

Your World First

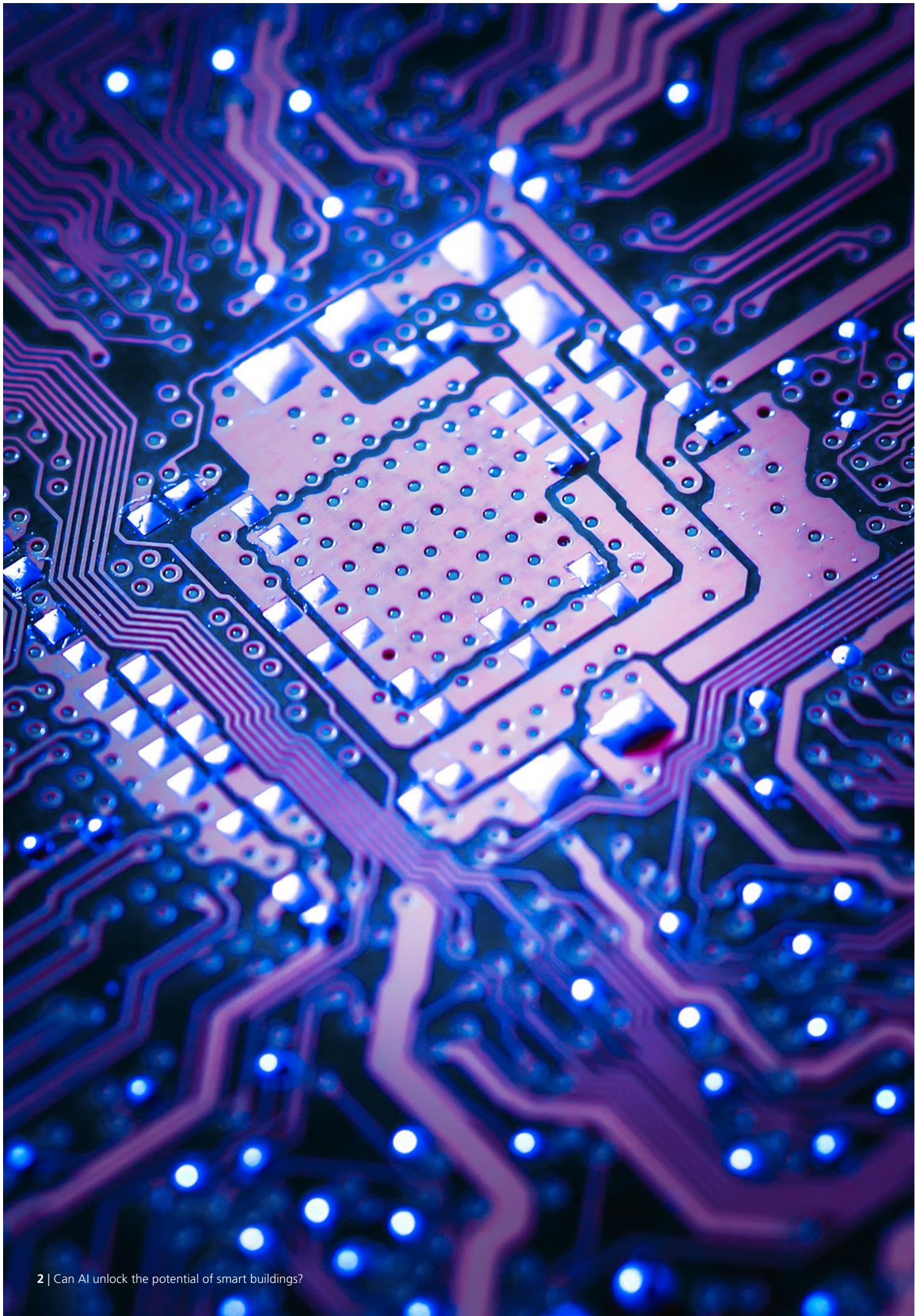


Can AI unlock the potential of smart buildings?

CMS UAE report



Artificial
Intelligence



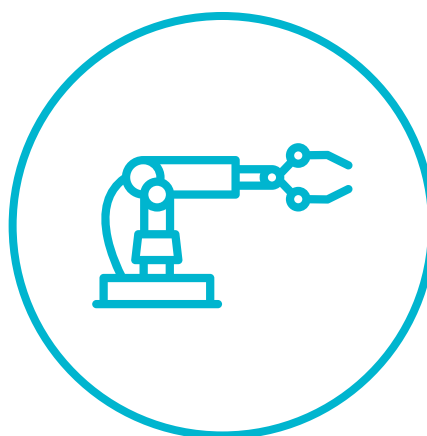
Introduction

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 (the interconnection via the internet of computing devices embedded in everyday objects, enabling them to send and receive data) “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. This is all in line with the UAE smart initiatives that we have increasingly seen over the last five years. 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.



The National Artificial Intelligence Strategy 2031 aims at positioning the UAE as a global leader in artificial intelligence by 2031, and to develop an integrated system that employs artificial intelligence in vital areas in the UAE.

UAE Cabinet, 2019¹

¹ <https://www.gulftoday.ae/news/2019/04/21/uae-cabinet-adopts-national-artificial-intelligence-strategy-2031>

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

IEA, 2016



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 in a retail context, can help shoppers navigate to stores, receive geo-targeted promotions and locate car parking spaces.

