

Smart buildings.

Our future
is smart.

SmartScore white paper.
April 2021.

Executive summary.

The future of the built environment is smart. Not implementing technology for technology's sake, but the result of a conversation amongst tenants, owners and technologists focused on the outcomes that the users of buildings actually want.

We are just at the start of the smart building journey and it's imperative that real estate gets smart now, and gets smart right.

For the past year WiredScore has been conducting extensive work with the WiredScore Smart Council, comprising over 90 tenants, landlords and other property professionals from around the world, to develop an intellectual framework for smart buildings. What has become clear is that 'smart' is an opaque subject for the industry – there is little agreement regarding what matters in a smart building: how to create one, how to work with the supply chain, or even what 'smart' itself means. This white paper provides clarity.

Why do we need smart buildings?

Outlines the three trends that underpin the move to smart buildings: the increasing use of technology in our personal lives, the changing nature of our professional lives, including the recent experience of working from home, and the climate crisis.

Defining a smart building.

Answers the question 'what is a smart building?' with a user-centric, outcome-orientated approach; a smart building delivers outstanding outcomes for all users, through digital technology, to exceed their evolving expectations. The four outcomes that users care about above all others are: an inspirational experience, a sustainable building, a cost efficient building and one that is future-proof by design.



Measuring whether a building is smart requires two different views:

1. The view of the user: does the building provide functionality to delight and attract people, and resolve the challenges that users typically face?
2. The technological view: are the technological foundations to deliver those functionalities in place?

What does a smart building deliver?

Discusses the functionalities a smart building should offer its users: individual and collaborative productivity, health and wellbeing, community and

services, sustainability, maintenance and optimization, and security.

The technological foundations for smart.

Discusses the technological foundations that underpin those functionalities, including digital connectivity, building systems, a landlord integration network, governance, cybersecurity, and data sharing.

We are extremely grateful to all those who have contributed to the thinking that has gone into this white paper, including the work of the WiredScore Smart Council. We hope that it will serve to bring a smarter future closer for us all.

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1.

Introduction.

Successful buildings are about people. They are tools that provide for human needs – shelter, security, a focal point for community, or more specialist outcomes such as wonderful acoustics or a sterile surgical environment.

What people want and need has always evolved over time, and our buildings too have adapted. Now, however, driven in part by advances in technology, our expectations are transforming faster than ever before. And our buildings need to respond – a challenge in an industry where the pace of change has always been slow and measured.

Although technology is both a significant driver of change, and a fundamental part of the solution, the changes we make as an industry need to start not from the technology, but from the people.

Technological success is determined by the outcomes technology delivers for people: high-tech space is not a goal in and of itself.

Ever present in our day-to-day, technology is the digital right hand most of us couldn't live without. Devices formerly designed to perform simple labour saving tasks, or provide peripheral entertainment are now fundamental to the way we live, work and navigate the world around us.

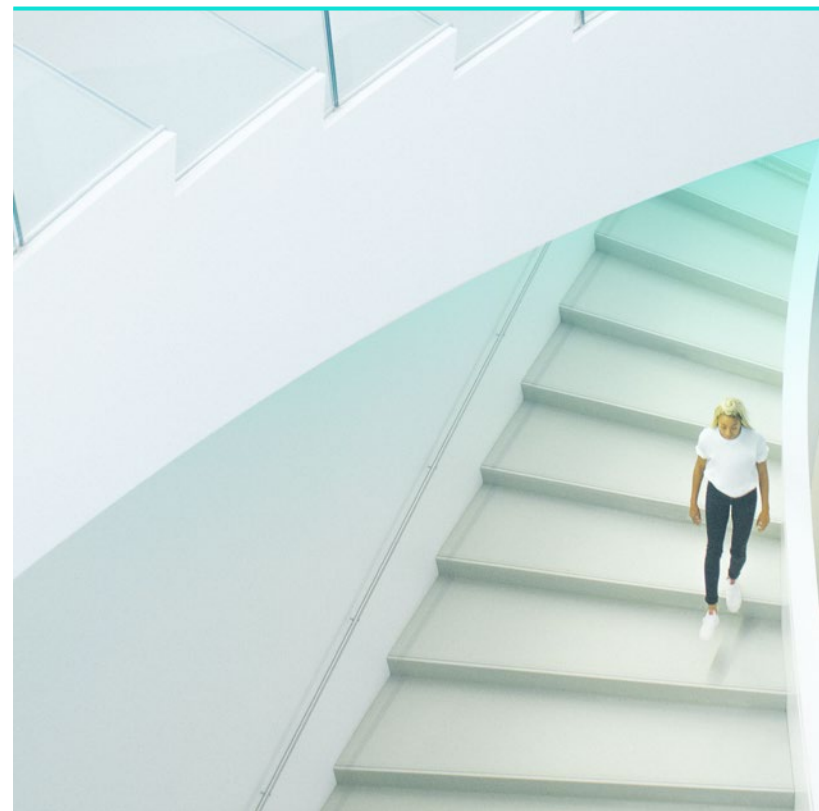
Watches, phones, televisions, even cars... Our once gear-and-cog operated devices have digitized to become highly intelligent, ever-learning smart machines. At an accelerating pace, technology is developing in new ways to deliver outcomes that enhance multiple aspects of our lives. Consider all of the extraordinary advancements that have occurred in the past decade alone. Now imagine that same level of technological development

occurring in the decade to come. It's an exhilarating thought, isn't it?

