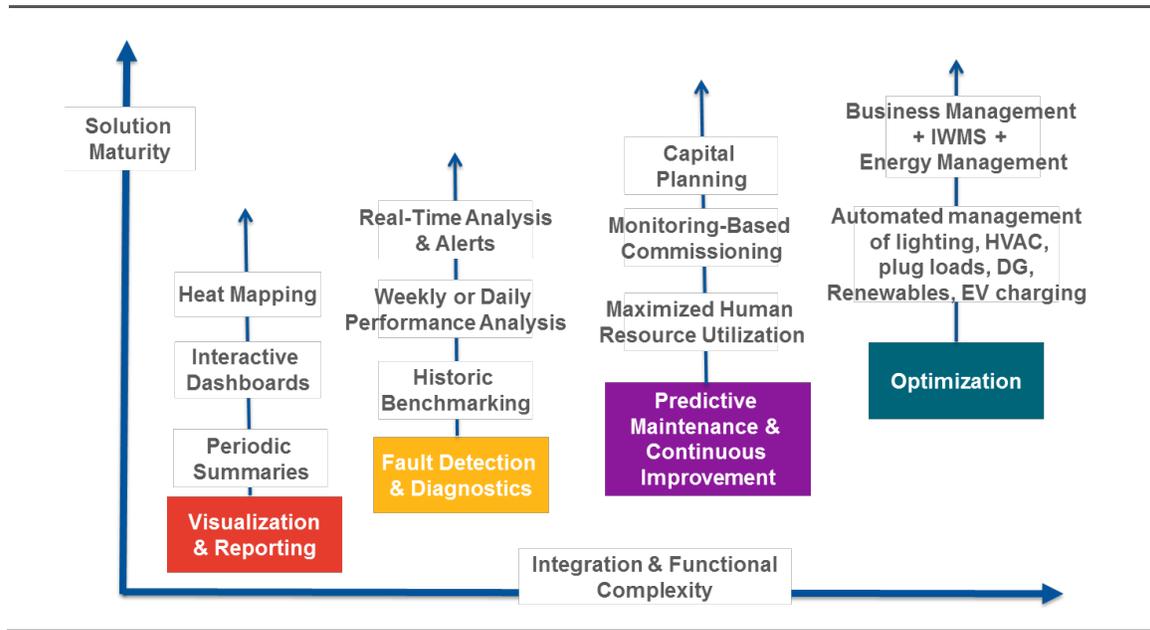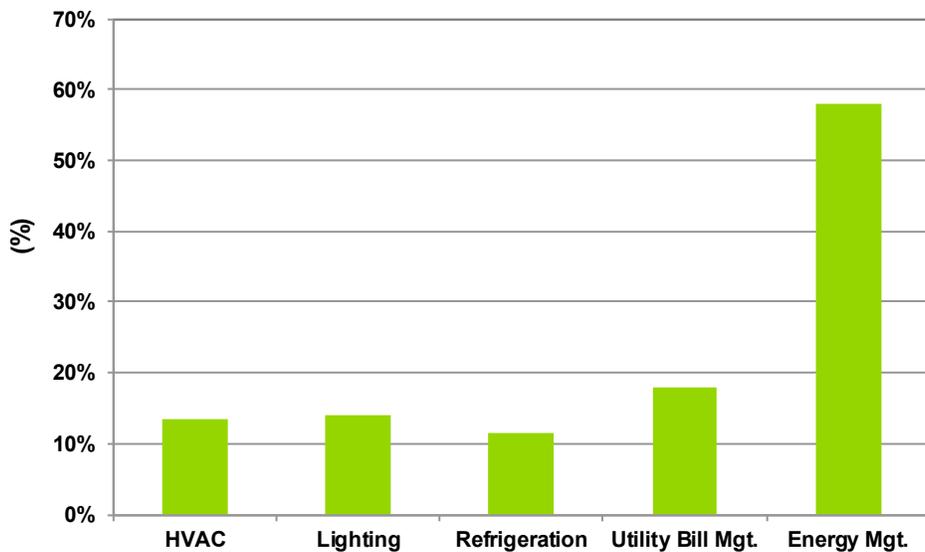

(Source: Navigant Research)

- **Visualization and reporting** provide benchmarking, heat mapping, interactive portals, and mobile apps. These tools can be customized to present customers with operational and energy data. The complexity of these offerings varies greatly depending on customer needs, spanning from a simple dashboard to graphical presentations of energy consumption across floor plans.

