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STATE OF
PROPERTY OPERATIONS &
MAINTENANCE SOFTWARE

A landmark study identifying key opportunities in BAS
operations and O&M software.

BY JAMES DICE & RAJAVEL SUBRAMANIAN

facilio

James Dice

James Dice, PE, CEM, CMVP is the founder of Nexus Labs, a weekly blog, podcast, online school, and consultancy striving to create smarter, more efficient buildings. Nexus Labs does not endorse products or companies. Our goal is to help tell remarkable stories that will educate and move the industry forward.

Email: james@nexuslabs.online

Rajavel Subramanian

Rajavel Subramanian is the co-founder and CPO of Facilio. He heads Facilio's product strategy and is committed to making it easier for property stakeholders to maintain and operate large real estate portfolios spread across geographies. Raj's career spans over 20 years of product and revenue operations focusing on enterprise-scale telecom, and IoT solutions. He is passionate about leveraging cloud-based solutions to solve operational challenges at the portfolio scale and transforming the future of building automation.

Email: raj@facilio.com

State of Property O&M Software

A fundamental reboot of property operations and maintenance

My own theory is that we are in the middle of a dramatic and broad technological and economic shift in which software companies are poised to take over large swathes of the economy. More and more major businesses and industries are being run on software and delivered as online services— from movies to agriculture to national defense. Many of the winners are Silicon Valley-style entrepreneurial technology companies that are invading and overturning established industry structures. Over the next 10 years, I expect many more industries to be disrupted by software.

Why Software Is Eating The World
by Marc Andreessen, August 20, 2011

Marc Andreesen wrote his famous essay, **"Why Software Is Eating The World"**, almost ten years ago. And he was right—software has eaten the world. Across almost all industries, the leaders are all software companies. Amazon digitized books and became The Everything Store. Netflix replaced DVDs and Blockbuster. Even Tesla, a car and battery manufacturer, considers themselves a software company at heart. The examples of software-driven disruption go on and on.

However, there's at least one industry that hasn't been fully disrupted by software yet: real estate operations, especially the operations & maintenance (O&M) of buildings. The building O&M industry plays a massive role in our lives, even if it's behind the scenes. We spend over 90% of our lives in buildings. Buildings are where we eat, sleep, work, play, recreate, get entertained, and buy our goods. O&M teams are tasked with keeping these spaces healthy, productive, comfortable, sustainable, safe, efficient, and well-maintained.

Recent trends are only adding to the already long list of O&M responsibilities and increasing the expectations of key stakeholders, such as building owners, tenants, occupants, and governments. Whether due to the COVID-19 pandemic, corporate commitments to curb climate change, more complicated building systems, or more demanding occupant expectations, O&M teams around the world are being asked to level up their performance.

As the capabilities of technology have advanced and expectations have risen, a large gap has grown between what O&M teams need and what their currently deployed software tools are capable of. Most buildings are managed with 1990s technology and spreadsheets. Given the progress that software has made in other industries, it's hard to escape the feeling that there must be a better way.

> This whitepaper presents an analysis of the current state of software in building O&M and the barriers for technology adoption. It explains the possibilities that can be unlocked with modern software and suggests a viable strategy for real estate owners and operators to unlock that potential. Co-authored by James Dice, Founder, Nexus Labs, and Raj Subramanian, Co-founder and CPO, Facilio, this paper presents insights and observations based on the changing real estate technology landscape and backed by learnings from working closely with the industry.

Current State of O&M Software

The O&M technology & software landscape, and the resulting user experience, is extremely complex, decentralized, and fragmented in terms of data, applications, and services. For example, there are core building systems like HVAC, lighting, fire safety, or surveillance with their own dedicated software, standalone edge devices with embedded intelligence, separate software (or spreadsheets & paper notebooks) for every functional need, smart sensor systems that are becoming commonplace, and more.

As a result, valuable data is vastly dispersed and fragmented across disparate systems, software, and service providers. Data is often locked away or not readily accessible for the O&M teams, with vendors and contractors being the gatekeepers of data. This bottleneck, along with the lack of integration between applications, means O&M teams lack real-time visibility into their operations and their processes tend to be reactive rather than proactive.

The problem of silos

The unfortunate state of software in building operations can be attributed to the number of data, application, and service silos at various levels. The more siloed the O&M software is in a portfolio, the more complexity is required for efficient people and processes. There are at least three levels of O&M silos when viewed from the context of a real estate portfolio.

1. System silos: These are disconnected systems within buildings, e.g., HVAC, lighting, fire, metering, elevator, surveillance, access control to name a few.

2. Building silos: From a portfolio context, each building can be siloed and disconnected from other buildings with its own internal systems.

3. Functional silos: At either the building or portfolio level, there could be independent systems for each functional need, e.g., Computerized Maintenance Management System (CMMS), tenant billing, energy management, capital planning, etc.

System silos

System-level silos have their roots in the building design and construction process. Building designers have not historically put much focus on holistic, integrated technology design, so all the different systems in the building—such as HVAC, lighting, elevators, fire safety, metering, access control, etc.—come with separate specifications, contractors, manufacturers, and service vendors. As a result, building owners and operators are left with siloed systems that were intended for vendors and service providers, not O&M teams.
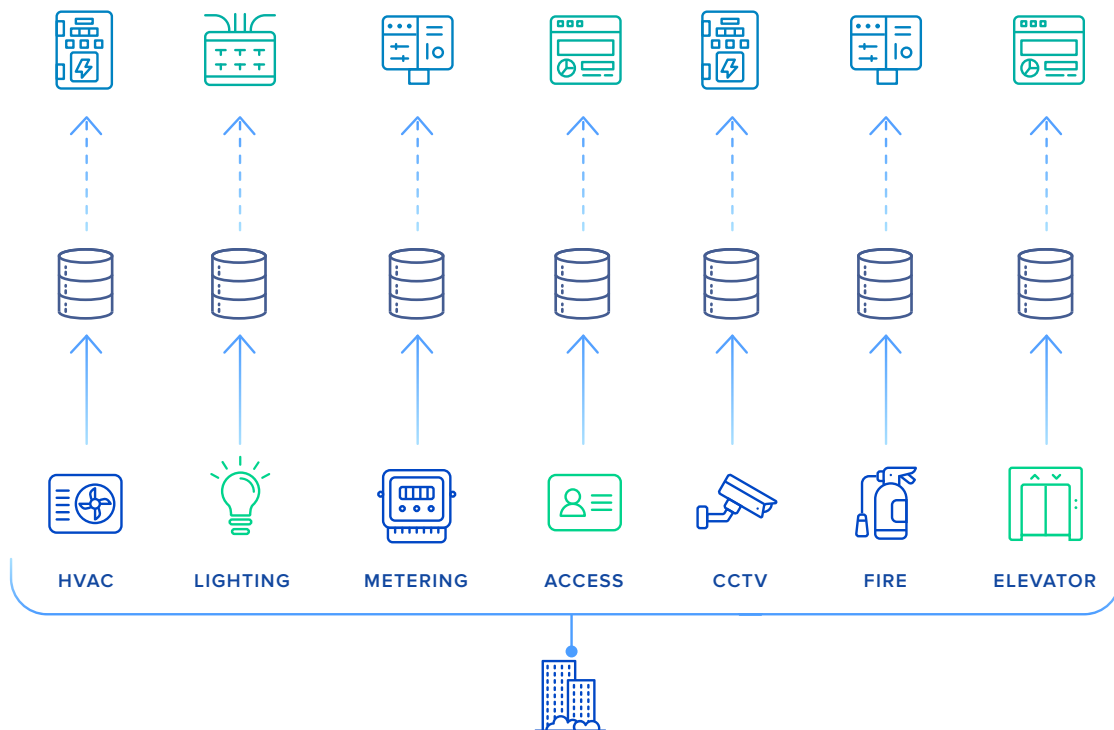

