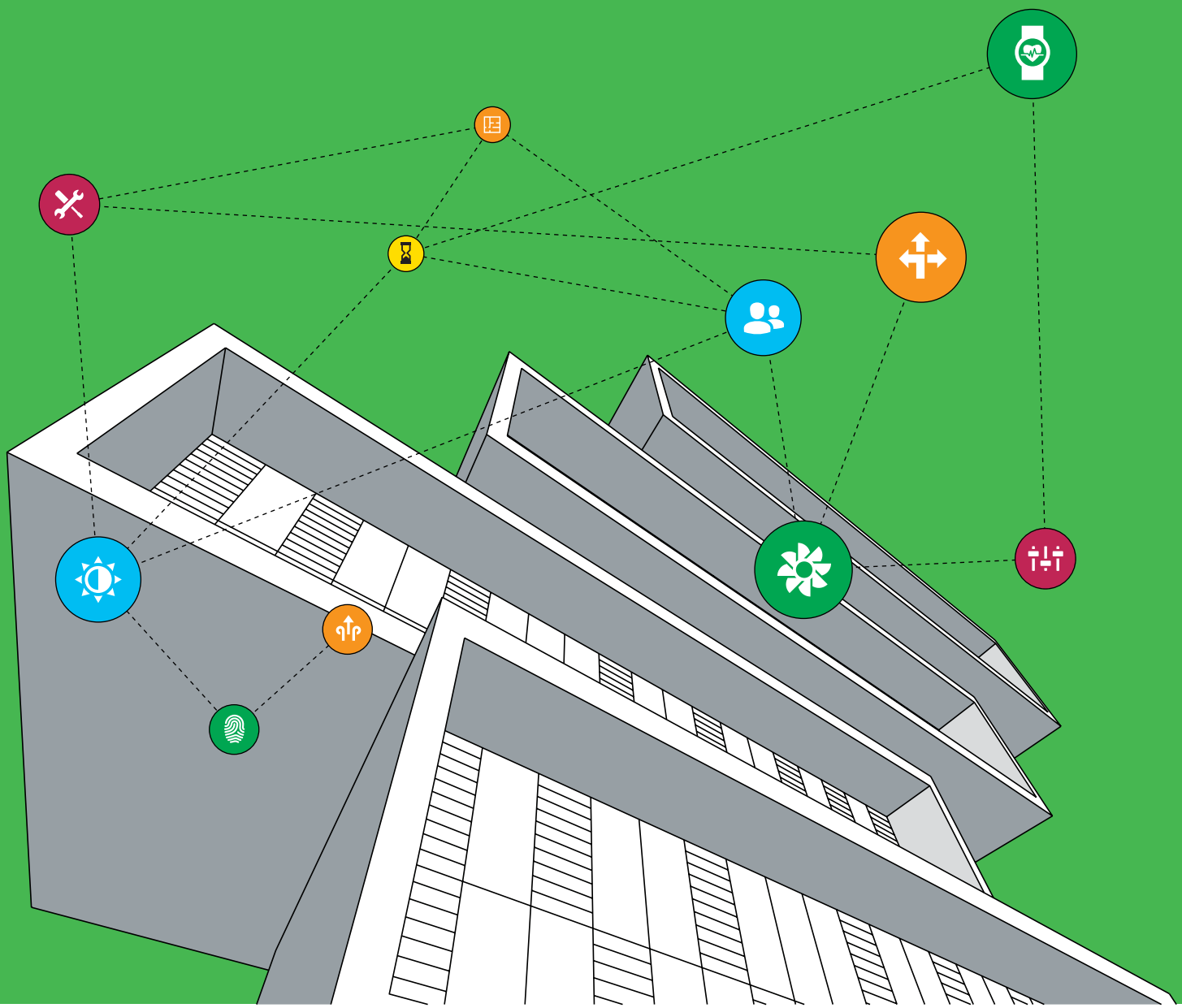
Activate to Collaborate

- The evolution of the smart workplace



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Foreword

by Preeti Bajaj, Schneider Electric

Buildings are crucial enablers of economic activity but if we're honest about it, they frequently fail to live up to our collective expectations based on our experiences everywhere we live, work and play.

Buildings are crucial enablers of economic activity but, if we're honest about it, they frequently fail to live up to our collective expectations based on our experiences everywhere we live, work and play.

As one Harvard Business Review article put it, in the shift to the knowledge economy, workers transitioned from being hired hands to hired heads. In the experience economy, the most valuable workers will be hired hearts[1]. So, clearly, employers everywhere need to innovate to differentiate in the war on talent.

At the core of any workplace experience will always be human connection. Thinking back on personal favourite workplaces in the past, it wasn't the facilities themselves (imagine sub-lease in a hidden away corner in an old dilapidated facility), but what we created that made it memorable. It was a space that enabled discussion, that made us stronger. In an optimal working environment the building should just work.

The evolution of Smart Buildings is opening up an exciting opportunity to enable that desired experience. Technology becomes an enabler of a seamless, collaborative, healthy and comfortable working experiences.

Our clients are telling us that they see smart buildings technology as an important part of their own or their clients' strategy. What is interesting however, is that there seems to be a disconnect between that vision and the traditional means by which the industry procures buildings. The drivers of these two forces are very different, yet the overwhelming shift towards digitisation demands that they align soon. Otherwise you end up with technology for technology's sake, devices that don't work together and ultimately get in the way of the user and - the ROI goes down the drain!

I want to thank all the inspiring and passionate people who shared the rich insight that goes in this paper.

Enjoy the insights and I look forward to continuing this discussion with you.

Exec summary

According to leading developers and tenants from Australia's vibrant commercial real estate industry, buildings haven't really changed much since the advent of flexible and activity-based working nearly 20 years ago. But that is about to change.

The third evolution of smart buildings and the smart technology that powers them is transforming the old-style buildings, inert containers of siloed information and services, into hyper-connected responsive and controllable machines. The result is converged technology in healthier buildings enabling a smarter, more innovative and productive workplace. In interviews and surveys of nearly 100 industry experts from the corporate real estate sector, we have identified the trends and drivers that are shaping smart technology and the next generation of buildings.

Smart buildings enable amazing user experiences that increase wellbeing, improve collaboration and support innovation and productivity. Our research showed that 83% of organisations see smart buildings as important, but only 43% are prepared to pay more to locate in one. The imbalance in investment in the technology must be addressed through a shift in how these buildings are procured; a new commercial paradigm where developers, tenants and advisors collaborate and negotiate to deliver the collective vision.

Our study looks at the development of more sophisticated building management systems, converged technology and the Internet of Things (IoT), which are bringing more elements of building infrastructure online and producing vast amounts of data in the process. Data covering everything from employees' movements around the building to desk occupancy and air quality can be analysed and maximised or mitigated. There is a strong interest in the use of big data and predictive technologies to inform companies on how to maximise the potential of their workplace and more importantly, their people.

The research uncovered a number of trends including the subtle shift in activity-based working back to the needs of team culture and team working; the need for a building to be able to respond to the changing dynamics of an organisation, through agile working, flexible workspaces and co-working; and health and wellbeing. In fact, 95% of the people who participated in our survey said that the wellbeing of their employees and the impact this may have on productivity are key components of their corporate and real estate strategy.

We see the major drivers for investment in technology and building design as the need for innovation, increased productivity and talent attraction. 89% agreed they would be open to the idea of gathering data on the location and activities of staff in the workplace if it made them more productive; however this opens up issues of privacy and ethics. As only 68% of our survey agreed they fully understood what a smart building is, as a result of our research we have defined the Activ8 model that provides a framework for understanding the next generation of building and incorporates the key trends identified in our interviews. Activ8 defines the eight elements of a smart building: insightful, green, fluid, personalised, healthy, productive, shared and effective.

Introduction

Imagine an app-centric, human-focused work experience where the ease of use, real-time service and end-to-end visibility is translated into how your office space works.

There's an app for that® has become commonplace since Apple introduced it to the world back in 2010. Apps are changing all areas of our lives, from booking restaurants and catching trains to dating and working out. Apps are leading the way in user- friendly technology and are bringing down established business dinosaurs in the process. The meteoric rise of the shared economy, with companies such as Airbnb, AirTasker and Uber, is causing massive disruption to the industries they are challenging. Through the use of an app, we benefit from a range of technology-enabled advances including peer-to-peer services, straightforward pricing, real-time booking and live tracking. The end-to-end service is totally transparent.

However, whilst we have embraced app culture in our personal lives, our work lives have struggled to keep up. Imagine an app-centric, human-focused work experience, where the ease of use, real-time service and end-to-end visibility is translated into how your office space works. The building is a platform that your app helps you to navigate; from setting your preferred comfort settings and deciding which workspace to head for, to booking a meeting room and locating colleagues, to helping with your current project. Creating a personalised work experience can all be done from your smartphone. Apps will be at the forefront of the next wave of the smart building evolution.

Back in the 1980s and early 1990s, there was a rush to create 'intelligent buildings', so called because they were able to cope with complexity and the spread of networked technology. The emergence of the PC and the local area network created complexity and the building responded with engineered infrastructure. However, in reality these were about conduits and risers, cooling and fire suppression and the provision of in-building data centres. The next incarnation, the first 'smart' buildings, came on the back of cloud and mobile technology. These were thinner buildings with smart technology and activity-based working that allowed a more agile and flexible approach to work.

We are now on the brink of a third wave of smart buildings, activated buildings with apps as the user-interface between the person and the building. This next generation of buildings is like a neural network of devices, sensors and equipment: connected, communicating, predicting and reacting. These buildings know what is going on inside them in real time and respond appropriately and actively. They are humanising the work experience for us.

There is a growing awareness in the Australian economy that innovation is vital for the nation's future growth[2]. The next generation of buildings must be able to support innovation, coupled with a move to more technology-focused jobs in order to increase productivity. Buildings are enablers of this economic activity, where better buildings produce better work outcomes. We found that 83% of the businesses in our survey agreed that smart building technology was an important part of their (or their client's) business, workplace and real estate strategy. So whilst small and medium-sized businesses can respond to the challenges of growth and demand in an agile way, through the inventive use of technology and creative working arrangements, their real estate is often lagging behind. Big businesses often take longer to respond and have different or additional challenges, including attracting the right talent in an extremely competitive marketplace.

Europe is firmly grasping investment in smart buildings, with groundbreaking developments such as The Edge in Amsterdam and Le Hive in Paris. But Australia has still to fully prove its commitment in the commercial sector, despite embracing the technology in other key areas including healthcare and life sciences. Our research shows an interesting disparity between the 83% who agree that smart building technology is an important part of their business strategy and the 43% that are prepared to pay for it. Key industry players put this down to needing a brave first-mover who is prepared to be the pioneer in this area or the fact that clarity on the ROI for the developer/ landlord compared to the tenants needs to be discussed and dealt with upfront[3]. For years buildings have been inert, static containers focused on efficiency rather than what works. Unhealthy, unsustainable, inflexible buildings encouraged a uniformity where employees had to fit in and collaboration and communication were by chance rather than by design. We now need a new type of building with intelligence that is more human-focused, optimised for people with the help of technology. The app is a symbol of this new wave; transparent, responsive, real time.

