# THE FUTUREPROOF ENTERPROOF

IOT SCALABILITY IN THE NEXT EVOLUTION OF BUILDING PORTFOLIO MANAGEMENT



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## **1 INTRODUCTION** THE FUTURE SMART BUILDINGS PROMISE

The reality for building portfolio owners is that their scale does not create a technology problem, it creates a profit and loss problem. In fact, the common themes that large real estate owners and operators have experienced in recent years, closely resemble the issues that enterprise software solutions have solved in other categories over the past two decades.

David Trice, Chief Product Officer, Honeywell Connected Enterprise

Office construction activity has been on the rise since 2010, peaking in 2020 at close to 19 million square meters globally<sup>1</sup>, similar to levels at the height of the last two cycles in 2001 and 2008.

10-years of economic growth has changed the commercial real estate sector, driving a fundamental shift in the way modern buildings are designed, marketed, and operated. Decades of pinpoint focus on energy efficiency and security improvements have given way to a new generation of buildings that place occupants at the center.

"A major trend reshaping the smart buildings market is the increased focus on occupant-centric workplaces, which has

developed over the past few years. Organizations are looking for new ways to attract and retain the best people and empower them to be productive. Shifts in the landscape of work are driving a greater focus on occupant experiences and interactions with buildings," states a 2020 report by smart building market specialists Memoori<sup>2</sup>.

Smart building technology has long promised to revolutionize our highly inefficient and occupant-neglecting buildings.

1 JLL, Global Market Perspective November 2019

2 Memoori, Occupancy Analytics in Building Location Based Services



### Portfolios of hundreds, or even thousands of buildings continue to push their smart agenda one complex implementation project at a time, delayed by an endless stream of interoperability issues and labor constraints.

Amanda Birkhead, Vice President of Product Management, Honeywell Connected Buildings

However, decades into the industry's evolution and smart buildings only make up a small fraction of total building stock. Even in the major cities of the most developed economies, wonderful smart building projects stand-alone, flaunting a technological vision that remains tantalizingly out-of-reach for most.

Building Internet of Things (BIoT) solutions have steadily matched and even surpassed the lofty expectations placed upon them, offering a reliable and attractive return-oninvestment (ROI) for energy efficiency alone. Occupant-focused applications now offer proven health, wellbeing, and productivity benefits, attracting premium tenants, and developing loyalty to drive growth in real estate. Yet adoption remains slow.

Findings of a 2018 survey by Forbes Insights<sup>®</sup> and an Intel<sup>®</sup> survey<sup>3</sup> asked 211 senior leaders around the globe whether building management technologies have produced a strong ROI, two-thirds (66%) responded "yes", marking a growing satisfaction with the technology.

"The BloT value proposition is not the reason for the lack of smart building propagation. The true barrier to bringing about this smart, sustainable, and profitable future for the real estate sector is - scalability," says Amanda Birkhead, Vice President of Product Management, Honeywell Connected Buildings. "Portfolios of hundreds, or even thousands of buildings continue to push their smart agenda one complex implementation project at a time, delayed by an endless stream of interoperability issues and labor constraints."

According to EG Global<sup>4</sup>, the average portfolio value of the world's 100 biggest real estate owners is \$61.3bn in 2020, pointing to a wider market of millions of buildings whose smart growth is stunted by BIoT complexity at scale.

These large building portfolios now represent a huge opportunity for smart building adoption, allowing us to bring buildings online by the thousands. However, in order to unlock this vast latent value, we must find a way to help building and real estate portfolio managers access and utilize their data more effectively.

"We must look beyond the building and find a way to leverage the BIoT, analytics, and machine learning technologies at the portfolio-scale, able to quickly and cost-effectively integrate building systems across multiple sites," continues Trice, who believes the solution should combine edge and cloud intelligence to agnostically connect diverse building systems and normalize performance data.

"Only when individual systems and buildings are connected, and their data normalized, can we begin to generate actionable insights at scale, providing data that business leaders can actually utilize for the intelligent, operational control that elevates an entire portfolio," he adds.

The solution should move past the problems of today, to create a platform that solves the problems of tomorrow. By changing the executive mindset around the scalability of the BIoT in large building portfolios, we can future-proof fleets of buildings to improve overall resilience and adapt to unforeseen changes in socio-economic or environmental conditions.

