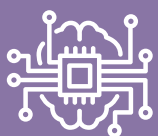


Your World First

C/M/S/
Law.Tax

Can AI unlock the potential of smart buildings?

CMS Report



Artificial
Intelligence



Approach

In November 2018, CMS hosted a round table discussion. We invited a cross-section of real estate industry players to discuss the evolution of smart buildings.

Participants



Julian Barker
Head of Smart Places,
British Land



Stephen Walker
Head of UK Business
Space Portfolio
Management, Aberdeen
Standard Investments



Richard Brazier
Associate Director of
Development & Sector
Specialist Lead for Offices,
AXA IM Real Assets



Richard Hamilton-Grey
Sustainability Manager,
Nuveen Real Estate



Neil Pennell
Head of Design
Innovation and Property
Solutions, Landsec



Sara Veldhuizen
Senior Manager Client
Success, OVG/EDGE
Technologies



Louise Ponting
Real Estate Lead,
EY



Alex Edds
Director of Innovation,
JLL



Nick Wright
Senior Director,
CBRE



Michael Jones
Senior Partner,
Foster + Partners



Tom Redmayne
Senior Director,
WiredScore



Hannah Prideaux
Business Development
Director, District
Technologies



Jack Sallabank
Founder,
Future Places Studio
(moderator)

CMS attendees



Clare Thomas
Real Estate Partner



Paul Sheridan
Environment Partner



Sam de Silva
Technology Partner



Stuart Tait
Real Estate Partner



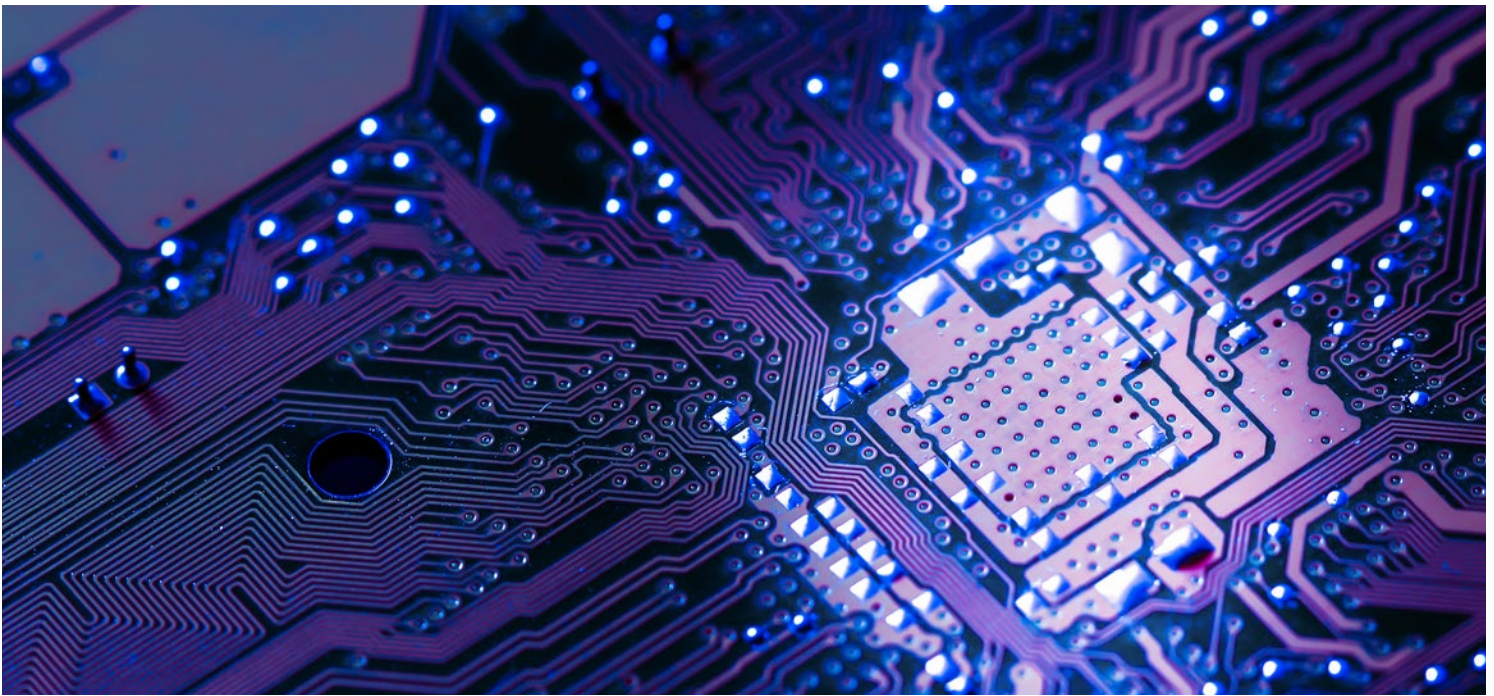
Colin Brett
Real Estate Partner



Douglas Hunter
Real Estate Partner



Alice Grocott
Senior Business
Development Manager



Introduction

The physical and digital worlds are becoming ever more deeply intertwined in all facets of life. The built environment is no exception.

