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Three Essential Elements of Next Generation Building Management Systems (BMS)

White Paper 500

Version 1

by Patrick Donovan

Executive summary

Building owners, facility managers, and system integrators face increasing pressure to save more energy, reduce costs, and maintain availability all while enhancing occupant experience and well-being. Achieving these varying objectives is best solved by a new type of BMS available today that goes well beyond HVAC controls. These modern next-generation BMSs benefit stakeholders by being a more open integration platform that uses IoT, cloud computing, data analytics, and artificial intelligence technologies to get more out of your available resources and connected systems. In this paper we explain factors driving evolution of BMSs and describe three essential elements necessary for solving management challenges of today and tomorrow. We will also explain how these elements put you on the right path to benefit from future emerging digital technologies.

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Introduction

The building management system (BMS), or as it is sometimes called, the building automation system (BAS), is a critical tool for operating a building safely, efficiently, and reliably. However, a hyper focus on energy efficiency and sustainability combined with fundamental changes in tenant needs and expectations are straining traditional BMS implementations pushing them to grow and evolve. At the same time, advancements in cloud computing, IoT, analytics, and artificial intelligence are leading to new and broader capabilities. With these as underlying technologies, next generation BMSs become the integration and aggregation tool for all the building's data across multiple business and operations technology (OT) systems and sensors. **By managing and controlling all the building's OT in concert with each other, energy and operational efficiency can be maximized while enhancing occupant productivity and well-being.**

Despite these emerging changes, we find many in the industry still have a very narrow view of the BMS as being mostly about HVAC controls. This traditional view holds that the BMS is comprised of just field and building controllers along with the on premise BMS software interface. Such a narrowly-scoped BMS implementation will have limited ability to address building management challenges and it will fail to take advantage of newer technology advancements. Modern, next generation BMSs connect to a much broader range of systems and can do more with that integration than was possible before. This is necessary as buildings become more intelligent.

Figure 1 highlights how the scope of BMS implementations and depth of system integrations is evolving as needs and capabilities change. Sometimes a traditional BMS integrates with other systems, but usually this just means data points are pulled from the system and displayed in the BMS software for added context or situational awareness. We refer to this level of integration as "loosely-coupled". Next generation BMSs take this integration much further. Not only does it interact with more systems, but the connection is more tightly integrated in that the data is combined with other system data and used for analytics, AI, and digital services that make operations more proactive and predictive.

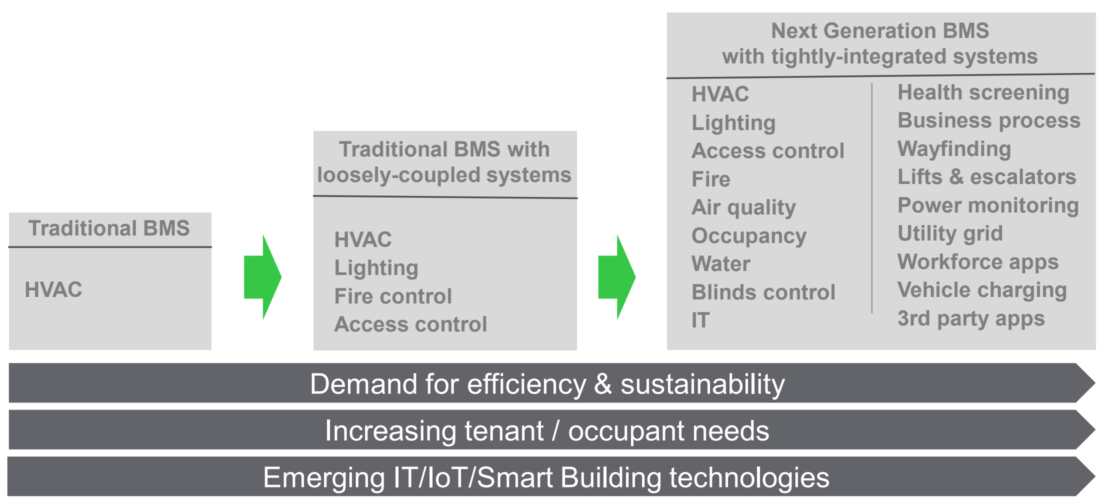

Figure 1
The scope of BMS implementations and depth of integration with other systems is evolving as pressure grows to be efficient, sustainable, capable of meeting changing tenant needs, and able to use emerging technologies.