The built environment will need to keep up. Our offices, enduring physical spaces built to last decades, often seem largely untouched by transformations elsewhere. But there is a growing awareness in the industry that offices are not immune to the changing world around them and will need to evolve to remain relevant. To do so, a new concept has emerged in real estate: the 'smart building'.

Smart buildings are inspirational, sustainable, cost efficient and future-proof spaces that put the users at the center. Technology creates the urgency for change, whilst simultaneously providing the means to adapt to it.

As the world has become more tech-centric, landlords have been steadily integrating technology into their spaces to increase tenant productivity and drive operational efficiency. This movement has been slow to gain mass adoption and, until now, the smart building debate has been dominated by technologists and technology firms. However, landlords and occupiers have started to make their voices heard, and it is clear that the definitive perspective on what it means to implement and maintain a smart building must sit with those that build and use the space. For this reason, the core of what it means to be smart must be anchored in the functionalities and benefits afforded to the building's users.



2.

Why do we need smart buildings?

When deployed correctly, technology enables our seamless engagement with physically outstanding, human-centric spaces.

There are three clear and distinct trends driving the desire – and need – for technology to bring our workplaces to life. The following will take a closer look at these trends, exploring how our expectations of the built environment have shifted.

1. Technology in everyday life is driving demand for more data and better services.

Every aspect of our lives is driven by data. We've become accustomed to a tech-enabled lifestyle: from education to exercise, entertainment to ecommerce, our reliance on technology in our personal lives has normalized a level of speed, accessibility and convenience, and we now expect this to be present in our professional lives too.

When it comes to the future of the working world, there's now an undeniable desire for smarter spaces: four fifths of office workers (79%) say they would like to work within a technologically advanced office¹. And, with nine in ten office workers saying that technology has significantly impacted many areas, or had a life changing impact on all areas of their life, a tech-enabled environment isn't just a nice-to-have for the working world, it's essential.

It is, however, important not to deploy technology for technology's sake. Less than half (47%)¹ of office workers currently working in a technologically advanced building actually use the available tech on a daily basis, suggesting that technology is often implemented without full consideration of the end user. People use technology in their personal lives because

¹ Global data gathered in a 2021 survey conducted by WiredScore in partnership with Opinium Research.

it's useful, not just because it's there. The workplace of the future must operate in the same way.

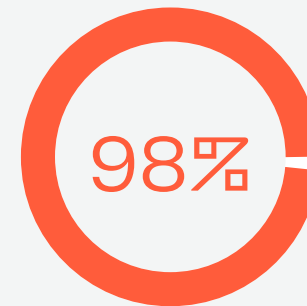
2. Changing working habits.

The way we work has changed, and our workplaces need to adapt.

Modern working habits are collaborative and driven by technology. Think shared documents, video conferencing, cloud-based computing, emails and synced digital diaries that give full visibility on who's doing what and when within your company.

Our day-to-day jobs have become so dependent on the outcomes technology can deliver that 98% of office workers say that they would not be able to do their job with the same level of ease without technology², and over half say they wouldn't be able to do their job at all. This change in workplace habits was apparent long before the pandemic, but our workplaces have been slow to adapt to the tech-dependency of the working world.

Offices rely on technology to bring alive great, sociable, collaborative spaces that still allow for individual productivity to flourish.



of office workers say that they would not be able to do their job with the same level of ease without technology.²

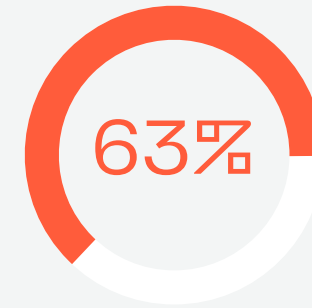
² Global data gathered in a 2021 survey conducted by WiredScore in partnership with Opinium Research.

Beyond tech dependence, the recent pandemic-induced shift in working habits has emphasized how important getting the actual office space right is. Landlords must work harder and more collaboratively to create environments that are attractive to the working world – otherwise, their spaces simply won't survive.



The buildings in which we work now have to make us want to work there by offering flexible and personalized services.

As working from home has become a more viable option, landlords have an even greater need to cooperate with occupiers to create safe, inspirational and desirable places to work that can attract employees back into the office. Offices need to be user-centric spaces, able to understand and adapt to our usage on a day-to-day basis. The only way to facilitate this is via a robust technological infrastructure that learns from its occupiers and adapts accordingly.



consider working in an environmentally sustainable space to be very important.⁶

3. The climate crisis.

Tackling the climate crisis is the global imperative of our time. The built environment alone generates emissions equivalent to 8.65 billion tonnes of carbon dioxide³. Buildings, and associated emissions, contribute nearly 40% of all carbon emissions globally⁴, creating mounting pressure on real estate to provide a green path forward. If we're to collectively meet our global carbon reduction targets-limiting global warming to below 35.6°F (2°C)⁵ the real estate industry needs to play its part.

