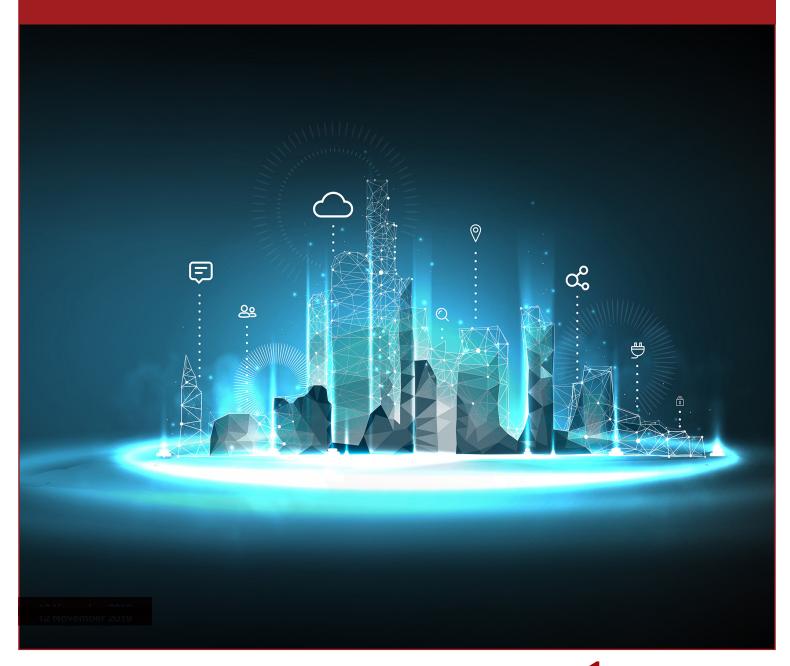**Ultimate Guide to:**

Smart Buildings

It seems that many areas of life today are turning 'smart' – from phones to homes and even whole cities. Technology is developing at such a rate that it is able to recognize who we are and what we're doing, and adapt and offer information to help us complete these tasks.

12 November 2019

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What are Smart Buildings?

So, what exactly is a smart building? At a simple level, a smart building is one that uses automated processes and interconnected technologies to become more responsive to occupants' needs while improving a building's performance against key metrics such as energy usage. Sometimes known as automated buildings or intelligent buildings, they will benefit from technology such as building management systems, adaptive energy systems, networked appliances and devices that gather and analyse data.

Nowadays, most buildings have some level of intelligence built in, whether in the heating and ventilation system, sensor-led lighting or safety systems. However, the Internet of Things (IoT) has added a new element to smart buildings, offering even greater analytics and insight into how a building operates and bringing disparate devices onto the network. IoT, the network of devices that are connected via the internet, relies on connected sensors to collect data that is then aggregated and analysed to deliver useful and actionable insights. And this is the crucial part of IoT, it doesn't simply provide more data, it provides better data that can truly be used to meet specific challenges. In addition, with the IoT it is also possible to integrate existing automation tools to further enhance this data, offering a scalable and credible means of implementing change.

Historically smart buildings and the IoT has been seen as something only useful to large enterprises, but as technology develops there is a now a compelling business case for small and medium-sized business. This has increasingly become the case as prices for IoT solutions and devices has fallen, deployment has become quicker and less intrusive, and the ability to easily track metrics such as energy usage and other operational efficiencies has led to a clear, demonstrable ROI.

It should also be noted that smart buildings don't only have a role to play in the corporate sector; their benefits can be felt across multiple markets. Consider retail, for example. Shoppers won't stay and browse if it's too hot or too cold, but in a smart building temperature can be monitored to ensure it is at a comfortable level, while sensors could enable more personalised shopping experiences. In restaurants and food outlets, refrigeration can come under the control of a smart building, reducing food waste and the costs associated with it.

£75.44b

The projected total installed base of IoT-connected devices worldwide by 2025

Source: Statista

The benefits of smart buildings

Smart buildings clearly have the potential to have a big impact across multiple sectors, but what benefits do they actually bring and how can you be sure that this isn't just another buzzphrase that doesn't actually make any real difference?

The proof of this is in the fact that many companies have already invested in making their buildings smart and they're reaping the benefits. Clients we've worked with recently include Google, IBM, The Shard and Bank of America, both installing new systems and upgrading existing solutions. This highlights another key benefit of solutions for smart buildings – they can be scalable and implemented with minimal downtime; with some of these projects full operability had to be maintained while the works were carried out.

Smart buildings also bring a host of additional benefits to both building owners and occupants. These include:

Productivity and efficiency benefits

Perhaps one of the best-known elements of smart building technology is environmental sensors that can monitor conditions such as temperature and humidity in each room or zone of a building in real time.

Temperature sensors have been in use for many years to control heating and air conditioning, but again the Internet of Things has extended their benefits. So, for example, in addition to enhancing comfort for occupants, sensors can also benefit machines that are temperature-sensitive and ensure they don't overheat. With smart temperature sensors it is possible to automate heating, ventilation and air conditioning (HVAC) controls to maintain ideal conditions and automatically detect issues as they occur.

Environmental benefits

As well as improving the working and operating environment for occupants and machinery, smart building technology can also have a positive impact on the wider environment reducing energy usage while enhancing efficiency.

Motion sensors, which are designed to pick up on physical movement, for example, can also be used to automate building controls such as heating and lighting depending on whether or not a space is occupied. Only activating lights when a room or corridor is in use, for example, can help to reduce energy consumption.

Similarly, electrical current sensors, which measure real-time energy consumption at a circuit, zone or machine level, are not only useful in identifying how much energy is being used, they can also help to identify areas of high energy use and thus potential waste. These can also automatically switch off devices when they're not in use, further reducing energy consumption.

