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Quantifying technology in real estate

August 2024 | Tech trends reshaping real estate dynamics | knightframk.com/research

Instant insights

What?

What is generative AI?

Generative AI is a type of artificial intelligence that can create new content, by learning from existing data. Generative AI systems use techniques such as machine learning to produce outputs that can mimic human-like creativity and decision making.

What are the power implications of AI for data centres?

The growing popularity of cloud-based servers - as opposed to on-site servers - to support AI products presents a challenge for data centres. Chips and CPUs optimised for AI use 2-3x more power than standard infrastructure.

What are the key trends in the gaming industry influencing real estate?

Factors include the rise of electronic sports (esports), immersive experiences, and gaming cafes; the need for specialist space; fluctuating headcount requirements; and evolving employee and client needs.

What new sub-sectors are emerging due to the convergence of technology and life sciences?

AI-powered drug discovery is a prominent new sub-sector, attracting significant VC investment and driving demand for high-quality spaces in tech-centric cities.

Why?

Why is AI crucial in today's real estate market?

AI enables the fast processing of vast quantities of data, improving insights and decision making in real estate. By 2030, AI innovations could generate the UK over £400 billion in economic value and increase UK GDP by more than 10%.

Why is technological integration affecting real estate in the gaming industry?

Investments in robust technology infrastructure are crucial to support high-performance gaming operations, including advanced connectivity and power supply.

Why are investments in data centre markets rising?

Increased demand for digital data storage and AI capabilities is driving higher investment in data centres, with significant capital directed towards accommodating the digital economy's growing needs.

Why is investment in technology crucial for real estate owners?

Investing in technology is essential not only for regulatory compliance and achieving sustainability goals, but also for increasing real estate value through enhanced energy efficiency and reduced emissions.

When & how?

When will AI's impact on productivity become noticeable?

Significant productivity enhancements from AI are already being realised and will continue to escalate as technology evolves. AI use is projected to save the average worker over 100 hours annually.

How are regulatory changes influencing technology adoption in buildings?

Updates to regulations such as the European Performance of Building Directive (EPBD) push for greater use of digital technologies in building analysis, simulation, and management.

How does technology facilitate real estate decarbonisation?

Advanced technologies like solar PV, EV chargers, and smart metering systems enable the real estate industry to significantly reduce emissions and enhance energy management.

How is lab design changing due to tech convergence?

Lab spaces are being redesigned to accommodate advanced technologies like AI and robotics, requiring more flexible layouts, enhanced power and connectivity, and sophisticated thermal management systems.

Artificial intelligence (AI)

Artificial intelligence (AI): computer systems that can perform tasks typically requiring human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Generative AI specifically focuses on creating new content, ranging from text to images and music, by learning from existing data and generating outputs that resemble human-like creativity.

£400bn

Estimated boost to economic value from AI-powered innovation in the UK by 2030

40%

Of corporate IT expenditure anticipated to be directed towards AI-related projects by 2025

100 hrs

Will be saved a year by AI-driven data processing capabilities, according to Google

Are you ready for AI?

Artificial intelligence has an incredibly broad role to play in the world of commercial real estate

AUTHOR
WILLIAM MATTHEWS

Writing in Knight Frank's latest Wealth Report, Ian McGuinness, Head of Research Analytics, puts it neatly: "Success in real estate has always been about information. That's why it's so exciting that we are at the beginning of a revolution in artificial intelligence (AI) – one that will enable us to make sense of quantities of information that would have seemed impossible only a few years ago." Indeed, our expanding AI-driven data processing capabilities will result in the largest improvement to productivity since the arrival of the internet, saving the average worker more than 100 hours a year, according to Google. In the UK alone, the company estimates that AI-powered innovation is expected to create more than £400 billion in economic value by 2030. GDP is expected to be more than 10% higher over the same period than it otherwise would have been, according to PwC.

DRIVING A RETAIL RENAISSANCE?

