

Technology and the Future of Real Estate Investment Management



Oxford Future of
Real Estate
Initiative



pi labs

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Foreword

Against the macro-economic backdrop of climate change, rapid urbanisation and now COVID-19, the industry is facing challenges it has never seen before. Understanding how to negotiate these challenges will require collaboration, new industry standards and the application of technology. Those real estate investment managers best able to weather this storm will be those who are most innovative and best at adopting emerging technologies.

While it is clear that the real estate investment management sector is at the beginning of a process of digital transition, there are many barriers inhibiting the widespread application of technology. This is most likely due to the lack of a regulatory framework and industry standards regarding the ownership and sharing of digital data, as well as a lack of knowledge of the available solutions.

This report aims to provide a roadmap for the industry, identifying the key process inefficiencies within real estate investment management and highlighting relevant technologies able to overcome them. We hope that this will contribute to the development of a more efficient industry in a time of considerable challenge.

Andrew Saull

Pi Labs Research Associate

Remember Amara's Law: we tend to overestimate the impact of a new technology in the short run, but we underestimate it in the long run. Many investment managers have wisely stood back, observing others overestimating the impact of new technologies. But, sooner or later, the long run will arrive. Misquoting Benjamin Franklin, who was quite good at innovation: if you fail to prepare, then prepare to fail.

Andrew Baum

Professor of Practice, University of Oxford



Executive summary

The value of the investable stock of commercial property owned by institutional investors around the world is estimated at around \$35tr, half the size of the global stock market – but it could get much bigger

The total value of all global real estate is estimated to be \$228tn, although the largest proportion of this stock represents privately-owned residential property. The value of the investable stock of commercial property owned by institutional investors around the world is estimated at around \$35tr (compared with a global equity market capitalisation of close to \$70 trillion). Of this \$35tr, 79% of the global property universe is held directly (in separate accounts, or self-managed), while 13% is held in listed form (publicly listed REITs and property companies) and 8% is owned by private funds (both core and private equity formats).

The world's largest real estate investors are sovereign wealth fund and pension funds estimated to have between \$30bn and \$60bn invested in real estate. The two biggest investment managers each have around \$200bn of assets under management

The world's largest real estate investors are a group of twelve sovereign wealth funds and pension funds estimated to have between \$30bn and \$60bn invested in real estate. The world's largest real estate investment managers are Blackstone (\$230bn of assets under management, or AuM), followed by Brookfield (\$193bn), Nuveen (\$125bn), Hines (\$120bn) and CBRE Global Investors (\$107bn). The main business lines for these leading managers have been funds and separate accounts.

Real estate investment managers are facing a perfect storm of challenges

The GFC of 2007-2009 led many investors to be unhappy with their investment managers. Institutional investors were

frustrated by the gating, closing or valuation cuts in open ended retail funds in 2007, 2016 and again in 2020. There has been a decline in the natural supply of investment, as defined benefit pension schemes have been replaced by less real estate friendly defined contribution. Increased regulation (AIFMD, KYC, unexplained wealth orders, MIFID) have also increased the stresses on the middle and back office of real estate investment managers. In a world of very low interest rates, prospective returns for low risk assets look very low, and in this context ad valorem fees look very high as a proportion of 4-5% returns.

The real estate investment management industry is undergoing a dramatic cultural shift driven by the pressures of technological innovation and climate change

Real estate investments are increasingly required to meet a high level of environmental, social and governance (ESG) criteria. In addition, the fourth industrial revolution has challenged the economics of the occupier markets, illustrated by the rise of online shopping and the decline of the high street and shopping centres.

As the industry begins to adopt technology, the bigger investment management firms will increase their market share

Currently, no firm has a dominant market share, while historically there has been remarkable instability in the fund manager league table. Within all other industries, digitalisation has led to industry concentration. Those companies which have the biggest user base will be those best poised to scale under the new market dynamics of real estate as a digital industry.

Owners who embrace operational real estate will better align their product with occupiers, leading to enhanced returns

Traditional real estate investment is non-operational, meaning that investors receive a stable, net rent through a long lease which pushes a lot of costs and risk onto the tenant. As leases reduce in length, the operational costs cannot be pushed onto the tenant through an FRI lease, meaning that attention has to be paid to the cost line. Attention also has to be paid to the revenue the real estate can generate, because lease renewal or tenant rollover will become more important. If and when real estate investors embrace this they will be thrust into a different world of employees, health and safety, feedback platforms and big data. This offers opportunities for diversification and growth, but also requires an understanding of customer relationship technology.

Data integration is needed

There is a lot more that software could do if there was better integration of new solutions. The rise in bottom up vs top down data used in real estate modelling requires the need for standardisation. In its absence there is a lack of knowledge on how data can be used, there is little incentive for data sharing, there is a mismatch between the data being collected and that which LPs request, and there are high sunk capital costs on legacy software creating a reluctance to switch to emerging systems.

Distribution (investor management) processes will see technology application prior to manufacturing (investment management) processes

We can identify two key activities in fund and asset management. The first can be broadly termed distribution: capital raising, investor reporting, compliance. The second can be broadly termed manufacturing, meaning the investment process. Distribution is tailor-made for tech solutions, as this is a customer-supplier process already massively disrupted and/or streamlined everywhere else. Manufacturing (the investment process) is more complex, but technology will increasingly underpin every stage of this process, from buying, through asset management to selling, plus reviewing performance.

Real estate asset tokenisation is still many years away

Attempts to securitise single assets have so far proven unsuccessful, and the blockchain-based tokenisation and fractionalisation of real estate assets is unlikely to take off any time soon. If and when blockchain begins to be trusted, it will first be applied to the back office administrative tasks within investment management, such as replacing the settlement systems at central banks and clearing houses. It seems that the most likely avenue for the emergence of blockchain in real estate will be the debt markets.

Real estate fund fractionalisation should be digitalised

While the blockchain-based tokenisation and fractionalisation of real estate assets is unlikely to take off any time soon, the digital fractionalisation of real estate funds would reduce the cost (and carbon footprint) of capital raising while introducing the possibility of developing efficient secondary markets for fund units.

True disruption requires strong RegTech and LegalTech markets

Technologies which are lowering the legal costs of setting up an investment vehicle are emerging, while digital IDs offer near-instantaneous consumer-facing AML and KYC checks, enhancing the prospect for secondary market liquidity.

Negotiations will be the most resistant to technological disruption

Negotiating a transaction is a human process for which a technological replacement is elusive. While it is technically possible to digitalise and speed up conveyancing, risk remains with the buyer, who will continue to undertake lengthy due diligence. Until an economical and widely available insurance product is available, digital property passports and other process improvements will make small and incremental changes to current transaction timescales.

Operations, compliance, finance and fund structuring are underserved by technology

An independent review into the PropTech start-up market found that very few companies are targeting these investment management processes. We can therefore assume these will be the process that will see the least disruption in the short-term.

Companies without a digital data strategy are already behind

Only 25% of real estate investment organisations currently boast an established data strategy. The most urgent need is for investment managers to structure, standardise and digitalise their existing data in order to accurately and efficiently position their portfolios, a task which can be tackled using today's technology. Only once this is achieved will the insights offered by alternative big data sources be able to reveal new components of value.

There is a lack of holistic models and available financing options for green retrofits

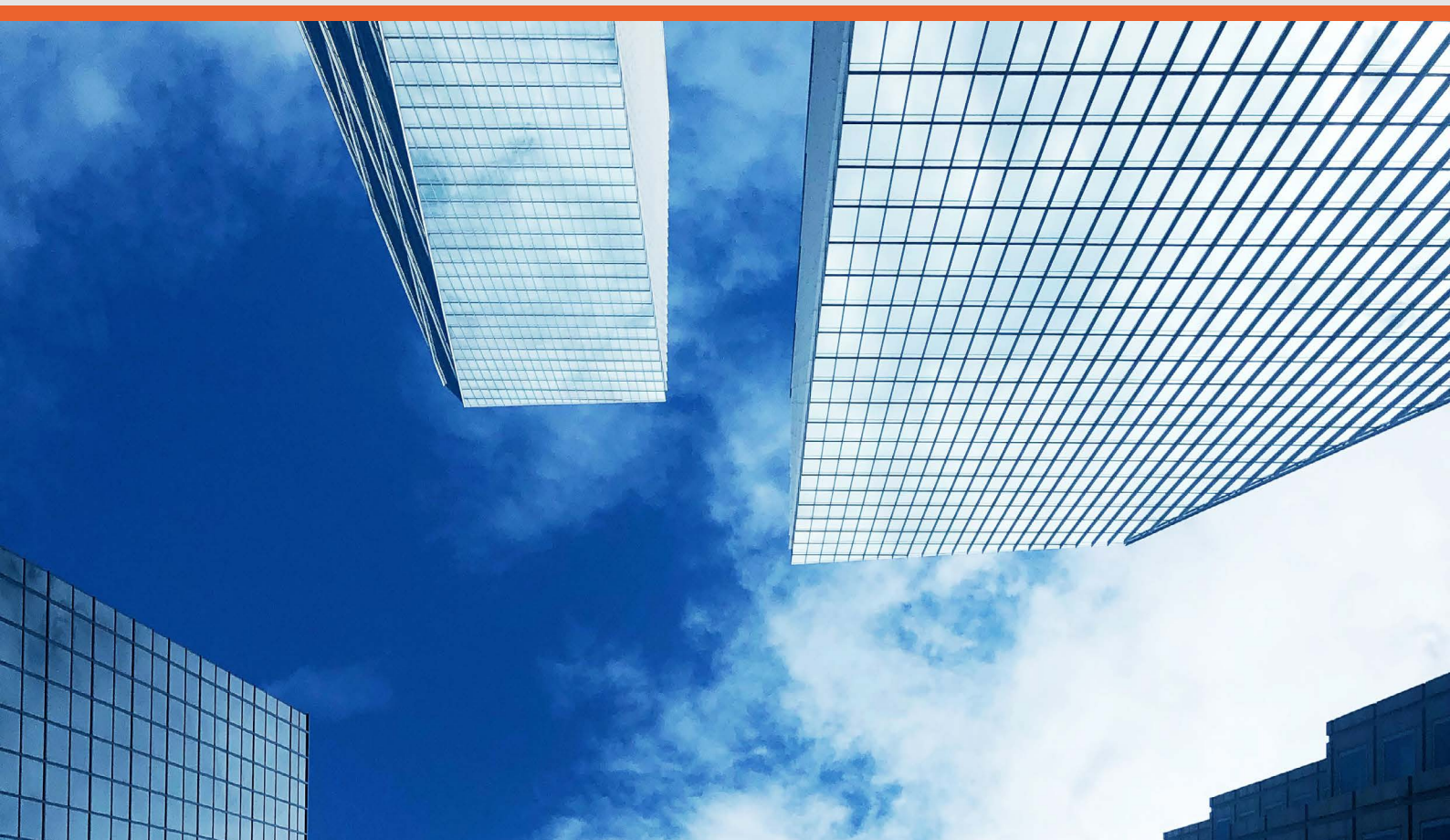
Roundtable participants agreed that ESG metrics will only truly be adhered to once it hits a company's profit line. At present there is a lack of knowledge and urgency about how to achieve this. Perhaps the biggest issue facing the industry is the need to upgrade the current building stock to meet 2050 net zero targets, with no clear model as to how this can be achieved in a profitable way.

Assets achieving emerging social accreditations will soon fetch a premium

As new, crowd-sourced social indicators of asset performance come to fruition through tenant experience apps or office booking platforms, and as industry benchmarks expand to include measures of a building's smartness, owners who adhere to ESG investing will be able to justify charging higher rents, subsequently increasing the value of the asset at disposition.

An end-to-end transaction and asset management platform is the biggest opportunity for technology

Some start-ups are able to aggregate data from disparate systems and software providers throughout the value chain, but we have yet to see the emergence of a dominant single platform which offers streamlined functionality connecting them all.



Introduction

While it has been estimated that real estate might comprise as much as 50% of the total value of the world’s assets, this does not represent the value of the investable stock. Many of the real estate assets in the world are never valued. There is a lack of transparency in many markets, and the generally low levels of information available in Asia and the emerging markets of the world mean that we do not know much about the size of the investable property markets in China, India and Pakistan, despite their huge populations and increasingly significant GDP. Even the total value of all U.S. housing is subject to debate.

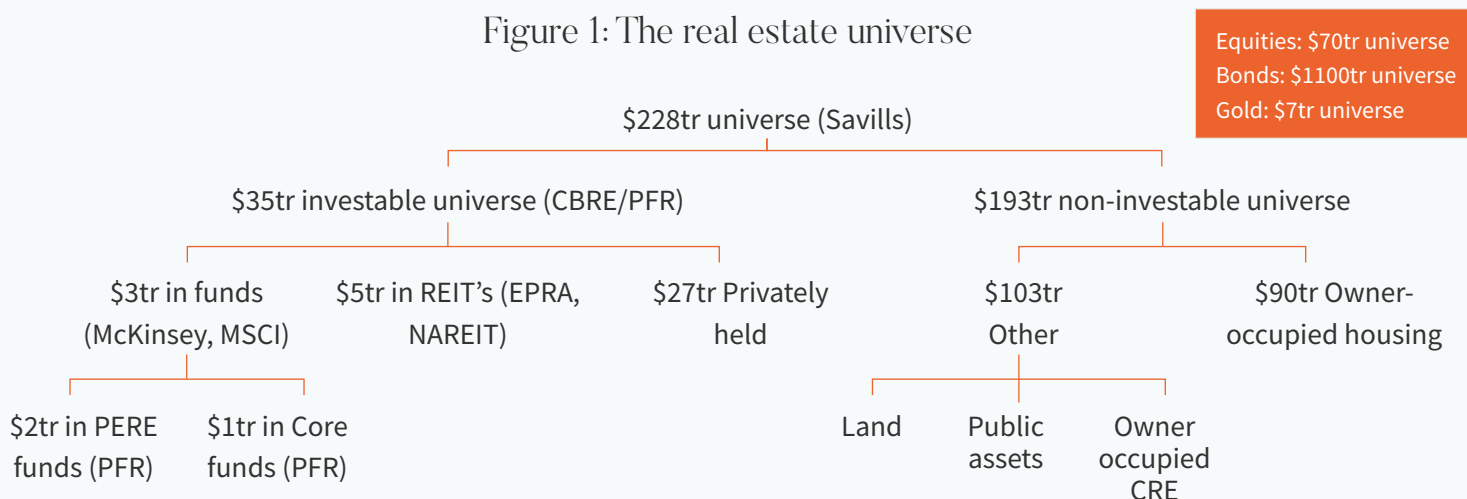
The total value of all global real estate has heroically been estimated to be \$228tr¹, although, with a large proportion of this stock representing privately-owned residential property, only a small part of this value is available to be captured by institutional investors, who are estimated to own between \$27.5-35tr, or 12-15% of the \$228tr total.