Business benefits

An often-overlooked advantage of smart building technology is the insight it can give you into how a building is being used, or if in fact spaces are being paid for despite being under utilised.

Occupancy sensors can be a valuable tool here, highlighting which desks or meeting spaces are available at any given time. In large organisations and those that have introduced flexible and hot-desking working practices, this can result in a better employee experience, improved productivity and cost savings – offering a clear ROI for businesses.

Occupancy sensors are useful in areas other than corporate workspaces, however. In retail, for example, they can provide actionable data on footfall, informing product placement or highlighting the need to move staff to a particularly busy area such as the checkout. As well as potentially increasing sales, this will also improve the customer experience, something which could have a positive impact on repeat business or generate positive reviews.

Equipment benefits

Predictive maintenance has become an important term in many businesses in recent times, and it has been made possible by smart technology. With predictive maintenance it's no longer a case of manually checking how equipment is performing or only responding when something fails. Instead sensors can detect changes in building performance and trigger an action to resolve it before it becomes critical.

Over the longer term, building management will gain useful insights into building performance and be able to use this to more effectively schedule upgrades and maintenance.

Relatively small measures such as this can have a surprisingly big impact on energy use, especially when you consider scaling it across an entire estate or building portfolio.

Financial benefits

Ultimately, all of the above benefits, and the many others that smart building technology can bring, also create financial benefits. Whether increasing productivity, removing inefficiencies, betting using spaces, better managing energy or creating a better experience for customers, these all have the potential to impact positively on the bottom line.

However, be aware that poorly implemented technologies can actually have a negative effect, taking away the ability of occupants to control their environments, leading to dissatisfaction within a space. Similarly, if the system hasn't been planned, implemented or explained properly it may well be under-utilized or simply used incorrectly, thus having little or no impact on an environment.

What technologies do I need in a smart building?

Now that the benefits of smart building technology are clear, the next step is deciding on the tools that will be most effective in your buildings. Depending on your needs and industry there are a whole host of options out there, monitoring everything from structural integrity to water quality and supply management.

But central to creating your smart building will be the building management system, which controls and monitors the building's mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems and security systems, from a single platform.

This system will be what delivers the data that will enable you to truly benefit from your building going smart, so consider what you need to know to achieve this and opt for a BMS that can supply customised reports tailored to your requirements.

Flexibility and ease of use should also be considered. Your requirements and your estate may change over time so find a solution that can grow and change with your needs while offering simplicity to users.

As mentioned, security is also key so ensure your BMS has robust security features.

Embedded smart sensors integrated within a BMS will significantly add to the intelligence of your building, and with wireless options now available, they can be installed quickly and easily with very little disruption. These sensors can cover everything from building maintenance and energy management to wellbeing and space utilisation.

In the future expect there to be options for additional personalisation that could even lead to additional revenue streams for property companies.

£105.8b   Predicted value of the global smart building market by 2024

Source: Markets and Markets

The future of smart buildings

Speaking of the future, smart buildings is one industry where further innovation and industry growth look to be pretty much guaranteed.

In addition to the ever-growing focus on wellbeing and environmental impact – which smart building tech can help to address – there are a number of technical enhancements on the horizon that look set to have a positive impact on the world of smart building. These include:

5G - With rollout in the UK this year and other areas of Europe, along with the US, set to follow suit in the coming years, 5G is expected to impact everything from concerts and live events to streaming and communications. And smart buildings can be added to this list too. So, firstly, what is 5G? 5G is the fifth generation of mobile networks and it's set to be far faster and more reliable, with greater capacity and lower response times, than the previous iterations, 3G and 4G.

It is widely believed that the adoption of 5G will have a significant impact on the connectivity of devices in automated environments, leading to a rapid increase in the number of connected devices and their capabilities. AR/VR for maintenance is one possible improvement, with 5G offering the speed necessary for this to become a truly useful tool. 5G could also increase the battery life of IoT devices making them more feasible to a wider market, including the cost-conscious public sector.

Edge Computing- While many of the IoT devices we've accepted into our

day-to-day lives utilise the cloud, there is a growing belief that a combination of cloud and edge computing could actually be more beneficial to smart building scenarios.

Edge computing optimises internet devices and web applications by bringing computing closer to the source of the data, thus minimising the need for long-distance communications between client and server, in turn reducing latency and bandwidth usage. This blended approach can also enhance access to information so that better decisions can be made more quickly, helping businesses to become more agile, while retaining the cost-effectiveness, scalability and flexibility offered by the cloud.

The artificial intelligence of things (AIOT) - We've all heard of artificial intelligence and we've all come across the phrase Internet of Things, but the next step on the smart building journey could involve the convergence of these two trends. This is set to create the ability to collate and analyse ever more data and potentially enable ever more use cases. Importantly, AIOT devices would also see a move away from reliance on the cloud, but this time the devices themselves would generate data. Benefits here include relieving pressure on what can be strained networks and reducing the need for data centres and their associated costs.

Of course, investing in AIOT would itself have serious cost implications, but if the history of smart buildings teaches us anything it's that costs come down pretty quickly once a clear business case has been established, so this could be one to keep an eye on.

Above all, both now and in the future, it's important that smart buildings deliver insight that makes buildings more efficient, productive and comfortable for occupants without becoming so complex that the benefits are lost in a sea of data. The tools are already out there to make this a reality and the savings in terms of time and cost are already significant.

To find out about how the right technology can make your building a better environment for everyone, contact the team via email at enquiry@syscombms.com or ring in to the office on (+44) 01784 435 125.

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