

Buildings of the Future

Sustainable | Resilient | Hyper-efficient | People-centric

# A guide to creating healthier buildings: Where wellness and productivity intersect

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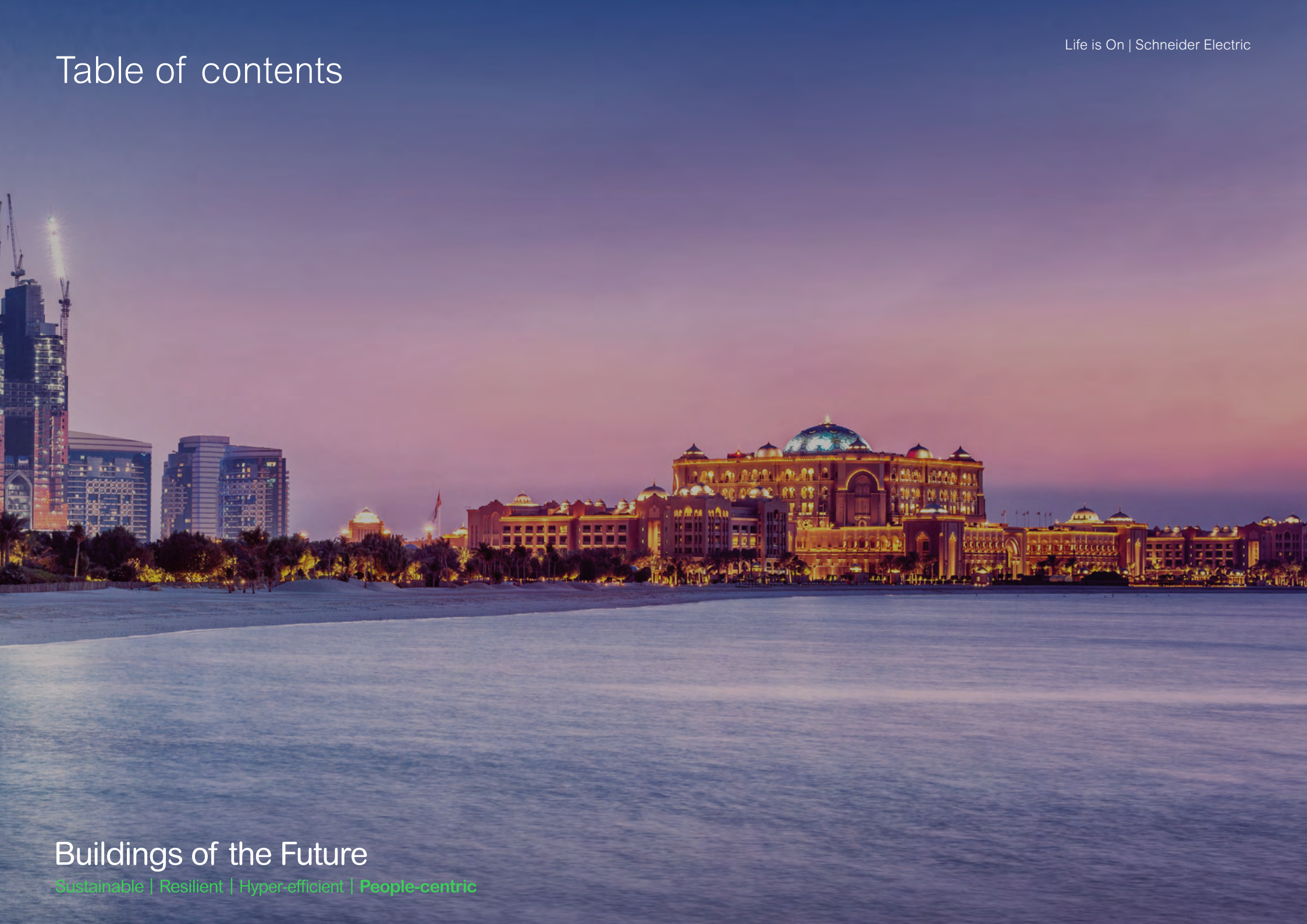


Life Is On

**Schneider**  
Electric



# Table of contents



## Buildings of the Future

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# Introduction



*“The future of buildings is smart...key trends [include] air quality monitoring, the importance of cybersecurity, occupant control, focus on wellbeing, predictive maintenance, evolution of BMS.”*

*-[Blue Future Partners](#)*

# Introduction

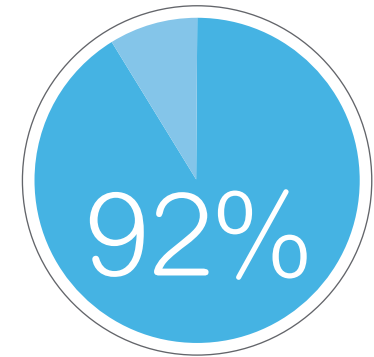
The global pandemic has presented building owners and operators with a unique set of challenges. During lockdown, many buildings have had to be maintained with limited access. As employees and tenants return, the 'new normal' demands new steps to provide a safe environment. Businesses need to find ways to maximize productivity while continuing to control costs and meet sustainability goals.