CASE STUDY

Case Study: ICD Brookfield Place

Brookfield have been developing and testing technologies across the globe. Whilst it is not entirely clear which technologies will be powered by AI in ICD Brookfield Place in the future, a central integrated technology infrastructure will be built in to ICD Brookfield Place, that will create a centralised technology platform for the building's current and future technologies. The intelligent infrastructure will connect all of the IT networks and systems that are used throughout ICD Brookfield Place and will create an open protocol for those technologies, allowing data to be analysed in a central way.

The SmartTech devices that are built in to the central building network will connect to a central management system, that will track KPIs to allow the pro-active maintenance of issues, to make sure that they are dealt with effectively. The central application will also control the building systems to ensure optimum use of energy and to identify the most cost efficient way of running the building. In the future,

tenants will have the ability to connect to a mobile application in order to control and tailor their working environment, including adjusting the light and comfort levels (within the programmed range). ICD Brookfield Place will implement guidelines around the SmartTech that will be connected to the central building network and will ensure that the network is compatible with new 5-G networks.

Secure remote access via virtual private network will be implemented in order to allow vendors to remotely monitor their specific systems and thereby reducing cybersecurity risks, with each user having a unique single sign on to the VPN network and a sophisticated VPN system, that only allows access when an authorised user requests it and for a particular length of time - reducing the risk of an unauthorised user gaining access to the buildings secure network. In terms of physical security, the cameras built in to ICD Brookfield Place will be run on a smart camera network – cameras will be POE (power over Ethernet) that will provide both communication and power which will result in both PLEX and capex savings.



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.

Smart cities require smart buildings

Reform in the real estate sector is crucial to achieving the Dubai Smart City Initiative and other similar initiatives across the UAE.

Smart Dubai is a government led incentive looking to achieve a smart way of life for the residents and visitors in Dubai.

"Collaborating with private sector and government partners, Smart Dubai is the government office charged with facilitating Dubai's citywide smart transformation, to empower, deliver and promote an efficient, seamless, safe and impactful city experience for residents and visitors. Smart Dubai is committed to a collaborative and agile approach to Dubai's smart city transformation, empowering strategic partnerships with the public and private sector and academia to design and implement services and elevate citywide thought

leadership, in line with its mission to make Dubai the happiest city on earth through technology innovation.²"

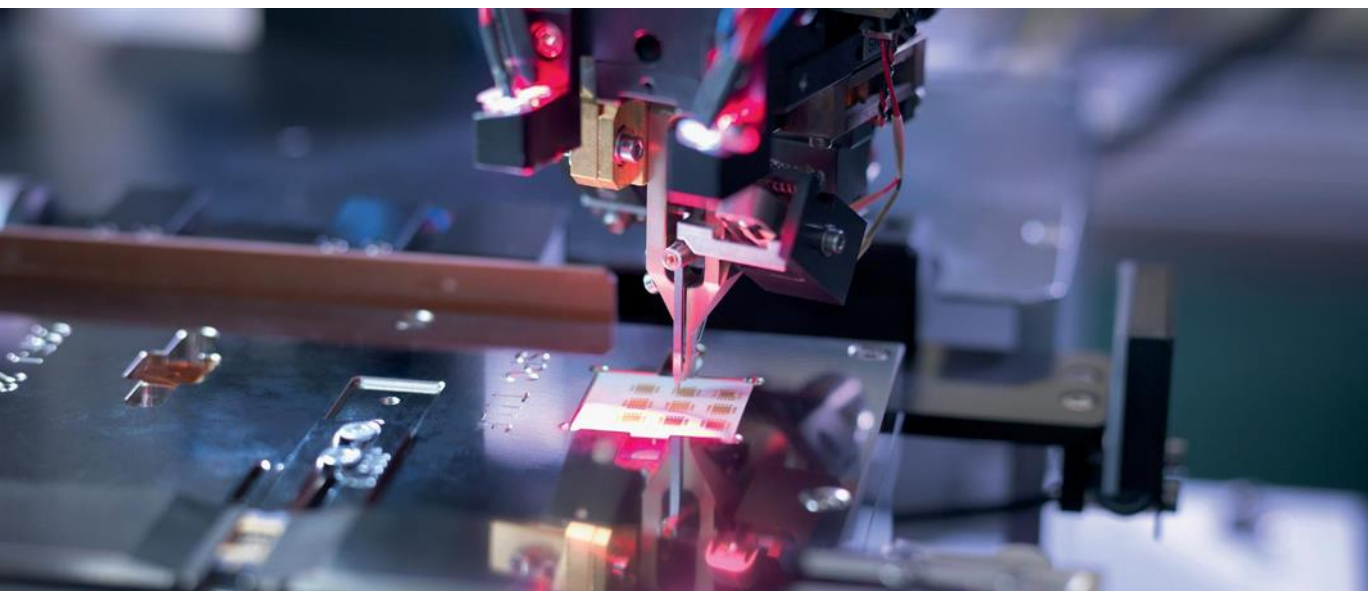
The city's physical infrastructure is the core foundation for other layers of architecture to be built upon in order to create a smart city. Developers will need to create commercial and retail spaces that are flexible and adaptable in a rapidly changing, highly connected world.

Buildings such as One Central in Dubai World Trade Centre and U Bora Tower in Business Bay, are reported to be adopting current technology to align with smart technologies being used elsewhere in the world. ICD Brookfield Place, DIFC, is expected to kick start a new generation of office buildings, incorporating smart technologies that are in line with state of the art smart buildings that have been developed elsewhere in the world.