The increasing prevalence of internet of things (IoT) devices and other forms of smart technology means that buildings can now be equipped with the infrastructure to be more responsive, adaptable and efficient than ever before. Used effectively, smart technology can improve the sustainability of a building, complement its wellbeing credentials, improve productivity and increase efficiency. But how much of this potential is being realised?

Despite smart technology becoming increasingly available, its adoption in commercial buildings is far from ubiquitous. Many developers, landlords and occupiers are yet to determine how best to plan for, implement and utilise the range of technology solutions now available. Whilst buildings can now collect huge amounts of data on their operational performance and the behaviours of their users, it does not seem that

this information is being widely analysed, shared or used to generate demonstrable value. Up until recently, the inertia of large swathes of the industry on this front could be put down to the difficulty of understanding and learning from increasingly large, complex and interconnected datasets. However, new artificial intelligence (AI) solutions offer enhanced capacity to crunch data and translate it into meaningful action. By identifying patterns and preferences, AI can then deploy this knowledge during future interactions between a building and its owner, manager, occupier or end user.

As part of a CMS organised roundtable discussion, we brought together leading figures from a cross-section of the real estate industry to debate whether AI is the game changer the real estate sector has been waiting for. Can AI unlock the potential of smart buildings?

In 2018 the UK government announced a GBP 1bn investment in AI.

Growing the AI Industry in the UK, 2018

What makes a building smart?

What exactly is smart technology? When applied in the context of commercial real estate, smart technology is a term that covers a range of devices and systems that are designed to improve the operational efficiency and user experience of the building.

For example:

- Building owners and occupiers can use smart technology solutions to manage and monitor their use of heating, electricity and water.
- Internet-connected devices can report on how and when a building is being used, helping to inform future decisions about the amount of space required by occupiers and how this should be configured.
- Apps are now available that can help office workers find empty desks, book meeting rooms and even locate colleagues, or that in a retail context can help shoppers navigate to stores, receive geo-targeted promotions and locate car parking spaces.

There is a huge amount of choice available to landlords and occupiers when it comes to smart technology, however, as Richard Brazier, Associate Director of Development at AXA IM Real Assets suggested, this variety creates a lack of transparency over what does or doesn't qualify as a smart building.

'We don't have a set definition or criteria of what technology you need to introduce to constitute a smart building,' he said. 'This means that different people are introducing different forms of technology, believing that all of these tick the smart buildings' box. Until there is a clear standard on what buildings should have in order to be branded as 'smart' and that becomes a mainstream classification, there will be confusion.'

Stephen Walker, Head of UK Business Space Portfolio Management at Aberdeen Standard Investments suggested that in seeking a definition of a smart building, landlords and developers should keep it simple.

'A smart building is like a smart person, someone who can tell you or teach you something,' he said. 'Using the example of the Bloomberg building, we can learn things from that office and it is teaching us how it can be used more efficiently for the benefit of its users and the environment.'

This sentiment was echoed by Michael Jones from Foster + Partners, who was lead architect on the 2018 Stirling Prize winning Bloomberg Building. 'No client ever asks for a 'smart building', instead they have a list of things that they want their building to help them achieve,' he argued.

In a world where every tenant has a different set of requirements for their buildings, many of those around the table determined that it is up to the building owner or developer to offer choice, rather than a fixed smart product. Douglas Hunter, CMS Real Estate Partner, said: 'You have some occupiers who will want a high tech building that they can simply plug into. Then you will have others who say 'provide me with the space and the flexibility, and we will introduce the technology we need'.

Richard Hamilton-Grey, Sustainability Manager at Nuveen Real Estate explained that for them it is about providing tenants with options:



'We are offering tenants a selection of carefully designed CAT B fit outs which are 'smart enabled'. Therefore, even if a tenant doesn't want to deploy smart technology today, it can be introduced at a later stage. This reduces functional obsolescence risk.'