While the current crisis has given us many challenges, it has accelerated the transition to a healthier, smarter workplace. Building stakeholders are realizing the short- and long-term importance of occupant well-being, occupant engagement, space management, and operational efficiency. They are also recognizing the crucial role a smart building plays in supporting these goals.

Through the integration of a digitized infrastructure with smart apps, cloud-based analytics, and expert services, building teams now have the tools to:

- optimize indoor air quality and HVAC efficiency
- empower employees with information and control
- make a safer, more responsive workplace
- optimize operational efficiency
- drive operational resiliency

This evolution defines the great importance of transitioning to [Buildings of the Future](#), buildings that surpass the demand for a healthier and more connected environment, while enabling the hyper-performance and flexibility that will continue to be in demand for decades to come. This guide offers a deeper look at the solutions that make these exciting possibilities a reality.



of real estate companies plan to maintain or increase their tenant experience-related technology investments.

-[Deloitte](#)

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## CHAPTER 1

# The return to workplace is happening. Is your building ready?



*Workers' thoughts on workplace reopening:  
Only 17% of workers feel very comfortable  
returning to their workplace. 29% of  
workers fear that their colleagues won't  
adhere to safety protocols.*

*—[The Conference Board](#),  
[September 2020](#)*



# The return to workplace is happening. Is your building ready?

In recent months, businesses and organizations of all kinds have been forced to keep employees at home, with their facilities left at low or no occupancy. The lockdown has put stress on families and the economy. In many regions, restrictions are being relaxed by some degree, enabling many businesses to restart. Employees are eager to reunite and collaborate with colleagues, while regaining access to office-based tools and resources.

However, it won't be business as usual. Under the 'new normal', organizations need to provide an indoor environment that is healthy and keeps people informed. At the same time, the business needs to be productive and sustainable, while operations are managed efficiently.

In some cases, these may initially seem like competing goals. The key is to simultaneously keep the occupant experience, the business, and the operation in balance by applying the right technological tools. What should you focus on?

## Occupant well-being

A smart application continuously collecting sensor data can be used to monitor the health of every zone of the indoor environment.

For example, humidity can be tracked to ensure optimal levels recommended by ASHRAE and the EPA. Adequate air circulation across the building can be confirmed, while CO<sub>2</sub> and volatile organic compounds (VOC) levels are monitored where employees gather. This data can be fed into the building management system to adjust settings as necessary.

Tracking occupancy and under-desk sensor data can also be used to ensure cleaning crews clean the right places at the right time, while VOC monitoring can indirectly confirm cleaning has been adequate.

## Return to workplace: 4 areas of focus

1. Occupant well-being
2. Space management
3. Occupant engagement
4. Building operational efficiency



### Space management

Businesses need to comply with new safe distancing rules. At the same time, it's important to adapt space so that people can work efficiently. Digitization can help.

Occupancy sensors can track how many people are in a given area, as well as what spaces are being used and how. Occupancy thresholds can be set and used to control access to floors, rooms, or common areas like a cafeteria. This can help avoid overcrowding and keep occupants distanced.

Usage pattern data on individual and collaborative spaces can also help office and facility managers optimize office layouts and adjust interim policies for use of specific areas.

### Occupant engagement

With employees or tenants no longer constantly in a building, it's important that the building owner or facility management team have an effective way to communicate how space can be used.

Mobile apps can help keep everyone informed about company updates and information about workspace usage or changes. Employers can set up selective notifications based on roles or teams.

This same smart technology can also give occupants access to digital tools to, for example, find parking, reserve a meeting room, or learn about community events.



There can also be tools to help people navigate the office under new policies, knowing where there is available space, and helping avoid areas that may currently be over-occupied, such as lineups in elevator lobbies.

### Building operational efficiency

While occupant safety is a top priority, it's also important to maintain building and operational efficiency. Once again, connected technology can help.

By analyzing target versus actual occupancy levels, setpoints for HVAC can be adjusted where needed to reduce energy consumption. Equipment analytics can compare HVAC performance against design specifications to verify proper operation, while airflow, pressure, temperature, and humidity are monitored to maintain a healthy work environment.

The efficiency of facility personnel can be improved by reducing the number of site visits. This can be accomplished in two ways:

- **Remote monitoring** and automated fault detection can reduce the need for preventative maintenance checks.
- **Monitoring and comparing** the real world performance of HVAC equipment against a 'digital twin' will identify when and where intervention is required. Using remote root cause analysis and problem correction can fix about 80% of problems.



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## CHAPTER 2

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# How HVAC and IAQ optimization supports healthy buildings now

# How HVAC and IAQ optimization supports healthy buildings now

Recent events have made it clear to building owners and operators providing a healthy indoor environment for employees, customers, and all other occupants is critical. A building management system (BMS) will play a key role in providing clean, healthy air as well as thermal comfort. A BMS that doesn't work correctly will have a negative effect on the air quality inside of the building.

