



**HARVESTING
DATA HELPS
IMPROVE
BUILDING
PERFORMANCE**

Honeywell

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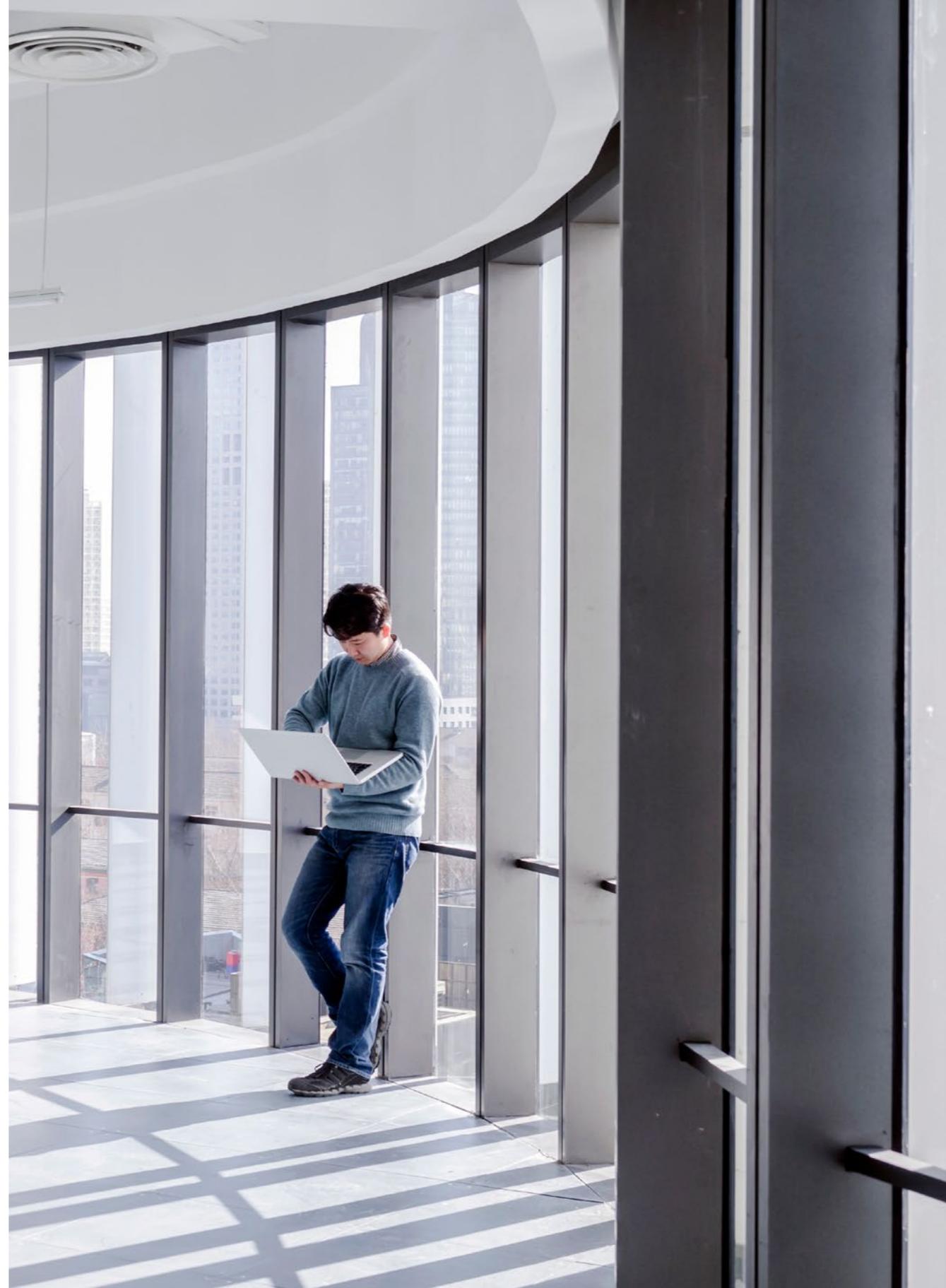
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HARVESTING DATA HELPS IMPROVE BUILDING PERFORMANCE

Facility managers have gigabytes of data available to them — even in buildings that might not be considered “smart.” With the burgeoning growth of the Internet of Things (IoT) and Big Data applications — for everything from the average building occupant’s laptop and smart phone to the refrigerator in the break room — information that can further the optimization of a building operations, improve comfort, reduce real estate and operating costs, and extend the life of expensive equipment is increasingly available.

But few facility managers are fully taking advantage of the data their buildings can provide. One challenge is pulling together data so that it can be used to its full potential. Tapping into data already housed in separate silos such as HVAC, lighting, access control, video surveillance, and fire/life safety can be difficult for those without advanced degrees in computer engineering.