Sustainability has also become a personal priority for many office workers: 63% consider working in an environmentally sustainable space to be very important⁶, and as many as 18% would refuse to work in a building that is not sustainable.

³ <https://ourworldindata.org/emissions-by-sector>

⁴ [https://www.worldgbc.org/news-media/WorldGBC-embodied-carbon-report-published#:~:text=Together%2C%20building%20and%20construction%20are,buildings\)%20accounting%20for%2028%25.](https://www.worldgbc.org/news-media/WorldGBC-embodied-carbon-report-published#:~:text=Together%2C%20building%20and%20construction%20are,buildings)%20accounting%20for%2028%25.)

⁵ https://ec.europa.eu/clima/policies/international/negotiations/paris_en

⁶ Global data gathered in a 2021 survey conducted by WiredScore in partnership with Opinium Research.

Sustainability isn't a fleeting fancy for the working world, it's an all-important consideration for the landlords and developers of today if they're to provide spaces that allow tenants to attract the top talent.

Improving in-use building performance is critical. Although the industry can do a great deal to improve sustainability by improving building materials and processes during development, operating emissions account for nearly three quarters of the 40% of carbon

emissions contributed by buildings⁷. Reducing these in-use emissions can only be achieved by deploying technology to optimize operating regimes.

As the world changes, so do our expectations. We spend as much as 90%⁸ of our time inside buildings. These three trends have precipitated a shift in what we expect from the places in which we spend so much of our time – a shift that we cannot ignore.

⁷ https://ec.europa.eu/clima/policies/international/negotiations/paris_en

⁸ U.S. Environmental Protection Agency, 1989, Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C. Washington, DC.



**of our time is spent
inside buildings.⁸**

3.

Defining a smart building.

Until now, the real estate industry has struggled to agree on how to define a smart building. Whilst most buildings now involve at least one aspect of smart technology, there exists no consensus on what makes a building smart.

We need a global standard so that the industry has a straightforward, usable blueprint for creating and measuring the smart buildings of today and tomorrow.

Smart must put the user first – beginning with the outcomes the user wants and needs from a building and then deploying the relevant technologies to deliver those outcomes. An outcomes-focused smart building uses the best, necessary technology to provide outstanding experiences for its tenants, operators and owners.

It's important to clarify who is meant by the 'user' of a building. All the people who benefit from the space, primarily office workers and the tenant companies, but also visitors, building managers and operators, owners and investors, and even wider society.

A smart building delivers four outcomes to those users:



An inspirational experience, a workplace that attracts and delights, with flexible and personalized services.



A sustainable building through a reduced whole-life carbon footprint by using technology to operate the building more efficiently.



Cost efficiencies are created by optimizing the building's performance.



Future-proof by design and able to adapt to new demands.



An outcomes-driven definition of smart buildings:

A smart building is one that delivers outstanding outcomes for all users, through digital technology, to exceed their evolving expectations.

WiredScore

The definition of a smart building, following a user-centric and outcomes-driven perspective, recognizes that a smart building is about using the best technology, processes and procedures available to deliver outstanding outcomes for all users.

Smart buildings are inspirational, sustainable, cost efficient and future-proof spaces designed to deliver exceptional levels of engagement and satisfaction to the users of today, and tomorrow.

When scoping and creating a smart building, developers face the challenge of not yet knowing who the tenant will be. It is true of commercial real estate that tenants are often identified late

in the construction phase, or once the development is complete. Therefore, the actual users of the building are unknown when critical design decisions are made.

This raises the question: how can developers make a building smart when many critical design decisions are dependent on the specific wants and needs of the building users?

To resolve this problem, a distinction must be drawn between 'smart enabled' and 'smart delivered'.

Across a building, the technological foundation should be put in place – including the building network, ubiquitous connectivity, and clear and structured governance frameworks.



Then in the areas they control, landlords should deliver the functionality relevant for that area.

They could for example ensure the building systems are connected into a single visualization layer, or deliver shared amenities that can be booked on a smartphone.

These decisions are sometimes out of the landlords' hands in tenant spaces. In this case, landlords need to provide the functionality for tenants to adopt or 'plug into'.

This could be an in-building app which tenants can integrate with their meeting room booking system or creating software and cloud infrastructure that allows users to control lighting, again which a tenant could plug their systems into.

To build on the definition of a smart building, the following chapters will outline the more detailed functionalities that users want from smart buildings, and then the technological foundations that are necessary for those functionalities to exist. All of these functionalities and foundations deliver some combination of the four outcomes: inspiring, sustainable, cost efficient and future-proof.

4.

What does a smart building deliver?

To provide an inspirational experience, and be sustainable, cost efficient and future-proof by design, a smart building must deliver a number of functionalities for its users.

The functionalities improve the in-building experience for users. Rooted in user stories which map how people interact with the building, each functionality, when delivered to its fullest extent, will delight one or more user groups, making the interaction seamless and enjoyable, overcoming a challenge or inconvenience, and improving the experience in each part of the building.



The six smart building functionalities:



1. Individual and collaborative productivity.

Creating spaces that enable people to be at their most efficient and effective using features such as: automatic visitor check-in, automatic meeting room booking, desk booking and occupancy detection.