Facility teams should follow a formalized, structured set of best practices to make sure the BMS is working properly, and that indoor air quality (IAQ) and thermal comfort are optimized. A combination of newest technologies and services can help facility teams simplify these requirements and make sure that the right choices are being made to provide a healthy and energy-efficient building for returning occupants.

## Audit and assess

The first step is for the site to be thoroughly audited and assessed. The audit will create a 'map' to define current capabilities, identify gaps, and list specific agreed actions for the building owner, manager, and any contracted services.

It is during this audit that the capabilities of the ventilation system should be analyzed so it can be determined if it can be adapted to meet the latest recommendations from organizations such as ASHRAE, including:

- Promote an increase in minimum of fresh air levels
- Limiting recirculation and some heat recovery systems
- Introducing higher grade filters, e.g., MERV-13 (EN-F7) and MERV-14 (EN-F8)
- Closer monitoring and control of humidity (between 40% and 60% rH)

All of these recommendations need to be considered and thought through. It is during this stage that collaboration is essential with other experts and your controls provider to make sure the control strategy and desired goals are achievable.

## How to optimize your BMS for cleaner air

1. Audit and assess
2. Update sequences and recommission
3. Monitor occupant well-being



### Update sequences and recommission

Once the audit has been carried out and the strategy agreed upon, the controls logic will need to be modified. New control setpoints for airflow will be provided after the system has been balanced. Changes in sequencing of dampers will be needed, along with new alarm thresholds, etc.

It is recommended to provide a global function as part of the controls sequence changes. This will allow the ventilation system to operate in a 'new normal' mode, but also revert back to 'normal' mode as needed.

This new mode will allow for:

- Maximizing the amount of fresh air coming into the system (ASHRAE recommends two air changes per hour of outside air) and limiting recirculated air from occupied spaces.
- Limiting demand control ventilation – i.e., occupancy and CO<sub>2</sub>-based control – for ventilation systems, as it is more important to provide the target air change per hour to benefit public health. It is important to still monitor and

log occupancy and CO<sub>2</sub> so more insights can be gathered and the system optimized over time.

- Adjusting the airflow requirements – e.g., controlling via variable speed drives – to meet the required air change rates for the space and adjusting air supply volume (within limits) to take into account the impact due to filters becoming dirtier.
- Limiting users' ability to change or override the BMS. Stricter controls are recommended regarding who on the facility team has permission to control setpoints. Any changes should be carefully coordinated with management with consideration for impact on infection control.

At this stage, recommissioning of the systems will bring multiple benefits. This can include simple energy efficiency savings. But it will also ensure proper operation of control signals and control sequences, and making sure variables are being logged and trended. These checks will ensure the system is working optimally.

It's also worth thinking about taking this opportunity to connect the BMS to cloud-based analytics, where advanced fault detection can be provided to ensure the systems continue to work as designed.

### Occupant well-being monitoring

Employees want to feel confident that the facility is kept at an optimum level of air circulation when making the choice to return to work. Advances in sensor technology now make it feasible to bring a full-comfort '360 view' to the forefront. This will help building managers to make decisions and be proactive. It will also help bring transparency so that occupants and employees can see that the facility has been transformed to a safe workplace.

Some of the technologies that can be used include:

- Simple-to-install, battery-powered IoT sensors that measure key comfort parameters such as: temperature, relative humidity, CO<sub>2</sub>, volatile organic compounds (VOC), light levels, etc. These sensors push data to a central aggregator with cellular connectivity. Data is collected

over time to help generate deep insights and a record of IAQ in the building.

- Building managers can use this data to cross-check comfort and safety conditions, for example, is humidity across the building is being maintained within ASHRAE guidelines for 40 – 60% to reduce the risk of infections. Monitoring can also detect if excessive cleaning is causing an unhealthy rise in VOC levels, or if lack of proper air circulation in some areas is causing CO<sub>2</sub> build-up.





- Remote advisory services can help rank each space on the various factors of IAQ impacting comfort. This can help the facility manager simplify the identification of spaces or areas needing attention. IAQ parameters will be recorded so that changing conditions over a typical day can be tracked and analyzed.
- Sensor data visualized and analyzed by advisory services can be fed to an employee engagement platform. Using a kiosk or mobile app, employees can access comfort scores for the building or a floor, helping ensure them optimal conditions throughout the workplace.

Solutions like these can help accelerate the transition of organizations that aspire to meet healthy building standards, such as those led by Well, Fitwel, and LEED. These standards typically require active ongoing monitoring of IAQ and comfort conditions in a building.



