

SHAPING OUR CITIES

**How Digital Technology is
Disrupting Global Real Estate**

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Real estate has always shaped cities, and technology has always shaped real estate. From the elevators and telephones that made the skyscraper usable, to the car's impact on the suburbs in the 20th century, technology has an intimate relationship with space – and with value.

The skyscraper solved a real estate problem by allowing for large amounts of rentable space on comparatively small plots of land in places where land is expensive: city centres. The advent of the motorcar allowed vast areas of land to be opened up for residential use, rapidly increasing the value of – and demand for – suburban and rural land.

Will digital technology have a similarly transformative effect on cities and real estate? At a city scale, the answer is yes – one only has to look at how online shopping continues to reshape asset classes like logistics, as well as the high street. But what about digital technology in the building; will it be as transformational as the elevator?

This report looks at how the commercial real estate industry is changing and explores how new business models will enable digital technology within buildings to create value.

IPUT REAL ESTATE
DUBLIN

ARUP

Authors:

Léan Doody
Zung Nguyen Vu
Pooky Mitchell
Alannah McCartney

Editors:

Nicola Hudson
Brice Richard
Stephen Hill
Léan Doody

Contributing companies:

Accenture
Allianz Real Estate
Boston Properties
CBRE Global
Investment Partners
Charter Hall
Eir
Goodbody
GRESB
Heden
Investa
IPUT
ISPT
Knotel
KPMG
Legal & General
LinkedIn
UBS
University College
London
Urban Land Institute
WeWork

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CONTENTS

Foreword	Page 02
Executive Summary	Page 04

Section 1 Drivers of Change

The climate crisis	Page 07
New competition	Page 10
Opportunity: what does this mean for landlords and developers?	Page 15

Section 2 Towards Better Workplaces

User centred places and buildings	Page 17
Sustainable and resilient assets	Page 23

Section 3 Barriers to Uptake

Value proposition	Page 27
Legacy systems and proprietary solutions	Page 30
Technology leadership	Page 31
Risk	Page 31

Section 4 What Does This Mean for Real Estate?

New business models aligned with user experience	Page 33
New approaches to technology	Page 34
New leadership roles	Page 39

FOREWORD

Shaping Our City

IPUT takes pride in being an Irish real estate company with a 50-year track record. As the largest owner of offices in Dublin, we recognise our responsibilities and take our presence in the city seriously.



Niall Gaffney
Chief Executive, IPUT

By investing in sustainable buildings and public realm, we place an emphasis on people.

We are investing in buildings that enhance the occupier experience, enabling us to set new environmental standards for offices in Ireland and marking us out as a landlord of choice.

Our business model has evolved, and we are now developing a number of major projects in Dublin city. This has prompted us to explore what are the drivers of change in real estate and how they are shaping the projects we are planning for our city.

Over the course of the past decade, we have seen technology disrupt business models globally with significant implications for the world of work. The real estate sector has been slow to embrace this digital revolution, however this is now rapidly changing.

In formalising our development strategy, we visited some of the world’s leading office and mixed-use schemes – such as Broadgate and King’s Cross in London and Hudson Yards in New York, amongst others. We have seen the increased prevalence of digital technology in these cutting-edge schemes and recognised the growth in demand from both investors and occupiers for more sustainable, efficient and environmentally friendly properties.

Against the backdrop of a growing climate crisis, investors now want more detailed asset level data to evaluate the sustainable performance of their investments ensuring that the companies they invest in are socially responsible stewards of their capital. In addition, occupiers are seeking quality office spaces and a greater investment in the public realm to attract and retain talent but with more flexibility within the office environment.

For the past five years, we have strived to align our own portfolio with best-in-class standards, recognising our corporate responsibility to our investors, occupiers and wider society. We have made significant progress achieving gold & platinum LEED and Wired Score certifications across our major holdings. Our own office became the first office in Dublin to be awarded WELL Certified Gold.





Computer generated image of IPUT’s Wilton Park development in Dublin 2

As we commence the development of almost 65,000 sq m of mixed-use space in Dublin city centre, we recognise that now is an opportune time for us to explore the key digital drivers of change in the real estate industry. We partnered with ARUP to evaluate the readiness of the industry to adopt these changes and to learn how we could apply global best-practice to our projects for the benefit of our future occupiers and support long-term returns for our shareholders.

We would like to acknowledge the contribution of Léan Doody and her team at ARUP in producing this report. We are also grateful to the various contributors from across the global real estate world who were so generous in sharing their experiences with us. This report sheds some interesting light on the challenges and opportunities facing the real estate sector and how the property owners should begin to reassess their business models and leadership over the next decade. Our ambition is to ensure we align our future plans with the learnings from this report.

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EXECUTIVE SUMMARY

Disrupting Real Estate

Commercial real estate has been slow to adopt new technologies. The traditional business model of letting properties on a 10-20 year basis has not demanded it. But things are changing.

The climate crisis is provoking investors to look for more sustainable assets and more asset level data will be needed to help them evaluate the sustainable performance of their investments.

Meanwhile occupants are looking for higher quality services and more flexible real estate to attract and retain talent – and they are increasingly seeing flexible office providers as part of the solution.

Commercial property developers themselves are starting to wake up to the new opportunities unlocked by digital technologies, to manage complex portfolios, make better informed development decisions, decrease project management costs, and even extract more value from the operations of complex properties.

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the real estate industry has been sluggish about adopting digital technology – one study puts it behind other industries by as much as five years

Pictured centre of image
1 Grand Canal Square, Dublin 2



These changing business models, new technologies and pressures from occupants and investors mean that there are opportunities to use digital technology to deliver better workplaces, for instance:

- Experience design and placemaking allow for better understanding of the needs of people from their spaces and how technology can help deliver great experiences. For example, Knotel relies on its tenant engagement app to help their customers get what they need, and help them better understand how they can design better spaces and experiences for their customers.

- Better occupancy data allows for more understanding of new space configurations and the productivity and satisfaction outcomes they enable.
- More informed portfolio management and reporting relies on asset level data about the condition of buildings, visualised by dashboards.
- Despite these opportunities the real estate industry has been sluggish about adopting digital technology – one study puts it behind other industries by as much as five years. There are multiple reasons for this: the difficulty of upgrading legacy systems, the conservative nature of the industry, and the lack of alignment with real estate business models.

So what are the implications for real estate?

- Organisations should take a more strategic view of user experience and the changing role of asset managers to be curators of services for tenants, managing ecosystem of partners. They will need to decide whether to outsource or hire Service Designers and perhaps consider employing a Chief Experience Officer.
- New lightweight approaches to retrofitting and construction mean buildings can be smart enabled without carrying out costly systems integration.
- New types of leadership roles will be needed to identify technology opportunities and lead implementation. Some organisations are hiring Chief Technology Officers as well as data scientists into their real estate functions. Ensuring privacy and security of data will be a key responsibility.



SECTION 1

Drivers of Change

KEY TAKEAWAYS

- The climate crisis has forced all sectors and industries to step up to take action. In order to safeguard investors' portfolios and buildings against the threats of climate change and future reporting requirements, more operational data is needed to assess these risks. Buildings must be equipped to collect operational data.
- Beyond the climate crisis, tenants and occupants are demanding more flexible working spaces. The traditional '9 to 5' workspace has changed dramatically. Tenants want spaces that can encourage, inspire and attract a creative and productive workforce, with services and digital solutions that support that. User experience design is a key tool to create services.



Reception at Riverside 2, Dublin 2

What links Greta Thunberg and former WeWork CEO Adam Neumann? Both are figureheads for two forces reshaping commercial property: the climate crisis and the flexible space industry. This chapter sets the scene by introducing these key forces – the climate crisis and the changing nature of work – which are threatening to disrupt the familiar real estate business model.

The climate crisis

In May 2019, The Guardian newspaper updated its style guide to recommend the term ‘climate crisis’ in place of ‘climate change’. Protest groups, such as Extinction Rebellion and School Strike for Climate, are having an impact on public opinion, as evidenced by an Opinion poll, conducted in May 2019 during Extinction Rebellion protests, finding that 63% of the United Kingdom (UK) public agreed with the statement “we are facing a climate emergency”. Fast fashion icon Forever 21’s bankruptcy, bans of single-use plastic straws, flight shaming, Burger King’s launching plant-based burgers – all sectors are beginning to step up to the challenge at hand. 2019 may prove to be a watershed year where the recognition of climate threat and the push towards climate adaptation become mainstream.

Real estate is not immune to either the ecological threat or the societal pressure to make changes, and real estate investors are now starting to wake up to the risks of global warming and climate change. For example, Allianz Real Estate has committed to making all of its investments climate-neutral by the year 2050. As Olivia Muir, Director for Asset Management UK Ltd, within Multi-Managers Real Estate at UBS says, “Sustainability is both a risk and an opportunity today. The risk is mainly around regulation and obsolescence. Opportunities include higher rents and retention on the occupation side and lower costs for the owner, for example financing.”

