London Technology Club

Future Technology Series: The Future Technology in Property Report

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london technology club.com

Foreword on the Future Technology Series: Property

As an asset class, real estate is the world's largest store of wealth. Commercial real estate alone has a value of over $30 trillion and accounts for eight per cent of global mainstream assets. There's no bigger industry more ripe for technological disruption, with commercial real estate tending to lag behind other sectors in embracing digital transformation.

I discovered this a few years ago while working in New York. I'd previously looked at the ways digital technology could transform the food, content management software and venture capital industries. However, when trying to help other companies find suitable workspace, I found the whole process to be hugely inefficient and incongruous to the fast pace and flexibility that businesses require today. This led to the birth of Knotel.

Solutions always derive from customer needs. This is why tools and platforms that address specific customer pain points, while delivering customisation and flexibility for the end user, are key to helping commercial real estate catch up in the digital transformation race.

This new report from LTC shines a light on two issues that are critical to the future of commercial real estate. The first is inefficiency. At Knotel, we're tackling the inefficiencies of traditional, inflexible leases that don't reflect the rapidly changing needs of customers in today's market.. The second issue is space optimisation. At Knotel, we found that reducing operational complexity and following best practices in workplace strategy helps our tenants and landlords make the most of the expensive real estate they own and occupy. Moreover, the smarter use of space reduces energy consumption and waste, boosting sustainability for any type of business. Now we're seeing the whole industry embrace and support this new way of thinking.

Although we're still in the early stages of providing technology that shifts the industry away from traditional leases to flexible workspaces, there's no doubt that commercial real estate (CRE) leaders are recognising the need to become more adaptable and flexible in their strategy. As highlighted throughout this report, the failure to embrace transformative technology will mean being left behind.

As members, we'd like to thank LTC for choosing property as the focus of this report and for recognising Knotel's ongoing involvement with the club.

Edward Shenderovich
Knotel co-founder and chairman

About the London Technology Club

Simon Pavitt
London Technology Club
Chief Operating Officer

The London Technology Club is an exclusive community of family offices, private and institutional investors, venture capital firms, technology experts and influencers. The club combines co-investment opportunities, education and relationship-building opportunities in the tech sector under one umbrella and provides access to competitive VC funds with attractive returns.

We organise events with leading technology visionaries, entrepreneurs and investors. A number of prominent international investors are members of our Advisory Board, such as June Felix, CEO of IG Group; Chris Rust, GP of Clear Ventures and ex-partner at Sequoia Capital; and Itzik Parnafes, GP of Battery Ventures.

Future Technology in Property is the first in our 2020 Future Technology reports series. The first series in 2019 covered Formula One™, wine, art, longevity and philanthropy. All of these are available, in full, on the LTC website.

Tech companies in property are hot right now, with more than $14 billion invested in them in the first half of 2019 alone. While other industries have been thoroughly disrupted by technology, this recent influx of investment is partly due to the fact that the CRE sector has been slow to adopt and apply the same technologies.

Certain concepts remain the same: location, location, location, for example. However, efficiency, transparency, intermediaries, decision making and space maximisation are now coming to the fore within the industry. The impact is being felt throughout the property chain: from the tenant experience to developer strategy, the office worker experience to investor decision making.

'Proptech' is causing a rethink around how physical space is used. There is a significant shift around harnessing non-traditional data for better decision making. The increased adoption of artificial intelligence and machine learning will accelerate this, especially around linking external spaces to those occupied by individuals.

The threat of failing to use technology and very quickly becoming a legacy solution is real. This report outlines where the pace of adoption is picking up and who is driving change within the property industry.
Put simply: failing to embrace new technology is no longer an option for real estate. And there has probably never been a better time for emerging companies seeking to reinvent real estate.

The second of our 2020 Future Technology Series reports will look at nutrition and will be published in April 2020.

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01 The Vision Summary

"There is no future proofing— from inside my buildings to my entire portfolio, it's just continual monitoring, measuring and agile management"

Executive Summary:
A vision for the future?

This could be a typical day in the future for a property entrepreneur:

It's funny to think that not so long ago, real estate was considered an illiquid asset. As distributed ledger technology became widely adopted and real estate could be fractionalised, it meant smaller players like myself could be so much more agile and proactive. I still can't believe how long it took the industry to fully digitise!

While it started with the likes of Zoopla and Zillow disrupting, the floodgates really opened in the early 2020s where the traditional incumbents started to be shown up as dinosaurs. The winners were the forward-thinking players that adopted active property management and made the decision to embrace technology to enhance transparency and operational efficiency as well as improve tenant experiences.

My day starts with checking my property exchange to see the latest on some of the real estate that I fractionally own. Today I cash out on a couple to give myself some extra liquidity.
I have simplified so much of my workflow with natural language processing (for lease analysis and title insurances) and blockchain (for transaction systems). For most of my real estate deals, once I've decided on them, automation can take care of the red tape. I can now make faster decisions and act upon them more quickly.

With trust in these technologies now the norm across the industry, we can't believe we did it any other way in the 'old days'. No dual paths and legal constraints anymore. I work chain-free and mostly off-market. Speed and precision. Nowadays I have access to tools that can provide insight in 15 minutes that, in the past, would have taken three months of research.

My morning usually consists of virtually viewing 10 properties from around the world via virtual reality (VR) that have been selected for me by predictive analytics and my property search platform assisted by artificial intelligence (AI). I have identified and developed my own non-traditional data sets on top of metadata analytics allowing me to get 'macro' one minute and then hyper-hyper-local the next for certain trends. No more gut instinct or cognitive bias for me.

However, I am still a fast follower of the most sought-after coffee chains and opinion-leading foodies and retailers, as they have billions of pounds resting on their analytics finding the right up-and-coming locations.

Within my portfolio, I have embraced hybrid hotels to maximise the space. They are specific in their audience demographics, and their business/travelling needs align with the types of workspace, residential and retail tenants we have. We think like a consumer business—we don't just own 'dumb boxes'. With residential, my mantra is, 'Don't sell a flat, sell a lifestyle.' I am so much more considerate now about who I am targeting and what lifestyle services I need in my placemaking.

As such, my occupancy rates are optimal—I am so thankful for the death of the traditional lease (like many things in the industry that were found to be not fit for purpose, 10-year terms and significant upfront costs are no longer relevant) and demand for flexible workspaces and the shift in consumer appetite for more short-term rentals and frictionless living. Members of 'Generation Rent' are happy to outsource everything-as-a-service.

I walk to my office—working out of my own multi-family property. All the tenants across the one-acre site like the variety of different brands using the retail space for short-term shops based on the time of year. It's become a destination for like-minded people. I am fully aware of thinking holistically about the space I own and the space around my space. The future of real estate is the relationship between biology and infrastructure.

I have a team of 50, but only 20 are in at any one time to avoid empty-office syndrome. We monitor usage and adjust the space accordingly. We come to work, not to co-work. Talent maximisation is everything—better-performing businesses equal better value propositions to developers. My smart buildings, thanks to IoT (the Internet of Things), are full of connected devices linked to my predictive maintenance dashboards. Most maintenance is foreseen and automated now. My role now is search, supervise, sell.

Due to neuroscientific advances, I measure the impact the surrounding area has on my wellness. If it's negative for me, it will be for others, so I look to proactively adjust the space and facilities where possible to maximise positive experiences. There is no future proofing—from inside my buildings to my entire portfolio, it's just continual monitoring, measuring and agile management.

Some quick definitions

Proptech (also referred to as property technology or real estate technology) is a "set of cross-industry technologies changing the way we research, rent, buy and manage property"[1]

For this report, we have focused more on the 'built environment' rather than on real estate development, construction technology (contech) or urban planning/systems. We have deliberately avoided ground-up development of real estate, including planning, design, materials, purchasing and construction management.

There are some great technology companies in those spaces worth looking at, including Aprao (cloud-based real estate development appraisals), Basestone (contech digital delivery platform), Procore (cloud-based construction management software), Spacemaker (building site and planning process AI) and Studio FIP (3D architectural visualisation).

1 proptech.capital

02 Digitalisation and investment decision making

"It takes little imagination to envision how the real estate market could remake itself if fractional ownership in individual properties traded with the same fluidity, transparency and costs as equities."

Real estate is in a period of digital adoption, which is driving lightning-speed change and challenging existing methods and legacy technology. These new technologies, and the resulting data, enable property professionals to improve efficiency in tasks and reporting. They also enable automation of processes, make possible faster and more accurate decision making, and provide better and more sustainable buildings. Ultimately, this not only makes our buildings and cities better places to work and live, but also improves the bottom line.

According to Arnie Sriskandarajah, managing director of leading PropTech venture capital firm Round Hill Ventures, real estate is "an illiquid asset" in which "fragmentation and traditional characteristics of the sector have been barriers to innovation".

> *"The fragmentation and traditional characteristics of the sector have been barriers to innovation"*
>
> **Arnie Sriskandarajah, managing director of Round Hill Ventures**

Sriskandarajah says new technologies "can enable digitisation, which provides a range of opportunities to streamline inefficient processes, and increase operational speed and profit margins". He concludes: "Even as the largest asset class, real estate still falls victim to scarce resources and inefficient processes, but the industry can be transformed."

Properties trading like equities

By Aaron Powers, CEO of Hunit

Despite the large sums being deployed and [the property sector's] central position in most investment portfolios, the last significant innovation in [the] sector occurred in 1960, when US President Dwight D. Eisenhower enacted the law that enabled a new form of investment vehicle: the Real Estate Investment Trust (REIT). Having proliferated to most major economies (37 at the last count) and encompassing $1.7 trillion in assests[1], these tax-optimised vehicles enable virtually any investor to make liquid, index-style investments in large, diversified real estate portfolios.

There were three broadly available real estate investment strategies:

- Active: buy and hold (leveraged or cash, revenue generating or not)
- Active: buy, improve and sell
- Passive: index investment via REIT

Despite the investor-facing differentiation, all approaches are constrained by the same underlying market limitation: real estate transactions are full of friction. They are costly, time consuming and (generally) involve large amounts of capital from a single source, increasing risk and the need for costly due diligence.