The first sign of a 'Smart City' in the Emirate is Dubai's Sustainable City; an area that uses technology to create sustainable living for its residents. The city is powered, where enough energy is cultivated, entirely by renewable energy produced by solar panels, and has recycling plants that will recycle water and waste.

It is down to developers and landlords to look at how the existing infrastructure in Dubai can be adapted and new developments designed and built to offer cost effective, environment-friendly, connected buildings.

² <https://www.smartdubai.ae/about-us>



What technology is already being developed in the UAE?

- IoT sensors and cameras - being fitted in and around buildings in order to collect data.
- SmartTech devices – increasingly used in all aspects of people's lives, with a global survey by Altrus Group reporting that 53% of commercial real estate companies have already made investment in to at least one type of property technology firm³.
- AI – already being developed by companies within the UAE, Smart Dubai has teamed up with IMB to launch a AI Lab while major international companies across Aviation, Finance, Hospitality and Energy have all setup AI innovation labs or partnership projects to look at the use of exponential technologies and particularly AI to improve efficiency and transform certain business functions.
- AI is being utilised in the education sector with JESS Dubai introducing the use of CENTURY platform, an AI based platform that personalises a learning pathway for each student allowing teachers to teach all children in a class differently and simultaneously⁴. In addition, Hamdan Bin Mohammed Smart University recently launched a new smart building in Dubai that connects smart systems with AI, such as power and efficiency control, lighting system, cooling and other facilities on campus⁵.
- Blockchain – The Dubai Land Department is driving the transformation in the real estate sector, creating a Blockchain system using a smart and secure database for all real estate contracts. The move to smart contracts will cover lease registrations and link them to utility and telecom accounts, as well as Dubai Electricity and Water Authority ("DEWA") accounts. It is expected that real time sharing of information across the government and private sector could transform the way that property transactions are conducted, with transactions that would have taken 20 days to be concluded, completing in less than 30 minutes⁶.

3 https://www.altusgroup.com/press_release/altus-group-report-reveals-rapid-acceleration-of-prop-tech-adoption-and-rise-of-disintermediation-as-major-trends-impacting-the-commercial-real-estate-industry-in-2019

4 <https://www.jess.sch.ae/news/2018-05-06/JESS-launches-AI-in-the-classroom>

5 <https://www.hbmsu.ac.ae/news/dhahi-khalifa-launches-first-of-its-kind-smart-building>

6 <https://www.khaleejtimes.com/business/real-estate/how-blockchain-simplifies-dubai-real-estate>

Buildings designed for users

The SmartTech that is built in to buildings should be designed and implemented with a focus on user experience, considering the functions of the businesses that will lease or own the premises. How SmartTech could be enhanced by AI in the future can be looked at from a retail, commercial and box space perspective.

Retail

There is no shortage of malls in the UAE and with a slew of new malls currently under construction across the region, and the occupancy rate of units in malls on the decline, there are many questions to be asked, such as (1) how can construction companies and landlords future proof new malls?; (2) where can SmartTech and AI be used?; and (3) what might a mall look like in the future?

Interactive mall applications

From targeted advertisements as you scroll down your social media newsfeed, to suggested new lines when you browse your favourite shop's websites, we are all aware of the use of big data across the retail industry.

An AI driven mall app could create a omni-channel retail experience. Through analysing the personal profile data that each retailer within the mall has about you, from your style, size, price range and previous purchases, alongside the real time stock of a store (using IoT sensors and cameras to track which lines and sizes are available), a mall app could notify you of the products that fit your profile as you walk past the store, including where you can find it in-store.

Click & collect

We could see stores getting smaller and having less products displayed on the shop floor with a bigger click and collect area where shoppers could reserve goods online in their nearest mall and then go to try them on, in a pre-set up changing room, at a chosen time.

This would be an extension of the technology in online applications and on websites, linking it directly to the technology in the building. The AI would constantly analyse in store stock levels and track online activity and reserved items, to keep applications updated with available stock and reserve changing rooms for a user's desired time.

Utilising a platform in this way will help to reduce the use the amount of carbon emissions that are produced through the delivery and returns of goods in addition to a reduction in the use of plastics. The fashion arm of the retail industry is second highest pollutant and with global brands such as Stella McCartney and H&M leading the way in becoming more sustainable and eco-friendly, it would be a good marketing tool for landlords to show that they are doing their part to join the movement.

"The approach to every tenant should always be the same – completely unique"



Designer leasing counters

In the drive to be more green, recycling is an obvious answer. With fashion designer, Flippa K already offering a leasing service⁷, it is anticipated that a similar service could be seen in the UAE soon. Again, this would alter the fit out specifications of a unit, in addition to the amount of space required and length of the lease – tenants may be reluctant to sign a long lease for more space whilst concepts such as this are being trialled. The technology behind such offering would interface directly with existing applications, the AI driven ‘mall app’ and ‘click and collect apps’, to track stock levels and notify you of products that fit your profile. In addition to collating figures to track companies progress in becoming more green.

Pop-up / experimental spaces

Smart buildings are already being fitted with omnipresent IoT sensors that support a network of interconnected devices, allowing the building to collect and analyse a wide range of data. AI systems can process this information, learn from patterns and use it to make decisions for the building.

