SMART BUILDINGS AND THE INTERNET OF THINGS: A NEW CONCEPT OF OPERATIONS AND OCCUPANT EXPERIENCE

Given the millions of media mentions about the Internet of Things (IoT), it's no surprise that many people hear only a buzzword, a catchphrase. Even Gartner, the global research firm, devoted one of its so-called "Hype Cycle" reports to the IoT.

However, the impacts of a new technology are commonly overestimated at its outset, then underestimated as the technology matures and bears real-world benefits. For commercial buildings, the IoT is now creating new levels of operating efficiency. But it also promises a new business model for enhanced space utilization, occupant experience and business productivity.

Like the smart cellphone has done to the idea of the telephone, and the self-driving car will soon do to the idea of the automobile, IoT capabilities will transform buildings into workplace assets that contribute much more to the success of the businesses that occupy them.

But how is the IoT in a building defined? And how is it different from a building automation system (BAS)?

BAS VS. IOT-ENABLED BAS

A BAS is a computer-based management system installed in buildings to monitor and control building systems (mechanical, electrical, plumbing, lighting, security, fire/life safety, etc.). The early versions of these systems were focused largely on energy management and offered varying degrees of integration and communication across building systems.

In simple yet accurate terms, the IoT-enabled BAS has similar core capabilities as a conventional BAS. However, its functionality is broadened and deepened due to the integration of building systems on an IoT platform (Figure 1). The IoT platform offers a greater level of intelligence, connectivity and efficiency across both building systems and business enterprise applications.

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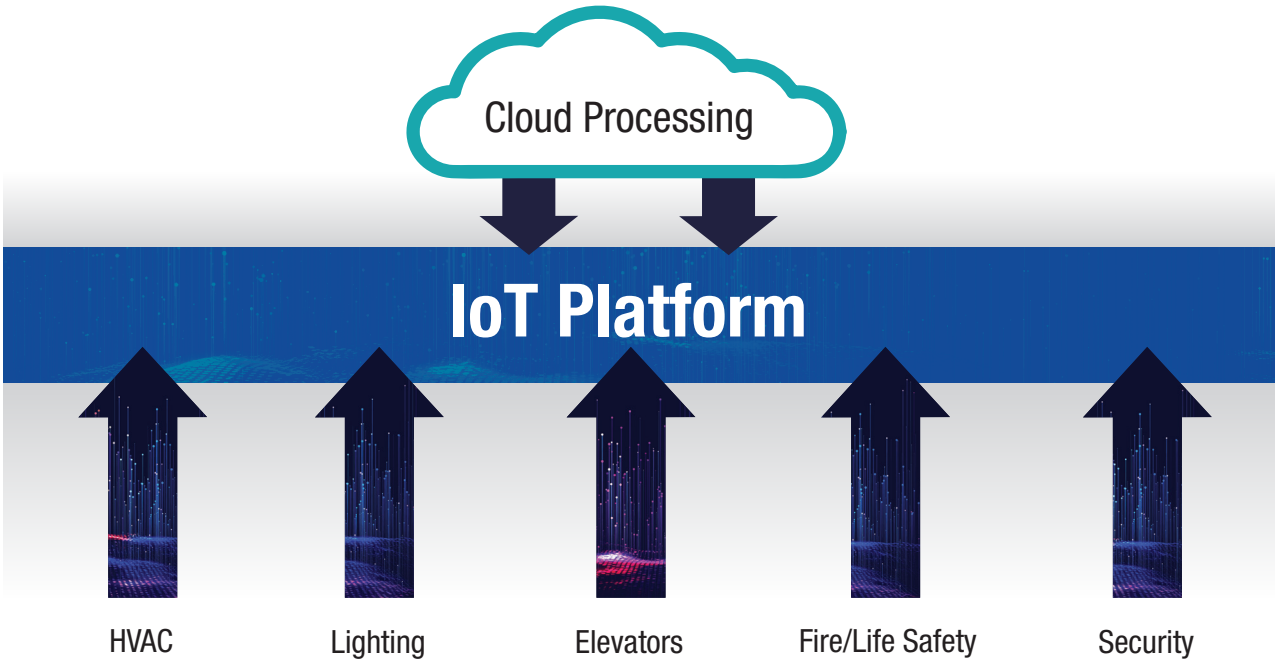
FIGURE 1

IOT PLATFORM ENHANCES BUILDING AUTOMATION

The IoT platform integrates data points from each building system and enables additional analytics and processing in the Internet cloud.



The platform enhances real-time data analytics, space utilization tools, machine learning, predictive maintenance schedules and sophisticated remote, mobile and personal building controls. In addition, IoT allows communication conversion protocols (BACnet, Modbus, LonWorks), which permit multiple software apps to share and act on the same data (Table 1).