Richard Brazier explained that a similar strategy was being adopted at TwentyTwo Bishopsgate:

'We have made sure that the fundamentals of the building are right so that tenants can come in and overlay whatever tech they want. We will have up to fifty different tenants in the building, some of which will want to be incredibly technologically advanced in their fit out, and others who will want

to adopt a more traditional approach. As the landlord, we have to be able to cater for as much or little as different tenants want. At the same time, we don't want to put technology in the building that in five years' time will become obsolete.'

Rounding this point, Neil Pennell, Head of Design Innovation and Property Solutions at Landsec noted: *'At the heart of the problem is the fact that real estate is illiquid but the way people live and work today is totally flexible and constantly changing. The best we can do to future-proof our buildings is to get the basics right so we can continue to retrofit them with technology as the landscape changes.'*

CASE STUDY

Residential: Midtown Doral, Miami

All residents at Midtown Doral have exclusive access to a pre-programmed smart technology system known as Vertilinc:

- Tenants receive a mini iPad which has an app installed which gives residents access to their apartment, building and community.
- The app allows tenants to remotely control their lighting, heating, curtains and TV & audio systems.
- Owners' cars can be synced to the home system so when they exit their parking spot the systems ensure that the home is in 'off' mode and heating or air conditioning is switched off, lights turn off and doors are locked. Everything then returns to pre-set upon re-entering the parking garage.

Smart controls and connected devices could lower building energy consumption by 10% globally by 2040.

IEA, 2016



Is AI adoption the next logical step?

AI is already all around us, affecting many aspects of our everyday lives. Most smartphones now have a built-in smart assistant powered by AI; music streaming platforms use AI to suggest your next track; Google Maps gives you up to the minute AI-derived traffic information and AI-powered smart cars are driving on our roads.

The promise that AI holds when it comes to creating better buildings is incredibly enticing. AI can interpret data in real-time and take appropriate action without the need for human intervention, leading to greater efficiency, less wastage and more 'frictionless' experiences for building users. Despite this, AI is not yet high up on the agenda for the sector at large.

'I think AI is a next logical step in buildings to turn the data created by increased sophistication of IoT systems and smart devices into actionable information,' said Hannah Prideaux, Business Development Director at District Technologies. 'Having said that, I don't see much of this being applied yet.'

'This is about taking the next step from smart to sentient buildings,' added Julian Barker, Head of Smart Places at British Land, 'AI that sits on top of the dataflows coming out of a smart building and then analyses and optimises the building in real-time, whether for experience, productivity, efficiency, cost or environmental footprint. Transparency and trust are going to be critical.'

For Michael Jones from Fosters + Partners, any talk of AI is premature until the real estate sector gets comfortable with data. *'The only way we are going to get close to AI acting as a driver for building innovation is to be doing the baby steps now by gathering and sharing the data that will inform AI solutions of the future,' he argued. 'Unless we start somewhere, AI is a long way off.'*

CASE STUDY

Retail: Westfield, San Francisco

Westfield has released plans to turn its shopping centres into smart retail destinations. Westfield Retail Solutions, formally Westfield Labs, is the digital development arm of the retail company and is trialling smart technology in its San Francisco mall which include:

- Eye scanners which on entry will bring up information about a visitor's previous purchases and give recommendations.
- Smart mirrors that use virtual technology to show how a piece of clothing will look when worn.
- Smart toilets that can detect hydration levels and give feedback about which nutritional products you need based on your purchase history.

Legal focus piece



Sector comparison: real estate vs. energy and transport

In terms of environmental sustainability, whether in respect of carbon, resource efficiency, the circular economy or waste management, real estate is clearly a major sector. Real estate is the dominant sector in terms of energy end-use, consuming approximately 40% of end-use energy in the EU.

In the transition to a low carbon economy, the three biggest sectors needing to adapt are energy, transport and real estate. Of these three, real estate has made the least progress, unfortunately by a significant margin. This is partly understandable because the sectors are very different.

The energy and transport sectors are much more centralised, with fewer commercial players and less complex economic models. This has enabled legislators to target these sectors more readily. The energy sector, with its relatively centralised infrastructure, was the legislators' prime initial target. Transport, and particularly the auto sub-sector, which has few major manufacturers and is essentially based around a single product, the internal combustion engine, was a natural second target. In both instances:

- Regulation to constrain greenhouse gas emissions occurred in tandem with development of alternative technologies.
- Regulation began modestly, seeking to work with the sectors and stakeholders but progress was poor resulting in tougher legislation.
- Economic incentives were provided to support the build-up of clean energy.
- The price of clean-energy fell more quickly and steeply than anticipated; and
- The auto emissions' scandal hastened the widespread introduction of hybrid and electric vehicles.