In this paper we will first discuss three factors facing building facility managers today that are putting pressure on management systems to evolve and adapt. Next, we describe three key attributes of next generation BMSs along with how these emerging capabilities are best able to solve today's building challenges. Finally, we provide thoughts on how BMSs are likely to evolve in the future.

3 factors driving the evolution of BMSs

A typical traditional building has a BAS/BMS that is limited to HVAC and perhaps lighting, access control, and power monitoring. The facility manager and their operations team use it simply to monitor for problems and do basic controls. Working from within a silo apart from the IT department, occupants, business units, and corporate real estate; their focus is mostly just making sure the building systems function on a day-to-day basis. And that work tends to be highly manual and labor-intensive. Building owners become wholly dependent on seasoned expert facility managers with lots of tribal knowledge to make sure things keep working. Maintenance is calendar-based and reactive. Tenants and occupants have no control or insight beyond what they might physically experience while in the building. All complaints, requests, and service orders come through the facility manager. Each building is managed independently from other buildings that might be part of an organization's real estate portfolio. **This traditional model is going away.** Both societal and technology factors are driving the evolution of BMSs from being primarily an HVAC control system to being more of a smart building system integration platform for proactive monitoring, control, and automation.

Change is being driven by three fundamental factors:

1. Increasing demand for efficiency and sustainability
2. Changing tenant/occupant requirements and expectations
3. Emergence of newer IT, IoT, and smart building technologies

The third one broadens the scope and improves the capability of BMS systems to better address the first two factors. Each factor is described below.

Increasing demand for efficiency and sustainability

Without question, buildings have a significant impact on the global environment. "When indirect emissions from upstream power generation are considered, buildings were responsible for 28% of global energy-related CO_2 emissions in 2018. In absolute terms, buildings-related CO_2 emissions [had risen] for the second year in a row to an all-time high of 9.6 $GtCO_2$[1]." And note this did not include emissions that are generated from the construction of buildings. When construction is included, buildings represent approximately 40% of global CO_2 emissions[2]. Environmental impact aside, building energy use has a significant impact on operations' budgets. In fact, it is estimated that roughly one third of total non-fixed operating expenses go towards energy consumption[3]. As a result, there is growing regulatory, financial, and social pressure on commercial real estate firms and building owners to reduce energy consumption and to ultimately decarbonize their building operations.

This pressure, which is increasingly a requirement, to reduce energy use means there's a more intense need for detailed energy monitoring and real-time controls. Carbon pricing schemes such as carbon taxes, emissions trading systems (ETS) and results-based climate financing (RBCF) are providing pricing signals or the incentive to be creative and exhaustive in efforts to use building controls to reduce building energy consumption. This includes actions like participating in grid services, selecting among different energy sources based on time-of-day pricing, and controlling power and lighting based on knowing operational status of hard-wired and plug loads, utility price signals, room occupancy, weather data, and so on. Far from just

[1] https://www.iea.org/reports/tracking-buildings

[2] Ibid.

[3] https://www.constellation.com/solutions/for-your-small-business/small-business-resources/commercial-real-estate.html

controlling HVAC systems, a BMS today needs the ability to monitor and control all powered systems in the building to fully optimize energy use throughout the entire site. Traditional BMS systems are not well positioned to do this. A modern, next generation BMS provides the tools needed to fully optimize energy use and comply with growing societal pressure and governmental climate regulations.

Changing tenant/occupant requirements and expectations

Occupant and tenant expectations are changing, and this is driving the BMS to do more. People that rent and work in buildings have a growing awareness of climate change and sustainability issues, as well as a desire to be energy efficient both for the good of the environment and for economic reasons. People want to rent from or work in efficient buildings. People today are also more likely to be concerned about their personal health, mental well-being, and the impact their immediate environment has on those things compared to previous generations. There's a demand to make buildings not just safe, but satisfying and enjoyable for the occupants. On top of that, people's everyday experience with home consumer technologies, IT, and smart phones is impacting their work place expectations and work patterns. There's an expectation, we believe, for IT services to always be on and available. **Building services resiliency is now a critical attribute.** The prevalence of smart home tech and a "there's an app for that" mentality has people expecting or, at least wanting, the ability to easily interact with buildings and their environments to customize their personal spaces, navigate their way around the building, make resource requests, pass through security with less hassle, and so on. These new requirements and expectations not only have a big impact on building design, but also on operations. Efficient, reliable buildings that focus on tenant health, safety, well-being and productivity have a distinct competitive advantage for owners.