The impact of high transactional friction incentivises the market to minimise the number of transactions. This creates a dynamic where portfolio yields (for either individual investors or REITs) are depressed, as mediocre investments are held rather than sold, and asset-value transparency suffers as the market re-prices assets only when they are entering or leaving a portfolio. The result is a duopoly of investment strategies: capital-intensive, high-friction and low-liquidity positions or low-friction, high-liquidity and passive index-style investments.

> "It takes little imagination to envision how the real estate market could re-make itself if fractional ownership in individual properties traded with the same fluidity, transparency and costs as equities.

Investors could engage in active portfolio management strategies, perennially pruning positions in low-performing properties for ones that favour desired criteria such as short-term capital appreciation, long-term cash yields or recession-resistant 'blue-chip' prestige properties.

Property owners could effectively 'float' portions of their holdings, achieving liquidity in a traditionally illiquid asset class as well as benefitting from increased asset-value transparency through continually updated market pricing.

Entirely new models could emerge, such as platforms allowing residential homeowners to redeploy a portion of the equity currently locked in their homes into a diversified portfolio of properties, allaying single-market structural risk and allowing them to deploy capital into cash flow-yielding properties.

Some of this could be achieved through the creation of single-property, exchange-traded REITs—to the extent that such a configuration would be allowable by applicable national REIT regulations. But the costs of administrating an exchange-traded security puts this out of reach for all but a handful of the most valuable properties globally. Smaller, non-listed REITs (or other types of private-market, special-purpose vehicles) could cost-effectively hold single-property portfolios, but currently lack the ability to represent fractional economic interest in them using a fluid digital market.

1 ey.com

DLT and smart contracts

The primary innovation of distributed ledger technology (DLT) is to create trust and transparency in markets lacking a centralised agent, such as an exchange. Often confused with so-called cryptocurrencies (such as Bitcoin) or the 'regulations-be-damned' initial coin offerings (ICOs) of 2016/17, DLT is a distinct class of technology that can be applied in numerous industries and use cases.

Often deployed in private ('permissioned') corporate environments, its low-cost transparency has allowed groups like Wells Fargo[1] and HSBC[2] to achieve significant internal efficiencies in managing previously high-cost processes associated with clearing and reconciling internal transactions. In the case of HSBC, $20 billion of paper-based investment assets were digitised in one go.

1 reuters.com
2 forbes.com

In a financial setting, DLT uses 'tokens' recorded on the distributed ledger to represent individual investment instruments: bonds, equities or other innovative forms of fractional ownership. When used to represent assets that are subject to specific regulations or to make commitments (covenants) to investors, a token's behaviour can be determined by an adjacent technology known as a 'smart contract'.

While the term encompasses a broad range of functions and levels of sophistication, current market-leading examples constitute legally binding agreements that also direct computer systems to perform actions when certain conditions are met, reducing or eliminating execution risk. In addition to providing operational efficiencies through features like automated payments or regulatory reporting, smart contracts can fulfil critical, centralised-market functions, such as assuring that a token is held only by investors from permitted geographies or accreditation statuses. Together, DLT and smart contracts provide the technical means to digitise existing private-market, paper-based investments (such as those found in the large and growing 'alternative investments' market). But they also provide a basis for the creation of new types of investment structures not viable without a fluid and trusted digital market.

A present and growing market

Tokenisation of real estate is occurring and deal flow is increasing. One of the first examples was the $18 million sale of 20 per cent of the St. Regis hotel in Aspen, Colorado[3]. Whether through prescience or luck, the structure of this early use of DLT technology included traits that are now emerging as success factors: it was a partial sale of an individual property by an existing owner/operator. Trust was enhanced through its retained majority ownership stake and forecastable investor cash distributions based on robust historical data.

3 fortune.com

Not all endeavours have met their goals: a Manhattan property development seeking to raise $30 million was called off in 2019 due to distribution and marketing challenges[4]. That deal sought to raise capital for an unproven development with little external balance sheet to underpin investor security. Other deals that sought to raise capital for diversified pools of real estate also met challenges. This indicates the market is hesitant to engage with structures with poor balance sheets or those that show uncertain benefits over today's REIT sector.

But these failures are more than counter-balanced by the growing number of successes. Amongst others[5][6][7] notable deals include the tokenisation and sale of 30 per cent of a Nottingham student residence[8] and the January 2020 tokenisation and sale of 80 per cent of a Zurich office building[9]. Tellingly, all of the deals cited above were based on the tokenisation of individual properties by their existing owners, who subsequently retained substantial stakes (and who presumably continue to manage them). New deal flow in this model appears to be accelerating, with the recently announced programme to tokenise more than $600 million of individual properties by Alliance Investments. The tokenization starts with a 180-unit residential property in Manchester[10].

4 thetokenist.io
5 ico.li
6 blog.brickblock.io
7 forbes.com
8 thetokenist.io
9 swissinfo.ch

Winners in tomorrow's markets

Signs indicate that individual property tokenisations can precipitate a shift in assets worth more than $1 trillion. The biggest initial beneficiaries will be today's property owners, soon to possess new tools for improving their return on capital. Within this group, the largest winners are likely to be property owners focused on active property management. Presumably, a well-run property will amplify investor demand for its tokens via its stronger cash flow performance (resulting in higher property valuations). As a further benefit, management excellence opens the door towards asymmetrical returns on capital: profit-generating services to partially owned properties provide the opportunity to generate a larger percentage of overall returns via management revenues as capital is redeployed across a broader number of properties needing best-in-class management. Going even further, performance incentives could conceivably operate so as to be structured to provide an increasing share of property revenue to the management service provider when baseline investor covenants are exceeded.

10 thetokenist.io

Similarly, tokenised service providers like those participating in the cited deals will serve an important role in helping the property market in its transitional steps. But as the tokenisation process is already heavily reliant upon the legal services industry, cost-effective tools allowing these professionals to create DLT-based instruments on their own will likely soon outcompete specialist service providers when measured on cost and scale.

UK-based DLT/smart-contract technology startup Hunit asserts that the big shift in the market will occur when these technologies have been demystified and brought out of the realm of specialist service providers and put into the hands of today's industry professionals[11]. As most users of social media can confirm, the creation of mass-market, user-friendly web platforms precipitated a boom in innovative and compelling retail products. Similarly, the in-house creation of DLT-based investments by today's legal professionals will accelerate the creation of a large, vibrant market of tokenised properties and unlock new investment opportunities within one of the world's oldest markets.

11 hunit.com

Fractional ownership marketplaces

Mintus, a new company on the proptech scene is the world's first marketplace to facilitate fractional ownership of assets focused on prime commercial real estate and fine art. Mintus creates scalability on the supply side and accessibility and democratisation of ownership on the demand side. Their pledge is to 'own the unownable' with its DLT technology.

Each asset is owned by a Special Purpose Vehicle (SPV) which is set-up an investment company where secure units shares/tokens are issued reflecting a proportion of the underlying asset values. This process will be regulated by FCA's AIFM (Alternative Investment Fund Management) regulation providing investors with security of their investments.

Partnering with well-known asset managers in CRE, and partnering with museums in Fine-Art, Mintus are using its partners' origination, underwriting and due diligence expertise to deliver expected returns for investors. In Fine Art, the same institutions will display the asset providing insurance cover during the lifetime of the investment, and in CRE the asset manager with a strong track record will manage the investment to ensure value is enhanced. Shares/Units/Tokens will be distributed by private banks, institutional wealth managers and family offices. through a white-labelled platform provided by Mintus ensuring a broad investor base in order to create more liquid marketplace.

"Our initial focus will be with private banks and wealth managers adopting our easy to use APIs to seamlessly integrate Mintus" says founder, Tamer Ozmen, ex-CEO of Microsoft Turkey. "Wealth managers will be able to provide access to real-time pricing, allowing them to manage real estate and art investments in the same way they manage other asset categories for their clients".

"The benefits are clear" adds Harin Thaker, Mintus Interim CEO and ex-CEO of German Real Estate Bank Hypo "no financial barriers to investment, no jurisdictional dependence on geography, reduction in legal and processing fees, short settlement processes, liquidity for investors with no timing restraints and low trading costs with provenence and authentication secured. We have the capability to issue as many fractions against as many assets and our platform allows a very secure and scalable trading platform."

Reducing inefficiencies

Despite the utility of property as a store of value, the buying, selling and trading of real estate has remained a lengthy, complicated and expensive process.

As per Hunit's point of view above, DLT may well provide the opportunity for property as a medium of legal exchange—the ultimate asset that more people can own and trade. Companies like TPX Property Exchange are opening up real estate to global investors. TPX designs, delivers and operates global real estate exchanges using DLT, artificial intelligence, messaging, cybersecurity, storage and smart contracts to transform legacy real estate workflow processes into a fast, efficient, liquid and secure, global property trading system.

Documentation

According to PwC[1], the average mortgage application is 500 pages long and takes 30 to 60 days to complete. There are so many steps and intermediaries involved in taking out a loan that the average cost of obtaining one is almost $9,000.

Leverton, a company that uses deep learning algorithms, provides accelerated real estate document abstraction services. Leverton's platform uses natural language processing and other machine learning capabilities to extract and structure relevant information from complicated documents related to purchase, sale, lease, title insurance and mortgage transactions.

Investors in Leverton include JLL Spark. According to Guy Grainger, JLL's CEO for EMEA: "We have come to the realisation that there is a lot of workflow in what we do, and that many processes can be automated out, enabling faster decisions. For example, our partnership with Leverton allows us to provide a more accurate and quicker lease analysis service than we could otherwise give. We benefit from the increased speed, whereas access to our data allows Leverton to improve its product."

In the UK, HM Land Registry deals with over 20 million enquiries each year, 5.5 million of which concern changes to title. A report by *The New Stateman*[2] found that delays occurred in close to 40 per cent of all transactions surveyed.