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## CHAPTER 3

# Keeping buildings healthy over the long-term



*To sustain occupant well-being, building conditions should be continuously measured and BMS controls adjusted as necessary. You also need to take into account balancing IAQ and comfort against energy efficiency and costs.*



# Keeping buildings healthy over the long-term

After using a set of best practices to make sure the building management system (BMS) is working properly, you can have the peace of mind that indoor air quality (IAQ) and thermal comfort have been optimized to enable occupants to begin returning to work. But the responsibility of the building owner and operator doesn't stop there. How do you sustain a healthy building over the longer term?

To sustain occupant well-being, building conditions should be continuously measured and BMS controls adjusted as necessary. You also need to take into account balancing IAQ and comfort against energy efficiency and costs.

Once again, the newest smart building technologies and services can help you simplify these requirements for healthy buildings.

## Control and monitor

Every aspect of building automation should be monitored and analyzed to ensure that a healthy environment is being maintained. For example, occupancy and CO<sub>2</sub> levels should continue to be monitored, logged, and analyzed. Humidity

should also be accurately tracked. If you don't have this capability now, you should consider a room monitoring solution.

With increased outside air and humidity levels, it will be important that the building is able to maintain indoor temperature (in compliance with standards) for the comfort of occupants. Therefore, temperature should be monitored and logged in each room and zone – this may require additional sensors.



It is important to also maintain the correct flow of air from clean to less-clean. You should consider monitoring and trending of pressure and air flow rates, including room-level monitoring if there is a need for internal zone differential pressure.

In support of better predictive maintenance, pressure sensors can be used to monitor the pressure drop caused when filters need replacing. Indoor air quality should also be monitored. Dust can act as a vehicle for viruses that become aerosolized. PM2.5 or PM10 monitoring devices should be considered for monitoring whether levels of particulate are being adequately reduced. Volatile organic compounds (VOCs) can also have a negative impact on occupant health. IAQ monitoring systems can be used to monitor and log VOC levels.

Finally, occupancy levels will be important to monitor. This will help comply with guidelines set by local authorities, and to keep occupants safe. Simple tracking by access control systems may be enough, or it may be necessary to monitor different areas in a building, from meeting rooms and cubicles to communal areas, such as cafeterias and gyms.

In this case, smart building management tools are available that can help monitor and manage occupancy. Facility managers will be alerted when the number of people exceeds a set threshold for a given area, while employees are informed of available 'safe' areas and meeting rooms on their mobile devices.

Concentrations of indoor pollutants are

**2-5x**

higher than outdoor concentrations.

[-EPA](#)





### Use continuous commissioning and fault detection

Due to the requirement to enhance occupant well-being, the steps required – e.g., increased use of outside air, and higher-rated filters – may have a significant impact on building energy consumption. Ensuring all systems are running properly is critical for the sake of occupant health, but also for optimizing overall building performance and business resilience.

To maintain a healthy building as well as optimize energy efficiency, the health of HVAC assets should be monitored and faults detected quickly. For example, air handling units should be monitored for proper operation of dampers, air temperature, air flow, fan speed, CO<sub>2</sub> levels, and filter pressure. Zones should be monitored for proper humidity level, temperature, air flow, air pressure differentials, and CO<sub>2</sub> levels.

By analyzing BMS and occupancy data, steps can be taken to minimize energy consumption. By having appropriate sensors in place, smart building analytic tools, and the support of expert services, you can



achieve deep insights into the health and performance of your building. Armed with this knowledge, you can make the best decisions to proactively balance occupant well-being and efficiency.



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## CHAPTER 4

# Smart building mobile apps boost employee engagement, productivity, and safety



*Highly engaged teams can help increase customer loyalty by 10%, business profitability by 21%, and employee productivity by 20%.*

*-Gallup*



# Smart building mobile apps boost employee engagement, productivity, and safety

For all organizations, there is now a heightened need for efficient communications, during a time when many employees have been working remotely. As buildings reopen and some or all of those occupants return, it will be even more important to stay connected to employees to keep them safe and informed.

Meeting this challenge offers organizations a great opportunity to use smart building technology to increase employee engagement, which in turn, can deliver many dimensions of benefits. According to a study by Gallup, highly engaged teams directly correspond with better business outcomes, with the most successful of these helping increase customer loyalty by 10%, profitability by 21%, and productivity by 20%. Not only does this represent a significant competitive differentiator, Gallup also recognizes that more engaged employees are “more likely to remain with their organization.”

Today’s workforce of Millennials and Gen Z are also digitally savvy. Increasingly, ‘mobile-first’ professionals expect the same level of connectivity, convenience, and control at the office as they experience outside of work.

These trends are driving the development of a new breed of mobile engagement apps that are empowering employees with a digitized workplace experience. Smart apps help deliver high-value, easy-to-access digital services that keep employees and tenants connected and informed, whether working at the office or from home. The most powerful of these apps act as a platform that lets a company integrate a flexible choice of building management, IT, and concierge services into a single, unified portal.

## Smart building apps connect people to safety

Occupants need clear and up-to-date instructions when returning to the workplace. Receiving disparate email communications from different senders can be confusing or, worse, be lost in an inbox.