2. Health and wellbeing.

Creating safer and healthier working environments via features such as: air quality monitoring, lighting / temperature / ventilation adjustment, cleanliness and maintenance reporting systems.



3. Community and services.

Placing community, services and information into the hands of users, creating a sense of community by providing building users with the ability to explore and access external services (like local events and amenities), deliveries, accessibility options and providing a feedback loop to collect and action user suggestions.



4. Sustainability.

Improving and reporting on the sustainability of the building via energy / water usage tracking, temperature / lighting optimization, waste management, and by providing charging points for electric vehicles.



5. Maintenance and optimization.

Optimizing the building's space and systems through more immediate and detailed performance data allowing focused maintenance regimes and more finely tuned system performance.



6. Security.

Providing a safer place to work and innovate with more advanced systems such as: building security, access control, fire alarms and compliance management.

Buildings across the globe are successfully incorporating these smart building functionalities to achieve outcomes that users want and will benefit from.

The following highlights a selection of noteworthy examples:





Productivity:

Owner: Great Portland Estates
Building: Hickman, London

For the last five years GPE has been developing a smart building capability and have now delivered three smart buildings with more on the way. At Hickman, located in London's Whitechapel, GPE has delivered their smartest building to date.

Hickman has been designed to meet GPE's vision to continually innovate to enhance occupiers' workplace experience. The smart building links a digital twin with Sesame, GPE's workplace app, to allow occupiers the chance to make the most of every day.

The digital twin helps GPE to monitor occupiers' movements through sensors in every light fitting and combines this with energy consumption and real time feedback on every piece of equipment in the building.

This allows GPE to meet the sustainability target to become a net zero carbon business by 2030, as well as enabling a variety of productivity benefits for users.

These benefits start for workers before they leave home: Sesame allows them to check the air quality in the office, book their desk and to check how busy their tube platform is to avoid busy times. On their journey they can read over 150 titles and magazines provided free with the app and when they arrive sensors allow staff hands free access into the building. Once at their desk they have control over lighting and temperature at their workstation.

Health and wellbeing:

Owner: EDGE

Building: EDGE London Bridge

Health and wellbeing has been at the center of EDGE's approach to offices for many years, with technology being a key enabler. The pandemic has accelerated the focus on health in the industry, often with a focus on preventing disease, and EDGE sees the potential to address the topic holistically, asking:

How can someone be healthier and happier when they leave the office than when they arrived?

To achieve this, EDGE leverages technology in various ways. Firstly, ensuring that the building seamlessly meets the needs of the users, using data from various sensors in real time for building systems to automatically adjust settings, ensuring optimum comfort levels at all times. So, the building adapts to the life within and not the other way around.



With the sister company EDGE Next, EDGE puts data in the hands of the building users to help them navigate their workday. For example, warning users when there are too many people in a room to have safe ventilation levels or advising which desks are available and best suit their comfort needs. EDGE also leverages daily occupancy data to ensure effective cleaning protocols. Furthermore, EDGE Next provides key insights to real estate management to improve performance, so that every building can become even healthier over time.

EDGE's new flagship development in London, EDGE London Bridge, will feature the latest smart technologies, not only to ensure it offers the healthiest office environment, but also to support the company's sustainability goals and help EDGE to deliver the most sustainable office tower in London.

Community and services:

Owner: Gecina

Building: Gecina HQ, Paris

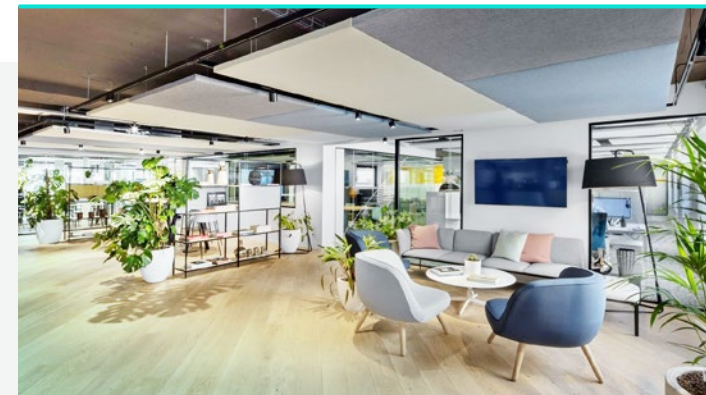
Gecina's headquarters has been imagined and designed as a sustainable living space, a reflection of changing work practices, but also as proof of the company's commitment to society and the environment. This required attention to the layout, to the allocation of shared space for collaboration, a more advanced service approach, and the integration of technology to improve the quality of user experience, CSR performance and efficiency within the building.

In terms of technology, the foundation is the highest possible standard of connectivity for users, equipment and associated services. This enables more fluid collaboration, and simpler deployment of new services, such as thermal control or blinds, access to the building via a smartphone, digital concierge services, parcel boxes, or fleet car sharing made available to all employees. Each employee can access all services via smartphone and, in 2021, Gecina's mobile app will aggregate not only the building's service offering, but also the shared services available across the wider Gecina network.