Fig 1.1. Complexity and system silos in each building in your portfolio

Many of these systems come with dedicated hardware, management software, operating systems, firmware versions, licenses, and more that add to the complexity. In addition, since newer O&M priorities, such as energy efficiency and sustainability, depend on multiple silos working together, system silos keep O&M teams from meeting increasing expectations.

Building silos

From a portfolio perspective, each building in the portfolio often forms a new silo. Rarely are building-level systems integrated into a single portfolio-level application. Even in cases where the same vendor solutions are deployed in different buildings, there is no standardization in data format or interoperability, which makes it difficult for O&M teams with portfolio-level responsibilities to view and assess performance.
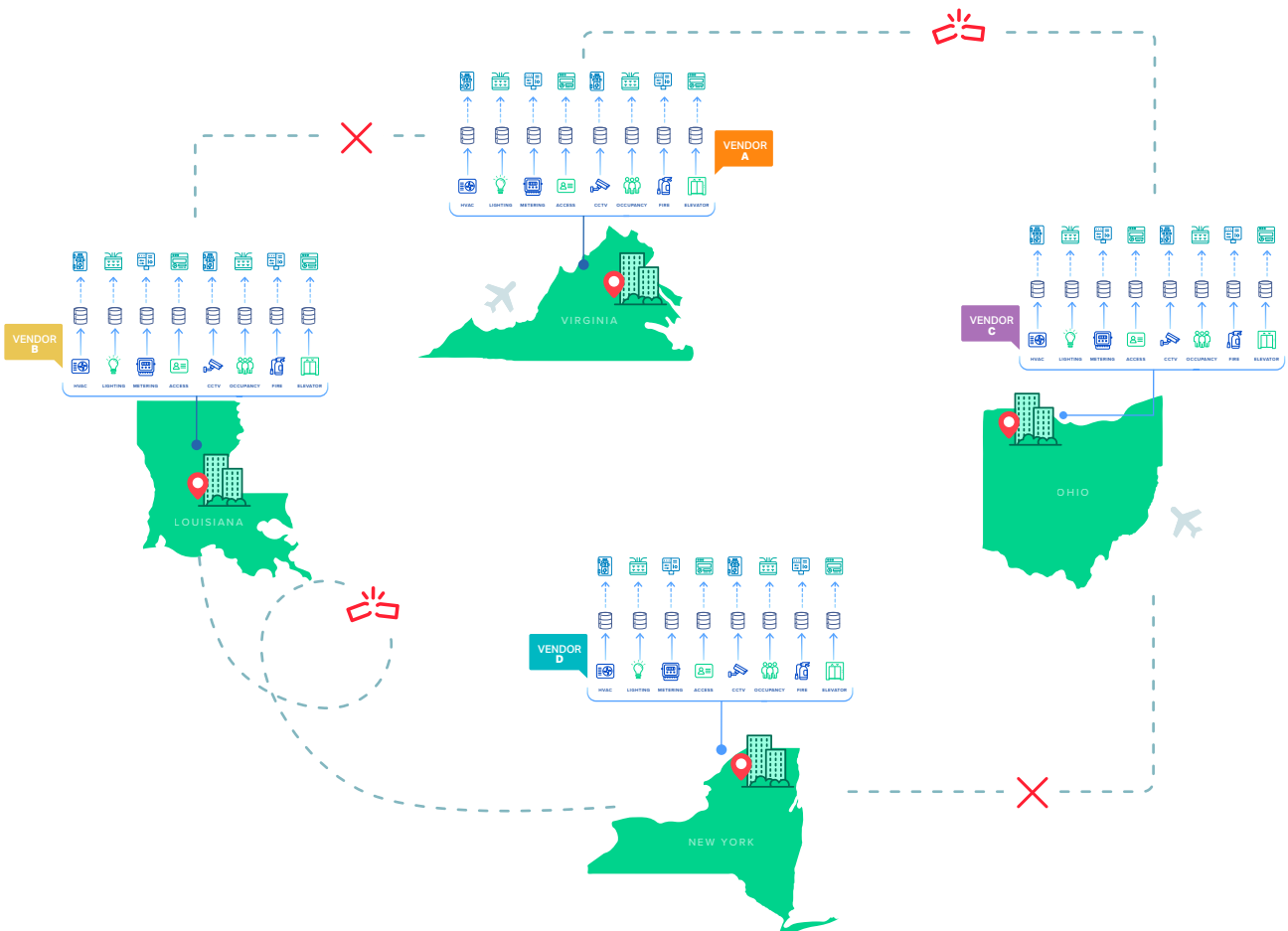

Fig 1.2: System and functional silos across buildings in a portfolio

As a result, it becomes time-consuming or even impossible for property stakeholders to surface meaningful operational insights across buildings.

Functional silos

Besides relying on the core building systems discussed previously, O&M teams have come to use different applications for functional needs like maintenance management, energy management and reporting, asset performance monitoring, tenant or occupant engagement, and billing & expense management, to name a few. While these functional silos usually get deployed across a portfolio, it's not uncommon to find them being further siloed at a building or regional level, further adding to the complexity. Today, to execute their numerous responsibilities and workflows, operations teams juggle multiple software solutions:

- Computerized Maintenance Management System (CMMS)

- Energy Information Management System (EMIS)

- Environmental, Social, and Governance (ESG) reporting software

- Measurement & Verification (M&V) software

- Tenant utility billing software

- Capital planning software

- Property management software

- Tenant & occupancy engagement/servicing

- Vendor management software

- Fault detection and diagnostics (FDD) software

- Visitor management software

- Demand response management

- Occupant experience & amenities

With so many balls to juggle, O&M stakeholders find their core daily workflows to be inefficient, confusing, full of task switching, and difficult to keep up to date. Managing this complexity takes away from, rather than enhances, O&M teams' ability to operate and maintain their buildings. It's no wonder they fall back on spreadsheets and clipboards.