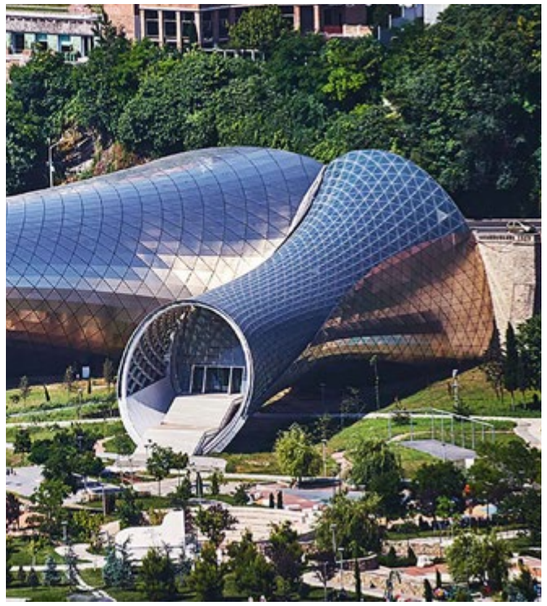
Deloitte[3] highlighted a serious inefficiency under the present conveyancing process in that "auditors, banks, financial authorities, ap-

1 cointelegraph.com
2 newstatesman.com
3 deloitte.com

praisers and owners each individually have to validate the data which they receive. All these validations result in higher transaction costs in the brokerage, legal, recording and banker fees".

Sweden-based ChromaWay has developed a private blockchain-based transaction system to eliminate the need for multiple verifications of the same data. Chromaway has provided live demonstrations of a fully integrated blockchain transaction involving collaboration from the Swedish land registry as well as numerous IT companies. Companies such as Chromaway will be able to save costs and time for property acquisition through technologically supported land register rewriting.

Countries such as the UK, Sweden and Ukraine are also testing blockchain applications to record national transactions. They are being aided by companies such as UBITQUITY, which provides a 'record-keeping SaaS' for real estate deals that can be used by governments or title companies.



The National Agency of Public Registry (NAPR) of the Republic of Georgia, in partnership with The Bitfury Group, is using blockchain technology to provide its citizens with a digital certificate of their land titles. This blockchain pilot currently enables registration of the purchases and sales of land titles and registration of new land titles.

Propy, headquartered in Palo Alto, developed a Transation Platform with payment and a settlement protocol on smart contracts. The National Association of Realtors invested in Propy in 2019. Their mission is to automate home-buying. They are a recognised brand in real estate due to the first transactions of physical assets on blockchain.

The company has created a marketplace that consists of a listing site, a transaction platform to exchange documents, and a blockchain-based registry that does not need third-party agents to process transactions. Payments are exchanged on the Propy platform, thereby reducing wire fraud. Propy has completed several transactions on its platform. Essentially, end to end transation management platform that streamlines the back-office of brokerages, developers and iBuyers.

There is still nervousness about relying purely on blockchain solutions and, due to current legal constraints, companies such as Propy need to follow a dual path of completing the transaction in the traditional fashion while recording in a parallel blockchain procedure.

The rise of non-traditional data

According to Anu Maakan, CEO of GoLet4me, real estate as an asset class "is complex, volatile, fairly non-transparent, beset with high costs and involves a multitude of middlemen and participants in the chain. Advances in big data and predictive analytics can bring improvements."

Property-related data has traditionally focused on the fundamentals of market performance (e.g. median household income, property performance/vacancy levels), property features (e.g. year built), rental growth, capital availability, cost of capital and transaction activity.

However, the type of data will change, according to Round Hill Ventures' Arnie Sriskandarajah:

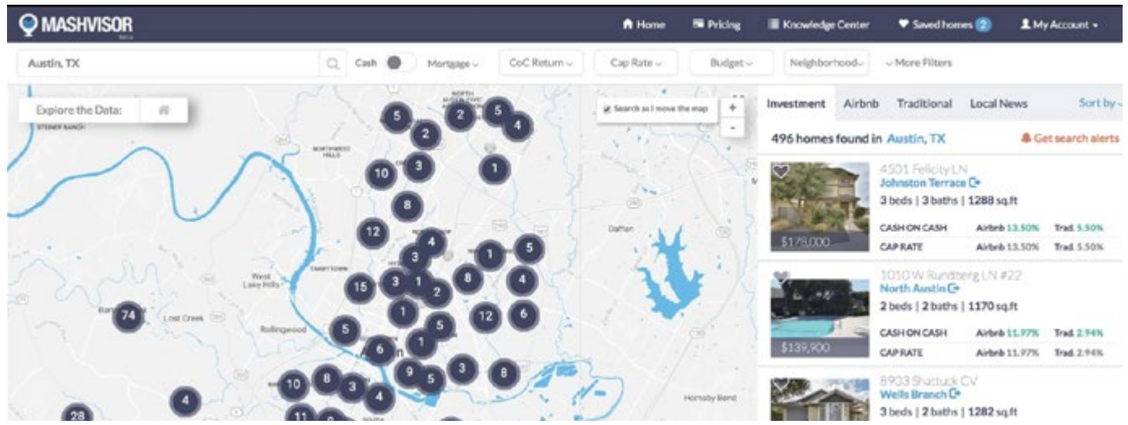
> *"Data will play a big role across real estate development, investment and management—technology will not only enable the use of existing, accumulated property data but bring new non-traditional data sources to light."*

Some, such as real estate investment management firms like Round Hill Capital, have been faster than others to respond. Round Hill Capital incubated Round Hill Ventures to capture the value created by technological innovation to deliver impact in the built world. Embracing technology early on has given Round Hill Capital a 'first-mover' advantage, as a leader in a very competitive, fluid market.

JLL Spark is a notable frontrunner in the proptech space, being one of the first real estate incumbents to set up a strategic venture fund. It launched its $100 million global investment fund[1] in June 2018. JLL's notable strategy, in the words of global CEO Christian Ulbrich, is "to become a tech company that works in real estate".

1 prnewswire.com

Predictive analytics



"Predictive analytics will allow investors and developers to make better purchase / rental decisions, assess when and where to invest/ divest and to determine the real value of properties."

Anu Maakan, CEO of GoLet4me

McKinsey reported[1] that resident surveys, mobile phone signal patterns and Yelp reviews of local restaurants can help identify 'hyperlocal' patterns—granular trends at the city street level rather than at the city level. Macroeconomic and demographic indicators, such as an area's crime rate or median age, also inform long-term market forecasts. The suggestion is that nearly 60 per cent of predictive power can come from "non-traditional variables".

"Two properties that seem to have identical investment potential can experience very different growth trajectories," says GoLet4me CEO Anu Maakan. "Competitive forces and changes in the needs and demands of tenants and investors is going to create a shift. Those who can add value to the decision-making process via data and analytics will win."

Predictive analytics can also help guide investors in managing their rental property in a more effective way, resulting in a higher return on investment. For example, as highlighted by Maakan, in Mashvisor's Airbnb Pricing and Occupancy Insights, the company is able to predict what key variable should be focussed on and what needs to be done to increase future occupancy rates, which in return will increase future cash flow. The same analysis can be used for the design of the home—should an investor buy a property with one, two or three bedrooms and how many bathrooms should be included? All of this is critical information that goes into determining the investor's highest return when it comes to purchasing a property.

Skyline AI is an artificial intelligence investment manager for commercial real estate. The company partners with leading commercial real estate firms to establish next-generation investment vehicles, enhanced by AI and machine learning models. The startup uses more than 200 non-traditional data sources going back over 50 years, including interest rates, financial performance and demographics to make algorithm-based predictions for the commercial real estate investment process.

AI investment management supports faster, more confident decisions that achieve better performance. The belief is that decision making in property can be subjective and has in the past relied on significant bias.

One company receiving significant attention (and creating a buzz with its market insights) is PriceHubble. The company was created to improve the understanding

1 mckinsey.com

and transparency of real estate markets based on data-driven insights.

PriceHubble includes innovative and non-traditional factors for real estate valuations in its digital solutions. It aggregates and analyses a wide variety of data, runs big data analytics and uses state-of-the art machine learning to generate valuations and predictive analytics for B2B and B2C real estate customers.

The company is run and supported by an international group of investors. The team brings expertise in data, machine learning, real estate and turning startups into sturdy companies. It serves players across the whole real estate value chain: investors, developers, property managers, banks, realtors and portals. It currently operates in France, Germany, Switzerland and Japan, with headquarters in Zurich.

According to founder and chairman Stephan Heitmann: "We amass large volumes of multidimensional data to distil actionable, easy-to-read and visually appealing insights. We use the latest machine learning methods and have a deep understanding about locations and

neighbourhoods. Partners can integrate our insights into their workflow either via our API or our convenient app."

The latest results of one of PriceHubble's studies showed a clear correlation between newly opened innovative cafes and rental developments in Switzerland[2]. PriceHubble data experts analysed 540,000 offers during a 15-year period from 2004 and a set of randomly selected innovative cafes across Switzerland. It found that rental prices of properties close to newly opened innovative cafes increased on average by 6.1 per cent during a three-year period. This was 2.4 per cent faster than the average increase in the corresponding city.

Such findings follow previous findings by the likes of Zillow, which highlighted data correlations such as how a Starbucks store opening increases home and property values. More specifically, the data shows that, between 1997 and 2014, properties closer to the coffee shop increased in value by 96 per cent, compared to 65 per cent for all US residential properties. The effect was biggest in Boston[3]. There have also been similar findings for Waitrose[4] and Soho House[5].

2 handelszeitung.ch
3 zillow.com
4 idealhome.co.uk
5 countryandtownhouse.co.uk

03 Commercial Real Estate

"If co-working disrupted the commercial office. Airbnb redefined the traditional hospitality industry with short term rentals (STR). Multi-family is now being disrupted, fuelled by disruption in commercial and hospitality..."

Flexible office and co-working space

According to proptech and real estate technology investment company JLL Spark:

> "We are at the centre of the largest revolution in commercial real estate this century, with 30 per cent of corporate portfolios expected to be flexible office space by 2030."

