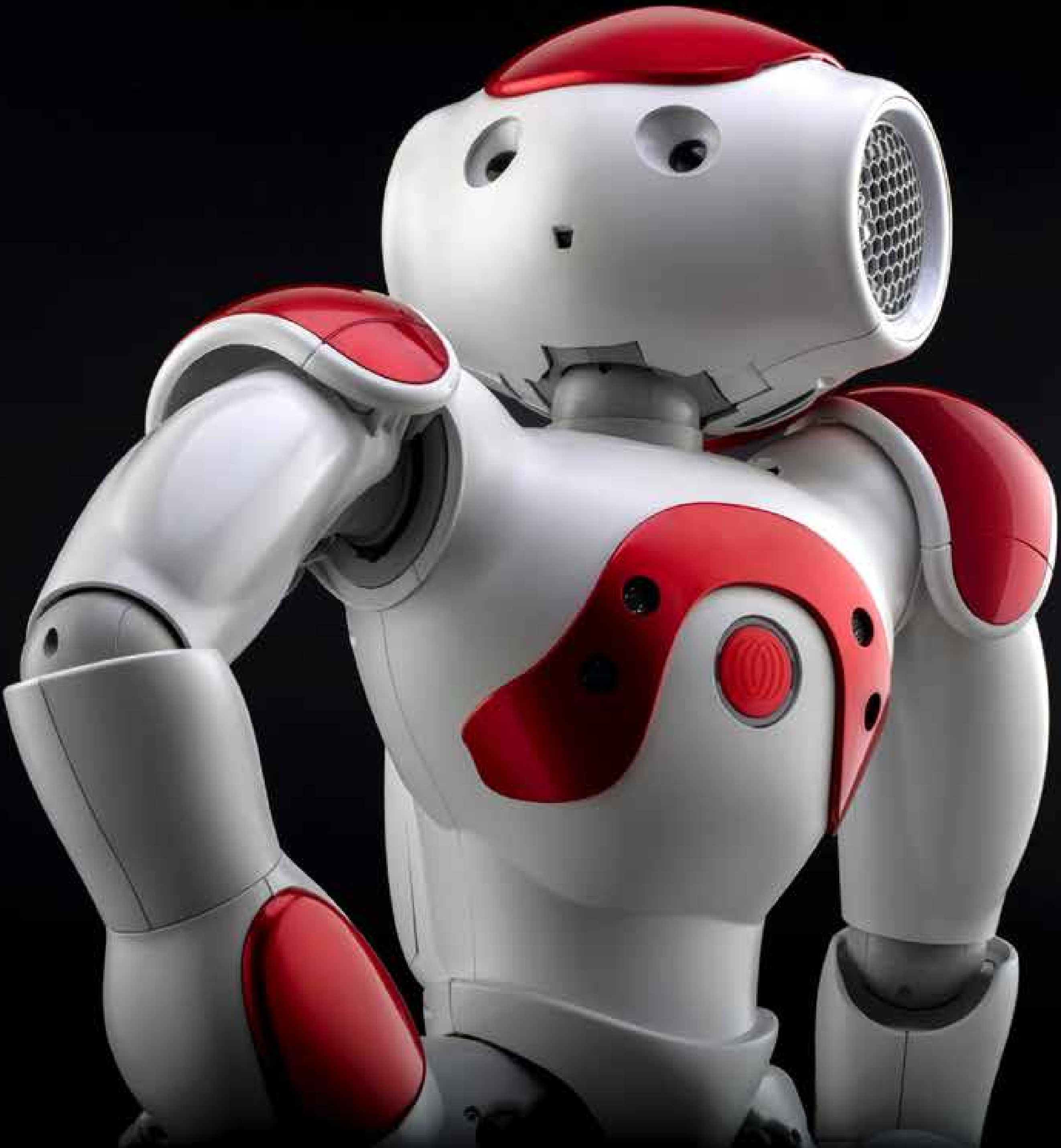
Clicks and Mortar

The Growing Influence of Proptech



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Foreword

Technology has transformed many aspects of our lives – from how we communicate with each other, to how we buy things, to the way we work. As more and more processes are digitalised, many established industries are finding that the usual way of doing things has been disrupted.

We believe real estate is next, so it's vital that advisors, brokers, investors and start-ups recognise the challenges and opportunities ahead. Data analytics, artificial intelligence, the Internet of Things, virtual reality, blockchain– all of these will change how we invest in and occupy real estate in the future. At JLL, we're already integrating some of these into the services we provide to our clients.

