eGuide

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The Smart Building Guide

How to Enhance the Value of Your Existing Buildings

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INTRODUCTION
What is a smart building?

What actually is a smart building, and who benefits from it? What are the benefits of a smart building for stakeholders such as building owners, tenants, users and facility managers?

In this guide, we attempt to answer the key aspects of this question. Don't expect an exhaustive enumeration of everything that makes a building smart or of all the techniques used in the process. The aim is to provide a pragmatic introduction to the Smart Building phenomenon.

To begin with: there is no single, universally accepted definition of what constitutes a smart building; existing definitions are either quickly outdated or rapidly expanding. The definition has now evolved into a holistic view of what a smart building is and, more importantly, should do for its users. After all, buildings are developed for people. Smart buildings should maximize the safety, health, comfort, well-being and productivity of their users. Smart buildings have developed at a rapid pace, from buildings that focused primarily on energy efficiency, to buildings that bring together a range of technologies and try to combine them in order to optimize the occupant experience.

This means breaking through the data silos of existing solutions toward a single connected platform which includes:

- **Energy Management**
- **Sustainability**
- **Space Optimization**
- **Comfort**
- **Well-being**
- **Productivity**
- **Management & Maintenance**
- **Safety & Security**
- **User satisfaction**

By definition, a smart building is an interplay of different systems, which is responsive to building occupants, adjusts to the way it is used and reacts to its environment; it is always striving for greater optimization in energy efficiency, maintenance, and space utilization. Cloud computing and integrated smart building platforms thereby combine the data for analysis, insight and compliance, including the growing demand for ESG reporting, mandatory or otherwise, and the automatic control of the building.

An overarching software solution, a smart building platform, can merge these data silos and solutions, but must also support the user experience.

For example, by providing ease of operation through a consistent user interface, via a single web interface or a smartphone app.

In addition, bringing together the data from underlying systems should enable insight and reporting through data analytics and visualization. And this data can then also be used to develop algorithms that support the autonomous operation of the building. Furthermore, the data is also used to provide insight to improve the daily work of administrators, facility managers, operators, service providers, and the like. And it is needed to meet legal obligations based on increasingly stringent

European regulations.

USE CASES
Why Smart Buildings?