- **Fault detection and diagnostics** can be automated in some available intelligent building solutions. These systems focus on HVAC system alerts and software analytics for equipment management.

- **Predictive maintenance and continuous improvement** capabilities move operations and maintenance from a reactive process to a proactive approach. This segment of intelligent building solutions offers proactive system improvements and forecasting of financial scenarios. These offerings help streamline equipment upkeep and prioritize investment and retrofits.

- **Optimization**, the most sophisticated class of intelligent building solutions, implements a more complete strategy for energy and operational management beyond energy cost savings. Optimization can be applied to automated demand response, dynamic energy procurement, and peak demand management, which can be implemented in situations with smaller individual buildings that are part of a larger portfolio.

There is no one formula to define the combination of applications or capabilities to meet the needs of all customers. Expectations reflect the technical maturity of the customer and their business priorities and goals. In order to capture customer perspectives on outsourcing aspects of facilities management, the online survey asked respondents about various business objectives. The results below demonstrate a strong opportunity for energy management, but also continued pushback on surrendering control. Less than 20% of respondents communicate a high level of comfort with outsourcing control of their individual building systems. Alternatively, nearly 60% communicated strong support for outsourcing energy management. These findings underscore the message that energy management has been difficult. Facilities and operational staff have struggled to deploy and utilize the expensive and complex legacy control solutions. These personnel have the expertise to control and manage specific equipment types (e.g., HVAC and lighting), but need support in acquiring a cohesive vision for their whole building or portfolio, which is necessary for effective and successful energy management.

Chart 2.5   *Respondents Willing to Outsource Control and Management of Business Activities*

(Source: Navigant Research)

These results reflect findings from other Navigant Research reports and demonstrate the opportunity to position intelligent building solutions as partnerships for energy management and operational efficiency.

Section 3

STATE OF THE MARKET

As the intelligent building industry has evolved, so too have the value propositions for customer investment in intelligent building technologies. Vendors position their solutions in many ways. For example, energy efficiency is a universal benefit for intelligent building solutions because the associated utility cost savings provide a straightforward demonstration of return on investment. Beyond energy efficiency, there are a wide variety of business benefits from deploying data-driven energy management and optimization strategies.

Navigant Research suggests that the adoption of intelligent building technologies is driven by the broad business benefits of actionable insight. In other words, the data collected can provide business information in different ways to different stakeholders. One of the goals of the online survey was to test this idea and explore any specific pain points for retail customers that could help refine the value proposition to drive broader technology adoption. The results suggest there is no single issue (or even a list of three) that is far and away more influential in developing a value proposition of intelligent building technologies. Respondents were asked to rank the following business challenges on a scale of 1 to 5, where 1 is "not at all influential" and 5 is "extremely influential."

- Not enough maintenance staff

- Not enough visibility into operational info

- Too many systems in place

- Corporate reporting and sustainability goals

- Need to manage sub-billing

- Need to manage work orders

Each of the options received an average score of 3. What is even more interesting is that less than 1% of respondents scored any of the options as "not at all influential" or "extremely influential."

These results validate the assumption that there is not one driving factor, no silver bullet to move the pendulum on investment. The retail business is challenging, and there are many influences that determine success. Intelligent building technologies and services vendors will find success when they demonstrate broad capabilities and offerings. There is room to continue demonstrating value with pilots and case studies to help potential customers understand the business impact of energy management and optimization.