So in this exciting new world where technology and real estate converge, which companies will be at the leading edge? Will it be the big, established players, or the entrepreneurial new entrants? Or do both have a role to play as 'proptech' transforms the industry?

To understand this burgeoning sector, last November we collaborated with Tech in Asia, a platform with its finger on the pulse of the tech start-up scene, to produce this report to quantify the size and characteristics of the opportunity in Asia Pacific. Due to overwhelming demand, we've updated it to include new deals, developments and trends that have emerged to date.

The report uncovers the impressive range of start-ups in the proptech ecosystem, the investment they're attracting, and the client needs and markets they serve. Most importantly, we dig into what impact these companies, and the products and services they offer, will have on the real estate end-user – whether you're an institutional investor, a corporate occupier, or a first-time buyer.

As a company, JLL has been serving clients' real estate needs for more than 200 years. Many of the companies we looked at for this report have been in existence less than two. But what we have in common is that we must all innovate and evolve to stay relevant – and to stay in business.

I firmly believe the next five years are pivotal for the real estate industry. We must embrace change or be left behind.

Drop me a line at Anthony.Couse@ap.jll.com and let me know if you agree.

Anthony Couse
Chief Executive Officer, JLL Asia Pacific

Let's talk *Proptech*

Executive summary

JLL predicts that the total value of investable global commercial real estate will reach US$65 trillion by 2020, with Asia Pacific accounting for over 30%[1]. Considering the number of emerging markets in the region and their accelerating urbanisation rates, the region will play an increasingly important role in the global real estate landscape.

This is a sector that has been underserved by start-ups, but not for long. Property technology –or proptech– start-ups have begun entering a space traditionally dominated by large incumbents. Asia Pacific has seen its own share of proptech start-ups emerging. Our research shows that they have received around 60% of over US$7.8 billion invested in proptech start-ups worldwide since 2013[2].

Significantly, the market dynamics of the Asia Pacific property market have caused proptech in Asia Pacific to evolve differently from proptech in North America and Europe. Property listing start-ups have the lion's share of funding, driving rapid expansion into adjacent verticals such as big data and analytics. Meanwhile, compared with North America and Europe, Asia Pacific's diverse demographics and differing levels of infrastructure and development present challenges such as the lower availability of tech talent and consumer preferences for offline channels and tools.

Nonetheless, such difficulties should be alleviated soon given the growing smartphone penetration in Asia Pacific and rising salaries in the technology sector, which will attract an influx of talent from traditional industries. Other strong drivers of change like rapid urbanisation and government support for Smart Cities are likely to boost the development of proptech as well as corporate engagement and collaboration in this space.

There are plenty of opportunities to be first-movers in the underserved niches of proptech. Consumers, start-ups and corporates will all stand from being part of the sector's growth in Asia Pacific.

What is *proptech?*

Proptech, a blend of the words property and technology, refers to the utilisation of technology as a solution to challenges in the real estate sector. Specifically, technology is used to create or renovate services offered in real estate to buy, sell, rent, develop, market and manage property in a more efficient and effective way.

Given that the total value of investable global commercial real estate will reach US$65 trillion by 2020[3], this presents too large an opportunity to escape the attention of start-ups.