Limitations imposed by the silos

Due to the lack of integration and the dispersed nature of data across system, building, and functional silos, building owners and operators lack visibility into their operations and the flexibility to modify processes to improve efficiency. This siloed, disconnected technology stack imposes several limitations on O&M teams:

1. Data lock-in and dependence on vendors and service providers

First and foremost, the data created inside the different silos is often locked away despite the value it could provide to the portfolio's stakeholders. Furthermore, many of the applications across these silos are closed systems that lack interoperability features. As a result, owners and operators are left to rely heavily on vendors & service providers, who serve as gatekeepers of their precious information on each silo. For example, real-time occupancy data from access control systems or turnstiles could be useful in energy management & optimization software, but the data is not readily available. These lacks mean O&M teams become reactive, less nimble, and blindsided with partial or outdated information to inform key decisions.

2. Unmet stakeholder needs

Second, while the people running a building or a portfolio of buildings are expected to work together as a holistic team, their software tools are single-purpose, disconnected, and designed to be used by only a single persona. Any application is rarely useful outside the scope of its silo or to anyone other than the stakeholder it's meant for. This means most stakeholders must use too many systems. They must also live with error-prone, inefficient manual workflows for coordinating with other teams.

For example, consider the case of after-hour scheduling requests from tenants in commercial buildings. Building managers have to process tenant requests from a work order system, notify the building technicians or contractors to modify HVAC and lighting schedules in BAS, and then, using a billing software, bill the tenants post-usage. Also consider portfolio-level stakeholders, for instance, the Director of Engineering who wants visibility into HVAC performance across buildings. BMS software does not cater to their needs because it is meant to serve the purpose of building technicians alone.

3. Barriers for innovation

Finally, for O&M teams striving to keep up with demanding owner & occupant needs, deploying new technology is an uphill battle. Even when it is deployed, new technology is usually added on as another silo, compounding the complexity. Suppose, for example, that you want to deploy new Indoor Air Quality (IAQ) or people-counting sensors to ensure safety in indoor environments. Because of the hardships in integrating data from these sensors in BAS, especially when there are so many BAS silos in a portfolio, you must deploy those sensors as standalone systems with their own management software, adding yet another functional silo. Extending this siloed architecture to support new capabilities is impossible without integrating some, if not all, of the siloed systems into a new architecture.

Solving the silo problem

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The industry has seen attempts in the past to solve the problem of silos in real estate portfolios. While it may not be practical or even necessary to integrate all of the silos in a portfolio into a monolith application, there are smart ways to reimagine the O&M stack to eliminate the silos and the limitations they impose.

Depending on context, O&M teams can prioritize which silo problems to address, and then focus on specific systems, buildings, or functions instead of using an all-in approach. Since new systems and buildings will be added to the portfolio, and because functional O&M needs evolve over time, fixing silo problems is an ongoing rather than a one-time exercise. The solution, therefore, needs to be flexible and extendable, and without the limitations prevalent in incumbent O&M offerings.

To address the silo problems discussed in this paper, look for the following attributes in possible solutions:

1. Data sharing - the solution has to unleash the data consolidated across silos by enabling access to data for the different stakeholders and the applications that need it.

2. Consolidation - the solution has to consolidate software functions across silos to remove complexity for stakeholders currently dealing with multiple silos.

3. Interoperability & openness - the solution has to offer open APIs and interoperability features that allow for integrating new silos or applications.

In many ways, these attributes are related; they are commonly found in modern application architectures prevalent in other industries or domains.

The Overlay Approach

When thinking about eliminating silos in existing buildings, it's impractical to rip and replace existing hardware & software with a new alternative. While rip and replace may be an option in new construction projects, it will not work across a portfolio. Practically, the new solution has to solve the problem of silos by integrating with existing systems in the portfolio. The most efficient way to accomplish this is by using "overlay" software. An overlay software by definition will "sit on top of" existing systems or applications to allow access to data and functionality from the underlying systems. For overlay software to eliminate silos, it should work across multiple underlying systems and silos.

While it is possible to think of the overlay software at a building level (overlaying systems in buildings the way an Integrated Building Management System IBMS does), the overlay approach is most useful in solving the problem of building silos for one or more systems in a portfolio context. An overlay solution can unify the software functionality specific to a building system across the portfolio, thereby eliminating building silos for that particular system. And by doing so, the overlay solution brings operational data from those systems across buildings to a single place, which can then be used for different stakeholder or application needs. Henceforth, unless otherwise noted, when this paper mentions overlays, it speaks to solutions that solve for building silos in the broader portfolio context.

Overlay architecture

Overlay software by definition must integrate with underlying systems and consolidate geographically dispersed systems. Hence a distributed cloud architecture lends itself well to this cause, wherein a remote/edge component enables integration with building systems and then connects to a centralized application hosted on the cloud (either private or public). This architecture can easily scale across a portfolio to remove building silos and, depending on the design and features of both the edge and cloud components, can remove system or even functional silos.

The Edge

The edge component of the overlay architecture can be a simple software that supports integration with underlying building systems. This software can be deployed in a standard compute infrastructure like a virtual machine or an industrial PC or gateway: all it needs is access to the local network, controllers, devices, and systems it integrates with. With connectivity to the cloud layer, the edge layer can seamlessly transmit real-time data to cloud applications.

An IoT gateway can also be used to host this software and provide connectivity to the cloud in a plug and play manner. Depending on the solution, the edge layer can support protocols like Bacnet IP, OPC, Modbus IP, Lonworks, etc., and specific application integrations with vendor systems and databases. The integration can be one-way or bi-directional, thus enabling either or both monitoring and control of the underlying systems.

The Cloud

The cloud is the centralized layer that manages connectivity to the edge, consolidates data from it, and offers applications the ability to enable multiple stakeholder use cases: these applications can be hosted either in a public cloud infrastructure like AWS, Azure, GCP, etc., or a private cloud within an enterprise data center.

The rapid adoption, growth, and commoditization of cloud & edge technologies in recent years mean the cost-benefit equation has turned to favor the consumer. The cloud-based enterprise software space has also seen large-scale innovation in data analytics, application integration, messaging, low code extensions, etc. that lends itself well to solving many of the challenges in the real estate O&M space.

One important but often-overlooked component of the cloud layer is a common data model. Today, each silo represents data in its own unique way. There's the name of each data point (e.g. Discharge Air Temperature vs. Supply Air Temperature vs. SupAirTemp vs. DAT) and the context of each data point: what it represents, what equipment it connects, what system the equipment belongs to, what space it's in, etc. The software overlay must unite all silo data into a common taxonomy and ontology.