Comparable legislation in the real estate sector is still nascent (e.g. the EU's Energy Performance of Buildings Directive). However, as the energy and transport sectors move forward, the real estate sector becomes very exposed. If the whole economy is to meet its carbon targets, it follows that the burden on real estate must increase substantially. Smart buildings are a way to increase sustainable energy efficiency.

Messages from the experiences in the other sectors, include:

- Expect harsher legislation and potentially 'stranding of assets' (e.g. unlettable, difficult to sell).
- Transition will be both a significant threat and a huge opportunity.
- Expect disruptors, disruptive technology, new entrants, new JVs, and investor scrutiny.
- Traditional models will not disappear quickly, but will be squeezed from external and internal competition.

Can the data hurdle be overcome?

To many of those around the table, gathering actionable data was the crunch point. For AI to act as the brains behind smart technology, data needs to be analysed, but in view of recently revised General Data Protection Regulation (GDPR), the sense of caution is understandable. Smart technology that captures data on a building's energy use is one thing, but capturing data on a person's use of a building takes commercial real estate into complex and unknown territory.

'There is increasing distrust about how and why a company wants to capture data and how that data will then be used, so our industry will need to act accordingly' said Julian Barker, Head of Smart Places at British Land. *'Recent scandals such as Cambridge Analytica have meant that the data issue is a very sensitive one currently.'*

Louise Ponting, Real Estate Lead for EY, oversees premises requirements for more than 3,000 staff in London alone. She believes data gathering on the movements and behaviours of the workforce should sit with the tenant and not the landlord: *'If we want to capture data then that is up to us,'* she argued. *'I couldn't possibly sign a lease which gives away data on my staff.'*

However, CMS Technology Partner Sam De Silva believes that the real estate sector shouldn't be overly deterred by concerns about data use. *'To say that data privacy is the key issue is a bit of a cop out,'* he said.

'Companies like Google have built their empires from data. It's a misconception that GDPR is all about blocking people and companies from sharing their data. Instead it should help empower them to be in control and to make a trade with their data, giving consent for applications they consider useful. The reality is that buildings are going to produce data and the more data we share (legally of course!), the more value we get from it.'

Sara Veldhuizen, Client Success Manager at EDGE Technologies, made a similar point: *'The question is are we going to engage with it or are we going to allow all of the components of a building to collect their data separately and not utilise them?'* she asked. *'For things to change in this space it's going to take a few more people to be pioneering. We need shared risk and shared investment between landlord and occupier.'*

Whenever a sector faces a new opportunity or challenge, which smart technology is in equal measures, progress requires some bravery. Hannah Prideaux warned that if the real estate sector did not grasp this opportunity, then others would: *'Disruptors are going to come along that allow open sourcing and open coding. They will displace those who have been protective about their data.'*

Stephen Walker from Aberdeen Standard Investments agreed that by not properly engaging with data, the real estate sector leaves itself open to new entrants from the technology world: *'There are cash rich companies poised to make a move in this space. The Googles and WeWorks of this world. They are going to be our competitors of the future because they have no legacy issues and huge R&D budgets.'*