One sector poised to benefit from greater AI adoption is retail. As Emma Barnstable explains in recent research: "The theory goes that by augmenting AI with its human workforce, productivity and efficiency improvements will drive profitability. For instance, self-service checkouts enabling one staff member to handle multiple transactions at once, reducing staffing costs. With AI technologies capable of optimising both operators' "back end" (automated warehouses) and "front end" (customer service chatbots), the accrual of even small implementations across retailers' value chain could lead to major gains. All basic retail disciplines can be revisited using AI technologies, such as what to stock, how much and when".

CENTRES OF EXCELLENCE

The UK is an established world leader in the AI space, and as Jennifer Townsend notes, AI-focused employment clusters have sprung up across the UK.

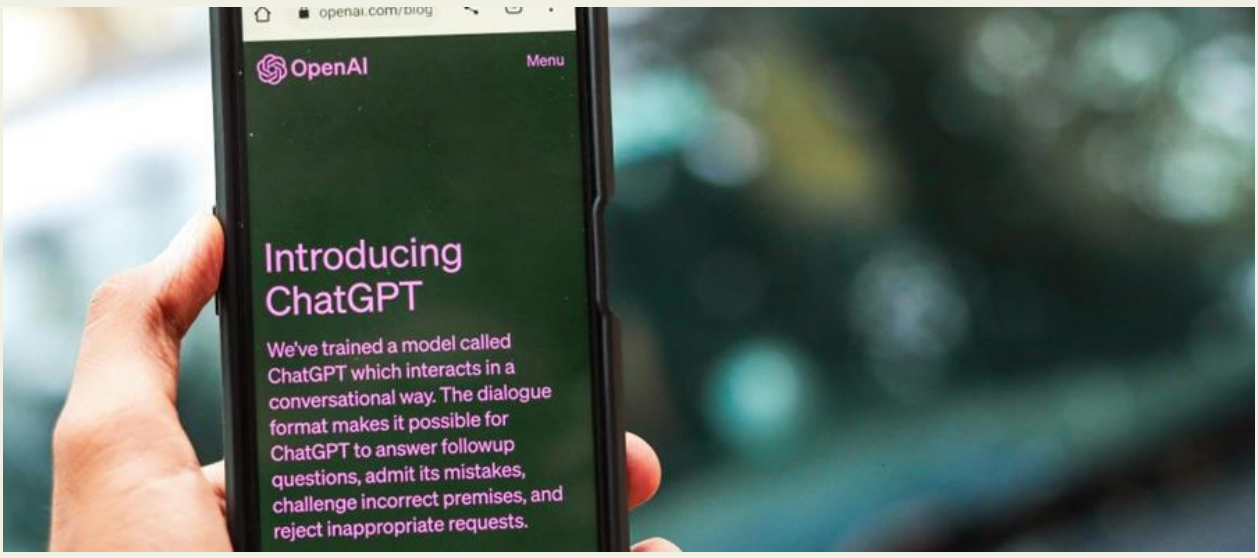
AI companies can have some very specific real estate needs. Firstly, flexibility is key, given that 80% of companies are either SMEs and/or at seed, start-up, or scale-up stage. Proximity to talent and like-minded companies in a collaborative ecosystem is also high on the checklist, as well as buildings and neighbourhoods that provide an exemplar employee experience.

Generative AI workloads can consume a significant amount of power, making access to sufficient energy resources a major consideration.

AI'S ROLE IN ESG

While generative AI is undoubtedly a significant consumer of energy, it also opens up possibilities to address ESG challenges in new and innovative ways.

Flora Harley identifies several important use cases for AI in ESG. First and foremost, the ability to monitor and optimise building use could lead to notable reductions in emissions. AI can also help in various different aspects of measurement. This is important not only to ensure that buildings can achieve the accreditations they warrant, but also to address trickier questions on topics such as the 'social' aspects of ESG.



MARKET VIEW

Artificial intelligence, arrived just in time?

AUTHOR
MAX BEARD

Without wanting to sound like a Simon Sinek tribute act, with all new technological advancements, it is often most important to explore the why - why is it important to us? (Sinek wrote a great book 'Start with Why'.) We look to explore why AI has such large potential at a time when global productivity is dwindling.

It is not often that technological advancements arrive at a time when they are most sought after. Could AI save the day and lift us from this productivity slump?