Imagine walking into your office, being welcomed by name as you walk through security and being handed a coffee exactly how you like it. The building has recognised you and is responding to you directly. Via an app, you are directed to a free quiet space that has the perfect comfort settings for the report you have to write that morning. You have not been to that bit of the building before, so the app shows you the way. Not only does the smart building know your working preferences but it also integrates with the building management system to give you a seamless user experience. You can start your working day hassle-free, with the things you need for work 'just working'. A collaboration space that you could use for a brainstorming session in the afternoon has become free. The app sends you an alert. The smart building has also identified a colleague visiting from another city, who is an expert in the topic you are discussing. Your day is a seamless, personalised, productive experience.

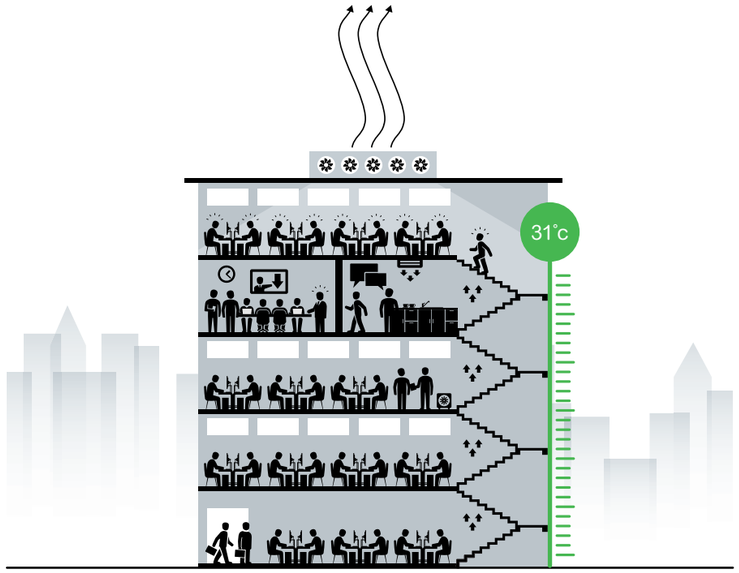
"It takes vision and courage to achieve a paradigm shift in real estate. We hope that this report will be a catalyst for change and help activate a smarter future."

This paper was written following in- depth interviews and discussions with 20 leading tenants, developers, technology advisers and designers from the Australian commercial real estate sector. Those interviewed are leaders in their respective fields and have given us an incredible insight into their many years of experience and knowledge of this business. This is in addition to the responses to a questionnaire from corporate real estate experts, which is part of a global review of attitudes and thoughts about the future of smart buildings.

"It takes vision and courage to achieve a paradigm shift in real estate. We hope that this report will be a catalyst for change and help activate a smarter future"
- Philip Ross, CEO, Unwork.com

1. Evolution of the workplace

"With the shift to activity-based working we are in a reactive state, there is so much fluidity, but is the space working really well or not? It's hard to fully understand how shifts are taking place in the business."



78% of people agreed that capturing real-time data on how staff are using workspaces is a major trend.

Buildings and the workplace are evolving. They are moving from being inert containers to being real-time assets; connected real estate where the building can load balance itself; optimising its reaction to its real-time occupancy. With this evolution there is a potential to shift the property industry forward. The advances in analytics and predictive optimisation mean that the utilisation of buildings and the work of those managing them will become so much more sophisticated. The IoT is converging with real estate to create an ecosystem where every aspect of the building can be connected – in effect the building will be a neural network. Once, proprietary systems and protocols meant that building-based systems could not effectively talk to each other. There is now convergence, open standards based around the internet protocol (IP) and a unified network that means a building can, for the first time, have a really smart, centralised backbone and network, where things can all connect and speak to one another. And amazing things can happen when you connect the unconnected.

The rise of the networked building opens up all sorts of possibilities, from connected real estate providing property directors or the commercial real estate (CRE) function with a live view of their portfolio, to the idea that a property can engineer serendipity and so play a part in corporate success – more assets and less overheads.

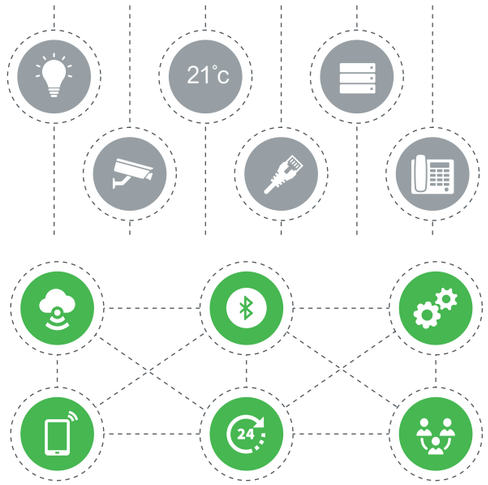
IoT provides data that will inform how space is used

With the advancement of the IoT, more and more devices, sensors, meters and hardware are coming online. All of them will provide information. In a smart building this data will be able to provide incredibly detailed information on how a building's use is changing; which rooms and spaces have people in them, and when certain items need replacing, cleaning, maintaining or turning off. In our study, 78% of people agreed that capturing real-time data on how staff are using workspaces is a major trend.

What is a smart building?

We are used to buildings where everything is separate, nothing talks to each other and data is in silos. Smart buildings are connected joined up systems with networked nodes and sensors, creating a huge depth of big data that can be analysed to give an insight to a range of activities and systems. Whilst many current buildings have some of these characteristics, none of them are as smart as they could be. A smart building should have:

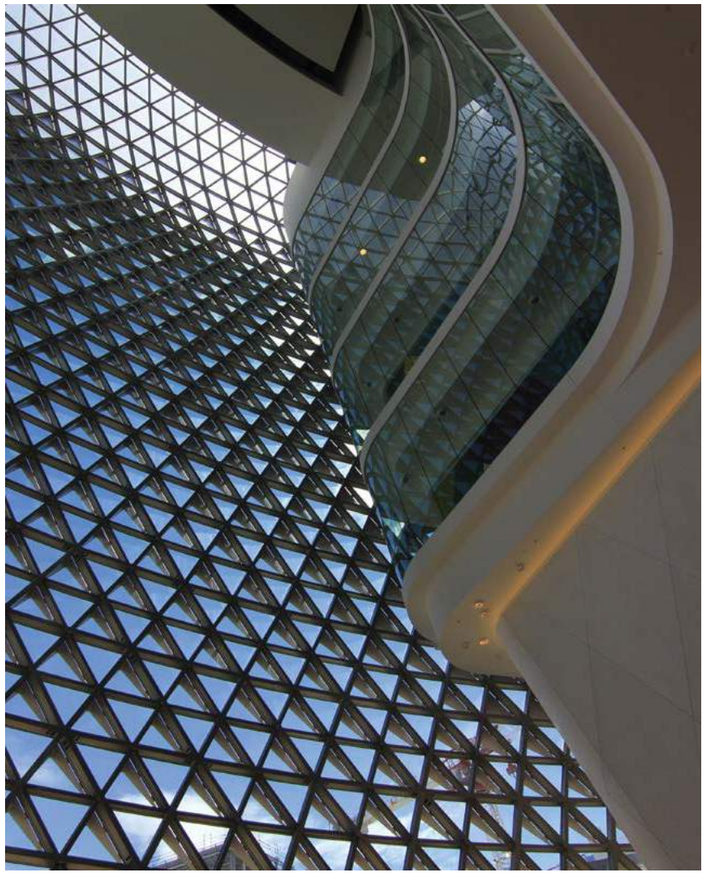
- A centralised system and services enabling control and maintenance of lighting, heating, cooling and networks providing exceptional operating efficiency that monitors and reports on the performance and maintenance of devices
- An integrated system offering an enhanced experience for users through an app interface
- An IP-based network connecting devices, sensors and critical plant systems to a main backbone BMS or ICMS which proactively optimises the building
- Open software architecture and a common protocol language, such as BACNet, that allows future adoption of new devices, sensors and systems as they become available
- Personalised comfort conditions and collaboration opportunities that promote increased productivity
- Air, light, space and activities that are designed to support a healthy lifestyle
- Occupancy and usage that are monitored so that space can be adapted, reconfigured and re- zoned depending on need



Services and systems are in silos, technology is converging and the separate systems will be hyper-connected and will communicate.

The technological backbone of a smart building, the integrated control and management system (ICMS) or building management system (BMS), receives information from sensors and devices that are spread around the building and will be able to adjust settings for temperature, light and room allocation in response. In most commercial buildings today, the BMS only regulates critical plant systems, but the next generation of ICMS can do so much more. It can be connected to the smart devices, acting as the building's operating system, and makes decisions on how to optimise the building's performance. The energy savings that can be made from the real-time monitoring and adjustment of these systems is considerable. In addition, the use of open protocols gives some assurance to future-proofing the system for new technologies and further scalability. Whilst there are relatively few corporate buildings in Australia fully

utilising this next generation of smart building technology, there are some good examples of public constructions that are using the technology to intuitively maximise sustainability. The South Australian Health and Medical Research Institute (SAHMRI) has achieved an 18% saving on energy by using an intelligent metering system and is future-proofed by using an integrated building system based on open communication protocols (see case study). →



Case Study: South Australian Health and Medical Research Institute (SAHMRI)

Built with funding from the federal government, the research institute houses researchers from leading cancer and heart charities, and the three top state universities. The iconic building uses an Integrated Building System (IBS) that incorporates innovative technologies in heating, cooling, hydraulics, lifts, fire monitoring, electrical monitoring, lighting, security, and lab controls. This allows the building to maximise energy efficiency and performance, saving money throughout the lifecycle of the building.

Location: North Terrace, Adelaide, South Australia

Size: 30,000m²

Tenant: South Australian Government

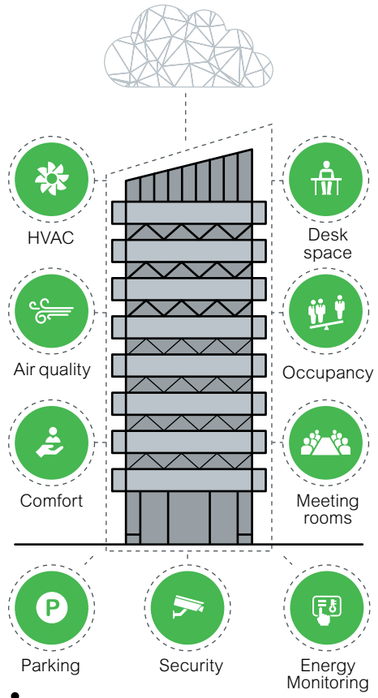
No. of occupants: 600+

Key achievements:

- LEED® Gold certification (Leadership in Energy & Environmental Design)
- Future-proofed using an integrated building system (IBS) based on open communication protocols
- An intelligent metering system that provides real-time data on energy and water consumption
- 18% whole building energy savings

Schneider Electric technology systems

- EcoStruxure - an integrated building system occupant application with systematic energy monitoring and real-time control of all energy usage. All energy waste is reduced – from electricity and water to mechanical and human.