How modern overlay software can close the silo gap

An overlay solution can add value to O&M teams primarily in the following ways:

1. Consolidated operational data: Overlays democratize operational data by consolidating into a single place

2. Consolidated software functionality: Overlays optimize operations by offering software functionality across silos from a single interface

3. Enhanced stakeholder value & operational efficiency: Overlays unlock value for more stakeholders and enable use cases to improve O&M processes

Consolidated operational data

The first value of the overlay is that it frees up data and gets previously siloed systems talking to each other. Building owners realize that their data has immense value, and, to improve operations, require that it be freed up. The key to allowing data-driven services and operations is to pull the data out of each silo and into a single place to make it useful for many workflows and stakeholders. Data consolidation is crucial because building operations happen across silos and most O&M workflows require data from multiple silos.

Occupancy data is a great example. It can be used for many different things: more efficient HVAC and lighting schedules, tailored ventilation control, space management, social distancing enforcement, occupant engagement, and more. In most buildings today, occupancy data is locked away in one of the silos and hence is of limited use. It might be in the BAS, which is where the occupancy sensors are plugged in. Or the lighting control system. Or the access control system. Or some new IoT solution like the Density platform. As long as occupancy data is in just one system, its value is limited as its usage context is specific to the functionality of that system. Now multiply that limitation across an entire portfolio of buildings. The overlay has the potential to unlock all of that value across the enterprise.

Consolidated software functionality

Once all operational data is centralized, the redundant software functionality from each silo can be consolidated, too. Before consolidation, O&M teams had been expected to log into multiple systems across silos to access different software applications—a major tax on their productivity. To make matters worse, those software systems could be dispersed across corporate networks with local user authentication processes. In that case, managing network and application access for the people that need to log into each system adds another layer of inefficiency.

With the data centralized in the cloud and local two-way communication with each silo established, it's easy to imagine some or all of the software functionality of the silos being supported from the overlay software. Think of an unified BMS software for the entire portfolio, a portfolio BAS overlay. It could handle user authentication and authorization for different users by restricting access to data & features based on their scope. With more users across the O&M organization now being served by a single application, there is more scope to enable workflows and interactions that weren't possible with siloed applications. Also, since many of these overlay systems are built with the latest technologies, users reap the benefits of web & mobile-based access to the software and an improved user experience compared to the desktop applications they're used to.

Enhanced stakeholder value & operational efficiency

When an overlay solution is deployed, it unlocks values greater than the sum of its parts. By virtue of having all of the data and users across the silos in a single place, an overlay software is situated to expand its functional scope beyond the realm of the traditional use cases supported by underlying silos, offering enhanced value to O&M stakeholders.

This enhanced value can be looked at from the lens of data & functionality. With all data in a single place, overlay software is ideal to either offer or enable:

1. Data analytics & business intelligence: Overlay software can enable analytics, reporting, benchmarking, and real-time visibility into the data it holds.

2. Data mediation for 3rd party applications: For any application that needs data, it becomes possible to serve it up from a single place - without the integration bottleneck O&M teams face every time they have to do so. Imagine the ease of automating tenant billing, energy management, or ESG reporting if utility and submetering data across the portfolio is consolidated in an overlay.
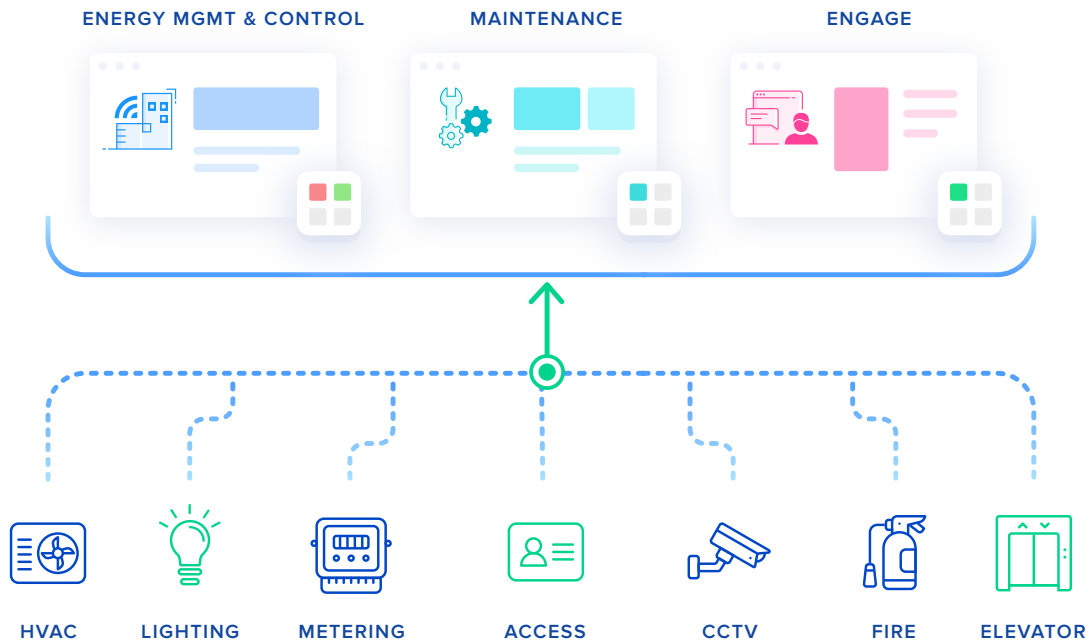
ENERGY MGMT & CONTROL　　**MAINTENANCE**　　**ENGAGE**