Generative AI has emerged at a pivotal moment, offering solutions to the global productivity crisis that has been worsening for decades. In the late 1980s and early 1990s, deregulation provided a temporary boost to business & productivity by reducing governmental constraints and encouraging market competition. This period was followed by a wave of labour arbitrage opportunities from the mid-1990s to the mid-2000s, where companies tapped into cheaper global labour markets to maintain productivity levels and cost efficiency. From 2008 onwards, low interest rates became a metaphorical crutch, enabling businesses to grow despite stagnant productivity. However, these strategies have now reached their limits, underscoring the need for a fresh approach.

Enter generative AI, a technological advancement that not only arrives when it is desperately needed but is also available to the masses. This cutting-edge technology leverages advanced algorithms to perform tasks that traditionally require significant human effort and time. In the property sector, generative AI can revolutionise various aspects of the industry, from generalist ideation, architectural design and urban planning to market analysis and client engagement.

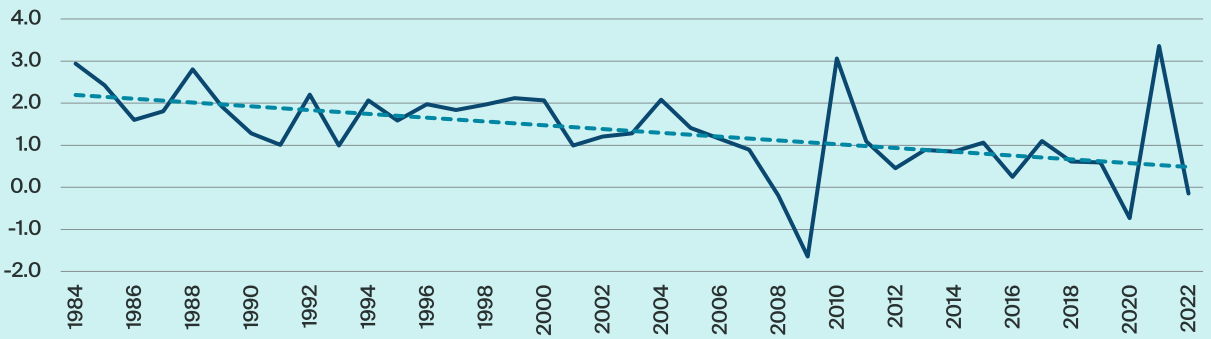
Generative AI excels in creating complex models and simulations rapidly, generating content and enabling more efficient behaviours. This reduces the time and costs associated with traditional processes, allowing for quicker project completions and more innovative solutions.

Additionally, generative AI's ability to analyse vast amounts of data in real-time offers property professionals and investors alike precise market insights, hypothetically aiding them to make more informed decisions and anticipate market trends.

The timing of generative AI's readiness for mass use couldn't be more opportune. As businesses face the diminishing returns of previous productivity strategies, generative AI provides a new avenue for growth and efficiency. Its ability to augment human creativity, optimise operations, and generate actionable insights positions it as a key driver in overcoming the current productivity slump.

In conclusion, generative AI's arrival is a timely boon for the global productivity crisis. By transforming the property sector and beyond, it offers sustainable, long-term solutions that previous strategies failed to deliver. This technological advancement not only addresses immediate productivity challenges but also sets the stage for future economic resilience and growth.

Labour productivity per hour, G7 countries
Constant prices, % annual growth



Source: OECD/Knight Frank Research

Digital consumption

Digital consumption: the use of digital media and technologies by individuals or organisations to consume information, entertainment, or services via devices such as smartphones, computers, and tablets. Encompassing activities such as streaming TV and music, engaging with social media, downloading apps, gaming and accessing online content.

$300bn

The global gaming market is projected to exceed $300bn by 2030

£7.82bn

Value of the UK video games consumer market in 2023, a 4.4% increase on 2022

140%

Revenues from UK games events has jumped 140% year-on-year

The gaming sector reloads

Despite some recent negative headlines, the growth trajectory of the global gaming market remains upward - having the right real estate strategy is critical for success

AUTHOR
JENNIFER TOWNSEND

The gaming industry experienced substantial growth during the COVID-19 pandemic, fuelled by surging consumer demand. Novel gameplay and distribution models, robust fundraising, mergers and acquisitions further propelled this expansion. 2023 certainly witnessed great successes, including Microsoft's Activision Blizzard acquisition and the launch of blockbuster movies inspired by popular gaming franchises, highlighting the sector's widespread cultural impact. However, the year also saw over 10,000 staff layoffs due to changes in business strategies, decreased funding, rising expenses, consolidation, intensified competition, and an adjustment to more sustainable growth rates.