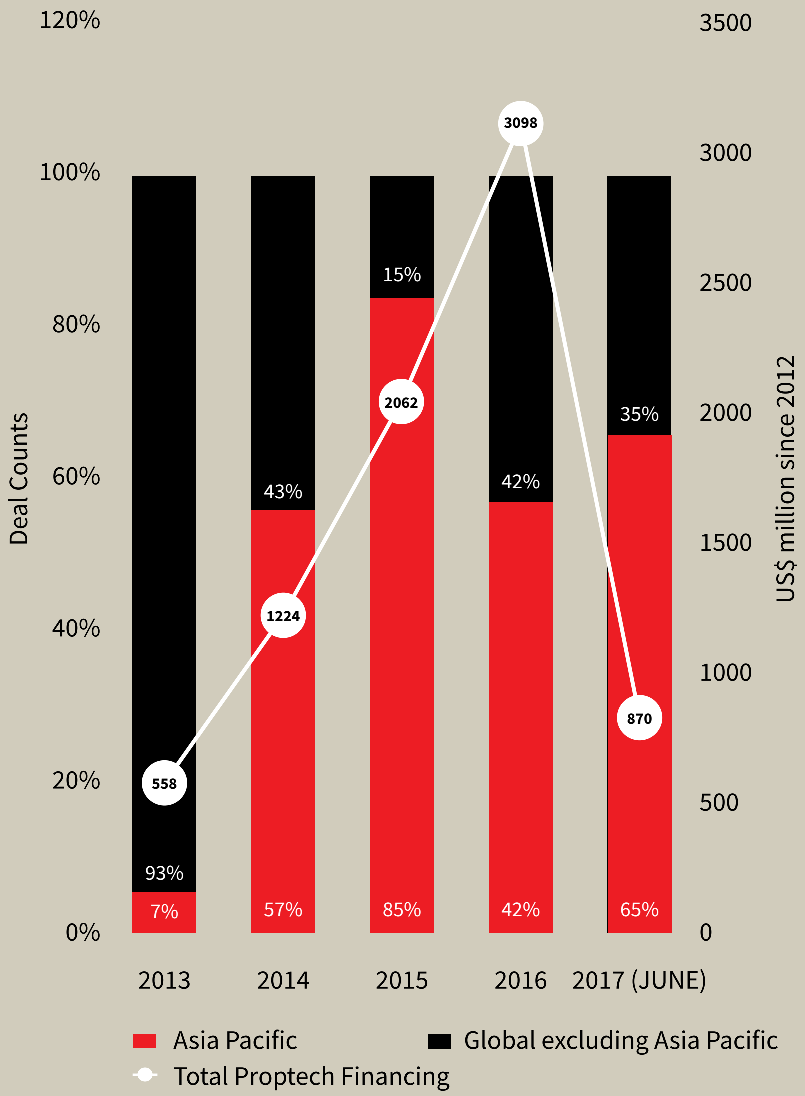
Proptech financing by region

179 proptech start-ups in Asia Pacific have raised funding since 2013, accounting for almost US$4.8 billion of the US$7.8 billion[4] that has been invested globally from 2013 to June 2017. These flows can only increase to match the growing demand for property in Asia Pacific.

While the bulk of inflows have gone to Chinese start-ups, which is not surprising considering mainland China's roughly US$6.6 trillion[5] total investable commercial real estate universe alone, investments into other markets, namely, India, Southeast Asia, Australia and Northeast Asia, have begun picking up. In addition, start-ups have progressed in their technological capabilities, going beyond online portals to incorporate emerging technologies such as Bitcoin into their services.

Considering the high-risk and disruptive nature of start-ups, only those that have raised funding will be mentioned in this report, as venture capital funding typically indicates start-up viability and maturity.

Graph 1: Proptech Financing by Regions



Viewpoint: China – a complicated market that is full of potential for proptech

China has the most market potential in Asia Pacific, but it's also complicated. After operating in China, it is easier to expand to other advanced markets like Hong Kong or Singapore than the other way round.

Colin Bogar
CEO and Founder
Property Passbook*

China is full of potential for proptech. The country has a large number of consumers and investable assets. China's real estate services are so traditional that it is considerably easier to come up with a better solution. Just like how Alipay has prospered, partly thanks to China's ineffective financial system, the same thing can happen in China's real estate industry—poor user experience present plenty of opportunities for proptech start-ups.

In this sense, China is a better environment when compared with other advanced markets to test ideas. Chinese consumers generally do not trust the way things are traditionally done and are open to new initiatives. If a company can get things right in China, it is simpler to get things right anywhere else. Another major advantage for proptech in China is the access to engineering talent and the low costs of hiring them. Singapore and Hong Kong have high labor costs while some other markets may not have qualified talent.

Proptech in both commercial and residential markets in China is exciting. There is an increase in high-tech commercial real estate service providers not only in Tier 1 and Tier 2 cities, but also in secondary ones. In addition, the residential market continues to attract investments as there is a lot of room for user experience improvement. For example, a new solution that brings an improvement in user experience elsewhere, is many times more impactful in China where consumers have limited choices.

However, the expected slowdown in the real estate market in 2018 could possibly affect proptech start-ups operating in the residential market more than those operating in the commercial market, where overbuilding happens but business remains stable.

Overall, China is a tough but promising market, similar to a challenging math problem. Once you solve it, you probably can solve simpler ones as well. In order to ace in China, proptech start-ups need to know their market well as each segment in China's real estate. Each sector from retail, residential, office leasing, and more, is very different from the other. Start-ups need to pick a competitive advantage that is hard to replicate. Otherwise, they will soon see themselves back to square one due to copycats.

* Property Passbook is a Shanghai-based data-powered investment recommendation engine that helps investors make better informed decisions. The start-up also offers end-to-end support including 24/7 customer service, financing assistance, web accessible real time asset management and long term rental guarantee programmes. Covering 45 major cities all over the world, Property Passbook claims to be the largest global marketplace for real estate investors.