And simply having data available isn’t enough. The real benefit comes from transforming that raw data into action. Today, facility managers have many options for both getting access to data and then making it actionable, using tools such as integrated systems, analytics, advanced automation and sophisticated maintenance strategies.





MISSED OPPORTUNITIES FOR USING BUILDING DATA

To understand the potential value of data in buildings, it's worthwhile to look at how buildings typically use data today. Many facility managers of large buildings or campuses already obtain building data from thermostats and other HVAC sensors. A building management system (BMS) can then use this data to control HVAC subsystems to help optimize comfort and energy efficiency.

Security and access control are also rich sources of data. Video surveillance systems, for example, are often invaluable for security, fire/life safety, and assessing incidents.

Traditionally, HVAC and security systems remain in separate silos. That's often a missed opportunity. Consider the power of data from security systems when it is pulled into the BMS. Surveillance and access control systems can track the movement of people throughout the building or across the campus. When these functions are integrated into the BMS, they also can provide useful facility optimization data that can assist in improving space planning, occupant comfort and productivity, and tenant satisfaction, as well as energy savings and sustainability goals.

Breaking down siloes can pave the way for facility managers to take advantage of a growing range of powerful tools to gather and analyze data. A new generation of building Internet of Things sensors, working in tandem with existing building systems, mean that facility managers can tap into a wealth of information about actual building performance. And with smart edge devices and cloud-based analytics, facility managers can turn that stream of data into actionable information.

Fault detection and diagnostics, for example, can help zero in on problems that would otherwise remain hidden; potential cost savings can be significant.

Data visualization is typically another valuable analytical tool. Dashboards can provide at-a-glance information that enables facility managers to spot signs of underlying problems and tackle them quickly.

This new generation of tools enables facility managers to better take advantage of building data to help reduce costs, enhance comfort, and minimize premature equipment failure.

The growth of IoT is another opportunity for facility managers to obtain data that can be used to enhance occupant experience and potentially right-size commercial real estate. Operators of large buildings and campuses are increasingly deploying navigation technology that uses indoor positioning systems. These systems can help building occupants or visitors find their way around by using a network of Bluetooth beacons. This same data can help inform decisions about what kinds of space — and how much space — are really needed.

People and asset location tracking can also allow a user to alert a facility staff about a maintenance issue, such as when restroom facilities are not meeting desired hygiene standards and need attention from the cleaning staff.

A key to the new thinking about using building data is the growing recognition that the cost of salaries often far outweighs the cost of energy or leasing costs. Building data can be used to improve occupant experience, and therefore help support employee retention and recruitment and to enhance productivity. The good news is that building data can also help reduce energy and other operating costs and to optimize real estate costs. The bottom line: Data can help both improve occupant experience and reduce costs.

OCCUPANT DATA LEADS TO MORE INFORMED DECISIONS

There are plenty of ways that more effective use of building data can help facility managers improve occupant experience. Consider the question of how much a particular space is actually used. Building occupants may complain to each other about problems in high-traffic areas, such as excessive noise levels or inadequate cooling or air flow. But only a small percentage will actually provide feedback to building management, so facility managers either get such information too late or, worse, not at all.

Conversely, some spaces are likely to be underutilized, a waste of valuable real estate. In fact, Honeywell research shows that a significant level of commercial space is currently underused.

The challenge of understanding space use is even greater when space is repeatedly reconfigured, whether that happens in a medical center, a university, or a Class A office building. Here, again, data can help. Rather than relying on mere physical observation and “guesswork” as the basis for decisions, facility managers can examine data captured from a variety of sensors. They can use that data to make more informed decisions on everything from maintenance and cleaning scheduling to the optimum number of desks in a given area — even the



best place to put a water dispenser. And knowing exactly where and when people congregate can allow savvy facility managers to often reduce building overhead if they base decisions on reliable data from a centralized network with building management software.

Every building is different, of course. A museum’s goal may be to ensure a great experience for visitors while maintaining environmental conditions within strict limits to help protect valuable artifacts. To do that, the building systems have to help facility managers react to changes ranging from the weather to the number of visitors. Clearly, the specific challenges are different from the issues that may arise in an office building. Nevertheless, the value of data to predict problems, proactively manage schedules, and guide action is common to both, indeed all, types of buildings.

Another way to get actionable insights is to offer employees, students, patients, guests, or tenants a way to provide feedback via a rating system — perhaps through an IoT application they already use personally for their building experience.



HOW MUCH DATA IS TOO MUCH?

The last thing a facility manager can afford is to be inundated with data that impedes rather than aids decision making. A torrent of alerts and alarms, reports and notifications can bog facility managers down, rather than helping them to improve occupant experience or reduce costs.

Today, powerful analytics can help facility managers make better sense of data by helping to spot trends and forecasting problems. Data modeling can be used to enable predictive maintenance. For example, monitoring air flow and pressure and temperature changes over time may show that a filter is developing a problem and needs to be replaced before a serious issue arises.