HVAC　　LIGHTING　　METERING　　ACCESS　　CCTV　　FIRE　　ELEVATOR

Fig 2.1: Data mediation for 3rd party applications using overlays

3. Functional consolidation: Once all stakeholders have data access from a single place, they'll want more of their functional needs enabled by the same application, which helps the consolidation to some extent. For example, in cases where there is a portfolio BAS overlay, IAQ sensors won't happen as a standalone deployment. Instead, IAQ data would be integrated into the overlay solution and a contextually integrated IAQ monitoring app provided for stakeholders as part of the same solution. Updates on IAQ could be pushed to the occupant engagement app, while an IAQ-optimized control sequence could be pushed down to the HVAC system. This is why an overlay solution needs to be extensible (platforms vs applications) or lend itself well for integrations with adjacent applications (single sign-on, best-in-class interoperability features, etc.).
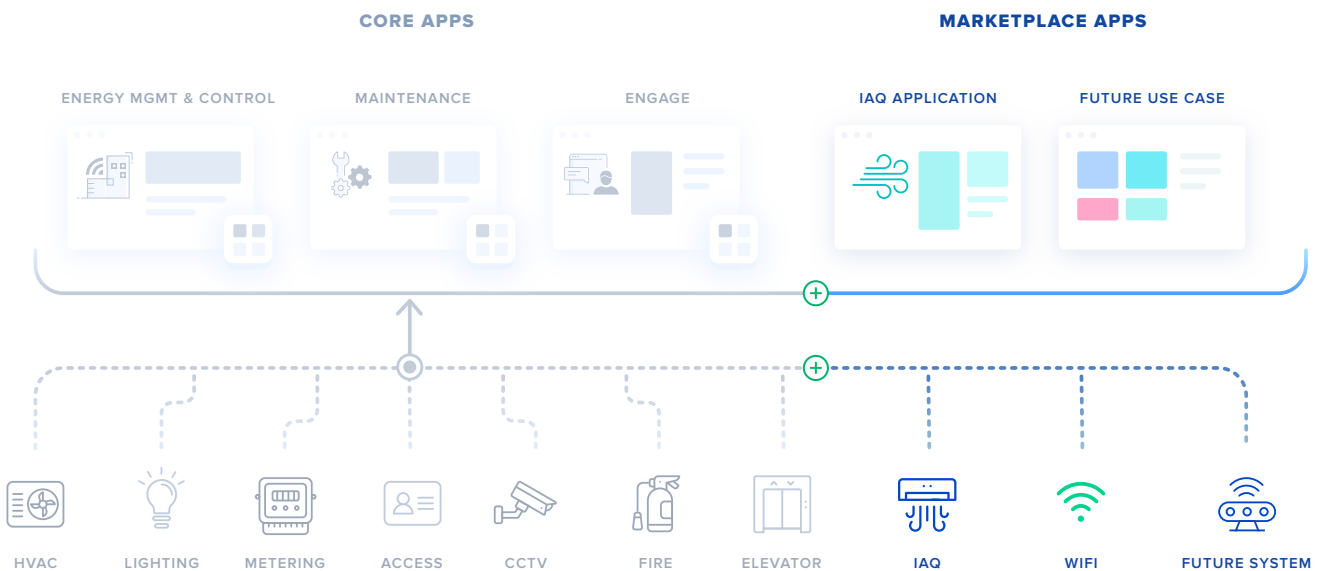
CORE APPS　　　　　　　　　　　　**MARKETPLACE APPS**

ENERGY MGMT & CONTROL　　MAINTENANCE　　ENGAGE　　IAQ APPLICATION　　FUTURE USE CASE

HVAC　LIGHTING　METERING　ACCESS　CCTV　FIRE　ELEVATOR　IAQ　WIFI　FUTURE SYSTEM

Fig 2.2: Overlay architecture that is extensible for future needs

These features may seem like a big leap compared to the incumbent O&M systems in the industry today. In reality though, it's not a lot to ask, and most modern, cloud-based applications support interoperability, data analytics & visualization features by default.

Types of Overlay Software

Overlay solutions come in all shapes and sizes. The offerings vary by scope, functionality, stakeholder use cases, user experience, and overall sophistication. The overlay can be a simple tool, an application, a platform, or anything in between. It can partially or completely eliminate the problem with one or more silos. This section presents a broader classification of overlays, including the following common overlay types and how they solve the problem of silos:

1. **Building overlay:** overlay that closes gaps at the building-level

2. **System overlay:** overlay that connects a single system across the portfolio

3. **Functional overlay:** overlay that meets the needs of certain organizational functions

4. **Data overlay:** overlay that consolidates and mediates data across the portfolio

5. **Hybrid overlay:** overlay that combines multiple types of overlays, ideally all four, in a single solution

Building overlay

A building overlay connects different building systems present in a single building, for instance HVAC, metering, access control, fire safety, elevator. An example of the building overlay is the traditional Integrated Building Management System (IBMS). Other examples include Building Information Model (BIM), a digital twin solution that integrates real-time data from building systems. Building overlays may be suitable for large buildings with dedicated O&M teams whose responsibilities rarely go beyond the scope of the building itself. The industry has also seen many case studies of overlay solutions built by MSIs, vendors integrating various systems and offering consolidated functionality for users at the building level.
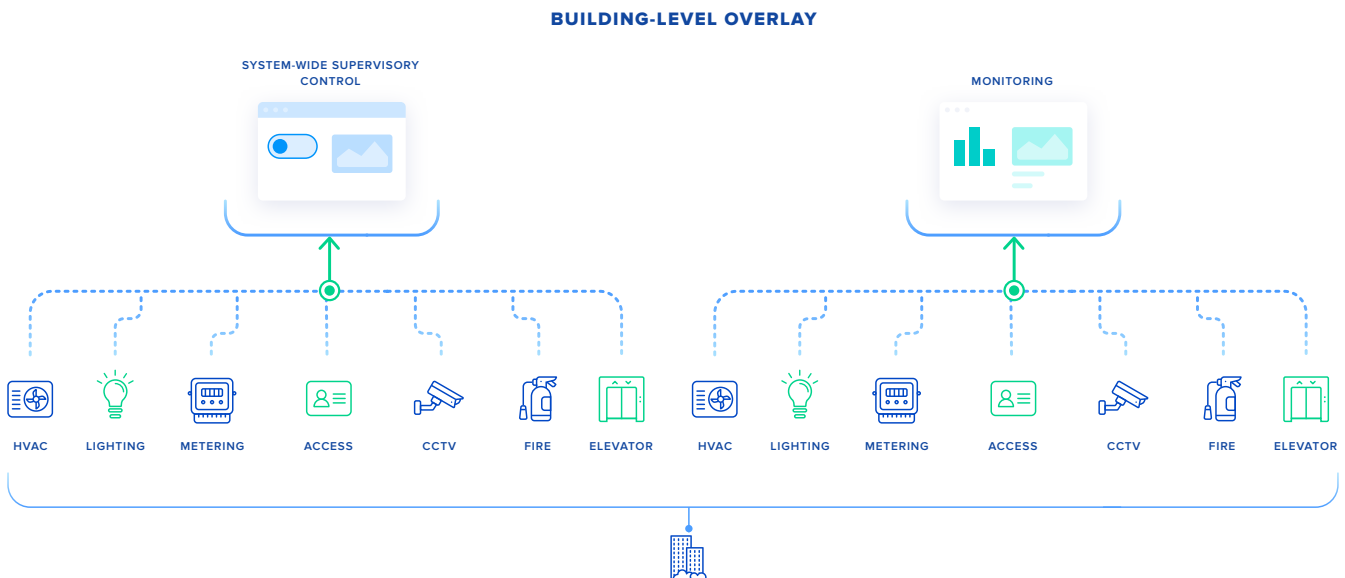
BUILDING-LEVEL OVERLAY

Fig 3.1: Building-level overlay that connects various systems in one building

SCOPE

- Connects with different systems in a single building
- Supervisory controls, unified monitoring and alarm management, system optimization or simulation for energy efficiency, comfort etc.