The unexpected coronavirus pandemic, stay-at-home orders, and the deepening recession have created challenges and opportunities for all industries; Smart buildings and real estate especially.

However, by handing executives and portfolio managers scalable solutions that intelligently drive investment, improve occupant experience, and enable autonomous solutions, we can still aspire for that green, productive, and profitable future that smart buildings promise.

<sup>3</sup> Forbes, Intel IoT Insights

<sup>4</sup> EGI, EG Global 100: World's biggest real estate-wning companies revealed

### 2 THE IOT SCALABILITY PROBLEM FOR BUILDING PORTFOLIOS



Data Complexity Behind the Building Facade

Behind the façade of commercial buildings is a myriad of diverse operating systems, generating massive amounts of data. Harnessing that data to inform smart business decisions can be a massive challenge for any facilities management team and that complexity only increases over time as smart building solutions continue to mature.

These growing data lakes overflow with enterprise-level complexities that hinder strategic growth for property developers and real estate investment trusts (REIT), as well as healthcare, retail, and corporate real estate portfolios, among others. A lack of standardization in commercial buildings inhibits connectivity between systems, making it more challenging to affordably adopt and deploy smart solutions at scale.

Limited standardization of communication protocols, in particular, significantly restricts the development of an effective architecture for the current BIoT landscape. This standardization problem then increases exponentially at the portfolio level, as each building introduces its own set of protocols.

Global building portfolios are acquired one building at a time, with each bearing a different set of operating systems from a wide variety of vendors and manufacturers. A typical smart building will host dozens of different systems, none of which were designed to work together. Multiply dozens of systems by thousands of buildings and you start to get an idea of portfoliolevel BIoT complexity.

Each system is designed separately and shoehorned into a smart building solution. When you put all those systems and all the buildings together, you end up with quite a mess that can be very difficult to manage.

On top of that, every one of the thousand buildings has a person or a team responsible for making sure it's operating correctly. That's just not a scalable process.

# **3 THE BUILDING BLOCKS OF SCALABILITY**

#### ASSETS

Building assets are a varied group of elements that include many critical and high-value systems. Despite this, many buildings owners and managers simply don't understand how to operate and maintain those assets to improve performance, promote longevity, or maximize value. As we zoom out to a portfolio-scale, building assets become an enormous blur of under-performing elements that seem impossible to address from the top.

#### PEOPLE

Most buildings today maintain a contract with a maintenance provider that lives in perpetuity on the owner's profit-and-loss statement. It's an antiquated labor-based model that serves as an undesirable tax on uncertainty, like an insurance policy that is never reassessed. However, in order to scale effectively, we must get rid of this "human-fallback" mentality and start to drive that value to the bottom line and create a proactive or justin-time model.

#### PROCESS

Heating, cooling, security, lighting, ventilation, water, and many more building systems depend on processes that require continuous optimization in order to maintain cost and performance levels. With so many different vital processes needing attention in modern buildings, extensive automation is essential if we are to reduce process cost and downtime, or improve performance, especially at an enterprise scale.

#### **HEALTH & SAFETY**

In the modern building, operations teams are not simply there to optimize maintenance and security but also to enhance occupant health, safety, and comfort, which combine to drive productivity. This new human-centric world and all the new data that comes with it, create a continuous stream of new challenges for each building to overcome, and a difficult health and safety landscape to navigate, especially in the current age of pandemics and social distancing.

#### **ENVIRONMENT**

Buildings represent up to 39% of total global energy consumption<sup>5</sup>, which is still largely fed by dirty fossil fuels. An evolving regulatory landscape is constantly raising the "green" bar for building performance, while public opinion relentlessly increases the environmental pressure on all parts of society. Owning a building creates an environmental responsibility, owning 1,000 buildings creates a complex environmental compliance puzzle.

#### **CYBERSECURITY**

The smart building landscape is a minefield of unsecured digital endpoints and neglected network connections that can turn the office copier into a threat to business continuity and occupant safety. Each building network must endeavor to find a balance between optimizing data flow and applying restrictive security as they strive to reduce the threat from thousands of devices. At the portfolio-scale, vulnerable endpoints can be in the millions. The only way to protect the network's vast edge is to empower its nucleus.



<sup>5</sup> EIA, How Much Energy is Consumed in US Buildings?