The ICMS is the smart backbone of the building, receiving information from sensors and devices spread around the building.

With the emergence of power over ethernet (PoE) systems, where electrical power and data can be transmitted over ethernet cabling, individual low power devices, such as LED lighting and CCTV cameras, can be powered and can then send back data to the ICMS. This can tell it, for example, that it will need maintenance in a few weeks or advise on adjusting Lux based on daylight. PoE enables the monitoring and control of power consumption at the device level, allowing individual devices to be switched off when not required.

From a facilities point of view, the amount of data feeding back into the ICMS allows it to become an intuitive building, which knows instinctively what needs to be done. This intuition conserves energy and has the potential for huge cost savings. The ICMS functions on multiple levels, deciding which bathrooms are being used most and therefore need cleaning, to identifying under-utilised areas that can be turned off at quiet times and which should ultimately be looked at for re-zoning. The base levels of comfort settings and occupancy are then overlaid with the content of social media, web-based collaboration tools and even voice and sound sensors to provide an intricate understanding of the kind of interactions and collaborations that are happening in the space. The organisation can then plan and manage the building with the deep knowledge and understanding they need to do this effectively.

Optimising a multi-generational workforce

We are in a unique time, where we have four (going on to five) generations in the workforce at once. It is clear that these generations see work in different ways and have different expectations of the workplace, but there are also commonalities and opportunities. Optimising the collaboration between the generations is an additional way to boost innovation and productivity, so needed by the Australian economy.

But whilst your classic baby boomer is unlikely to be expecting a social life from the workplace, they have had a long working life during which technology has been changing, progressing and often under-performing. Their tolerance for things that do not 'just work' can be pretty low. The millennial generation or Gen Y, will almost certainly be looking to work to add something to their social life, but have grown up with the latest technology and will expect it to work well in the workplace.

On a purely physical level, the amount of noise, light and temperature that people of different ages tolerate can also be very different. Boomers have been shown to be rather intolerant of noise and have more trouble regulating their body temperature[4]. A workspace that allows you to set comfort settings to your optimum working conditions does not only help this generation but suits all ages. Equally, really flexible activity-based working (ABW) gives people the choice to work in a place that suits their needs and expectations, whether that is a noisy team space or a quiet booth, whatever age they are. Your workplace app can not only allow you to control the ambient environment but can also direct you to the right place to work for you.

With an increasingly ageing population, the demographic of the workplace will shift as we see older people staying longer in the workforce. If people are fit and well then they are more productive and take fewer sick days. This will be even more important with an ageing workforce. Natalie Slessor, Head of Workplace at Lend Lease, anticipates an increase in the trend for investment in wellbeing as a result of these changes.

"I think we will find corporations investing in health and wellness, the reason being that healthy people are more productive, more focused and live and work longer."

Organisational culture - what really attracts talent?

The next generation of workplace should optimise the working conditions of all of its occupants. A building should not only enable smart working but also represent the ethos of the company, feeding into the corporate brand and company narrative. What differentiates an organisation from its competitors is the experience you have when entering a building, which is a reflection of the culture of an organisation. This is relevant to the customer experience as well as to the employees'.

"Work has become a consumer experience."

"Judge us by the environment that we choose to create for ourselves," explains Chris Alcock, Principal at SpaceLogic. A smart building should be seen as an enabler to the broader culture and smarter attitudes within a company. "If we start with the physical infrastructure, it is wrong. We need to start with the people." The building and its technology need to support the corporate culture and a sense of cohesiveness.

"Buildings are made as culture clubs, they are part of bringing people together to be part of the brand that they work for, and in our case that is the Macquarie brand. It's about how we energise people in that space and technology needs to reinforce that as well," says Will Walker, Global Head of Business Services, Macquarie Group. Smart should be viewed not only on a technological level within a building, but as an enabler to the corporate culture. Robert Hitchcock, Program Manager for Mirvac's HQ project explains: "A smart building makes everything easy. The corollary of that is that your ability to attract people into your business; have them working effectively; have them working on brand new creations; solving problems...because the technology becomes just easy."

Case Study: The Edge

Heralded as the world's most sustainable office building, The Edge is designed to challenge traditional organisational work culture with agile, high- performance workspaces, which encourage innovation and collaboration. It has large, open floor plans situated in a U-shape around a 15-story, north-facing atrium. This is surrounded by balconies, allowing users to easily move between levels to meet in naturally lit areas.

Location: **Zuidas, Amsterdam, The Netherlands**

Size: **40,000m²**

Tenant: **Deloitte**

No. of occupants: **2,500**

Key achievements:

- The world's greenest building, with a BREEAM rating of 98.36%
- 28,000 sensors - motion, light, temperature, humidity, infrared
- A quarter of the building is meeting and collaborative space

Schneider Electric technology systems

- Schneider Electric Building Management System (BMS) SmartStruxure™ solution - BMS-compatible field devices are installed in ceilings and in technical rooms, including sensors, valves, actuators and heat meters, which provide energy related measurement of thermal energy used in the building
- Power Monitoring Expert
- Electrical distribution and field devices from Schneider Electric

“The new decision-makers are the workers who can choose where they want to work.”

Investment in smart buildings is about offering a workspace that allows the company to attract and retain the right people. Amanda Stanaway, Principal at Woods Bagot, looks for ways to innovate and ideas to explore with clients to allow them to have ‘the edge’. “In the really competitive workplace market in Australia, workplace is a focus. The workplace is a marketing and transformation tool, and it is critical in the attraction and retention of talent,” says Stanaway. “Business can’t afford not to consider the workplace: how it looks and represents brand as well as it how it performs.” Once you have brought people in to work for you, invested in them and trained them, you need to keep them.

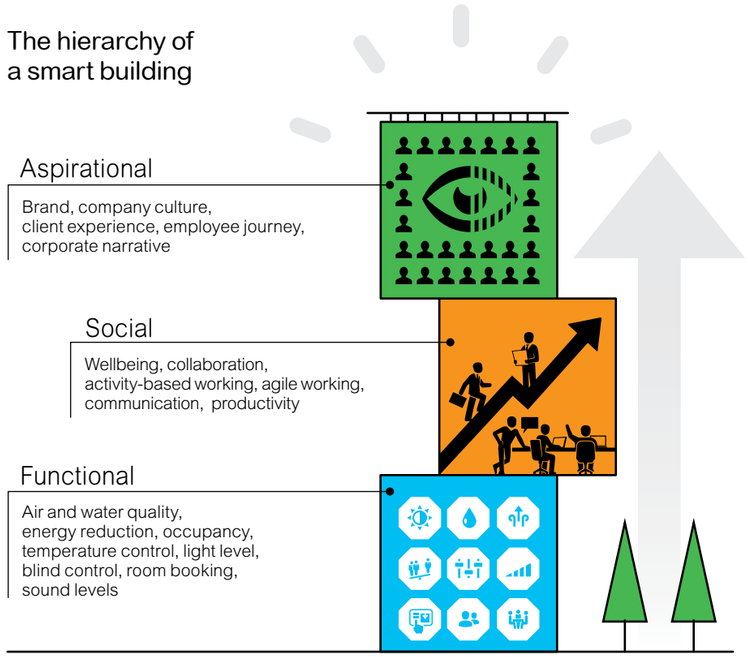
The next generation of workers, Gen Y and Z, are looking for ‘flexible work arrangements and the opportunity to give back to society[5]’ as the two most important factors in the rewards-mix that attracts them to an employer. Tony Armstrong at the International WELL Being Institute agrees there has been a subtle shift in work culture: “Work has become a consumer experience. Technology has taken us beyond work-life balance to work-life integration. Gen Y is now looking for a positive work-life integration to support its holistic wellbeing.” A job is more about who you are and what you represent than ever before. By working for a company you are looking to achieve your goals but are also aligning your ideals with the organisation. Ideally, the workplace is a commodity that suits your lifestyle and allows you to achieve your aims. If your workplace does not offer that, in a competitive market there will be another company that will.

Clients and customers also experience the corporate culture when they visit a building. A smart building can provide important differentiation in an equally competitive market. With the introduction of customer apps in places such as The Edge, giving travel advice, parking details and way finding information, the client experience can be as seamless or even better than an employee’s. How a building looks and functions creates a valuable impression on a customer. As Robert Hitchcock, Mirvac, explains, “You don’t want the lift to stop on ten floors on the way down when you’ve got your top client in it.”

We have already established that attracting and retaining talent is a key driver for investment in buildings and technology. The personal technology provided to potential employees and the environment that is created in the workplace are important elements in the offer for new workers. These elements are also vital in staff retention.

In the more fluid workplace market of today, with increased use of contract and freelance staff, and new working models such as online outsourcing platforms, the traditional workforce structure is changing. Individuals can choose to work for a company that fits in not only with their aspirations and self-image but also with their work model. Renee Nutbean, Future Trends Analyst at ISPT, sees that “the new decision-makers are the workers who can choose where they want to work. Ultimately they will want to work with people that they are getting results with.”

The hierarchy of a smart building



2. A workplace that suits you

"Smart buildings will demystify what happens, even down to a child knowing where their parents are in an office."

The evolution of activity-based working

Fluidity and flexibility are defining words in the smart building lexicon. Technology, the way we work and even the types of jobs that we will be doing are evolving and changing. Buildings and workspace need to move with them. Imagine a building that can enable the way you want to work that day or even that hour. A combination of quiet space, collaboration space, meeting rooms and ad-hoc community areas are key features of these buildings. But the idea that you can choose a place to work that suits what you need to do that day is not new. Gijs Nooteboom, Managing Partner at Veldhoen and Co., was one of the pioneers of activity-based working (ABW) when Veldhoen worked on the groundbreaking Interpolis project in Tilburg in The Netherlands in 1997. He believes that in order to truly create changes in working behaviour, the company culture needs to change first. "The organisation needs to make changes that work for them, they need to start with what changes they want and then work out how to get them. Technology should enable, not lead, and then you can see the natural behaviour of people."

So how is the next generation of buildings going to take ABW to the next level? With technology and smart devices, a building can start to gather data on occupancy and usage. For example, usage data can identify how many people have used a meeting room over a year, with peaks and averages, to assess if it needs to be redesigned to suit the business. This approach can enable the efficient and optimal use of every part of an entire building. In addition, the data can then support workers' requirements for specific types of space. It can identify under-utilised areas, if a zone is not being used the way it should be or if it needs changing. "There is the opportunity now to provide algorithmic feedback," explains Renee Nutbean, Future Trends Analyst at ISPT. "In theory we could approach an occupier and say 'we've noticed a section of your area isn't productive. Our analysis shows, through for example voice recognition, that you're not getting people working well in a particular environment, we are not hearing great discussions; there's no collaboration.' They are the type of useful metrics a smart building now needs to deliver." This is why technology is such a vital part of workplace strategy. The kind of people-analytics data produced by badge-holders will help organisations to proactively experiment and to provide answers to the questions that they are posing about how their buildings are used and how to get the most out of them.