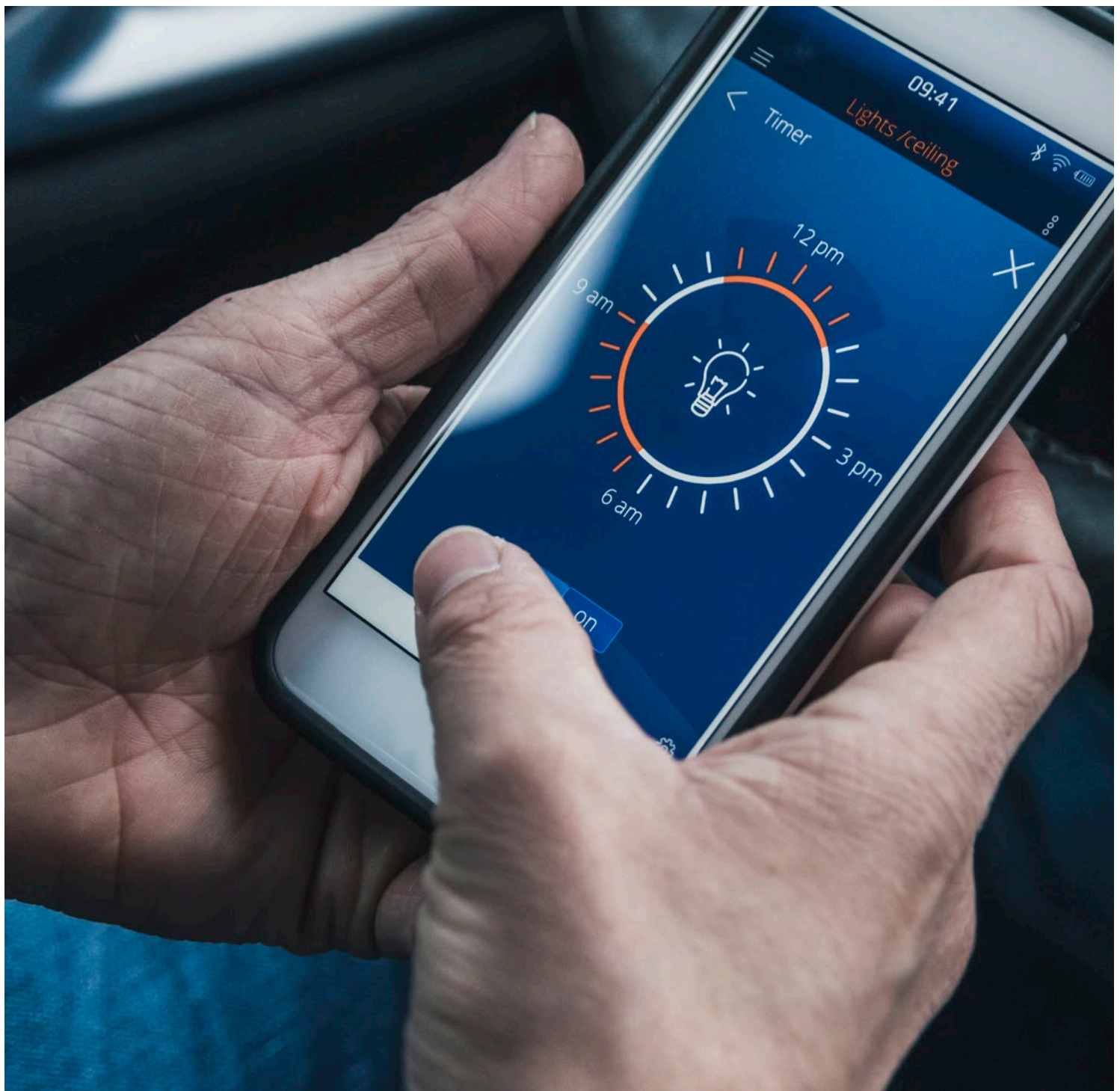
Few people disagreed that, at some point soon, the question of how to gather and use data effectively will be answered. At that point, the speed of change for the industry will rapidly accelerate.

'It will be an interesting decade,' said Neil Pennell at Landsec. *'Things won't change much in the next few years but in the next decade they will change radically. We are all trying to guess where to put our*

bets and what we need to do, but the starting point will always be good buildings with strong bones.'

Paul Sheridan, CMS Environment Partner, added that the sector can learn from looking at how other sectors have responded to change. *'The transport sector and energy sectors were in the same position 10 to 20 years ago and they had to change,'* he argued. *'There is an enormous opportunity for the real estate sector and for others to invest in new ventures in real estate. Winners will come from the entrepreneurial companies willing to take risks.'*

For District Technologies' Hannah Prideaux, those in the real estate sector need to start preparing themselves: *'I would suggest the sector ensures that they implement the right systems to get the right data,'* she said. *'This of course requires them to work out what data they're actually trying to capture and why, before just implementing new systems, hardware or technology.'*



Does it pay to be smart?

To move forward with smart technology implementation, questions about value need to be addressed. Who should pay for smart technology? Is this cost ultimately offset by its benefits?

Those around the table had already discussed who should be implementing the technology, the tenant or the landlord, but whose pocket that should come from is another matter. Will a tenant pay for technology that they are unfamiliar with? If those in the real estate sector haven't yet figured out what it means to be smart, chances are most their customers haven't either. So even if a landlord or developer wants to add smart technology into a development in order to future-proof it, will the tenant be prepared to pay a premium for this?