This change in tenant needs and expectations is changing the facility manager's scope. **And that means the BMS's scope must change as well.** The FM is still responsible for HVAC operations and delivering on energy goals, of course. But increasingly now they must also deliver on occupant comfort, providing interactive and healthy spaces, continuous system availability, security, connectivity and compliance to corporate and governmental regulations. Emerging commercial building leadership personas such as workplace strategists are imposing new expectations on facility managers to impact metrics such as employee engagement, productivity and overall wellness scores. A new generation of workers, residents and hotel guests expect to be hyper-connected to the people and systems around them and influence their surroundings via digital tools. In today's commercial buildings, people still largely rely on the facility manager to handle their requests regarding comfort, cleaning, and communications, just as they have for the past several decades. Effective modern BMSs will have some of the attributes of a digital personal assistant, in effect, which will empower occupants, making them less dependent on facility managers, and enable the FMs to deliver on the expanding list of expectations, metrics and regulations. Meeting these needs requires smart building technology and being designed for mobility; technology that can be managed and controlled by the BMS. Traditional BMS systems are not well architected for this.

Emergence of newer IT, IoT and Smart Building technologies

Building management systems have been evolving, in part, as its underlying technologies have improved over time. For example, older traditional systems provided very simple controls of HVAC equipment using pneumatic (compressed air), analog, and electro-mechanical type controls. In the 1990s and 2000s direct digital controls (DDC) emerged and are widely used today providing greater functionality, interoperability, flexibility, and increased reliability. And today the growing use of standardized IP protocols between systems and devices simplify and enable BMSs to be much more than just simple mechanical automation systems. But this is just part of the change that is occurring.

The explosion in the **“Internet of Things” (IoT)** phenomena has meant that it is easier and less expensive for manufacturers and system integrators of buildings tech to add microprocessor-based controls, sensors, and IP network connectivity to more and more of their devices and systems. The maturity of low-power, line-of-site personal area wireless network technologies like Zigbee and Bluetooth have made it much simpler to connect field controllers and a wide variety of IoT sensors with building controllers, without wiring. The ease of connecting devices and systems using standard IP protocols means that a BMS can not only monitor and control more, but it moves the BMS from serving only the facility manager to now being able to directly assist tenants. The scope of the BMS grows to provide occupant services such as direct access to maintenance requests, wayfinding, room booking, and personal mobile comfort control.

The rapid growth of sensors and IoT devices means an explosion in data generation. There is an opportunity to use **“Big Data” analytics and artificial intelligence (AI)** technologies on this data to make building operations and management more automated, efficient, reliable, and proactive. Analytics and AI are becoming mature industries with proven use cases in IT and data center applications, and increasingly in commercial buildings as well.

Cloud computing provides the compute power, storage space, and security needed to enable analytics and AI. It provides a secure means for gathering large amounts of data across many devices and sites. The ability to easily scale compute power and storage capacity makes it ideal for training machine learning algorithms. The cloud also provides a secure foundation for remote monitoring across multiple sites, as well as 3rd party monitoring and app development. These IT and IoT related technology evolutions have enabled the development of so-called smart building tech.

The 3 essential elements

An effective, next generation building management system is a platform for integrating building, business, device IoT data and segment-specific specialty systems such as air quality monitoring for hospitals, or room booking systems for hotels. The ultimate purpose of the BMS is to extract value from that data to operate and maintain building systems safely, reliably and efficiently while maximizing the productivity and well-being of its occupants. Next generation systems are far broader in scope and capabilities than traditional BMS systems originally contemplated by ASHRAE. They are also easier to use, program, scale, and update. A modern, next generation BMS implementation spans from device sensors to building controllers (ie, the edge) to the cloud with apps and services (See **Figure 2**). Accessible from anywhere, next generation systems enable knowledge reporting, application of analytics/AI, predictive maintenance and is self-diagnosing.