The co-working space has received significant attention, driven by the challenges faced at WeWork and SoftBank. The failure of office space company WeWork to go public has been well documented with the focus on its losses and the ousting of its CEO, ultimately reducing its valuation to $8.5 billion from $47 billion.

According to Nick Russll of Conception X, "Co-working is a huge sector and winners are just now emerging. While WeWork stumbles, others such as Ryan Simonneti's Convene rises. Soho House Group is launching eight floors of of coworking with its new property on 180 The Strand, London this year. And why not, it's an evolution of the membership club. Far from co-working being dead or done, WeWork really just started the movement".

Whilst co-working has been grabbing the headlines, others have been disrupting the global office space market.

Knotel, founded in 2015 in New York, has quickly grown to 200 locations in 15 cities. The company's focus has been on the 'office cloud' for the Global 2000 rather than co-working or shared spaces. Knotel is a tech-enabled platform that enables companies to innovate and scale by offering flexibility in lease term, fit out and operations.

"We have differentiated ourselves by providing a turnkey alternative to traditional commercial leases and leveraging data-driven technology to increase market efficiency,"

says founder Edward Shenderovich. "We create efficiencies in matching supply and demand while providing benefits to both tenants (flexibility, savings) and landlords (sustained occupancy, higher yields). Our customers (over 240 of them) are typically enterprises with 40–500 employees, ranging from blue-chips to startups. We allow our customers to focus on workplace culture and core business without any distractions."

Knotel offers customers fully branded spaces with tailored term lengths, lower expenses (security deposits, operating costs and build-out capex) and a faster time to market. Landlords benefit from access to new tenant profiles, sustained occupancy and enhanced yield on investment.

As the market for workspace providers continues to evolve, new entrants are coming in to carve out their own niche. In London, for example, there is Huckletree with a focus on tech businesses working alongside each other and Runway East focusing on start-ups networking.

In Europe, Unicorn Workspaces is a fast-growing shared office provider, with 21 workspaces in Berlin, Potsdam, Cologne, Munich, Hamburg and Lisbon. Unicorn has been offering affordable and eco-conscious workspaces since 2015. Their vision is of 'workspace as a service' provides the offer of offices on a subscription basis—through flexible lease contracts, customer-centric service, functional design and eco-conscious work environments.

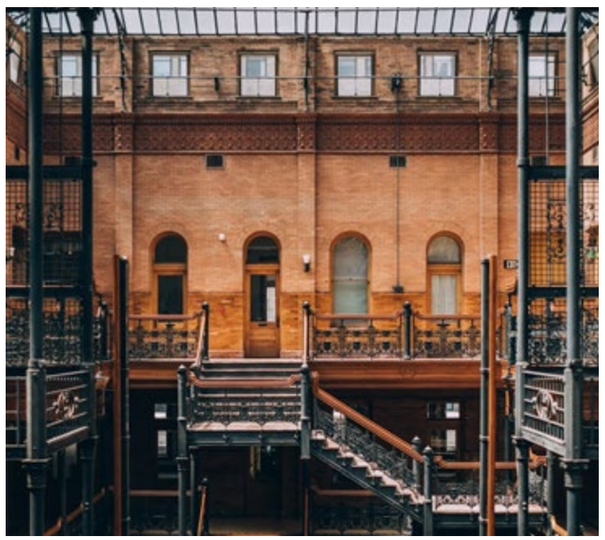
Neuehouse, on the other hand, is positioning itself as the private workspace and cultural home for creators, innovators and thoughts leaders. Its focus to date has been the US, securing iconic buildings such as Bradbury Building in Los Angeles. The company's mission is to reimagine the ideal environment for creative performances and progress.

Interestingly, they have focused on technology as a point of difference. Neuehouse CEO Josh Wyatt says: "Some of these companies, like Knotel, Wework or Industrious, are using data tools to mine customer bases that are based on very specific geographic maps in each city, and that's fine. We're playing outside of that market. Those concepts are going to be incredibly successful, but we don't compete in that space. We sit above the fray and provide highly elevated and aspirational products that are more about the people and less about in-your-face technology."

When it comes to searching for office space, HubbleHQ is leading the charge as a tech platform, optimised to match space, places and cities with businesses. Working in banking, co-founder Turshar Agarwal saw how much space was being wasted within companies' offices and how much small businesses were struggling to find affordable and flexible office space.

HubbleHQ was created to provide an online marketplace for finding and renting office space for start-ups and SMEs. It lists all the major co-working spaces, shared offices, as well as more typical leased space. The ambition is to build the world's first 'Artificially Intelligent Office Broker' that can decrease office search time from three months to just three days.

Hubble quickly hit a milestone of 10,000 desks in 500 offices available to rent in London, including an exclusive deal with the Unicorn Funding Circle, to rent 400 desks in its new office.



Retail

There hasn't been a huge amount of positive news for the bricks-and-mortar high-street retailers as more consumers shift to online shopping. Footfall to high streets, retail parks and shopping centres continues to fall[1].

One company, however, that has carved out a strong niche is Appear Here. Based on the concept that "renting commercial property should be as easy as booking a hotel room", the company has been hailed as the "Airbnb for retail" by Monocle and a "Digital game changer for the high street" by The Guardian.

Appear Here's mission is to "make vacant shop space accessible to anyone with an idea" and "to widen the pool of tenants". The platform lets entrepreneurs trial their ideas, rather than take out long term leases, "seeing rent as a variable cost".
The company has seen more than 180,000 brands and entrepreneurs use the platform, from first time entrepreneurs to major brands and retailers including Net-a-Porter, Chanel, Apple, Amazon, the BBC, Nike, Coca-Cola, Spotify and Netflix.

1 theguardian.com

The company has raised a total of $21.4 million in VC funding from the previous backers of Farfetch, and Glossier, and has recently announced a strategic partnership with Fifth Wall Ventures. The company is also backed by Net-a-Porter's Natalie Massenet.

With large high-street brands continuing to scale back their retail footprints, more property owners are looking for assistance to fill their vacant space, playing right into the hands of Appear Here. Expect the brand to scale quickly globally.

Hospitality

Tonight there will be over two million people staying in Airbnb rentals all over the world. There have been over half a billion Airbnb stays in total since it was founded in 2008[1]. While Airbnb disrupted the traditional hospitality industry with short term rentals (STRs), there are still over 70 companies valued over $1 billion in the hotel industry.

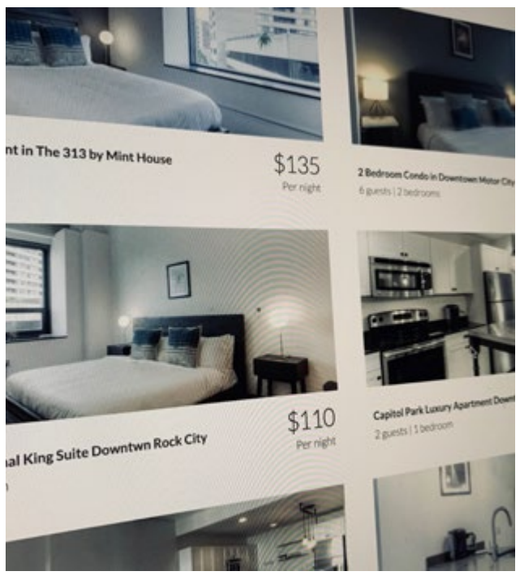
While the immediate future of Airbnb is a potential IPO in 2020, most would argue we are in the 'Airbnb era'. In the future we may look back and also realise it was the era when apartment landlords became the new hoteliers.

Landlords turn their apartment buildings into de-facto hotels to cash in on the rise of Airbnb, with 30 per cent of homeshare bookings for business stays in 2020. We are seeing a shift in companies entering the market with a clear type of end-user rethinking the hotel space.

For Mint House, this is business travellers who don't like hotels but are forbidden to use Airbnb. Mint House provides the convenience of a home with the feel of a high-end hotel. They are travel apartments combining wellness, productivity and connectivity with the comforts of home for a premier business travel experience.

According to Mint House CEO, Will Lucas, the company's focus "is to be the best of a hotel without the worst of a hotel. The best of an Airbnb without the worst of an Airbnb".

1 ipropertymanagement.com



The company uses digital technology to enhance the guest experience and handle processes like avoiding a front desk via mobile check-in and provides a digital concierge app (to pre-stock the fridge with what you want).

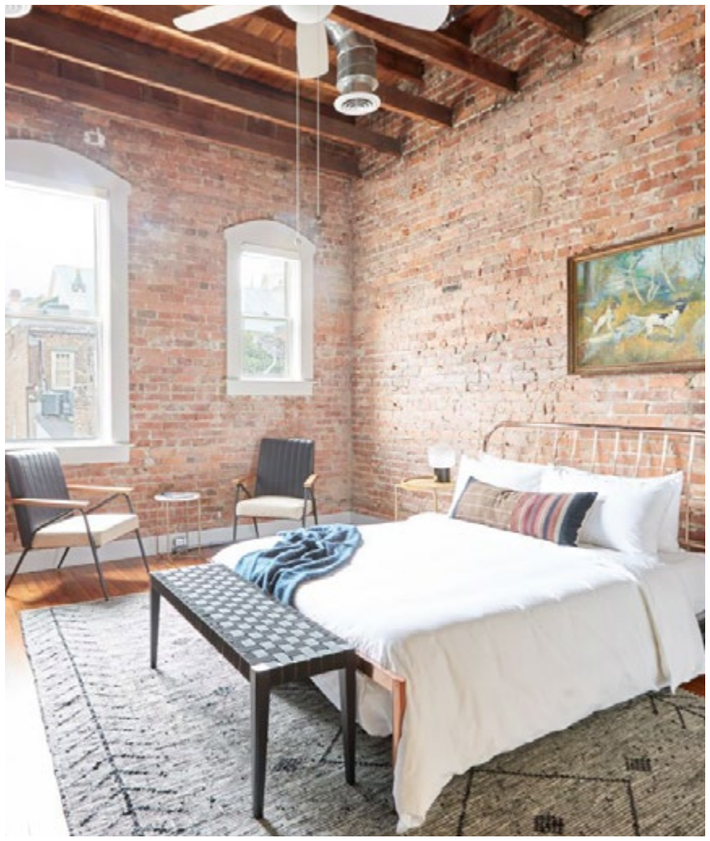
Mint House see this as a $120 billion opportunity[2]. It recently signed a partnership with American Express and is currently focused on getting on major corporate companies travel platforms. Total funding to date has been $15 million.