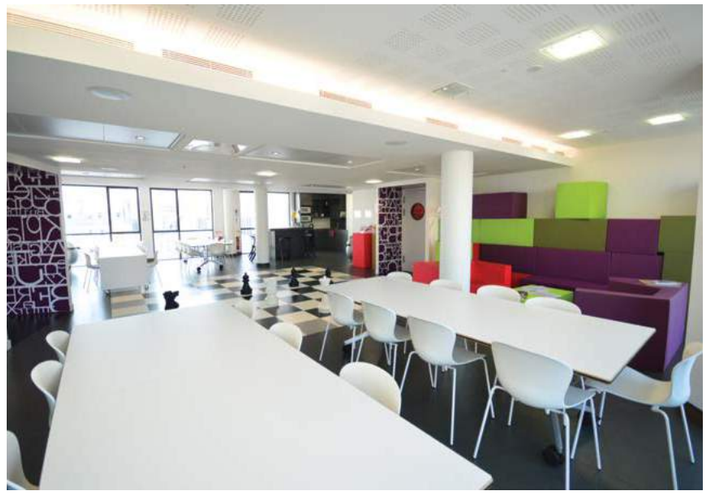
On a simpler level, ABW creates another kind of challenge. If you can sit anywhere it is harder for people to find you. The old way of locating people in a building has gone, but now workplace apps can locate someone in the building and then show you the way to find them. "Smart buildings will demystify what happens, even down to a child knowing where their parents are in an office," suggests Will Walker, Head of Business Services, Macquarie Group.

"Initially when we did activity-based working, the emphasis was on the individual and now we've shifted that to being more about the team."

But is ABW working? Macquarie Bank has always been a trailblazer in terms of groundbreaking buildings and new ways of working. It introduced ABW in its iconic Shelley Street building in Sydney about five years ago. They were swiftly followed by other organisations that saw the benefit of the new style of working. However, we are now seeing some organisations moving away from individual choice and truly flexible working, towards a new way of team working where the emphasis is on reinforcing team culture and group cohesiveness.

For effective collaboration and communication, it is often better for teams to sit together. Some larger organisations are already addressing the challenge of teams by the use of 'Homezones' in their smart buildings. Whilst still supporting ABW, groups and teams are allocated a zone on a particular floor. They can choose to work in the zone or somewhere else with a different team, depending on the work they are doing. With the next evolution in technology they expect to be able to find a seat in their Homezone and identify the location of co-workers all through an app.

The advantages of agile working and ABW can be incredible. This style of working can produce the cross-pollination of ideas and fast business decisions that only the serendipity of bumping into someone by the lifts, or ending up at the next desk to a colleague from out of town can produce. ABW is the realisation that one size does not fit all. But we predict that it will now evolve into activity-based clustering (ABC), shaped by the positive attributes of activity-based space with the move from individual to group, cluster, community and team. Future smart working will be more aware of the needs of the team, as well as bringing huge benefits to the individual and the organisation, if used in the right way.



Case Study: Colliers International R&D

Colliers used their building as a 'living lab' with data from badge holders to analyse how desk sharing and different activity-based workspaces were being used.

Location: Levallois-Perret, France

Size: 2,500m²

Tenant: Colliers

No. of occupants: 180

Key achievements:
- The building was awarded the French environmental award HQE (Haute Qualité Environnementale)
- The 180 occupants work from 140 work stations

Schneider Electric technology systems
- Schneider Electric's WorkPlace Efficiency

Activated third spaces

The concept of third space represents a range of solutions where people congregate, communicate and work. The culture of working anywhere in third spaces has been much more common in academia, on campuses, quads and in public spaces. A commercial building, where every square metre counts, can respond to the needs of people to work in different typologies of workspace with much more engineered social space to encourage communication, co-creation and idea sharing. In a multi-tenanted building, this can even support the collaboration of different businesses in the same sector. Warwick Johnson, Director at Brookfield Multiplex, uses the example of French café culture to illustrate this concept: "We are going back to this model where writers, artists and intellectuals went to cafés to discuss. Nowadays formal meeting spaces are used for only 20% of meetings, informal cafés are better as they improve communication and cross-pollination of ideas." Creating and activating third spaces and allowing work, collaboration and communication to take place in them is a major trend in smart technology and corporate culture. A study by Colliers of its headquarters in France supports the concept that informal meeting places, are extremely popular and productive. The study, in which it used badge-holder transmitters to track the movement of employees, showed that the cafeteria was regularly used outside of the lunch hour for meetings. 'While the cafeteria is not intended for planned and unplanned meetings, ... in practice, having a meeting in the cafeteria instead of in a meeting room, might be of value for users. It allows them to be seen and eventually heard by others[6].'

"We are going back to this model where writers, artists and intellectuals went to cafés to discuss."

The next generation of buildings can engineer and plan third spaces that can provide the flexibility for ad hoc meeting spaces as well as having the potential to encourage the collaboration and communication that companies crave. "There is an enormous opportunity for buildings to offer a physical and technological platform that can connect people based on their interests and activity. In other words by using this platform, a building could attract people because it understands what the individual is working on and then actually can become the conduit to connect these people even if they don't know each other," explains Renee Nutbean, ISPT.

We predict that with smart buildings and an app-enabled sharing culture more developers will begin to provide shared facilities and amenities. They will differentiate their product and provide their tenants or customers with an effective offer that means that fewer facilities need to be provided in a particular tenancy. The benefits of shared amenities and cross-pollination are obvious; fewer square metres leased but a more effective place to do business and attract talent. The building is 'activated' and through smart apps, these new, shared amenities are seen as a simple extension to the workplace.

Workplace as a service – building as a platform

Independent co-working hubs are starting to do just that. These are casual but highly connected third spaces, which can be bought on demand by the day or by the month. The trend for a workplace that can be treated as a service, in the same way that something like software can be, is a huge move forward. For small companies, start-ups and lone operators this makes so much sense. Workplace as a Service (WaaS) allows companies to lease office space not by the square metre but by the seat, with all of the IT and communications included. Companies can expand or contract in response to their pipeline and growth rate, paying only for what they are actually using. These hubs also serve the purpose of encouraging networking and innovation with like-minded companies and individuals. Companies and organisations that normally focus on social events and networking, such as Soho House in London, are offering global destinations and high-tech, mixed workspaces. In the case of Soho House, in line with its brand, this is for people in the creative industries[7]. Work Club has spaces in Sydney and Melbourne and positions itself at entrepreneurs but from mixed industries to allow the exchange of ideas and co-creation amongst its users. Hub Australia is aimed at small businesses, giving them the flexibility of space that they need when they start.

"For smaller companies and start-ups, the need to differentiate themselves by their workspace is sacrificed for the flexibility of the space and the opportunity of informal networking and cross-collaboration," says Robbie Robertson, Partner, Spatial & Brand Experience at Deloitte. Robertson has seen this paradox as start-ups go for co-creation environments rather than their own space. "The benefit is that they can get cross collaboration with other companies. It is a big change from the old serviced office model mentality; I see the hybrid club/corporate workspace becoming more and more popular."

There is a parallel trend for flexible leases that allow start-ups the flexibility of scalable office space. In fast-growing industries such as technology, change is happening so quickly that companies and the real estate they inhabit are struggling to keep up. There is a tension between what start-ups need and what classic property developers want to offer. Understandably, a property developer wants security and longevity in its leasing. But new companies need to have the flexibility to grow rapidly or shrink, depending on their trajectory. These companies need scalable office space to match their needs. Rapidly growing companies are reluctant to rent space that is too big for them, even if they know they are going to grow into it eventually, because there is so much uncertainty about how long that process will take.

"For smaller companies and start-ups, the need to differentiate themselves by their workspace is sacrificed for the flexibility of the space and the opportunity of informal networking and cross-collaboration."

The Australian government has committed funding to encourage collaboration and partnership between research institutions like universities and industry to help them innovate together. Start-ups are looking at flexible working options as well as flexible leases that allow them to grow as and when they need it. The pay-off is that they are unlikely to get this flexibility in premium buildings. Atlassian[8] has shown that this is not always a problem. It has been voted the best place to work for the second year in a row, despite being in one of the oldest buildings in the CBD, mainly due to its corporate working culture and inventive use of technology in the space.

For large companies, who need their own dedicated space, this model may not be the answer. Instead they can turn the concept on its head. By using occupancy solutions and gaining the insight into how the office space is being used, if there are areas that are consistently being under-utilised they could be sub-leased to interesting smaller companies that will bring value to the mix of people and intellect in the building. A good example of this is the sub-leasing of 28 Freshwater Place in Melbourne. The space has been freed up by the mining company MMG and has been taken over by the tech networking company LinkedIn[9].

The challenges of changing workplace requirements in permanent structures

People are doing jobs today that did not exist ten years ago, and that landscape will continue to change. Companies need to be agile in order to compete on the global stage. There is a sense that Australian and New Zealand businesses in particular have the ability to be more flexible and entrepreneurial in their attitudes to change and innovation. This may be due to their location providing a unique economic driver that means that they have to push their spaces harder.

However, the larger the company, the harder it can be to adapt to the changing demands of their workforce in a timely way. Natalie Slessor at Lend Lease has experienced the dissatisfaction of CEOs who cannot understand why everything takes so long: “There’s a real mismatch about how quickly we can mobilise technology as consumers, in our home and in our lives, and how quickly we can mobilise technology in the workplace. Corporate and consumer technology seems poles apart from a user experience, and this is fuelling the frustration.”

The next generation of buildings should be more agile to allow these changes to happen quicker. Ultimately, the level of investment in specific building technologies lies somewhere between the requirements of the developer, the building manager and the needs of building occupants. Often there is a need to understand who is actually benefitting from the investment. Bruce Duyshart, Director at Meld Strategies, explains: “When considering a range of potential technologies, typically there is a ‘what’s in it for me?’ mentality that is going on with each stakeholder. The challenge is finding a sweet spot that will be widely recognised as bringing the most value to a project. We’re also up against a range of sociological behaviours, ranging from those who are the ‘innovators’ and ‘early adopters’ up against those in the ‘late majority’ or ‘laggards’.”