Reporting requirements – moving towards more disclosure

As Mark Carney, Governor of the Bank of England warns, our global financial system is backing carbon-producing projects that will raise our planet’s temperature by more than 4° C¹ by the year 2084,² double the limit outlined in the Paris Agreement. Regulation is set to increase. Over time, the European Union (EU), city governments and real estate companies have taken several influential actions to address these demands:

- On an international level, in May 2018, the European Commission adopted a legislative package on sustainable finance aimed at asset managers and investors, including disclosure requirements for environmental sustainability and low-carbon benchmarks.³
- In New York City, the City Council has mandated its 14,500 least efficient buildings to accelerate efficiency upgrades in order to radically reduce their greenhouse gas emissions.
- In addition, the Governor of the Bank of England, Mark Carney, has stated that banks should be forced to disclose their climate-linked risks within the next two years, and he has also said that more information about these risks would prompt investors to penalise and reward firms accordingly.
- As Olivia Muir says, “We are asking our fund managers increasingly detailed questions on sustainability issues and place a growing emphasis

on these answers in our monitoring and management of investments – for example around climate-related capex amounts and insurance risks.”

Investors will need more asset-level data to better inform their assessment of these risks.

Risk analysis and mitigation

Despite the growing number of regulatory frameworks that require companies to report on and disclose information on their sustainability performance, there is still an overall lack of common reporting structures and frameworks.

Understanding climate risks, how to mitigate these risks and the implications on real estate are proving to be a major challenge for investors and portfolio managers.



Sustainability is both a risk and an opportunity today. The risk is mainly around regulation and obsolescence. Opportunities include higher rents and retention on the occupation side and lower costs for the owner, for example financing

Olivia Muir
Director for Asset Management UK,
UBS

¹ <https://www.theguardian.com/business/2019/oct/15/bank-of-england-boss-warns-global-finance-it-is-funding-climate-crisis>

² Xiaoxin Wang, Dabang Jiang, and Xianmei Lang, “Climate Change of 4°C Global Warming above Pre-industrial Levels,” *Advances in Atmospheric Sciences* 35, no. 7 (July 2018): 757–770, <https://doi.org/10.1007/s00376-018-7160-4>.

³ https://ec.europa.eu/info/business-economy-euro/banking-and-finance/green-finance_en



Pictured above
Earlsfort Garden, Earlsfort Terrace, Dublin 2

Rapid urbanisation means that many of the assets which are held by real estate investors are in cities, which are particularly vulnerable to the immediate effects of climate change. As our weather conditions become more extreme, so too do the associated insurance costs. In the United States (US), the economic costs of 2018's 394 natural catastrophic events amounted to US\$225bn, with insurance covering US\$90bn of the overall total, creating the fourth-costliest year on record of insured losses. In some parts of the US, insurers are refusing to insure certain properties as a result of the increase in extreme weather events. The insurance protection gap (i.e. the portion of economic losses not covered) was 60% in 2018, the highest level since 2005.⁴

It is widely understood by investors that insurance is not an appropriate method of evaluating climate risks, as insurance

premiums are typically evaluated on historical analysis and do not take future climate risks into account. Assessing and pricing climate risks is a developing topic within the insurance industry, although the impact of these risks on the value of real estate is difficult to measure.⁵

Corporate reporting is essential for understanding climate risk awareness. As the landscape for reporting climate-related risks in real estate continues to grow, investors are beginning to integrate environmental, social and corporate governance (ESG) data into their investment decisions and corporate strategies. Real estate developers play an important role in assisting investors who take climate risks into consideration. Methods of data collection are likely to become more sophisticated in the future so that the value impact of climate risks can be understood and factored in accordingly.⁶

More data is needed

Through the collection of data, it is possible to observe, monitor and understand the impacts of climate change on real estate, while also being able to predict future changes and optimise buildings appropriately. The key reporting benchmarks, outlined below, are moving in this direction.

- Currently, GRESB (Global Real Estate Sustainability Benchmark) is a key benchmark used to collect comparable and reliable data on the ESG performance of real assets. Launched in 2009 by a group of large pension funds, GRESB covers US\$4.5tn in real estate and infrastructure value and is used by more than 100 institutional investors to monitor their investments, engage with their partners and, ultimately, make decisions which will lead to a more sustainable

⁴ <https://www.insurancejournal.com/news/international/2019/01/22/515420.htm>
⁵ https://1eg3hu1ihr2ga6vceuz7hb-wpengine.netdna-ssl.com/wp-content/uploads/sites/127/2019/02/UJI_Heitman_Climate_Risk_Report_February_2019.pdf
⁶ https://1eg3hu1ihr2ga6vceuz7hb-wpengine.netdna-ssl.com/wp-content/uploads/sites/127/2019/02/UJI_Heitman_Climate_Risk_Report_February_2019.pdf

- real estate industry. It relies on participating real estate managers to self-report data focusing on ESG performance, energy, water, waste and greenhouse gas emissions. From 2020, reporting of asset-level data will be mandatory.

 - In addition to GRESB, there are several other benchmarking tools being used by real estate developers. The Science Based Targets Initiative specifies how much and how quickly a company needs to reduce its greenhouse gas emissions to stay in line with the goals set out by the Paris Agreement. To date, 672 companies are taking science-based climate action.
- One example is Landsec, which manages more than 2.2 million square metres of property, and which has committed to reducing greenhouse gas emissions by 40% per square metre by 2030. The Science Based Targets Initiative has helped Landsec to set these targets and come up with different methodologies for achieving them. Landsec set itself the challenge of becoming the sustainability leader in the real estate sector
- after an increased number of investors began to ask about its sustainability goals and initiatives. These targets have affected its work across three main areas: buying buildings, developing buildings and managing buildings. Since implementing these targets, Landsec has been able to enhance its reputation and relationship with investors, as it can be considered a better long-term investment and is future-proofed for further investor requirements.⁷

In addition to creating tools and platforms with which real estate developers can collect these data, there is also a push to share this information in order to drive disclosure, insight and action towards a sustainable future.

The following initiatives encourage and support disclosing information related to sustainability reporting;



- The Carbon Disclosure Project (CDP) is a not-for-profit organisation which measures companies’ environmental impact.⁸
- The Task Force on Climate-related Financial Disclosures (TCFD) develops voluntary, consistent climate-related financial risk disclosures for use by companies in providing information to investors, lenders, insurers and other stakeholders. As of February 2019, more than 580 companies (which are responsible for US\$100tn in assets) have expressed their support for TCFD recommendations.
- BREEAM is a world-leading sustainability assessment method used for masterplanning projects, buildings and infrastructure. The BREEAM In-Use scheme is used to assess the environmental impacts and sustainability issues relating to existing buildings. It recognises the need to evaluate the actual operational performance of buildings rather than that of the building as designed.⁹
- LEED is the most widely used green building rating system in the world. LEED provides a framework to create healthy, highly efficient and cost-saving green buildings. LEED certification is a globally recognized symbol of sustainability achievement.

As real estate developers are expected to keep up with these different benchmarking frameworks, these different reporting needs are producing a need to collect more operational data on the impact of critical sustainability issues – such as climate change, human rights, governance and social well-being in property and estates – which, at the moment, are difficult to gather and quantify.

⁷ <https://sciencebasedtargets.org/case-studies-2/case-study-land-securities/#targetText=The%20targets,from%20the%20same%20base%20year>
⁸ <https://www.cdp.net/en/companies>
⁹ <https://www.assurityconsulting.co.uk/knowledge/guides/what-is-the-relevance-of-breeam-in-use-to-fm>

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Tenant demand

A growing number of companies are committing to reducing their carbon footprints. Since commercial buildings account for 39% of global carbon emissions,¹⁰ their efforts often involve their buildings. For example, since 2009, Microsoft has committed to reducing the company's carbon footprint and is striving towards cutting carbon emissions by 75% by 2030. One of the ways Microsoft hope to achieve this is through building sustainable campuses and data centres. It hopes to remove fossil fuels completely from these new buildings and run the campus on 100% carbon-free electricity.¹¹

LinkedIn has also committed to 100% renewable energy and a 75% reduction in carbon emissions in its operations. As of 2018, 80% of its buildings are powered from renewable sources. Within its buildings, it aims to reduce waste during demolition, construction and operation. To date, 60% of LinkedIn's offices have green building certificates.¹²

The flight-shaming movement, which aims to discourage people from choosing to fly because of the environmental impact, has added a new dimension to reducing corporate carbon footprints. Solutions for reducing the environmental impact of business flights revolve around taking direct routes, flying economy or purchasing carbon offsets to reduce their carbon footprint. However, there is an opportunity for technology to aid in improving the connectivity and collaboration of people from anywhere and at any time, with the aim of decoupling business growth from environmental impacts.¹³

New competition

Beyond sustainability, tenants and occupants are demanding a more responsive and flexible workplace experience. This has been driven and enabled by new competition from space-as-a-service providers, which have given tenants more choice in services and office experiences. As a result, landlords and developers are starting to listen more attentively to the tenant voice. This is forcing building owners and developers to provide a more outcomes-based offer. Tenants do not just want an office – they want a space which encourages, inspires and attracts a creative and productive workforce.

What a good workplace means today

As many industries are beginning to move away from the traditional '9–5' concept of working environments, we are faced with the question of why firms still require office space at all.