The app will also allow a direct exchange between Gecina and the user community, facilitating the process of continuously expanding and improving the user experience through the production and further analysis of data.

Through the use of IOT technologies, such as remote fluid reading and metering sensors, Gecina will achieve greater efficiency in the operational management of the building, allowing higher levels of user comfort whilst striving for ambitious CSR commitments.

Looking to the future, the focus is on the Building Operating System and the digital twin that should be implemented at the Gecina headquarters in 2021.





Sustainability:

Owner and Developer: M&G Real Estate
Development Manager: Nuveen Real Estate
Building: 40 Leadenhall, London

Environmental, Social and Governance (ESG) criteria are central considerations in the development of 40 Leadenhall in the City of London and the decision making of M&G and Nuveen Real Estate in the delivery of the project. These factors are also of great importance to potential occupiers, their employees and to wider society. The building delivers 900,000 sq ft of commercial office, amenities and retail space and needs to achieve this in the most sustainable means possible.

In a building of this scale, it is not practical to rely on human intervention alone. This was recognized at an early stage in considering building controls and operations, and there was a desire to optimize the wealth of data that is delivered through the Building Management Systems (BMS) and Energy Management Systems to allow the effective management of power, lighting, heating, cooling and ventilation.

In order to enable exemplary sustainable performance, the ability to provide complex and thorough analytics will be a key criteria in the identification and procurement of a Smart Platform that will be used by the Building & Facilities Management team to manage and control the building systems. Coupled with the addition of occupancy and environmental sensors to supplement the BMS and the ability to link to a Digital Twin of the building, smart technologies will mean that 40 Leadenhall will be an exemplar project in terms of sustainability.



Maintenance and optimization:

Owner: Art-Invest Real Estate

**Building: Hammerbrooklyn.DigitalCampus,
Hamburg**

All modern buildings boast a variety of technical building equipment, and the way in which these devices function is key to user satisfaction and operational costs. However, across the industry, the data latent in these systems frequently remains untapped, as systems are often not combined in a way that allows visualization and systematic data analysis.

It's here that smart buildings make a big difference: Art-Invest Real Estate employs artificial intelligence to digitally upgrade the Building Management Systems (BMS) across their portfolio to enable fully automated analysis (or evaluation), revealing areas for potential.

By combining system data in one single place, Art-Invest Real Estate deploys algorithms to improve building performance, energy consumption and day-to-day use, as the generated data streamlines operational necessities via predictive maintenance.



However, Art-Invest Real Estate is also exploring solutions beyond the BMS, including at Hammerbrooklyn.DigitalCampus, where smart elevator solutions provide predictive maintenance, allowing the building's elevators to operate at levels of optimal performance.

Combining smart technologies drives operational savings, to reduce energy consumption and increase rates of tenant satisfaction. Additionally, by enriching the building's digital twin with maintenance and optimization data, levels of transparency are increased by making the building's data more readily available.

Security:

**Owner: PGIM Real Estate, SJP Properties
and Norges Bank Investment Management**
Building: 11 Times Square, New York

At 11 Times Square, PGIM Real Estate and its joint venture partners SJP Properties and Norges Bank Investment Management have deployed a number of measures to ensure security of the building, while still ensuring smooth operations between building management and tenants. The access control system, CCTV and visitor management system are all provided via BluB0x. When a new tenant moves in, PGIM Real Estate receives a list of tenant employees with their primary office floor to then issue access cards for their entry via the turnstiles at the elevator banks in the main lobby.

PGIM Real Estate's card access system is integrated with the elevator Destination Dispatch system so when a tenant presents their access card at the turnstile, they will receive their elevator designation on the turnstile screen. If they intend to go to another floor, they simply present their access card at the kiosk in the elevator lobby and select the floor they wish to go to for a new elevator designation.

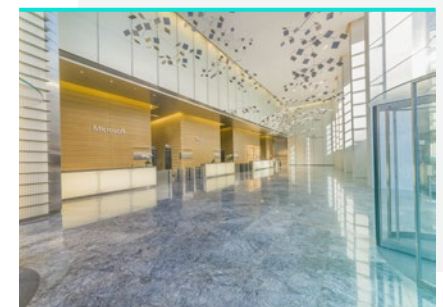
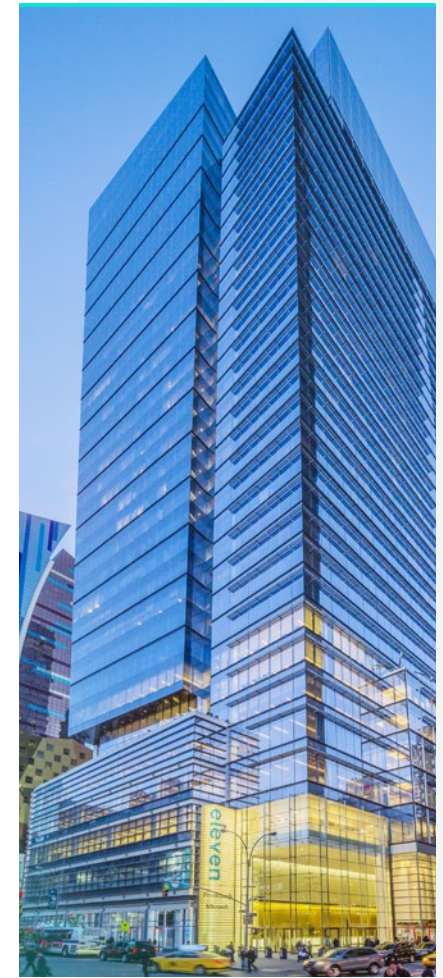
Further modifications were made to future-proof the infrastructure and enable innovation. For example, the card readers at the turnstiles were replaced with QR code readers. These allow tenants to hold their access card a further distance from the turnstile, avoiding having their access card actually touch