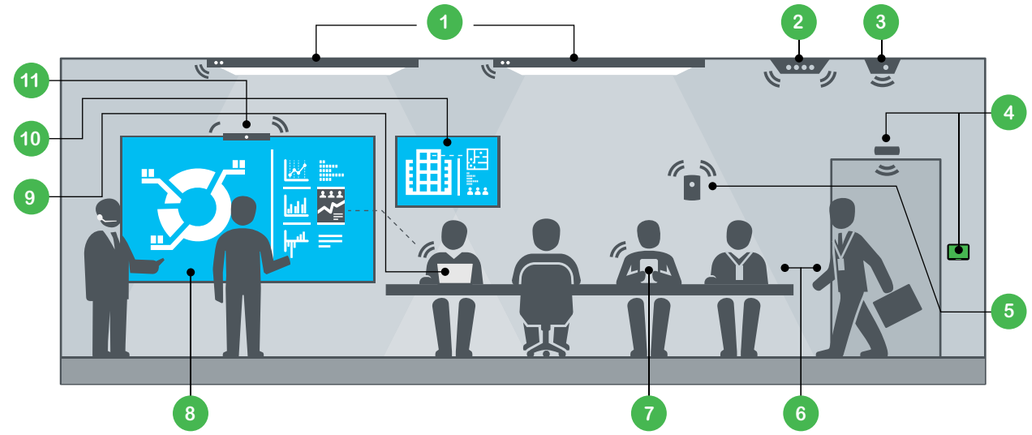
In a high performance workplace, having things that just work is essential. Who pays for the technology must depend on the unique combination of the base build and who is using it. According to Will Walker at Macquarie Bank, “When you have more than one building, they need to be able to talk to each other and provide the same experience, so it has to be tenant-led.” When smart technology is helping a company to understand how their dynamic is changing and how their buildings are being used, the view is that this investment should sit with the end user. Cost is always a factor. Smart technologies now enable larger companies to begin to understand how their dynamic is changing. Systems using POE or virtual cabling facilitate the evolution of space by making it easier to change the use of areas. Re-zoning is based on the knowledge and data that sensors and smart devices provide, and re-configuration can be done by software in a couple of clicks. The reduction in churn cost is considerable.

Changing and reconfiguring the workspace can be looked at in a physical as well as a technological way. ANZ Bank conducted an extensive review of its ways of working and workspace utilisation, which included the use of sensors to identify which spaces were working well and which were not. It looked at furniture as a key way to resolve its issues. Ken Lynch, Head of Workplace at ANZ, describes its development of the Playbox system[10], which uses furniture and engineering to give the company the flexibility and fluidity it needs. Each way of working it identified in its workshops was given a ‘kit of parts’ that was modular and reconfigurable. For example, locker bays are on wheels and double as white walls, meeting rooms can expand and contract and even kitchens can be moved.

This ease of re-configuration even applies to bringing older buildings up to modern standards. Jon McCormick of Brookfield GIS has seen a number of older buildings brought back up to standard: “Flexibility is about having the space to do whatever you want in the future. We are seeing a lot of re-purposing of older buildings; with the advent of some of the new products we are seeing the repurposing becoming a lot easier.” The next-generation of buildings is flexible, agile and modular, allowing their inhabitants to change their environment depending on their needs. “We have to get over looking at workplaces as cast in stone,” explains Laurie Aznavoorian of Aznavoorian Consulting. She believes that workspace must constantly evolve to support today’s rapidly changing organisations. “Many new progressive workplaces have very few built-in spaces, instead they employ furniture, curtains or screen elements to define space, which affords greater malleability to quickly respond to user demands.”

Creative thinking could be the saviour of the workplace but is not something that naturally goes hand in hand with a relatively conservative construction industry. If there is a good relationship between the investor-developer and the end user, this gives an opportunity to do something special. “Certain watershed projects allow you to do something really different with a user who is prepared to invest,” explains Robert Hitchcock, Program Manager for Mirvac’s HQ project. “You can toss the rule book out and look at what you can do as a landmark project and then everyone will see what can be achieved and that then becomes the new normal.”

In a way, the industry is waiting for a pioneer, who is prepared to stick its neck out and to get it done. Amanda Stanaway at Woods Bagot has been lucky to have had some brave clients, but agrees that you need someone prepared to be the first-mover. “It will take a truly brave client and an amazing exemplar to convince corporates or developers of the benefits of a smart building. Imagine if Google used their technology on a building, how could they change the industry? And how smart could that building be?”



Future smart meeting room

1: Future smart lighting
Power over ethernet (PoE) LED lighting with intelligent sensors and the ability for user app control. Future LiFi wireless data.

2: Smart room central sensor
Key head for monitoring presence and lux (lighting) level as well as BLE radio node to pick up occupancy and sociometric badges as well as data from other wireless sensors in the room. On the cabled IP backbone.

3: WiFi Smart Access Point (AP)
WiFi coverage as well as location layer data and ‘digital exhaust’.

4: Door sensor
Door sensor for measuring occupancy and intelligent door sign for room booking and NfC check in.

5: Air quality smart sensor
Wall mounted wireless sensor for measuring air quality (CO2 etc).

6: Sociometrics
Smart badges that report on location and manage presence and occupancy.

7: Smart phone
App based control of environment, mood setting, audiovisual as well as services such as food and drink.

8: Immersive AV
Smart collaboration systems, such as Microsoft’s Surface Hub, Oblong or Nureva with video conference and side digital ‘cork boards’ as well as haptic control.

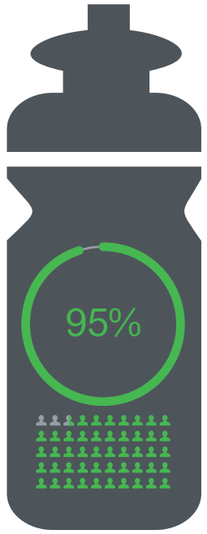
9: Wireless presenter
Connectivity for portable devices to connect and share content.

10: Big data
Visualisation and presentation of data, from the ability to show building metrics such as energy efficiency to a ‘who’s in’ and ‘find the expert’ platform.

11: Smart audio
Ability to create discrete sound fields, use automated ‘assistants’ and voice control.

3. A workplace that supports health

"Our vision is that we want you to leave work healthier than when you arrive."



95% of the respondents in our survey said that the wellbeing of their employees and the impact this may have on productivity are key components of their corporate and real estate strategy. It seems like common sense that a healthier, happier workforce will be more productive, have fewer sick days and will want to stay with a company longer. Research clearly shows that there is a link between how healthy people are and how productive they feel they are at work[11]. But workplace happiness and how wellbeing fits into that is more of a jigsaw puzzle than a straightforward solution. The International WELL Being Institute certifies buildings and companies by looking at seven elements that make up wellness: air, water, nourishment, light, fitness, comfort and mind. CBRE's Corporate Headquarters in Los Angeles was the first to be WELL certified. Its staff responded extremely positively to the building, with 83% saying they felt more productive and 94% saying that their new space had a positive effect on their business performance[12]. Macquarie Bank's 50 Martin Place is the first Australian building to have achieved a WELL pilot certification. Medibank's building at 720 Bourke Street, Melbourne, is not far behind. As the concept of wellbeing grows and matures, companies will need and want to gain some objective verification of their corporate healthiness. In terms of the buildings themselves, they should encourage occupiers to operate in a sustainable way that builds on the developers base building and raises the standard of buildings for those who spend so much time in them.

A sophisticated BMS or ICMS solution will be able to record the levels of air pollutants and CO_2, as well as check the purity of water and even assess sound levels. Jon McCormick, President of Brookfield GIS, has seen the sustainability agenda drive the introduction of smart technology to reduce the amount of energy, water and waste, but that in some cases this compromised the quality of the indoor environment. "We are starting to see a ramp-up in people looking at the suite of measurement tools to make sure that one is not compromising the other," he explains.

An air quality sensor has been developed by the University of Sydney and is being trialled in a number of key buildings. 'SAMBA'[13] allows an organisation to get a feel for air quality as well as supporting the re-certification of its buildings. BMSs are sensing and displaying what is happening in their environment in real time but they are also reacting and adjusting automatically. They are programmed to know exactly what needs to be done to maintain the status quo and adjust to preserve optimum working conditions. So much so that if the system is over-ridden by a facilities manager, it will demonstrate to the operator why its solution would have been more effective and saved money and energy. This is building optimisation at its most powerful.

WELL certification is starting to gain some traction in Australia and corporate tenants may be looking for WELL building status along with Green Star™ and Nabers® rating when selecting a location. But wellness accreditation is more than just about making sure the air and water are as good as they can be; this is about a corporate wellness and resilience strategy that puts the needs of the individuals at its heart.

Investing in your people makes sense. If you need to look at the business case for wellness, salaries make up the majority of business expenditure. Therefore health and productivity benefits far outweigh the financial savings that can be engineered from energy and water efficiency alone.

Warwick Johnson, Director for NSW/QLD at Brookfield Multiplex Ltd, agrees: "Staff performance is vital and energy is a small cost compared to staff churn. If 80-90% of your long term expenditure is on staff, it's better to worry about staff than bottom line costs." Add to that the statistic that we spend 90% of our time in buildings[14] and there is a compelling case for improving the built environment.

But how do organisations ensure that they are creating a healthy environment for their employees? The link between our environment and wellbeing has been researched in depth over the years. Dr. Esther M. Sternberg is a pioneer on mind-body-stress-wellness and environment interrelationships. She uncovered research from the 1980s that showed that patients in hospital with a view of nature healed faster than those without[15]. There is also a strong correlation between the availability of green space and people's perceived health[16]. In response to this, many smart buildings incorporate green, outside space within their buildings. At The Edge in Amsterdam, the world's greenest building, a huge atrium sucks stuffy air out of the working floors and replaces it with fresh air. The Majunga Tower, Paris, has a terrace on every floor (see Majunga Tower case study) and International Towers, Barangaroo has cafés on many floors with a huge open balcony complete with barbeque facilities for team-building events while Westpac's new workspace has 9,000 plants as part of the interior landscape.

Case Study: Majunga Tower

Majunga has outdoor loggias or balconies on every floor and 2,000 m² of terraces and gardens around the base of the building.

The building's technology enables its occupants to significantly reduce their energy consumption and footprint. It can compare real occupancy rates with reservations and room capacity, allowing redistribution of space when needed.

Location: La Defense, Paris, France

Size: 67,200m²

Tenant: Axa Investment Managers and Deloitte France

No. of occupants: 5,000

Key achievements:
- BREEAM excellent rating
- Reduced carbon footprint by 4x
- Improved energy efficiency by 5x

Schneider Electric technology systems
- WorkPlace Efficiency: integration of BEMS, SmartStruxure, powered by StruxureWare to achieve the highest levels of space management and efficiency

“If 80-90% of your long term expenditure is on staff, it’s better to worry about staff than bottom line costs.”

Recent research suggests that longevity is no longer based on genetics alone and what you do each day either positively or negatively impacts your health. The World Health Organisation has identified the workplace as the number one place to fight lifestyle disease as we spend almost a third of our lives at work. Our workplace health & wellbeing strategies can impact not only our health but our productivity as well. Duncan Young is Head of Workplace Health & Wellbeing at Lend Lease. “Our vision is that we want you to leave work healthier than when you arrived, “he explains. “We all agree that governance and frameworks are important but culture and leadership are key for lasting change.”