Firms still see quality office spaces as a critical asset for enabling productivity, culture, recruitment and retention. Attracting and retaining top talent is critical to the success of modern companies. Office spaces are thus expected to actively help enable a productive and engaged workforce. As organisations are faced with accelerating and expanding change, and as automation advances, organisations and workplaces are placing a premium on collaboration and creativity.



“
Nothing supplants one-to-one, face-to-face relationships. Although our people can work anywhere, we want them to want to come to the office. We try to design highly appealing spaces that will help drive productivity and engagement

Jim Morgensen,
VP Workplace, LinkedIn.¹⁴

¹⁰ https://americas.uli.org/wp-content/uploads/sites/2/ULI-Documents/Greenprint_PerformanceReport_VOL-10.pdf The Greenprint Performance Report

¹¹ <https://blogs.microsoft.com/on-the-issues/2019/04/15/were-increasing-our-carbon-fee-as-we-double-down-on-sustainability/>

¹² <https://socialimpact.linkedin.com/environmental-sustainability>

¹³ <https://www.raconteur.net/business-innovation/reducing-corporate-carbon-footprint>

¹⁴ Arup interview



Pictured above
IPUT's offices overlooking St. Stephen's Green, Dublin 2

To begin with, innovation in knowledge work comes through face-to-face connections and chance encounters. "Ideas spread more easily in denser places", Edward Glaeser summarises in *The Triumph of the City*.¹⁵ While Glaeser speaks of density as the competitive advantage of cities compared with suburban or rural areas, the same argument could be made for bumping into colleagues within a dense office or bumping into potential clients in a dense business district. Colocation,

the placement of several entities in one place, can become a competitive advantage for firms. However, as with cities, there must be a balance. Good workplaces allow people to meet others and find a space of belonging without feeling overwhelmed by the volume of others.

Second, having a shared physical space is important for work culture. While remote working offers flexibility, it can be more difficult to build a strong culture and shared ethos when teams

are working remotely all the time. It can be even harder to train and mentor junior staff when there is no face-to-face connection.

It has become commonplace for developments, large companies and co-working spaces to look to start-ups for cues of good workplace design. Ten years ago, an open office with colourful beanbags, ping pong tables, and beer on tap embodied the ideal space as imagined by start-up founders – twenty-something graduates straight from American fraternity halls.

¹⁵ Edward Glaeser, *The Triumph of the City*, 1st ed (New York: Penguin Books, 2012)

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Pictured above
Tropical Fruit Warehouse, Sir John Rogerson’s Quay, Dublin 2

As start-up culture matured, so did its taste in workspace design: virtually all of these elements are now being phased out or abandoned. Open-plan offices, for instance, have received the most intense backlash: workers complain that they are distracting, with official studies finding that employees in open-plan offices spend 73% less time in face-to-face interactions.¹⁶ The conversation has shifted towards defining what ‘good culture’ really is and how proper management techniques can get us there.

Third, we cannot assume that all workers want to work remotely. Especially in big cities with high rent, many employees do not have appropriate space at home in which to work. While having the choice to work at home can be a luxury, having nowhere to escape to can turn into a burden. For all these reasons, the role of commercial real estate has not diminished. Rather, it now plays an even bigger role in delivering on the strategic goals of organisations.

Despite this, some companies feel that they must convince people to come to the office. It is no longer acceptable for the office to be just an open floor with rows of tables; it needs to be an enabler of collaboration, of individual styles of working, a node in a global network. It should offer employees a chance to feel part of something bigger. Multiple user needs must be considered: opportunities for wellness during the workday, moments for social belonging, and flexibility for teams to reconfigure spaces to suit different work activities, for example. Failing to deliver on these expected needs will lead to friction, dissatisfaction and, ultimately, a decline in work productivity and satisfaction.

There are several cultural shifts happening at a global scale, which are converging to shape new expectations for the workplace. The digital transformation is changing how teams and people want to work, allowing for personalisation, automation and insight.



¹⁶ <https://www.bbc.com/worklife/article/20180718-open-offices-make-people-talk-less-and-email-more>



Pictured above
Reception at 10 Molesworth Street, Dublin 2

People are becoming increasingly open about personal challenges in the workplace and expect support from employers for their wellbeing and mental health. The office is no longer simply a place to work; it is also a place for socialising, relaxing and engaging with the surrounding community. And the global climate crisis has made people more aware of the environmental impact of their actions in the workplace.

Real estate developers and landlords are expected to adjust their current offerings and services to keep up with the new expectations and technologies that are out there. There are abundant opportunities for smart technology and landlord services to support these shifts. Space needs to be used in a more strategic way in order to deliver on the needs and expectations of occupants, and data can be used to achieve this goal.

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There are several cultural shifts happening at a global scale, which are converging to shape new expectations for the workplace

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Pictured above
WeWork office space

“ More landlords are adding short-term and flexible co-working spaces to their portfolios in response to demand from existing and prospective tenants for more flexibility

Industry disruption

Space-as-a-service providers and new platforms are meeting many modern tenant needs and advancing them. Landlords are beginning to respond with their own space-as-a-service offerings, but many have also outsourced these flex space offerings to third parties to manage.

Flexible leases and co-working spaces

More landlords are adding short-term and flexible co-working spaces to their portfolios in response to demand from existing and prospective tenants for more flexibility. However, given that this is still a relatively new service for many, companies require more granular data in order to create financial projections and inform the future leasing strategy. Despite the risks presented by WeWork’s

failed initial public offering (IPO) in 2019 (largely related to the speed of its expansion and valuation model, rather than to co-working itself), the underlying model of ‘space as a service’ has become mainstream and is here to stay. This will involve a different approach to risk, design and management. More importantly, it also involves a fundamentally different relationship with tenants – changing from hands off to much more hands on.

More value-added services

Employee engagement and talent attraction are also key concerns for tenants. As a result, tenants are placing a premium on workplaces that offer community and learning opportunities. Meanwhile, excellent indoor environmental quality and building infrastructure (lifts, access, connectivity, etc.) are becoming basic requirements.

Many small-to-medium-sized businesses and start-ups, which prioritise agility, do not want to spend resources on designing a workspace, updating furniture, managing facilities or even managing different contractors. They want the flexibility to quickly expand or contract their footprint without committing to fixed, long-term, upfront leases. They also want access to other spaces when they do expand or contract. They are increasingly interested in seeking out landlords (such as Knotel) that can provide all these services in one package, and are willing to pay extra for the convenience. This offers an opportunity to landlords if they can design and deliver the right services to wrap around their existing real estate.



Better data

Tenants today want to ensure that they are making the most of the costly space and services they are paying for. Accessing data not only ensures that occupants are getting value for money, but can also reveal interesting insights about business behaviours and inefficiencies. Businesses want data in order to understand their own needs for space and to make better use of their space.

Without access to data or the processes to manage and take advantage of it, it is difficult to make effective change in real estate and keep up with the demands and expectations of occupants. Creating networks and feeds of communication between landlords and building

occupants is an important task. Enabling access to data allows people to see trends in how spaces, services and facilities are being used and to explore opportunities for sharing information.

Opportunity: what does this mean for landlords and developers?

This report focuses on the opportunities for commercial property landlords and developers to use innovative new digital services, digital technology and data enablement to enhance their business. It also highlights the different current risks and challenges that landlords face – for instance, the need for improved asset-level

data and behavioural user data, the challenges of integrating smart building systems into legacy infrastructure, and the mindset shift required when it comes to considering user experience and service design.

Landlords and building owners are in the unique position of being able to offer integrated design around experiences – from the physical building structure through to curated end user experiences for people in their buildings across space, technology and service. But this requires a fundamentally different approach to risk and a different relationship with tenants, from the upfront sell to the ongoing partnership.



Businesses want data in order to understand their own needs for space and to make better use of their space