### **4 THE NEED FOR** ENTERPRISE PERFORMANCE MANAGEMENT

The evolving IoT landscape in buildings creates overwhelming technological complexity at the portfolio scale. However, it opens up opportunities to apply enterprise-scale solutions.

"The reality for building portfolio owners and managers is that their scale does not create a technology problem, it creates a profit and loss problem," says David Trice, Chief Product Officer, at Honeywell Connected Enterprise. "In fact, the common themes that large real estate owners and operators have experienced in recent years, closely resemble the issues that enterprise software solutions have solved in other categories over the past two decades."

Enterprise Solutions are designed to integrate multiple facets of a company's business through the interchange of information from various business process areas and related databases<sup>6</sup>. However, it is the monitoring of the performance of various facets that provides the top-level visibility for actionable intelligence and centralized control, where Enterprise Performance Management (EPM) becomes the driving force in enabling enterprise solutions to steer value to the bottom line. EPM is a software category that focuses on how enterprises unify their data, decision-making, and business goals to optimize and automate their operational people, processes, and assets. EPM ensures businesses can answer critical questions performance questions about their portfolio, its operation, the risk of interruption, and the bad actors holding back productivity. EPM also goes beyond current performance to incorporate insights for long-term sustainability that meets the obligations of all stakeholders, as well as the visibility to improve safety and security of all people and assets.

The concept behind EPM has been around for decades, first digitized by performance tracking using rudimentary accounting software in the 1970s, and the introduction of spreadsheets in the 1980s. It was then that Enterprise Resource Planning (ERP), a system that is designed to process transactions and keep track of resources, took hold in the enterprise environment.

6 Gartner, <u>Glossary of Enterprise Solutions</u>



The History of Enterprise Performance Management

### If we're ever going to solve the scalability problem, we've got to find ways to connect a building in one day.

Billy Turchin Chief Product Officer, Honeywell Connected Buildings

The 1990s saw a huge boost in connectivity with the arrival of internet-based communication such as email, primitive chat platforms, and file sharing services. The early -internet highlighted the vast potential of enterprise- wide performance tracking models and inspired more advanced software solutions that enhanced reporting, improved control, and offered basic automation.

The next revolution of enterprise solutions was triggered by the dot-com bubble of the early 2000s but has its roots in the mid-90s. The shift from databases to automation began to aggregate contact, lead, opportunity management, and deal tracking into consolidated frameworks, eventually labelled as customer relationship management (CRM).

The ideal EPM solution for building portfolios demands an infrastructure that ranks the operational performance of one building against its peers on a range of performance indicators. Presented for portfolio managers in a centralized location, the EPM model represents a solution that can drive productivity and new value straight to the bottom-line. The dot-com era brought the widespread migration of software from windowsbased to web browser-based, providing the flexibility CRM needed to disrupt the enterprise solution space. The rise of cloud computing in the 2010s accelerated the consolidation of solutions, empowering CRM and ERP models with flexibility and intelligence but also creating new possibilities. Today, enterprise solutions are all about cloud-based Software-as-a-Service (SaaS). The cloud allows a more affordable alternative model that lowers both operational expenses (OpEx) and capital expenses (CapEx) by eliminating the need for companies to purchase software and hardware or hire additional IT staff. With no costly infrastructure to support, resources can be invested in growth opportunities, while employees can focus on more valuable tasks.

This is the kind of thinking we need for building portfolio management. We require an Enterprise Performance Management tool that unifies assets, people, and processes into a single, operational-focused, platform, a process methodology specifically designed to enhance building systems performance by enabling management to better respond to challenges and opportunities on a project, section, operational line, geographic area, and on a holistic executive level. This modern EPM approach can be seamlessly applied to many enterprise environments, including property developers, REITs, universities, and all commercial real estate portfolios.

For building portfolios, the EPM model can be used to aggregate and present the masses of data being generated by a large portfolio of buildings into a digestible format that drives better decision-making and enables autonomous and centralized control capabilities for transformative and sustainable bottom-line impact. Such an EPM model would need to quickly connect every system in every building across the portfolio, then normalize and understand how diverse operational data combine to tell the story of building performance.

Only when that connectivity and data architecture is in place can you hope to derive valuable insights and deliver automation mechanisms at a portfolio-scale. Once those two elements are functioning, however, the possibilities are endless and the rate of smart building adoption will grow exponentially.