The largest global real estate investors are pension funds, insurance companies and sovereign wealth funds (also

known as government funds). They are typically attracted to real estate due to reliable returns, a healthy yield premium over bonds, and low apparent correlation with broader capital markets. However, with multiple layers of fees and complexity, even well-educated investors may be unaware of the true cost of the strategies and structures that they are invested in.

To add to this opacity, the real estate investment market is also said to be plagued by the high costs of entry to what is a highly illiquid asset class, which is also lumpy and difficult to diversify. While many believe these characteristics are not wholly undesirable to institutional investors, we have seen that only \$3tn of the \$228tn total addressable market, focussed on no more than 20-30 countries, is held in a co-mingled fund format, leaving many to question whether alternative investment vehicles aimed at democratising access to the asset class across a wider investor base, sectors and geographies may unlock this untapped potential.

Figure 1: The real estate universe



Source: Authors own, after: Savills, CBRE, PFR, McKinsey, ERPA, NAREIT (divulged in full in reference section)

Issues for the industry

Like many other sectors, the real estate investment management industry is undergoing a dramatic cultural shift driven by the global financial crisis of 2007-2009, the pressures of climate change, rapid urbanisation and now COVID-19. It is no longer enough to simply promise high, reliable returns to investors, but investments are increasingly required to meet a high level of environmental, social and governance (ESG) criteria. In addition, the fourth industrial revolution has challenged the economics of the occupier markets, illustrated by the rise of online shopping and the decline of the high street and shopping centres. These trends have only been accelerated as a result of “The Great Global lockdown” imposed under the current pandemic.

In the retail/food & beverage space, we will see a lot of losers as retailers cease to trade, landlords collect half of the rents they expected to receive, and high streets become pepper-potted by residential conversions. The office market could see radical change, but stresses will be felt as occupiers, digesting the need for more space per desk, healthy buildings and homeworking, resist long leases and expensive fit outs in favour of flexibility. Flex offices and plug and play solutions will be medium term winners, as will storage, DIY, garden centres and any format with free space.

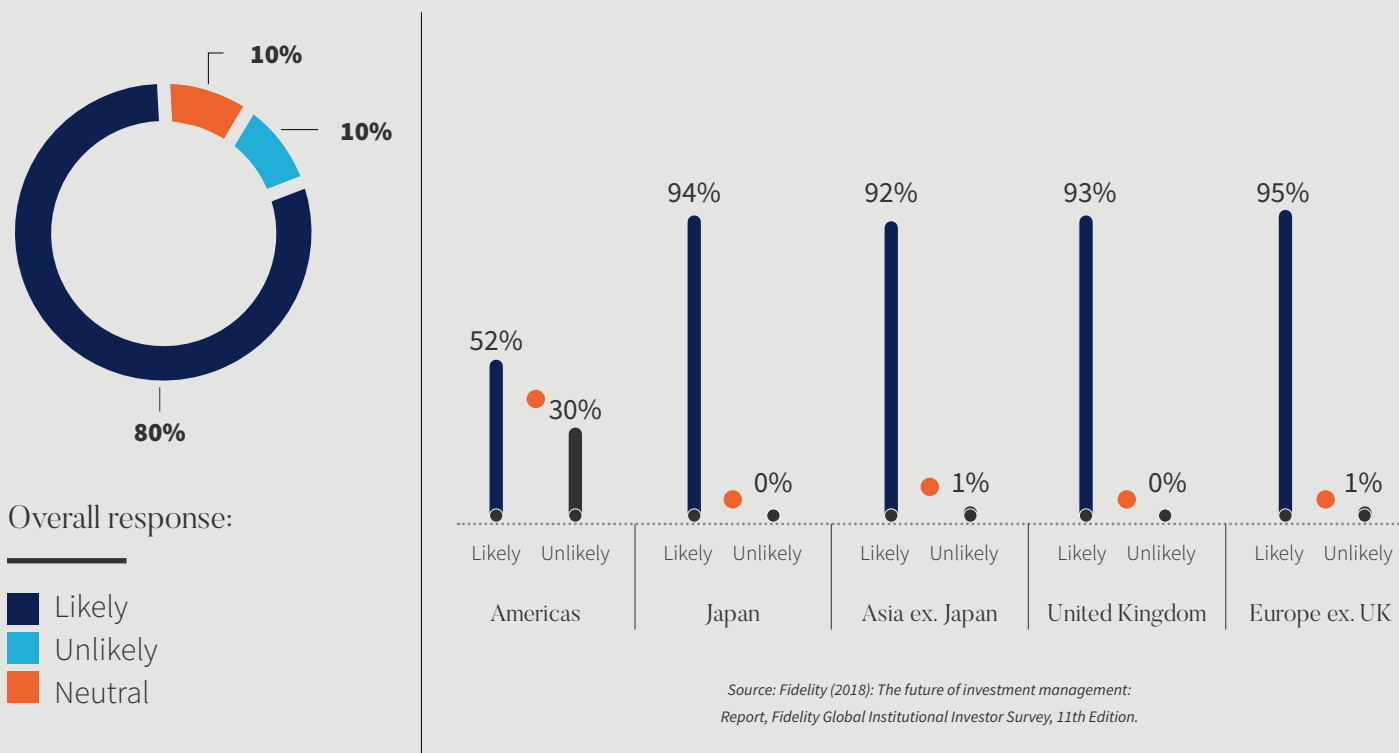
We will likely see a move to turnover indexed retail rents, meaning that more data will be created and shared, providing the opportunity to understand retail location

geography and economics like never before. This will fuel a data science-driven boom for tech companies. In offices, we may see a move to occupancy top ups delivering a premium for healthy buildings with fitness facilities, fresh air etc. A premium (or a much lower discount) will be realised for shiny new assets that enable customer tracking, cleanable surfaces and so on. The UK stamp duty holiday coupled with social distancing gave another boost to housing portals and intermediation platforms of all kinds – maybe leading (at last) to a more tech-supported market for trading houses.

It seems certain that the use of technology platforms as intermediaries between buyers and sellers of space will accelerate, to accommodate short term frictional vacancy and the re-alignment of real estate occupation.

The development of websites and phone apps has made possible the development of highly efficient secondary markets for all things, and it is to be expected that a standardised closed ended property fund format freed from the trading limitations that are currently typical will quickly develop its own secondary market liquidity. Whether the UK-based Association of Real Estate Funds (AREF) leads or assist in this process currently seems unlikely. While AREF is supportive of changes designed to modernize, standardise and regulate a form of tax-transparent closed ended fund, it oversees a particularly tech-unfriendly information platform which will do little to enable these funds to reach new markets.

Figure 2: How likely is it that new technology will fundamentally change the industry by 2025?



The economics of real estate investment management means that perpetual funds generally deliver more enterprise value than closed ended limited life products. Brockton and Tristan have both recently converted limited life products to perpetual funds for this reason, and also because informed investors will understand the inconvenience and financial cost of having capital drawn for short periods. However, to achieve this advance requires an efficient mechanism to allow switches between unit holders (secondary market liquidity). Hitherto, managers have resisted such innovation, citing financial regulation (KYC) and the cost of taking on new investors. In addition, managers often require a minimum initial investment to justify client on-boarding costs.

Real estate investment managers are also struggling to identify sectors in which they can now invest. In the 1990s, a typical portfolio mix was 50% retail, 40% office, 10% industrial. Retail has been in near freefall since the mid-2000s, with so-called ‘balanced funds’ doing whatever they can to reduce their retail weightings; the office market now appears to be similarly, if less spectacularly, challenged. In 2020, logistics was such a clear winner that fears of over-pricing were holding some investors back, while rental residential – a clear growth sector – is in limited supply and hard to find in sufficient scale.

Against this background, the investment and fund management industry remains conservative, apparently immune to the tech-driven forces of change that have spawned so much investment in FinTech and occupational real estate markets (AirBnB, WeWork, Rightmove). Despite this severe business conservatism, this report sets out how digitalisation will drive significant change in the real estate investment and fund management industry, primarily through a shift from top-down, macro-economic data modelling and towards a bottom-up, ever more granular data approach, enabled by emerging technologies and delivered through either allocator-driven or vertically-integrated business models.

“Data analytics are already chipping away at the lack of transparency, and those high barriers to entry may be indirectly lowered by the use of technology to develop and market more liquid investment vehicles”.²

ISSUES FOR THE INDUSTRY

The Investment Manager of the future

Traditionally, real estate investment was non-operational, meaning that investors received a stable, net rent through a long lease which pushed a lot of costs and risk onto the tenant. Typically, under this model, the building owner is separated from the customer – the space user – by a long set of intermediaries (asset managers, property managers, facilities managers), so that what should be a B2B or B2C business model is instead wholly passive. In addition, the procurement model sitting behind this market is often speculative, with a developer having no idea who will be the ultimate customer for the space, nor the buyer of the asset. Once the building is sold, the developer's responsibility generally ends.

However, leases have been getting shorter, and there are several new property types beyond industrial, retail and office which involve (a) very short leases (e.g. 9 months for direct-let student housing); (b) costs which cannot be pushed onto the tenant through an FRI lease; and, as a result (c) volatile net cash flows. Because the operational costs cannot be pushed onto the tenant through an FRI lease, attention has to be paid to the cost line, and because these properties are unlikely to be let on a long lease and tenant rollover (lease renewal) probability becomes important, attention also has to be paid to the revenue-generating potential of the asset.

The nature of operational, or semi-operational, real estate is the customer-supplier relationship. If and when real estate investors embrace this they will be thrust into a different world of employees, health and safety, feedback platforms and big data. The COVID-19 crisis will increase this pressure, which will be at its most acute in senior housing, affordable housing, hospitality, health care and educational assets, all of which (a) offer opportunities for diversification and growth and (b) require an understanding of customer relationship technology.

This will lead to combined development and operating platforms (sector specialists); fund managers transitioning to operators; and, because operators know what the customer wants, fund managers transitioning to developers (Greystar being a market-leading example). It will also require an understanding of the technology driving the B2C relationship, connecting product with buyer, characterised by Airbnb.

This move to operational real estate favours two models: first, the vertically integrated developer/investment manager/operators such as Hines, Prologis or Greystar; second, the allocators such as Townsend, Stepstone, CBRE Global Investment Partners, operating in the gaps between these market leaders, or creating them and spinning them out.



As the industry begins to adopt technology, we believe we will see the bigger investment management firms of both types increase their market share for three primary reasons:

A. No firm has a dominant market share – yet

The aggregate assets under management of the top 20 global fund managers is around \$1.8tr. This is around 5% of the investable market; the largest single manager, Blackstone, has a market share of less than 1%. In a total listed equity marketplace of around \$70tr, meanwhile, Vanguard has assets under management of over £6tr, which is a market share of 9% (and over 25% of all mutual funds and ETFs).

B. There has been remarkable instability in the fund manager league table

Of the top 10 managers in 2007, only three (PGIM/Pramerica; UBS; AXA) were still there in 2017. ING was swallowed by CBRE Global Investors, so maybe we can claim four. Five of the ten brands have disappeared and 4 of the top 5 in 2017 were not in the top ten in 2007. This instability is related to the small market shares of the market leaders.

Table 1: Global fund managers by AUM, 2007

Rank	Fund Manager	AUM (€m) 2006
1	ING Real Estate	79,220
2	RREEF	53,685
3	Morley Fund Management	47,979
4	Morgan Stanley Real Estate	47,655
5	Pramerica Financial Inc	46,519
6	LaSalle Investment Management	32,005
7	Axa Real Estate Investment Managers	32,000
8	UBS Global Asset Management Real Estate	30,459
9	Principal Real Estate Investors	28,144
10	PRUPIM	27,666

Source: PFR (2020): Global Investment Managers 2020, Institutional Real Estate Inc., Special Report

Table 2: Global fund managers by AUM, 2017

Rank	Manager name	Total 2017 €m
1	Blackstone	161,542
2	Brookfield	137,453
3	PGIM	108,008
4	Hines	91,728
5	Nuveen/TH Real Estate	90,941
6	CBRE Global Investors	86,010
7	UBS Global AM	76,411
8	AXA IM - Real Assets	71,115
9	Swiss Life Asset Management	69,258
10	JP Morgan Asset Management	69,042

Source: PFR (2020): Global Investment Managers 2020, Institutional Real Estate Inc., Special Report

* Figures have been reported according to publicly available information. However, it has been brought to our attention that internal measurements may not be consistent with one another. For example, Hines report AUM including the value of assets for which they also provide property management to 3rd party owners.

C. Digitalisation leads to industry concentration

In digital markets, users cluster on the platform that has the largest user base and the economies of scale that follow create a virtuous cycle of growth – those platforms that attract the most customers have access to the most data, and are thus able to offer better products and services than competitors, attracting more users, and so on. In real estate the combination of the huge funding requirements to gain market share and the potential monopoly gains associated with market leadership is fuelling the race to attract large amounts of venture capital to push digital platform business models. Thus, we are currently witnessing a transformation towards business dynamics that have information technology and data at their core. Eventually, perhaps, this type of transformation will characterise the real estate investment management industry as much as algorithmic trading has changed securities-based fund management.