The line between business travel and holiday in both the minds of travellers and property owners is blurring. GoLet4me is both property manager and content creator. Its focus has been on property owners happy to utilise Airbnb but who don't want to actively manage themselves.

"We complement holiday/ business travel with pleasurable stay experiences" said Founder Anu Maakan. "We offer a suite of services from interior design, personalised check-ins, listings management and guest experience for your short let / Airbnb property. Happier guests and superior ratings translate to repeat business, higher occupancy and yields for our clients. Without technology we would not have been able to provide this service piggy-backing the rise of the likes of Airbnb."

2 skift.com

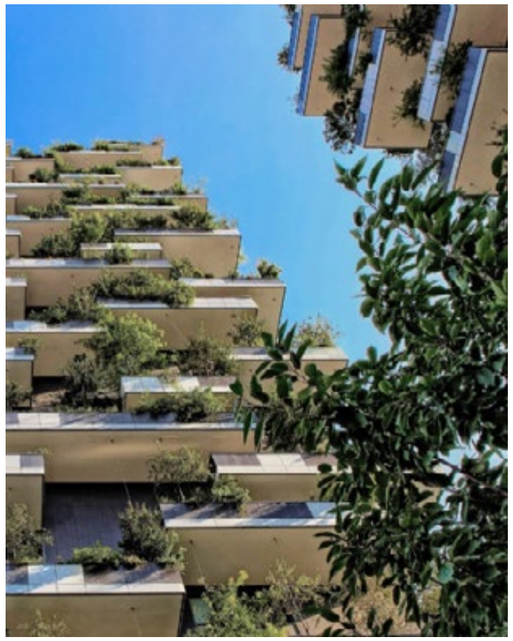
The hybrid hotel



Travelers increasingly want to stay in places that have the complete set of amenities they've come to expect from the apartments they live in. Assets are therefore becoming more flexible in use.

"The consistency and service of a great hotel that doesn't come in a typical hotel format, combined with the warmth and comfort of staying in a space that feels more like home, and the ability to choose the perfect location from the best neighbourhoods in cities around the world" according to Sonder.

According to Forbes, these companies are "filling the sweet spot between the authenticity of apartment rentals and the predictability of hotels".



Diversified multifamily

Multifamily has become an increasingly diversified sector, with niche asset classes such as student housing, and with companies such as, senior housing, co-living and micro-units garnering major investor interest.

According to Mint House CEO Will Lucas:

> *"If co-working disrupted the commercial office, Airbnb redefined the traditional hospitality industry with short term rentals, multifamily is now being disrupted, fuelled by disruption in commercial and hospitality."*

Summarising the future of hospitality, Guy Grainger, CEO of JLL EMEA, said: "Human experience-based services will become ever more significant; as commercial real estate edges closer to becoming a consumer business, it won't matter whether the asset is a hotel, an office building, a mall or an apartment block—individuals will want all the same things such as access to information, clean air, connectivity and more."

04 Residential

“Decades of human subjectivity and gut instinct, are rapidly being replaced with precise machine learning-led investments”

The real estate sector counts for almost 60 per cent of the world’s mainstream assets, with 75 per cent belonging to the residential sector[1].

According to Revolt Ventures, three-quarters of real estate stock is allocated to residential with over two billion households calling this stock ‘home’ at an average value of $82,000 per home.

Europe and North America continue to take majority share of residential asset values, accounting for 23 per cent and 22 per cent of global residential real estate value respectively, yet accounting for seven per cent and 11 per cent of the global population.

Residential also continues to be a resilient asset class within real estate and exhibits strong growth at five per cent on average year-on-year globally since 2017. This is primarily driven by the majority of residential assets held by homeowners, as such limiting the ‘investable’ portion of the market to an estimated 34 per cent of all global properties. Such access limitations have been further exacerbated by continued demand for residential real estate with macroeconomic developments including the global population expected to reach 9.8 billion by 2050. The urban share of population to continue increasing from 55 per cent to 68 per cent over the same period, and construction and land bottlenecks capping supply.

According to Revolt Ventures managing partner Ted Orf: “We believe there are two overarching opportunities in residential real estate from both a real estate and operating company lense; the first is to improve efficiency of delivering new real estate stock and the second is optimising current real estate stock to better match consumer requirements.”

1 innovify.com

Data analytics and intelligence

According to Arnie Sriskandarajah at Round Hill Ventures, “two key players in residential property investment” are Casafari and REalyse.

CASAFARI is an example of a company which uses machine learning and big data to bring transparency to the real estate industry.

The start-up is building the cleanest and most complete database in its geographies, allowing clients to access downloadable historical and descriptive data sets for all property classes. Its analytics dashboard can be used by real estate professionals to source the best opportunities and close deals faster.

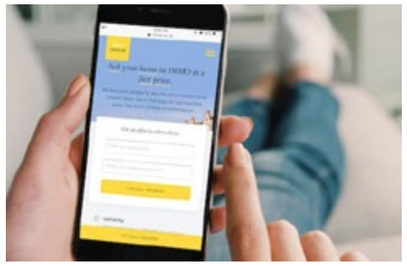
The positive impact of a platform like CASAFARI in property investment is significant. By using the data provided, property investors can select the most promising areas in both urban and rural locations. Technology can be used to identify the type of homes most profitable to be built in the future, including the characteristics they should possess.

CASAFARI brings transparency to the real estate market by indexing over 10 million listings from more than 9,000 sources, daily. Processing information just like Google, but going far deeper, as CASAFARI uses vertical metasearch focused solely on real estate. The company uses machine learning which brings together different listings of the same property “just like Kayak does for flights and Trivago does for hotels”. According to the company, the result of this is the most complete database of unique properties in Europe: “CASAFARI is the Bloomberg terminal for real estate”. For Round Hill Ventures, REalyse is another example of a company which uses data to bring transparency to the real estate industry. From commercial to residential property investment, the start-up puts together every residential property dataset in one platform and overlays the data with powerful analytics tools that can be used by anyone.

REalyse currently covers 99 per cent of the UK residential market and is used by some of the UK’s most prominent investors, lenders and developers to power faster and more effective decision making, using AI to bridge the gap between human error, cognitive bias and computational limitations.

In addition to its proprietary data, REalyse collects more than 550 UK residential datasets each month, giving “the freedom to interrogate market, demographics, land and ownership, and planning data”. The battleground of the future is the ability to provide real estate professionals and institutional investors with hyperlocal data in real time.

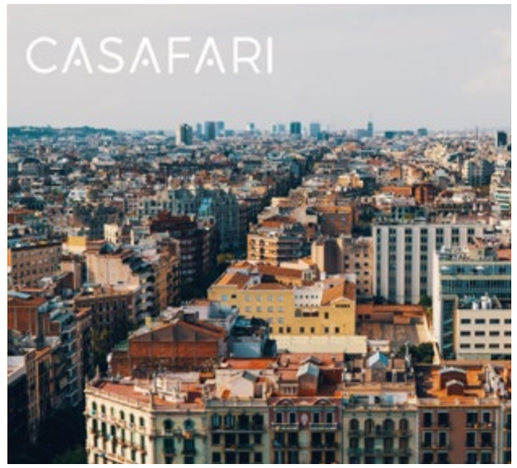
One cannot fail to mention Zillow here. Launched in 2006, headquartered in Seattle, Zillow serves the



full lifecycle of owning and living in a home: buying, selling, renting, financing, remodelling and more. It starts with Zillow’s living database of more than 110 million US homes – including homes for sale, homes for rent and homes not currently on the market, as well as ‘Zestimate’ home values, Rent ‘Zestimates’ and other home-related information.

Zillow operates the most popular suite of mobile real estate apps, with more than two dozen apps across all major platforms. Zillow currently has a market cap of $9.8 billion, and is telling Wall Street[1] it intends to grow revenue from $1.3 billion now to $20 billion in the next four years.

If Zillow hits its home buying, selling and lending goals to achieve this revenue, it would have one per cent of home sales and 0.4 per cent of annual mortgage fundings.



1 thebasispoint.com

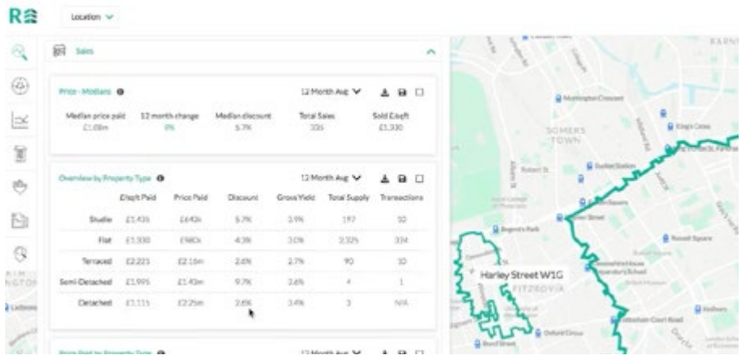
Buying

According to GoLet4me’s Anu Maakan, big data and predictive analytics “can enhance the house hunting experience”

“Most home buyers begin their property search online. They typically don’t reach out to a real estate agent until later in the process. By leveraging predictive analytics, agents can use consumer data to understand the buyer’s journey over time better. They can pinpoint consumers who are in the market to purchase a home and reach them with the right message, at the right time.”

Similar to Amazon’s predictive recommendations, real estate search portals could start to offer buyers homes that match their lifestyle. This can introduce consumers to new types of homes and neighbourhoods they may not have considered otherwise.