As sensors and cameras are installed across malls, it will be easier to identify spaces in stores and malls that are not being utilised to their full potential. An AI generated map showing optimum real estate units within a mall could allow the mall to structure rent prices in accordance with the busier areas and look to put pop-up and experimental stores in the quieter areas. Smaller start-up companies that offer greater variety and new innovative brands will attract visitors and shoppers and ensure that all of the space is used to its full potential.

Warehouses / storage units

Whilst there are new innovative ways that AI and SmartTech can be utilised to unlock potential in brick and mortar retail, there is no denying that e-commerce is on the increase. With e-commerce in the region set to be worth \$48billion by 2022, we will also take a look at how AI can be used in warehouses and store units in the region, and what this sector could look like in the future.

Driverless cars

Warehousing units could see infrastructure put in place that allow for driverless cars between units, reducing the need for humans and allowing more efficient AI-powered technology for transporting goods between warehouses.

Warehouse automation

Across the globe we are seeing the e-commerce players investing most heavily in automation. For instance, online food retailer Ocado is reinventing how warehousing should work for grocery logistics and can now pick a 50-item grocery order in under five minutes using robotics in their warehouses. As it stands, this type of installation however is still extremely expensive for an occupier to install. However, as the use of SmartTech and AI develops and systems are more readily available, this could well be seen across the different e-commerce and retail sectors.

⁷ <http://www.witness-this.com/style/sustainable-fashion-by-flippa-k>

E-commerce in the region set to be worth \$48billion by 2022⁸.

The National, AE, 2019

AI to monitor space utilisation

Using IoT sensors, cameras and an AI-powered system could track unused space and notify its users. As WeWork has in the office sector, there is the potential for warehouses to become a part of the sharing economy, with occupiers able to rent pallet space and racking space by the day or the week as and when the demand arises.

Office / commercial space

Air conditioning

The building management system of a smart building not only regulates inside and outside temperature, humidity, carbon dioxide levels, noise levels and light intensity, but also analyses how all of these systems are interacting and is able to pre-empt faults. It will sense when there is a change which could lead to a maintenance issue and alert facilities management. Data is displayed on real time dashboards.

Such a system will have health benefits for occupants through maintaining ambient conditions at all times and will save costs through predictive maintenance and repairs.

Hot desks

Occupants locate free desks and meeting rooms through a central app which collates data from sensors and has wayfinding navigation built in. The smart building can provide periodic reports on overall desk occupancy, facilitating whether fewer or more desks are required and which zones of the building are most popular.

This will optimise space and assist occupants in easily locating a suitable place to work where they have access to their required resource.

Desk area with daylight using sensors

The smart building can inform occupants via an app which zones within the building retain the most natural daylight during the day, allowing them to move to brighter areas if preferred. In areas with no natural daylight, the electric lights follow circadian rhythms.

This could lead to increased productivity gains for occupants, due to the link to daylight exposure.

Chatbot at reception

Upon arrival at reception, visitors are greeted by a chatbot which is able to speak multiple languages. If they have visited before, the chatbot is able to detect this through voice and facial recognition software. The chatbot will know who the visitor met on the previous visit and which drink they chose.

This would lead to cost savings on front-of-house services and improve efficiency, leading to happier clients when they arrive at the meeting. This said, we query whether people would prefer human interaction upon arriving at a building, vis-à-vis being welcomed by a robot.

Coffee point and canteen

The smart building learns each occupant's tastes and regular behaviours. When they swipe in through the entrance gates in the morning their preferred coffee is automatically prepared so it is ready and waiting for them to collect. Hyperlocation technologies such as iBeacons send tailored offers for discounts on occupants' preferred meal choices to their mobile. Healthier options receive greater promotions.

This would save time through automating a users daily routine, reduce food waste, through order anticipation and would have health benefits for occupants. We do however note that such an AI software that is able to not only predict a humans behaviour, but that can also account for a human changing their mind, could be somehow in the future.

Adaptable workspaces

Another common use of AI in smart buildings is smart lighting, which increases the energy efficiency of buildings by using motion sensors that automatically switch-off lighting when areas are not in use. The Edge building in Amsterdam has taken this concept to the next level with over 28,000 sensors detecting motion, light, temperature, humidity and infrared. Using a smartphone app, employees input their light and temperature preferences and the system tracks their location, automatically adjusting the environment as they move around the workspace.

⁸ <https://www.thenational.ae/business/technology/e-commerce-in-the-region-set-to-be-worth-48bn-by-2022-1.745643>



Security

AI is poised to play a significant role in improving occupant safety in commercial office buildings. Advancements in chip architects and facial recognition technology are now making it possible to AI-based video analytics software to be used to manage huge volumes of video data to enhance the safety and security of people in buildings and businesses.

Using AI will make it a lot more difficult for people to commit identity theft, unauthorised entry by an intruder, or the delivery of suspicious packages, many of which go unnoticed using traditional surveillance methods. The inability to effectively identify these kinds of threats inhibits security personnel from taking pre-emptive actions, which are often necessary to prevent public harm.

AI-based security surveillance systems can serve as a virtual security guard with unlimited capacity and endless attention spans capable of monitoring videos 24 hours a day seven days a week.

Machine learning algorithms can be trained and customized for unique environments and circumstances based on inputs such as facial features, detect zones, masks and camera angles.

When machine based AI spots suspicious activity its send alerts for human verification to security personnel, who then review and assess risks and decide the best course of action.