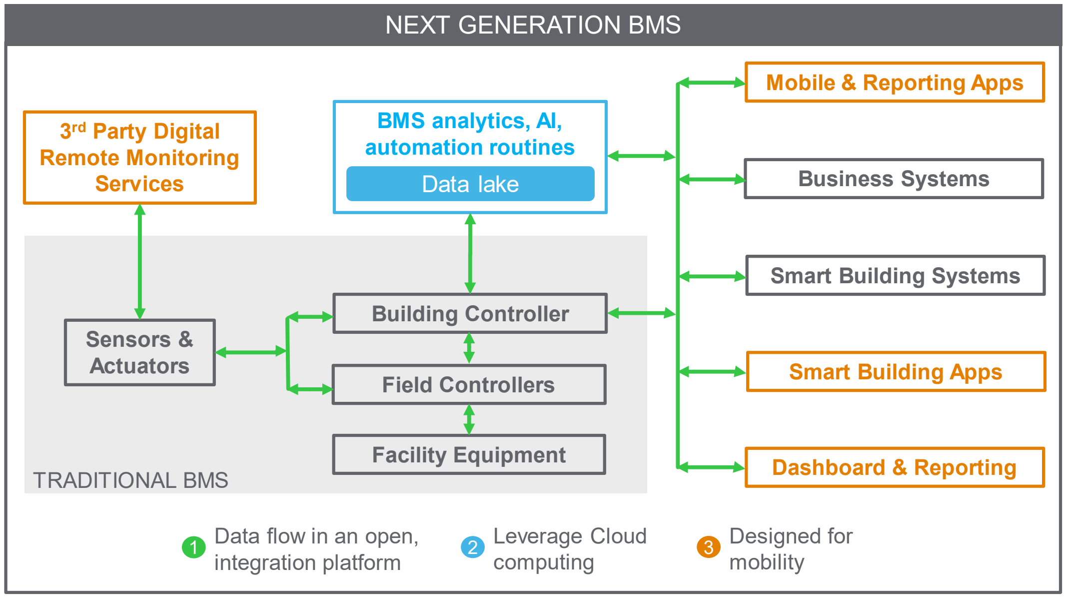

Figure 2
A high-level architectural diagram of a next generation BMS system that, unlike traditional BMS implementations, extends from the equipment to the cloud.

These newer, more effective systems automate more of the work previously done manually by facility managers. Tenants go from being passive to active occupants by being able to influence and affect their personal environments based on individual tastes and preferences. In this paradigm a BMS is the critical central intelligence (i.e., the brain) that pulls together data from equipment, the cloud, other systems, people, real-time workflow patterns, along with regulations and policies to both share knowledge with stakeholders (FMs, occupants, owners) and, when empowered to do so, take independent automated action. ASHRAE has been quoted as saying "Intelligent Buildings are not intelligent on their own, but they can supply the users with more intelligent options thus enabling them to work competently[4]. **Our position is that effective, modern building management systems are now capable of enabling some degree of autonomous intelligence and action.** This capability will expand as the underlying technologies improve.

Achieving this vision of a broader, more capable BMS requires an architecture with 3 key attributes:

- Based on an open, integration platform
- Leverages cloud computing for analytics and AI-driven digital services
- Designed for mobility

It is still important to ensure the system can perform the fundamental, traditional tasks well. But selecting a BMS with these 3 attributes will help, in effect, future-proof the system by providing a BMS infrastructure with a software platform upon which additional capabilities can be added over time. It will put owners on the right path for the future as system capabilities increase and the underlying IT and Smart Building technologies continue to evolve and grow. A good analogy for this is the smart phone. What began as a better, more mobile interface for making telephone calls and browsing the internet became a much more sophisticated and intelligent device (smart maps, banking, health tracking, etc) providing increasingly more functions and value over time. For the end user, they're still holding, looking at and talking to a small rectangle. All the complexity of the technology evolution remains hidden from the user. A BMS based on these 3 attributes will put users on a similar path.

[4] Alexandria Engineering Journal Volume 57, Issue 4, December 2018

#1: Based on an open, integration platform

The first essential attribute is that the system is open enough to integrate with other building subsystems, IoT devices, sensors, business processes, databases, and apps. Historically, BMSs have been relatively closed and proprietary in nature given their traditional, limited scope. But obviously, if the BMS is to do more than just control the HVAC system, it needs to be able to collect data from and send data to systems and devices not traditionally integrated with a BMS. The BMS must be designed with some degree of openness in order to do this and to benefit from smart building technologies as they emerge. After all, it is very unlikely, if not, impossible for all the varied things the BMS would connect with to be made by the same BMS vendor where everything is using the same proprietary languages and protocols. The ease of connectivity becomes important if the BMS is to have the central role in operating the whole building. The specific process to integrate with other things may differ from one vendor to another. And so, this can be a comparison point when selecting a solution.