Pictured below
10 Molesworth Street, Dublin 2

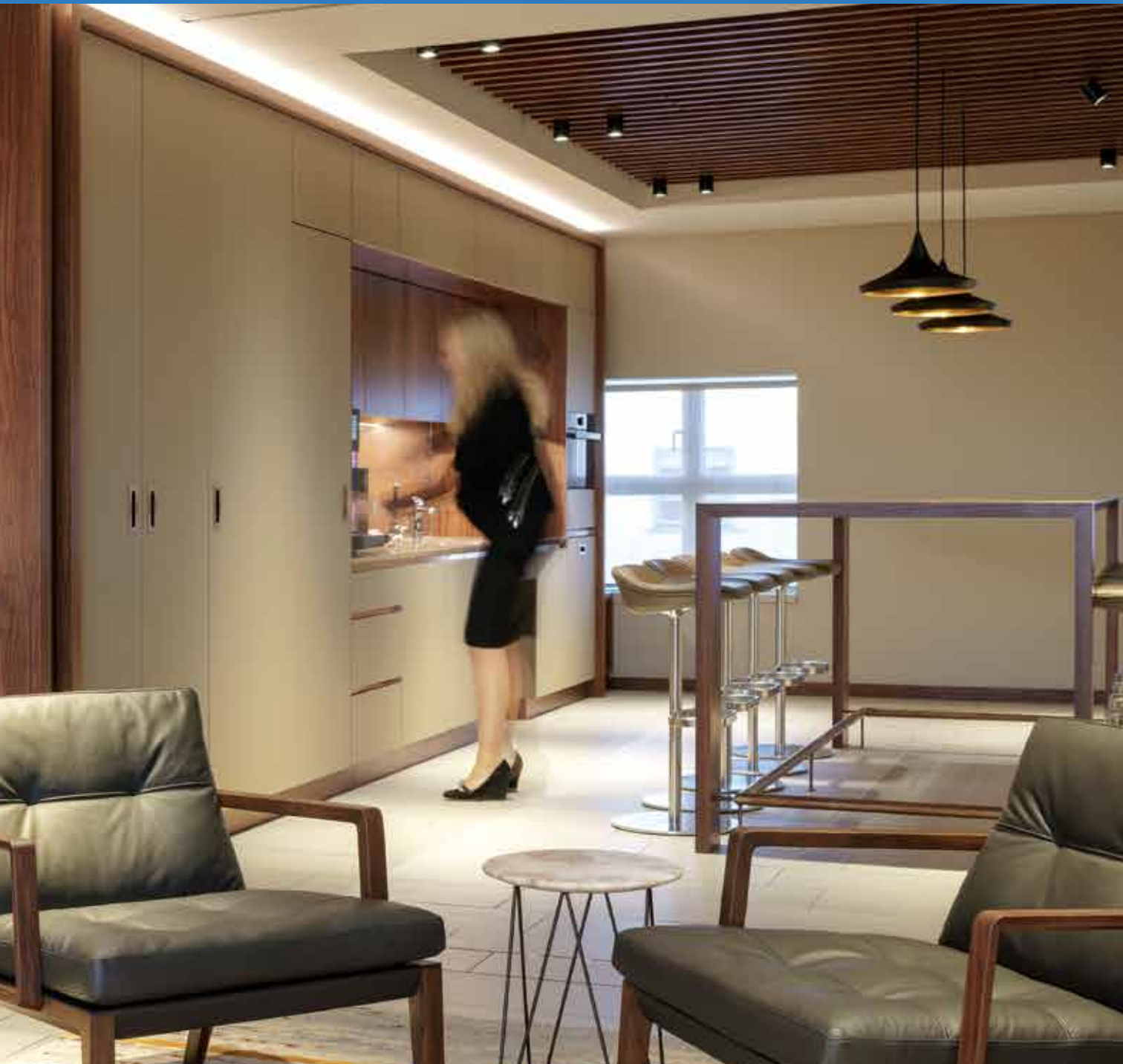


SECTION 2

Towards Better Workplaces

KEY TAKEAWAYS

- The changing demands of investors and occupants has brought a great opportunity for real estate stakeholders to rethink creative and innovative solutions in order to improve efficiency gains and additional revenue streams. A number of leading organisations are using digital and user experience to create buildings that are more sustainable, resilient and occupier focussed.



The evolving demands of investors and occupants put new pressures on real estate owners, developers and landlords to begin thinking about how to adapt to these needs. These forces bring about a great opportunity for real estate stakeholders to rethink creative and innovative solutions in order to improve efficiency gains and additional revenue streams. This chapter looks at some ways that landlords and occupants are starting to use digital technology to enable new ways of working and sustainability, aligned with their current business drivers.

User centred places and buildings

“There is a definite movement in real estate towards becoming more like the hospitality sector. There is a huge amount of competition to attract the best employees, and companies are turning towards their buildings to offer them that unique selling proposition.” Achal Gandhi, Head of Global Portfolio Management at CBRE Global Investors.¹⁷

Today, a landlord needs to not only satisfy the needs of the tenant’s Chief Executive Officer and Vice President of Real Estate in a company, but also needs to design services for a wide range of users – a role that many landlords are not equipped to take on. But what do users expect from a good workplace, and how can developers and landlords use digital technologies and services to meet these expectations?

Some landlords and tenants are turning to user experience design and placemaking to understand what occupants need, and are designing services to meet their needs. Understanding the current and future needs of a building’s users and how they can be

addressed (through technological and non-technological means) significantly reduces the risks of technology investments. This process, referred to as ‘experience design’, can support a building throughout its design, development and operation.

According to a recent CBRE survey¹⁸, one-third of tenant companies have plans to hire a User Experience (UX) Lead, and two-thirds would be willing to pay a premium for a building in which the landlord had provided an enhanced UX offer. This is up from 18% in 2018.¹⁹ User experience design seeks to design spaces and services by understanding user needs and data in order to create a better human experience and contribute to wider strategic goals. The pioneers of user experience design and placemaking in the built environment context have been visitor attractions – from museums to theme parks – because their whole raison d’être is to sell an experience of a place. For example, in 2013,²⁰ Disney launched its MagicBand, a wearable device that allows guests to gain entry to Disney World, access attractions, make purchases at restaurants, and

unlock their hotel room doors – and that provides operational data to Disney World on people flows around the park.

So, in a real estate context, the user experience of the commercial office should contribute to enhanced productivity, and to talent retention and attraction by creating better experiences for people in those buildings. Some companies, such as Charter Hall in Melbourne, are hiring Chief Experience Officers to ensure that building design and operational decisions (including building technology decisions) are driven by user experience.

This approach only makes sense for the landlord where it is aligned with a business model that rewards the landlord for tenant retention. This is why co-working and flexible space providers have seen such growth – as tenants can take short leases and pay for services as they need them, the flexible space operators are incentivised to take the time to design good experiences for tenants. Knotel is a good example where its business model is aligned with the needs of its tenants.



There is a definite movement in real estate towards becoming more like the hospitality sector. There is a huge amount of competition to attract the best employees, and companies are turning towards their buildings to offer them that unique selling proposition

Pictured Opposite
47-49 St. Stephen’s Green,
Dublin 2

Achal Gandhi,
Head of Global Portfolio Management at CBRE Global Investors

¹⁷ Interview with Arup.
¹⁸ CBRE 2019 EMEA Occupier survey.
¹⁹ CBRE 2019 EMEA Occupier survey.
²⁰ <https://www.fastcompany.com/3044283/the-messy-business-of-reinventing-happiness>

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Digital supporting landlord
flexible space: Knotel

Knotel caters for mid-sized companies that want to see their own names above the door; it rents out entire floors to companies, rather than subdividing the space. It specialises in providing space in city centres – areas that are in high demand and are usually quite expensive. Knotel customers want office space where their talent wants to be, and therefore their space needs to be more productive in order to offset rents.

Knotel helps customers to make their space more productive. Their workplace strategists work with customers (often companies with 200–400

employees which would not have such a strategist in-house); these workplace strategists help companies to lay out space in order to maximise employee productivity. Knotel then operates the space according to its service agreement, thus saving customers the trouble of managing multiple contracts and service providers. Customer satisfaction is key to lease renewals: “Our business model is aligned with the lifecycle of our customers’ businesses – we want them to stay with us as they grow and change, either in their current location or somewhere else in our portfolio. We want our customers to be satisfied, so that we can serve them over the full life of their business,” says Chris Namih, Head of European Expansion at Knotel.²¹

A core part of the Knotel experience is its tenant engagement app. Customers use it to report problems, book rooms, and interact both with the space and directly with Knotel. It includes user-facing information (e.g. Wi-Fi codes, post, recycling), and it makes it easy to on-board new staff. It is also a useful source of data for asset managers and designers, and it guides them on what they need to pay attention to when planning space.

Other examples of workplace design and technology have been primarily driven by occupants in order to improve their own utilisation and staff productivity. Examples on the next page from Adobe and Google illustrate this point.



Our business model is aligned with the life cycle of our customers’ businesses – we want them to stay with us as they grow and change, either in their current location or somewhere else in our portfolio

Chris Namih, Head of European Expansion, Knotel

Pictured below
Knotel Paris



²¹ Arup interview.

“

In the past we relied on people telling us what they think they do, now we can get hard data that tells us how people are really using the space

Jim Morgensen,
VP Workplace,
LinkedIn



Google Campus Warsaw

Activity-based working assisted by occupancy sensors: Adobe

Office workers are reacting against homogeneous open workspaces, which they consider to be distracting and to prevent collaboration. From an organisational point of view, as rents become increasingly expensive in sought-after city centre locations, office managers want to optimise spaces and increase utilisation. Activity-based working allows teams and individuals to choose where to work, flexibly, depending on the task at hand.

Sensing data can support activity-based working by informing people of which office areas are free to be used, thus enabling agile collaboration. Adobe's new London space has sensors under each desk and different types of social spaces, enabling people to know what space is free. Companies such as Workplace Fabric have created signage screens for users to obtain live information about available spaces; this information is displayed on a managed signage screen in the office. Through a clear, colour-coded format, users can use this data to instantly locate suitable workspaces on the floor.

Going further, LinkedIn is deploying sensors and using anonymised Wi-Fi triangulation to understand occupancy and patterns of use, so that it can design its workplaces better. "In the past we relied on people telling us what they think they do, now we can get hard data that tells us how people are really using the space," says Jim Morgensen, VP Workplace for LinkedIn.