Despite these negative headlines, the growth trajectory for the global gaming sector remains upward. The global gaming market is still poised for significant growth, projected to exceed $300bn by 2030. Additionally, 91% of industry executives expect global gaming revenues to increase this year. In the UK, employment in the sector is also set to rise, with 73% of respondents to TIGA's business opinion survey planning to expand their workforce in 2024.

Recent financial reports, employment data, and corporate moves illustrate this more positive sentiment. Disney invested $1.5bn in Epic Games, aiming to merge Disney and Fortnite communities into a new gaming and entertainment universe. Jagex was acquired by CVC Capital Partners for £900m. Announced global redundancies decreased in Q2, and the UK Games Jobs Tracker shows a modest 1% increase in available jobs in the UK games industry. Ukie's recent valuation report revealed that the UK video games consumer market was worth £7.82bn in 2023, a 4.4% increase from 2022. So, there are clear reasons to be optimistic about the future. Reasons that serve to endorse the growth trends have been identified in our recent Gaming Report.

Companies are transforming, as evidenced by investments in generative AI by Square Enix and Keyword Studios. Media and gaming convergence is evident, with Netflix enhancing its gaming streaming service and Nintendo confirming a new Super Mario Bros. film for 2026.

Moreover, opportunities are emerging beyond those noted in our report. Examples include software-as-a-service (SaaS) tools designed for game developers, gaming offerings for older generations and increased investment interest from private equity firms.

IMPACT ON REAL ESTATE

Real estate strategies must evolve as this dynamic sector navigates market shifts and seizes emerging opportunities. Gaming occupiers must nimbly realign their real estate to meet evolving business needs by pursuing strategies such as space utilisation assessments, asset reviews and disposals, and implementing flexible, scalable solutions. Offshoring continues to rise up the agenda.

Occupiers will continue to consider multiple factors when deciding on the optimal location, including the ability to attract and retain talent, proximity to industry clusters fostering synergies, nearness to academia, availability of local incentives, robust fibre connectivity, low latency, and reliable power supply to support operations. Proximity to data centre services, whether in-built or via a third-party provider, will also be a principal consideration when choosing a site. Buildings must deliver additional robust technology infrastructure to ensure sustained operations.

Greater emphasis will be placed on user experience through thoughtful design and enhanced amenity provision. This drives productivity, employee wellbeing and talent attraction/retention. Examples include offering a variety of workspaces to suit the diverse needs of end-users. Programmers, for example, require acoustically engineered spaces, ergonomic seating, height-adjustable desks, and appropriate lighting. Given that their work is very focused, they also require areas to unplug and disconnect. Collaborative areas are critical for the flow of ideas, and specialist spaces like motion capture studios enable the development of the best games.

Given the sector's creativity, there is an emphasis on bold, playful, immersive environments that reflect brand and culture and inspire. Examples include event spaces for employees and visitors to play the games being produced and explore new technologies.

It should also be noted that while we have focused on office/studio space, the sector has other potential real estate needs, such as esports facilities and gaming cafes. Indeed, revenue from UK games events has jumped some 140% year-on-year.

As the gaming industry navigates market shifts and capitalises on emerging opportunities, a robust and adaptive real estate strategy is essential to support growth and transformation, attract and retain top talent, maximise productivity and efficiency and ultimately deliver the best product and service.

Data centres

Data centre: a specialised facility designed to house a large volume of computer servers and related hardware, designed to store, process, and distribute large amounts of data. The backbone of digital infrastructure, supporting cloud services, big data analytics, artificial intelligence, and various other critical computing needs for businesses and organisations.