'What we are not doing as an industry is demonstrating the benefit to the end user and we have to change that,' said Nick Wright, Senior Director of Strategic Consulting at CBRE. 'We need to move towards a more customer focused, service mentality and better explain how smart technology delivers results.'

'My perception is that the majority of people don't know what they want smart to mean and so are not initially keen to pay for it,' added British Land's Julian Barker. 'But once we illustrate the value of specific use cases, they are interested in discussing many smart service examples.'

Stephen Walker of Aberdeen Standard Investments thought back to a previous period of change. *'It is very similar to the sustainability conversation we had five or ten years ago, where if I have a green building will someone pay more rent for it? Back then the answer was probably not, but now there is much more pressure to be environmentally responsible and the stakes are higher.'*

For many of the developers and landlords around the table the JLL '3-30-300 rule' is a useful place to start when discussing the value of smart buildings with a tenant – the average

order of magnitude between a company's cost for utilities, rent and payroll. As Julian Barker said: *'At British Land we are looking at the benefit of introducing smart from the perspective of the salaried employees sitting at their desks, which is by far the biggest financial outlay for a tenant.'*

'The problem is we do not have the metrics to measure if some of these technologies are making an impact,' argued JLL's Alex Edds. 'Is absenteeism going down in buildings where smart tech is being deployed? Are staff retention rates improving? The problem is occupiers won't share this information with landlords. They have no reason to currently.'

Perhaps the best way to convince a tenant of the value of smart technology is for the landlord to have a flagship building within their portfolio that shows the range of possibilities in action. The EDGE in Amsterdam is considered one of the world's smartest buildings that sets an example for others to follow.

Sara Veldhuizen of EDGE Technologies explained that because so much tech has been built into the building, those data-based conversations can happen. *'I consider myself a bit of an evangelist because my daily activity is to go to tenants and to explain to them that the sensors serve a purpose in improving energy efficiency and staff wellbeing,' she said. 'The beauty of a smart building is that by drawing on lots of rich data, you can have a very fact-based conversation. For example, you can show the zones of a building that staff choose to hotdesk in most frequently and provide an analysis why that might be by looking at data sets such as heat, light and noise levels in the popular areas.'*

Richard Hamilton-Grey from Nuveen Real Estate added *'Health and wellbeing is fertile ground now with tenants – our customers - and if you can show them concrete evidence of smart technology helping to achieve these goals, then they really start listening. An example could be*

a building being able to tell its occupants which seating areas to use to get the most daylight as the day progresses. Studies have now shown that optimising the amount of natural light exposure significantly improves wellness among workers, leading to gains in productivity.'

Furthermore, Neil Pennell from Landsec saw inherent value in innovation. *'The EDGE shows us that there is real value in going first. We have seen a regional developer become an international brand. As an industry we are yet to fully grasp the power of branding in the same way that the technology giants have done. Could we create a smart building with a brand as strong as the iPhone? Occupiers would likely be prepared to pay a premium to be in a building like that because of how it positively reflects their own brand.'*

Picking up this point about synergy between building and brand, Richard Hamilton-Grey of Nuveen Real Estate said sustainability was a key

issue now: *'Very soon occupiers are not going to be able to meet their corporate Environmental Social and Governance (ESG) requirements unless they start occupying ultra-efficient buildings, with a preference for those that are net zero carbon. Smart tech can play a role in optimizing operational efficiency, as part of the overall increase in the quality of service. Therefore, the conversation about how smart tech can help them do that is fertile ground for us to engage tenants.'*

Given the rising tide of regulation, Tom Redmayne from WiredScore argued that smart technology might be the only way to mitigate the risk of non-compliance. *'Over 50% of our interest now comes from people who know they design well-connected buildings, but they are worried about obsolescence,' he said. 'Therefore, it is less about 'can we charge higher rents' and more about 'are we going to lose tenants and have higher voids?''*

CASE STUDY

Office: The Edge, Amsterdam

The 430,000 sq ft office building in the Zuidas business district in Amsterdam was designed for global financial firm and main tenant, Deloitte. The building, which uses 70% less electricity than comparable office buildings, has achieved the world's highest BREEAM rating awarded to an office building. Examples of some of the smart technology in The Edge include:

- An LED-lighting system co-developed with Philips equipped with a multi-sensor to detect movement, light, infrared and temperature.
- None of Deloitte's employees at The Edge have an assigned desk and instead use a custom-built app for desk bookings based on the kind of work they need to do on a particular day; the app can also tell employees which colleagues are in the building and where they are located.
- Meeting room lights flicker 15 minutes before the end of bookings to indicate that a meeting should be wrapped up.