Remote work, assisted by wireless audio/video: Google

According to a recent study, 70% of permanent employees work remotely, away from their main office, at least once a week.²² Meanwhile even while in the office, more and more work involves collaboration with colleagues who are working remotely, either from other offices or elsewhere. Some organisations are even establishing themselves as distributed companies. Stripe, a \$35bn online payments company, is built as a distributed company with "hubs" in San Francisco, Seattle, Dublin, and Singapore. Earlier this year, Stripe announced that its fifth hub

will be "remote" — made up of new hires that can live and work anywhere.

People increasingly want the option to work remotely or from the office, while still feeling part of a bigger team. This will increasingly be a concern as organisations seek to reduce their carbon footprint by reducing the amount of business travel their employees must do. Remote working can also reduce costs, as companies require a smaller real estate footprint the more employees work remotely. However, it is vitally important to maintain strong personal relationships and culture for remote workers.

To make remote collaboration seamless, all of Google's offices are equipped with its custom wireless hardware which enables people to log in to a conference directly from a Google calendar invite and hangouts. The speakermic, custom designed and built by Google, intelligently reduces echoes and actively manages background noise to deliver rich, immersive, crystal clear 360° sound. In huddle rooms, 'Meet' hardware can automatically zoom and crop based on the number of people in the room.

²² <https://www.cnn.com/2018/05/30/70-percent-of-people-globally-work-remotely-at-least-once-a-week-iwg-study.html>

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Going beyond this, Jim Morgensen of LinkedIn would like more automation of these kinds of tasks – perhaps using AI and sensors to support a seamless user experience of collaborating with people across many locations. “We would like the system to take care of picking the right room, recognising and connecting people automatically, providing the right air quality, lighting, air flow for the number of people in the room – making an enjoyable and seamless experience for our people.”

So much of this productivity and experience-enhancing technology is deployed by occupants. But what is the role of the landlord in enabling this in the building, and in the wider arena of placemaking across a city precinct? We see some of these ideas pushed to much more extreme versions in new district

master plans. Free from the constraints of legacy systems, new smart districts, such as Toronto Waterfront or Hudson Yards, have the power to imagine what an ideal vision could be from scratch, and push for more radical use cases. However, these districts also offer some lessons for where smart technology needs to include careful consideration of community, privacy and social context.

Hudson Yards: visitor
experience use cases are quick
wins, but need to be considered
thoroughly

New York City’s US\$20bn Hudson Yards development on Manhattan’s West Side is the largest private real estate development in the history of the US. Co-developed by Related and Oxford Properties Group, the

project spans 1.7 million square metres of high-end mixed-use commercial and residential space. At the project’s outset, the developers had grand ambitions of using smart technology primarily to create energy efficiencies and sustainability. It was envisaged that Hudson Yards would have an on-site microgrid and gas-fired microturbines to generate both hot and cold water, as well as sufficient electricity to keep the lights on during a power outage. A system of sensors and apps – developed in partnership with New York University’s Center for Urban Science and Progress – will provide an unprecedented flow of data for the Center for Urban Science and Progress’s researchers and Related’s analysts to pore over.



These visions have been successfully implemented to varying degrees. The hybrid service model for a large microgrid, developed in conjunction with Con Edison, is seen as an innovative model that could open up new options for large developments to combine locally produced energy with support from the grid. However, the initial promises of urban data-driven management have (so far) proved more aspirational than practical and have been put on hold. According to Jay Cross, President of Related, Hudson Yards, “We concluded that big data is probably the last thing we’ll get to. It’ll be years from now before we’re in that world.” Technology has changed rapidly in the decade since planning began, Cross notes, and running data feedback loops or grappling with privacy concerns is not something the real estate company is equipped to tackle.

Rather, Related and Oxford Properties Group turned its attention to smaller experiential initiatives, partnering with the New York-based company Intersection (which counts Sidewalk Labs as an investor) to integrate several straightforward smart features once a building has tenant employees in situ. For example, an app will let tenants track packages, pay rent, or make concierge requests. Currently, biometric fingerprint sensors allow office workers at 55 Hudson Yards to speedily move through the lobby’s security system. Touchscreen kiosks provide visitors with everything from basic wayfinding to tickets for 30 Hudson Yards’ observation deck. These use cases provide the property developer with immediate quick wins and tenant satisfaction.

However, the kiosks’ application in Hudson Yards still leaves something to be desired. They resemble LinkNYC’s free Wi-Fi kiosks, bearing the shape of supersized phone screens and doing little to activate the space or truly encourage community engagement with the development. They were largely conceptualised in a utilitarian manner and, like LinkNYC, have raised a whole slew of data privacy concerns. Shahid Buttar, a director at the

Electronic Frontier Foundation, an international digital privacy advocacy group that campaigned against LinkNYC, said that infinite data retention periods are a “red flag” for data privacy and the rights of individuals who do not opt in to the technologies – for example, being filmed. “This kind of technology, absent community control, can be pernicious,” Buttar said. “It might be a private neighbourhood, but it’s still no more respectful of the individuals that are in it.”

Lessons from Hudson Yards

Chasing after a grand ambition of complete data collection and storage might be a costly distraction for developers, given the high costs, privacy concerns and unclear use cases. Rather, developers should focus on getting the user experience right – identifying several high-value use cases where they can pilot smart technology and develop the right data management protocols. These use cases need to be considered early on in order to have maximum impact. This will create ‘quick wins’ for tenant satisfaction and will also result in upskilling the organisation, generating valuable lessons about technology development and data management.



This kind of technology, absent community control, can be pernicious... It might be a private neighbourhood, but it’s still no more respectful of the individuals that are in it

Shahid Buttar,
Director Electronic Frontier Foundation

Pictured left
Vessel by
Thomas Heatherwick
at Hudson Yards

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“ The role of the asset manager will change to be more data driven and they will become curators of key services

Grigor Hadjiev,
Head of Special
Projects, West Europe
Allianz Real Estate

Understanding the dynamic relationship between people, place and technology

In cities, technology platforms such as Airbnb, Uber and JustEat are changing land use and mobility systems and making new services possible, even while they reshape labour markets and industries. City governments are using digital technology and data to address congestion, upgrade lighting, save energy and empower communities. Citizens rely on their smartphones to navigate, pay for transport, access entertainment, shop and generally reduce friction in their urban lives.

At a city level, however, the use of technology has had very real impacts on how space is organised, configured and used. For example, the impacts of online shopping include changes in the use of high streets, increased need for logistics parks, and increased traffic from deliveries. In the UK, the retail stalwart Marks & Spencer has closed 100 shops across the country in response to its decreasing need for physical space – 33% of its clothing is now sold online. As Marks & Spencer is typically an anchor tenant on local high streets, this is leading to further challenges for town centres. How can planners and urban designers accommodate

citizens’ desire for convenience in new models of retail, with supporting infrastructure (logistics), as well as in new models for town centres?

Another example is the growing trend for more prepared food delivery to homes and offices. Some restaurant chains are now making decisions about where to locate based on how easy it is for delivery vehicles to reach them. Pedestrianised town centres are no longer attractive. Like retail, restaurants will need to raise their game to offer better experiences and better surroundings – otherwise they are potentially competing with people’s homes. Chain restaurants will probably be most affected in terms of a requirement for different spatial layouts. The logical extension of this for chain restaurants in particular is that they are opening ‘dark kitchens’: standalone kitchens in locations with lower rental costs and good access for delivery vehicles.

As online and physical spaces converge, the impacts on cities will continue. On a more granular level, there will be more technology in the public realm as more IoT and smart city solutions are rolled out in our cities. Our city plans will need to accommodate these spatially, but also at a technology systems, data and policy level.



Sustainable and resilient assets

“The role of the asset manager will change to be more data driven and they will become curators of key services.”²³ Grigor Hadjiev, Head of Special Projects, West Europe, Allianz Real Estate.

When the average lease was 10–20 years long, asset management was fairly passive. Now that tenants are asking for more – shorter leases, as well as more flexibility, services, technology and sustainability – it is more challenging to maximise assets to provide a good return on investment.

This prompts new questions about what services tenants need and how landlords can ensure that those services are provided in their buildings so that they retain existing tenants and attract new ones. This will require strategic partnerships with companies and co-working operators who can operate the buildings. But, in order to understand what services are needed, landlords will also need to have a firm knowledge of how the building is operated so that they can identify the valuable services for their tenants. This will require the right data and the right insights in order to steer stakeholders and implement new business models.

As is the case with experience design, the pioneers in using data to understand customers and their needs are the co-working and flexible space operators. For instance, WeWork has created a tool called Polaris to help the organisation become better at listening by constantly tracking, cataloguing, and sorting nuggets of user insights sourced from hundreds of continuous user research interviews globally.

Optimising energy and environmental performance has been a bigger driver for landlords. Improving the sustainability and energy performance of their buildings and providing better customer service around facilities, has pushed some landlords to deploy platforms to better understand how buildings are performing and take action to fix issues.

Pictured below
1 Grand Canal Square, Dublin 2



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The Crown Estate:
understanding building
performance

As one of the largest property managers in the UK, The Crown Estate has a portfolio worth £14.3bn in commercial, industrial and agricultural real estate.²⁴ The Crown Estate has set out three major aspirations for 2030²⁵ in conjunction with its Development Sustainability Principles:

- 1. Climate-proof business: By 2030, to be climate resilient, with portfolio decarbonisation and effective climate change adaptation in place.