#### CONNECTIVITY

Connectivity is fundamental for the management of large building portfolios but, today, it can take months to bring a building online - a difficult ask for a portfolio manager striving to realize the benefits of the BIoT across 1,000+ buildings.

"If we're ever going to solve the scalability problem, we've got to find ways to connect a building in one day," says Billy Turchin, Chief Product Officer at Honeywell Connected Buildings. "We have to make it quicker and we have to maintain a secure infrastructure throughout. Once we have that common data interface in place across hundreds, or thousands of buildings, we can start to look at portfolios a bit differently."

It is hard to compare one building to the next because they are different. They have different systems and different data structures that need to be normalized through a common and consistent interface. By providing a mechanism that allows us to aggregate that data, we can begin to understand how one building compares with another, which building is

#### 4 The Need for Enterprise Performance Management

performing best or worst and, critically, track the effectiveness of investments and strategies.

A connected building portfolio provides the data that allows decision-makers to understand where they can get the greatest return-on-investment - that's true portfolio management.

#### **BUILDING OPERATIONS**

Connectivity is useless if you can't make sense of the data and how it helps to improve the performance of the building. So, for an EPM model to be successful, the ideal portfolio solution would need a deep operational understanding.

Be it optimizing energy consumption against occupant comfort, security effectiveness, or the increasing value of human-centric applications, a comprehensive operational understanding is crucial for control.

Operational insights from portfolio level data can optimize energy use, help support maintenance capabilities for struggling assets, empower the whole labor force via mobility and automation, and reduce overall building management costs through centralization of intelligence. Then, once that infrastructure for operations is in place, portfolio managers can finally focus on the vast value-generating potential of improving the occupant experience.

Consider a typical building. As an occupant, the first system you encounter may be the access control system in the parking deck. From there you would likely face a second, and separate, access control system to enter the building itself. You may then face a third access control system for the elevators, a fourth for your floor or office space, and it is typical that all these access control systems are completely independent of one another.

Think about all the possible friction points that could arise from access control alone, then consider all the other building systems at play, and then multiply it by 1,000 for portfoliolevel building operations complexity. In order to create a frictionless environment for occupants, buildings need support from budget holders and to channel that support in the most effective way, and budget holders need portfolio-level visibility and control to drive their investment thesis.

The ideal EPM solution for building portfolios demands an infrastructure that ranks the operational performance of one building against its peers on a range of performance indicators. Presented for portfolio managers in a centralized location, the EPM model represents a solution that can drive productivity and new value straight to the bottom-line.



### **5 BUILDING THE PERFECT PORTFOLIO MANAGEMENT SOLUTION**



Building the Perfect Portfolio Management Solution

The ideal EPM solution for building portfolios is simple and fast to deploy. It offers advanced BIOT analytics and utilizes machine learning to integrate building management systems across multiple sites. It also provides real-time, 360-degree visibility, enabling centralized and autonomous control.

Through a user-friendly, web-based interface, accessible from anywhere, executives and portfolio managers can see how each building is operating through a ranage of performance indicators that combine into an overall building performance score with the portfolio level perspective decision makers need.

The ideal building portfolio management solution makes the performance of every set of systems, in every building, visible from the top in order to drive impact to the bottom.

This ideal building portfolio management solution allows you to identify problems then explore underlying causes, in order to understand new opportunities and how to seize them.

The story of each set of building systems in each building encapsulated in a simple performance rating.

#### **ENERGY PERFORMANCE**

#### The Energy Consumption Problem Demands an AI Solution

Despite the 20-year efficiency revolution, total energy consumption from commercial real estate is still increasing<sup>7</sup>, creating a spiraling problem that cannot be corrected with our labor-intensive current methods. Today's many building management platforms don't all have the ability to learn and, therefore, are not capable of keeping up with the increasing complexity of the evolving BloT landscape. Meanwhile, regulatory and social pressure continues to rise in response to climate change.

No reasonable number of humans can make the decisions necessary to optimize energy in real-time in one building, let

alone a large building portfolio, but this is exactly what artificial intelligence (AI) is designed to do. Only when you have a secured way to connect building systems with an AI that's empowered to manage energy use, can you hope to optimize a portfolio.

#### **COMFORT PERFORMANCE**

#### **People Are Our Greatest Asset**

The true value of the BloT lies in occupant-centric applications that drive the health, wellbeing, and productivity of building occupants. This is what the IoT has been promising, the performance indicator that shows portfolio managers how attractive they are to the biggest, most progressive, and highest value tenants.