EXAMPLES

IBMS, BIM or Digital Twin solutions

System overlay

System overlay solutions connect to one (or more) systems across buildings and offer a unified solution at the portfolio level. An example is a BAS or surveillance system overlay that consolidates all data and functionality across buildings in a unified solution. One of the traditional approaches to system overlay solutions has been to apply the same application built for a building system, say BMS, to a portfolio by setting up an IT network and communication infrastructure across the portfolio. System overlays solve an important problem at the portfolio level and are especially useful in scenarios where O&M teams work across buildings in a portfolio.
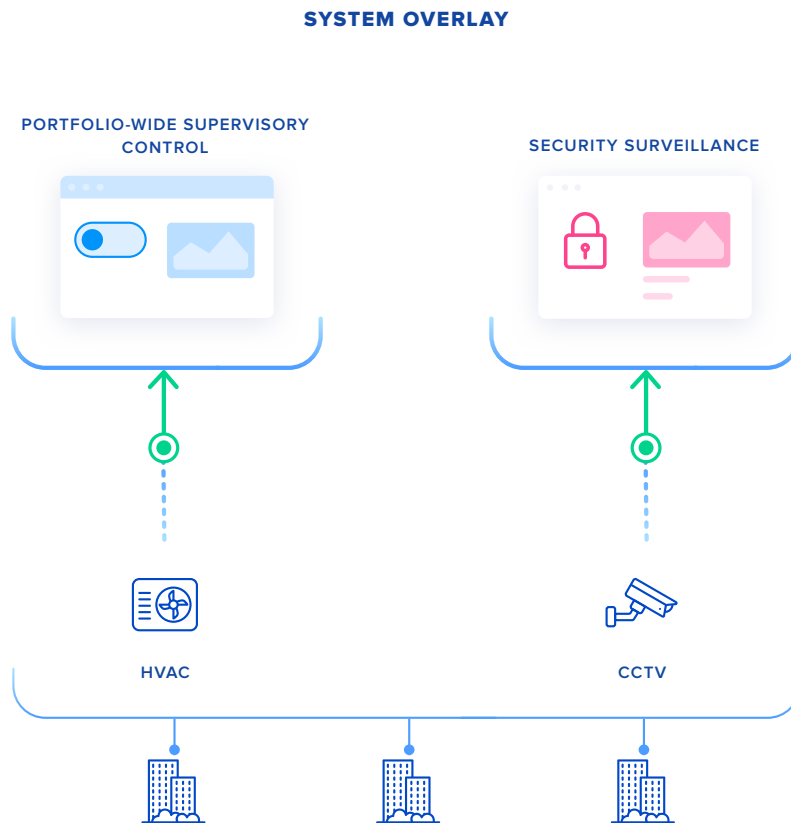
SYSTEM OVERLAY

PORTFOLIO-WIDE SUPERVISORY CONTROL

SECURITY SURVEILLANCE

HVAC

CCTV

Fig 3.2: System overlay solutions connecting one or more systems across buildings

SCOPE

Connects single or multiple building systems across the portfolio

EXAMPLES

- Portfolio BAS
- Portfolio surveillance solution

Functional overlay

Functional overlay caters to the needs of a specific O&M function. It is typically deployed at a portfolio level and integrates with the specific, in-scope systems across buildings. However, certain limited-scope functional overlays can be deployed at a building level. Such solutions are becoming increasingly common; consider energy management or optimization software, IAQ monitoring solutions, analytics & FDD solutions, tenant billing software, ESG and benchmark reporting, space utilization solution, personalized comfort control solutions, etc.

Inevitably, every portfolio has multiple functional needs, and every time a functional overlay solution is deployed, it adds to the complexity of managing functional silos. Also, each functional overlay has its own solution for integration, data extraction, storage, centralized analytics, and, potentially, cloud-based tools. As a result, redundant system integration efforts may be required whenever a new solution is implemented unless a system overlay or common data overlay (discussed in the next section) is available.
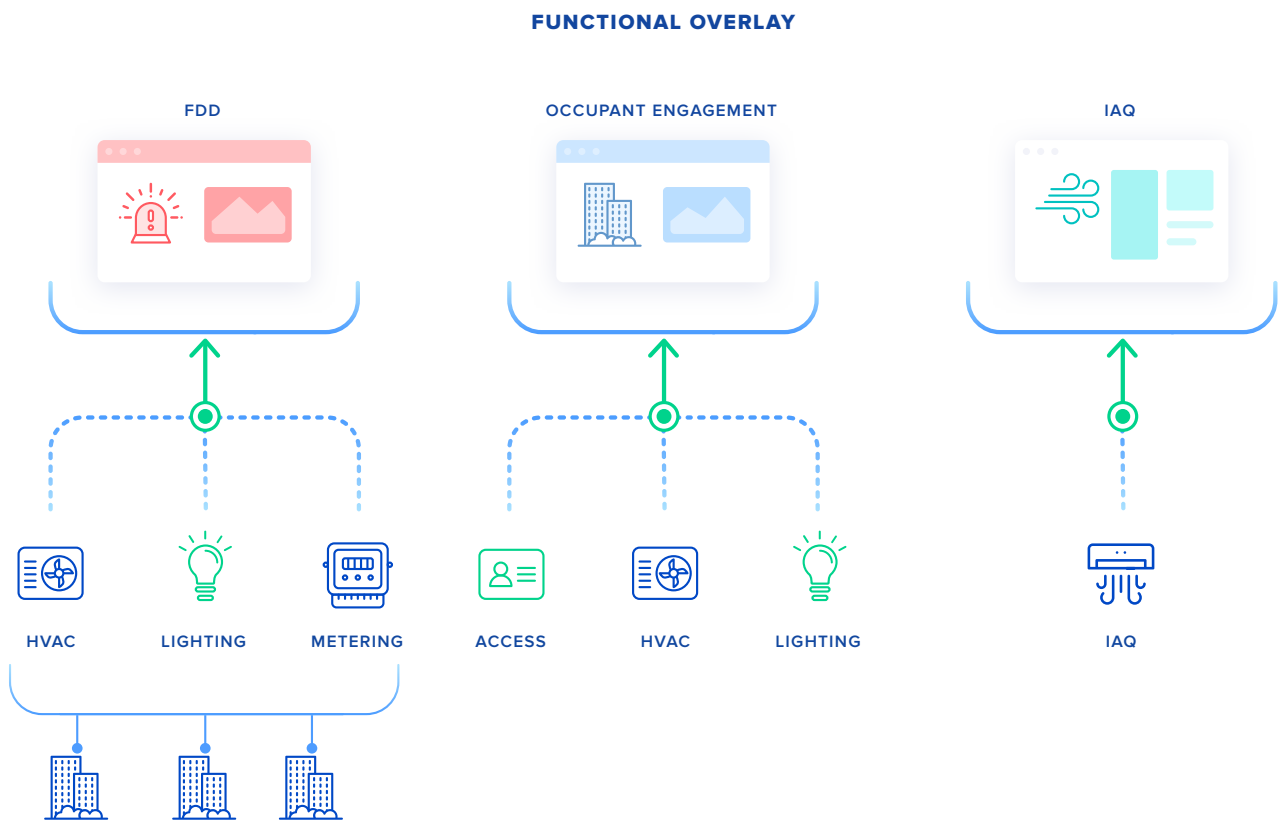
FUNCTIONAL OVERLAY