Buildings are responsible for 66% of electricity consumption and 19% of CO₂ emissions in the UK.

CCC Progress Report, 2018

Seeing the bigger picture

As the smart cities agenda progresses, the spotlight might shine more intensely on smart buildings. Countries around the world are becoming increasingly urbanised and environmental pressures are growing. National and local government are calling to create smarter cities. From Forest Cities in Malaysia and China, to Bill Gates' smart development 'Belmont' in the Arizona desert, schemes are emerging around the world. As Foster + Partners' Michael Jones said: 'Whilst no one is asking for smart buildings, everyone is asking for smart cities.'

For smart cities to become a reality, the acceptance of AI by the real estate sector is essential. AI presents the opportunity to link up all aspects of our lives. It will use data to make the journeys we take and the activities we engage in, whether for work or leisure, smoother and more customised to our individual preferences.

'There is very little point having a smart building if it is not connected to the outside world,' said EY's Louise Ponting. 'As a large occupier, we have a responsibility to encourage our staff to use our assets intelligently and that can only be done with smart city technology that feeds into the building's utilisation. It is all well and good having a building that optimises its environment for the comfort and productivity of our staff, but if they are all stuck on a train or in a traffic jam on the way into work then what's the point?'

JLL's Alex Edds agreed: 'A developer's thinking about their end user shouldn't start at the point that person walks into the building, but rather when they wake up at home. They need to think about how to incorporate their entire journey. However, collaboration with other key sectors like transport, healthcare and energy is some way off.'

Some of those present at the discussion felt that until a number of basic technological provisions were guaranteed, there would be limited space for AI or smart technology. Clare Thomas of

CMS argued: 'In terms of smart cities and smart buildings if we can't get the basics right in terms of providing reliable internet across our cities, how can we expect to go further and explore the possibilities of AI?'

Landsec's Neil Pennell agreed that the UK needs to up its game with key technology before attempting to be really smart: 'We do have a slow internet service whilst some of our competitor countries are making sure they have that infrastructure in place,' he said. 'Common standards could help us move forward. Scandinavian countries for example have mandated to provide fibre solutions.'



Legal focus piece



A new lease landscape?

Flexible and agile working, sustainability and technology changes are impacting on the type and content of commercial leases being entered into.

With more flexible working in the workplace and more staff regularly working outside the office, there is less need for fixed workspaces. Companies are now better able to assess their space utilisation by using smart technology such as under-desk sensors. This leads to data-led decisions on redesigns of the work environment to encourage a superior experience for those in the workplace. It can also lead to tenants wanting greater flexibility in the leases they take. The term may be shorter and/or there may be flexible rights to end the lease early.

This trend is evident through the declining length of UK commercial leases. Statistics from MSCI Inc's annual UK Lease Events Review reveal that since the year 2000 the average length of a lease has fallen from 16 years to 7.1 years. The proportion of short term leases (5 years or less) completed in 2018 rose to 42.1%, whilst medium term leases (5 -9 years) fell to 36.9%. Over 38% of leases completed in 2018 contain a break option.

The new accounting standard IFRS 16 is also likely to encourage shorter lease terms, since from 1 January 2019 most leases together with corresponding financing liabilities will be recognised on the balance sheet.

Sustainability has become an important factor in the form of leases. Concerns about the environment and more specifically energy ratings which have recently given rise to the Minimum Energy Efficiency Standards (MEES), has led to leases including 'green lease provisions'. Examples include landlord control over which assessor a tenant can use to provide

an energy performance certificate, and the right for a landlord to withhold consent to tenant's alterations that will have a material adverse impact on energy ratings. This becomes an even bigger concern from 1 April 2023 when landlords may incur penalties if there are continuing leases of sub-standard rated properties. Such leases will be unlawful and will likely have an adverse valuation impact.

The technology offerings of properties matched to the needs of tenants are increasingly featuring in leases. Electronic communications services are today as important a utility as water, gas and electricity. Tenants assume that their properties will be connected and therefore the property documentation needs to enable this in as seamless a way as possible. Leases are also beginning to reflect the needs and characteristics of smart buildings including intelligent building management systems, data gathering devices and remote monitoring.

Leases will continue to adapt to the changing needs of our society and the demands it places on the use of property.