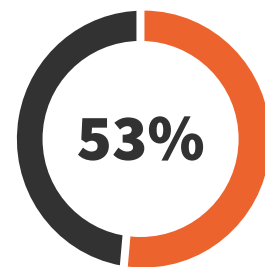
There are early signs of an emerging super class of manager – beginning specifically with Blackstone and Brookfield – and their growing investment in data science. It is notable that these businesses are focussed on private markets and are unconstrained by banking or insurance parents, or by larger brokerage businesses. Given this focus, plus the appeal of the vertically integrated model which generates large pools of customer data, it seems that Hines could emerge from the pack as another growth engine. As growth in Asia will continue to exceed growth elsewhere, we may see the emergence of a fourth player from this region, no doubt with a claim to more data about the nature of the occupational market. To identify those managers likely to climb the league table, we should look to their business model, their geographical focus and their capacity for data-driven innovation.



Technology and investment managers

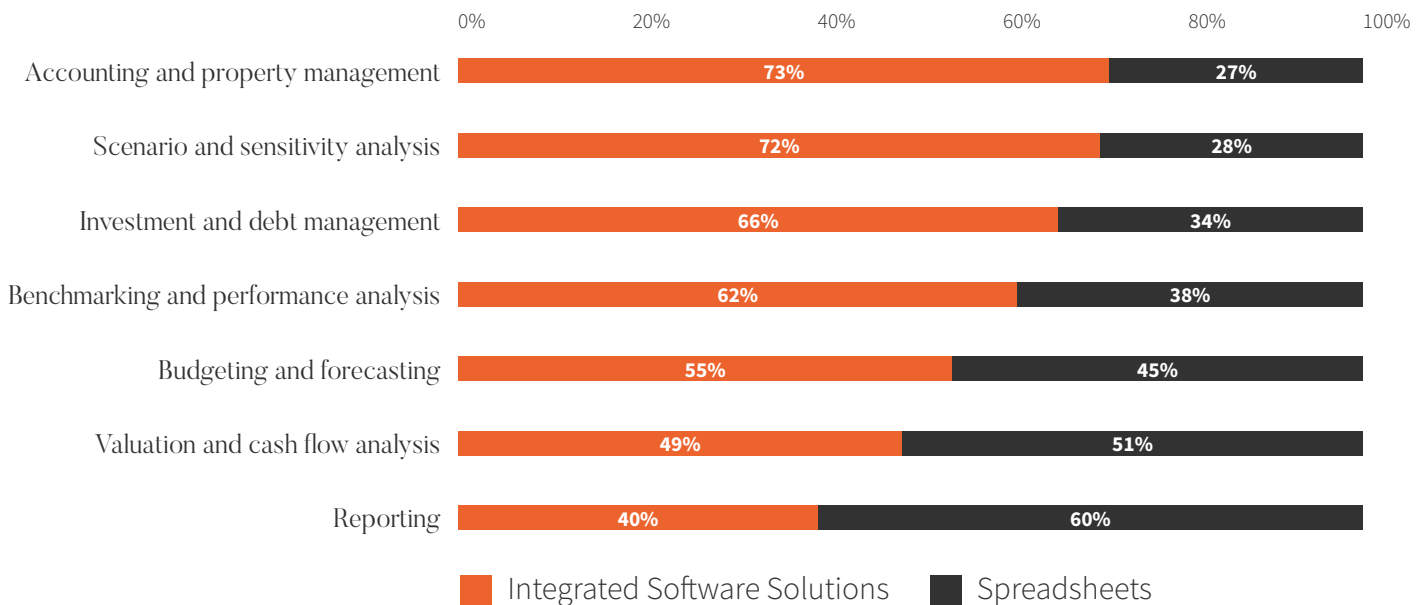
Over the last 10 years, investment into PropTech has accelerated from a foundation of \$1.1bn in 2010 to a high of \$27.2bn in 2018. The total amount invested across this period (2010-2020) is just short of \$100bn³. 53% of real estate companies are now directly investing in at least one type of PropTech firm⁴.

Despite this, the real estate investment management industry, like much of the wider real estate ecosystem, is still notoriously analogue-based in its approach to everyday processes. Deals are often sourced face to face through personal networks, relying on rumour and market hearsay, while hand signed documents are still exchanged via the post, only to then be scanned and uploaded, or worse, stored in filing cabinets. 60% of firms are still utilising spreadsheets as their primary tool for reporting, 51% for valuation and cash flow analysis and 45% for budgeting and forecasting⁵.



53% of real estate companies are now directly investing in at least one type of PropTech firm⁴

Figure 3: Software vs spreadsheet use by function



Source: Altus Group (2019): The Innovation Opportunity in Commercial Real Estate: A Shift in PropTech Adoption and Investment, CRE Innovation Report.

We believe it is fair to say that property investment managers have not been at the forefront of this PropTech boom. There are two probable reasons for this: first, the majority of innovation has been aimed at the producer-customer relationship (witness Airbnb and WeWork), which does not characterise the nature of the real estate investment management business model in which this relationship is often sub-contracted; second, while there is a Real Estate FinTech sector which speaks directly to investment managers, the message being conveyed has just been too ambitious, with inadequate consideration of demand for the product. The most obvious examples are blockchain, crypto-currency real estate platforms and tokenisation.

Culturally, there is a lot of resistance to technology adoption as many are currently benefiting from what is perceived to be a trusted and functional system without risking the sharing of digitalised data through a central platform. While systems exist to help select target properties and evaluate their acquisition, many feel that existing methods of fundamentals-based analysis are still superior to technology-based ones, and almost half of all fund managers and investors agree that better matching of buyers and sellers through technology will mean more competitors for targeted assets (a bad thing, in their eyes). However, fund managers are excited about the ability to quickly screen a high volume of projects in more detail, allowing them to more precisely focus their investments on specific sectors or situations⁶.

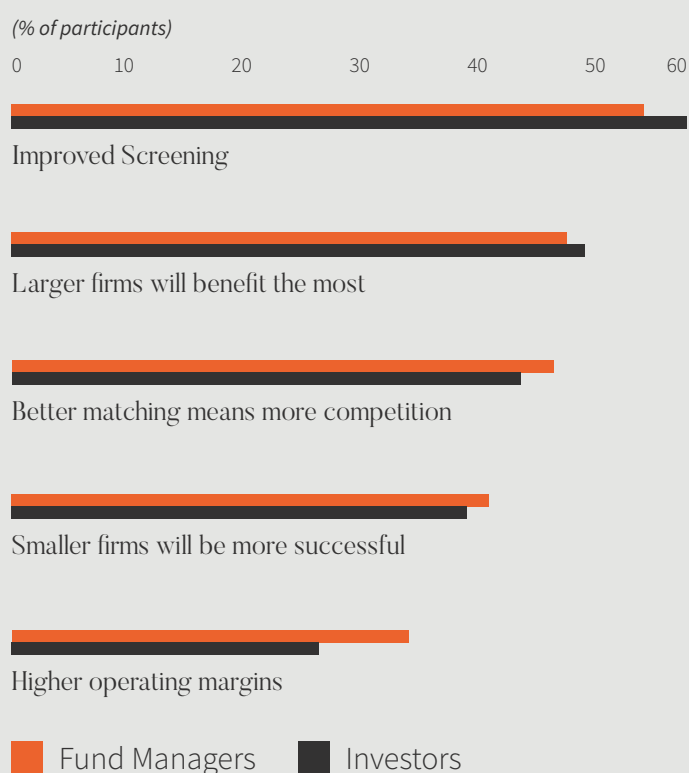
Whether it is desirable or not, technological change is coming. Those companies who adopt technology will be able to develop a greater understanding of the market and the asset-specific risks associated with each investment, and hopefully thereby generate alpha. However, with only 25% of real estate investment organisations claiming to already have an established data strategy⁷, it seems that most have been slow to realise the opportunities presented by emerging technologies.

“Real estate investors are well aware of the crucial role big data analysis can play in measuring the operational performance of their holdings. A building manager’s ability to monitor energy and water use relates directly to the asset’s efficiency, attractiveness to tenants and, ultimately, market value”.⁸

Perhaps this awakening will come as a result of the COVID-19 pandemic. As investment management teams have been decentralised, the need for an online platform that centralises critical portfolio data has become ever more apparent. In order to be successful, disparate spreadsheets are no longer suitable, and teams need instant access to real-time data in order to push deals forward, manage tenant relationships and make informed decisions. Technology offers a route towards this centralised portfolio data, and offers real time insight into the impact COVID-19 is having on the business.

“Real estate can become a mainstream asset class with a greater transparency of information, better measurable returns and benchmarks, stronger legal and tax frameworks, and more efficient methods for investors to acquire, lease, manage and sell their property assets”.⁹

Figure 4: Impact of PropTech on investing over the next 5-10 years



Source: SEI (2020): The future of real estate investing.

CASE STUDY

The Real Estate Investment Management Technology Forum

Such is the scale of the challenge facing the industry, that a forward thinking group of Europe's leading Investment Managers have set up an exclusive roundtable forum for sharing best practices and pain points, and for driving digital transformation amongst their peers.

Known as ReimTech (The Real Estate Investment Management Technology Forum) and chaired by Naqash Tahir (PGIM Real Estate), this group consists of over 40 innovation champions (CTOs, CIOs, Head's of Innovation etc), who have been meeting once a quarter at a physical London location for the last 4 years. Representing approximately \$900bn AUM, this network holds enough influence to drive the necessary change within market.

Sitting at the nexus between technology providers and the real estate industry bodies, they hope to fill the void in knowledge that currently exists between these two siloed, but increasingly co-dependent, groups. While, in the absence of clear governance on how to negotiate real estate's digital transformation, this group acts as a soundboard for the industry, both guiding cutting edge, disruptive technologies and calling for updates or integrations to the widely used incumbent industry platforms.

A typical meeting contains 2 hours of presentations and discussion with academics, start-ups, industry bodies and thought leaders, followed by an hour of member only knowledge sharing, following Chatham House rules. While rival organisations may compete on assets and investors, this group holds a refreshingly mutual understanding that when it comes to technology adoption, an open and collaborative approach between its members is best suited. Sharing stories of successful and failed pilots, arranging joint product demos, undertaking shared tech due diligence and identifying where regulatory bodies need to focus their attention are just a few of the success stories to come out of these private meetings.

ReimTech hope to learn from other industries which have fallen foul to technology monopolisation or disruption from external organisations (we've all heard the Blockbuster-Netflix example), and use their combined clout to guide one another whilst re-addressing the power dynamics imposed by current technology vendors, pushing back against needless fees and data protectionism for the benefit of all Investment Managers.

In the true spirit of transparency, openness and collaboration, external Investment Management firms are welcome to join the group by getting in touch with the chair.

Table 3: ReimTech members

- | | |
|---------------------------------|----------------------------------|
| • PGIM Real Estate | • Savills IM |
| • LaSalle IM | • Segro |
| • CBRE Global Investors | • Ares Management |
| • Aberdeen Standard Investments | • Fidelity Investments |
| • Patrizia | • Broadgate Estates Ltd |
| • Schroders | • Partners Group |
| • Invesco | • Harbert Management Corporation |
| • Fiera Real Estate | • Tristan Capital Partners |
| • AEW Europe | • Infrared Capital Partners |
| • AXA IM | • Marathon Asset Management |
| • Aviva Investors | • Barings |
| • M&G Investments | • EQT Partners |
| • Legal & General IM | • Long Harbour |
| • British Land | • Royal London |
| • Nuveen | |

TECHNOLOGY AND INVESTMENT MANAGERS

Roundtable findings

What do leading real estate investment managers see as the key barriers to technology implementation? To explore this issue, we gathered together over 30 global participants from leading firms to share their expert insight into the key pain points within the industry and their experiences with current software systems. The key sentiments from these October 2020 roundtables have been summarised below and used to inform the focus of this report. For the sake of anonymity, we have not attributed any quotations but acknowledge participating organisations at the end of the next page.

1. “One of the key issues for all managers big or small is the due diligence process in assessing acquisitions, and the multitude of information sources now needs more and more management, especially with the increase in the number of stakeholders we need to take care of now, especially post COVID. While some of the biggest investment managers are using 20+ data scientists to do the job, traditionally it’s been done by a manager and the underwriter.”
2. “The separate KYC processes, involving individual banks, with different investors or joint venture partners are very time intensive. If there was a centralised system, where this process only occurred once to the highest standard required in the market, then this would save a lot of time.”
3. “It seems ridiculous that we have an industry where a building might be developed speculatively, pre-funded by an institutional investor who has no input into the design of the building. The institutional investor then sub-contracts the property management of the building alongside an asset management joint partner, who both have no connection to the individuals who are using the building and even less of a connection to the original developers”
4. “We see some specific expert platforms which are capable of getting all of the environmental data from all the right sources, but we see a lot of challenges to integrate all of those specific systems into one single decision making or analysis place where we can combine all the data.”
5. “What we see is that if we have a lot of data and we show which data we use, we always get into a discussion with the client who has a different data format and requires us to follow their guidelines and we lose a lot of information because they want specifics, and not the broad view we want to show.”
6. “The bigger managers have advantages. One of the key advantages is the visibility and understanding of the market. The bigger they are, the more properties they have, the more data they have and the more interactions they have with some of the largest tenants in Europe. That’s their USP – to open that up to any AI or data platform is unlikely. They want to reap the rewards of their hard work.”

7. “There are ideas in the market that in the future you could charge a reduced rent per square foot, with a top up rent based on actual occupation levels. So if the building is full of people, you make more rent than if the building is empty. These ideas are going to require the generation of data from a smart building.”
8. “If you look at the current real estate stock, a large majority of it isn’t suitable at the moment, it’s not ‘smart’ or environmentally friendly. But the solution isn’t to simply knock them all down and rebuild brand new buildings. The technology to be able to make those changes will start to come through. However, at present there is not that much available.”
9. “I once had to hold 497 face to face meetings all over the world to raise a new fund. It was so inefficient I decided to keep count. There must be a more sustainable way to achieve this, both environmentally as well as physically and mentally.”
10. “In the US, energy performance metrics are so opaque and any technology that can improve our awareness about not only the current energy efficiency but also the potential efficiency improvements is very welcome.”
11. “If we didn’t have inefficiencies in the market, many of us wouldn’t have jobs.”
12. “We are on the front end of a transformation. For 30 years we have been using a top down approach to forecasting cash flows. For example, you build a 5 or 10 year model of rent escalation likely based on a top down concept of GDP growth. However, we now have the opportunity to use data science to perform bottom up forecasting of what actually happens at lease events, what actually happens at a lease renewal, what actually happens at a rent revision and the true costs of retrofitting. That will drive modelling much more than it has in the past.”
13. “I can see more firms focusing on energy, predictive maintenance and the tenant engagement side in 2021. It is the next big tech focus for real estate investment managers.”