Note that the concept of openness exists on all levels of a BMS architecture. White Paper 501, A Framework for Defining Openness of a Building Management System (BMS) provides an effective means for discussing and evaluating how open a BMS is. It considers openness across three levels: data acquisition/sharing, system integration, and building orchestration. For each level it considers interoperability, engineering complexity and who is able to perform integration and maintenance. For the purposes of this paper, we are only concerned with the ability of the overall BMS to integrate with other devices and systems in order to extract value from that interaction.

Integration involves the implementation of standard, open protocols within operations (OT), IoT, and information technology (IT).

OT protocols

BACnet (Building Automation and Control Networks), is a standard mechanism for computerized building subsystems to exchange information. Implementation of such a protocol means different systems, from different vendors are interoperable and can share information. Types of systems that communicate this way include HVAC, lighting control, access control and fire detection. Other popular open OT protocols include Modbus (popular in industrial environments) and LON (local operating network).

An attribute to look for in a solution is the incorporation of BACnet/IP natively at all layers of the architecture. IP is a familiar internet protocol that allows building controllers of the different building systems to talk to each other over an ethernet network. It is faster and has more bandwidth than alternative communication standards, such as a serial bus used by more traditional solutions. Note that communication bandwidth is a key consideration as increasing amounts of data are aggregated and shared to support advanced analytics. Putting traditional OT protocols over IP is an aspect of the “OT/IT convergence” trend so prevalent today.

IoT-related protocols

The BMS should also support common IoT-related protocols such as SNMP, HTTPS, web services, MQTT, and so on. Here, we are talking about IT protocols used to put small, low powered IoT devices on the network inexpensively. Today there are a range of wireless sensors that can provide additional intelligence to facility managers and building occupants that are not a specific part of a subsystem such as HVAC, lighting or access control. These independent devices may be occupancy sensors, wireless thermostats or smart locks. At this level, wireless communication protocols such as Zigbee and Bluetooth are standard and should be supported by the BMS. Zigbee is great for porting low data rates with low power consumption, while Bluetooth aims at optimally connecting mobile devices and sensors that are in close proximity. Effective BMS systems are engineered for scale when it comes to integrated IoT devices. Increasing the number of data measurement points can improve decision making, control schemes, and predictions. But the system's controllers need to be able to handle the growing number of devices feeding data into it in real-time. This is another comparison point when evaluating vendors.

IT protocols

Effective, modern building management systems should not only communicate with common OT and IoT-related open protocols at the level of sensors, actuators, and field/building controllers, but also with standard IT protocols at the level of business systems, cloud, and 3rd party applications. Schneider Electric, for example, uses web services. This is a standard that is hardware, operating system, and programming language independent. Web services, a form of an Application Programming Interface (API), facilitates interaction between two machines. It is used to connect one BMS system to another system such as an electrical power monitoring system (EPMS) or to another BMS at another site. It also is used to connect to 3rd party business systems such as billing, room reservation systems, analytics applications, etc (See **Figure 3**). In practical terms, it allows the BMS to easily consume data via standard SOAP and REST services (both rely on well-established rules for exchanging information.) This is ideal when integrating with a third-party device with a pre-existing web interface.