Avinav Nigam, co-founder and COO of IMMO Investment Technologies, a real estate fintech start-up with close to £65 million in capital raised, has noted a clear shift from a bottom-up to a top-down approach, where data is becoming core to a company’s strategy: “Decades of human subjectivity and gut instinct, are rapidly being replaced with precise machine learning led investments. The change in the residential sector alone, where ‘real property prices’ are now determined by non-traditional data sources like macroeconomic, geospatial and condition of assets, is making it impossible for large developers and organisations to stay competitive and giving rise to a new breed of technology businesses.”



Founded in 2017, IMMO digitally sources, appraises and acquires centrally located properties at scale on behalf of institutional investors. The acquired properties are upgraded and turned into fully furnished ‘living as a service’ homes targeting the long-term rental market. Essentially, IMMO connects consumer supply with institutional demand.

The latest funding ($72 million) round in November 2019 marked an important milestone for the London-based start-up. From renting furnished IMMO homes as a young adult to selling a house to IMMO later in life, the company’s vision is to become ‘Your housing partner for life’.

Founded by Hans-Christian Zappel (Davidson Kempner, Forbes 30U30), Samantha Kempe (Blackstone) and Avinav Nigam (P&G), IMMO buys residential properties directly from consumers on behalf of professional investors, thereby helping consumers sell their homes effortlessly and providing investors with desired real estate exposure at scale. IMMO homes are fully renovated/furnished, meaning tenants enjoy high-quality, long-term rental homes that are professionally managed.

According to Zappel : “Selling a property is the biggest and often

most stressful transaction in our lives. It takes on average 19 viewings and many months to identify a buyer. About 40 per cent of transactions still fall through at that point due to financing risk, changing circumstances and minds. When selling to IMMO, customers enjoy a chain-free, professional experience that is fast, reliable, transparent and convenient. We offer attractive prices without charging fees and enable homesellers to plan their lives around this important transaction."

Selling

New tech-enabled entrants are disrupting some highly established markets in residential property sales. Each has their own pain point or friction in the process that they are looking to remove.

According to Invisible Homes founder Mark Wells: "Property sales transactions have been painful for everyone involved. Sellers pay huge fees to estate agents for, generally, a far too poor service, and any properties that don't sell immediately are blighted. On the buyers' side, there's a lack of transparency and properties are often sold without being openly listed."
There's huge potential to improve the whole experience by harnessing tech and data, while significantly lowering costs.

Invisible Homes creates a digital marketplace that aggregates off-market properties with all potential buyers in the market. It mobilises its own estate agents, who engage with buyers and sellers to drive transactions. Since the pool of buyers is no longer restricted, as has been the case with off-market sales in the past, the company brings benefits of off-market selling to a far wider, mainstream audience.

Single units account for 94 per cent of all residential real estate transactions. However, as valuing and acquiring thousands of single units has so far been practically impossible, investors were restricted to deploying in the empty market of portfolios and multi-family developments.

IMMO has built the technology to source, appraise and acquire single units at scale, thereby opening up a single unit residential real estate as a new asset class for institutional investors. IMMO's inspection team collects 281 datapoints on every property. The IMMO Intelligence combines this property level data with millions of environmental data-point such as traffic nodes, crime statistics, school/restaurant/Airbnb ratings, distance to supermarkets and so on to come up with an offer price for the seller. It is this speed and accuracy that allows IMMO to buy properties at scale directly from sellers.

Since it 'owns' the whole value chain of the transaction, Invisible Homes provides complete visibility of buyer and seller behaviours—both digital and analogue communications. Equipped with the visibility of end-to-end data with scale, it has a Smart CRM system that allows its agents to target more relevant buyers for a given property.

Local sales agents armed with data insights deliver a more efficient sales experience – which benefits the seller (a faster sale) and the buyer (more relevance). The underlying business operations allow Invisible Homes to charge just 0.75 per cent commission, just under half of most competitors' fees.

The company launched in Fulham because it is a typical London district, but one where off-market sales, in the traditional sense, are rare. Within a year, it had become the third largest estate agent for new property instructions – virtually unheard of for a new local agent. It registered more than 6,000 Fulham buyers in 18 months, which is between ten and twenty times more than the local agents.

According to the company: "Digital platforms delivering data-driven insights are indeed transforming the proptech industry and we believe Invisible Homes is at the forefront of that transformation."

Opendoor is a tech-enabled real estate investor based in San Francisco. Homeowners come to the company when they are looking to sell and Opendoor uses data science to quickly generate a cash offer. Opendoor then flips the homes at a profit. It is estimated that the company is buying and selling more than 10,000 homes annually.

In 2018 Opendoor had a $3.8 billion valuation, $1.3 billion in funding and huge ambitions. The company's success is a key reason Zillow pivoted[1] last year to go 'down funnel from providing leads to buying, selling, and financing homes.

Chain free selling

Launched in January 2016, Nested operates in a similar way to a traditional estate agent to help you sell your house. But there's a key, tech-enabled difference. In addition to providing a valuation, marketing and sales service, the start-up guarantees it will sell your property for 95-98 per cent of market value within 90 days – or offer you the cash itself instead. Why is Nested so confident of its sales capabilities? Because it believes it has the right tech and data to price a property accurately in the first place.

What's more – and this bit is crucial – if Nested achieves a sale price that's higher than it initially guaranteed, either before or after the 90-day window, it will split the difference, up to 70/30 in favour of the property owner. This, in theory, keeps the interests of both parties aligned.

The idea behind Nested is to eliminate the uncertainty that arises while trying to both sell and buy a house. Too often, people find themselves caught in a property 'chain': trapped in limbo while waiting for a property to sell, which can mean missing out on a desired new home.

Nested's headline message is that it's the first and only estate agent to make sellers chain-free.

Empowering sellers

YouHOME, a London-based agent, has built a proprietary platform called PlatformYOU. This enables sellers to track home sales from start to finish and provides real-time, online data analytics and comparable homes sales evidence. The idea is to hand the power to you, the owner, when selling a home.

1 housingwire.com

Renting

According to Revolt Ventures' Ted Orf: "Rentals are a growing market share of European residential stock, with an average of 30 per cent of dwellings let out to renters across Europe as of 2016; this is particularly strong in focal European countries such as Germany (49 per cent renters), UK (38 per cent renters) and France (37 per cent renters). With increasing house prices across Europe following 2008, there is increasingly a rental generation expected for the foreseeable future."

However, understanding a city's rental market can be daunting, especially as available housing stock is tough to track. Apart from checking with a building's management company or landlord, consumers can find information through a variety of online sources. New York alone has countless apps and websites: Naked Apartments, StreetEasy, Localize.city, Zumper, Renthop, Triplemint, HotPads and Pad Mapper, to name but a few.

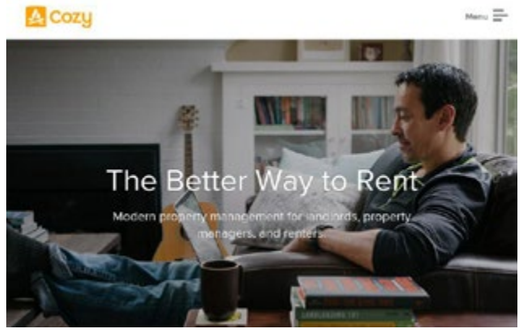
Landlords, meanwhile, struggle with the stresses of listing properties, screening tenants and collecting rents.

Enter the likes of Cozy, originally backed by—among others—Google Ventures. Cozy offers an easy way for landlords and renters to get things done together. The company aims to make the entire rental process transparent, trustworthy, simple, secure and available anywhere. The Portland start-up was sold to CoStar Group, a provider of commercial real estate information, analytics and online marketplaces, for $68 million. It powers Apartments.com, the online apartment listing website, with information on millions of available units.

"We believe that if we continue to focus on delivering a fantastic renter experience on Apartments.com, we will continue to be the most heavily trafficked website offering the most valued advertising solutions," said Andrew Florance, CoStar Group founder and CEO. "Cozy's technology makes the renting and payments process simple, secure and intuitive. When combined with Apartments.com, the 40 million prospective renters who visit our network each month will be able to effortlessly locate, apply, lease and pay for their new rental home completely online."

Specific problem solving

For someone coming from abroad, finding housing in a foreign city can be stressful and frustrating. There's also burdensome red tape for those without a guarantor. Garantme facilitates housing access



for students in France by acting as a guarantor. By doing this, it provides reassurance to landlords about students' profiles and ability to pay rent every month.

In just 24 hours, students using Garantme can obtain a certificate of eligibility to the guarantee and quickly and easily request Campuséa student housing. The company assists students throughout the application process, in a range of languages including English, French and Chinese.

Shared living rental services

Aimed at improving the experience for 'Generation Rent' in sprawling cities, Lyvly is a marketplace that helps renters find high-quality, shared living accommodation and landlords to find good tenants.

Properties are fully managed—services for tenants include managing household bills, cleaning and replacing items like toilet paper, lightbulbs and dishwasher tablets. But additional value comes from Lyvly's community platform, which treats renters as members of a network of "like-minded individuals who share a passion for shared living".

"Renting is often not a pleasant experience, and living in cities can be lonely and stressful," says co-founder and CEO Philip Laney.

> *"Moving into your new apartment, sorting out furniture and utilities, and then trying to connect with busy people around you all while working long hours in a transient economy are frustrations many of us have experienced.*

We are confronting three problems for renters in the city: their desire for community, convenience and affordability."

Laney says the current way people rent shared accommodations is also painful for landlords, who don't have consistency and control over the quality of their tenants, and often pay high fees to a middle-person and struggle with vacancies. "We provide them guaranteed income with no voids and no fees, and a genuinely positive social impact," he says.

Lyvly recently raised $4.6 million in Series A funding, led by Mosaic Ventures. And Greg Marsh, who co-founded Onefinestay, has joined as chairman and investor.

From co-working to co-living

Companies such as The Collective promote the 'global living movement'. The Collective helps people discover co-living buildings designed to connect and inspire through shared spaces and experiences. Such collaborative living environments target millennials and urban creatives with properties designed for home, work and play. Services including wi-fi, cleaning and more are all included in one bill.