A new mindset

What is apparent is that we have not yet reached the tipping point, when smart technology becomes really intelligent. At present, there simply aren't enough examples of how AI can power smart technology for those in the real estate sector to start the task of educating occupiers about the benefits it can bring.

And where examples do exist, concerns around data protection need to be allayed before we can learn enough about what is needed. All of this will take time.

However, everyone present at the roundtable agreed that the sector is in the early stages of radical digital transformation. Major changes could come sooner than the industry anticipates. It is already the case that some more pioneering tenants are asking building owners and developers to implement smart technology, even if the concept is far from most occupiers' minds. To prepare for the changes that will certainly come, the sector needs to develop a unified game plan.

'For me, it's about being more open and collaborative as an industry,' said Nick Wright at CBRE. 'We need to understand what some of the challenges are and there is still a long way to go before this adoption takes place. Everything we have talked about is about trying to change mindset. We are naturally quite cautious as an industry because we place very big, long term bets.'

Sam de Silva, CMS Technology Partner, agreed: *'If we want to realise the potential of smart*

technology and AI in real estate then the sector needs to share data, share opportunities and be open to new opportunities and adopting cutting-edge technologies. We have seen the banking sector starting to do this and now we need to see the real estate sector start its journey.'

'Absolutely there is potential for AI to improve our use of buildings, in lots of ways from efficient reception experiences to enhanced building services management.' Added Stephen Walker from Aberdeen Standard Investments. *'The property sector needs to be bold when such solutions present themselves and be prepared to invest expenditure in reasonably embryonic systems, particularly if the systems involve machine learning which should lead to iterative improvements.'*

No single developer, landlord or tenant can create the next generation of smart buildings alone; it will take collaboration and understanding between all those involved for the potential of smart technology to be realised. By working together, however, those in the real estate sector can be smarter and ultimately create healthier places with enriching, personalised experiences for the people that visit them.

CASE STUDY

Manufacturing: BMW, Dingofling, Germany

BMW is increasingly looking to digitise its operations to make its logistics more efficient. Many of the technologies can be found at the Dingofling production site, the company's largest site in Europe which sees approximately 376,000 cars produced a year:

- Autonomous transport systems and smart transport robots are used to move pallets inside the warehouse.
- Sensitive lightweight robots support workers by taking on physically demanding tasks.
- Smart watches for logistics staff alert them about an approaching delivery via a vibration alarm.
- Augmented reality glasses, used for scanning and packing in the warehouse have increased productivity by 20% and reduced error rate by 33%.



Law . Tax

Your free online legal information service.

A subscription service for legal articles
on a variety of topics delivered by email.
cms-lawnow.com



Law . Tax

Your expert legal publications online.

In-depth international legal research
and insights that can be personalised.
eguides.cmslegal.com

CMS Cameron McKenna Nabarro Olswang LLP
Cannon Place
78 Cannon Street
London EC4N 6AF

T +44 (0)20 7367 3000
F +44 (0)20 7367 2000

The information held in this publication is for general purposes and guidance only and does not purport to constitute legal or professional advice.

CMS Cameron McKenna Nabarro Olswang LLP is a limited liability partnership registered in England and Wales with registration number OC310335. It is a body corporate which uses the word "partner" to refer to a member, or an employee or consultant with equivalent standing and qualifications. It is authorised and regulated by the Solicitors Regulation Authority of England and Wales with SRA number 423370 and by the Law Society of Scotland with registered number 47313. It is able to provide international legal services to clients utilising, where appropriate, the services of its associated international offices. The associated international offices of CMS Cameron McKenna Nabarro Olswang LLP are separate and distinct from it. A list of members and their professional qualifications is open to inspection at the registered office, Cannon Place, 78 Cannon Street, London EC4N 6AF. Members are either solicitors or registered foreign lawyers. VAT registration number: 974 899 925. Further information about the firm can be found at cms.law

© CMS Cameron McKenna Nabarro Olswang LLP

CMS Cameron McKenna Nabarro Olswang LLP is a member of CMS Legal Services EEIG (CMS EEIG), a European Economic Interest Grouping that coordinates an organisation of independent law firms. CMS EEIG provides no client services. Such services are solely provided by CMS EEIG's member firms in their respective jurisdictions. CMS EEIG and each of its member firms are separate and legally distinct entities, and no such entity has any authority to bind any other. CMS EEIG and each member firm are liable only for their own acts or omissions and not those of each other. The brand name "CMS" and the term "firm" are used to refer to some or all of the member firms or their offices. Further information can be found at cms.law