Section 4

INNOVATION FOR RETAIL

Navigant Research has found the business case that resonates with potential customers can vary by vertical and even by stakeholder within an organization. In retail spaces, maximizing the customer experience is paramount. Comfortable spaces that keep customers in stores equate to stronger bottom lines. A comprehensive intelligent building solution can deliver the necessary information to store managers, facility operators, and executives to proactively monitor and manage the customer experience.

4.1   Retail Case Study

Entouch offers customers a comprehensive, enterprisewide intelligent building solution and advisory services with 24/7 customer support. Technology coupled with account management provides remote monitoring and alerts from energy experts, which are informed by the data from wireless sensors and legacy data and controls infrastructure and communicated via cellular technology. Entouch monitors refrigeration, HVAC, lighting, and energy use, and presents this facility data in an online software platform available to the user and the Entouch advisory services team. The following Entouch case study illustrates how a nationally recognized retailer utilized intelligent building technology to reduce energy consumption by 20% and decrease operating costs.

A large lumber and building supply retailer was challenged to better manage its HVAC systems, which had been working overtime and were on the verge of failure. The retailer's facility management team determined that open receiving bay doors were one of the primary causes for spiking energy demands and failed HVAC equipment, but could not identify any pattern or rationale to flatten out the volatility in energy consumption, extend equipment life, and reduce costs. Initially, the retailer relied on a modest facility team and a legacy energy management solution to investigate the issue. The energy alerts were overwhelming and lacked insight, failing to direct any improvements in operations.

Entouch's remote sensors were deployed to monitor the receiving bay doors and provided immediate insight into the associated energy losses. For every alert triggered, the Entouch advisory services team notified the facilities manager at the site and tracked data patterns to identify operational issues leading to open doors such as scheduled shipments, delayed inventory stocking, delayed closing, etc. This information provided the retailer a record to model the open door effect on the store's energy costs.

Entouch provided insights far beyond tracking the bay doors, including:

- Analysis of energy usage, HVAC, and lighting system performance
- Data-driven insights for costs savings through energy efficiency

- Better resource planning, reducing truck rolls and visits from third-party HVAC and lighting technicians

- The consolidation of critical data and insights for accurate settlement and invoicing for sub-leases

After 1 year of deployment, the retailer is benefiting from a 20% reduction in energy use, which equates to over 1 million kWh, with an average reduction of 60,000 kWh per month.

This Entouch case study is illustrative of the benefits of intelligent building technologies for energy savings and business improvement. By deploying new sensors or integrating with existing data and controls infrastructure, IoT intelligent building solutions provide a unified view of operations within a facility and across a portfolio to optimize spending and management approaches.

Section 5

CONCLUSIONS AND RECOMMENDATIONS

Intelligent building technologies are changing the way retail stores are managed. Data can be collected through cost-effective wireless devices and transferred through wireless and cellular technology for analysis that informs building operators and executives about energy use, comfort, and even traffic flow. Energy efficiency has been the foundational use case for intelligent building solutions because these improvements provide metrics for tracking return on investment. As the market continues to mature, more nuanced and sophisticated use cases are helping to engage more customers and increase investment.

The following recommendations from the results of the Navigant and Entouch survey can help promote the broader adoption of intelligent building solutions:

- Focus marketing, education, and outreach efforts on the specific pain points and objectives of each target customer segment. In retail spaces, showcase benefits beyond energy efficiency that improve the customer experience.

- Utilize existing technologies to ensure that new investment delivers better information, not just more data. There is a wide range of existing infrastructure and tools that retail store managers and executives rely on to manage their facilities and businesses. Leveraging the data these systems can provide from the initial engagement to minimize capital costs and focus on customer priorities.

- Provide flexible solutions that can scale with the customer journey. Many preliminary engagements may be most successful if the deployment targets data aggregation and presentment—even simple reports and dashboards. However, Navigant Research has found that as customers work with intelligent building technology partners, they demand more sophisticated solutions over time. The ability to scale and offer more complex analytics and capabilities over time can ensure ongoing engagements and the development of a trusted advisor relationship.

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