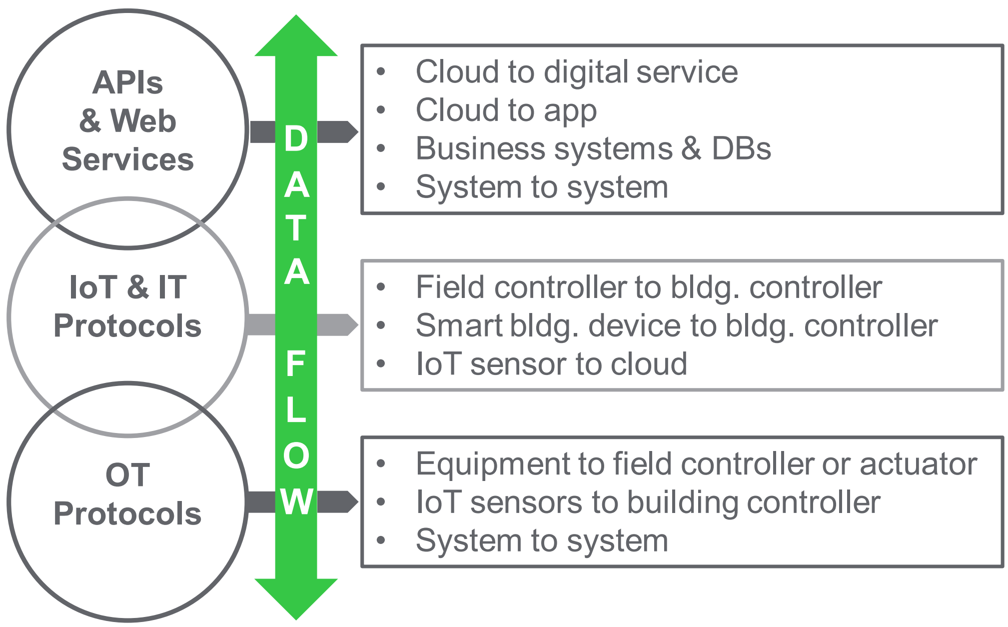

Figure 3
Today's modern next generation BMSs act as an aggregator using a variety of standard open protocols from the device to the cloud.

Not only should open protocols be supported, but the vendor should make the BMS capable of incorporating legacy systems and devices not supporting open protocols when required by the owner. For the occasional unsupported device, effective BMS vendors offer a means by which a driver or "translator" can be developed so that those systems or devices using the unsupported protocols can now be monitored and controlled. This capability helps particularly when there is older legacy gear that is not being be replaced. More open vendors maintain and share a public library of validated applications and drivers. These are pre-existing and tested which provide an easy means to create new integrations between systems that don't speak the same language.

An open integration platform not only needs to bring data together as described above, but it also needs to make sense of the data by giving it context. This is crucial for enabling better analytics, process optimization, and AI. The ideal scenario is that the BMS is automatically applying a concept called semantic tagging to building data, making information easy to interpret and orchestrate. Semantic tagging is a process of attaching contextual information to a piece of raw data. For example, a sensor within a BMS system may be "tagged" with information about its location in the building and the type of equipment it sits in is available along with the measured sensor output. This additional information allows more sophisticated correlations and queries to be made between classes of data. For a more detailed discussion of semantic tagging see White Paper 501, A Framework for Defining Openness of a Building Management System (BMS).

Note that the more open, connected, and broad nature of modern next generation BMS systems increases the need to focus on cyber security. This is another evaluation point upon which to compare vendors of BMS solutions. Choose vendors who prioritize security in the design, implementation, and support of their offers. Choose vendors who follow the Secure Development Lifecycle (SDL) approach in the management of their software and device firmware. It is important to embrace and apply the cyber security guidelines and best practices defined by IEC 62443 and relevant IT focused security standards from organizations such as the National Institute of Standards and Technology (NIST). For a more detailed discussion on how to secure cloud-connected building management systems, see Schneider Electric White Paper, "A Practical Framework for Cyber Secure, Cloud Connected Smart Building Control Systems".

#2 Leverages cloud computing for analytics and AI-driven digital services

Cloud computing has revolutionized the IT industry bringing lower costs, unlimited scalability, improved resiliency, mobility, ease of management and maintenance, and so on. It is a core component of the world's overall computing architecture today. Next generation building management systems benefit from it as well. We propose that an essential element of a next generation BMS is the use of cloud computing technologies and services, either public or private.

The cloud is either necessary or is the preferred means for providing **several important building management capabilities and functions including:**

- An unlimited repository for storing, backing up, and integrating massive amounts of OT device and system data that was previously siloed
- A secure means for trusted partners or vendors to remotely and proactively monitor building equipment and systems as a service ("digital services")
- Enablement of "big data" analytics and machine-learning algorithm training that leads to valuable insights, predictive maintenance, and control automation
- Provides visibility, alarm & data consolidation, and aggregated reporting across multiple, geographically dispersed sites allowing FMs to effectively manage fleets of buildings
- A cyber secure[5] means for third party app development

[5] Schneider Electric White Paper, "A Practical Framework for Cyber Secure, Cloud Connected Smart Building Control Systems"

In short, cloud computing provides the fundamental foundation needed to make a BMS less manual and reactive in nature, to being more predictive and ultimately more automated. It provides the means by which a BMS can benefit from data analytics and artificial intelligence technologies that are continuing to grow and mature over time. For example, today some vendors like Schneider Electric can integrate occupancy sensor information with building management data in the BMS's native cloud platform to automate building controls based on its occupied state. It is a smarter mode of operation. The same integration of occupancy sensors with the cloud platform provides detailed space usage analytics that can be cross-referenced with important health indicators like CO2 and volatile compound levels. This again provides more intelligence to the facility manager as she makes trade-off decisions about the space in the building.