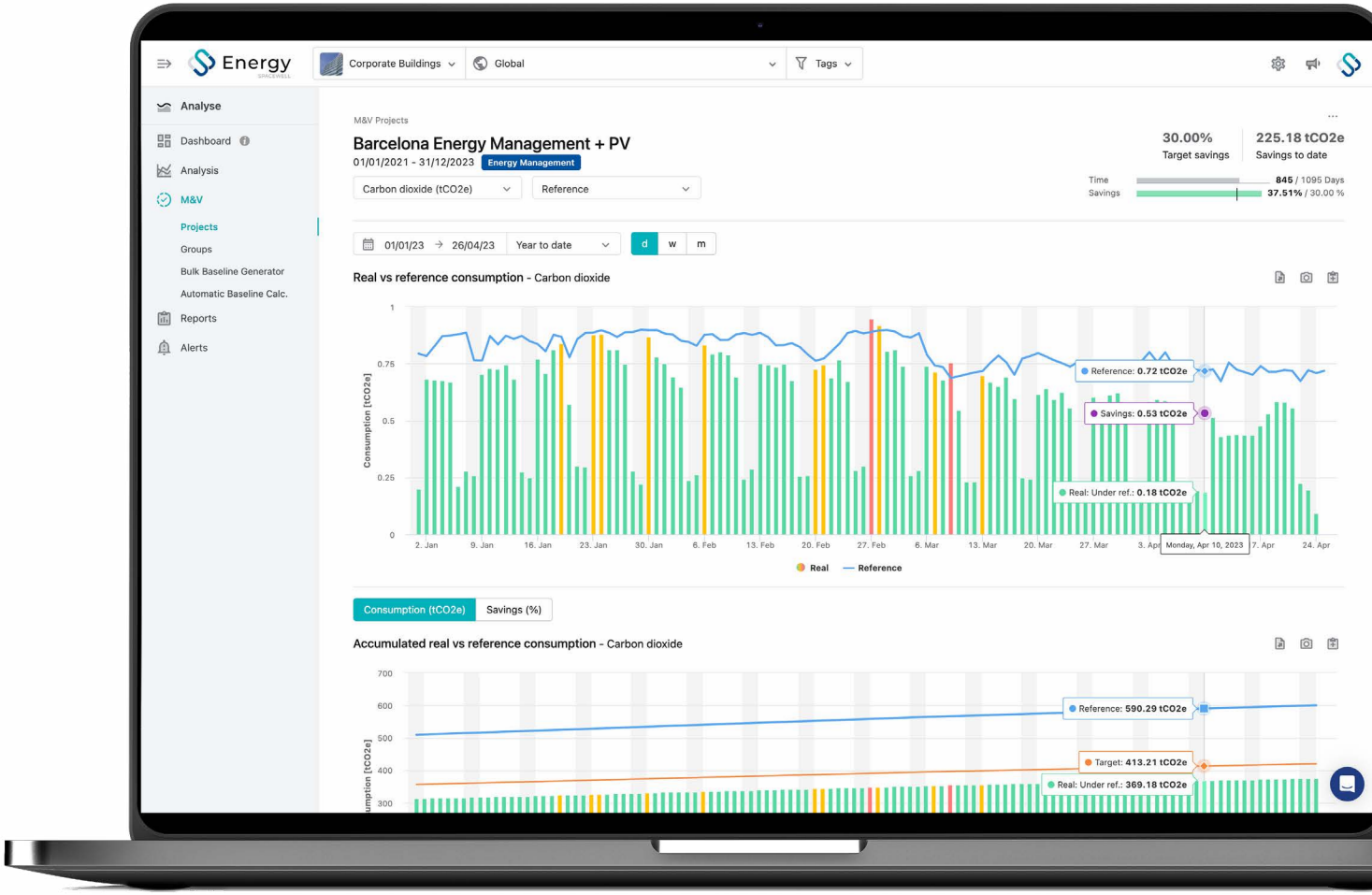
SUSTAINABILITY

Smart buildings are undergoing an almost silent but major all-encompassing revolution. Sustainability is no longer limited to energy efficiency. It also includes the use of materials in development and maintenance of buildings, the well-being of the user and the environment of the building.

Circularity (reduce, reuse, recycle) is a further deepening of sustainability, which also considers the future use of building materials. Circularity extends to furniture, flooring and the use of cleaning materials, too. It also includes the eventual dismantling of the building after its useful life. A complete smart building platform is capable of reading/linking the 1st design (BIM) and provides comprehensive support throughout the entire lifespan of a building.

As an introduction to smart buildings, we will first look at the energy systems of smart buildings. Partly because these are often requested as the first “use case.”

In the next sections we will pay attention to space optimization, among other things.



The deployment of Energy Dashboards is often the first step towards a Smart Building

The providers of energy monitoring and reporting systems claim energy savings of up to 30-50%. Indeed, optimizing climate control can already yield large savings.

A basic installation for such systems is often limited to placing a number of submeters and unlocking the main meters, sometimes via the already present building management system (BMS) and sometimes via completely separate meter solutions. Energy conservation is a cost-reducing activity that has the added benefit of a reduced carbon footprint. Due to legislation from the Paris and other climate accords, owners and tenants are obliged to meet increasingly strict energy labels for their buildings. An energy management solution as part of a complete solution can – as a first step – provide insight and support optimization and mandatory energy reporting, with a direct impact on cost reduction and a lower carbon footprint. It can also help raise awareness of energy efficiency within organizations and support them to achieve long-term energy performance goals.

Due to the growing complexity of energy solutions and systems in buildings, the need for intelligent energy management solutions is growing. Energy can be generated, optimally distributed, stored, and allocated within the building according to availability and demand. For example, the energy needed for charging stations, the energy generated via solar panels and the energy used from the grid are then balanced and optimally utilized. A building's energy consumption, and the consumption behavior of the users becomes a major focus for a full Paris-proof development.

In sum, energy management can enable both the owner and tenant to realize direct cost savings and lower their CO2 footprint, which is crucial in meeting new legal obligations and supporting social objectives. An energy-efficient building is also more attractive to tenants, leading to higher lease prices and increased property values.

SPACE OPTIMIZATION

Monitoring space usage was initially triggered by the idea that it would provide savings in square footage. Since then, due to the pandemic, the cards have been shuffled differently. The idea that we would all maximize work at home is already outdated; there are clear peak times at the office, especially Tuesdays and Thursdays are popular.

When returning to the office, people desire safe, comfortable, and modernly flexible workspaces. While footprint optimization remains an important driver for businesses, it is equally important to ensure that spaces are fit for purpose and adapted to new ways of working.

Space monitoring and optimization is invariably part of a Smart Building platform

The huge talent shortage, also known as the “War on Talent” is making companies rethink their office spaces and adapt them to the expectations of new employees with highly-in-demand skills. But without measurement we don’t know what to focus on and what is optimal. An integrated Smart Building platform provides us with the necessary insights and tools to make informed decisions that will lead to more optimal outcomes. Insight also allows to put a portion of a floor or even an entire floor (temporarily) out of service, leading to a reduced need for heating, cooling, and cleaning.