Natural disaster / attack

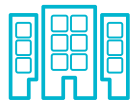
An AI-powered building system could, using data received from sensors and cameras, know exactly where in the building people are, including which areas are at the highest risk. It could be used to instantly warn landlords and tenants of an impending safety concern, whilst in real time, helping the emergency services to identify the specific location of those individuals at high risk.

Environmental drivers

In addition to the business and user experience benefits of using AI and SmartTech, unlocking the potential in Smart Buildings could also assist 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 that needs to address the use of energy and non-renewable materials in the UAE.

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.

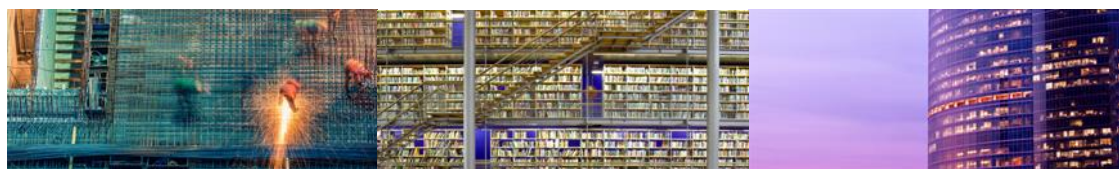
UAE vision 2021 "it is the region's goal to become the eco-friendliest country by the year 2020"



Building design

Design is a key factor influencing the environmental performance of buildings and the construction industry increasingly utilises AI to identify the most efficient building designs. Generative design software allows architects and engineers to input the parameters of a project, including materials, manufacturing methods and cost constraints. The software tests and learns from each iteration of the design to select the most efficient option.

For example, Manitoba Hydro Place in Winnipeg, Canada uses an energy efficient design to reduce its carbon footprint by 70% compared to a similar office building of conventional design. Passive systems, such as south-facing winter gardens, natural daylighting and a solar chimney, take advantage of the environment to reduce energy usage. Active systems, such as computer-controlled natural ventilation, minimise the need for air-conditioning and interact with the design of the building to help maximise its effectiveness.





Energy use

Technologies including AI, IoT and machine learning have helped ENBD REIT to reduce the energy consumption of Al Thuraya Tower 1, more commonly known as Dubai Media City office, by 7%⁹. The technology collects, analyses, and interprets big data, which it then uses to create an “interactive view of a site’s data universe”. This reportedly allows EP&T Global to deliver actionable information for facilities management teams to achieve efficiencies and cost reductions reported to be worth AED250,000 (approx.\$68,058.75, as at 24 April 2019).

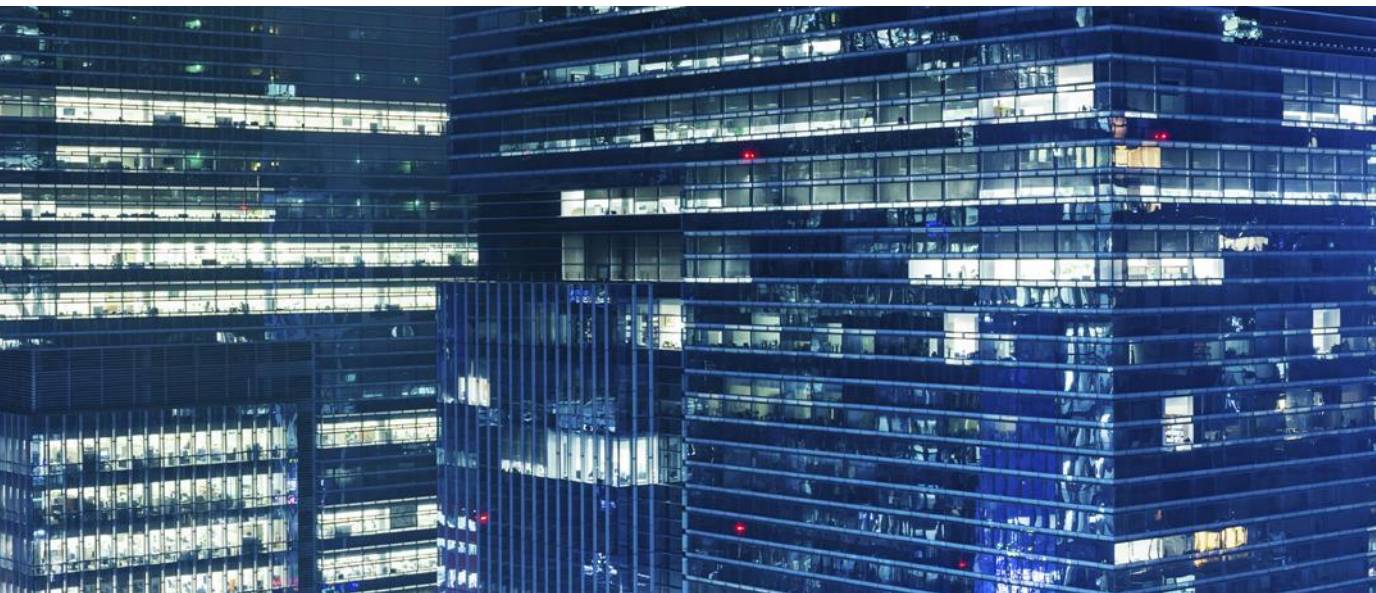
Dubai’s Sustainable City, which has approximately 5,000 solar panels across the complex, produces green energy for more than 500 villas. The clean energy product of the solar panels contributes to the DEWA grid who will then store surplus energy stores to be drawn upon to operate the complex. The villas come equipped with other energy saving solutions such as insulation, solar water heaters and home appliances.