Proptech deals[6] from June 2017 to Feb 2018

WeWork and SoftBank: WeWork, a New York based co-working unicorn, managed to raise US$4.4 billion from Japan's Soft Bank Group Corp and its Vision Fund in August 2017. The investment is broken into several parts: US$3 billion will be spent on shares from WeWork directly and buying from current shareholders who wish to sell; US$1.4 billion is an additional investment into three subsidiaries in China, Japan and the Pacific region (including Southeast Asia and South Korea). The additional investment is expected to help WeWork strengthen its foothold in these regions against local competitors[7].

Xiaozhu.com and Yunfeng Capital, JOY Capital, MorningSide Ventures Capital, Capital Today: Xiaozhu.com, dubbed China's Airbnb, is a booking website for daily rentals and short-term stays. The start-up has recently become a unicorn after a US$120 million investment by Jack Ma-backed fund, Yunfeng Capital in November 2017. The company claims to have raised US$270 million in five rounds of financing and would go for an Initial Public Offering overseas as the next step. Xiaozhu.com will utilise Alibaba's smart technologies to improve its customer experience[8].

Harbour Apartments & Gaw Capital Partners, TrustBridge Partners: Harbour Apartments is a Shanghai-based start-up operating co-living apartments aimed at young tenants in seven major cities across China. The company managed to raise US$60.9 million in the Series A round in September 2017. The investment is seen as a foray by Gaw into China's affordable housing as the government stimulates the rental sector to cool down China' residential market[9].

51 Wofang.com and Star VC, Sense Time Group Ltd., Green Pine Capital Partners: 51Wofang is a leading Virtual Reality technologies provider based in China. The start-up raised US$31.8 million for its Series B round in December 2017.

i-house.com and various strategic investors: i-house.com is a China-based global real estate blockchain cloud platform. The start-up secured up to US$30 million in January 2018 for its seeding round, which is quite a significant achievement. Its investors include Draper Venture, the largest venture capital fund in the blockchain sector. A few other established names include Blockchain Ventures, Collinstar Capital, Tangle Capital, Badwater Capital, OEX International, all of which are successful early investors in blockchain projects all around the world[10].

Mogo Room and Giant, Yunfeng Capital: Mogo Room, a Shanghai-based apartment rental O2O (online to offline) platform focused on young professionals, raised US$30 million for its Series C round from Giant Network, Yunfeng Capital and Ant Financial in January 2018.

Waves of change - proptech trends

Proptech in Asia Pacific can be broken down into three waves. It began with proptech 1.0 in 2007 when start- ups like PropertyGuru were launched to address consumers' need for a single online portal that collated property listings. These portals took the form of aggregators or marketplaces, and presented a relatively low degree of technical challenge with a direct-to-consumer or pay-to-list business model.

Proptech 2.0 emerged in 2013 to address the needs of small businesses and brokers that were more complex than those of consumers. Start-ups like Propstack, a Commercial Property Intelligence platform based in India, provided tools that improved decision-making and business processes. The growing availability of tech talent enabled start-ups to employ more advanced technology such as Data and Analytics or Virtual Reality (VR), while using a pay-to-use or Software as a Service (SaaS) business model.

The current Proptech 3.0 wave – arising shortly after Proptech 2.0 in 2014 – is led by start-ups employing emergent technology such as Unmanned Aerial Vehicle (UAV) and solar power to address enterprise needs. These products, such as QwikSpec's cloud-based platform for field inspections and data analytics, require heavy upfront investment and domain knowledge in the property sector. It is worth noting that such innovations are built from the ground up to address complex enterprise needs instead of being adapted from products of other sectors.

In the coming years, we anticipate the following trends outlined in the next few pages.

Table 1: Evolution of Proptech in Asia Pacific

Proptech 1.0	Proptech 2.0	Proptech 3.0
• Low technical challenge	• Medium technical challenge	• High technical challenge
• Consumer focus	• Small business focus	• Enterprise focus
• Aggregators / marketplaces	• Existing technology	• Emerging technology
PROPTIGER	PropKaro THE PROPERTY DALAL STREET	HIVE UAV
lianjia.com 链家	51VR	SenseHawk
CO Assets™	PROPSTACK	QwikSpec
LIVSPACE	followit	Seeder

#1: Rapid expansion in proptech 1.0

Growth in the middle class population and their income will create more demand for homes. Coupled with increasing smartphone adoption rates, the Internet will serve as the start of property searches for more home buyers. In addition, network effects readily lend themselves to list-and-search start-ups where an increased number of listings will make them more attractive to consumers.