FDD   OCCUPANT ENGAGEMENT   IAQ

HVAC   LIGHTING   METERING   ACCESS   HVAC   LIGHTING   IAQ

Fig 3.3: Functional overlay solutions solving specific O&M functions

SCOPE

Connects with underlying building systems based on scope

EXAMPLES

- EMIS that integrates with submetering & utility data

- FDD or Energy optimization solution that integrates with BAS

Data overlay

A data overlay is a novel approach that consolidates data across a portfolio without offering end-user functionality. It involves integrating with underlying silos to consolidate data and creating a common data model with a required taxonomy and ontology, and then sharing data to any application or stakeholder. In this scenario, the overlay acts as middleware, or as a data broker for portfolio-wide information; it does not provide specific O&M capabilities or functionality. This largely alleviates integration problems when deploying new solutions and functionality across the portfolio. A data overlay can include in its scope one or many systems or building silos. For example, it can be an overarching data lake for all systems data from all buildings, or a limited data overlay for energy systems alone—for instance, to consolidate data from building utility & sub-meters, weather data, etc.
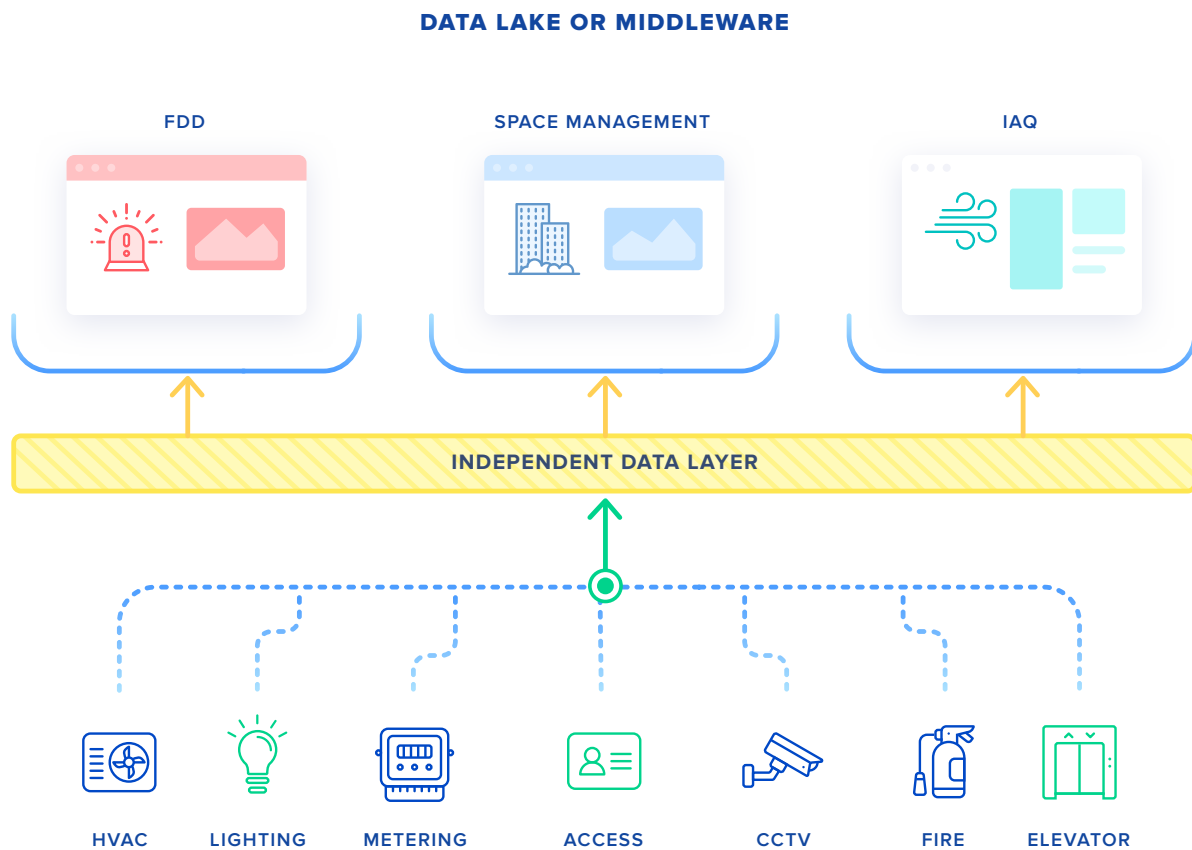

Fig 3.4: Data overlay consolidating portfolio-wide information

Hybrid Overlay

One type of overlay is not better or worse than another. Depending on the context of an O&M team, its organizational needs, and challenges, and priorities, any of the above types could prove a good overlay approach to pursue. But because each type has its limitations, the hybrid overlay solution could be a practical solution.

To understand what the hybrid approach means, let's look at the limitations of each of the above types of overlays:

- **Building overlay -** doesn't apply in a portfolio context and creates building silos

- **System overlay -** can be limited in terms of system scope & functional coverage

- **Functional overlay -** solves the needs of one function well but creates functional silos

- **Data overlay -** great at consolidating all of the O&M data but offers no end-user functionality

In spite of these limitations, each overlay solution has its merits and can be useful when applied in a specific context. However, while it might be prudent for an O&M team with changing needs to adopt a particular overlay solution today, that solution might soon need to be replaced with another type or extended to additional silos or for new functionality.

For example, when a team decides to deploy a system overlay for HVAC/BAS and solve for portfolio-level supervisory control, it has to account for future needs as well—such as adding another system (say, access control/occupancy) or more functions (say, FDD) to its scope. Or, if the team decides to start with a functional overlay like EMIS or FDD (using energy or HVAC/BAS data across buildings), what happens when there is a need to add a new function (supervisory controls) or system (again, access control/occupancy)? Over time, this can potentially become a problem, which is why a hybrid approach could make sense.

A hybrid overlay will combine multiple types of overlays, ideally all four, in a single solution. By doing so, a hybrid overlay offers building owners the flexibility to implement what is required today and a pathway to extend the same solution when the need arises later. For this reason, a hybrid overlay can not be a simple point solution or a single purpose application like an EMIS, portfolio BAS, BIM, FDD solution, etc. It needs to be a platform that supports all or some O&M functionalities, either natively or by enabling 3rd party applications to be tightly integrated with contextual workflows between each other. A marketplace approach lends itself well for this model where 3rd parties can leverage the data unified in a platform and plug their functionality into it.