TECHNOLOGY AND INVESTMENT MANAGERS

The data standardisation problem

Findings from the roundtables and subsequent follow up suggested that the successful real estate investment manager of the future will be one that can offer a streamlined reporting structure and a standardised system, so that single assets can be managed under a single software solution which accurately describes the portfolio risk and expected return. Like many issues in this industry, the goal of streamlined reporting is often frustrated by the absence of data standardisation protocols.

While we can criticise property professionals for their reliance on generic software, we can understand that there are many task-specific propositions which are proving too narrow to satisfy the broad range of operational requirements. Because many of those products have a closed technical architecture, they are not able to integrate with other solutions. This leaves many operating teams with a complex patchwork of systems that cannot be integrated into a cohesive ecosystem. As a result, property teams have more systems to manage yet are still struggling to deliver the desired outcomes¹⁰.

It was suggested in the roundtable that despite the availability of more and more bottom up data, there are big barriers to using this data effectively. These are: a lack of knowledge about how data and how it can be used (how many data scientists work in real estate investment?); low incentives for data sharing; a mismatch between the data that investment managers collect and that which their LPs request; and high sunk capital costs on legacy software creating a reluctance to switch to emerging systems.

These roundtable sentiments are supported by survey findings that suggest that the top reasons why commercial owners stopped using a given tech solution were: it failed to integrate with other tools in their tech stack (33%); the difficulty in utilising its full potential (28%); and the fact that it did not offer enough features (25%)¹¹. However, a single data standard and truly open APIs (links between software

packages) would overcome these issues, allowing for the integration of software systems and a more streamlined data analysis and reporting process.

“The industry is creating more valuable data than ever before, but CRE executives are faced with fragmented data sources, data duplication and poor integration between applications. The lack of automated and seamless workflows is fuelling the need for a greater integration of applications and the automation of processes”¹²

It is reported that 45% of commercial real estate teams spend 15% or more of their time managing and organising data, while for 12% of CRE employees this process takes up over a quarter of their time, representing in excess of 3 months of their annual workload¹³. This is likely due to the siloed and fragmented systems used throughout the industry, as well as the complexity of current portfolio management tools.

While legacy property data standards such as PISCES and OSCRE have long attempted to overcome this issue, few in the industry are even aware of their presence and little change has been effected. Although a breakthrough may be imminent, with the recent open access release of OSCRE’s Industry Data Model, claiming to cover most aspects of the real estate asset lifecycle, and with renewed calls for an industry wide framework currently being led by the Real Estate Data (RED) Foundation.

In a recent review of industry standards, RED Foundation discovered that current standards tend to be focused on either a specific stage of the building lifecycle or job function, managed or regulated by different organisations and often applied and acknowledged in isolation. As data is increasingly needed to inform decisions beyond the building stage or job function by which it was created, there is a need for new standards that will allow data to be used by an ever-wider variety of practitioners¹⁴.

“For real estate to meet the challenges of reducing the climate impact of buildings while improving user experience, we will have to work together to link systems and share data. The only way to do that efficiently is by agreeing on standard approaches to data, systems and processes.”¹⁵

It is our belief that any top-down prescriptive data standards will ultimately fail, as they will struggle to keep up with market practice. Machine learning systems, on the other hand, will allow data sharing to happen from the bottom up - recognising the similarities between common formats and consolidating data into a single standard. For example, one firm’s lease length data will be made compatible with another’s through intelligent systems trained on historical data formats recognising that they are both the same, not by every firm adopting the same format to begin with.

One market where new digital data standards are soon to be enforced is in Building Management Systems. Striving towards a fully automated, carbon neutral, ‘smart’ building operating system, BACnet International, KNX Association, OCF, Thread Group and the Zigbee Alliance have partnered to better align commercial buildings with users’ connectivity needs.

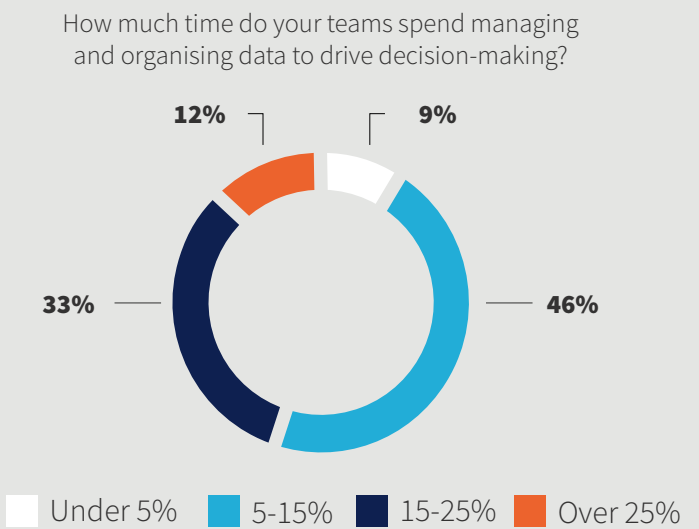
2-3 months

Almost half of CRE firms spent 2-3 months of the year managing and organising data to drive decision-making.

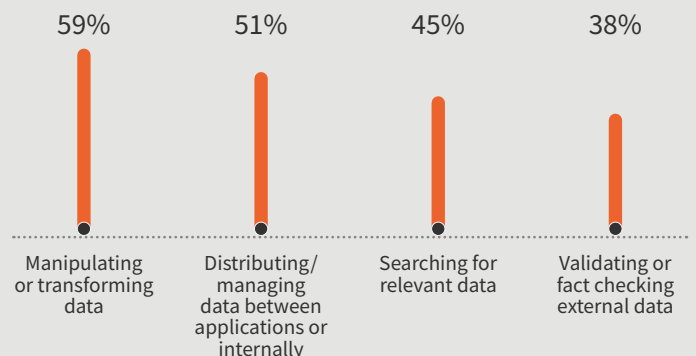
The alliances have collaborated under the IP Building and Lighting Standards, a new initiative aimed at improving the integration of smart building products. The aim of the collaboration is to promote a secure multi-standard IP-based infrastructure as a backbone in building automation to replace the less efficient, still-widespread use of siloed solutions. These associations will harmonise leading technology standards, reduce the fragmentation in smart building connectivity and promote a broad acceptance of coexistent solutions¹⁶.

Such an open collaboration between the leading real estate investment management platforms would surely similarly enhance the efficiency of this notoriously undigitalised industry.

Figure 5: Time spent managing CRE data



Activities Requiring Most Effort and Time to Manage Data



Source: Altus Group (2020); CRE Innovation Report 2020



COMMENT

Naqash Tahir, Head of Systems and Innovation at PGIM Europe.

“

There are two key issues with the application of technology to the real estate investment management industry:

We need a data standard – it’s a must – industry players must stop talking in silos and, as a collective, decide how to proceed. Even within individual companies there are often dissimilar standards. RICS in conjunction with BPF, AREF and other institutions have the power to drive the top down change, and they must make it a priority.

As a result, there is no single system that serves the end to end asset management process. Too much money is currently being eaten up supporting legacy systems. On average around 60-70% of an IM’s tech budget is going on maintaining old software. Firms are pumping money into legacy systems, trying to make them work for asset management, but they are not built for that and are only useful for certain processes.

We have the tools to give us digitalised data, but we also need the connections and integrations between the software providers to make use of it. There is a lot more that software could do if there was a data standard and better integration of new solutions.

”

Naqash Tahir is Director at PGIM Real Estate, Head of Systems for Europe and Project Manager for the Asia region. He is responsible for technology strategy, digital transformation, innovation and PropTech for continental Europe, as well as overseeing various projects in Asia.

Previously, he served as the team lead for European systems, while managing projects and overseeing fund analysis.

CASE STUDY

REST Solution

REST Solution offer a centralised platform for investment and asset managers that enables them to draw accurate and real-time asset-level data.

Professionals in CRE are losing between 30% and 40% of their time by manually collecting asset level data from disparate sources and stakeholders, crunching it and then looking for risks and trends. The lack of a central source of accurate and real time data takes focus away from more value-adding processes. This cloud-based platform is able to aggregate data across common industry software providers, acting as a single source for reporting metrics and automating the presentation of real time data for portfolio managers.

As well as financial data and asset management reporting software, REST Solution incorporates data from brokers, valuation software, asset service providers and ESG data, providing portfolio managers with a comprehensive catalogue of all necessary information required to execute their investment strategy, while allowing those in the value chain to continue using their existing software stack.



Rest Solution co-founder:
Guillaume-Henri Bouchero



Rest Solution co-founder:
Brian Laleye

“Laleye founded REST off the back of a personal pain point, after realizing no software existed on the market which addressed his family’s asset management firm’s real-time reporting needs. They created a module which he claims is the only one in Europe that can connect to any type of software, as well as connecting to databases, receiving data dumps and working with APIs.”

- Forbes

TECHNOLOGY AND INVESTMENT MANAGERS

Start-up market map

It appears clear that the majority of the real estate investment management industry continues to use generic software such as spreadsheets for their key everyday requirements, missing out on the huge process efficiencies presented by emerging technologies. Often the problem is not a lack of will but a lack of knowledge of available solutions, with 56% of CRE executives only willing to invest in a market proven technology¹⁷.

Given that around 8,000 PropTech start-ups are listed as of August 2020¹⁸, it's no wonder that 89% of CRE executives identify market consolidation as a necessary requirement before widescale PropTech adoption can occur¹⁹. Figure 6 contains a structured list of those real estate investment management technology start-ups most applicable to the specific job functions and inefficiencies we outline in this report.

Figure 6: Investment management technology market map



Source: Authors own

A photograph of a laptop on a desk. The laptop screen shows lines of code in a dark-themed editor. To the right of the laptop is a desk lamp with a glass chimney and several circular light elements. The background is a blurred office setting.

Distribution and investor management

Distribution involves the processes of raising and retaining capital

Historically, the distribution functions of capital raising, investor reporting, compliance and performance analysis have taken place through face-to-face meetings, in-person presentations and the tedious manual transfer and validation of analogue documentation. However, while these interpersonal skills are still very much required, they are increasingly being supplemented with specific technology systems able to streamline the management of relationships, increasing the frequency of interactions and the quality of information provided.



DISTRIBUTION AND INVESTOR MANAGEMENT

Capital raising

Perhaps the biggest change to the capital raising process has come as a result of the “Great Global Lockdown” in reaction to the recent COVID-19 pandemic. As of 14th June 2020, the use of Microsoft Teams had grown by 894% compared with its base usage during the week of 17th February. In the same period, Zoom use grew by 677%²⁰. While these video conferencing platforms represent generic software, their en-masse adoption has laid the foundation for a dramatic cultural shift in the way real estate companies raise capital.

The knock on effects for the PropTech market could be enormous, as the real estate industry looks to shift all existing analogue systems onto specific, digital, cloud-based solutions to remain productive in the face of increased remote working. It is reported that 82% of real estate companies are looking to invest in home working and digital meeting tools in the immediate future, while the second strongest preference (50%) is for technologies that foster stronger digital links with the marketplace²¹. 61% of CRE executives believe online marketplaces will have a major disruptive impact on the industry, while the majority of CRE firms have used an online marketplace for a recent transaction, with most intending to increase their use of this technology in the future²².

Source Central has attempted to create a digital capital raising marketplace, matching institutional real estate investors with the funds and their management teams. Their offering provides a secure two-sided network based on interactive real asset fund data, facilitating the initial interaction that can then lead to follow on presentations and potential investments. LendInvest has partnered with some of the world’s largest and most sophisticated institutional investors seeking exposure to real estate debt through securitisation, forward funding and other debt instruments to create a digital marketplace.

Software solutions are now also able to deliver insights on how managers are perceived by potential investors, adding a new layer of insight to those trying to raise capital. For example, start-up Appfolio Investment Manager allows the

investment management team to track individual investor interactions across their integrated investment management and investor portals. Tracking this interest allows for more personalised and targeted offers, saving time on the fund raise and enhancing the chance of securing capital.

Once the connection has been facilitated, the use of secure cloud-based data rooms and investment portals such as Drooms removes the need for information to be sent via post, or presented in person, moving the whole onboarding process online. The combination of datarooms, e-signature software such as DocuSign, RegTech/KYC and onboarding solutions mean that we can envisage a world where capital can be raised from large institutional investors without an in-person meeting or physical document transfer needing to take place.

Alternative finance

The most well-known source of alternative finance for real estate investments is crowdfunding. However, given that the UK alone sees real estate transactions of around £50bn in any typical year, crowdfunding’s share is only estimated at somewhere between 0.1% and 0.25% of all capital raised²³. Many have predicted this share to grow with the development of blockchain technology and its touted ability to “tokenise” real estate investments.

Tokenisation refers to the process of representing fractional ownership interest in an asset with a blockchain-based token. These interests can then be traded via their digital representation on online exchanges. Instead of receiving part ownership of physical assets, investors receive a digital receipt that represents their holdings in an entity that owns the asset.

As of 1 July 2020, 297 start-ups dealing in the real estate industry were using blockchain technology, compared to over 400 a year earlier. The overwhelming majority of these are targeting real estate investment and financing applications²⁴.

“Through the digitization of asset ownership and lowering of transaction costs, FinTech and blockchain may give real estate more public market attributes, potentially creating publicly accessible and verified records of asset-level financials. If this evolution occurs, real estate will ultimately become better suited to advanced data analysis — including Artificial Intelligence — which will seek to fill the gap between insights and investment recommendations. Real estate quant trading strategies currently used in public markets may soon be a possibility. This would be truly disruptive to the investment characteristics of real estate as an asset class.”²⁵

The case for the digital tokenisation of single real estate assets is clear to many innovators. Real estate is lumpy and illiquid. A broader base of investors should be able to participate in the ownership of institutional grade assets, allowing them to build diversified portfolios with modest sums of money. However tokenisation faces many barriers to adoption. Firstly, there needs to be a clear demand for the tokenised product; secondly, market participants need to be comfortable with blockchain, which thanks to a host of cryptocurrency fraud and theft²⁶, has made the headlines for all the wrong reasons; and finally, the regulatory framework needs to be in place to provide the necessary investor protection.