Large developers are also thinking about providing not just homes but lifestyles. For example, Battersea Power Station, a £9 billion redevelopment project across 19 acres of public space, is being redefined as a London destination with homes, shops, cafes, offices, leisure facilities and cultural venues. Fundamental to the strategy is building a thriving community.

Georgia Siri, UK director of sales at Battersea Power Station Development Company (BPSDC), says: "With 85 per cent of Londoners admitting to not knowing their neighbours, we wanted to pave the way for a new kind of neighbourhood, one where real friendships can be formed and where people feel they are part of a community."

Created with that community in mind, the Battersea Power Station Power Club app gives residents instant, real-time access a range of information: from letting them know when a parcel has arrived to booking a parking space for visitors. It also provides a neighbourhood network, helping residents connect and feel a part of the new community. Members can join clubs or create their own. In fact, there are now over 60 clubs for everything from chess and book clubs to running and dog walking. All owners and residents have access to the app, with a wide range of groups for all ages and interests.

Residents can use the app to book a valet, reserve a meeting or private dining room. They can also book tickets to events and experiences taking place across Battersea Power Station's eclectic mix of shops, cafés, restaurants, fitness and wellness facilities, cinema and theatre.

"The Power Club app brings a new energy to traditional forms of social interaction. In an age when knocking on your neighbour's door is not the 'done thing' anymore, the app allows people to easily connect on interests and topics that matter to them and then meet up off the back of this (the traditional bit). This technology doesn't replace traditional neighbourliness, community spirit and the need for people to be involved in running these programmes – it enhances it," explains Siri.

Seamless living

Acasa is a home payment platform designed to enable 'seamless living'. It automates and streamlines the processes of moving in, managing and moving on for tenants, utility companies and property agents, and makes it easy to set up, shut down and pay for rent and utilities.

Household members in the UK can use Acasa's website and mobile apps to set up, manage and split costs for energy, broadband services, water and TV licences. To achieve this, the start-up has partnered with a number of 'challenger services', including broadband company Origin and green energy provider Octopus Energy.

It's also partnered with Virgin Media to offer the telco's broadband services directly in the Acasa app.

> "Running a home sucks—it's still analogue, archaic and arduous,"

says Acasa co-founder and CEO Nicholas Katz. "One person always gets screwed over by having to be the one in charge of bills/finances... which also means they take on all the credit risk, which most renters don't realise! Eight days of every year of your life are wasted dealing with home finances, setting up bills, talking to providers, chasing people you live with for money."

05 Smart Space

"Simply being a dumb box is no longer viable. Property is moving from being about selling a product to delivering a service."

According to Arnie Sriskandarajah, managing director of Round Hill Ventures: “People spend 90 per cent[1] of their time indoors—the world’s buildings have a direct impact on both the external environment and individuals’ well-being. Technology helps in new asset development and management for both human health and suburban settings. Digital real estate technologies are not only constructing ‘smarter’ buildings but helping to optimise existing assets better.”

Proptech solutions are helping real estate asset managers increase and optimise the value of buildings and maximise investment returns.

Smarter space can mean better management of spaces within properties, smart relationships with the urban setting around the space, smart technologies and the Internet of Things (IoT) within a space, and even smart space-as-a-service.

1 buildinggreen.com

Predictive maintenance

According to Arnie Sriskandarajah: “New technologies help landowners engage with tenants and address issues that may appear more quickly—allowing property maintenance to be predictive rather than reactive.”

One revolutionary property management solution is Plentific, which seamlessly connects landlords with trusted (and verified) local tradespeople. This enables landlords and property managers to deliver better, faster repair and maintenance services to tenants at a competitive cost. It also unlocks operational savings for housing providers, speeds up tenant service delivery five-fold and creates more economic opportunities for local trade talent. Tradespeople can access jobs through an easy-to-use platform, bidding only for the work they want.

Smart building proliferation through IoT

According to a study by Deloitte[1]: “Approximately three quarters of CRE respondents… believe smart buildings will become the norm over the next five years.”

1 deloitte.com

Around 60 per cent of respondents – particularly those from the Netherlands, Singapore and the UK – expect smart buildings to become mainstream within two years, while US respondents expect it to take five years. Some, including nearly half of respondents with an industrial real estate focus, see it arriving even more quickly: within one to two years.

The IoT will be crucial for broader adoption of smart buildings. Legrand, Panasonic, IBM, Honeywell and Hitachi are some of leading names using IoT sensors in smart buildings. Most focus on energy savings, but there are more innovative examples as well.

Consider ISS, a customer of IBM, which is using IBM Watson in more than 25,000 buildings to assess readings from sensors on windows, doors, chairs, food dispensers, air conditioning systems and more. The sensors on doors, for example, can help commercial kitchens within these facilities figure out how many meals to cook for lunch, thus reducing food waste.

Beyond reducing cost, the IoT also allows owners “an opportunity to have direct conversations and relationships with building users rather than only with their tenants; it also offers an opportunity to differentiate CRE companies by using the information to identify unmet consumer demands, provide more

sophisticated services to their tenants and transform tenant and user experience," according to a report from Deloitte[2].

Through consulting and advanced facilities management technologies, ISS will use IBM's Watson IoT platform to transform the services it provides to building owners and users around the world. Its goal is to make buildings more personalised, intuitive and user-friendly.

IoT devices can be installed virtually everywhere, from factory floors to water pipes to lights. For example, Cooledge provides luminous surfaces and lighting as a building material, using LEDs as an energy-efficient and long-lasting light source. Its lighting technologies are fully integrated, digitally controlled surfaces that are part of architecture, rather than being added to it. The potential impact of such innovations on energy usage and efficiency could be huge in the future.

According to Vanessa Butz, Founder of District Technologies: "A good building needs to be connected, integrated, productive, future proof, insightful and information-led."

District Technologies was established in 2017 and now operates in London, Lisbon and New York. Its technology offers a digital hub for physical spaces—mobile software platforms that connect users with smart buildings and the things they care about around them. The company's mission is to help building technology prepare for the smart-city revolution. And it's combining front-, middle- and back-end technologies to improve and provide world-class building experiences.

"Learning from your building is key to advancing your lead against competition in the future," says Butz. "By being able to gauge user trends and analyse key data points within a building, 'future proofing' becomes a thing of the past."

District Technologies can provide seamless building experiences services such as digital keys, as well as help people book spaces and connect with others in the building. The company's technology integrates seamlessly with building management and legacy systems via its open developer community.

For landlords and managers, the benefits include increasing asset value by utilising dead space, accessing untapped potential revenues and improving the bottom line. And worries about future-proofing are eliminated as data can be analysed, interpreted and used to continually improve experiences across buildings, companies and portfolios. The technology helps with management of not only interior space inside, but outside spaces as well.

2 deloitte.com

Smart relationships with urban settings

Opinion piece by Josh Artus of The Centric Lab

"My world in real estate is dominated not by bricks and mortar but by synapses and neurons. I co-run a business called The Centric Lab, a team of neuroscientists and researchers creating data-driven solutions to urban health challenges.

The reason this is a real estate question comes down to rehashing an old saying: Is an empty office building still an office building?

A number of factors are changing the nature of work and the mental demands on workers. As machine learning and automation become more dominant, the tasks humans will be responsible for will require complex cognitive processing with a higher intrinsic load. 'Load' here means the amount of working memory or brain energy required to complete tasks. As we know from the great scientist Isaac Newton, every action has an equal and opposite reaction. So to understand how to maximise talent and workplace productivity, we need to better understand how to manage the mental load on workers.
This isn't just an occupier/HR question. JLL's now-infamous declaration on occupier costs is split roughly according to a rule of 3/30/300: £3 on utilities, £30 on rent and £300 on staff. While the industry has established research institutes and supports certification standards to elevate the '3' and the '30', there is still ambiguity about how to optimise the '300'.

For landlords and developers, the demand has now shifted to: "Don't sell me an office, sell me a productive workforce." This leads to the same question as in the technology

industry: Unless suppliers understand their buyers, how can they create a product market fit? Certifications only go so far. While they pull the industry up a notch, they fail to address the complexity of the influence of urban environments. They also don't recognise the dynamic qualities of work, which requires more than overt engineering through a technology-driven form of Taylorism (breaking every action, job or task into small and simple segments which can be easily analysed and taught).

Equally, buildings may fit into checklists while people do not. People lead complex, multi-variable lives with a variety of influences. One thing we haven't understood—and this is where our technology focuses – is the likely present state of a person entering a building, based on their urban footprint. Knowing the biological and cognitive risks as a result of this urban footprint is the missing piece in our understanding. It represents the knowledge gap around why there is still high reporting of workplace presenteeism and absenteeism.

Simply put: poorly planned and managed urban environments put people's health at risk. Without a healthy system, people cannot be productive. Our neuroscience research works to identify the influences that cities have on our biology and cognition.

Cognition cannot be engineered, because mental processes such as creativity are not linear. There is no standard cognitive process that makes someone creative. I've seen more creative people fixing a car on the side of a motorway than I have in a jazzed-up meeting room in a corporate office. Ask yourself: how many great ideas come into your mind as you're walking through fields at the weekend, on a run in the evening, or cycling to work in the morning?

Urban stressors (air pollution, noise pollution and so on) cause the body to respond using biological processes to restore. Sometimes, people can restore easily. Sometimes, they can't. When people are constantly exposed to these stressors, the chemical reactions are equally constant—and we run the risk of developing side effects.