Although we are only in the early stages of the application of AI in buildings management, predictive analytics capabilities are available today. Digital models (or a "digital twin") of an HVAC system in virtual environments can be created and used to compare with your actual HVAC performance in real time to identify abnormal behavior that might be leading to an eventual fault or failure.

Another example available today is a sort of predictive maintenance dashboard or score card. The BMS software interface displays a list of monitored equipment sorted by health or by issues detected based on risk to system availability. It can show what is at risk or what might be affected if the system in question goes offline. It can even calculate a financial value of the risk if it is not addressed, thereby helping to justify equipment maintenance or upgrades.

See White Paper 502, How AI can Impact Buildings to Become More Autonomous, to understand the critical success factors for enabling AI in buildings, use cases (present and future), and the challenges building owners will likely encounter and how to overcome them.

#3 Designed for mobility

Today, employers and building owners want a deeper engagement with their "mobile first" tenants, occupants, and customers. Employees, hotel guests and university students, for example, want easy access to information and the ability to interact with it. They want and expect some level of control and easier ways to complete tasks. A next generation building management system should offer mobile apps and services to meet these needs.

Occupants will expect an easy mobile experience that gives them information, but also some control over their surroundings. A BMS-supported workplace mobile app could enable, for example, a user to request a new comfort setting (temperature, lights, window shades), use their device for area access control, book a conference room, communicate with the IT helpdesk, benefit from wayfinding, and file a ticket for maintenance via their mobile device of choice.

Being "designed for mobility", however, is not just about allowing tenants to easily interact with and control their surroundings. It is also about the BMS software interface for the operator being able to be accessed and controlled from anywhere, at any time by facility managers, maintenance staff, and trusted third party service providers.

Mobile applications can make maintenance more operationally efficient. For example, a long-standing need of facility managers is to have access to effective dashboards with visual updates and real-time status against key performance indicators.

They should be able to access that information anywhere, on any device. These dashboards could be just for a single local site or the dashboard could be at the cloud level – accessible from any web browser – providing a view across all sites individually or in sum. Another example is a technician commissioning equipment within a building. She will benefit from mobile applications that allow her to tune set points via a mobile interface, rather than needing to leverage a computer at each site. The technician benefits from checking the health of equipment remotely via their mobile device as it limits the need to go into the building and reduces the manual process of hauling out ladders and climbing into the ceiling to accomplish the same. **Figure 3** shows a screenshot of an example of a mobile commissioning app for BMS field controllers.

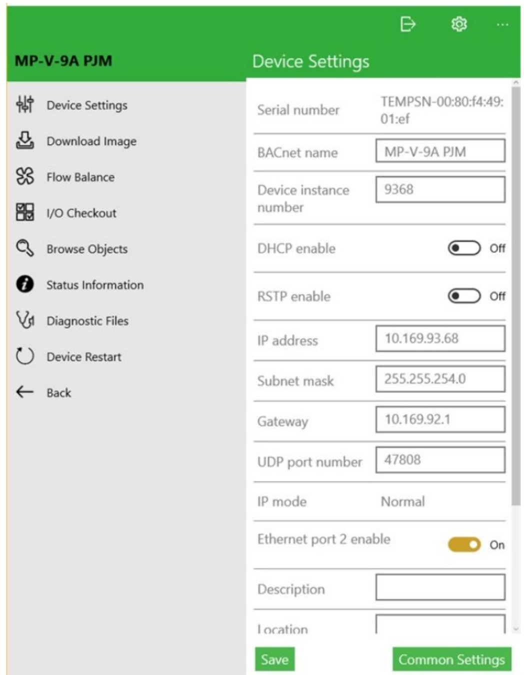

Figure 3
A screenshot of Schneider Electric's eCommission SmartX Controllers mobile app

A next gen building management system, as described previously, will be based on an open, integration platform. This provides the means for mobile BMS application development. This open app platform allows mobile services to be made available to many different building personas and creates opportunity for innovation by enabling 3rd party app development. The BMS's central role is to aggregate all of the data, securely store it, normalize it, and analyze it. It is upon this – either the data lake in the cloud or locally at the building controller level – where app development is done. In the end, the BMS should be able to easily extend information to a managed mobile application framework, refining services over time based on the changing organization needs. Like any app, these BMS apps should be available via Apple, Google or private app stores for easy consumption by the users. The flow of data between the building and the mobile solutions must be secure by using data encryption and be GDPR compliant.