Smart building engagement apps act as a mobile central communication hub – a single ‘source of truth’ where employees can immediately access the latest information on company and site policy. An app can also integrate evolving safety information feeds from official federal, state, and local sources.

Administrators can deliver critical notifications about changing site situations – sent as either high-visibility push or banner notifications – directly to each user’s phone. In this way, employees know exactly what to expect today and during the week. Facility and human resource (HR) teams can target communications by personas, e.g. all employees or sub-groups, such as departments and teams.

Safety can be further supported before an employee visits the office. The engagement app can be used to complete a health form for a pre-assessment. Once inside the office, their mobile device will enable a safer, touchless experience. Surfaces they regularly interact with – from elevator buttons, to room comfort controls, audio/visual devices in meeting rooms, and digital badges – can now all be remotely controlled.

#### Help everyone efficiently find their way

In the ‘new normal’, occupants and visitors will need to more efficiently navigate the office. A mobile engagement app can help with every aspect of the office experience.

Engagement apps can deliver a wide range of useful information made available through the integration of multiple data sources – from internal facility, property, security, and HR systems to external news and transportation feeds – all delivered through a singular, convenient view.



## Machine learning, wearables and the IoT: the future of Healthy Buildings

Well-being is personal. Apps available on wearable or mobile devices share data and give occupants more control over their environment with features like:

- Quiet zones
- Building entry assessment
- Hot desking
- Smart parking
- Room booking
- Wayfinding
- Maintenance tickets



### Enhance the work environment

The newest apps can include a full range of comfort control and maintenance features. This includes simple control over temperature, lights, or blinds in an office or meeting room. If there are problems with systems or equipment, the app can be used to communicate with the help desk. The employee can also self-report a maintenance issue by using their mobile device to take a picture and submit a ticket directly into the facility management system.

Common activities during the workday are also streamlined. An integrated company directory makes contact with anyone just a tap of a finger away. When it comes time to book a meeting, the app will find and reserve an available room, as well as helping arrange catering for guests and registering them for a site visit.

When concierge services are included, employees can quickly access information and reservations for the cafeteria, fitness club, or transit. They can also use opt-in channels for clubs, communities, or

people with common interests, etc. The engagement app will also keep people working from home more closely connected to the office, their coworkers, and community activities.

### Continuously improve the experience

Engagement apps are helping deepen the employee connection. With unique customizing and branding, the app becomes an extension of the smart building workplace and company experience, directly in the hand of each employee.

And extensive data analysis tools can help the administrator see how the app is being used, by persona, location, service, and device. Using this insight, apps can be continuously improved over time by adding or changing services. Organizations should seek an open, agile engagement platform that can dynamically adapt services to the changing needs of the company and its people.



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## CHAPTER 5

# 3 ways space management enables a safer, more responsive workplace





# 3 ways space management enables a safer, more responsive workplace

Before the global pandemic, your organization may have already been evolving the way you manage your office space. Maybe you were taking steps to right-size your space for your company's head count, or reallocate under-used spaces and amenities. You may have also been moving toward a more fluid strategy, with a particular ratio of fixed versus flexible spaces, supported by 'hot desking' and 'hoteling' for employees. Optimizing these types of initiatives requires decisions that are based on real occupancy data.

Today's occupants are increasingly concerned about safety. Will there be adequate physical distancing in their workspace and in common areas? How will they quickly and safely find an available workspace?

The tools and protocols you put in place today to address these requirements and concerns should also help your organization adapt to future needs. Fortunately, smart building technology can help. The newest space management solutions will help you protect your staff and comply with new government guidelines, while supporting new, more-efficient ways of working.

## Monitor occupancy levels

To accommodate the new requirements, occupancy sensors and space management tools can be used to measure people-counts in different areas throughout a building in real-time. Capacity thresholds can be set for a room, floor, or building, with alarms sent to the facility manager if occupancy approaches or exceeds those limits.

To ensure air quality and comfort, occupancy monitoring data for each space can be shared with the building management system to proactively optimize HVAC settings. It can also support other building operations, including focusing cleaning where and when it is needed thereby reducing unnecessary traffic for a safer environment.