the turnstile. In conjunction with the new readers, new tops were required for the turnstiles to accommodate the new reader configuration.

QR code readers also allow tenants to use their phones to activate the turnstile from a certain distance, without the use of their access card. The same functionality can be provided on guest passes.

To support a safe return to work post-COVID, a new module has been added called 'Fit to Work'. Every night at midnight, tenant access cards are deactivated. Tenant employees are asked to log into BluSky (the website for BluB0x) via the web or an app every day. From there they can access 'Fit to Work' where they are asked one question: 'Do you certify that, for today, you meet all conditions established by your employer and the facility in which you work?'. Once they answer affirmatively, their access card is reactivated within seconds, allowing them entry through the building turnstiles.

Further to this, employers are required to have a plan for their employees to facilitate social distancing, limiting occupancy, limiting large group gatherings, and detailing measures taken by the employer to enable contact tracing.





To deliver user functionalities reliably,
robustly and consistently, a smart building
needs a firm technological backbone.

5.

The technological foundations for smart.



The technological foundations of a smart building can be formed into six broad categories. Within these categories, the hardware, software, services and procedures required for success must be considered together.

Implementing the features and excelling in each category will ensure that a building is smart.

**Digital connectivity:**

Secure, reliable and dedicated digital connectivity, available for users and systems is at the core of the smart building experience.

**Building systems:**

The physical systems and software platforms that control the building (such as heating and lighting systems), and underpin many of the smart functionalities a building can deliver.

**Landlord integration network:**

The network running through the building and connecting the building systems and software, to which the occupier can integrate (including the physical environment and cabling).

This category includes considerations such as the robustness, security and extendability of the network, and the range of physical and communication protocol integration options.

**Governance:**

The smart strategy of a building: the drivers and methodology behind the implementation of the building's technology, the roadmap for future improvements, the success metrics and the feedback cycle in place that allows users to continuously drive value. Further to this, governance also refers to the way in which the owner has enabled users to engage with the building via fitout and integration guides.

**Cybersecurity:**

The policies, practices and testing processes that ensure the building's systems and data are secure and are following the right protocols and standards, recognizing that as buildings become more technologically advanced, the risks and consequences of a system failure (through error or deliberate action) increase significantly.

**Data sharing:**

The essential data foundation of a building, split into two key components that cover the legal, ethical and practical aspects of data sharing:

1. Keeping users' personal information safe and secure whilst enabling a host of smart building features.
2. Using the building's utilization and performance data generated as a value-adding component of the portfolio the building sits in.

Several existing buildings and developments are already incorporating these smart technological foundations: ✓

Digital connectivity:

Owner: Allianz Real Estate

The digital cornerstones of smart buildings are data security and data asset management. As each smart asset produces vast amounts of data, it raises the question: how to securely collect, analyze and make smart use of this data?

As mandatory underlying infrastructure, the digital connectivity of a building is one of the prerequisites to enable data production and management.

Smart and secure buildings require diversity and resiliency of high-level wired and wireless connectivity available to the building users, tenants, site operators and landlord. And securing the infrastructure is part of a wider effort to protect the building and its user from cyber attacks.

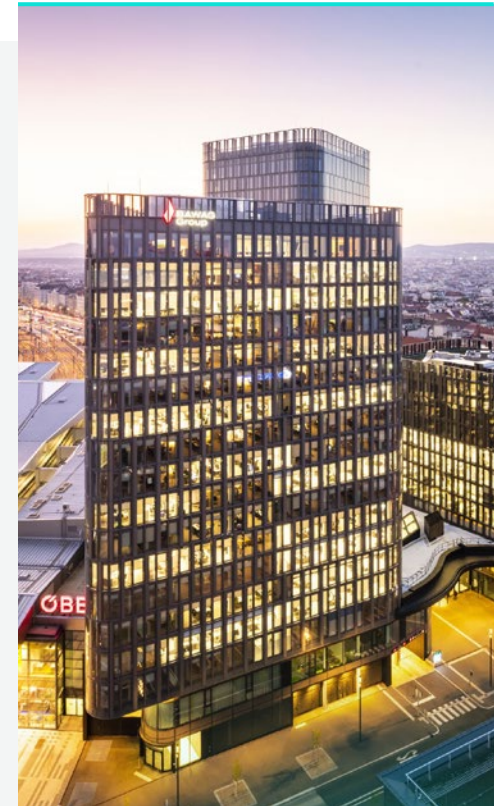
Data security is symbolic of the trust which must be established between a landlord and its tenants. The policies and procedures governing all aspects of data handling must be exemplary, going beyond mere compliance with regulations. The smart features of a building need to be robust and digitally secure thereby ensuring a safe data flow to the asset manager,

guaranteeing the continuity of services to users while at the same time reinforcing the leasing decision of the tenants.