As a subset of proptech 1.0, we see the potential for tech-enabled brokerages to grow immensely. This is due to the fact that developers and other incumbents need a means of digitising their inventory to keep up with evolving consumer preferences. Additionally, such start-ups will have added traction in markets with traditionally lower levels of institutional trust and professional services. By owning the full customer experience as well as guaranteeing quality listings and matching buyers and tenants with inventory, these start-ups have the potential to dominate the market.

On the other hand, they may continue to face an uphill battle in convincing brokers and developers to divert marketing spend from offline channels to online listings. This challenge could be overcome by the increasing numbers of younger, upwardly mobile buyers and tenants who turn to the Internet, compelling the diversion of ad spend into online channels.

Drivers

Middle class income growth, increasing smartphone penetration

Challenges

Business preference for offline channels

Proptech 1.0

#2: Consolidation and competition within proptech 2.0

As proptech 1.0 start-ups expand rapidly, they will increasingly come to compete for listings and views. To increase the attractiveness of their platforms, they will begin to offer additional value-added services such as property intelligence (Data and Analytics) and virtual viewing (VR and 3D). The lack of reliable data sources in emerging Asian markets boosts the data flywheel of proptech 1.0 start-ups who have access to large pools of proprietary data.

It may be more cost-effective for Proptech 1.0 start-ups to acquire proptech 2.0 start-ups than building their own services. The high levels of funding that we have seen in the proptech 1.0 space indicate these start-ups possess the financial muscle to acquire instead of building out their own capabilities.

Proptech 2.0 start-ups in the underserved commercial property sector will face increased competition from incumbents, in addition to proptech newcomers who find the residential property space overcrowded. We may also see an increase in the number of proptech start-ups offering fringe technology meant for consumers such as smart home devices and solar panels.

Drivers

Growing pressure for competitive edge within Proptech 1.0

Challenges

Competition from incumbents

#3: Emergence of new verticals in proptech 3.0

With the continued growth of the property sector, property developers and brokers will face a corresponding increase in demand for their services. This is a growing niche that start-ups can serve and benefit from. The rising importance of technology in all aspects of life has encouraged the growth of technical sophistication within the region and attracted global tech talents to Asia Pacific.

This sets the stage for technically advanced start-ups catering to enterprise needs to grow rapidly. This is an underserved niche in Asia Pacific compared with countries such as the United States, where a start-up called PlanGrid, which developed a construction blueprint app, raised US$40 million in Series B funding and claimed to have helped over 500,000 projects around the world[11]. The spillover effects from the said property boom in Asia Pacific should prove sufficient in convincing proptech start-ups to explore this space.

Increasingly complex enterprise needs pave the way for disruptive technologies, notably blockchain. Blockchain is probably one of the most popular buzzwords in recent years. In short, this new technology can be understood as “peer-to-peer” sharing of data[12]; that would help transform more than 30 industries[13]. However, beyond Bitcoin payments and remittance, blockchain remains largely experimental. In real estate, the adoption of blockchain would rewrite the industry in four ways: disintermediation, fraud prevention, Money 2.0 (a novel currency concept designed to empower anyone – not only central banks – to issue money), and smart contracts[14].

With blockchain, a database is stored in blocks that are chained to each other using a cryptographic signature, which allows blockchain to act as a middleman and eliminate intermediaries. Blockchain also offers an incorruptible ledger system that is unhackable due to its distributed nature[15].

Bitcoin is widely known as a digital currency and, similar to Ethereum, it can perform “smart contracts”, minimising human involvement in agreement verification. With blockchain, the ways of doing business in real estate would be significantly altered.

In Asia Pacific, the number of blockchain start-ups is expected to surge with increasing funding from initial coin offerings, different venture capital funds and established banks[16]. Blockchain start-ups mostly operate in the fintech industry, with China and India being the two leading destinations of funding (US$2 billion and US$1.7 billion respectively, 2016)[17]. Japan is another leader in blockchain – the country legalised Bitcoin and is rising as a Bitcoin market leader[18]. Within the proptech landscape, we have observed a number of Singaporean start-ups adopting blockchain to “tokenise” property.

Proptech 3.0 start-ups, however, will face significant challenges in hiring experts with the required domain expertise. A key reason would be remuneration – there is a significant disparity to overcome to draw technical specialists away from conventional firms. For example, in Singapore, the median salary of a Construction Project Manager is S$84,184 per annum[19] whereas start-up founders can usually expect a starting income of S$24,000 to $60,000[20], which indicates that of the same level, personnel at start-ups cannot expect to earn the same rate as their peers who work at more established firms.