Space Optimization measures the occupancy of a building without infringing upon the privacy of its occupants. It can determine how many people are present in which area of the building at any given time. Learning how employees and visitors interact with the facilities can provide a variety of insights, which in turn enable reporting capabilities that allow for cost savings through optimization. Over time, this can lead to adjusting service and even rental agreements.

Insight into how spaces and facilities are actually used helps inform or correct the design of a building, ensuring it is tailored as closely as possible to the needs of its occupants:

- **How many meeting rooms and flex workplaces are really needed and when?**
- **Can we influence behavior and direct the booking of meeting rooms and or workspaces?**
- **Can we limit or spread out days when we all want to work at the office, in order to make maximum use of the space provided?**

Meeting rooms could also be pre-conditioned, or undergo a fresh air boost in the flu season or when a lot of virus is going around, thus supporting comfort, well-being and safety for the user.

COMFORT

The experience of comfort in a building is too easily attributed solely to the climate system; this is notable because the vast majority of complaints in a building are also related to other factors that influence comfort, so there is plenty of room for improvement.

However, comfort appears from scientific research to be a complex interplay of temperature, humidity, CO2 level, noise, light and other issues such as furnishing, as well as the perceived degree of control that users have over the environment.

Improving user-perceived comfort in a building can be achieved by the use of additional sensors to more accurately and quickly adjust temperature, humidity, light levels, occupancy, or even something as simple as measuring and displaying these metrics. Users greatly value transparency. The fact that temperature, humidity or CO2 levels are shown to be right already makes people feel comfortable. Feedback is an important tool in this context. This feedback can, for example, be provided by sensors with a display, a light indication or integration with an AV control element.

Color-coded floor plans show ambient conditions across the building

In a more advanced scenario, controls can be added that allow the user to directly influence the ambient conditions. Smartphone apps or a room display with controls can be useful tools in this regard. A greater density of sensors can show where in the building workstations are available that are closer to the personal preference of the user (temperature/light/noise). In this scenario, in addition, the environmental conditions do not need to be adjusted, which prevents extra energy consumption.

A higher level of comfort results in fewer complaints, which reduces absenteeism, increases productivity, creates a more pleasant working environment and decreases the demand for facility management and management services.

For facility managers and operators, added sensors and improved comfort demonstrate that buildings are upholding the performance that is increasingly stipulated in leases. Also, proper PR around this aspect ensures higher attractiveness for new employees.

EASE OF USE

A smart building is outfitted with a variety of systems that are included as part of the building itself (such as energy, lighting, climate control, and elevators) as well as additional systems that tenants or facility management/operators have added on (like access provision, parking, lockers, audio/visual equipment, dispensers, and coffee machines).

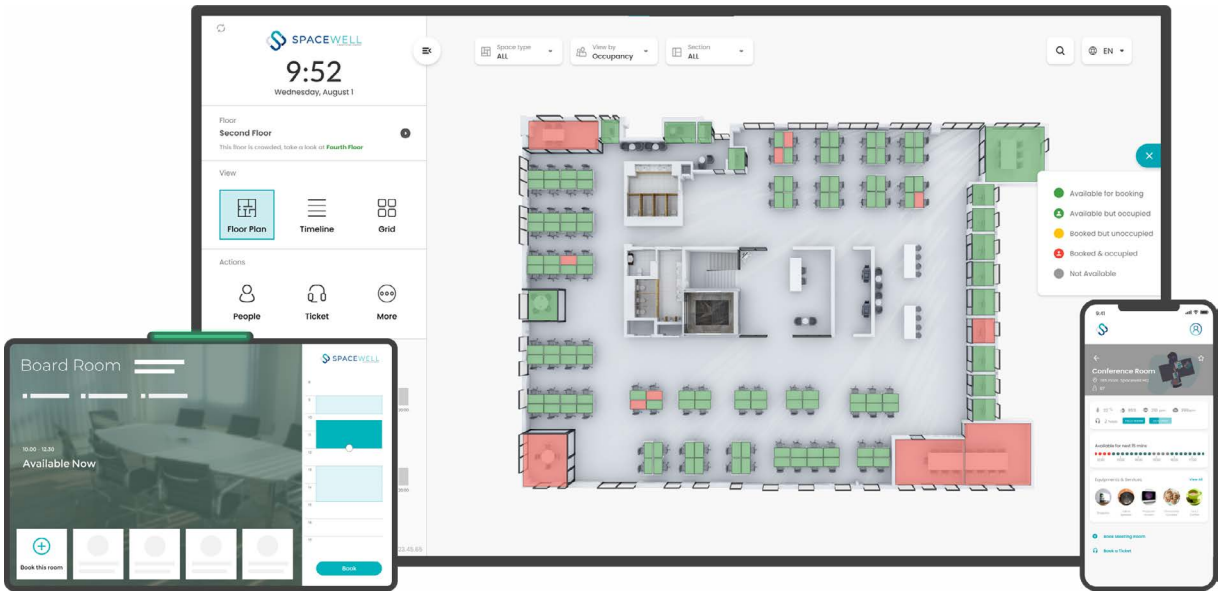
All of these systems generate data that can be extracted and integrated into a comprehensive system, allowing the performance of each individual system to be optimized for the benefit of those occupying the building.