TABLE 1

EXPANDED CAPABILITIES OF IOT-ENHANCED SMART BUILDINGS

An IoT platform can expand existing automation capabilities while adding new ones.

Traditional Building Approach	Smart Building Approach
Wired infrastructure	Wireless infrastructure
Monitoring	Smart sensoring
Historical system data	Real-time system data
Preventive maintenance	Predictive maintenance
Energy management	Whole-building occupant experience
The building viewed as a physical asset	The building viewed as a business asset
Start-up commissioning of building systems	Continuous commissioning of building systems
Onsite building management	Remote building management
Building operations	Building occupants
Zone temperature control	Personal temperature control
Lighting to illuminate occupants' tasks	Lighting to enhance occupants' cognition and productivity
The building as a shelter for the workforce	The building as a factor in workforce wellness and productivity
Onsite data analytics	Data analytics in the cloud

LEVERAGE BUSINESS RESULTS WITH IOT

To achieve success, businesses must focus continually on top-line and bottom-line results. Few tools help with both results, but for commercial buildings, IoT-enabled applications can impact all components of total occupancy costs: building efficiency, space efficiency and people efficiency.

JLL (formerly Jones Lang LaSalle), the global real estate services firm, has incorporated these three components into a pyramidal model of occupancy costs (Figure 2).[1] In the 3-30-300 model, utility costs average $3 per square foot annually, lease costs are $30 per square foot, but occupant costs (salaries, benefits) swell to $300 per square foot.

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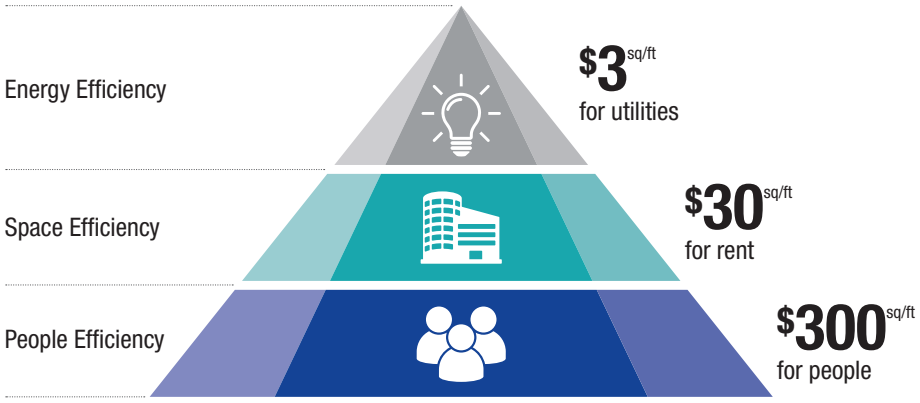
[1]JLL, "A Surprising Way to Cut Real Estate Costs." www.us.jll.com/en/trends-and-insights/workplace/a-surprising-way-to-cut-real-estate-costs

For more on how the IoT-enabled workspace can energize the workforce, see **Driving Productivity with Occupant Wellness**

FIGURE 2

THE THREE COMPONENTS OF TOTAL OCCUPANCY COSTS

Source: JLL



While the absolute dollar values for your building may be different, the order-of-magnitude relationship among the three components is likely to remain similar – which is to say, space costs are typically 10 times greater than utilities costs, and people costs (i.e., employees) are 10 times greater than lease costs.

The pyramid model can be used to calculate strategies for reducing occupancy costs. For example, JLL estimates that a firm with total occupancy costs of roughly $60 million (i.e., $540,000 for utilities, $5,400,000 for office lease and $54 million for employees) could anticipate the following savings from improvements in people efficiency:

- $1.50 per square foot annually if employee absenteeism fell 10%
- $11 per square foot if employee retention increased by 10%
- $65 per square foot if employee output rose 10%

Some building improvements can have a positive impact on one level of occupancy cost but a negative impact on another. For example, the benefit of an energy efficiency initiative could be negated if it created temperature discomfort that reduced employee output. The 3-30-300 model helps managers to evaluate the impacts of varied building improvements.

Firms should expect their workplaces to realize their full potential, just as they expect their employees in those workplaces to realize their full potential. IoT-enabled buildings help firms to focus on employee outcomes and not just on utility costs and space costs. ■

For more information on the occupant experience in IoT-enabled buildings, click on other articles in this series.

1 Smart Buildings and the Internet of Things: A New Concept of Operations and Occupancy Experience

2 Smart Sensors: The Roots of Building Connectivity and Intelligence

3 How to Quantify the Bottom-Line Value of Occupant Experience

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Siemens is the sponsor of this research project.