Drivers

Growing pool of technical talent, increased enterprise needs

Challenges

Need for property domain knowledge

Viewpoint: The revolution will be digitised

Blockchain technology offers a means to improve transparency. For real estate to compete effectively as an asset class, investors are demanding, and expecting, ever-greater levels of transparency – in terms of legal and regulatory enforcement as well as speedy and secure transaction processes.

Christopher Clausen
Associate Director,
Asia Pacific Research
JLL

The costs associated with trading real estate are much higher than in other asset classes, often resulting in a wide bid-ask spread – the difference between buyer and seller pricing expectations. Furthermore, transactions are often carried out via time consuming face-to-face interactions with various parties typically involved in the transaction process, e.g., lawyers, bankers and brokers.

Smart contracts, essentially programmes coded in the blockchain, have the potential to change this. When conditions specified in an encoded contract are met, the transfer of money or assets between parties is automatically triggered, reducing the costs and friction associated with these transactions. Smart contracts also offer a means to streamline commercial real estate investment through a new form of securitisation.

At the most basic level, real estate investors are purchasing an income stream. But real estate, including commercial real estate, is a highly illiquid asset class, making it difficult for investors to acquire and dispose of those income streams. The sale of a building can be facilitated by "tokenising" it, that is, dividing up the ownership of the asset into multiple shares, each of which can be sold to a different investor. Smart contracts can enable investors to buy and sell shares of a building with rental income paid out to token holders. All other things being equal, the resulting improvement in liquidity would provide sellers and buyers with more information on asset pricing, narrowing bid-ask spreads.

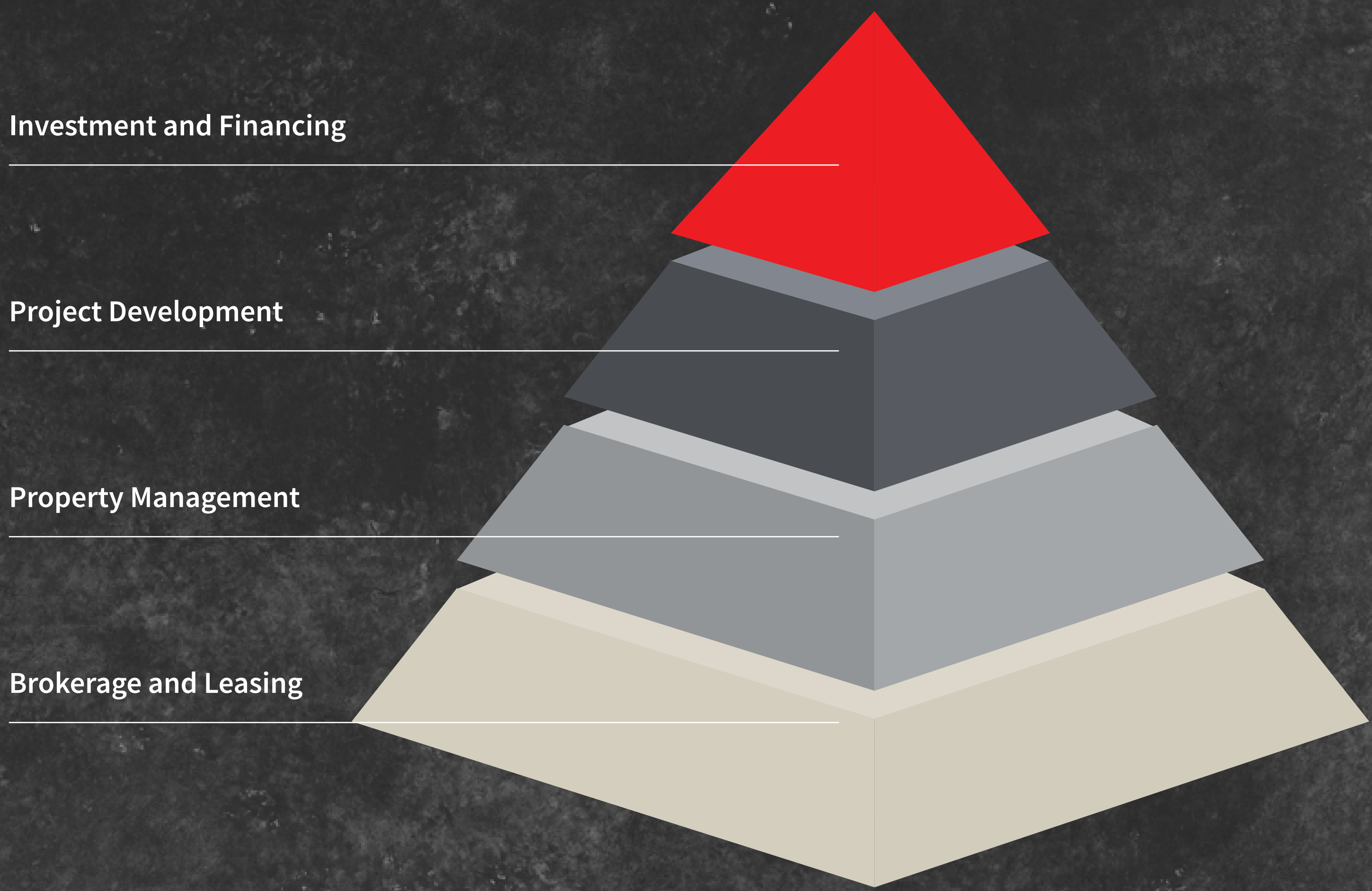
Such a system would offer institutional investors a means to more quickly and accurately achieve their target allocations, and it would also enable them to easily dispose of assets. Barriers to commercial real estate investment could also be reduced, allowing for greater participation among retail investors.