This third point is particularly interesting, as under most current regulatory frameworks the direct ownership of an asset cannot be split into many pieces and thus tokenisation (or securitisation) first needs an intermediate structure or corporate wrapper to be created, traditionally requiring high up-front costs and strict legal compliance.

Therefore, if tokenisation is to become normalised within real estate investing, it will have to be applied to existing funds rather than single asset purchases. This is because there is already a clear demand for the product, which is already fractionalised, as well as an established regulatory framework and KYC compliance, leaving the only remaining hurdle to fund tokenisation being the normalisation of blockchain technology.

According to our own conversations with experts in the field, the use of blockchain is more likely to emerge in the back office administrative tasks within investment management, such as replacing the settlement systems at central banks and clearing houses. In the wider investment markets, it seems that the most likely avenue for the emergence of blockchain would be in the debt markets and corporate bond investments. Real estate debt providers based in large banks are the most likely blockchain pioneers in the real estate market.

Fractional ownership and secondary market liquidity does not necessarily require blockchain technology, as is being showcased by regulated London based exchange IPSX, soon to be replicated in the US through LEX, a commercial real estate securities marketplace. On January 9th 2019, IPSX achieved recognised investment exchange status and became the world’s first regulated securities exchange dedicated to the initial public offering and secondary market trading of companies owning single and multiple institutional grade real estate assets. On January 24th 2019, HMRC tax approval meant that the assets traded could be tax-transparent single asset REITs. Their promise was similar to that of a tokenised asset: providing a venue for investors to trade shares in single-asset-owning real estate companies with increased transparency and cost efficiency.

However, nearly two years on, this remains an unproven thesis. Why would – or should - an unqualified retail investor look at individual asset offerings when they could buy shares in a Real Estate Investment Trust (REIT) run by experienced managers building a well-diversified portfolio?

Perhaps the answer lies with the launch of a new category of REIT. Non-public traded REITs, such as those managed by RealtyMogul, pool small investments from a large number of individual investors, making investing in REITs that are not traded on major stock exchanges accessible to the retail market for the first time. This new structure could make regulated, diversified, professionally managed portfolios accessible to a democratised base of commercial real estate investors.

While these, or similar, alternative finance models will allow more people to invest lower amounts, thereby ‘democratising’ the industry, expert knowledge (and the data that is generated by the larger players) will earn an increasing reward. It therefore seems likely that democratised real estate investment will (for a while, at least) remain the preserve of smaller, more innovative investment managers who will struggle to scale.

DISTRIBUTION AND INVESTOR MANAGEMENT

Investor relations and reporting

Larger institutional investors are increasingly demanding strategic relationships with their managers, leveraging their access to research, analytics and advice. Yet 60% of firms (remarkably) utilise spreadsheets as their primary tool to fulfil investor reporting functions. Meanwhile products such as Yardi IM, MRI IM, Juniper Square, Argus Voyanta, Coyote, Cherre, and RealPage AIM are all offering automated AI driven analytics, sourced through the aggregation of disparate data sources and platforms, aimed at providing a one stop shop for the data needed to compile those reports.

In an attempt to overcome the issue of a lack of data portability across these siloed software solutions, data standards agency OSCRE are currently working on an initial integration between MRI, Yardi and VTS, to hopefully facilitate more open and connected technology stacks across the full investment management value chain.



DISTRIBUTION AND INVESTOR MANAGEMENT

Operations, compliance, finance and fund structuring

Traditionally, institutional-grade real estate investment managers control the structuring of any investment vehicles and limit access to those vehicles to qualified investors, often with a minimum investment narrowing the potential investor base. This increases the clamour for 'democratisation'.

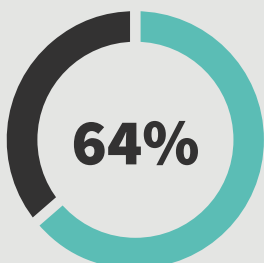
We outlined earlier how emerging companies are attempting to use technology to operate in this field as facilitators, connecting companies to investors and ultimately giving more control over the investment decision to the investor (facilitating investment in units in a single property, for example). Any successful PropTech company targeting this democratisation of asset ownership will ultimately be reliant on innovations in the LegalTech and RegTech markets in order to do so in a compliant and economically efficient manner.

As compliance mechanisms becomes increasingly digitalised through platforms such as Vauban, the whole process of setting up a fully regulated, easily divisible corporate wrapper around any single asset or future fund will become both more time and cost efficient, while potentially laying the foundations necessary for a breakthrough in commercial real estate democratisation. However, even if these alternative financial products ultimately fail due to the host of additional barriers we outline, the growth in LegalTech targeting the investment management industry will ultimately reduce the costs of operation and, consequently, lower the required returns.

It is a legal requirement for investment managers to undertake know your customer (KYC) and anti-money laundering (AML) checks on any investor who wishes to participate in a fund, so that all money which passes through can be deemed legitimate. This produces another barrier to more efficient real estate investment. The technology being designed to deal with the 'onboarding process' is known as RegTech.

64% of financial institutions claim that siloed systems and the lack of consistent cross-referenced IDs was a common pain point when onboarding, with many using numerous tools to access and verify client information²⁷. This takes as much as 20-30% of a relationship manager's time²⁸, with current internal processes resulting in duplication of work and documents, delaying progress and damaging the return on investment²⁹.

Proper identification of end-users is critical. Once secure digital identities, such as eEstonia or near instantaneous digital identify checking software such as ID.me become mainstream, another barrier to the fractionalisation and secondary trading of emerging assets and fund structures will be removed. Many believe that one of the strongest use cases for the establishment of blockchain technology is in its ability to create a secure and trusted digital identity framework.



of financial institutions claim that siloed systems and the lack of consistent cross-referenced IDs was a common pain point when onboarding

CASE STUDY

VAUBAN

VAUBAN is a wealth container platform which automates the formation and administration of asset holding legal entities (Wealth Containers) such as Funds, SPVs, Trusts and LLPs in just a few hours and with only a few clicks. From initial structuring to NAV calculation, it is a fully integrated, one stop shop platform that allows anyone to launch a new, legally compliant and regulated fund in a seamless and digital way.

This is done through two main steps:

Investment managers choose the structure for the Wealth Container based on their desired purpose (Foundation, Hedge Fund, VC, PE Fund, Inheritance, other SPV etc), before combining that with the entity type (Limited Company, Partnership, Trust, LLC) and the jurisdiction where it will be domiciled.

Once this is complete, investors can tailor the corporate documentation and the constitution of the Wealth Container on VAUBAN's platform to customise clauses relating to governance, waterfall distribution, geographical restrictions, carried interest etc.

After both stages are satisfied, the vehicle will be legally set-up through the platform. After which, VAUBAN automates governance and compliance for the Wealth Container including making annual filings, offering multi-permissioned system for different stakeholders to log-in and view the extract relevant information and automated onboarding of investors.



VAUBAN founders: Ulric Musset and Rémy Astié

£1 billion

the platform is projected to manage over £1 billion by summer 2021

“VAUBAN has taken what has traditionally been a drawn-out process and digitised it, reducing friction for those looking to secure and deploy. Vauban is leading the charge in a growing trend; with a boom in alternative assets the scaling company is set to be the infrastructure layer that investment will be built on.”

- Eshat Vatsa, Principal at Pi Labs

DISTRIBUTION AND INVESTOR MANAGEMENT

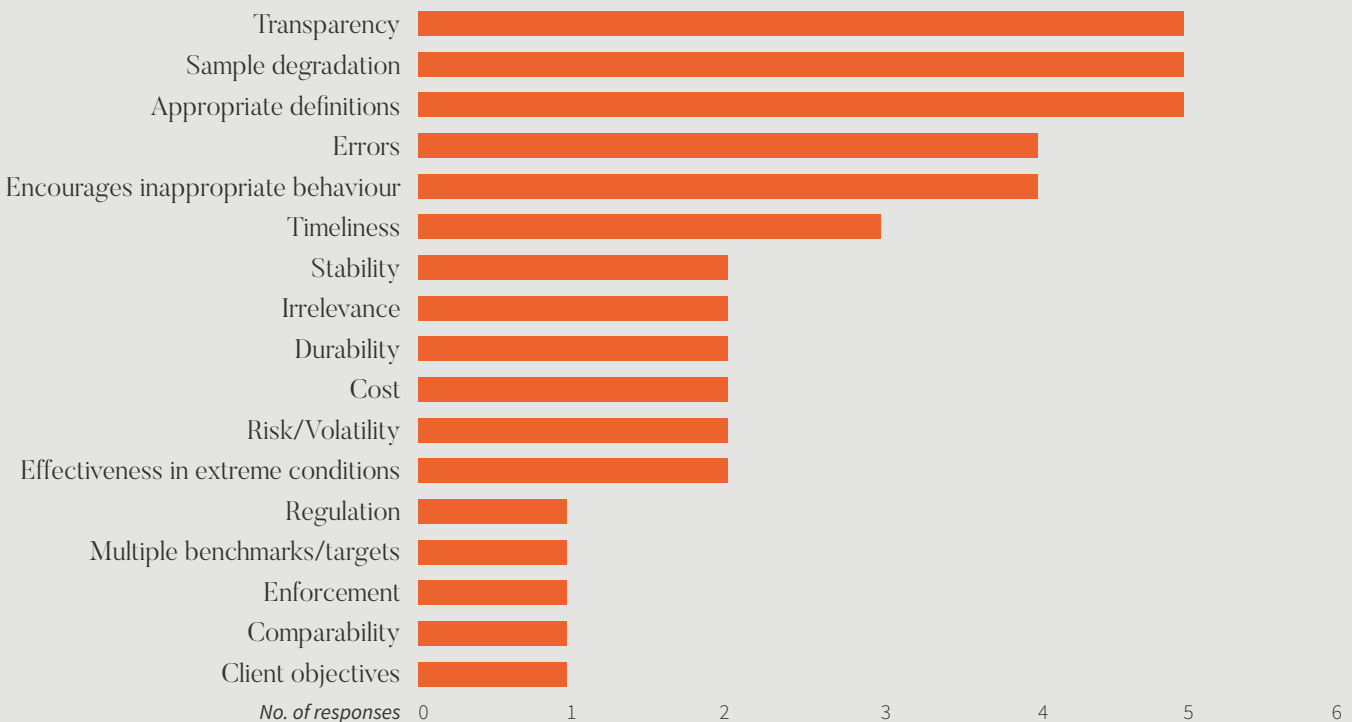
Performance analysis

Like any business, investment managers focus on sustainable income, profits, and market share, and are therefore concerned with competitors and business risk. This leads to the pinpointing of return and performance relative to industry benchmarks³⁰.

“The major challenge with current benchmarking is designing a system which can cope with changing market conditions and which delivers a good balance between the measurement and attribution of performance that adequately captures both risk and return.”³¹

Benchmarking provides a way for limited partners (LPs) and general partners (GPs) to gauge the performance of individual funds and portfolios in relation to their peers, and to evaluate broader performance metrics. However, a historical lack of benchmark transparency, accuracy and immediacy has created the potential for mis-measurement, a particular problem for investors when performance-related fees are payable. This is slowly changing, thanks to new open models of benchmarking such as VTS Marketview, which allows CRE professionals to compare their real-time performance versus market benchmarks for critical operational, financial, supply and demand metrics.³²

Figure 7: Hazards in defining and implementing effective benchmarking policy



Source: IPF (2018): Current Practices in Benchmarking Real Estate Investment Performance

It is reported that 41% of firms have been able to automate the benchmarking and performance analysis process, the highest of any process in real estate³³. However, this automation does not necessarily create any additional value beyond time saving. For this to occur, firms need to unveil new insights which can feed back into investment decision-making. AI or machine learning systems provide promising technology for this purpose, but are still relatively underutilised (11%), most likely due to the lack of availability of standardised digital data on which these systems rely.

There is a clear use case for using technology to convert analogue data and digital spreadsheets into a single, structured and specific database. This is the necessary first step in any investment management firm’s data strategy. For example, PATRIZIA has enlisted the services of Cognotekt and EVANA AG to utilise their natural language processing and document storage capabilities in order to create a digital database of all asset-related information, from invoices to leases, across all of its €45bn AUM³⁴.

Companies such as Architrave are now able to provide document scanning, storage and analysis in a single package. We have also mentioned previously Yardi IM, MRI IM, Juniper Square, Argus Voyanta, Coyote, Cherre, and RealPage AIM, which all purport to perform a similar function. Only once a level of clean internal data has been achieved can a company begin to turn towards more advanced technologies to deliver added value.