1.5x

In 2024 alone, the world is expected to generate 1.5 times the amount of digital data than it did just two years ago

40%

Google's implementation of AI in its data centres reduced cooling costs by 40%

<9%

UK data centre market vacancy rates below 9% as of Q2 2024

Data centres: the backbone of tech growth

AUTHORS
DARREN MANSFIELD & HARRY HANNAM

THE DIGITAL DATA SURGE

Data centres are the critical infrastructure of the digital economy. In 2024 alone, the world is expected to generate 1.5 times the amount of digital data than it did just two years ago (KKR). Demand for data centre services accordingly continues to rise, fuelled by the migration of data from on-site servers into the cloud and in support of new products such as artificial intelligence (AI).

The growth of AI, in particular, is set to change the data centre landscape. The AI market is projected to reach US$1.7tn by 2030, according to Grand Research View. As this technology continues to revolutionise numerous industries, the AI market is expected to grow 36.6% annually between 2023 and 2030 (Grand View Research).

CHIPS, COOLING & CPUs

The challenge for data centres, however, is that the chips and central processing units optimised for AI use two to three times more power than standard infrastructure (Infrastructure Investor), meaning that cooling requirements are far higher. Initial research from Goldman Sachs estimates that a request utilising ChatGPT requires 10 times more power than a Google search. The anticipated Google AI search application may double or triple this number again.

This surge in adoption of AI-powered solutions will undoubtedly require greater investment and infrastructure. The training and implementation of generative AI models is expected to cost $76 billion by 2028 (Forbes), more than double the annual cost of Amazon Web Services, the world's largest public cloud provider.

IMPLEMENTING AI IN DCs

AI isn't just a source of demand for data centres. The technology is being used within data centre operations to create greater efficiency, for example in cooling hardware, meaning providers can cut costs and reduce waste energy.

Google's AI implementation has reduced its cooling costs by 40% (Google Deep Mind). Equinix uses an AI-based cooling solution to increase energy efficiency, most notably in its Frankfurt 'FR6' data centre, where it has seen a 900MWh, or 9%, reduction in its annual energy consumption. The software models the operating characteristics of the cooling system using telemetry data to create a 'digital twin', which is then used to dynamically calculate optimum operating strategies in real time.

AI is also being used to bolster data centre security through anomaly detection by monitoring network traffic, accessing logs and system behaviour (Digital Realty). This allows data centres to predict threats and vulnerabilities.

Whilst AI is in its infancy and brings with it an increase in power usage, it can also help to reduce IT infrastructure inefficiencies. Predictive analytics can aid operators in streamlining power allocation and rack space. In turn, these more data-driven decisions lower operational costs and improve power usage effectiveness.

UK MARKET PERSPECTIVE

The UK has seen over £750 million invested its data centre market during the first two quarters of 2024, over five-times the volume invested during the same period in 2023.

A key transaction has been Blackstone's £110 million purchase of the former BritishVolt site in Northumberland, plans for which involve the development of a £10 billion AI-focussed data centre campus. Alongside this, Microsoft has announced its plans for a £2.5 billion data centre development to expand its AI infrastructure in the region.

GLOBAL MARKET PERSPECTIVE

The widespread emergence of AI sent shock waves through the global data centre market, with record absorption rates being reported in the US, with Europe and Asia expected to follow. Early indications are that markets such as Johor, Mumbai, and Jakarta will benefit from the proliferation of AI due to the cheaper cost of land and power. Cloud adoption is surging in the Asia-Pacific region, driving demand for data centre services.

Sustainability tech revolution

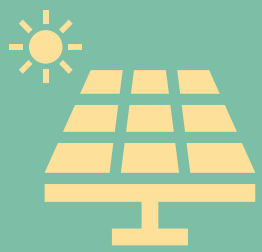
Sustainability tech revolution in real estate: the integration of advanced technologies which enhance the environmental performance and efficiency of real estate. Encompassing innovations such as smart building systems, energy-efficient materials, and IoT solutions, all designed to reduce carbon footprints, lower operational costs, and promote sustainable urban development.