However, this new approach to securitising real estate assets raises a number of questions. Where will tokens be traded? Will tokenised assets have the same level of governance as REITs (Real Estate Investment Trusts)? What effect will tokenisation have on asset management, quality and performance? Can third-party management help solve the quality and performance problems? And how will tokenised assets be valued?

While blockchain has the potential to transform commercial real estate, the change will not happen overnight. The development of supporting infrastructure will take time to develop. But work is already underway with private sector and government partnerships utilising the technology in places such as Sweden, Georgia, the United Kingdom and Japan. It's only a matter of time before this new technology revolutionises commercial real estate investment.

Proptech verticals

Based on different types of activities within the real estate market, we grouped Asia Pacific proptech start- ups into four main verticals: Brokerage and Leasing, Investment and Financing, Project Development and Property Management. In this region, start-ups operating in Brokerage and Leasing occupy the largest share, followed by Property Management, Project Development and finally, Investment and Financing. Within each vertical, start-ups will be categorised into sub-verticals based on either product functions or employed technologies.

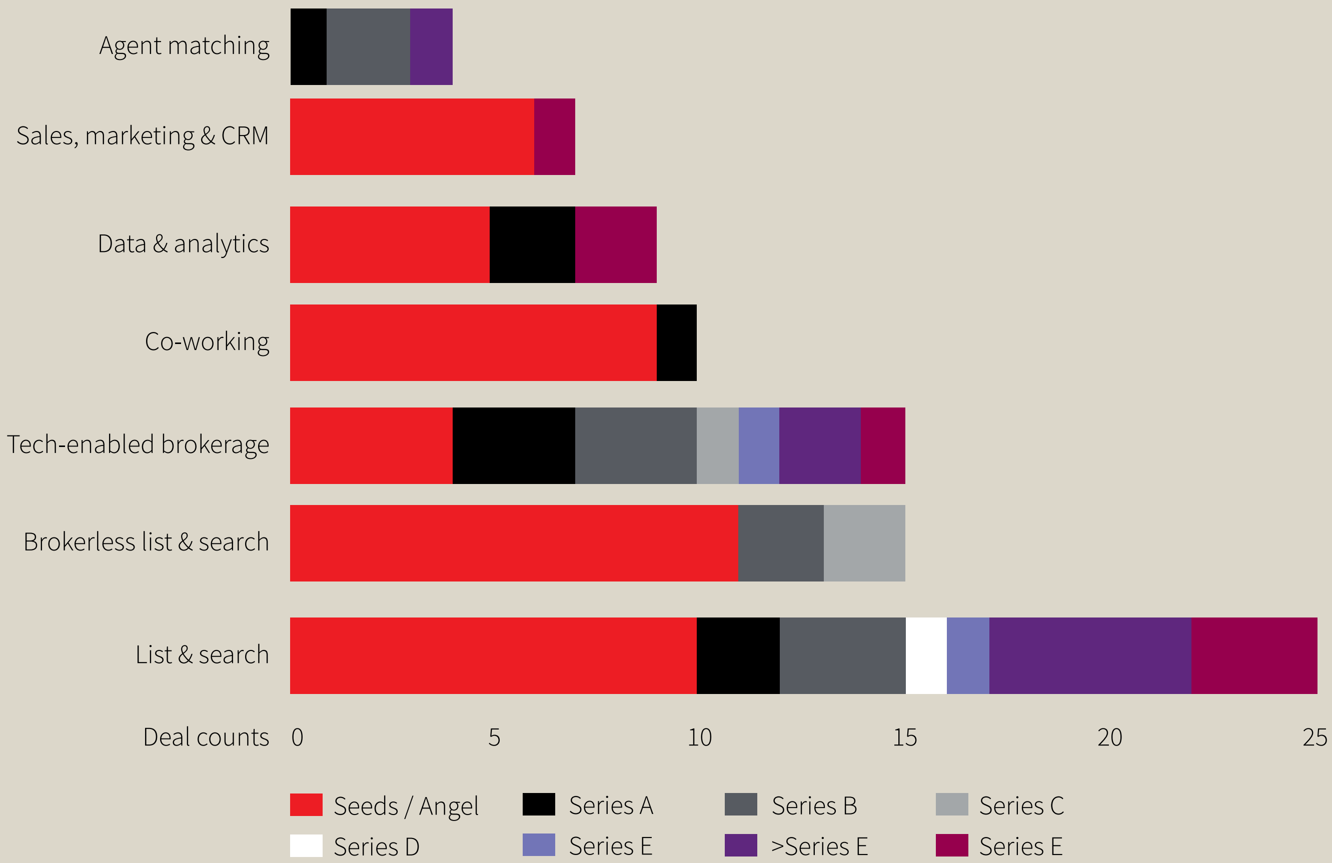


Brokerage and Leasing

Out of the 179 proptech start-ups in Asia Pacific that have raised funding since 2013, 94 of them are in the brokerage and rental space where they serve as the channel or marketplace between brokers, property owners and purchasers. These marketplaces are primarily focused on residential property presumably in response to the regional buoyant housing market.

These marketplaces are the most mature among the verticals, receiving the most late-stage funding. We are beginning to see the emergence of verticals that support the brokerage and rental process, namely in sales, marketing and Customer Relationship Management (CRM) tools for brokers, as well as co-working operators.

Graph 2: Financing status in Brokerage and Leasing vertical by sub-verticals



List and search