So how should a facility manager get started on the road to more effective use of data in an existing building?

- One key step is to identify the sources of data in a building. Here it's important to think beyond siloes. For example, in addition to data from the HVAC, lighting, and access control systems, consider what might be available from the video surveillance equipment. The use of analytics may enable data from the latter to be used in ways that a facility manager might not have thought of.
- Another jumping off point is to take a look at a typical day in the lives of building occupants, from the time they arrive in the parking structure, to their entry into the building, to finding a space, to booking a room for a meeting. What are their friction points? What problems are they struggling to manage? How can facility data be used to save occupants time?

With this information, a facility manager can begin working with a trusted advisor to identify ways that data can help to improve occupant experience and building performance. A system design review is often a useful way to flag pain points and identify places to improve visibility into system performance. This top-down perspective can help facility managers see how current systems and subsystems fit together and to find opportunities to break down siloes. An asset improvement plan can provide a structured way to move forward with equipment upgrades that may be required to optimize the use of data.

FROM SILOES TO ACTIONABLE INFORMATION

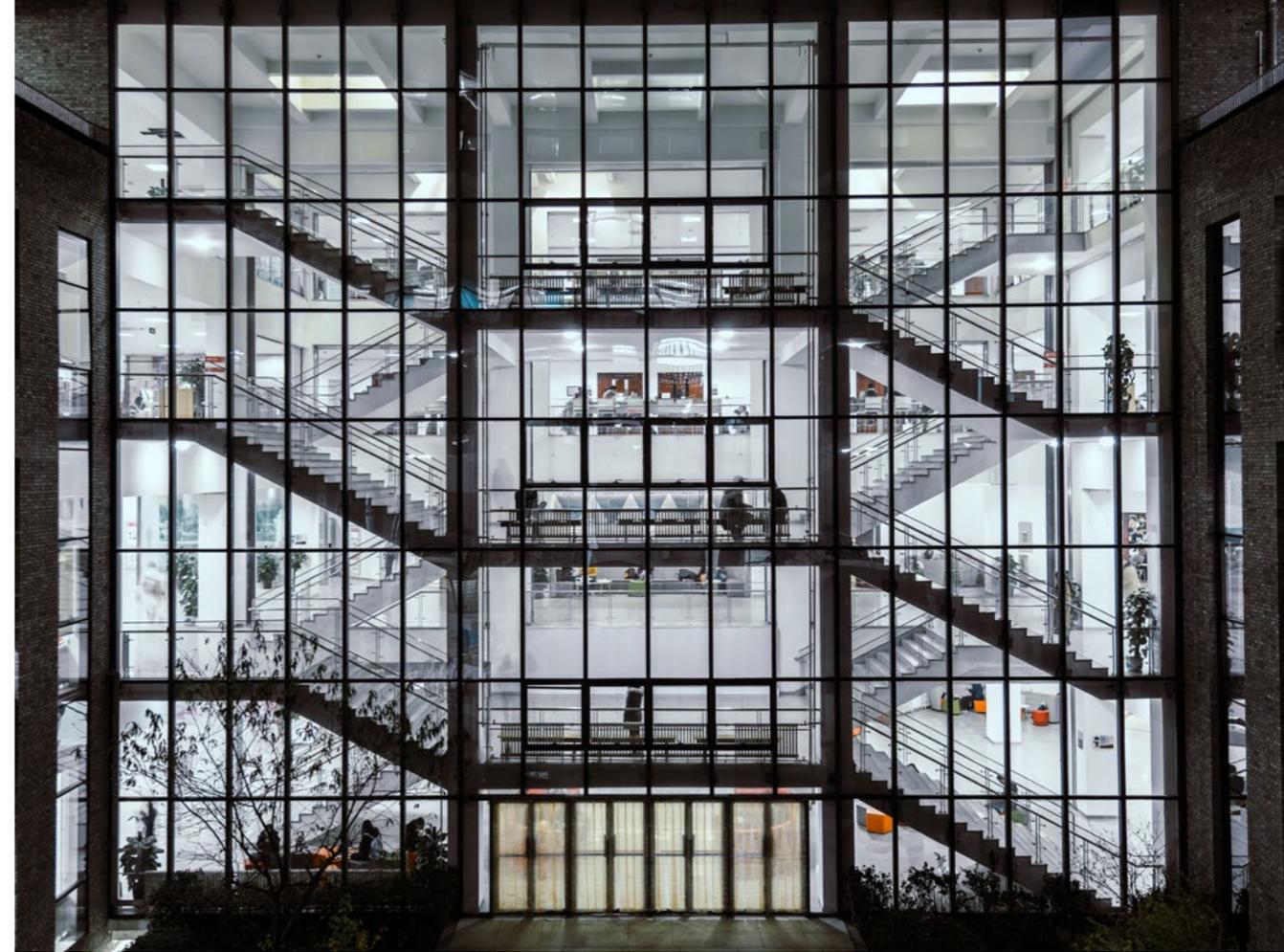
While most buildings have incredible amounts of data available, tapping into that data in a useable format can be difficult, even with open standards and protocols. How much or how little information such products actually share can vary from one vendor to another, even for similar pieces of equipment.