- 2. Healthy places and habitats: By 2030, to be creating healthy places where customers, employees, communities and natural habitats can thrive.
- 3. Super-efficiency: By 2030, to have closed the waste loop using circular economy principles.

In order to better understand how its buildings are performing, The Crown Estate deployed Demand Logic, a software tool that provides live data intelligence on how a building operates. This was used to gather, analyse and visualise operational data across The Crown Estate’s Central London portfolio, a mix of old and new buildings.²⁶

The Crown Estate’s managing agents, BNP Paribas and JLL, are now able to use this systems analytics software provided by Demand Logic to identify actionable insights across a number of key assets. Additional building management system (BMS) specialist maintenance labour is available (over and above the standard scheduled maintenance) to respond to the issues that are raised, which to date have focused primarily on optimising plant run-times and comfort conditions. In addition, the systems analytics approach has supported a range of remedial works projects delivered by the managing agents, working in partnership with Arup. In these projects, systems analytics data have been used both to target remedial works in problem areas, and to validate the outcomes.²⁷

Another company with big sustainability targets, Landsec, claims that it could save 10–15% in energy usage per year with Demand Logic’s tools. And Microsoft has been working on energy saving solutions for several years: “Around 60–70% of the Microsoft campus has unified, integrated dashboards and reporting. We use this dashboard information to monitor our systems [and] see if we need to send out a technician... Our energy smart building software tells us the 500 most expensive faults, in a descending order of dollar value. And it predicts potential cost savings – for example, if we were to fix a certain issue, it would save us \$5,000 a year. These faults auto-generate a work order for issues to be fixed remotely or dispatched to an on-site technician.”²⁸



Pictured left
Cleveland Row, London

²⁴ https://www.thecrownestate.co.uk/media/3189/22668_the-crown-estate_ar_2019-interactive.pdf
²⁵ <https://www.thecrownestate.co.uk/en-gb/our-business/sustainability/>
²⁶ <https://youtu.be/DznXc41xnDs>
²⁷ FM 2.0.
²⁸ <https://www.microsoft.com/itshowcase/Article/Content/845/Data-analytics-and-smart-buildings-increase-comfort-and-energy-efficiency>

The latest innovation in understanding building performance space is the concept of a digital twin. Although the idea has been around since NASA created it in the 1970s, it has only recently been adopted by the real estate industry. The concept is that a digital twin is a model of a physical asset which allows physical and digital assets, humans, digital humans and social environments to exchange data. The purpose of a digital twin is to monitor and evaluate a building’s performance in real time, in order to derive insights for decision-making. But the digital twin concept can be interpreted and implemented quite broadly. The ultimate aim is to be able to apply AI and machine learning to automate and manage building functions. We are quite far away from achieving that goal.

Arup is currently involved in the construction of a digital twin of the Dutch Government’s County Hall building in The Hague – a replica of an office building of around 16,000 square metres. The process has involved the following steps. First, more than 30,000 data points from the existing building management system (BMS) were extracted. Second, a further 350 IoT sensors were added; these were specifically tailored to measure user interaction. Third, the dimensions of the physical building were translated to the virtual world using 3D scanning, and were linked to a scientific simulation model being fed with the sensor data.

The province, South Hague (in which The Hague is located), aims to have its buildings energy neutral in 2040. The Government’s strategy to achieve this is twofold: it will optimise current functioning of buildings, while renovating, uplifting and transitioning where needed. But, as with any building, energy meters do not indicate whether the current building is consuming too much energy. Furthermore, like any other building, the Province House, in the Hague



Pictured above
Air Street, London

is a unique building. There is no reference building against which to compare it. But, by building a virtual twin of the building, we can obtain an exact copy of the building against which to compare real-time data. This reveals not only whether the building is consuming too much energy, but also how much more than it should be, and where exactly the energy leaks are located.

A different approach to operations

Digital will modestly change the way we design buildings; the significant changes will really be in how buildings are constructed and in particular how they are operated. The primary challenge here, as with many aspects of digital transformation, is not so much the technology itself, but more the commercial, contractual and behavioural changes that

are required in order to realise the potential benefit that the technology offers.

One example is Facilities Management. Having more data about the building systems is not useful unless the maintenance contractors are also incentivised to use that data to identify and implement improvements proactively, instead of sticking to their schedules of tasks. Because they can look at their data more regularly and more granularly, they can make business and operations decisions based on proven and informed data. In this way, there is a behavioural shift in the way that maintenance is practiced which is technology enabled. Not only will this save on costs, with reduced labour and time resources, but it will also allow landlords to focus on enhancing their assets to be more sustainable, as opposed to just making them fit for purpose.

SECTION 3

Barriers to Uptake

KEY TAKEAWAYS

- Real estate is one of the most heavily under-digitised sectors. As the technology community are quick to come up with tech solutions, such as PropTech, there is still a mismatch between the solutions being developed by tech vendors and how they are deployed.
- A key reason for this is that value propositions for digital solutions are not aligned with mainstream real estate business models – although the rise of flexible space operators and the need for more operational data will change this. Proprietary technologies, little technology leadership and risk appetite also play a part.



The Edge, Amsterdam

To this day, real estate remains one of the most heavily under-digitised and conservative sectors. According to Bran Ferren²⁹ and a CB Insights report,³⁰ the global industry is lagging behind the curve of IT-based innovation by as much as five years. Insights from the KPMG Global PropTech Survey 2017: Bridging the gap show that as much as 66% of respondents did not have a digital strategy for their enterprise³¹ – quite an alarming proportion given the need for digital transformation across the industry.

Meanwhile, the technology vendor community is developing a plethora of PropTech solutions across the real estate value chain, including smart building solutions. ‘PropTech’ is the somewhat catch-all title given to anything tech related in the world of real estate, and the concept has seen a lot of hype over the past few years. The investment numbers are starting to match the hype: 2018 saw investment in PropTech increase to the tune of US\$20bn, exceeding 2017 figures by 38%.³² Projections for the end of 2019 forecast that investment funding will be on par with 2018 amounts, if not exceed 2018 figures by as much as 40%.

However there is still a mismatch between the solutions being developed by the technology vendors and what is actually being deployed in commercial buildings.

There are four main reasons for this:

- Value proposition not aligned with current real estate business models
- Legacy systems and proprietary solutions/vendors
- Lack of technology leadership
- Risk

Value proposition

The use of digital technology to deliver data and services in buildings has not been well aligned with traditional landlord business models. Typically, many landlords maintain a small portfolio made up of large, long-term leases, with terms of up to 10–15 years. At the end of each long lease, it is often in the developer’s interest to find new tenants, given that rent has likely significantly increased over those 10–15 years, and the developer will be able to negotiate more favourable terms in the new lease compared with the existing one. Roles such as facilities management, complaints and customer service are outsourced to third-party providers who provide basic services. Unless the landlord has particular needs for differentiation or data-driven operations (for example, The Edge building in Amsterdam and similar buildings elsewhere), digital buildings have not been mainstream.

As illustrated by JLL’s 3/30/300 (utilities/rent/payroll) research,³³ the most significant cost to a company occupying a building is not incurred through utilities or rent, but rather through payroll in the form of lost productivity. Considering that improving human productivity far outweighs the cost-benefit of optimising energy consumption, it is easy to understand why landlords and operators have been lacking the incentives to avail of PropTech solutions, given that, until recently, the available technologies primarily focused on energy savings and optimisation.



We are using 21st century technology to reinvent 20th century real estate rather than using it to provide the solutions needed in the 21st century

Yolande Barnes,
Chair of the Bartlett Real Estate Institute UCL

²⁹ Realcomm Conference Group, “Realcomm | IBcon 2015 Announce Keynote Speakers; Renowned Technologist, Bran Ferren, to Headline,” news release, 13 May 2015, <https://www.24-7pressrelease.com/press-release/406551/realcomm-ibcon-2015-announce-keynote-speakers-renowned-technologist-bran-ferren-to-headline>.

³⁰ CB Insights, Funding To Real Estate Tech Startups Skyrockets In First Half Of 2016, (2016), <https://www.cbinsights.com/research/real-estate-tech-startup-funding-trends-q2-2016/>.

³¹ KPMG, KPMG Global PropTech Survey 2017: Bridging the gap, (2017).

³² <https://www.ft.com/content/1c6e4c38-ef57-11e9-bfa4-b25f11f42901>

³³ <https://www.us.jll.com/en/trends-and-insights/workplace/a-surprising-way-to-cut-real-estate-costs>

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But as discussed in Chapter 1, tenants have new needs for their commercial real estate. They want spaces that enable productivity, that entice employees to come to the office, and that are highly sustainable and flexible. They are increasingly looking for a mix of permanent and flex space, with services that enable their employees' productivity.

Current market conditions are putting pressure on a landlord's top line. Today's vibrant start-up landscape means that a large number of premium renters are small growing businesses who could either scale exponentially within five years or disappear completely. Even established firms are adopting an agile mindset and seeking to rent a mixture of flexible/short-term spaces alongside traditional long-term leases. The consequence is that landlords have a larger and more diverse portfolio of leases, which combine a mixture of flexible and fixed rentals.