There is growing realisation that sitting down all day in your workplace is bad for your health[17]. Dr. James Levine of the Mayo Clinic coined the phrase ‘sitting is the new smoking’. To combat this, in-building mobility is gaining a great deal of traction. Getting your workforce moving is an ongoing challenge. Unsurprisingly for a healthcare provider, at Bupa, there is a strong move towards encouraging staff to make healthy decisions throughout their working day. Like some other iconic modern buildings the company has a central internal staircase in its Sydney office to promote movement. The Green Office in Meudon, Paris, promotes the use of stairs by having a beautiful tropical living wall. It is a net-positive building for energy and encourages the use of stairs for health reasons but also because lifts use massive amounts of energy[18].

Bupa also encourage both standing and walking meetings, which as well as being healthier have the added bonus of reducing meeting times by 34%[19]. In its Melbourne office, it has 20% of its desks as standing desks. This level increased to 50% in the Sydney HQ after requests from staff, demonstrating that behavioural change can be achieved with the right provision, education and corporate culture. Interestingly though, according to Rachael West, National Workplace Manager at Bupa, “we see a much greater adoption of standing desks when they are electrically operated, people find the manual wind-up ones too much effort and they don’t get used as consistently.”

We do not all have the time to pop to a lunchtime yoga session, but fitness at work is about office culture as well as the physical space. Macquarie’s platinum commitment to wellbeing is a range of investments including the promotion of the all-too-often dingy basement changing rooms to centre stage on the fifth floor. This is a strong visible sign that the company values fitness and supports employees taking advantage of these facilities.

Smart technology can also play an important part in supporting corporate wellness programmes. Investment in the iPhone® 6 mobile smart device, which has a wellness app, and also personal wearable devices such as Fitbit® mobile fitness tracker, which has corporate programmes, can encourage participation in exercise. The information from these devices feeds back to the smart building backbone and allows competition, encouragement and tracking. These kinds of programmes not only increase the general health of workers but there is evidence to suggest that a corporate sponsored scheme has a positive impact on staff retention[20]. Within a competitive talent marketplace, companies and organisations that invest in their staff’s wellness and health will be more attractive to potential employees. When Apple opened a wellness centre to woo staff at their California headquarters, it had 43,000 visits in just over a year[21].

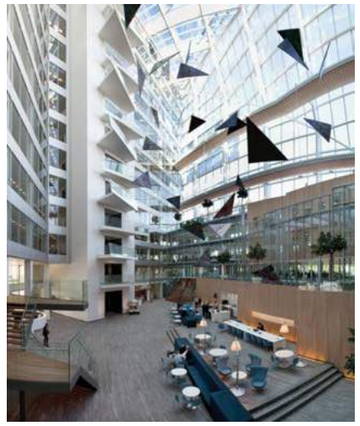
4. A workplace that measures performance

"Have we solved the productivity equation? You have to take the technology, people and the building together."

Comfort conditions

Creating a building that supports optimum performance and aims to increase productivity starts with getting the basics right. One of the core elements of smart building capability is the integrated control and monitoring of comfort conditions (temperature, light levels and air quality). A smart, connected solution has sun-tracking features, enabled with BIM and 3D modelling of the building and its environment, which allows it to tell when the sun impacts a window. The result is the automatic lowering of blinds, the operation of HVAC and adjustment of the lighting levels all together. This ensures that the comfort conditions remain stable and optimal, whilst maximising energy savings.

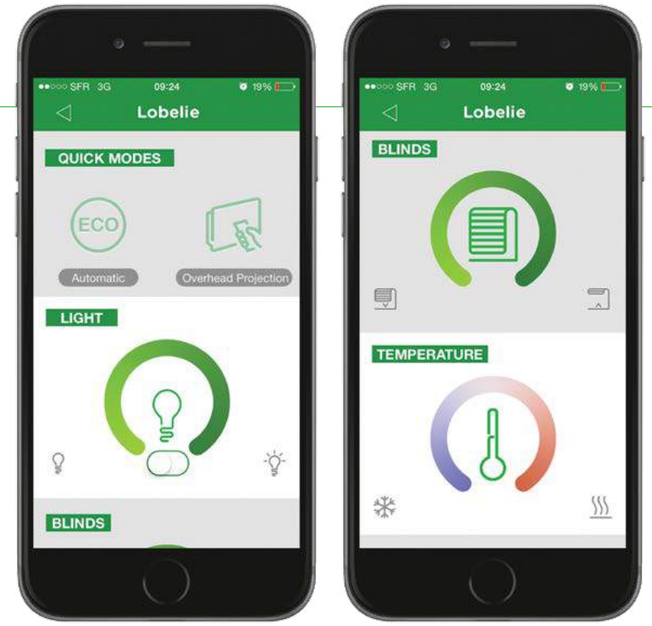
The need to monitor air quality has developed along with the desire to create healthier buildings. Jon McCormick, President of Brookfield Global Integrated Solutions, agrees that there is a growing demand for systems that can manage air quality. "We are starting to see sensors that can measure the elements of the indoor environment quality, which are then connected back to the ICMS so that we are not only looking at the temperature and space of an occupier but also airflow, CO and CO_2."



A number of next generation buildings, such as The Edge in Amsterdam and Le Hive in Paris (see case studies), are already using an app that allows you to control your own comfort settings, adjusting the temperature and lighting levels in the room or zone you are in and remembering those preferences for future space allocation. This allows for a personalisation of space that is all about making the work environment as productive as possible.

Excellent management of comfort conditions is something that immediately impacts on a building's energy use. "Smart buildings are designed to have an intelligence that allows us to improve comfort control as well as maximising energy savings. A smart building also makes it easier to get information about a building's real time performance to a much wider audience. This allows you to manage a building more proactively rather than the traditional reactive methods that have been the status quo for decades," explains Bruce Duyshart, Director at Meld Strategies.

Data dashboards help facilities managers to know where inefficiencies exist. Cloud-based data analytics software then interprets this data and converts it into actionable information, allowing staff to prioritise and proactively address issues. It allows building owners and operators to reach and maintain a higher level of building intelligence and performance[22]. This ultimately allows for a more efficient building.



Case Study: Le Hive

Employees can use an app on their smartphone to control their own personal comfort conditions, book and monitor meeting room availability. The employee app not only gives location information and local travel information, but also allows them to find their way around the complex building and locate colleagues.

Le Hive is a fantastic example of the implementation of the energy efficiency solution. Schneider Electric used technology alongside a corporate communications programme that encouraged building end users to take steps to reduce their personal energy consumption. The result was a massive 47% reduction in energy consumption.

Location: **Rueil-Malmaison, Paris, France**

Size: **33,000m²**

Tenant: **Schneider Electric**

No. of occupants: **1,800**

Key achievements:

- First building in the world to be awarded an outstanding (six-star) BREEAM In-Use rating and to obtain ISO 50001 certification
- Reduced energy consumption by 47% - from 150 kWh/m² to 78 kWh/m²
- Flexible footprint to meet changing business needs
- Efficiencies gained in meeting room and workstation utilisation post implementation of WPE

Schneider Electric technology systems

- Schneider Electric building management system (BMS) SmartStruxure™ solution with WorkPlace Efficiency measures occupancy and space utilisation
- Occupants' app with multiple features, including; location, way-finding, meeting room finder with booking functionality, and personal comfort control
- A full HVAC solution measuring luminosity, infrared (movement/presence), temperature, hygrometry, CO_2, via wireless sensors on RFID
- Lighting and blind control

The productivity gap

The difficult question that most organisations ask regarding investment in smart technology is if it will actually produce the desired results – will smart technology and smart buildings make our staff more productive and our business more effective? “We ask ‘does technology increase the effectiveness of the performance of the individual in the team?’” explains Will Walker, Global Head of Business Services at Macquarie Group. Through the use of badge-holders and smart devices that identify who you are or what you do and how you move around in a building, the key interactions that increase productivity can start to be analysed. Communication and collaboration are seen as vital to productivity and business success. These interactions can be encouraged and engineered into the space we inhabit.

“In a very fluid and free space you can see the opportunity for a building to become the conduit to connecting people,” says Renee Nutbean, Future Trends Analyst at ISPT. The next generation of buildings are designed to increase collaboration, communication and the fast business practices that this encourages. This is one of the main drivers for organisations to invest in smart building technology.

Who should pay for smart building technology?
83% agreed that smart building technologies were an important part of their company’s business, workplace and real estate strategy but only 43% agreed that companies were prepared to pay a higher rent or increased service charge to locate in one.

“We ask ‘does technology increase the effectiveness of the performance of the individual in the team?’”

Buildings will begin to use occupancy data to support collaboration, to influence how people work and to ensure that people and knowledge do not remain in silos. Some companies have an issue with ‘hidden work-in-progress’; with people going off and working on side-projects that lack visibility to the rest of the organisation. Eventually the use of occupancy data will help to resolve this by encouraging communication, knowledge sharing and collaboration.

Take this one step further and the technology can start to push information that it knows you might be interested in. Nicola Karcz, Solutions Engineer – Buildings at Schneider Electric, explains how this might work: “In the future we see technology addressing the problem of ‘unknown unknowns’ by providing relevant information to the right people at the right time. For example, you could get a notification that an interstate colleague, who you haven’t met before, but who works for the same client as you, is visiting your office today, and has a break between 10-11am. The digital concierge may then suggest a meeting spot at the coffee shop for you to compare notes and share information. This kind of collaborative technology could really help overcome the barriers of information overload that many working people experience.”

Artificial intelligence may also have a role in knowledge management, cutting through a company’s collective intelligence and pro-actively pushing relevant information to the right people.

As with all of these technological advances, investment in the right technology is key. Amanda Stanaway, Principal at Woods Bagot, has seen a range of awareness about the need to invest in technology. “Most people understand that technology is the enabler and backbone of their company, and that they need to invest and work through these issues to enable productivity and their future workforce. The ones that are most educated will acknowledge that their lack of investment in the past is one of the limitations in moving significant businesses forward or being 2020 fit.”

Towards measuring productivity

Measuring productivity and creating an environment that can be shown to increase productivity is still the Holy Grail of office design. In terms of smart buildings and smart technology, most companies still want to see evidence before they invest. “The problem is always trying to quantify the value of the outcome in terms of benefits, productivity and so on, “explains Rodney Timm, Director at Property Beyond. “As soon as you put a business case paper in front of most board of directors they ask where is the evidence, where has this been done before and what financial evidence is there of benefits that have been achieved? You then need to be able to attribute these benefits to the smart building in isolation from other contributing factors such as a change of leadership that may have occurred at the same time.”

The productivity conundrum has been around for a while and Amanda Stanaway at Woods Bagot wonders if we need to start looking at it differently. “Have we solved the productivity equation? You have to take the technology, people and the building together; you can’t look at them in isolation. Actually you need to change the question and ask ‘how can you afford not to do this?’”