Some building systems offer more data, while others, such as those for lighting, often use proprietary systems, which sometimes make useable data more difficult to extract. Some legacy equipment also may still operate with proprietary systems.

For building owners interested in harnessing the power of this data so that they can have near real-time control of their existing buildings, these details can be daunting.

One solution to help with this situation is to connect disparate building systems to a universal network with integrated building management software like Honeywell's Enterprise Buildings Integrator (EBI), that can handle thousands of data points easily and is scalable to accommodate future technologies.

The integrated building management system platform is the core of the system. Then, preventative maintenance software can help



optimize building systems and subsystems and even generate an alert when a specific damper is stuck open or closed, compromising outside air changes, or when a chiller is drawing power outside its operating parameters.

The centralized control software suite allows disparate functional data — such as fire/life safety, access control, security — to be combined and presented in the same window as building systems data. Also part of that suite is a digital viewer program that combines CCTV into the package. All this data can be accessed via a smart phone or tablet in near real-time, even when you are on the other side of campus.



DATA ANALYSIS, PLANNING YIELD MULTIPLE BENEFITS

Volkswagen's Autostadt in Wolfsburg, Germany, recognizes the value of building data — and has the results to prove it.

Autostadt is one of the world's largest automobile distribution centers, delivering up to 500 vehicles to customers daily. The 69-acre campus is probably best recognized by its fully-automated twin car towers. Since its initial construction in 2000, the campus has undergone

periodic improvements focused on ambient air-quality upgrades and increasing lighting functionality. In 2016, Honeywell and Autostadt decided to analyze the potential for building optimization. Armed with key performance indicators and a clear understanding of investment costs and long-term savings, Autostadt began executing its staged migration plan toward digitalization and connectivity between buildings.

Their building management platform collects building system data and delivers continuous optimization options. With this BMS in place, the facility team now were ready to implement the first projects.

With Honeywell's assistance, it was important to Autostadt to proceed step-by-step, to set small targets, and also to wait for initial results that would allow them to apply further fine tuning.

The first buildings requiring attention were the two landmark Car Towers, which, at 158 feet high, act as beacons in the night sky. The fully-automated parking garages provide safe storage for 800 cars and can deliver up to 500 cars daily to waiting customers. A critical element of the value of the car towers is their fully glazed, cylindrical, steel skeleton construction, which offers a view of virtually all the action inside.

When the towers first opened, the windows tended to fog because vehicles entering the structures were very warm in the summer and cold in the winter. The initial correction was to keep the towers at a relatively constant 72 degrees F to prevent the fogging. Unfortunately, maintaining this constant temperature was using considerable energy.

After analysis of climate data from temperature and moisture sensors placed at strategic points in the two structures, the baseline temperature was set at 59 degrees F; upon further study, that temperature was reduced to 57 degrees F. Now, to address the prior fogging issue, the heating system kicks in only when the inside temperature reaches 57 degrees or when a surface temperature measuring point registers 90 percent humidity. Once optimum interior climate conditions are met, the system switches off.

The final report held another surprise. The initial analysis showed about \$39,000 in expected annual energy cost savings, which was a 21% savings on the previous \$190,600 in annual energy costs.

But, in the 12-month period following commissioning, the actual energy savings was \$78,500 – a 41% annual reduction. In terms of carbon dioxide emissions, this represented a reduction of 460 tons annually in contrast to the initially expected value of 308 tons.

After this success, additional improvement projects are also underway. The expansion of connectivity continues as part of a building optimization and digitalization program. Data from 37,000 data points already are being gathered by the EBI system. Roughly 23,000 of these are hardware points at field level. According to Honeywell, the collaboration between the two organizations worked the way Autostadt would imagine a professional relationship should – at eye-level.

CONCLUSION

The use of data often presents an opportunity to help raise your large building or campus to its optimum potential in terms of occupant comfort, space utilization, preventative maintenance and energy conservation. An effective strategy typically pulls together data from a range of building systems, as well as IoT devices, to address pain points and improve visibility into building performance. The ultimate result can be highly-utilized spaces and highly-engaged employees.

As a global leader in building, security and life safety management solutions, Honeywell can provide integrated design, installation, maintenance and service, as well as ongoing optimization as your change or technology advances. Its buildings team can share extensive expertise to best help your buildings achieve their desired potential on many levels, as they did for Autostadt.



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