Add the convenience of a single smartphone app or web interface creating a unified user experience that simplifies the process for users. This is important as it allows the users of the building to quickly access what they need from different systems. Ultimately, this makes using multiple systems much more streamlined and efficient.

Visitor access to the building can be quickly facilitated by providing a QR code, and it can be further strengthened if parking space is booked in conjunction with license plate recognition. The registration of a visitor can be handled largely or completely automatically.

For users of smart buildings, a single smartphone app can be used to locate suitable workspaces, grant access to the building and parking area, operate lockers, and open interior doors in meeting rooms. It can also be used to locate co-workers, based on room and desk reservation data.

Touchscreen devices such as kiosks, room displays, and smartphone apps inform users and let them interact with the building



In a more sophisticated scenario, the smartphone app can use location data (obtained via Wi-Fi or Bluetooth) to accurately identify the locations of colleagues or resources within a building or on an educational campus. With this information, users can submit any inquiries or complaints pertaining to their current situation.

It should be noted that this type of application should not infringe on people's right to privacy and should be implemented with an opt-in policy.

Integrating smart building technology with a unified user experience simplifies daily tasks and resolves any associated challenges. Employees no longer have to expend significant effort to access and use the building's facilities.

Having an attractive work environment and providing a hassle-free work experience is essential in order to be an attractive employer. This not only makes the building more desirable to potential tenants but also increases the value of the property for the owner through higher rental potential.