On top of that, companies like WeWork and Knotel are raising the bar for competition and attracting the most premium tenants by offering bundled services, ready-to-use tech features, and flexibility for a premium price. These market shifts prompt developers to consider how customer- or service-oriented they wish to be and, depending on this decision, which client segments they want to serve and what services these clients might require.



A word about data

Having data is not enough. Many organisations sit on large amounts of data – which are costly to collect and store – without being able to access them or actually make good use of them to solve problems. To make the most of data, companies need clear goals, targeted research questions and the ability to iteratively translate research questions into action (and vice versa). According to Grigor Hadjiev, Head of Special Projects at Allianz Real Estate, “Having data is core to our business, but data is not useful unless you ask precise questions that can influence actual decisions.” Furthermore, the data that’s presented to every user needs to be reliable. The speed with which a user will lose confidence in unreliable data is significantly higher than the speed with which they will regain confidence once that data becomes reliable again.

Companies such as Boston Properties have new roles, including Director of Data Services and Enterprise Data Architect, for experts in working with and handling data.

Looking at quantitative data alone also cannot help companies solve problems. All tech companies combine qualitative user research (small sample) with big data analytics in product design, as they serve complementary purposes: user research generates hypotheses and identifies problems, whereas big data validates findings at scale, quantifies impact and predicts future behaviours. Qualitative data can come in the form of user feedback, and is essentially a form of deep listening to building users. Knotel uses the anonymized data collected through its app to design better spaces for its customers.



Having data is core to our business, but data is not useful unless you ask precise questions that can influence actual decisions

Grigor Hadjiev, Head of Special Projects, Allianz Real Estate

The ethics of data is another area which needs further discussion. The ethical implications of widespread use of new technologies are not agreed upon. Undeniably, however, there is increasing disquiet about privacy and the use of personal data to target people for political or commercial ends. Privacy, trust and surveillance are key issues, particularly given the widespread deployment of Internet of Things technologies; one question is how to get people’s consent and build trust. The Centre for Digital Built Britain has published its Gemini Principles³⁴, which provide high-level guidance. While these principles are welcome, further debate about data ownership and privacy is required if we are to see a consensus in this area. This could be a key risk for so-called smart city developments: one of the reasons for Alphabet-backed Sidewalk Labs’ troubles in Toronto has been its approach to privacy and data management.³⁵

Although it is widely posited that ‘data is the new oil’³⁶, unlike oil, data currently really only has value in the business silos where it was generated. Pricing mechanisms for valuing data are only just emerging. This is particularly true for new data sources such as realtime data from sensors or social media. Exchanging and sharing this data is difficult because lack of commonly accepted standards and assurance mechanisms means it is difficult to compare like with like, and pricing mechanisms are not yet mature. Individual organisations are deriving great value from analytics and the ability to create efficiencies and even new offerings based on data, but the idea of data as a raw material which can be bought or sold (like ‘oil’) is not yet here. Finding new ways to collaborate that allows for sharing and value exchange will be key to opening up business models around data

and ensuring that value can be extracted from data beyond what could be created within individual companies. There is also a need for privacy and regulation to create trust – and open the way to data sharing. One such initiative is Icebreaker One, which aims to “bridge the data gaps between finance, assets, policy and science to deliver a zero carbon future”³⁷ by developing standards-based marketplaces for environmental & financial data.

“ Although it is widely posited that ‘data is the new oil’, unlike oil, data currently really only has value in the business silos where it was generated

Pictured below
1 Grand Canal Square, Dublin 2



³⁴ <https://www.cdabb.cam.ac.uk/Resources/ResourcePublications/TheGeminiPrinciples.pdf>
³⁵ <https://www.ft.com/content/9cd15bcc-fbff-11e9-a354-36acbbb0d9b6>
³⁶ <http://www.economist.com/news/briefing/21721634-how-it-shaping-up-data-giving-rise-new-economy>
³⁷ <https://icebreakerone.org/>

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Legacy systems and
proprietary solutions

Another major hurdle which inhibits the progress of digital real estate is the fact that most industry stakeholders rely on legacy systems with siloed data sets. As many real estate companies have their business logic deeply rooted in proprietary legacy systems, it is hard to migrate and modernise these systems without major losses to normal business operations.

There is a growing drive to extract more granular asset data on how a building is performing for reporting on various benchmarks, such as GRESB. This is far from being widespread, however.

With legacy systems, operators and maintenance teams are provided with very limited and poorly served data on building performance. As a result, it is difficult for these buildings to support the new demands for data and services.

The vast majority of buildings in the market are relying on traditional building data from the building management system (BMS), metering data, and even paper bills for reporting. As one technology leader for a large pension fund says: “We have looked at energy usage by combining data from energy sensors, energy demand and energy billing, but we had to do our own data integration, and had

to buy the data in from external sources – ideally they’d be in the building and aware of each other.”³⁸

These manual systems are no longer feasible sources from which to draw sufficient insights or fully take advantage of what a building might be able to say with data. This data will become increasingly more important in determining the valuation of portfolios. This is due to the rise in prominence of sustainability as a key feature of real estate business models and operating strategies.



Computer generated image of IPUT’s new office development, Tropical Fruit Warehouse, Sir John Rogerson’s Quay, Dublin 2

Technology leadership

Technology leadership in landlord organisations has traditionally focussed on the enterprise operations. Now with increasing digitisation of the built environment, new responsibilities and skills will be needed. Currently there is often an overall lack of strategic overview in terms of how digital technology can enhance services within real estate, and who is responsible for its implementation. The challenge is moving these new technologies beyond flagship projects and into the mainstream.

This requires an understanding of potential value, how the construction project can accommodate technology to minimise risk, how to manage complex stakeholder relationships where tenant systems need to connect to landlord systems (e.g. how to connect the building’s security system to each tenant’s user ID and meeting management systems).

New partnerships will be needed between facilities management and the IT function as their respective domains – the operational building systems producing data and the converged networks on which they run – merge. Furthermore, building user experiences based on services using digital technology in the building will need new models of leadership and management.

Risk

Taking these considerations together, it would seem that smart buildings have in the past presented too much of a risk to developers and landlords. The design of smart buildings can present developers with too many uncertainties requiring early decisions for properties that may only see the light of day years later.

There is often uncertainty about cost and return on investment, as the success of digital interventions can depend on detailed functionality and the nature of the organization using them. This makes it hard to run a rigorous return on investment on these initiatives.

Furthermore, the developer may not know who the tenant will be at the time design decisions need to be made.

- It may not be clear who will be responsible for the final technology implemented.
- Facilities Management teams may not be equipped to run very digitally enabled properties.
- There will also be ongoing risks in terms of cybersecurity and resilience which require specialist input.

The next chapter will examine how developments in business models, technology and governance are starting to address these barriers and risks.

“

We have looked at energy usage by combining data from energy sensors, energy demand and energy billing, but we had to do our own data integration, and had to buy the data in from external sources – ideally they’d be in the building and aware of each other



³⁸ Arup interview.

SECTION 4

What Does This Mean for Real Estate?

KEY TAKEAWAYS

- As tenants demand more flexible space and support from landlords to deliver new services and investors require more data, new business models will emerge, supported by user experience design.
- New approaches to creating smart buildings and the growing number of real estate technology leaders, will create more opportunities to successfully deploy digital solutions to address tenant and investor needs.



Will digital technology in buildings be as transformational as the elevator was for the skyscraper or the car has been for cities? We have yet to find out. But more nascent technologies, such as digital twins that can operate buildings automatically, or even the frictionless use of digital collaboration tools, combined with a sustainability-driven clampdown on business travel, could contribute to new building typologies and new types of urbanism.

In the meantime, digital technology needs to be aligned to what current landlords, tenants and investors want from their buildings. This chapter presents some suggestions for how to approach that requirement.

New business models aligned with user experience

The business model for commercial real estate is likely to change in ways that will demand a more strategic view of user experience and a more strategic view of digital technology:

- Tenants are starting to require more landlord support to deliver user experience and extract data
- New demands for flexible space provision will require more focus on data and experience
- New roles for asset managers as curators of services, requiring more data on tenants and on the performance of their assets.

This will require a strategic view of user experience, with new roles such as Chief Experience Officers and changing role of asset managers to be curators of services for tenants, managing ecosystem of partners. Landlords will need to work with operators such as JLL, Knotel, CBRE but not lose sight of their ultimate customers. They will need to work out how to get data and understanding of them. Using experience design in the early stages of design will inform key spatial decisions by understanding the current and future needs of a building's users.

When setting a vision and aspirations for a building, an understanding of current behaviours and technologies can highlight key trends and user expectations.

During the early design stages, experience design can inform key spatial decisions and challenge designs to incorporate new behaviours (e.g. space for delivery lockers; electric scooter charging points). User journey development should involve all disciplines in order to collaboratively translate the building vision into tangible experiences. As the design of the building progresses, service blueprints or designs can identify requirements for tender specifications (both for technology and for non-technology products and services), operational plans, tenant pitches, for ensuring performance during testing and operation.

There is not yet a standard approach for how to pay for these initiatives. In some markets this will be part of differentiating the building and attracting certain classes of tenants. Some technology will be required to support changing business models (e.g. operating flexible space). Some tenant services may be operated as pay per use, or be part of the service charge. Some technology solutions may allow for cost savings, e.g. having a better understanding of space usage may allow for estate rationalisation. It will be important to align services and the supporting technology to the overall development strategy and develop business cases for specific buildings.