JLL report a direct link between market transparency and the adoption of PropTech for areas such as smart buildings, IoT,

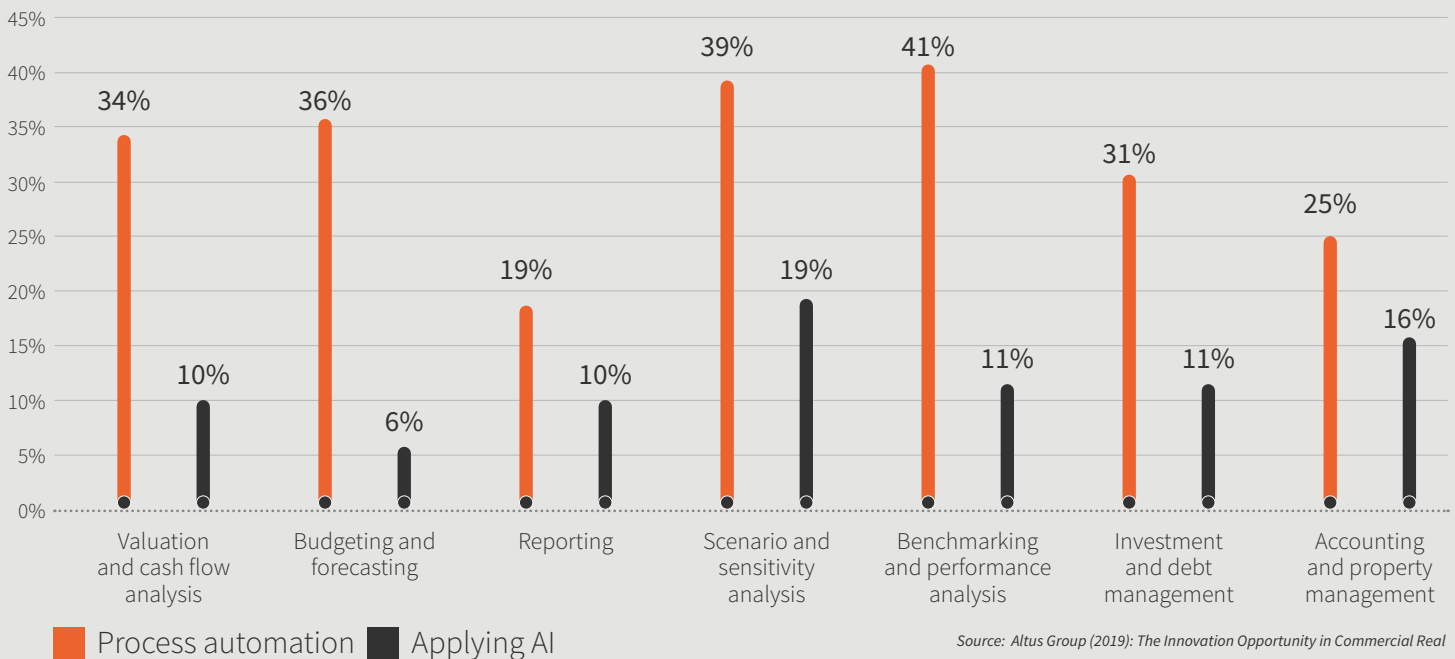
and big data³⁵. This enhanced market transparency makes any performance analysis and benchmarking more accurate and reliable. For example, there is mounting pressure on the real estate industry to cater for ESG criteria in investing criteria as more investors and corporates increasingly look at asset- and city-level sustainability credentials to make decisions about where to invest or locate.

“The adoption of new technology platforms generates new and more easily-accessible market data, which is key for overall real estate transparency” ³⁶

Importantly, transparency attracts investors. If they can accurately see how and where an investment manager is matching or outperforming benchmarks, they are more likely to continue providing capital, while investment managers are drawn to invest in countries that have favourable operating conditions, transparent market practices, and readily available data and performance benchmarks³⁷.

“Data accessibility is essential for benchmarking and valuation – not just at the market level, but also deep within an asset manager’s portfolio” ³⁸

Figure 8: Where CRE firms are automating processes and applying AI



Source: Altus Group (2019): The Innovation Opportunity in Commercial Real Estate: A Shift in PropTech Adoption and Investment, CRE Innovation Report

Manufacturing and the investment process

Manufacturing involves the processes of deploying and managing capital.

The transfer of paper-based marketing brochures, reliance on local experts, in-person site visits, hand-signed documents, human valuations, manual surveys, and incomprehensible leases written in a form of old English are all coming under threat from market innovations and emerging technologies. Those investment managers who adopt these technologies and adhere to rapidly changing cultural demands should begin to source better assets, negotiate more favourable terms, more accurately manage and forecast risk, and transact without undue delay.

However, while distribution and investor management is tailor-made for tech solutions, which is a customer-supplier process already disrupted and/or streamlined everywhere else, manufacturing (the investment process) is more complex. Real estate portfolio strategies and asset plans require a particularly demanding breadth and depth of market knowledge - or data - and bespoke tools for measurement and analysis.



MANUFACTURING AND THE INVESTMENT PROCESS

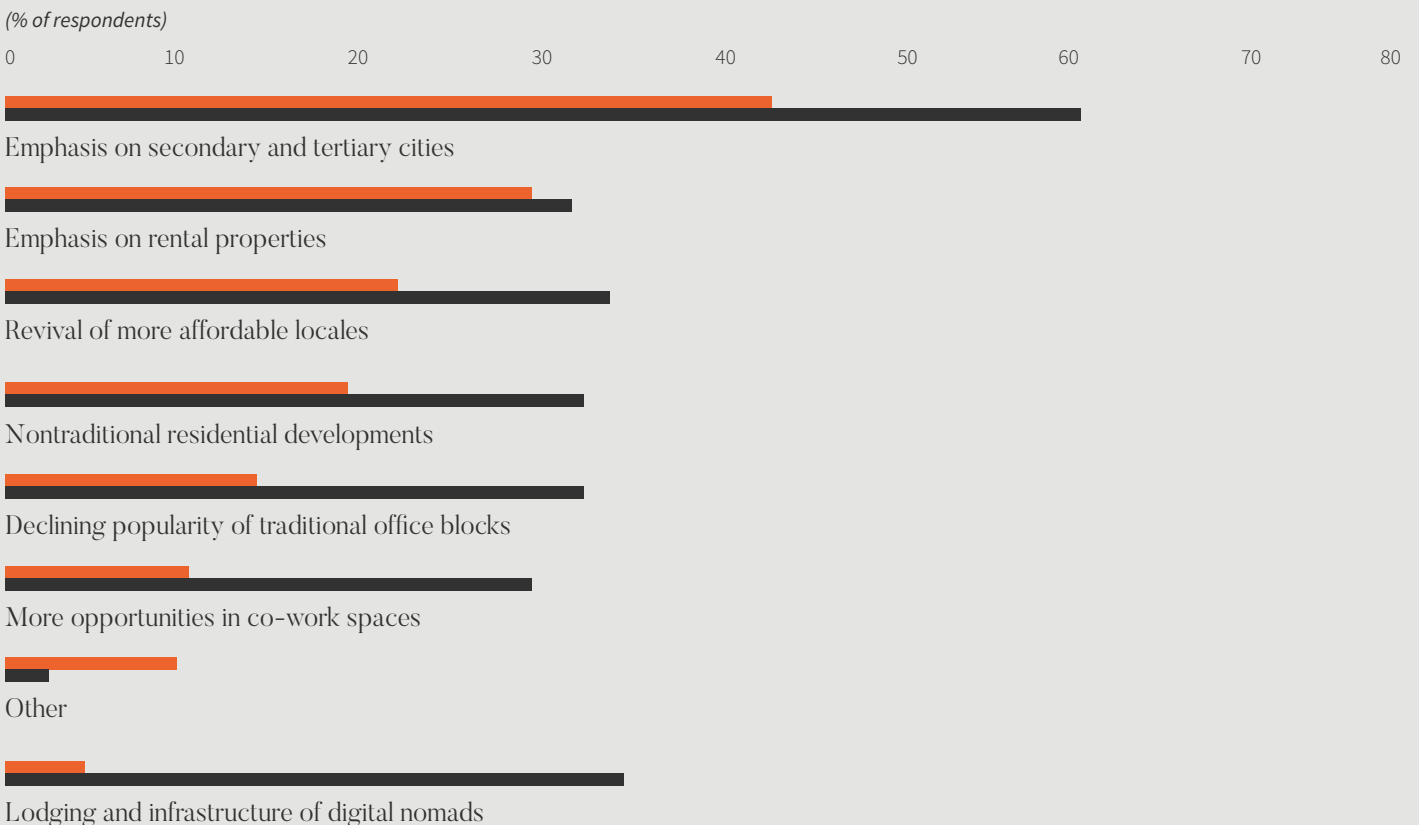
Sourcing

There is currently said to be a lot of ‘dry powder’ and excess capital in the private funds market poised for a post-pandemic, distressed asset buying frenzy. It is estimated, as of May 2020, that this value stood at \$328 billion³⁹. This unspent capital represents around 1% of the current value of all unlisted funds, not an untypical amount for recent years but increasingly concentrated in a smaller number of hands.

The impact of the pandemic is predicted to be far more systemic than previous crises. Trends already underway throughout the last decade have been accelerated as a result

of COVID-19. Some believe that home working may damage the demand for offices. The rise in remote working and online shopping threaten to further damage once vibrant urban cores, while suburban residential still remains difficult to buy in suitable scale. The future of alternatives are also unclear, as healthcare looks to increase its level of remote consultations and university students are set to undertake remote education for some time. With only so many outperforming warehouses and data centres to go around, this has led to a widescale hunt for newly emerging sectors and geographies in an attempt to identify the next growth market.

Figure 9: The expected COVID-19 impact



Source: SEI (2020): The future of real estate investing

Many property fund managers pride themselves on their access to stock, due either to a large scale of operation leading to a high number of transactions being offered, or on their carefully nurtured relationships with brokers and vendors in the market. Buying off-market has become a codeword for doing good deals, and consultants who advise on manager selection are often very concerned with a fund manager's access to market information and buying opportunities⁴⁰.

Specialist portals such as Datscha, Biproxi and Reonomy market themselves as providing access to the entire supply of commercial, multi-family and land assets in their target region. This allows investment managers to source off-market deals by filtering search results by asset type, asset size, sales history, debt history, tenants, ownership, tax history, and more criteria. However, as more data becomes openly available, the market power that comes with being its custodian diminishes. In its place, a new form of proprietary market power is emerging, derived from the machine learning model.

Machine learning technology solutions automate data collection by accessing APIs (links between software packages) and connecting various databases before preparing the data for analysis. The ability of these processes to extract patterns and to use the resulting intelligence promises to help to design new market-entry strategies. AI and machine learning systems are required to reveal these insights due to the sheer amount of data which needs to be considered when attempting to model something as complex as the revenue potential of a city centre hotel, which is simply not possible through traditional statistical modelling. Underwriting with data-backed conviction will not only help identify future growth regions, but models can be written to help pick better assets, and invest in second-tier cities, out-of-favour submarkets, and emerging specialty segments.

“Two seemingly identical cities with the same credit quality may suddenly reveal stark differences when we apply our proprietary analysis using FBI crime data, EPA climate data, housing affordability data and more”.⁴¹

Common machine learning software packages, which include R, Python, Java and Java Script, require an in-depth understanding amongst their users of mathematics, econometrics and data science in order that they can be successfully applied to real estate use cases. The real estate industry is not heavily populated by such folk. It is no wonder, therefore, that numerous start-ups exist which are offering these skillsets to the investment management industry; equally, it is not surprising that these relationships are slow to build.

Skyline AI claims to use a comprehensive commercial model which, using 130 data sources covering 50 years, includes information on stock market performance, interest rates, financial indicators, commercial real estate analytics and demographics data. This allows them to build an algorithmic representation of a property in relation to its urban environment and to make 15-year predictions around the asset's performance.

In the residential arena, machine learning software is being used to identify suitable acquisition targets for iBuyers (short for 'instant buyers') such as Opendoor, who offer completed transactions within 7 days. Targeting residential investors, REalyse claim to bring together every available dataset on residential property, presenting it through powerful, easy-to-use analytics tools. This makes it easier to create definitive, quantifiable assessments of risk and opportunity.

MANUFACTURING AND THE INVESTMENT PROCESS

Appraisals

This crucial aspect of the property purchase decision involves the employment of specialist property skills, in-house or out-house, to ensure that the asset being appraised is all that it appears to be. This involves commissioning a valuation report, including the collation of comparable evidence and opinions concerning the strength of the local market, plus an assessment of the present value of its expected income stream discounted at a rate which reflects its risk, requiring a cash flow forecast. As per our earlier statistic, 51% of CRE firms are still using generic spreadsheets for valuation and cash flow analysis, while 45% are doing so for budgeting and forecasting.

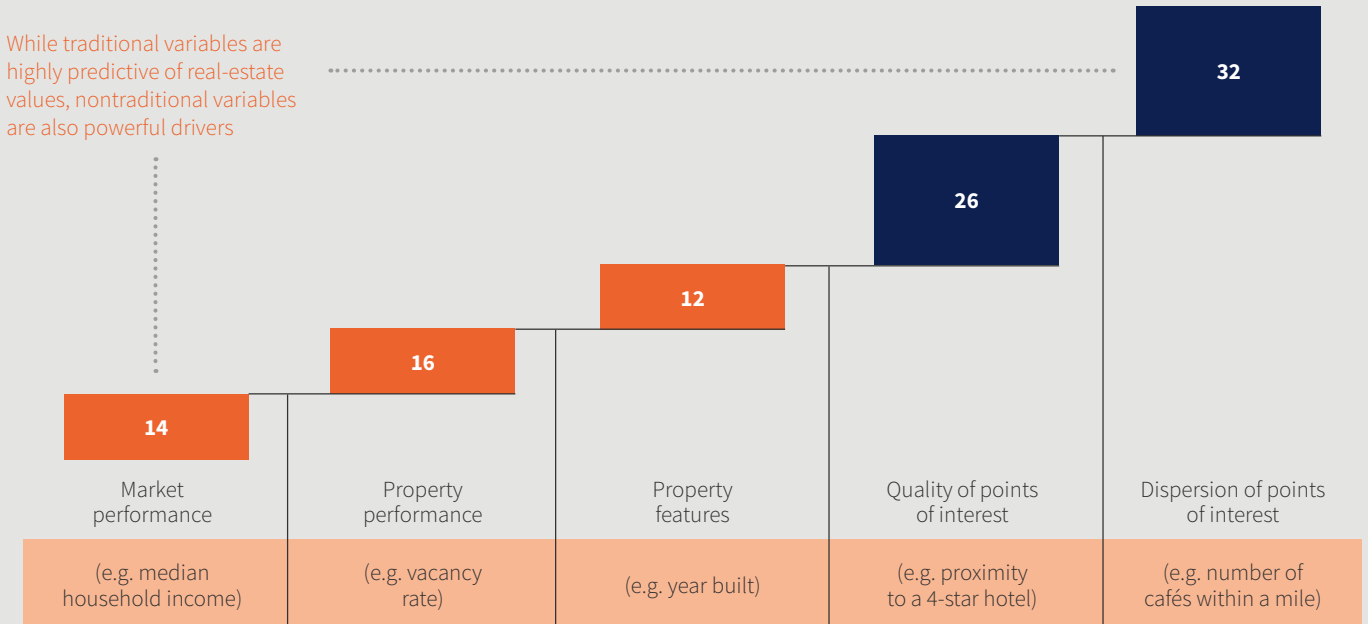
New and unconventional data sources are becoming increasingly relevant and emerging technologies are making the process of collecting and analysing data, and actioning insight, far more efficient. Tenant experience surveys, mobile phone location data and crowdsourced online reviews of local hospitality can help identify hyperlocal patterns.