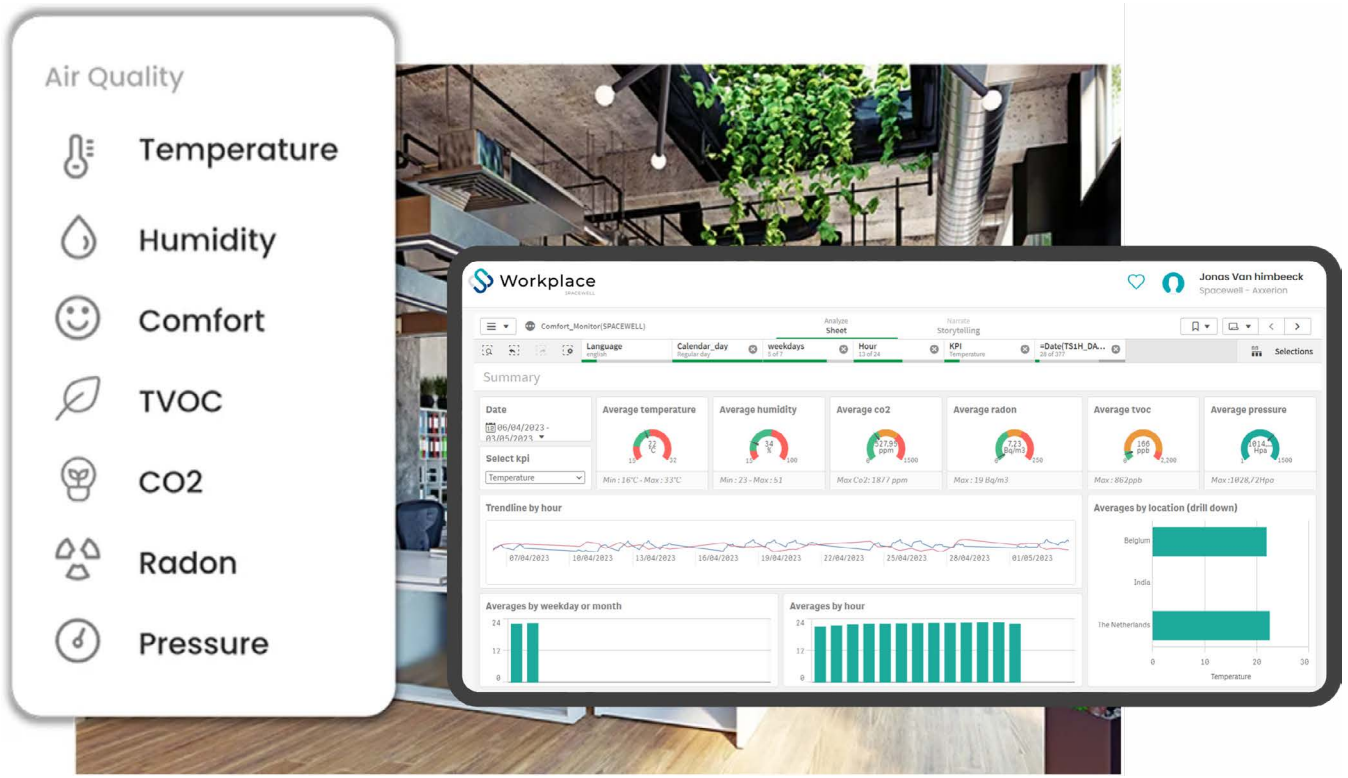
WELL-BEING

Employee well-being has become more and more important in our society, not only from the perspective of the tenant/employer, but also for those who provide facility support services, as well as managers and maintenance personnel.

Smart buildings provide a comfortable, secure and hygienic environment for all stakeholders, while ensuring that water quality standards and legionella control measures are met. The total package of measures to ensure well-being is certainly too large for this introduction. It also requires considerations such as furnishing, color selection, design, greenery, soundproofing and more.

Certifications for well-being are becoming increasingly advanced, featuring more sophisticated and varied sensors to measure and report data. Such sensors measure temperature, humidity, CO2, VOC, particulate matter, light, and sound. The increasing affordability and advancement of sensors is leading to a rapid growth in the number of sensors being used in these systems.

Well-being in a Smart Building is supported from different perspectives



A heightened sense of well-being can result in reduced absenteeism, greater focus, and increased productivity. Lower absenteeism leads to a direct net benefit for the employer/tenant.

Indoor air quality is something that needs attention. Poor air quality is not only harmful to our health, but there is growing evidence that it also impairs our cognitive function – the ability to think clearly and creatively. For schools as well as businesses, it is, therefore, important to gain insight into air quality among other things through the installation of CO2 sensors. The necessary adjustment of air ventilation in schools is undoubtedly accompanied by interest in the energy use and carbon footprint.

Buildings that have been certified for their well-being can garner higher rents and benefit from better rentability and higher property value. Employers or tenants in a certified building are more desirable to prospective employees, resulting in improved retention and greater satisfaction from occupants.

Facility management organizations and building operators can set themselves apart from the competition, increase customer satisfaction, and bolster their competitive position while attracting new clientele.

PRODUCTIVITY

Another crucial factor is the acute and growing shortage of young talent, which poses a significant threat to the continuity and long-term success of the organization. In addition to being an attractive employer, it is essential to improve the productivity of the organization as a whole and of the individual employee, because the amount of work increasingly has to be done with fewer employees.

It has previously been suggested that productivity is improved by comfort, ease of use, and overall well-being; however, the digital transformation toward hybrid working is now becoming an integral part of what constitutes a smart building.

Activity-based workplaces with spaces optimized for specific tasks and/or roles are becoming the norm. Think of individual focus areas or spaces where you can closely work together as a project team. The most modern workplace design cannot compensate for the failings of a digital workplace that is not properly functioning.

Integrating workplace technology such as occupancy sensors, digital touchscreens, smartphones, and audio/video conferencing – and allowing for the use of these technologies regardless of location and time – can significantly improve an organization's productivity and the performance of its employees.