## 3 ways to create a responsive workplace

1. Monitor occupancy levels
2. Ensure safe distancing
3. Adapt office layout



### Ensure safe distancing

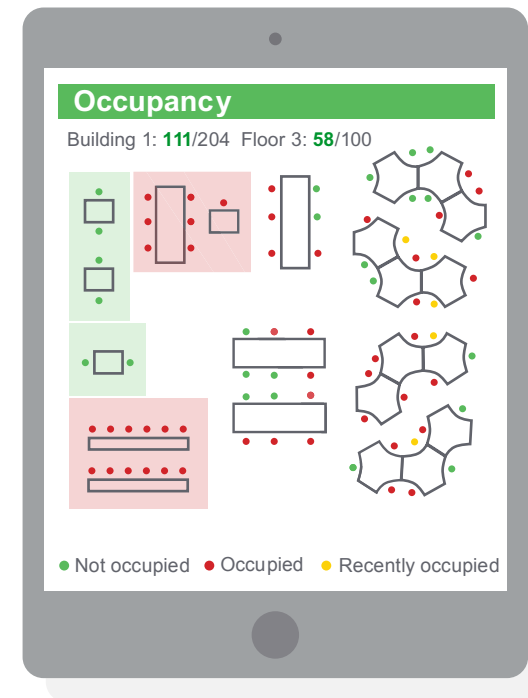
Occupancy monitoring can also help ensure that occupants are following distancing guidelines. To avoid overcrowding, building owners and tenants will need to adapt interim policies for facility usage, including for areas such as the cafeteria, gym, and break-out areas. Collected data on usage patterns can be used to optimize policies and manage each amenity based on capacity thresholds.

The newest engagement apps also enable real-time availability and occupancy level data for each space to be displayed at a kiosk or accessed by mobile devices, helping employees safely and efficiently navigate the workplace.

### Adapt office layout

Data on usage and evolving head count enables a static workplace to become responsive. In contrast to manual estimates or guesses, a space management solution will identify new occupancy patterns and how individual and collaborative spaces are being used. This will help determine when a change in layout, workplace mix, or interim policy change is needed for specific usage areas.

For example, underutilized desks, offices, meeting rooms, or amenities can be quickly identified and reallocated as necessary. Rather than just marking desks or rooms with an 'X', employees can be given app-based access to see available spaces in real-time to support office hoteling.



Dashboard example of improved occupant visibility throughout a building.

### Choosing the best space management solution

Space management solutions will include a network of IoT-enabled sensors and other devices. Technologies can include passive infrared to capture simple 'yes/no' occupancy status, imaging and thermal monitoring sensors for area-specific people counting, active infrared to count people flow, and desk sensors to identify availability.

A solution should be hardware agnostic to adapt to equipment from a variety of vendors, and sensors should be easy to deploy and retrofit. For example, a wireless network can use the global cellular network without dependency on the IT infrastructure. The network should allow integration with a unified IP backbone either through a wired connection or using a range of wireless options, such as WiFi and Zigbee.

The solution should unify all data in the cloud for controlled access to monitoring, reporting, and analytics. It should also have the ability to share data with other systems, for applications such as wayfinding, demand-led servicing, or predictive maintenance.

With a network of IoT-based sensors connecting to the cloud, your IT department will have concerns about cybersecurity and data privacy. To give your enterprise the confidence it needs, you should choose a solution vendor that follows industry best practices and is fully compliant with all applicable cybersecurity and data privacy standards from the device level to the cloud (e.g. IEC 62443, General Data Protection Regulation).

The solution should be consistently adaptable to all of your facilities, with the support of a global vendor with local support in each region. Choose an experienced solution provider that offers a one-stop-shop, including expert advisory services to help you make your space management data actionable.



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## CHAPTER 6

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# 4 ways smart building technology helps optimize operational efficiency



# 4 ways smart building technology helps optimize operational efficiency

According to a survey by the International Facility Management Association (IFMA), “utility cost is the largest component of a facility’s operating cost.” Running a close second is maintenance costs, followed by janitorial costs. As organizations return to a ‘new normal’ during and post-pandemic, they will have to address a wide range of challenges to ensure their buildings are healthy and safe for returning occupants while still operating efficiently and cost effectively.

While a facility depends on its HVAC and electrical infrastructures, its facility teams must ensure everything is operating and maintained properly. But with fewer resources, they are now expected to manage an even greater scope of responsibilities, including finding ways to reduce operational costs further. Under the current situation, they may also have limited onsite access.

Fortunately, there are four ways new digital tools and remote services can help take facility operations from good to great.

## Save time, effort, and money

Schneider Electric surveyed hundreds of its global customers and determined that 37% of facility equipment was not working as it should. As part of this, approximately 12% of air handling units (AHU) had major issues that caused wasted energy while potentially affecting air quality. Prior to having the right monitoring and analysis technology in place, most of these problems were essentially invisible to the facility teams while causing unexpected behaviors.

A digitized HVAC and electrical infrastructure – including a network of IoT-enabled connected meters and sensors – provides maintenance teams early risk warnings to equipment reliability or occupant well-being. Whether hosted in the facility or in the cloud, an analytic app also delivers the insight needed to uncover opportunities to improve energy efficiency; for example, by improving equipment controls and minimizing anomalies.

## How digital tools help transform your building

1. Save time, effort and money
2. Optimize facility services
3. Provide an opportunity to modernize
4. Make smart buildings ‘remote services ready’

Going further, some analytic applications may offer a 'digital twin' that has mathematically modeled the physical infrastructure. A digital twin helps improve the accuracy of insights, avoids mistakes or errors (false positives), and can improve diagnostics for inter-dependent equipment.