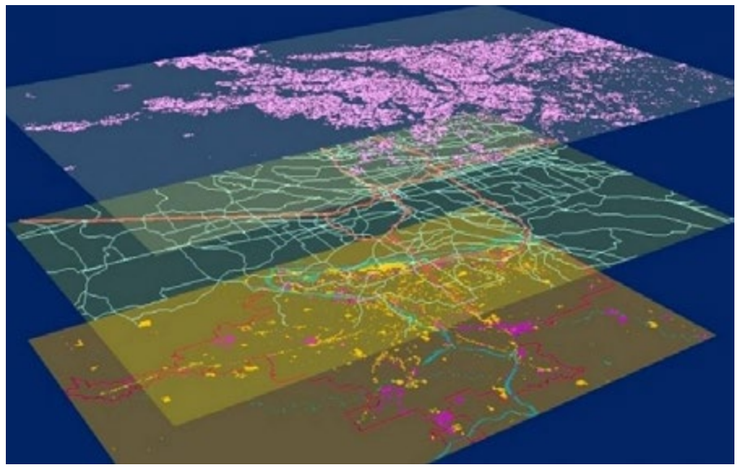
The overproduction of stressor-related chemicals weakens a system. This means existing ailments (clinical) or new psycho-social stressors (work/personal) can have greater impact than before as a result of urban dwelling.

Future productivity and business competition depends on managing human performance in complex tasks against the risks posed. In this case, it means knowing how to respond to the challenges that cities pose to worker performance and mental health.

Therefore, when looking at technology, we've been looking at everything but the office to understand how to create a smart office building.

Our software involves using GIS*[1] with environmental and urban/built data to understand the weight of impact an urban area and footprint has on a person. Going forward, adding these metrics to decision makers' considerations helps them to refine actions to be more responsive to the city and people for whom they're creating products and services.

*A geographic information system (GIS software) is designed to store, retrieve, manage, display and analyse all types of geographic and spatial data. GIS software lets users produce maps and other graphic displays of geographic information for analysis and presentation" Josh Artus, The Centric Lab



Neuroscience in the workplace doesn't involve headsets and recording brainwaves. Quite simply, that's BS: more scientists than not have debunked the toy-like tools used by charlatans to show happiness through brainwaves. Real neuroscience involves using urban and environmental data to evaluate how these factors impact a potential worker type.

The very near future of tech in real estate involves understanding people by understanding the city better."

According to Arnie Sriskandarajah at Round Hill Ventures: "It is expected that over 68 per cent of people will live in cities by 2050.

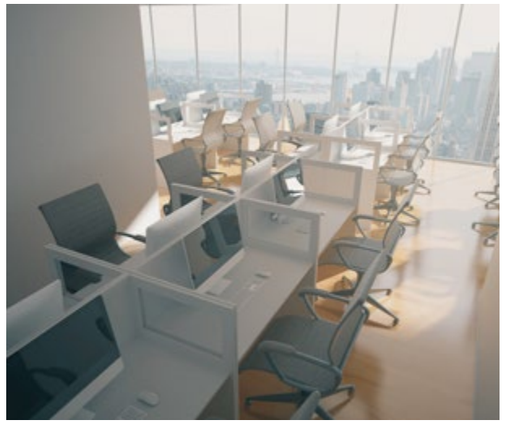
> *Land is scarce and the digitisation of the built environment will help to better utilise the limited resources available.*

Property firms that leverage technology to manage both their assets and ecosystem relationships will be the ones who will come out ahead."

Josh Artus of The Centric Lab says: "There is a new, more holistic approach to drive spatial/tech solutions when looking to understand people-city-health-cognition. Neuroscience will be an important future part of property technology in order to evaluate the risk factors of urban areas and their effect on the workplace and businesses."

"After our first few years, we developed our in-house software that brings together environmental data and scores values on a bespoke neuroscience-informed scale to evaluate the risk factors that urban areas have for all people. Our services then go into breaking down what this means to businesses (that is, workplaces) and to social services (such as public authorities). We will be looking to scale this tool in the near future. For The Centric Lab, talent maximisation is everything for businesses. A better-performing business equals better value propositions to developers," Artus adds.

Empty building syndrome



Time utilisation surveys have been around since AECOM developed them for IBM in the 1990s. The method of delivery has changed—today, tablet-based tools are available to gather data on how space in a building is occupied. But what hasn't changed is that organisations are still failing to reap the benefits of their investment in space.

According to AECOM: "On average, well over one-third of workspace is empty at any point during the core working day – and yet organisations are paying for the empty space."

Workspaces (desks, offices and other types of workspaces) are occupied on average 42 per cent of the time[1]. And people are often away from their desks elsewhere in the building a further 18 per cent of the time

While there is some variation across sectors and geographies, the general occupancy levels are consistent: workspace is grossly under-used.

A few months ago, JLL Spark invested in VergeSense. It has deployed VergeSense's AI-powered sensors in its London headquarters to help track and maximise how it uses office space.

1 aecom.com

Digital twins

Matterport is one of the largest proptech companies in the world, with a market cap of $500 million, and which recently raised $48 million for aggressive growth. The company delivers an end-to-end system for creating, modifying, distributing and navigating immersive 3D and virtual reality (VR) versions of real-world spaces—known as 'digital twins'—on the web and mobile devices. The Matterport Pro Camera and Cloud Services turn real-world places into immersive virtual experiences.

Matterport's powerful platform makes it easy to create, customise, publish and maintain a highly accurate digital twin of any space, such as a room, floor or building. To publish a digital twin, all a user needs is one click, a paired compatible camera and a Matterport subscription.

CBRE, the world's largest commercial real estate company, has begun moving towards digitising and diversifying by acquiring the technology start-up Floored. Now known as CBRE Build, the company's focus is on interactive 3D imaging within real estate. The technology allows users to view online modelling before deciding to build, buy or rent.

Space-as-a-service

To wrap things up, here's a wonderful summary of new thinking about smart space, written by Antony Slumbers, digital strategist and product leader in the proptech space:

In the 2020s, it will be relatively easy either to make a lot of money in property investment… or to lose a lot. What will be hard will be maintaining value. Why? Because technology is fundamentally changing the nature of society and business. And that in turn is changing the very nature of demand within the property market. What the market wants is – increasingly so – not what the industry has to sell.

Right now, a 'Trinity of Transformation' is under way. It involves massive increases in the data available to us, the scale of computing power at our disposal and the advanced capabilities of artificial intelligence, especially around the sub-set of deep learning. Combined, this trinity is remodelling how we work, live and play. All around us, to a degree that most people are unaware of, artificial intelligence is performing a 'software update' to society.

Kai Fu-Lee, the renowned Chinese AI venture capitalist, wrote recently:

> "AI algorithms will be to many white collar workers what tractors were to farm hands: a technology that dramatically increases the productivity of each worker and shrinks the total number of employees required."

At a foundational level, the real personal computing era is upon us. Today, we have 1980s supercomputers in our pockets and computers on our wrists.

"Mobile computing has disconnected place from knowledge, place from purpose. We no longer need to go to an office to do our work, or a shop to go shopping."Antony Slumbers

We do still need a roof over our heads, but where this needs to be is fluid. We are living in an 'as-a-service' world: property cannot avoid this.

Hence, space as a service – where individuals or businesses procure the space that provides them with the services they need, as and when they need them. Historically, property investment has been about supplying what people need. In the future, it will be about supplying what they want. And the business dynamics of those two drivers are fundamentally different. Consequently, the factors that drive successful investment will also change.

So, where to invest? And in what? First, it is imperative to stop thinking of property investment as being a close proxy to buying a bond. Everywhere, lease lengths are either getting shorter or disappearing altogether. Where long leases do exist, with strong covenants, they will be extraordinarily expensive – as they will be as rare as hen's teeth. Trophy assets are wonderful things, but not necessarily high performing.

"Property investment going forward will be about income, not rent."Antony Slumbers

This is not accepted by many in the capital markets, but the reality is that the demand for what they want to sell is dying. And when the customer no longer has to buy what is on offer, they won't. Supply has to change.

Second, as a consequence of the above, the 'operator' of a space becomes much more important and moves right up the value chain. The total income of a property asset is becoming highly dependent on the calibre of the operator. Property management (we don't yet have a term for this new type of service) is

increasingly critical, rather than a commodity. For landlords, this new world poses real dilemmas. Do they become operators themselves? Do they leave money on the table and outsource operations to a third party? Or do they partner with operators? Maybe they no longer exist? Look at Nuveen buying Devonshire Square[1] in partnership with WeWork. Where has the landlord gone?

Perhaps developer landlords stick to development and 'the money' cuts out the middleman and partners directly with an operator? The value tree is being reconfigured.

1 nuveen.com

The same applies to retail (currently undergoing the 'apocalypse' that may come to the office market forthwith), and to residential and to industrial. Every asset class is in the same boat.

"Simply being a dumb box is no longer viable. Property is moving from being about selling a Product to delivering a service."Antony Slumbers

In terms of technology, these changes suggest some key areas where new tools are needed:

1. Artificial intelligence: As Kai Fu-Lee says above, AI will become a pervasive component of all property processes (especially investment and location analytics). It is also a winner-takes-all type of technology. Better AI leads to better insight, which attracts more data to work with, which further improves the AI, which attracts more data. Rinse and repeat. How many search engines does the world need?

2. Productivity: A great workplace focuses on the individual. How can the property industry help enable a productive workplace? We need better technology for this.

3. Pleasure: Amazon can deliver to us just about anything we want or need, in a day or less. If your retail asset is not configured and optimised to provide visitors with an experience that makes it a better option than staying on the sofa, what precisely is its point? Technology to improve the retail experience is a growth area.

4. Flexibility: No one knows how they will use an office, or a retail or industrial asset, in five years' time. Spaces and places need to be designed to be flexible, where they can be easily reconfigured to suit the demand of the time. Technologies that enable flexibility are needed. Sidewalk Labs, owned by Google's parent company Alphabet, is heavily investing in this. As are others. A huge opportunity.

5. Climate risk is investment risk: Perhaps the most important five words in property investment. Property is responsible for 30 per cent of global carbon emissions, and consumes 40 per cent of the world's energy. This is a target on the industry's back. Technology to reduce energy and emissions is both required and a huge market opportunity.

6. Tools: The user experience of engaging with the property industry is not good. From planning, to construction, to operating, to disposal, there is not one workflow that couldn't be improved with better technology. Where is the greatest pain for the most (or most valuable) people? In a nutshell, the largest asset class in the world operates very inefficiently and ineffectively. Technology cannot fix everything, but it can fix an awful lot.

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