Digital information facilitates collaboration and enhances productivity

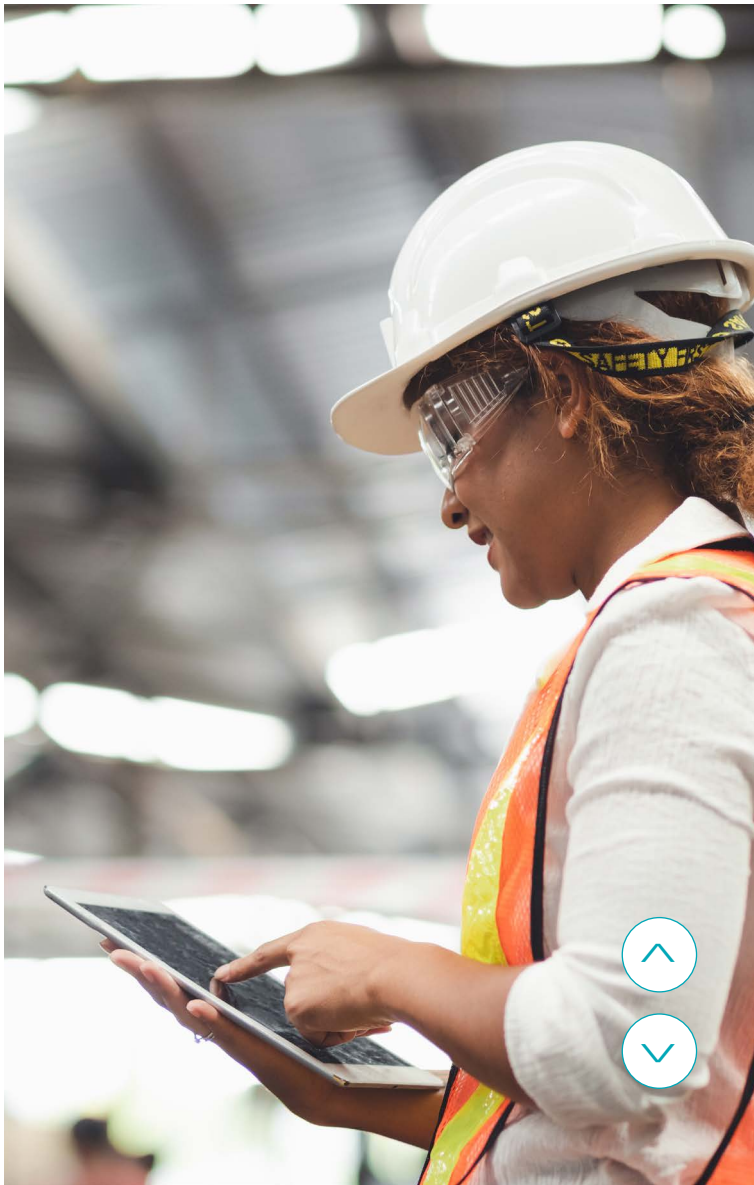
MANAGEMENT & MAINTENANCE

Building management and maintenance is mostly reactive, responding to problems reported or following a predetermined schedule. Smart buildings promise to move towards a model of performance-based contracts and maintenance predictability through available data and integration of systems.

New management and maintenance contracts are increasingly being based on performance results, requiring effective monitoring and forecasting of potential issues. Predicting when maintenance is necessary can be accomplished by analyzing data, and recognizing patterns that anticipate potential issues that may prevent a system from meeting expectations.

Workers in building management and maintenance often lack access to current documentation, even if it is available in one place. Having up-to-date digital documentation easily available, remotely and on the go, is essential for making maintenance and management operations more efficient and effective.

Performance-based contracts and predictability of maintenance cannot be set up without having a complete and accurate picture of all assets and systems in a building. A shift to digital repositories of building assets, remote management and performance-based contracts is enabling new parties to enter the market and create innovative business models. By requiring less physical on-site maintenance visits, digital transformation can help alleviate the shortage of qualified personnel.



Begin With the End in Mind

The examples of use cases provided above demonstrate that implementing a smart building does not have to be done all at once; some aspects may be more relevant to your organization than others and so can be addressed sooner. In other words, you can bring your building into the future in stages rather than taking on everything at once.

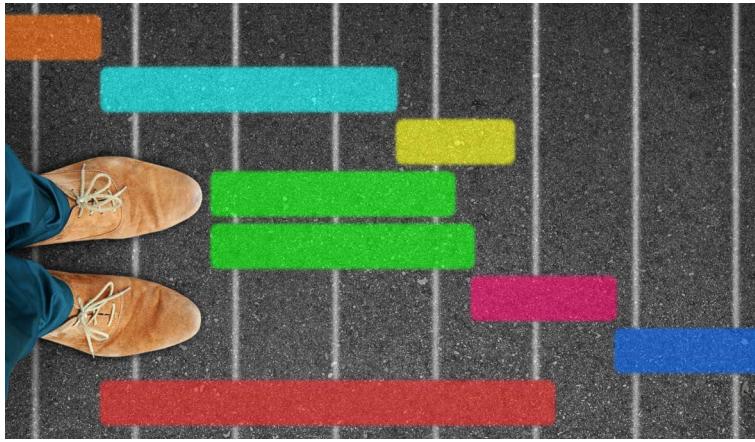
Ensuring success on the initial use case is paramount for garnering internal support and future investments in Smart Building solutions. And this includes communicating early and frequently why you are doing the project and how people will benefit from it. But no matter where you begin, it is important to think of the bigger picture and keep an eye on the end goal.

When selecting a Smart Building software platform, it is essential to bear in mind the long-term goals, too. Check if vendors offer comprehensive, tightly connected solutions that are backed by successful results in the field and provide a full path to achieving a smart environment, such as Spacewell's Workplace platform.

Nonetheless, the journey towards creating a smart building often begins with tackling a specific pain point, area of improvement, or new scenario that you want to enable. **Energy management** is a highly sought-after topic and it is legally mandated in many countries. Since the rise of hybrid work, **right-sizing physical footprints and optimizing space** has become a major concern. To achieve this, companies need reliable insight into occupancy and space utilization. In recent years, **occupant comfort and air quality** have also become increasingly critical factors to consider.