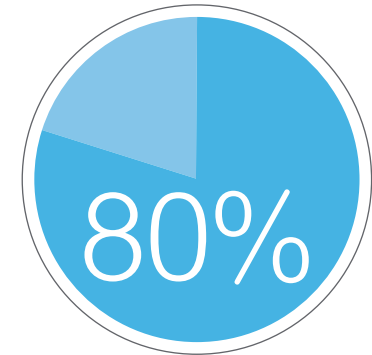
The analytic platform acts as a 'single pane of glass' to enable remote access to equipment and workspace conditions across an entire portfolio of facilities. With the inclusion of control capabilities, 80% of issues can be resolved remotely. For example, real-time occupancy and air quality can be monitored throughout a facility. If the number of people exceeds a set threshold, the facility team can be alerted and actions can be taken remotely to shut down a floor, or an entire building, if required.

The most powerful of these tools help teams prioritize situations so they can act quickly. This simplifies decisions regarding what should be done now and what can be scheduled later. In this way, maintenance can be done more proactively versus reactively, by turning data into prioritized actions.

### Optimize facility services

As noted, janitorial services are a major contributor to operational costs with cleaning typically the highest part of that cost. Historically, janitorial staff has usually cleaned desks and equipment, and sanitized telephones and keyboards, only 'on demand' rather than a regular basis. However, the pandemic has escalated the need for frequent sterilization. To help maximize efficiency, smart building technology takes advantage of occupancy and desk sensors to determine space utilization, which can then trigger schedules to focus cleaning only where needed.

Some organizations may need to operate their buildings with a reduced contingent of security guards. Their work can be made more efficient by using occupancy sensor data to track the movement of people throughout a facility. Smart building applications should offer interoperability with security systems to enable this functionality.



of issues can be resolved remotely



### Take the opportunity to modernize

This unusual period is a good time to consider your operational strategy, from auditing needs, to implementing pragmatic short-term actions, to planning longer-term investments to improve building health, for example.

This situation drives the question of whether to optimize or modernize. Consider this analogy. If you have an old oil-fired furnace that is failing, you might decide to spend the money on having it repaired simply to keep it running. However, there may be far greater long-term benefits in modernizing your heating system by replacing the old furnace with a new gas-fired one that will be more efficient and reliable.

The data provided by a smart building management analytic application helps you calculate the economic payback of upgrades and make the best decision. For example, for facilities is it better to fix a stuck damper on an AHU, or modernize the overall performance of your HVAC system by adding a variable speed drive to dynamically control the damper? In these types of cases, modernizing can be done by adding new controls or sensors while not requiring the cost of total equipment replacement.

In many countries there are financial incentive programs for modernizing buildings. For example, the U.S. 2020 Coronavirus Aid, Relief, and Economic Stability (CARES) Act allows a full deduction of certain project costs in a single year, with no limit on the size of the project. Similar programs exist in the European Union, with each country supporting the Energy Performance of Buildings Directive with their own funding mechanisms. And in Singapore, the Green Building Masterplan incentive scheme will co-fund up to half of the cost of retrofitting buildings for energy improvements.



### Make smart buildings 'remote services ready'

With many organizations facing the challenge of limited facility operations and maintenance personnel, all types of facilities can be impacted, and small to mid-sized buildings can especially feel the impact of reduced resources.

Cloud-based smart building management apps act as a portal to expert services. Remote service teams can augment onsite facility staff with the expertise they need to:

- Remotely monitor all systems and building performance, 24/7
- Diagnose problems and recommend solutions
- Identify opportunities to save costs and improve comfort and well-being
- Provide regular reporting and expert consultation, including ROI justification

Remote services help organizations do more with less to help facility teams move beyond planned preventative maintenance to focusing on ROI-based activities. A condition-based maintenance

approach can reduce unscheduled maintenance and associated costs. A further savings in energy costs can be achieved through continuous commissioning of building equipment. And with the help of service experts to diagnose energy, comfort, and maintenance issues, an organization can expect far fewer occupant complaints.




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## CHAPTER 7

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# BMS upgrades drive operational resiliency in 3 critical areas



*Today, every building could be a smart building by taking advantage of the newest BMS capabilities whether it requires updating, upgrading, or replacing your legacy BMS.*

# BMS upgrades drive operational resiliency in 3 critical areas

We're all now well aware of how the world can face a major crisis requiring all types of organizations to act quickly and effectively to maintain operational capacity and keep people safe. For your operations to be resilient you need a building infrastructure that can adapt quickly to changing circumstances and support the actions your facility teams need to take.

To create this type of building requires the latest in building management system (BMS) technology and services. Building systems, including your BMS, are not static and the supporting technology should evolve to keep up with your operational needs. Today, every building can be a smart building by taking advantage of the newest BMS capabilities, whether that requires updating, upgrading, or replacing your legacy BMS.