Pictured left
Computer generated image
of Wilton Park, Dublin 2

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New approaches
to technology

Demand for smart buildings is growing: 30% of occupiers surveyed in CBRE's EMEA Occupier survey see smart building technology as a factor in choosing a building in 2019, up from 18% in 2018.

The reasons for this are threefold:

- Tenants want simple data that they can use to drive decision-making.
- As the user experience becomes more important, some experiences will depend on the building being able to support particular functions. For example, a tenant might wish to enable a better meeting room experience, with automated access to collaboration tools and optimisation of air quality and flow, enhanced by wayfinding based on participants' proximity to the room.
- Landlords increasingly need more and better asset data for reporting, maintenance and operations purposes.

In the past, smart or 'intelligent' buildings were driven by the BMS. But siloed systems, proprietary protocols and lack of interoperability restricted buildings' ability to support operational efficiencies or occupant experience. The lengthy replacement cycles (20 years) also meant that it was not cost-effective to upgrade or replace the BMS with newer equipment. IoT technologies have the potential to upgrade existing systems by extending and augmenting existing equipment, e.g. by placing sensors on boilers, chillers and other hardware in order to enable real-time monitoring of legacy equipment. Wireless connectivity can reduce the cost of this installation, demonstrating the potential importance of 5G in buildings.

Future models of managing buildings and facilities will use machine learning and AI to sense and respond to occupant needs and environmental changes. These advanced models will rely on large volumes of historical, non-dispersed and real-time data.

Smart enablement for buildings

Smart enablement takes a different approach to a traditional smart building integration project. Instead of tying systems together at construction stage, the building systems are enabled in the base build and landlord areas so that the occupier can build their own applications later to extract data or support the user experiences they want. While all organisations may share some basic experiential requirements (e.g. in-building wayfinding) different segments of organisations may have different needs for different types of data and elements of services – it is important to know which one the developer is aiming for.

Taking the approach of smart enablement can facilitate many of the benefits of a smart building, without having to put in place costly features immediately, which could become redundant or not suit the ultimate tenant's requirements.

“
Future models of managing buildings and facilities will use machine learning and AI to sense and respond to occupant needs and environmental changes





The Exchange, IFSC, Dublin 1



5 Earlsfort Terrace, Dublin 2

The key tasks are to:

- **Understand who the potential customers are**
Using experience design techniques, identify potential user experiences to help define the scope.
- **Establish consistent device and data naming**
Making sure that all devices and systems can be uniquely identified is key to being able to extract data later or automate those devices to produce particular experiences. A naming scheme is agreed at design stage for all design engineers to follow.

- **Implement a converged network in the building**
An Integrated Communications Network (ICN), also referred to as a “converged network”, is a common Ethernet communications network that can be utilised by all, or a select set of building related systems, such as: security, lighting, heating, ventilation, and air conditioning (traditional BMCS), energy and water metering, fire alarm, motorized blinds, base building Wi-Fi. The intent of the ICN is to replace all of the individual bespoke networks that were traditionally installed in a building into a single network. An ICN means that connection of future systems is relatively

seamless and streamlined with connections able to be established with minimal additional cabling and network infrastructure

- **Use internet standards and IoT gateways across systems**
This allows for applications to be built later, when the occupier is in place and knows what they need. Using open Internet standards moves away from traditional proprietary interfaces and makes it easier for software engineers to engage with building automation.



Design and procurement

Successful delivery of either a smart building or a smart enabled building relies on a mix of diverse skills, roles and responsibilities – managing the process can be complicated and difficult which will ultimately rely on the scope of services including team responsibilities and risk levels being clearly understood and procured correctly at the outset. A specialist consultant will work with the project team across the design stages to help identify and prioritise proposed user experiences, define the scope of systems and the naming scheme for devices. Technical specifications for individual building systems may be augmented with clauses relating to data and security requirements for the network.

Procuring the infrastructure and integration requirements for a smart building is relatively straightforward because the

physical requirements tend to be aligned to the traditional construction delivery process of specialist contractors who are responsible for the installation of the client’s IT infrastructure and building services control systems. Early engagement of a specialist contractor, working collaboratively with the project team, is key to the successful delivery of a smart enabled building. Applications and user interfaces can be procured later outside the construction contract.³⁹

A key benefit of delaying application procurement is that some business cases and contracts can be identified and let after practical completion of the physical building, when there is greater knowledge about the tenants and their business. This addresses some of the key risks associated with implementing digital technology – value can be apportioned and cost and ROI will be easier to estimate.



Successful delivery of either a smart building or a smart enabled building relies on a mix of diverse skills, roles and responsibilities



³⁹ James Wanless *et al.*, 31 May 2019, “Smart buildings – the case for smart enablement,” *Building*.

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Pictured above
Original timber beams at Tropical Fruit Warehouse, Sir John Rogerson’s Quay, Dublin 2

Approaches to retrofitting

New buildings are a relatively small percentage of the overall building stock – the annual replacement rate of buildings (the percent of the total building stock newly constructed or majorly renovated each year) has historically been about 2% in the US⁴⁰ and 1% in Europe. Most of the buildings around today will still be in use in 2050. So many of these buildings will need to be retrofitted in some way to provide more granular data and support new user experiences.

Retrofitting can be a complex process. The most important consideration is understanding what the requirements are and why – what data is needed, what experiences or services need to be provided.

Then there may be several ways of delivering those requirements.

- The first thing is to understand the capabilities of current building systems and explore whether they could be commissioned differently to enable the requirements.
- Depending on what needs to be measured, there may be lightweight sensors which could collect particular types of data (e.g. fine-grained air quality data), uploaded to cloud storage through 5G or Wi-Fi.
- More comprehensive requirements such as extracting granular data from legacy building management systems (BMS) may be delivered through a smart enablement approach, using

a consistent naming scheme to uniquely identify individual pieces of equipment in the building, and a converged network to connect them all. This can involve a lot of manual work to implement the change but then could allow for monitoring and control of specific pieces of equipment such as chillers or pumps across the portfolio.

Technology is developing all the time to address particular needs and niches. The key success factor for implementation is being clear about the expected value and putting in place roles and responsibilities to manage the design and deployment.

⁴⁰ <https://www.usgbc.org/articles/existing-buildings-99>

New leadership roles

Some leading organisations such as Lend Lease, Boston Properties and Hudson Yards have put senior digital leadership in place to identify and implement where technology can better support or disrupt the business. At an industry level, more digital governance is needed, at an organisational level with new roles, such as Chief Technology Officer and even Chief Experience Officers and new collaborations, such as between Facilities Management and Information Technology. These roles should support new business models, understanding customer needs to support the design of new experiences and services. They should take on new approaches to data management – for reporting and to support the development of other roles such as asset management.

A big change for developers is in asset management. Now that tenants are asking for more – shorter leases, as well as more flexibility, services, technology and sustainability – it is more challenging to maximise assets to provide a good return on investment. The role of the asset manager will change to be more data driven; using customer oriented data will be vital to future decision making. Taking a data-driven approach can also help manage costs and cut down on expenses that are not directly delivering a good return on investment, improving customer experience, or delivering on social value and sustainability. Data, when paired with capable analytics and leadership, help align an organisation’s investments with its goals.

Where previously many landlords relied on outsourcing operations to JLL or CBRE, or to a host of FM managers and other services, this increasingly presents a risk, as it creates a disconnect between the landlord and the ultimate customer. In a service economy,

access to data and customer insights is a powerful competitive advantage, and companies such as JLL and CBRE are also looking to capitalise on their expertise through competing co-working services such as CBRE’s Hana.⁴¹ Furthermore, decentralising the operations and management of a building can make it challenging to enable all of the systems and behaviour changes needed to adopt more sustainable, climate-conscious practices. The trade-off between maintaining a slim organisation (but potentially losing a competitive edge) and expanding into a customer-facing service organisation must be carefully considered. Even if landlords do not operate every aspect of the business themselves, they will want to be the curators of the right mix of processes and services, and bring these together in a holistic way for tenants. Once again, having access to data analytics across different aspects of the business is vital in shaping the right partnerships.



The role of the asset manager will change to be more data driven; using customer oriented data will be vital to future decision making

Pictured right
Riverside 1, Dublin 2



⁴¹ <https://www.cbre.com/real-estate-services/directory/flexible-space-solutions>

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Pictured above
Culture Night 2019 – light projection mapping onto IPUT’s offices at 47-49 St. Stephen’s Green, Dublin 2

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IPUT Real Estate Dublin

47-49 St. Stephen’s Green
Dublin 2, D02 W634, Ireland

T +353 (0) 1 661 3499
E info@iput.com

Media Enquiries

Jonathan Neilan
FTI Consulting

T +353 (0) 1 765 0886
E jonathan.neilan@fticonsulting.com

iput.com





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IPUT **REAL ESTATE** DUBLIN

IPUT plc
47-49 St. Stephen's Green, Dublin 2, D02 W634, Ireland
T +353 1 661 3499
info@iput.com

iput.com