Data-driven asset management, on the other hand, is the adoption of a holistic approach to making decisions on the investment with the ultimate aim of increasing asset value. For example:

The more we understand the occupational patterns of our buildings, the better we can manage them in terms of optimizing energy efficiency and enhancing user experience through additional services.

As one of the world's largest real estate investment managers, Allianz Real Estate's number one priority with the adoption of a smart approach is to further maximize portfolio value – by meeting a 'net-zero carbon' target by 2050 as well as to providing superior user experience across assets. Given the size of the Allianz Real Estate portfolio, this is achievable through scalable, standardized industry practices and market transparency.



Building systems:

Owner: Hines

Building: Texas Tower, Houston

Within Hines, a specialist team, the Conceptual Construction Group, ensures that the building control systems in each development are cutting edge solutions tackling tomorrow's built environment challenges. One recent example is Hines' Texas Tower, a 47-story Class AA office building located in the heart of downtown Houston, designed by Pelli Clarke Pelli, and achieving triple platinum in LEED®, WELL, and WiredScore certifications.

Texas Tower connects API-centric mobile applications with core building systems to surface timely utility, utilization, and operational data.



It combines front and back-of-house systems for a seamless, trustworthy experience whether it's air quality data, touchless access control, room booking, utility billing, or preventative maintenance. It's all connected.

This data allows Hines to ensure that its buildings continue to evolve and incorporate the best in building technology to inform the next generation in development. Hines also combines smart asset level-data with portfolio-level intelligence to drive both their own investment performance and the industry forward.





Landlord integration network:

Owner: KingSett Capital

Since 2018 KingSett has set a Smart Technology Vision across their Canadian Real-Estate Income Fund (CREIF) assets: to 'enhance a strong entrepreneurial and innovative culture through measurable and sustainable investment in technology, process and people, to drive premium risk weighted returns.'

An early focus of implementing this vision has been on ensuring strong base building networks (BBNs) exist within Kingsett's buildings, and cyber security policies have been implemented to protect the systems that utilize this network.

During the pandemic, these networks have allowed for agile adoption of technology throughout their buildings. Implementation of air quality monitoring, hands free technology, occupancy monitoring, building control and enhanced security could be easily achieved utilizing this infrastructure. Because of the converged network, integration of these systems to drive further benefits is also now possible.

In an existing portfolio building systems are evolving constantly. Having the infrastructure and policy in place has helped KingSett to ensure that they are moving holistically toward a better experience for their tenants.

Governance:

Owner: Skanska

Building: Two Drydock, Boston

Skanska USA Commercial Development has invested significant efforts to create a common platform for project teams to develop future-proof assets with sustainable, innovative, and flexible building solutions focused on a superior tenant experience.

Success across a wide range of developments is underpinned by a clear and structured governance framework, with an ambitious and evolving vision and technology roadmap at company, region and individual asset level.

Two Drydock showcases Skanska's global experience and breadth of knowledge in a vision that centers around optimizing tenant experience. For the first time, the building application was built into the vision from the onset, allowing Skanska to build an entire amenity stack around it.

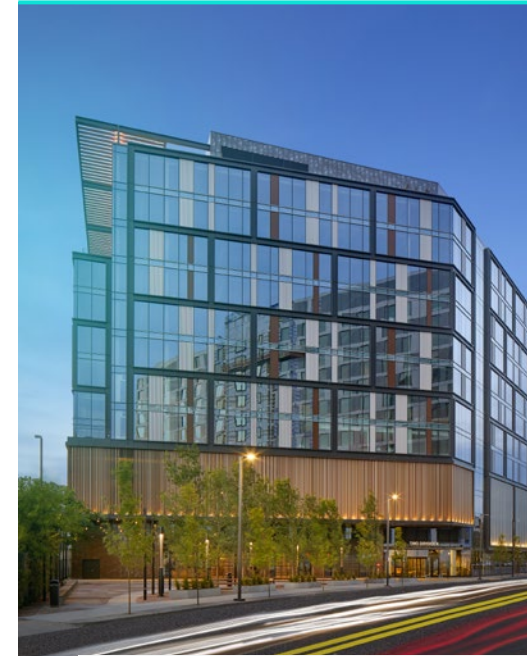
The main priority was to enable a frictionless in-building experience: from dynamic parking all the way up to the tenant's desk on their floor. A clearly articulated vision was fundamental to ensuring the right technology was implemented to enable that experience for tenants.

The roadmap at Two Drydock is underpinned by the right foundational technologies to enable future use cases. From a user functionality standpoint, this means deploying base building technology that can enable rapid deployment of features for tenants based on their requirements. The key here is enablement, as moving technology too far into the tenants' space isn't pragmatic, but providing the right foundational design gives them the capability to dial up the features they want.