Effective comfort performance tracking at a portfolio scale requires the rapid and seamless integration of a broad and evolving range of edge devices and building-wide systems. Lighting levels, HVAC configurations, access control flow, space utilization, and many other smart systems combine to improve comfort, happiness, and productivity, in a complex ecosystem that demands integrated intelligence.

#### ASSET PERFORMANCE

#### Show Me the Asset, and I'll Show You Its Place

We need to move beyond traditional machine monitoring and data gathering by merging machine modeling with modern cloud analytics. Digital twins predict machinery availability, drill to the root cause of inefficient machine operation, and bring order to reliability and maintenance planning. We should look at assets from an SLA perspective, protecting the resources of the company while minimizing the expense of the unexpected.

Prolific asset performance monitoring requires rapid deployment through a wealth of standard asset libraries and

<sup>7</sup> EIA, How Much Energy is Consumed in US Buildings?

tools to integrate data sources quickly and reap rewards. Advanced monitoring can enable a transformation in the way assets are maintained, while predictive analytics lead to "justin-time" maintenance models that make traditional scheduledmaintenance contracts obsolete.

#### **CYBERSECURITY PERFORMANCE**

#### Securing the Edge by Empowering the Nucleus

As businesses move to digitally connect their operations, having a site-specific strategy on cybersecurity is no longer safe or practical. Organizations leading digital transformation are developing enterprise-wide cybersecurity solutions that drive greater consistency and protection across OT environments. We need to teach OT to speak IT, so they can work together to protect the enterprise.

Solutions should meet industry standards and regulatory compliance requirements while remaining easy to use by teams stretched with increased responsibilities. The development of smart buildings presents a complex and dynamic technology landscape that is vulnerable to attack. To secure the front-edge, buildings need support from the command center.

#### **FINANCIAL PERFORMANCE**

#### Money is Still the Bottom-Line

Understanding costs in the context of building performance is essential for financial planning at the portfolio scale. Financial performance monitoring enables users to identify, prioritize, and quantify economic opportunities for improved resource allocation and strategic planning. Enabling real-time visibility and actionable intelligence for enhanced profit-driven decisionmaking.

Through a cloud-capable solution, portfolios can achieve collaboration across operations, so that better choices can be

made quickly, at any moment, with the bottom-line in focus. Building performance is a huge blind spot in the P&L of real estate companies but, through advanced portfolio-scale financial performance monitoring, you can uncover savings and optimization opportunities that you never knew existed.

#### **OVERALL BUILDING PERFORMANCE**

#### **Putting Your Portfolio in Order**

Finally, for true top-level visibility, the ideal solution requires a 'normalized' combination of all performance ratings to provide a view of how buildings are performing against others in the portfolio. A ranking system allows executives and portfolio managers to quickly understand which buildings need the greatest support and which have the opportunity to reach new heights. Thereby helping shope your investment thesis to create maximum value.

An overall performance score for each building depends on the accuracy of all other performance indicators to bring truly actionable insights to portfolio management. Not just to direct investment but also to track ROI, allowing changes to be better understood, improved, and replicated.



# **6 A FUTUREPROOF** ARCHITECTURE

In a smart building context, future-proofing will involve the delivery of technical solutions that are flexible and adaptable to accommodate changing tenant demands over time; meeting the future needs and expectations of clients, endusers, and/or occupants in terms of health, safety, and comfort. As well as durability and sustainability, performance characteristics, maintainability, and serviceability.<sup>8</sup>

2020 Report by Memoori, Smart Buildings Market Specialist "The ideal solution doesn't just solve the problems of today, it should also create a platform to solve the problems of tomorrow," says David Trice. "By changing the executive mindset around scalability of the BIoT in large building portfolios to a more open and flexible approach, we can future-proof our architecture for growth, disruption, and innovation."

Future-proofing is the process of anticipating and developing future trends to mitigate potential risks to a commercial building. Future-proofing approaches should be designed to improve the overall resilience of the building to adapt to unforeseen shocks or changes to economic, social, or environmental conditions.

Events like coronavirus may be unprecedented, but post-COVID virus control measures remain: energy conservation for climate change, sustainable construction for the environment, cybersecurity for increased connectivity, and a host of other challenges the future has brought to our buildings. The future is unknown but flexibility creates the ultimate resilience.