## Connectivity and integration for efficiency and flexibility

Whether a building is at partial or full facility capacity, operational efficiency will always be top of mind. Digitization of your HVAC infrastructure will bring data from connected smart devices, with your BMS

application helping you keep your buildings running smoothly, ensuring comfort for occupants, and having the tools for fast diagnoses and resolution of events. Having the newest BMS capabilities can also help you operate a sustainable building. However, upgrading your BMS system will not automatically result in energy savings. You'll need to use the technology to implement modern control strategies, which may also require recommissioning data inputs and control outputs.

Modernization of your BMS system is also the key to ensuring healthier facilities, gaining more monitoring and control over indoor air quality, and helping optimize the efficiency of cleaning protocols. And with many organizations restarting with only partial staffing, or a division of onsite and offsite employees, a smart solution will also give your team the tools it needs to manage a smarter, more flexible workplace.

The newest BMS systems are able to support these new challenges by aggregating and integrating data from different systems into one place. This can include HVAC, lighting, safety, security, workplace management, occupant engagement systems, and more. The BMS now acts as a 'single pane of glass' with dashboards that present building-wide performance data, making it as simple to control zone-specific temperature and humidity as it is to monitor the status of elevators. And your BMS will now be mobile-friendly, as accessible on your phone as your other apps.

### Cloud sharing enables remote operations and advisory services

The pandemic has highlighted the critical need for remote building operations. New IoT-enabled BMS solutions enable remote access for facility teams. Using powerful analytic tools – including comparison against a 'digital twin' for deep fault detection and diagnostics – maintenance personnel can evaluate and fix a majority of problems remotely, reducing the number of site visits needed.

Bringing BMS data securely to the cloud opens the door to different levels of support. For example, Schneider Electric offers a first level of support that invites owners of our EcoStruxure Building Operation solution to consent to register. Our solution is supplied with anonymous 'baseline' system information that can help us understand the general user population and efficiently gauge the severity of any issues that arise. Users will then be immediately alerted to any updates or fixes that are available.





At the next level, we offer responsive technical support directly to each BMS owner. Finally, a third level of support is especially useful for facility teams that are challenged with limited resources. This level includes EcoStruxure Building Advisor services, delivering customized support that helps you tap into the deeper value of your BMS data. Service experts monitor your facilities 24/7, using advanced diagnostics and proactive remote troubleshooting to help you optimize the reliability and efficiency of your building systems.

### Cybersecurity helps protect your operations

Cyber attacks are becoming more common and are now a greater threat to operational stability than ever before. With the extensive facility and cloud connectivity of the newest BMS solutions, a strong cybersecurity framework is critical to protecting your facility operations and business.

When upgrading or replacing your BMS, you should ensure that you are choosing a solution partner that is following all cybersecurity best practices and standards at every level. Schneider Electric is certified

to the IEC 62443-1 cybersecurity standard. Here is a non-exhaustive list of items that should be addressed:

- Penetration and vulnerability tests performed on all components, with retesting on a regular basis.
- Secure data access using one-way reads from controllers, devices, and equipment.
- Network should follow all existing network and firewall security settings.
- Optional data encryption during transfer.
- Subscription-based access using a trusted Internet authentication service.
- Data privacy and protection, with compliance with national and international privacy laws.

## A BMS upgrade strategy helps future-proof your facilities

If your BMS is not currently up-to-date or offering the latest capabilities mentioned above, you should be making a plan for a 'tech refresh' to upgrade and migrate to a new solution. Here are a few things to consider on that path.

- **Beware of old and close-to-obsolete operating systems.** For example, if you have a BMS system that is running on the Windows XP operating system, then you need to be seriously planning for some level of BMS upgrade.
- **BMS controllers no longer supported.** If a controller fails and a replacement is not available, you should have a BMS upgrade plan. Some spare controllers may help tide you over for a while, but you need a long-term plan. If you do not have the budget, you can plan a 1 to 3 year plan to upgrade all the non-supported controllers.
- **Find the right relationship.** You may wish to replace your BMS simply because you are not happy with the BMS contractor that provided your current system. In this case, having a clear

maintenance strategy with a trusted vendor is important. You may need to consider a multi-year plan to reduce the investment per annum, with staged transitions for software and hardware. You should also seek a relationship that not only fixes your current problem, but that also delivers a connected, flexible BMS solution that helps you immediately improve facility performance, while supporting a long-term vision and sustainable decisions.

The right BMS solution should:

1. Deliver actionable insights that facility teams need to better manage and optimize buildings, improve engineering efficiency, and meet increased cybersecurity and compliance needs.
2. Offer comprehensive analytic monitoring services that keeps building systems performing optimally, helping you optimize operating costs, occupant comfort and asset value while working with limited budgetary and maintenance resources.



[Visit Resources for Healthier Buildings Page](#)

# Additional Resources

To learn about how you can transform your buildings, please visit:

## Healthy Building Resources

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[Ensuring Occupant Health White Paper](#)

- [Infographic](#)

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