This approach needs to be accompanied by close engagement with tenants to support them in making the most of the features the building offers. Tenant integration guides map the base-build technology to the user stories that can be enabled. This means translating a lot of the upfront technology into outcome-oriented user stories for tenants, so from day one, tenants can make informed decisions about what features they want to prioritize.

It is only possible to learn and improve if you measure. At Two Drydock, Skanska has implemented technology to capture data on elements such as the overall energy performance of the building, occupancy, and how the spaces within are being used.

Data is key, as it is used to benchmark at a national and local level, targeting performance levels well above local baselines. To inform programming at a building and national level, Skanska hasn't forgotten the more traditional approach of using tenant surveys through the building app to elicit feedback from occupants to further improve the tenant experience.



Cybersecurity:

Developer: The John Buck Company
Building: 151 North Franklin, Chicago

151 North Franklin is a forward-looking 35-story office tower located in Chicago. The John Buck Company's team developed 151 North Franklin to include a fully integrated Intelligent Building Platform (mobile & web-based app) as its occupant facing portal.

However, the benefits that an intelligent building like 151 North Franklin can give users are accompanied by significant risks, unless a clear cybersecurity plan is in place. Tenants now expect their landlords not only to ensure their personal safety but also the security of their data.

This is why the cyber DNA at 151 North Franklin was designed for resiliency, high-availability and contains enterprise level hardware, IoT collectors with heuristic systems analysis and DOD level security. These components integrate with the building's cutting-edge technology stack to deliver premier and secure user experience to building occupants.

During the last 12 months, radical changes have been made in new and existing technologies. These advancements need to be continually monitored for risk, bandwidth, performance, and user experience. Partnering with a best-in-class technology services team who provides ongoing maintenance of the entire network implementation, along with constant support to all building vendors, contractors, and facility teams is an integral part of the Cybersecurity strategy at 151 North Franklin.



Data sharing:

Owner: British Land

Building: 100 Liverpool Street, London

100 Liverpool Street has innovation at its core, from the design phase through to construction, asset management and community engagement. To deliver the building, British Land implemented a converged network which adheres to the highest connectivity standards, delivering a single digital ecosystem which is secure, robust, and scalable.

To realize the smart vision for the building, it was necessary to surface required data sets from disparate building systems in a common format, providing the ability to communicate dynamic and static data to and from cloud services, enabling analytics, machine learning and a scalable approach to Big Data.

In 2019, the Building Device Naming Standards (BDNS) initiative was started, with the aim of creating new open standards for data in relation to the naming and labeling of devices in smart buildings. Together with the Open Data Institute, Arup and Google, British Land advised on the design and operation of an open standards process, to ultimately standardize conventions and benefit everyone involved in smart buildings.

100 Liverpool Street has pioneered the practical application of this standard. It is one of the first projects to implement an open protocol naming convention during the design, construction and operational phase of a project.



6.

Creating the definition.

To build a consensus on smart: what it means, how it can be valuable to owners and users, and (crucially) how to measure success when delivering a smart building – the WiredScore Smart Council was formed.

Comprising over 90 global, forward-thinking companies, the WiredScore Smart Council worked with WiredScore for over a year to form a global definition of smart buildings, and develop a framework for WiredScore's new certification for smart buildings (SmartScore), designed to serve both the owners and users of the buildings around the world.

The WiredScore Smart Council marks the first time landlords, tenants and real estate leaders of such caliber have come together to combine their knowledge and expertise to provide a dedicated approach to the impact of smart buildings within real estate.

The WiredScore Smart Council is the first of its kind in both scale and process. As a result, WiredScore's definition of smart is uniquely accurate, relevant and expertly informed – and the only definition generated by the industry for the industry.

About WiredScore:

WiredScore is the organization behind the WiredScore and SmartScore certifications: the internationally recognized digital connectivity and smart building rating systems for real estate, helping landlords design and promote buildings with powerful digital connectivity and smart capabilities.

WiredScore launched in 2013 in partnership with Mayor Bloomberg and the City of New York. Since then, over 650 million square feet of commercial and residential space has been committed to WiredScore certification, impacting 6 million people across 10 countries. For more information on WiredScore, SmartScore or to find WiredScore and SmartScore certified buildings, visit: www.wiredscore.com.

With many thanks to the companies who have provided case studies for this white paper, and to all the WiredScore Smart Council Members and Research Advisors for their generous and insightful input into WiredScore's smart research and development process.

WiredScore Smart Council members:

Allianz Real Estate	Legal & General
Allied Properties REIT	Lendlease
Art-Invest Real Estate	MOMENI
AXA	Nuveen Real Estate
Blackstone	Patrizia AG
British Land	PGIM Real Estate
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Commerz Real	Signa
Deliveroo	Skanska
Derwent London	U+I
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WiredScore Smart Council Research Advisors:

5Q Cyber	GOLDBECK
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CBRE	Siemens
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Cordless Consultants Limited	Smith + Andersen
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Deerns	Sweco
Demand Logic Limited	Syska Hennessy Group
Egis Group	The Flow
ELAN	Thing-it
Ellis Don	ThoughtWire
Ethos Engineering	Tribu Energie
Foster + Partners	Tridium
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To learn more about SmartScore certification:

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