300,000

the number of EV chargers the UK Government is targetting by 2030

7 in 10

European property investors require energy usage data prior to acquisition



48%

of UHNWIs seek renewable power sources when considering commercial property acquisitions

Tech-driven decarbonisation

How technological solutions can help address the decarbonisation challenge

AUTHOR
FLORA HARLEY

TECHNOLOGY A CRITICAL LEVER FOR DECARBONISATION

With the built environment accounting for approximately 40% of emissions, the sector faces a monumental challenge in decarbonising, with technology providing a critical level in achieving this goal. The provision of technology, including solar photovoltaic (PV) panels, electric vehicle (EV) chargers, metering, and data collection systems for energy and water consumption, holds the potential to directly impact real estate value through ancillary income generation and enhanced liquidity. Indirectly, these technologies contribute to green certifications such as BREEAM and compliance with EU Taxonomy requirements, which are mandated by 42% of property investors. Furthermore, regulatory standards increasingly emphasise the role of technology.

ESSENTIAL FOR ENERGY REDUCTION & OPTIMISATION

A key focus and value driver for real estate is the energy intensity or energy demand of buildings. Legislation, regulation, certifications, and investor demands are shifting towards actual energy intensity usage (EIU) rather than modelled data. Our survey conducted in summer 2023 found that seven in ten pan-European property investors, representing approximately £300 billion in assets under management, require energy usage data prior to acquisition. Technology plays a crucial role in more efficient systems as well as the ability to monitor and optimise energy consumption. Building Information modelling and digital twin technology are increasingly utilised for analysing cost-effective measures during new construction or refurbishment.

On-site energy generation, such as the installation of PV, is a requisite for achieving net zero or the highest sustainability criteria, including additional credits for BREEAM. In addition, PV and on-site renewable generation present significant income opportunities, reduce energy cost variability, and enhance liquidity for tenants and investors. For instance, 48% of ultra-high-net-worth individuals (UHNWIs) seek renewable power sources on buildings for investment purposes.

FLEXIBILITY & TRANSPORT

The updated European Performance of Building Directive (EPBD), enacted in 2024, includes several technology-related stipulations. Member States are encouraged to promote the use of digital technologies for building analysis, simulation, and management, particularly concerning deep renovations. Future requirements are anticipated for building energy management and flexibility to facilitate broader electricity management.

Establishing a network of EV chargers is conducive to these goals, as they not only support carbon-friendly transport options, but also provide battery storage for renewable power generation, thereby smoothing consumption and enhancing flexibility. In addition, EV chargers can provide ancillary income opportunities through agreements with charge point operators and enhance the attractiveness of a property for occupiers and investors for reaching ESG goals and indirectly influence though certifications such as BREEAM, which have stipulations.

TO FIND OUT MORE...

Read our ESG Property Investor Survey to gain insights into investor requirements and their impact on the market. Additionally, explore REframing ESG to simplify objectives and focus attention on key priorities, along with understanding the stipulations of ultra-wealthy investors regarding property investments. Lastly, delve into the concept of Solar Power Value (SPV) to grasp how PV and EV technologies can create income opportunities while enhancing environmental credentials.

Life sciences & innovation

Life sciences and innovation: the advancement and application of scientific research and technology to improve health, medicine, and biological understanding. This field encompasses biotechnology, pharmaceuticals, medical devices, and healthcare solutions, driving progress in disease treatment, diagnostics, and overall human well-being.

2nd

Digital transformation is the second most critical strategic priority for life sciences companies over the next three years

£1.1bn

Global year-to-date VC funding into AI-powered drug discovery companies is £1.1 billion, almost double that of 2023

9%

From 2019 to date, the UK has secured 9% of global VC funding for AI-powered drug discovery companies

Creation through collision

The growing intersection between technology and life sciences will create huge opportunities: we explore three principal paths to convergence and how they impact future requirements

AUTHOR
JENNIFER TOWNSEND

1. DIGITAL TRANSFORMATION AMONGST INCUMBENTS

Digital transformation - adopting digital technologies to create new business models or efficiencies - has become a strategic imperative for life sciences companies. Recent reports and statements illustrate this trend. Our analysis of the annual reports from the world's largest life sciences firms reveal growing investment in artificial intelligence (AI) and other technological platforms. Additionally, the latest Knight Frank (Y)OUR SPACE survey found digital transformation to be the second most critical transformation route for life sciences companies over the next three years.