Increasing productivity is complex and is the result of many factors related to people, technology and place. The use of badge-holders or their smartphone equivalents can help to unpick the complexity by providing data on one part of the equation; how the building is used. The devices identify how meeting rooms, third spaces, breakout areas and ad hoc meeting spaces are used. They can provide data on the types of interactions, social behaviour of employees and organisational dynamics that can help companies to understand how their employees work and how to make improvements, not only to productivity but also to employee satisfaction[23]. This insight can help to shape strategy, inform policy, challenge how a building is configured and provide valuable information on which types of space are best for productive work.

Companies are in favour of gathering data on their employees’ activities
87% agreed or strongly agreed that if it made their employees more productive, they would be open to the idea of gathering data on their location and activities in the workplace.

“Have we solved the productivity equation? You have to take the technology, people and the building together; you can’t look at them in isolation.”

Big data

With the development of the next generation of ICMS and the IoT, buildings are producing increasing amounts of data. This explosion in data brings opportunities and challenges for organisations. Whilst companies can start to use big data to help them analyse how their business is working and to support innovation and productivity, data security and privacy are increasingly becoming issues. Data breaches cost companies billions of dollars every year and losing personal data is a major reputational as well as financial problem for companies. “Increasingly quantum amounts of data are exposing businesses. Clients want to discuss how to protect that backbone,” says Preeti Bajaj, Vice President, Strategy & Transformation, at Schneider Electric.

Company badge holders provide data using RFID technology

The opportunity to create a big data picture of a building, by smartphone tracking and badges, is growing in appeal to building occupiers. Whilst the tracking devices give valuable information about how staff move about in a building and where they spend their time, it also raises issues around privacy and ethics. In our survey, 89% agreed or strongly agreed that if it made employees more productive, they would be open to the idea of gathering data on their location and activities in our workplaces.

In our survey, 89% agreed or strongly agreed that if it made employees more productive, they would be open to the idea of gathering data on their location and activities in our workplaces.

But whilst organisations are quite clear on which side of the argument they sit, their staff have mixed views on the information they are prepared to share about themselves. Some technologies are improving the acceptance of data gathering by using removable badge-holders for their employees. Users can separate their badges from the RFID holder and, if they really want to, swap badges with someone in the same category. The badge-holders are anonymous and only measure the occupancy of rooms and areas by categories of people e.g. tenants, partners, maintenance, security[24]. Another way of side-stepping the issue of privacy is by anonymising the information. Data hashing is a way of removing personally identifiable information (PII) so that the data can be analysed.

Some employees consider data gathering an intrusion into their personal freedoms. Staff at *The Telegraph* newspaper in London complained after finding trackers under their desks. Whilst the company explained that they were being used to improve energy efficiency and monitor building usage, staff did not like them and the company ended up removing them[25]. With good corporate communications, workers can be much more receptive to new ideas. If people understand that the reason the information is needed is to support a business and workplace strategy, they are more likely to agree to their information being used.

The integration of social media into the workplace has the potential to help map how real social interactions and work clusters take place, giving a company a glimpse of the collaboration and communication that fuels increased productivity. The building can then accommodate the real work and groups that need to sit together, rather than the traditional structures we are used to. This could be a natural step for millennials who have grown up with their lives on Facebook and Instagram, but could be more challenging for older team members, who may see it as an invasion of privacy.

WorkPlace Efficiency

WorkPlace Efficiency (WPE) is a Schneider Electric solution that covers a range of tenant services and addresses a number of challenges. It enables monitoring of occupancy, control of personalised comfort conditions and tenant services through an app. By being connected and natively integrated to the smart building backbone, the ICMS allows big data integration on a whole building level.

It is designed to monitor the occupancy of buildings and support the effective use of shared office spaces in an agile or activity-based working environment. The solution uses a network of connected sensors and anonymous RFID tags inserted into the badge holders of employees and other building users. These tags transmit information to the sensors via radio, which allows the measuring of occupancy of different spaces, such as desks, meeting rooms and ‘bubbles,’ in real time.

The information collected also includes the category of user occupying the space (e.g. employee, trainee or visitor). Occupiers using WPE are able to measure the frequency of space usage over a specified time interval, identifying when an individual space or particular types of space are used over the course of a day, week or month. They are also able to gauge the spatial utilisation of their breakout and meeting areas, measured by looking at the occupancy as a percentage of the capacity of a particular space.

If the company then needs to change the way a space is used, the solution allows areas to be re-zoned via software rather than re-cabling.

Predictive technology

Just as the big data from buildings provides an opportunity to analyse building use and to improve productivity, it also presents an excellent opportunity for predictive analytics. This involves combining external information sources, such as weather forecasts, travel patterns and even cultural and sporting events, with internal data sources such as seat occupancy, floor usage and movement around a building, to predict how a workplace will be used on certain days in a particular week. Personal RFID transmitters or similar technologies provide real-time data on the number of people who are using a space. This will feed into the ICMS. The building will start to predict what the usage will be on specific days, switch off whole floors on quiet days, and optimise space on busy days by directing people to free areas.

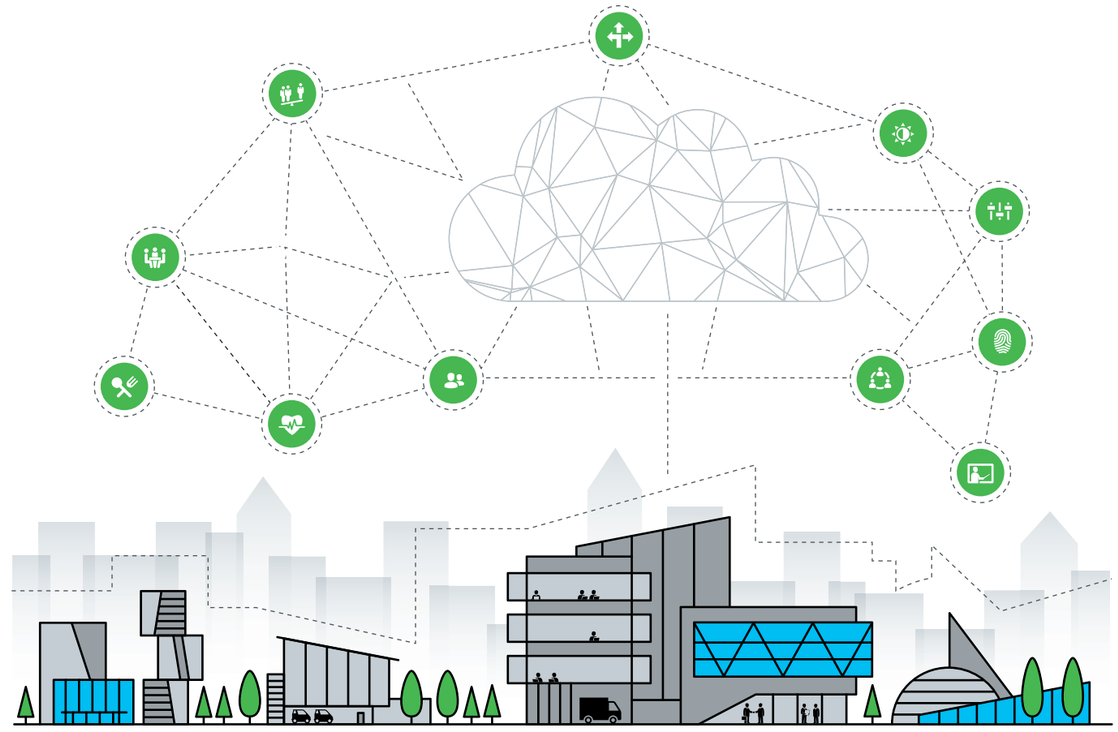
"A building will gather data and details of habitual use," explains Robbie Robertson, Spatial and Brand Experience Partner at Deloitte. "For example it will know that on a Friday it's busy because people go out after work, but on a Monday it's quieter and it will close down sections, and guide staff to available desk areas for an optimal experience." Systems can analyse data in this way, having an impact on energy consumption and operational efficiency as well as occupants' comfort. The end result is a more sustainable building that is cheaper to run.

> "Data volumes will enable companies to run experiments for different ways of interacting."

The information produced can allow a smart building to really understand and respond to its occupancy and environment and start to become proactive or intuitive. Martin Duursma, who was VP of the Citrix Technology Office until recently, has seen a number of start-ups moving into analytics and predictive technology. "They are doing some interesting things with data mining of the buildings themselves and then trying to be really smart about predicting, based on what they know is going to happen. They can then have more efficient use of cooling and lighting with their systems controlling that." Moreover, the data volumes will enable companies to run experiments for different ways of interacting and working, against control groups in the same building or across buildings, allowing further innovations in working styles.

5. Conclusion

We have seen how smart buildings are evolving to the next level: a connected, human-centric workspace that has an intuitive awareness of its occupancy and utilisation, with an app-centric interface that makes everything easy.



We have seen how smart buildings are evolving to the next level: a connected, human-centric workspace that has an intuitive awareness of its occupancy and utilisation, with an app-centric interface that makes everything easy. But ultimately, buildings are only enablers of economic activity, with better buildings producing better work outcomes. The challenge of increasing productivity and innovation must be seen as a mix of people, place and technology. Each of these elements plays a vital part and must be considered of equal importance.

We are already seeing the next generation of buildings incorporating some of these elements, with brave early adopters, both developers and tenants, especially in Europe, looking at the balance of investment into the necessary building technology. To truly reap the benefits of a smart building, there needs to be a synergy between the developer and the tenant. The investment in technology needs to be re-assessed so that both parties input and benefit. The most successful smart buildings involve the end user early on in the planning process and have a strong specification and procurement process in place. This should involve a multi-disciplinary team with HR, finance, strategy and property involved in the decision-making.

In our study, only two-thirds agreed that they fully understood what is meant by a smart building. This suggests that even in the real estate sector, there are still those who do not totally grasp the concept and therefore the exact solutions that the technology is providing. This misalignment could be one of the reasons why there are still issues between the tenant and the developer as to where the investment in this technology should sit, especially for a speculative development.

Along with the next evolution of buildings, there is already a move to smart precincts and smart cities. This is an area where the infrastructure, networks and platforms for energy and technology are shared and maximised, both reducing costs and providing a consistent experience for users. Renee Nutbean, ISPT, describes this as, “the creation of an ecosystem of buildings, where we are looking at the potential of the whole space, the intuitive space is what the end users need.” Some developments, such as the International Towers in Barangaroo, are already creating a precinct using a smart grid and shared services between the buildings. The Australian Technology Park (ATP) will also be a smart precinct where technology pervades internal and external areas. For precincts to succeed, the support of city councils is vital. There is a huge opportunity to influence city planners to create an area where serendipity, creativity and productivity are designed into the whole neighbourhood.

Smart cities are the next level up. The concept has been embraced in some countries, with cities such as Barcelona, Amsterdam and Singapore introducing smart technologies on a city-wide scale, and a credible vision is starting to crystallize, but the reality is still some way off. For smart cities and smart precincts to really take off, government or groups of interested parties need to get involved to ensure that there are standards between technologies that allow development and interoperability.

The most successful smart buildings involve the end-user early on in the planning process and have a strong specification and procurement process in place.