Macroeconomic and demographic indicators such as an area’s crime rate or median age also inform long-term market forecasts⁴². While this information is not traditionally considered real estate data, stitching such data points together can more accurately predict hyperlocal areas with outsized potential for price appreciation.

Mobile location analytics will likely play a part in real estate appraisals. Relying on data from mobile phones, apps such as Placense, Gyana or Geoblink are able to provide aggregated and anonymous real-time location insights. The metrics covered include customer visits, visit duration, visit frequencies, customer journey paths, gender, age groups, income levels, modes of transport, as well as other related demographic characteristics. When it comes to the changing nature of retail and the future of the high street, this demographic data could prove integral in understanding the rentable value of any building, thus affecting its valuation.

Figure 10: Nearly 60% of predictive power can come from non-traditional variables

Proportion of predictive power, % share



Source: McKinsey (2018): Getting ahead of the market: How big data is transforming real estate

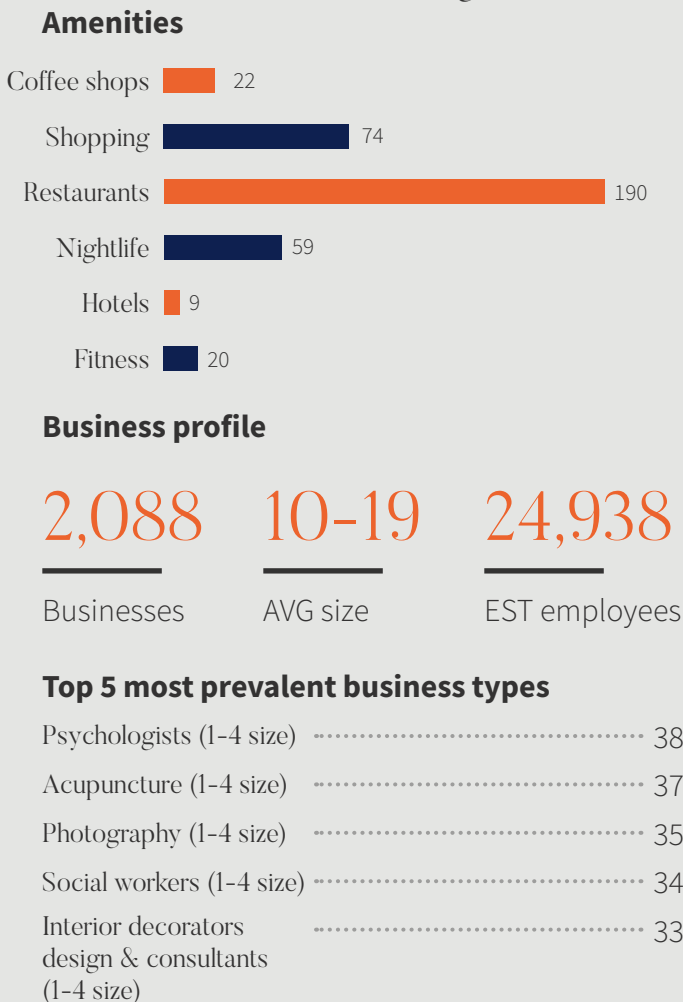
Take the example of WeWork, which uses various data metrics when deciding on the locations of their office portfolio. Collaborating with Factual, a data company who digitally map and categorise location information from online sources, they claim to incorporate data on community and governance, local landmarks, transportation infrastructure, healthcare, business and other desirable services in over 52 countries to create an index of must-have amenities within the neighbourhood of any potential office location. Such is the scale of this dataset that it has become a revenue stream in itself, getting passed to the likes of Uber, Amazon, Apple and SquareSpace. From this dataset, WeWork can instantly assess whether the potential location of an office suits their desired amenities and target tenant demographic⁴³.

On-site inspection and property analysis may in future be partially or entirely replaced by certain technologies able to capture, store and present comparable data sets⁴⁴. Examples include: drones, 3D imaging software and virtual tours, smart buildings (relying on IoT-connected sensors), building passports, digital twins and Building Information Modelling (BIM). Hollis (originally a professional building

surveying practice) now offer a fully virtual due diligence process. Through an online data hub, buyers, vendors and asset managers can view a building before, during and after a transaction with access provided to all necessary technical due diligence information.

Valuations are also sensitive to new drivers of market value such as sustainability accreditations (including BREEAM, LEED and WELL certifications); there are indications of emerging ‘brown discounts’, where buildings that are not accredited rent or sell for less⁴⁵. Technology is now enabling deeper ESG benchmarking, and the capture of previously immeasurable social (“S”) criteria which, once formalised, are also set to impact asset value⁴⁶. Most of these emerging social benchmarks focus on a building’s ‘intelligence’. As a leading example, WiredScore currently offers an accreditation based on the digital connectivity and network capabilities of a building⁴⁷. In time, it is predicted that a new model of occupant-centric building value will emerge, primarily driven by openly discoverable, crowd sourced satisfaction and productivity benchmarks, such as those widely available in hospitality⁴⁸.

Figure 11: WeWork’s office location index



Source: Stewart, M. (2019): *The Real Estate Sector is Using Algorithms to Work Out the Best Places to Gentrify*

Tenant engagement platforms such as Office App provide systems for app users to rate their experience of a given service or space, closing the feedback loop between the individual building user and the landlord. For the investment or asset manager, this data can greatly aid in growing rental value and valuations. Through understanding user preferences and offering a digital feedback mechanism, these apps will increasingly enable the collection of real time digital data which can be fed into AI systems to provide enhanced insight into the wellbeing and satisfaction of employees. In time, an aggregated benchmark across a sub-market or throughout an individual portfolio will bleed into asset valuation and allow investment managers to spot and rectify underperforming assets.

As with locations, two buildings that are seemingly identical when evaluated by traditional metrics can experience very different growth trajectories when non-traditional data is examined. It is easy to imagine how this disparity at the individual building level, when applied across a series of investments, can drive dramatic results at the portfolio level⁴⁹.

Finally, GIS software now exists which is able to provide map-based, property research, analysis, management and presentation capabilities. Products such as LandTech, Dig Map’s LandVision, Deepblocks and Nimbus Maps (among others) provide a mass of geolocation-based AI data to help with development projects.

Figure 12: Non-traditional metrics improve the accuracy of hyperlocal predictions



Source: McKinsey (2018): Getting ahead of the market: How big data is transforming real estate

MANUFACTURING AND THE INVESTMENT PROCESS

Negotiation

The longest process in any acquisition is the negotiation period, measured as the time from the first advertising of the proposed sale to the agreement of price⁵⁰. It is no coincidence that this is also the hardest process to digitalise of any in investment management, relying on human decision-making and interpersonal skills.

The nature of the current negotiation process clearly contributes to the illiquidity of the asset class. Regular attempts are made to improve efficiency by, for example, encouraging vendors to keep adequate information so that properties are put, and remain, in a state of readiness for sale. The most promising technological concept attempting to overcome these negotiation delays has been coined a building or property passport: this is a store of all the information relating to an individual property in its own unique digital data file, to be maintained by the owner or tenant and transferred along with the title.

This scenario will likely lead to a situation in which the data held in a property passport would have to be backed by an insurance contract in order to encourage buyers to be able to rely on the data provided. Lower insurance premiums could be offered to landlords in exchange for providing accurate information, enabling a more accurate predictor of risk. Similar enhanced terms could be offered by lending organisations who have a vested interest in compiling as much accurate and up to date information about a property as possible⁵¹.

Property auctions are another common tool for reducing the negotiation period and often lead to minimal due diligence. This process is now being driven online, which may greatly increase its appeal. For example, BidX1 offer registered online users the opportunity to purchase land, residential property and small scale commercial property almost instantaneously.



MANUFACTURING AND THE INVESTMENT PROCESS

Transactions (acquisitions and disposals)

One set of solicitors acting for the buyer and another for the seller are responsible for the conveyance, which is the administrative process by which rights over land are created and transferred, with funds moving in the opposite direction. This includes all necessary legal work during the due diligence period and post-exchange period. Current levels of technology within the commercial conveyancing profession do little beyond digitising the current workflow, offering a more efficient transfer of information than a paper-based process, but not currently capable of automating more arduous tasks.

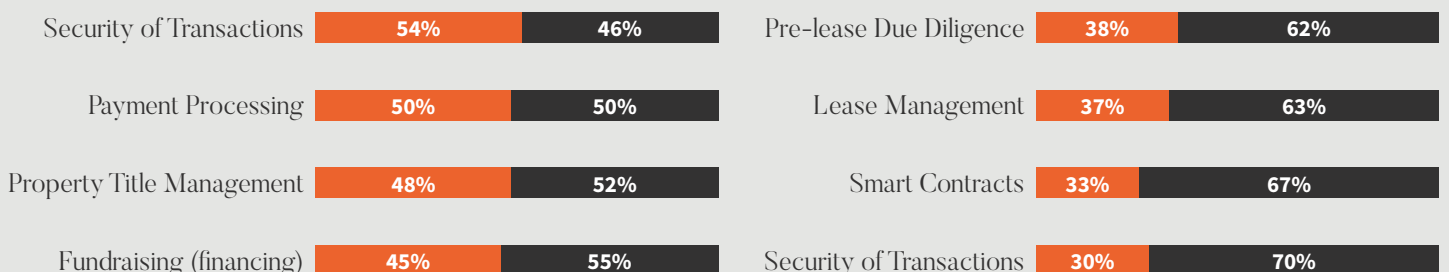
The establishment of a single system connecting all the agencies that supply information involved in property transfers can ease the conveyancing burden for firms or individuals. This single portal system is generally known as ‘e-conveyancing’, where all documents needed for a transaction (a future property passport) are made accessible to the parties involved in a transaction through a single online platform. So far, we are only aware of one global example of a functioning and successful e-conveyancing platform, which is Australia’s PEXA, which only overcame a host of barriers to its introduction after being made mandatory by the Australian government.

The biggest opportunity to revolutionise the transaction process comes with the application of blockchain technology. In its simplest form, a blockchain is a database of recorded

transactions, with no centralisation of control. The system was designed to be completely secure, with retrospective changes impossible. In 2019, the majority of CRE executives thought blockchain would be more applicable to real estate transactions than any other real estate use case. However, the same respondents also ranked blockchain at the bottom of the list of multiple emerging technologies for both its future impact and their firm’s intended adoption⁵². Apart from a subsequent flurry of small-scale residential transactions and a number of government-backed pilot programs to bring land registries online, blockchain has so far failed to live up to the expectations of the commercial property industry.

Despite this, start-up Coadjute have set themselves the goal of ‘digitally connecting the property world’ via blockchain technology. In March 2019, operating under their previous name Instant Property Network, Coadjute successfully demonstrated a smart contract-executed, blockchain-based real estate transaction. This trial, which included participants from established organisations such as Ashurst, Baker McKenzie, Barclays, Clifford Chance, AXA XL and Royal Bank of Scotland, took just 36 mins from start to finish⁵³. While blockchain still faces many barriers to adoption, perhaps this is a glimpse into what a future incorporating full market transparency, common data standards and a collaborative approach could achieve.

Figure 13: Areas where blockchain could have a significant role in commercial real estate



Source: Altus Group (2019): The Innovation Opportunity in Commercial Real Estate: A Shift in PropTech Adoption and Investment, CRE Innovation Report.

MANUFACTURING AND THE INVESTMENT PROCESS

Portfolio management

To effectively manage a portfolio requires an in-depth understanding of risk factors and their impact on the cash flow projections required to meet the fund’s or portfolio’s targets. Since certain assets within a portfolio have varying degrees of correlation (both positive and negative) with one another, the total risk in a portfolio should be less than the sum of each asset’s individual risk. But some risks are systematic, and these cannot be diversified away.

According to the investors and fund managers themselves, the biggest systematic or systemic risks currently facing real estate are climate change and government regulation⁵⁴.

Each of these areas is being targeted by technology solutions offering risk mitigation or measurement.

Kamma offers a hedge against regulation risk via the real time identification of property licensing and regulatory requirements at the asset or regional level. Using their platform, investment managers in the private rental sectors can remove the need for costly manual checks and ensure that their property licensing obligations are met. Cherre, a real estate data and analytics platform, offers new measurements of portfolio-specific climate risk and recently announced a partnership with Redzone, a smart natural disaster intelligence platform, which will lead to the incorporation of wildfire and hurricane modelling alongside core real estate data for more strategic climate related risk analysis and planning⁵⁵.

The risks associated with such ‘unforeseen events’ are more of a regular occurrence than many would perceive. Roughly every four years since the early 1990s there has been some form of crisis in the real estate capital markets⁵⁶.

Given the current pandemic, it is worth noting that ‘infectious disease’ was only listed as the tenth most likely global risk event to occur in 2020. Of those nine events deemed more likely, all are expected to be more devastating⁵⁷. The message here is not that we should be able to forecast the future, but that we should be prepared. Rent relief requests are unlikely to be confined to the world of COVID-19, but are likely a regular feature of real estate’s future.

Technology can help owners navigate these difficult issues in a few ways. It enables them to manage risks in a single, centralized platform, giving them full insight into the depth and breadth of each tenant relationship and helping them to make an educated decision about rent deferral or abatement. Second, technology allows landlords to better track how rent relief will impact future cash flow across the portfolio and net operating income⁵⁸.

Platforms such as Proda and SpaceQuant increase the efficiency and precision of rent roll processing. These software businesses employ machine learning (AI) to synthesize contents from unstructured rent rolls. The data are initially ingested, analysed, consolidated and standardised before they are prepared for subsequent processing or forwarding of the standardised and validated rent roll data. The purpose of the technology is to automate the manual processing of Excel format rent rolls, which has often been prone to errors.