Conclusion

Compared to other overlay approaches, the potential benefits of the hybrid overlays are immense. There is reduced cost and complexity because the potential problem of overlay silos is avoided. There is the coveted single pane of glass, and the simplicity that goes along with logging into only one system for all or most O&M needs. Modular applications allow owners to buy only what they need, and the software can guide owners on their digitization journey.

A good hybrid overlay solution, apart from being flexible enough to support more than one overlay type, must also check other important boxes:

- ✓ Access for all or most of the portfolio's O&M stakeholders and support for the jobs they need to do in the building Able to integrate flexibly and digest any sort of data, for instance from building systems, weather, sensors, utility, maintenance, BIM, digital floor plans, design data

- ✓ Able to integrate flexibly and digest any sort of data, for instance from building systems, weather, sensors, utility, maintenance, BIM, digital floor plans, design data

- ✓ Bi-directional integration with underlying systems wherever possible and ways to automate workflows between stakeholders or 3rd party applications

- ✓ Flexibility in creating a unified data model that complies with the customer's choice of industry standards

- ✓ Open to 3rd party application integration with either a software development kit (SDK) or vendor-independent marketplace solution

- ✓ Open to data sharing for the owner's other needs

This scalable, distributed platform architecture of hybrid overlays allows the ecosystem of vendors and application developers to evolve as the needs of the O&M team evolve. It compares favorably to most overlay solutions being developed and deployed. The platform can seamlessly apply to different enterprise needs, scale effectively across the portfolio, and empower O&M teams to focus less on managing data and software—and more on creating wholesome and real-time experiences for end customers. The hybrid overlay caters to multiple stakeholders, brings stakeholders together around the work they're collaborating on, and helps automate those workflows. It also captures the benefits of the independent data layer—making it easy to add new applications with very little integration or deployment cost.

This platform-powered architecture is a tried and tested model that has revolutionized other industries for decades and has proved effective in solving complex enterprise needs. Salesforce paved the way for the on-demand movement across enterprise use cases using a multi-tenant cloud platform architecture. Another example is the ServiceNow revolution in the IT industry. There is no reason it won't bear similar outcomes for real estate O&M.

Facilio's Hybrid Overlay Solution

Facilio offers an overlay solution based on the principles of the distributed-platform-based hybrid overlay discussed in this white paper. The hybrid overlay is not specific to just one system or building or function but can be applied across silos. Also, it combines the simplicity of point solutions and the power of platforms to make it useful in different O&M contexts.

Facilio's hybrid overlay can be deployed to solve the needs of any of the individual overlay types discussed in the paper:

1. System overlay: Facilio's overlay natively supports BAS overlay functionality at a portfolio level. The platform also supports integration with most building systems (see point 2) and offers the flexibility to build custom functionality using features like analytics, reporting & dashboarding, notifications, rule-based alarming, workflow automation, etc.

2. Building overlay: Facilio's edge layer enables integration not just with traditional building systems like BAS, metering, lighting, fire safety, etc. but also with sensors, IoT solutions, Building Information Model (BIM), and more. Combined with the functional modules (see point 3 below), this can be useful in deploying building overlay solutions.

3. Functional overlay: This is a key area. Most overlay solutions are specifically designed to address one functional need, such as supervisory controls, smart maintenance, energy management, air quality monitoring, space utilization, tenant billing, compliance reporting, etc. Facilio's overlay offers out-of-the-box functionality for most common O&M needs, namely:

- Supervisory controls
- Work order & maintenance management
- Service request & reactive maintenance
- Fault detection & diagnostics

- Energy management
- Utility management & bill processing
- Tenant billing & after-hour scheduling

Apart from these modules, Facilio's overlay is built as a low-code application platform that allows for custom functionality to be built for any current or future needs not natively supported in the solution. This solves the main problem with functional overlays: that one solution can wrap multiple functional needs and use cases for all the stakeholders involved.

4. Data overlay: Facilio's edge & cloud data platform can be deployed as a data lake or data broker with or without previously discussed functional modules. The platform allows for flexible data modeling adhering to different taxonomy & ontology specifications and supports best-in-class interfaces for data sharing (RESTful, OData, MQTT, etc.) & interoperability features.
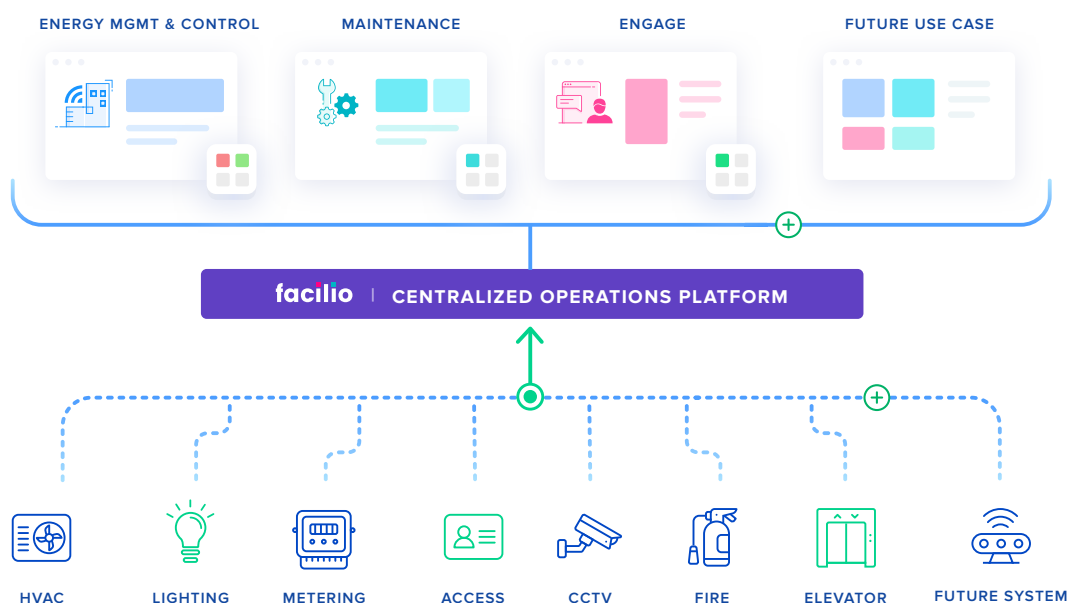
About Facilio

Facilio is the data-driven property operations cloud platform that aggregates operational information across RE portfolios to help owners and operators optimize performance and control operations, from one place.

Trusted by forward-thinking enterprises across 40 million sq ft of space globally, Facilio empowers RE professionals with real-time operational visibility and complete control over their portfolios.

To learn more about Facilio, email us at getsmart@facilio.com

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