Looking to the future, DEWA has also teamed up with Canada’s Enbala to build the region’s first virtual power plant (VPP), powered by AI, to expand the emirate’s renewable energy integration capabilities¹⁰.

Making mixed energy sources easier to navigate will help DEWA maximise the value of these varied streams by providing grid services such as peak shaving, frequency regulation, and energy balancing. The VPP’s smart network will be made up of solar energy, battery storage, and flexible energy loads. It will aggregate these energy sources to create a single conventional power plant that supplies energy to the emirate’s grid.

In addition, DEWA’s new headquarters, Alsheraa Building located in Al Jadaf, Dubai, will be the largest and tallest net zero energy building in the world. The building will have over 16,500 square meters of photovoltaic solar panels producing over 3,500kWp, there will be over 10,000 square meters of building integrated photovoltaic producing over 1,100 kWp and the total renewable energy generated by the building will be over 7,000 MWh annually. The building will also adapt the latest in energy and smart technologies which is hoped to result in a energy use intensity of less than 70 kWh/m²/year¹¹.

In the future, a more advanced AI system could interpret this real time data, identify trends and make decisions about when to store or sell electricity, and even communicate directly with external electricity suppliers.



9 <https://www.constructionweekonline.com/article-49019-dubai-office-building-implements-iot-and-ai-to-cut-energy-use>

10 <https://www.constructionweekonline.com/projects-tenders/180818-dubai-dewa-canada-enaba-to-build-ai-tech-enabled-virtualpower-plant>

11 <https://www.dewa.gov.ae/en/about-dewa/news-and-media/press-and-news/latest-news/2016/11/dewas-new-headquarters-in-aljadaf>



Temperature control

AI energy management platforms can be used in smart buildings to adjust temperatures using predictive energy optimisation. These systems interpret data on the building's characteristics and historical usage, and respond by precooling or preheating a building without any human intervention. Among other factors, the technology can identify how human activity, the weather and heat from electrical equipment can affect the building's temperature and will make temperature adjustments accordingly. Dubai is set to use AI technology to cool 90 Dubai buildings in Q4 2019, where the world's first cooling technology powered by AI will be used to cool buildings in Dubai's Jumeirah Village area. The 50,000 refrigeration tons plant will use AI to monitor and adjust the flow of chilled water. The facility will then use thermal energy storage technology and serve 90 buildings once operational¹².



Water supply

Smart buildings can also use AI systems to manage water supply. DEWA is reported to be the first public utility provider in the world to be in strategic partnership with Berkeley AI Research Lab in order to learn about the latest research and developments in renewable energy, water, automation, AI and accelerators¹³.

UAE company Veragon has also developed technology to "simply and sustainably transform water vapour in to pure mineral water"¹⁴.

¹² <https://www.constructionweekonline.com/article-50566-ai-technology-to-cool-90-dubai-buildings-soon>

¹³ <https://www.dewa.gov.ae/en/about-dewa/news-and-media/press-and-news/latest-news/2018/09/dewa-1st-public-utility-in-the-world>

¹⁴ <http://veragon.com/about-us/>





Connectivity / Integration

5G

One of the identified global “blockers” for the development of AI and the implementation of truly Smart Cities is the issue of connectivity – namely the worry that the mobile connectivity will not be powerful enough to process the flow of required data fast enough to fully take advantage of the capabilities of both AI and the integrated Smart City technologies.

Fortunately, 5G roll out in the UAE is at an advanced stage with UAE-based telecom providers set to launch 5G networks as early as late 2019. 5G connected technologies will help deliver the required capacity and increased connectivity to end users.

While providing the ability to access applications from “any platform, anytime, anywhere”, the improved broadband infrastructure will also shape the environment for the growing adoption of IoT and integrated smart city platforms, enabling them to become a way of life for many end users.

Resultantly, developers of real estate should ensure that any new, or existing buildings have the capacity to become a 5G site so that they can utilise this new technology to its full potential.

“Internet revolution started with connecting people and now it also includes connecting almost anything from devices to other things we see around us. We intend to additionally connect various city resources and infrastructures (e.g. water, energy, sewage, drainage, waste distribution networks, buildings, etc) to Internet for sensing several aspects in real time.¹⁵”

Smart Dubai 2021

¹⁵ <https://2021.smartdubai.ae/smart-living>

Can the data hurdle be overcome?

For many companies and developers around the globe, gathering actionable data is a crunch point. For AI to act as the brains behind smart technology, data needs to be analysed. This involves capturing data on both (a) buildings energy use, and also (b) around a person's use of a building. For a smart city, the data around individuals end-to-end user journeys throughout the day will also need to be collected through IoT inputs and interaction and subsequently stored and analysed.

Type of data

A lot of the data collected for the purposes of developing and using AI is either not personal information, or will likely not be deemed "personal information" (where data protection regulations are in force) as the data is aggregated / anonymous data. This said, in order to create a truly 'Smart' city and to connect all aspects of people's lives, AI systems will need to analyse and consider personal information. Where this is the case, the relevant data controller will likely need to ensure that either (1) the person has consented for their data to be used, for the purpose of developing AI; or (2) ensure there is a legitimate interest for processing and using that individual's personal information.