"In a smart building context, future-proofing will involve the delivery of technical solutions that are flexible and adaptable to accommodate changing tenant demands over time; meeting the future needs and expectations of clients, end-users, and/ or occupants in terms of health, safety, and comfort. As well as durability and sustainability, performance characteristics, maintainability, and serviceability," explains a Q3 2019 report by Memoori<sup>8</sup>.

By reforming the executive mindset on extensibility, integration, applications, and data standards we can create future-proofing flexibility and value-driving scalability at the same time.

8 Memoori, Future Proofing Smart Commercial Buildings

#### EXTENSIBILITY AND INTEGRATION ARE THE SAME THING

From a building portfolio perspective, extensibility and integration are the same thing:

- **Technically** we need Application Program Interfaces (APIs) to drive extensibility and we need APIs to drive integration.
- **Operationally** we need greater speed and functionality when bringing new acquisitions online, when including new or legacy systems, and for third-party or partner integration.

Once real estate firms begin to view these concepts as the same, they can begin to look at their businesses differently. Rather than feel backed into a corner over conflicting partner platforms, for example, they should be able to integrate all ecosystem members through a holistic solution connected to an intelligent gateway.

The intelligent gateway allows the secure creation and deployment of a wide variety of new connected applications and legacy systems operating in advanced environments. Today, gateways must support advanced computing as intelligence is pushed from the cloud to the edge; and, as more data is stored and processed at the edge, the network must be secure. of investments and strategies.

This change of mindset is key to future-proofing large building portfolios against the known and unknown future by:

- Integrating quickly to scale efficiently across diverse systems
- Driving extensibility down to the edge for continuous BIoT evolution
- Embedding assets for top-to-bottom control from the clouds

#### **APPLICATIONS ON TOP**

The ideal solution doesn't just build and connect applications, it builds an open architecture where applications can sit on top, creating an extensible application platform that future proofs large building portfolios. To allow for the development of applications on top of IoT platforms, the platform itself should provide the connection framework through functional APIs. The uniformity of APIs across the platform will enable efficient development of the growing number of cross-platform applications in the building space. Placing applications on top allows greater:

- Integration Speed as new buildings are acquired or brought online
- **Platform Extensibility** to drive asset integration into operations management
- Edge Propagation to manifest new assets in a centralized platform
- Cloud Capability to enhance overall intelligence and access mobility
- **Control Reach** offering application control down to the building level
- Al Empowerment enabling a rich data environment where Al can thrive
- Secure Foundations creating a clear and effective cybersecurity structure

A futureproof approach is required, and the obvious answer is open data standards.

#### THE FUTURE IS BUILT ON OPEN DATA

A modern smart building may have tens of thousands of data points with varied naming conventions from a wide variety of manufacturers, vendors, and system integrators. It is difficult enough to manage unstandardized data from one building, and it becomes an almost insurmountable challenge in a portfolio of 1,000 buildings. Furthermore, as smart building solutions mature the number of data points will continue to increase, exacerbating the problem.

"The Future is Open Standards," stated Memoori in a 2019 report<sup>9</sup>. "Adoption of an open data management and systems procurement strategy will help ensure a much greater degree of flexibility for the future integration of new systems and applications into the smart building, as well as helping reduce costs, implementation time, and overall complexity of the communications architecture."

We can take confidence from the overwhelming support for open data standards across the building industry, a view that modern machine learning engines can effectively be used to:

- Analyze naming models and data signal types/models
- Rationalize naming conventions to create a common methodology and vocabulary
- Prioritize data points to aggregate and standardize across the portfolio

#### 6 A Futureproof Architecture



Maturing Buildings Need Futureproof Solutions

From there, all we need is the intelligent gateway that aggregates the data and organizes it into containers holding;

- Tags
- Configurations
- Management Capabilities
- Data Back Ups
- Triggers
- Alarms

Open data provides a greater degree of flexibility for the future integration of new systems and applications

into smart buildings, as well as reducing costs, time, and complexity for building portfolio owners and managers.

Our scalable smart building future will be built on open data for portfolio-level success. Open data frameworks supported by progressive portfolio management solutions are enabling fundamental change that will create a world of abundant and actionable building data that drives smart building adoption and real estate value at the portfolio scale.

9 Memoori, Futureproofing Smart Commercial Buildings



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