With this eBook and the use cases described above, we aim to demonstrate that

- **while it is important to take a comprehensive approach when beginning with a smart building**
- **that doesn't mean you cannot start by focusing on one particular area. Indeed, this is often how such a journey begins in real life.**



STAKEHOLDER-ORIENTED OUTCOMES
Who Benefits From Smart Buildings?

The planet

Whether through improved energy efficiency, right-sizing and space optimization, or reduction of waste and increased circularity, smart buildings contribute to better sustainability and achieving ESG objectives. They are essential for organizations to reduce their carbon footprint and reach net zero operations.

Read also:

Data-Driven ESG Strategy:
How Facilities Management Can Lead the Way

Building Users/Employees

Ultimately, the performance of a smart building is judged by how it serves its users. Building occupants expect a flexible work environment that fosters collaboration, and offers them options and control through easy-to-use technology. This boosts morale and satisfaction, leading to greater well-being and productivity. Additionally, in today's hybrid context, it provides an incentive for people to make the effort of commuting worthwhile.

Corporate Occupiers

Green, smart buildings offer tenants a multitude of benefits, from maximizing efficiency and reducing energy costs, to ensuring a healthy, comfortable environment and improving employee productivity. In addition, green, smart buildings can also act as a marketing tool for companies.

Corporate Image

A green, smart building demonstrates a dedication to sustainability and ESG objectives that positively impacts the company's image and enhances its **attractiveness to stakeholders**, such as potential clients and partners.

Employer Branding

A smart building helps to create a **positive employer brand** and is a source of competitive advantage. It supports organizations to **attract, engage, and retain critical human capital**, especially as Millennials and Gen Z come to make up most of the global workforce. These generations, having grown up with mobile tech, expect a top-notch workplace experience supported by user-friendly technology.

Landlords

Landlords want their spaces occupied but due to hybrid/remote working, office real estate vacancy is on the rise. At the same time, the demand for green and smart buildings is greater than the supply. With smart spaces, fit for the future of work, landlords can **increase property value, rentability and lease rates**. Furthermore, many insurance firms offer premium reductions when implementing smart monitoring technologies that help de-risk properties.

Developers

As less office space is needed to support the post-pandemic workforce, office real estate needs to work harder for returns and there is a 'flight to quality.' At the top of the market, demand exceeds supply. To drive commercial success, developers seek to future-proof projects by providing clarity on performance to future owners, validated by third-party green & smart building certifications.

Building Managers & Operators

Smart building technology facilitates efficient and effective building management. It can also provide advanced safety and security measures such as remote monitoring, control of emergency lighting, access control systems, and fire prevention.

Smart Building Certifications

Building accreditations provide third-party verification of a range of performance characteristics, including energy efficiency, resource use and occupant health and well-being. Successive certifications reflect the evolving priorities and objectives of the industry.

Smart Building Certifications

1990s:
Green Buildings

As the awareness of negative environmental impacts of the built environment increased, BREEAM – the world's first green building rating system – was launched in 1990 in the UK. It was followed in 1998 by LEED in the US, currently the most recognized sustainable building assessment. These **sustainable & green certifications** later extended their scope in response to new challenges such as retrofit projects (BREEAM Refurbishment and fit-out standards, 2014) and net zero targets (LEED Zero, 2018).

Subsequent standards such as Energy Star (US), Nabers (Australia) and the European Union's energy performance certificates (EPCs) focus mainly on energy and are aimed at helping families and businesses reduce their carbon emissions by increasing **energy efficiency**. Smaller niche players – such as the zero waste certification system TRUE or the soft mobility certification CyclingScore – have filled the gaps left by the major certification systems.

2010s:
Focus on Health and Well-being

A new focus on occupant health and well-being led to the emergence of WELL (which evaluates indoor air quality, water, thermal comfort, light, movement, nutrition, sound, mind, community, and materials), Fitwel, and RESET, a sensor-based standard that promotes continuous data collection and ongoing monitoring.

These certifications can help building owners and developers differentiate their buildings and meet the growing demand for healthy, high-performing buildings. Businesses that want to support the well-being of their employees can also find inspiration in these schemes and use them as a guideline without necessarily going for formal certification.

2020s:
Smart Buildings Certification

The proliferation of smart building technologies and the emergence of "smart-washing" have highlighted a need for new, more rigorous certifications, underpinned by digital tech and real-time monitoring tools.

In February 2020, the SBC Smart Building Collective | Certification program was launched as the industry's first rating system to assess building technology and performance, leading to a surge of competitor SBCs, such as BOMA BEST Smart Buildings, SmartScore, and SPIRE Smart Buildings, being released within one year.