Consent could be achieved through a pop-up where an app is being used, or in employment contracts, and the legitimate interest rationale could be used for many of the reasons given above. This said, given the amount of testing and development needed to create effective and trusted AI systems in buildings, we are not sure how many companies will be willing to share their users personal data with AI machines, just yet...

A number of the retail and commercial examples discussed can be developed with aggregated anonymous data and will still enhance a user's experience and improve the sustainability of buildings. During the experimental phases, developers should be working with tenants to

determine what SmartTech would best benefit their business, employees and clients / customers and should ensure that SmartTech, and IoT sensors and cameras are fit, to allow developers and operators to collect useful (anonymous / aggregated) data that can be used to develop AI within the boundaries of the current legal and ethical data boundaries.

Dubai Data Law

Both developers and businesses looking at deploying AI solutions should remain astutely aware of the current legislative environment around data use in the UAE. The Dubai Data Law ("**Law**") continues to to impact on the use and deployment of data dependent AI solutions in two specific ways: first of all the development of an 'open data' landscape can help organisations garner valuable data needed to develop their particular solution, secondly if identified as a 'data provider' a number of obligations may be triggered for your organisation to collect certain types of data as listed under the Law ("**Dubai Data**"), store it, share it and/or publish it.

Dubai Data will not include personal data and could be an effective way of collating information around the use of buildings, for the purpose of developing AI solutions.

This said, the criteria for the selection of such private sector data providers has not yet been made available.

The Law does indicate that there will be limits placed upon the publication or exchange of Dubai Data as either open data or shared data. These will include a requirement on data providers to not breach rules of data privacy and intellectual property rights. Just how the Law will interact with these rules and rights however remains to be seen, particularly as the UAE and the Emirate of Dubai do not have data protection laws per se (although there are privacy laws in various legislations, and there is a Data Protection Act and Regulation in the DIFC, one of the free zones specifically mentioned in the Dubai Data Law).

The Dubai Data Law also indicates that a number of policies will be published, including policies relating to the protection of data providers' confidential data, intellectual property rights, classification of information, use and re-use of information and technical standards for information systems and networks as well as information cyber-security.

Storing data – Cloud Services Outsourcing Regulation

During the development of AI, data will need to be collected and stored. This will most likely be facilitated using electronic storage, through cloud solutions.

Currently, the legislative environment both within the UAE and across MENA is trending towards the localisation of data, namely the requirement for organisations utilising cloud or third party data solutions to ensure certain types of data are stored on-shore in the relevant jurisdiction in which they were collected. Specific examples of this movement towards data localisation can be seen in the Digital Payments Regulation and the proposed Central Bank Outsourcing Regulations, as well as specific laws in the Kingdom of Saudi Arabia ("KSA") governing the use of Cloud Computing. This legislation requires certain categories of data to be retained onshore within the UAE/KSA, and for banks/service companies and anyone providing certain financial/cloud services, to obtain certain categories of licence from designated regulatory bodies (Central Bank/CITC in KSA) to operate or even use these types of service.

Developers and organisations in certain industries looking to utilise AI in tandem with cloud solutions will therefore have to remain aware of the regulatory landscape governing the type of data they wish to collect and utilise and

deploy solutions and relevant data centre architecture appropriate to these regulatory requirements.

Collaboration and IP

Whilst this is all extremely positive for the UAE, there are still a number of questions around data protection and IP that need to be addressed before we can learn enough about the real potential of AI in our buildings.

One of the key factors to success is collaboration across the sector, with companies sharing developments and being more open. 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 AI and smart technology to be realised.

Collaboration could take a number of forms and could be done through a commercially incentivised model, utilising Dubai Data, an industry consortium type arrangement, or a combination thereof. However in order to achieve collaboration and encourage technological advancements across the sector, the impact on traditional IP rights need to be considered.

Although traditional IP protection methods can, to an extent, be utilised to protect AI, such protections are limited and are not suitable in all scenarios. In the UAE, as with other jurisdictions, the current IP laws are not well suited to deal with the ownership of assets created by AI technology.

In regard to smart buildings more specifically, the main issue for the relevant stakeholders is likely to be which party owns the IP in the AI tools that are being used in the buildings. Whilst the logical assumption is that the IP will vest with the developer of the AI tool (as the creator of the tool), what happens when the AI tool continues to mature and develop through the use of the data provided by the users of the building, i.e. the tenants/tenant companies. At what stage should the landlords, developers and any other relevant stakeholders have rights in the AI tool which has developed into its increased capacity form as a result of the data provided by such stakeholders? There is also the issue of protecting the initial AI algorithm as, even if a party obtains IP protection, for example, by way of a patent, as a result of its use and machine learning capabilities, even the algorithm that was protected at the outset will

have changed significantly from what was patented at the outset.

The current IP laws and systems in the UAE do not offer any answers to the issues related to AI and IP ownership. This has led to an interesting debate as to how existing IP laws and regulations can be adapted to provide a framework for ownership of IP rights in AI tools. In the meantime, there is a requirement to find the most sensible and pragmatic approach. In the context of smart buildings, where there are various stakeholders, ownership of the IP will most likely be dealt with contractually. One commercial solution which may help in such a scenario is where the AI developer retains the rights in the AI tool and, in return for providing the data required to augment the tool, the parties that provide such data are provided with clean data sets by the AI tool developer. This “clean” data can then be commercialised separately.