Companies are investing in internal teams, increasing IT spending, reengineering processes, pursuing acquisitions, funding promising startups, and establishing new partnerships to advance AI adoption. For instance, Sanofi has launched initiatives to become the first pharma company powered by AI at scale. This includes collaborations with startups like BioMap, Aily, and Bart's Health and the rollout of a company-wide AI platform. Elsewhere, Novo Nordisk's new AI research hub in London's Knowledge Quarter further exemplifies digital transformation. The new hub will house around 40 employees from the company's existing R&D and IT divisions. The Knowledge Quarter is home to several world-class science and tech companies and centres.

As life sciences firms digitalise, their real estate and workplace strategies must evolve. This will involve occupying workspaces near tech talent and partners, providing tech-enabled and collaborative environments, and meeting the needs of a digital workforce.

2. NEW DYNAMO SUB-SECTORS AND OCCUPIERS

The convergence of technology and life sciences also spurs new dynamic sub-sectors and occupiers. The AI-powered drug discovery sub-sector perfectly exemplifies this trend. Knight Frank and PitchBook data reveals a doubling of venture capital (VC) funding into companies in this field over the YTD – with some £1.1bn invested. Indeed, the UK ranks third globally in VC funding for AI-powered drug discovery companies, securing 9% of total financing from 2019 to date. Exciting scaleups like LabGenius, a London-based AI-driven drug discovery company that recently secured £35m, are emerging.

Emergent sub-sectors and occupiers will naturally fuel fresh real estate demand. It is worth noting that some companies at the cutting edge of tech and life sciences will not require specialist lab space. They will be seeking high-quality office space in leading tech cities.

Big tech is also making significant inroads into life sciences. Nvidia, for instance, invested in seven AI-powered drug discovery startups in 2023, increased its life sciences offerings, and formed partnerships with leading firms such as Roche. Similarly, Isomorphic, an Alphabet subsidiary that aims to drastically reduce drug discovery timelines, has inked deals with major pharma companies and is rolling out ground-breaking AI models. The company is forecast by analysts to be a top-five biopharma company in the future.

The growing influence of big tech companies is raising workplace standards as both life sciences and tech firms compete for the same talent. Tech companies, serving as anchor tenants or creating new clusters, are driving fresh demand as they expand their life sciences teams.

3. REDEFINING LAB DESIGN

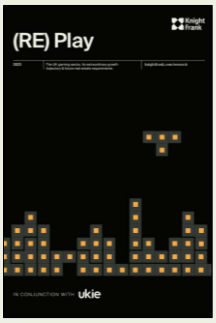
The convergence of tech and life sciences is transforming real estate specifications, particularly for lab spaces. As Iain Keys from Knight Frank discusses, emerging technologies such as AI, machine learning, robotics, 3D printing, nanotechnology, quantum computing, and tissue engineering are revolutionising the Pharma and Biotech industries. By 2040, daily operations will differ significantly, necessitating a rethink of lab design. Key considerations include:

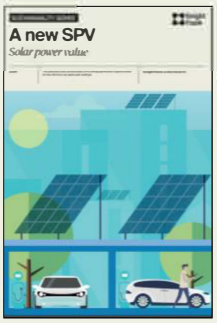
- Greater flexibility for regular technological updates
- Greater importance is placed on access to a reliable power supply and robust connectivity
- Additional load capacity for heavier robots
- Managing increased thermal loads due to automation, ensuring appropriate air quality and cooling/heating standards
- Adequate loading bays and accessible goods lifts
- Increased demand for data centre services
- Robots and AI systems may be housed in secondary locations to save money, diverging from prime laboratory spaces

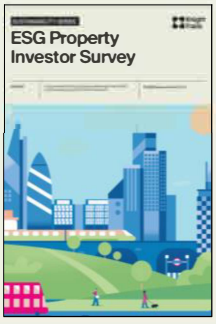
LOOKING FORWARD

These three routes towards convergence will create growth opportunities, require business model transformation and lead to new market entrants. To facilitate such a process, real estate will need to adapt and evolve to provide highly innovative, efficient, and tech-enabled workspaces in the future.

A selection of Knight Frank's market-leading research publications







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