Mobile interfaces are a required step to delivering a digital transformation in buildings. They make work easier for people caring for buildings, curate a closer connection to the building occupants and create more efficient communication methods between all personas. They allow the facility manager or building owner to get access to usage data by persona, location, service and device. This "human experience data" is a rich addition to the data integrations discussed previously in the paper.

A BMS designed for mobility fundamentally makes building management simpler. When you empower occupants with self-service building apps, you make life easier for the facility operations team. Digital services like remote monitoring apps frees up people to be anywhere while still having control over operations. Combine this with cloud analytics and building management becomes more proactive and intuitive.

Supporting future technology evolution

Implementing the right building management system as described in this paper means a building will be more energy efficient, easier to maintain for the facility manager, and more compelling for its occupants than it would be otherwise. But equally as important, o to evolve and grow over time. Here are 3 examples of emerging technology trends that next generation BMSs will capitalize on or help facilitate:

1. **Digital Twins** are software representations of the equipment and physical space in a building. They can be valuable in both construction and operations for better maintenance and change management but have been slow to gain traction as aggregating data from building systems silos is traditionally cumbersome. A building management system designed to be an open integration system with native cloud connectivity paves the way for more scalable creation and dynamic maintenance of Digital Twins
2. **Artificial Intelligence** can yield valuable insights and even lead to full automation of building systems. Advanced models could allow for autonomous control of the building which has been shown to be more effective than rules-based HVAC controls for energy efficiency, for example. Natural language processing will enable FMs and occupants to interact with building systems in a completely new way. Data orchestration will continuously optimize processes and enable self-adaption of building systems to meet the needs of people/environment. Like Digital Twins, AI is not mainstream in buildings today, and a big reason why is the difficulty of normalizing and accessing the many different sources of data needed to train and implement it. A building management system with the characteristics described in this paper is a huge step toward unlocking an AI-enabled future.
3. **Grid Efficient Buildings** are defined by the US Department of Energy as those with “next gen sensors, controls, connectivity and communication.” The vision for these buildings is that they give the occupant a better experience while also benefiting the electric grid and balancing the supply of renewable generation. A next generation building management system is prepared to fill this need and coordinate with other sophisticated cloud-based software (such as ADMS) to optimize across community eco-systems.

This paper proposes that the attributes of a building management system have become increasingly complex over the decades, largely as a result of societal pressures and available technology. Here, we emphasize that a BMS designed to be an open integration platform, with native cloud connectivity and mobile accessibility is a key to unlocking access to other emerging digital technologies. The ultimate goal in pursuing all of this, of course, is to make operations and management of a building simpler, more proactive, and eventually more automated.

Conclusion

The evolution of BMSs is driven by pressure to improve energy efficiency, changing occupant expectations, and the existence of newer IT and smart building technologies. Expanding from simple HVAC controls to being a smart building integration platform, next generation BMSs are a critical tool for operating the entire building – or even fleets of buildings - safely, efficiently, reliably and in a human-centric manner. A next generation BMS enables you to take advantage of powerful new technologies that will simplify and improve management and control capabilities by being more proactive and eventually automated. Choose a vendor who embraces the architecture and vision laid out in this paper which yields a BMS that is:

- Based on an open, integration platform
- Leverages cloud computing for analytics and AI-driven digital services
- Designed for mobility

A next generation BMS puts you on the right path for solving the challenges of today and the future.

About the author

Patrick Donovan is a Senior Research Analyst for the Science Center at Schneider Electric. He has over 25 years of experience developing and supporting critical power and cooling systems for Schneider Electric’s Secure Power Business unit including several award-winning power protection, efficiency and availability solutions. An author of numerous white papers, industry articles, and technology assessments, Patrick's research on data center physical infrastructure technologies and markets offers guidance and advice on best practices for planning, designing, and operation of data center facilities.

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