Across the real estate sector, extensive data will need to be collected from buildings in order for the AI technology to be developed. Utilising data collected under the Dubai Data Law there

is the chance that the Dubai government will team up with an AI provider to develop AI for buildings, using data provided by data providers, including the landlords and operators of commercial buildings. Alternatively, and in order to achieve more customised results, sector specific landlords and operators could work together with a AI provider, feeding in the data derived from the SmartTech and IoT devices, installed throughout their buildings, in order to develop AI technologies.

During the development stages and in the first instance we do not foresee this data being anything more than aggregated, general data that does not include any data that can identify specific individuals.

From a technical standpoint landlords / operators would need to ensure that data is being provided to the AI provider in a readable data format that the program can process. There is a vast range of SmartTech providers that use different platforms, a number of which do not directly interface with each other.



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. In Dubai there seems to be a shift in the way that businesses want to lease office space and this is evidenced by the anticipated changes to the one visa for every nine square meters of office space rule. With this in mind, landlords and developers need to think ahead on how to manage this change in the rental landscape.

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 and/or reduce the amount of space they lease.

Given an increased demand for flexible workspaces, landlords may also need to look at their fit out clauses and who is responsible for fit-out and providing services, such as DEWA to the unit.

Within the retail sector, a rise in presence of pop-up and experimental stores will require landlords to deviate from the traditional lease structure to make way for a more temporary lease, including considering provisions around fit out and the services that are connected to the unit. In a situation where a unit may be used as more of a 'click and collect', personal shopper experience, as opposed to a traditional shop, again landlords will need to factor in the SmartTechnology that the tenant wants to be provided as a 'service' under the lease and consider the provisions for collecting and using data to develop AI technology.

As discussed above, the introduction of sharing space and temporary lease terms could be increasingly used within the warehouse sector.

This will again see leases evolve to introduce shorter terms, fixed rent and service charge provisions and to look at alternative sub-leasing provisions that do not require a landlords consent whenever a short term sub-lease arrangement is entered in to.

Sustainability has become an important factor in the form of leases with companies striving to reduce their global carbon footprint and aiming to become more "green". As discussed, AI can assist greatly in this mission and is a great marketing tool to use with big corporate companies looking to purchase real estate in the UAE.

The technology offerings of properties matched to the needs of tenants are increasingly featuring in leases and will continue to do so as the products of Smart incentives across the region continue to unfold. Electronic communication 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.

Seeing the bigger picture

In the future, as Smart Dubai and similar initiatives across the UAE progress, the spotlight will *shine more intensely on smart buildings*. As Dubai looks to “facilitate a citywide smart transformation to empower, deliver and promote an efficient, seamless, safe and impactful city experience for residents and visitors¹⁶” (SmartDubai) developers need to get one step ahead.

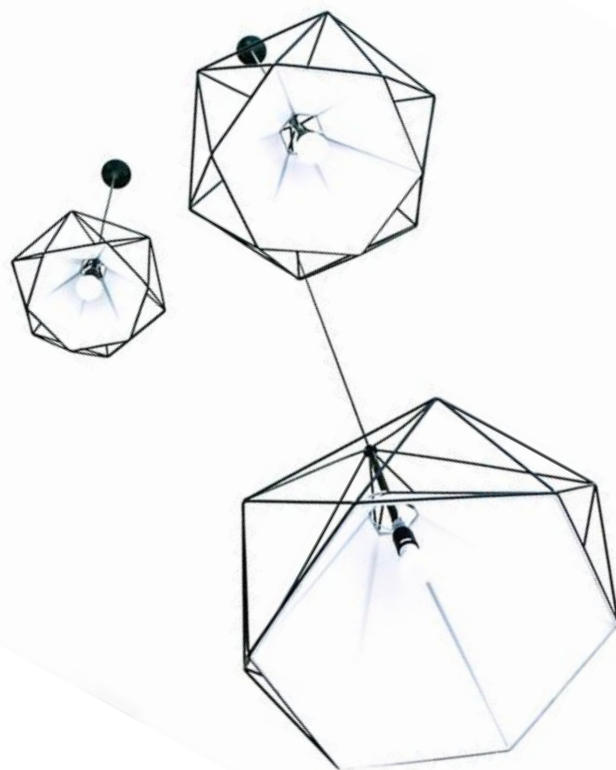
As discussed above, developers in the region are starting to realise the potential of smart technologies and the energy benefits that can be derived from utilising them. Once AI is developed further and utilised by the developers leading the way in SmartBuildings, it will provide more certainty around (1) what AI can offer; (2) how landlords can work with the occupants of buildings to ascertain how AI powered SmartTech can make a difference to both the tenants business and the overall global footprint of the building.

For smart cities to become a reality, the acceptance of AI powered SmartTech and IoT, 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. This is where the development of the 5G network will come in to its own, allowing faster and better connections than we are currently able to access; and ensuring a reliable infrastructure to connect buildings to all other aspects of its users’ lives and businesses.

If developers, landlords and operators of buildings work together to collate anonymised / aggregated data in order to develop AI in the first instance, the results will be more tailored, and connectivity between buildings will be an easier task in the future.

As AI advances and more working systems are implemented in to commercial buildings, the focus will turn to the end user, and not just when the user walks in the door – when they wake up, incorporating their entire end to end journey. Collaboration with other sectors including government, healthcare, education and energy is also key.



¹⁶ <https://www.smartdubai.ae/about-us>

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