Will we soon see one single, consistent international SBC standard? Not very likely, as certifications have differences in approach in response to priorities of specific markets and geographies. What is more likely are forms of cooperation between larger players such as BREEAM and LEED and the newer SBCs. Such complimentary partnerships can enable the established players to benefit from smart ratings, while the SBCs can increase their credibility and gain wider adoption.

Spacewell and Smart Building Certification

As a technology provider, Spacewell is an **Accredited Solution** with **both Smart Building Collective|Certification** and **WiredScore**. We are therefore uniquely positioned to help you get your commercial buildings certified.

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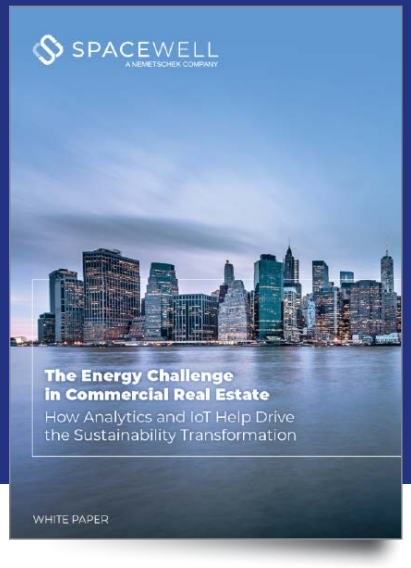

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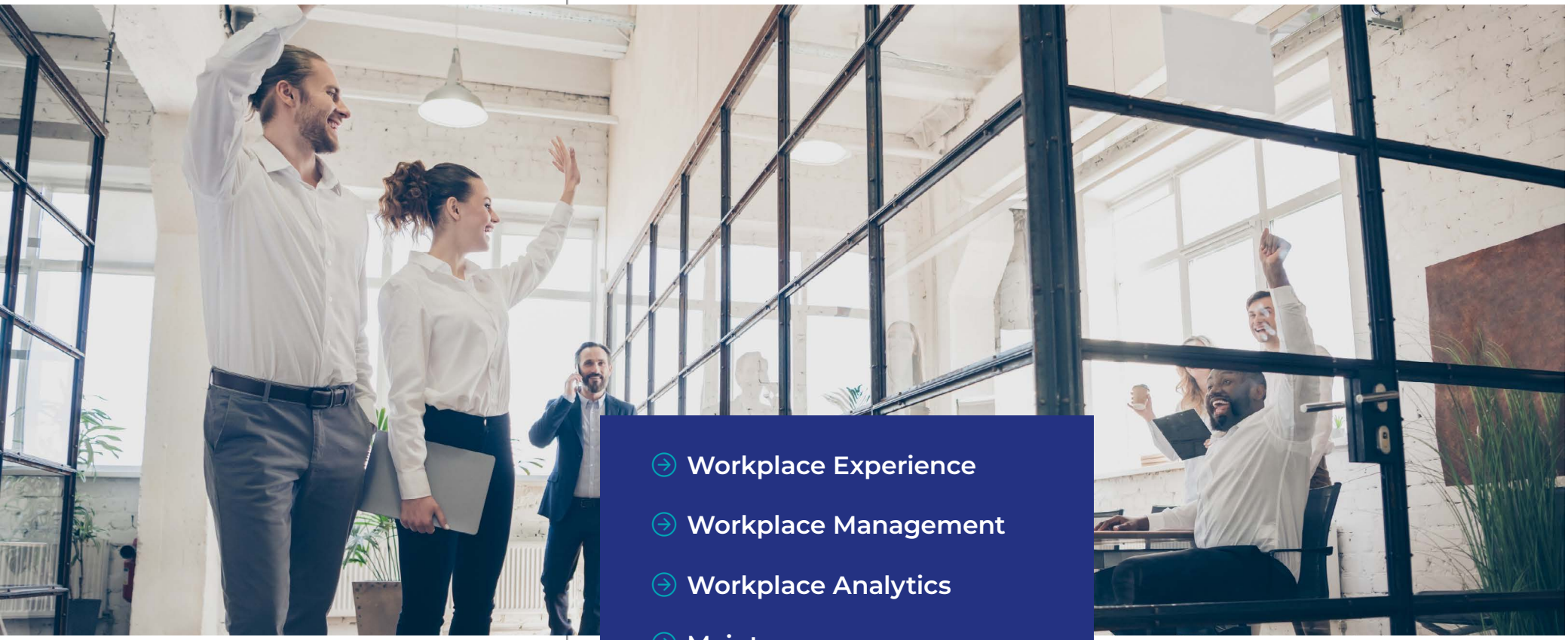

- Workplace Experience
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