“We have done some research with the roll out of Building Information Modelling (BIM), and a major problem is development in silos, there is a danger this could also happen with smart cities,” says Albert Eichholzer, Associate Director, Grosvenor Management Consulting. “The role of government is not to dictate solutions. Instead they should look to set minimum standards for communication and interoperability within a city or district designated as a smart city. That way I will know that if I’m in any building in that area, anybody who walks into that building with technology will be able to talk to me, while companies can still innovate beyond those minimum standards. This would be a utopia.”

Europe is slightly ahead of the curve again in this concept in that the UK government has initiated a ‘vendor-neutral’ interoperability standard for BIM that has been adopted for its own large-scale projects and it has defined a set of standards for the industry to follow.

Taking all of this research into account, this report presents eight key elements that constitute this next generation of smart building. Apart from the sustainability factor, which is taken as a given in any new building, the major drivers for investment in this technology are increased productivity, wellbeing, talent attraction and the cost savings associated with being in an efficient building. The next generation of buildings enhances productivity by delivering personalised experiences and comfort; smart services for wellbeing and convenience; and real-time occupancy measurement enabling better management.

Activ8 model – the eight elements that constitute the new smart building

1. **Insightful** – sensors and connected devices provide unprecedented information on how a building is operating. Air quality, temperature, light levels, cleanliness, maintenance and use of space can be adjusted depending on the data fed back to the ICMS. Smart buildings are not only responsive, they are intuitive, using historical and real-time information to predict how they need to respond on a given day.

2. **Green** – highly advanced monitoring of energy usage, water consumption and waste production, coupled with the ability to turn off lights, devices and whole floors if needed, allows energy management at an advanced level. Combined with the appropriate supply and demand energy management strategies, this can even create net-positive buildings that make more energy than they use.

3. **Fluid** – the next generation smart building accommodates the successor to ABW with flexible, fluid modular systems to enable evolving workspace requirements. The acknowledgement of team needs, coupled with new team structures based on social media and collaboration data, will mean that the workplace is constantly changing. Smart building solutions will enable this by allowing easy and cost-effective re-zoning of space.

4. **Personalised** – personalised experiences and comfort conditions, access to building facilities and collaboration opportunities will all be through your smartphone app. The building will recognise you and your needs, adjust configurations and make suggestions based on your preferences.

As part of the explosion heralded by the IoT, smart buildings will be a crucial part in the vision of connecting what is currently unconnected.

5. **Healthy** – wellness is now a serious issue. Clear evidence that wellbeing contributes to productivity and employees value its provision means that health is a trend that is not going away. Smart buildings contribute to a healthy environment and provide the technology that can facilitate and measure wellbeing.

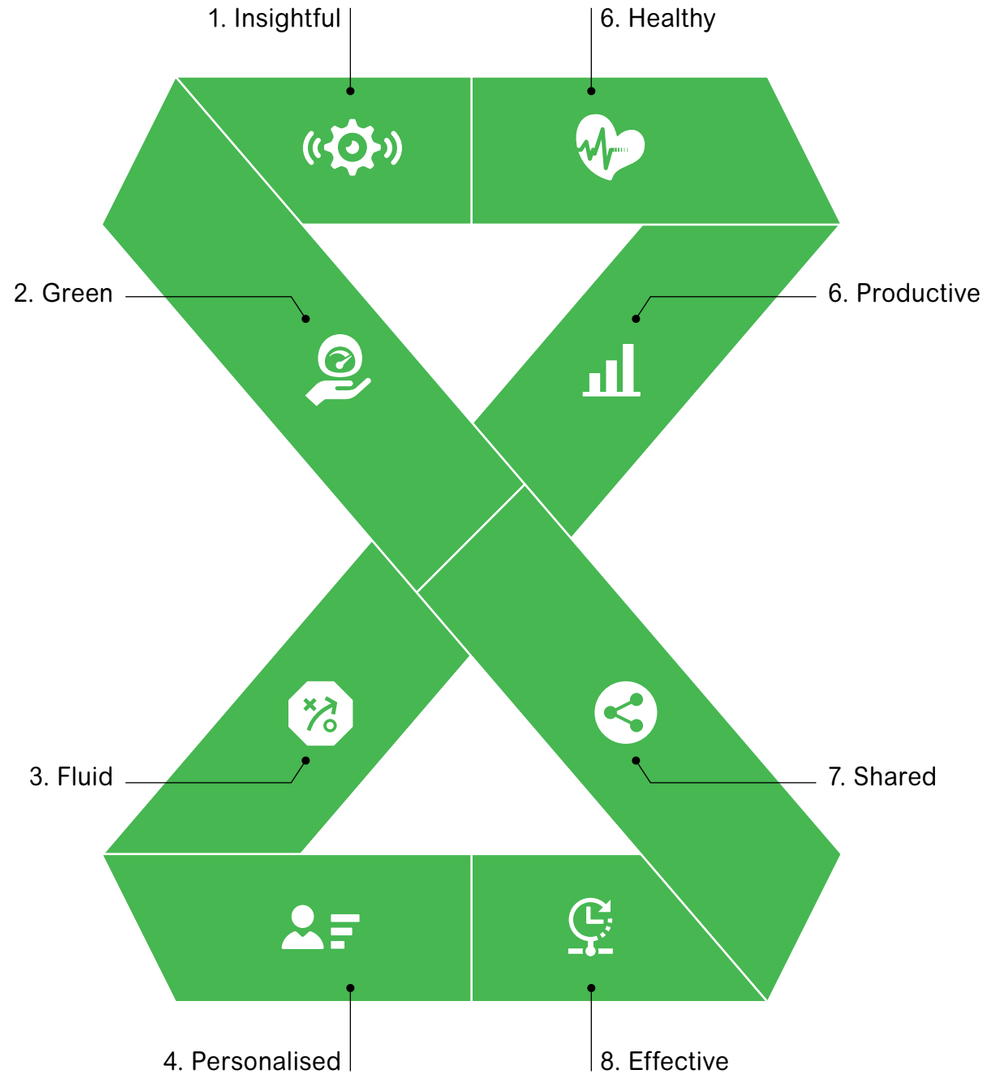
6. **Productive** – smart building technology is an enabler to a smarter corporate culture that drives growth and innovation through creativity and collaboration, in a working environment that just works and through the use of real-time data to drive or accelerate serendipity.

7. **Shared** – the trend is towards co-working, co-creating space and innovation areas, where colleagues mix with people from other business units, and even other companies. Big corporates rub shoulders with start-ups and academics in activated spaces. WaaS allows start-ups and smaller companies to buy workspace in the same way they buy a coffee.

8. **Effective** – there is a move towards using real-time occupancy data that will give insights into how a building is used and the dynamics of the workforce. Future algorithms can use predictive analytics to drive behaviours, patterns of use or interactions. This will help companies to maximise use of their real estate assets and allow staff to work in the most effective way.

The Activ8 model provides the basis for the business case for smarter space. The investment has to come from both tenant and landlord or developer. It is the joined-up vision and end-to-end conversation that will see the realisation of significant benefits. And this realisation can be through the supply chain, from facilities management through to customer experience, employee wellbeing and real estate efficiency. Smart buildings create a joined-up ecosystem and drive a new realisation that real estate is no longer inert and dumb but online and vital: real-time real estate will be a key competitive advantage and become a business driver rather than a corporate overhead.

As part of the explosion heralded by the IoT, smart buildings will be a crucial part in the vision of connecting what is currently unconnected. The Activ8 model illustrates the immediate benefits that can be realised, but like all good digital disruption we are at the infancy of a new era of real innovation in the built environment.



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Schneider Electric is the global specialist in energy management and automation. With revenues of ~€27 billion in FY2015.

Schneider Electric is the global specialist in energy management and automation. With revenues of ~€27 billion in FY2015, our 160,000+ employees serve customers in over 100 countries, helping them to manage their energy and process in ways that are safe, reliable, efficient and sustainable. From the simplest of switches to complex operational systems, our technology, software and services improve the way our customers manage and automate their operations. Our connected technologies reshape industries, transform cities and enrich lives.

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References

1 hbr.org/2014/11/from-the-knowledge-economy-to-the-human-economy
2 www.computerweekly.com/news/4500272748/Corporate-Australia-explores-new-ways-to-nurture-data-based-innovation
3 Schneider Electric symposium on The Future of Smart Buildings, Sydney 24 February 2016
4 www.nytimes.com/2012/11/15/booming/why-do-i-feel-colder-as-i-get-older.html?_r=0
5 How Gen Y & Boomers Will Reshape Your Agenda, *Harvard Business Review*, 12/04/09 by Sylvia Ann Hewlett, Laura Sherbin, and Karen Sumberg
6 Pervasive Technologies for Smart Workplaces: A Workplace Efficiency Solution for Office Design and Building Management from an Occupier's Perspective. Human Work Interaction Design. Volume 468 of the series IFIP Advances in Information and Communication Technology pp 73-82, 9 December 2015, Maria Ianeva et al.
7 sohoworks.com
8 www.brw.com.au/lists/best-places-to-work/2015/
9 www.smh.com.au/business/subleasing-puts-pressure-on-market-20130305-2fj4j.html
10 www.youtube.com/watch?v=XnJQPbP-U70
11 Fitness, Perceived Productivity, Job Satisfaction and Absenteeism, Journal of Exercise Physiology online *Official Journal of The American Society of Exercise Physiologists* Volume 6 Number 1 February 2003
12 www.wellcertified.com/well
13 sydney.edu.au/news/architecture/274.html?newsstoryid=14715
14 www.environment.gov.au/topics/environment-protection/air-quality/indoor-air
15 Healing Spaces - The Science of Place and Well-Being, Esther M. Sternberg, M.D.
16 Green Space, Urbanity, and Health: How Strong is the Relation? *J Epidemiol Community Health* 2006;60:587-592, Jolanda Maas et al
17 Occupational Sitting Time: Employees? Perceptions of Health Risks and Intervention *Strategies Health Promotion Journal of Australia* 22(1) 38 – 43, 2011, Nicholas D. Gilson et al.
18 www.green-office.fr/en/realisations/meudon/overview
19 The Effects of Stand-up and Sit-down Meeting Formats on Meeting Outcomes. Journal of Applied Psychology, Vol 84(2), Apr 1999, 277-285. Bluedorn, Allen C.; Turban, Daniel B.; Love, Mary Sue
20 Principal Financial Well-Being Index, 2013
21 Apple unveils new perks to attract talent 2014 fortune.com/2014/10/02/apple-employeeperks/
22 sourceable.net/big-data-analytics-paves-the-way-to-a-sustainable-building-october/#
23 Organizing for the future, Insights and Publications, McKinsey Report, January 2016
24 Pervasive Technologies for Smart Workplaces: A Workplace Efficiency Solution for Office Design and Building Management from an Occupier's Perspective (see No. 6)
25 www.huffingtonpost.co.uk/2016/01/11/daily-telegraph-occupeye-monitor-journalists-desks_n_8955310.html

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