Figure 14: The perceived impact of government regulation (top) and climate change (bottom) on real estate investing



Source: SEI (2020): The future of real estate investing

MANUFACTURING AND THE INVESTMENT PROCESS

Asset management

In recent years, several asset management solutions have emerged to help automate and standardise maintenance, inspections, leasing, viewings, and workflow processes. Such workflow automation can reduce administration workloads by up to 75%, saving vast amounts of time that could be spent on driving growth⁵⁹.

Assetti offers investment managers a single tool for everything from developing portfolio strategy to securing rent roll. They are able to streamline the financial reporting from asset managers to portfolio managers, offering automated visualisations of performance benchmarks. Their platform is also able to integrate with incumbent software, meaning that everybody in the value chain does not need to be trained in the same software packages to deliver insights and are able to use whichever provider they are most comfortable with.

In the LegalTech market, lease automation tools are able to cut down the time taken from a signed letter of intent to a signed lease. Using AI, LeasePilot are able to manage the complex, interdependent terms in a commercial lease, tracking every dependency, automatically adjusting clauses as the lease specification changes. This is potentially a useful tool considering the scale of leasing innovation that will be required as a result of the COVID-19 pandemic.

With the current uncertainty surrounding major retail occupiers, landlords have had to adjust their lease terms or face widescale vacancies. L&G recently announced their shift towards turnover-based rents across their £4.5bn retail and leisure portfolio. Colliers International, the property agency, and CACI, a data consultancy, are planning a new leasing model that would link rent to footfall and online sales in a catchment area⁶⁰.

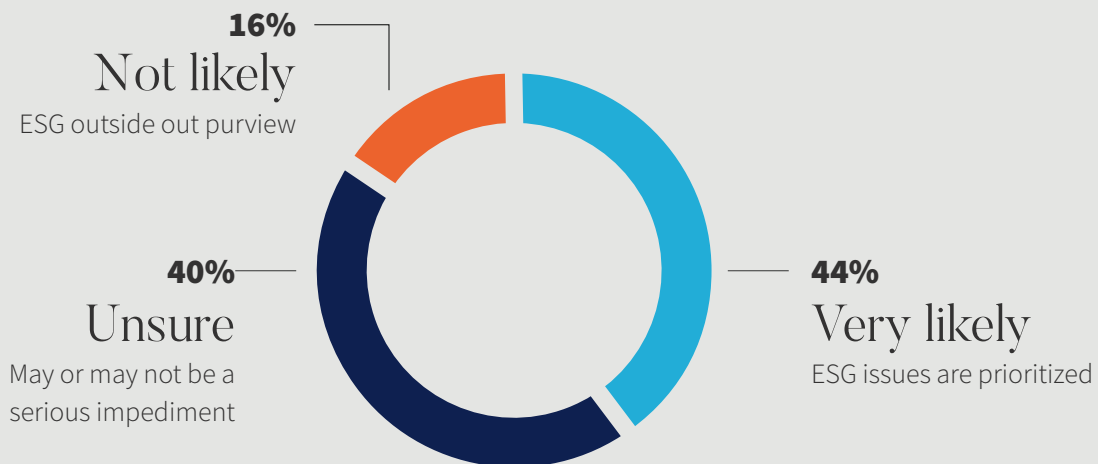
Within the office sector, a similar unbundling of lease terms is now being inspired by the co-working membership models which have dominated discussion in recent years. In the same way that Airbnb offered landlords the ability to connect directly to the consumer without having to instruct a hotel

operator to sublet their spare rooms, Essensys, a software system currently used by many operators to manage their flexible space, has just launched STEP, a booking platform that enables landlords and asset owners to transition from a passive to a flexible real estate model, without the need for an operator. Other entrants into this market include Office R&D who provide white labelled contracting, booking and tenant engagement platforms to landlords who wish to launch their own co-working offering, and RE-defined.

The market for such a leasing solution is sizable. In 2019, approximately 13 percent of all US office space remained unleased. While pre-COVID, it was reported that the average workstation in Central London costs £17.5k pa, yet the average desk utilization rate was only 45%. In a typical London office containing 500 workstations, that represents as much as £5m a year wasted on rent alone⁶¹. The opportunity to use occupancy monitoring solutions to reduce or repurpose this disused space is likely to grow given the uncertainty of the future of workplaces and a focus on improving occupant wellbeing through enhanced amenity provision such as break out areas, crèches or gyms.

As new, crowd-sourced social indicators of asset performance come to fruition through tenant experience apps or office booking platforms and industry benchmarks expand to include measures of a buildings smartness, owners which adhere to ESG investing will be able to demonstrably justify charging higher rents, subsequently increasing the value of the asset at disposition. An MIT study provides the most conclusive evidence yet for a link between the performance of the workplace and the financial value of the asset: across a sample of 1,337 Manhattan office leases, those assets which scored highly on Gensler's Workplace Performance Index commanded an average effective rent premium of 29%⁶². Given that only 44% of real estate fund managers currently prioritise ESG metrics in investment opportunities, this is an opportunity for asset managers to get ahead of the market⁶³.

Figure 15: Likelihood fund manager will turn down an opportunity on ESG factors



Source: SEI (2020): The future of real estate investing

The lack of consideration given to ESG metrics was highlighted in our roundtable findings. Participants agreed that ESG metrics will only truly be adhered to once it hits a company's P&L, but progress towards this goal is delayed by poor energy measurement and attribution.

It is widely reported that 70% of assets that will be in use by the 2050 net zero carbon deadline have already been built. Current industry attempts to measure the energy efficiency of those buildings are largely insignificant and unreliable. For example, evidence suggests that there has been no correlation between a commercial building's EPC rating, a UK government enforced industry-wide indicator of building energy efficiency, and the operational carbon use of the measured asset⁶⁴. On average, buildings are 3.8x less efficient in operation than intended at design, and there are reports of an asset which performed ten times worse in operation than intended having been awarded a BREEAM sustainability rating of 'Excellent'⁶⁵.

How is an investment manager able to understand the portfolio-related regulatory risk facing their underperforming assets when the benchmarks on which they currently rely are inadequate for this purpose? One way is to rely on granular data such as that provided by start-up Demand Logic, who provide live data intelligence on how a building operates, in particular the Heating, Ventilation & Air-Conditioning (HVAC) systems, utility meters and any internal environmental sensors, such as those used for temperature, CO₂, air-quality, humidity and occupancy. This intelligence can be used for a

range of investment management use cases from portfolio benchmarking down to facilities optimisation. Such insight could pose an opportunity for those managers who are able to identify buildings with rampant inefficiencies to improve net operating income. Part of an asset's risk premium is required to cover critical equipment failure shortly into the new ownership period. If a seller with a digitalised asset can demonstrate that the likelihood of a major failure is diminished, this will lower the risk premium and raise the asset value⁶⁶.

The optimal performance of the building's heating, ventilation, air conditioning and lighting systems have also been proven to positively impact the wellbeing, satisfaction and productivity of its occupants, leading to an average employee productivity gain of 2.7%⁶⁷. Further financial benefit is realised through reduced employee absenteeism due to sickness and an increased retention rate, leading to fewer lost working hours spent re-training new staff. A hypothetical 820 employee company occupying a 150,000 square foot space can gain \$3,395 per employee (\$18.56 per square foot, a total of \$2.78m) in annual profit. This is an NPV of \$21,172 per employee, or \$115 per square foot, over ten years, assuming a conservative \$20 per square foot cost premium paid for a high performance building⁶⁸.

However, the concept of a smart building is not limited to HVAC systems and environmental sensors. It is also based around the use of imbedded technology to monitor and automate facilities management. For asset managers, understanding how an asset is utilised, both in terms of space and energy systems, allows them to develop a more effective and efficient strategy while lowering the risk for financing. To do this requires a network of interoperable devices and sensors that can measure everything from desk usage, room booking, ambient temperature, CO2 levels, natural light, and plant function, among others, representing a huge market for technology focused start-ups.

Such is the lure of this market that competition could soon come from Microsoft and Samsung, who recently announced a partnership combining Samsung’s smart appliances and Microsoft’s digital cloud technologies, aiming to improve building operations and maintenance, along with creating better experiences for both service technicians and occupants⁶⁹. In a similar attempt, Honeywell and SAP, with a combined worth of \$270bn, have also recently partnered to target building performance improvements with integrated, cloud-based business and operational technology data. Providing a harmonized data architecture that connects building data from Honeywell with real estate and financial data from SAP, they hope to enable facility managers and building owners to reposition their portfolios through cost savings and newly identified efficiencies⁷⁰.

Figure 16: The user-centric capabilities of current smart buildings



Conclusions

Real estate investment management is an industry which is notoriously resistant to technological change. However, the prevailing macro-economic conditions of 2020 are now leaving little alternative but to embrace technology with much more intent.

The shock of COVID-19 has accelerated trends already being witnessed in both the capital and occupier markets as both retail and office sectors look to undergo a huge transformation in order to remain attractive asset classes. Those investment managers with the ability to measure and thus forecast these transformations will be best poised to thrive and not just survive this next recession. Technology offers a route towards centralising portfolio data and offers real time insight into the impact that COVID-19 – and other shocks around the corner – is having and will have on the business, helping them to identify potential risks and new opportunities.

The foreseeable future state of real estate investment management parallels that of financial services, in which an influx of data leads to a process of standardisation around specific data benchmarks, helping to create institutional-grade, transparent data platforms to support freely trading assets, or fractions of those assets, in the capital markets. However, this is likely still decades away.

The much more immediate opportunities are for investment managers to (i) use today's technology to raise capital and onboard clients, and (ii) to structure, standardise and digitalise their existing data in order to accurately and efficiently measure and then position their portfolios. Only once data standardisation is achieved can the resulting insights be enhanced through the introduction of alternative, big data sources able to shed light on the new components of value.

A prime example of these value drivers is ESG accreditations producing a market premium. In time, assets able to earn elevated social indicators and accreditations such as any emerging smart building index will be those able to fetch a premium (or avoid a discount). Another example is mobile

phone-based footfall data driving retail value. New indicators of locational quality are emerging, based on mobile phone and GIS data analytics. There is no longer a one size fits all approach to location, and investment managers who understand the power of such granular data in improving the accuracy of forecasting and appraisal models will outperform their peers. Such locational intelligence is also important in understanding the risks posed by climate change.

Data is also helping businesses understand how to manage assets, predominantly their utilisation and operation. New leasing models based on membership schemes or footfall/turnover rents require new measurements to be incorporated and understood. This requires new technologies able to capture these variables before we can begin to accurately model more variable cash flows.

However, building advanced analytics into a portfolio is no straightforward task. Collecting enough data to build accurate algorithms takes time. Manually scrubbing data for use in analytics can be costly. And despite the rise of organizations vying to capture value from advanced analytics across industries, relatively few achieve it at scale.

The absence of an industry-wide data standard also poses numerous problems. There is currently a lack of knowledge on how data can be used, there is little incentive for data sharing, there is a mismatch between data being collected and that which LPs request, and there are high sunk capital costs on legacy software creating a reluctance to switch to emerging systems.

To face this challenge head on, companies might begin by employing analytics in executing their most critical strategic imperatives; pursuing data-cleansing efforts based first on the most valuable use cases; and establishing clear internal processes for data governance, interpretation, and decision making.

Technology platforms able to aggregate once disparate data sets and automate the presentation of data analytics are now emerging, saving hours previously lost in creating and managing spreadsheets. Although these ‘sustaining technologies’ will not necessarily change the real estate investment management industry, they will make existing processes more efficient and will help to drive more reliable returns. We have yet to see the emergence of a single platform which offers streamlined functionality across all processes in the investment management value chain; it is not clear to what extent this is even feasible.

To change the nature of investment management altogether would require ‘disruptive technology’, and none appear more disruptive than the blockchain-based attempts to provide democratised access and secondary market liquidity to fractions of single assets. Despite this lure, the expectations and reality are still highly polarised, with few, if any, success stories emerging of securitisation or tokenisation. It will be some time before the trust and demand for fractionally traded, highly liquid, single asset representations will be sufficient for any real disruption to occur, due to the poor investor protection offered through weak regulatory and legal systems, and a lack of deep demand for the fractionalised investment. The normalisation of blockchain technology is most likely to occur in the back office administrative tasks within investment management and most likely to emerge in the real estate debt markets.

Because distribution processes are more easily supported by technology, the fate of the real estate investment management industry may be associated less with novel FinTech or PropTech, and more with emerging concepts derived from RegTech and LegalTech. We have highlighted

how the key barriers to financial innovation are being removed as emerging technology lowers the cost of setting up an investment vehicle and digital IDs offer near-instantaneous consumer-facing AML and KYC checking.

Many real estate firms have long made decisions based on a combination of intuition and traditional, retrospective data. Today, a host of new variables make it possible to paint more vivid pictures of a location’s and asset’s future risks and opportunities, and with unprecedented granularity. While many technologies are still relatively nascent, their predictive power is too great to ignore.

Progress in artificial intelligence is frequently exponential rather than linear—and companies must initially consider AI and data science as realistic supplements to their current underwriting, portfolio review, and research processes. Importantly, machine learning systems are self-refining, meaning the longer they are in operation and the more relevant the data points they consider, the more accurate they become. For each specific use case, it is likely to take years to identify, assemble and clean enough significant data so that the model’s accuracy is sufficient to drive investment decisions with a required degree of confidence.

As the big investment management firms are likely to increase their market share, the message is clear: if you are not already experimenting with the use of alternative big data, proprietary machine learning models and emerging digital platforms, you are running the risk of becoming a clear casualty of the digital transformation about to take place. We should remember Amara’s Law: we tend to overestimate the impact of a new technology in the short run, but we underestimate it in the long run. Sooner or later, the long run will arrive.



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Andrew Baum would like to thank the founding donors to the Oxford Future of Real Estate Initiative (Forbes Elworthy of Craigmore and The Centre for Studies in Property Valuation and Management Trust) plus Arcadis, BCLP, CBRE, EY, Facebook, Grosvenor, Nuveen, Redevco, Second Century Ventures and The Crown Estate for their financial support.