List and search portals, such as PropertyGuru of Singapore, are the most common types of start-ups. They are effectively an online classifieds platform combining search engines with brokers' listings. To commoditise and standardise the offerings, some start-ups like China's Mofang are going the extra mile to own and design the apartments being offered.

Tech-enabled brokerage

Eschewing the use of offline channels, tech-enabled brokerages use online platforms to connect their brokers with clients via internet platforms. Some tech-enabled brokerages like PropTiger even allow property developers to sell new inventory directly to home buyers. They also provide sales, marketing, and CRM tools to brokers.

Brokerless list and search

Taking a leaf out of AirBnb's book, brokerless list and search start-ups seek to connect property owners with buyers or tenants, thus replacing the broker as the intermediary of choice.

Agent matching

Agent-matching platforms use a combination of user social data and agent reviews to match home buyers with the agents that suit them best.

Co-working

Taking advantage of the growing number of start-ups and high rental costs, co-working start-ups are disrupting the property cycle by offering shared spaces, facilities and add-on supporting services to other start-ups, freelancers and, increasingly, more established companies. Compared with start-ups in other verticals, co-working start-ups do not possess unique tech capabilities; however, as they use technology to meet users' real estate demands – namely the need for affordable workplaces for individuals or small groups of people – co-working start-ups can still be considered proptech. Co-working start-ups offer easy access to space and flexibility with IT support for tenants such as a mobile app for booking or events registration. To attract tenants, most co-working operators market themselves as communities that bring together start-ups and potential clients or investors.

Data and analytics

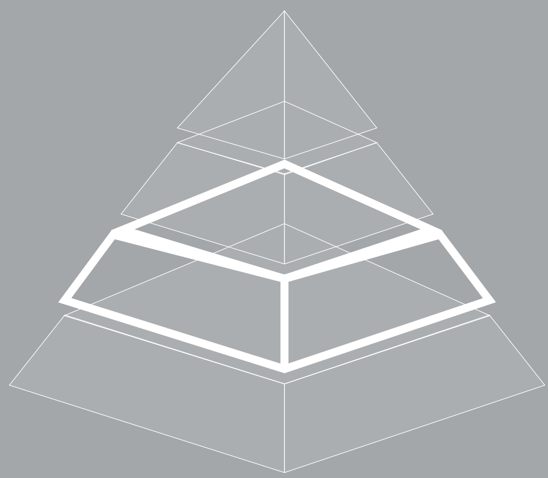
Initially beginning as a service that provided property buyers with the latest information and accurate valuations, data and analytics start-ups have begun providing enterprise clients with independent property data and reports.

Sales, marketing and CRM

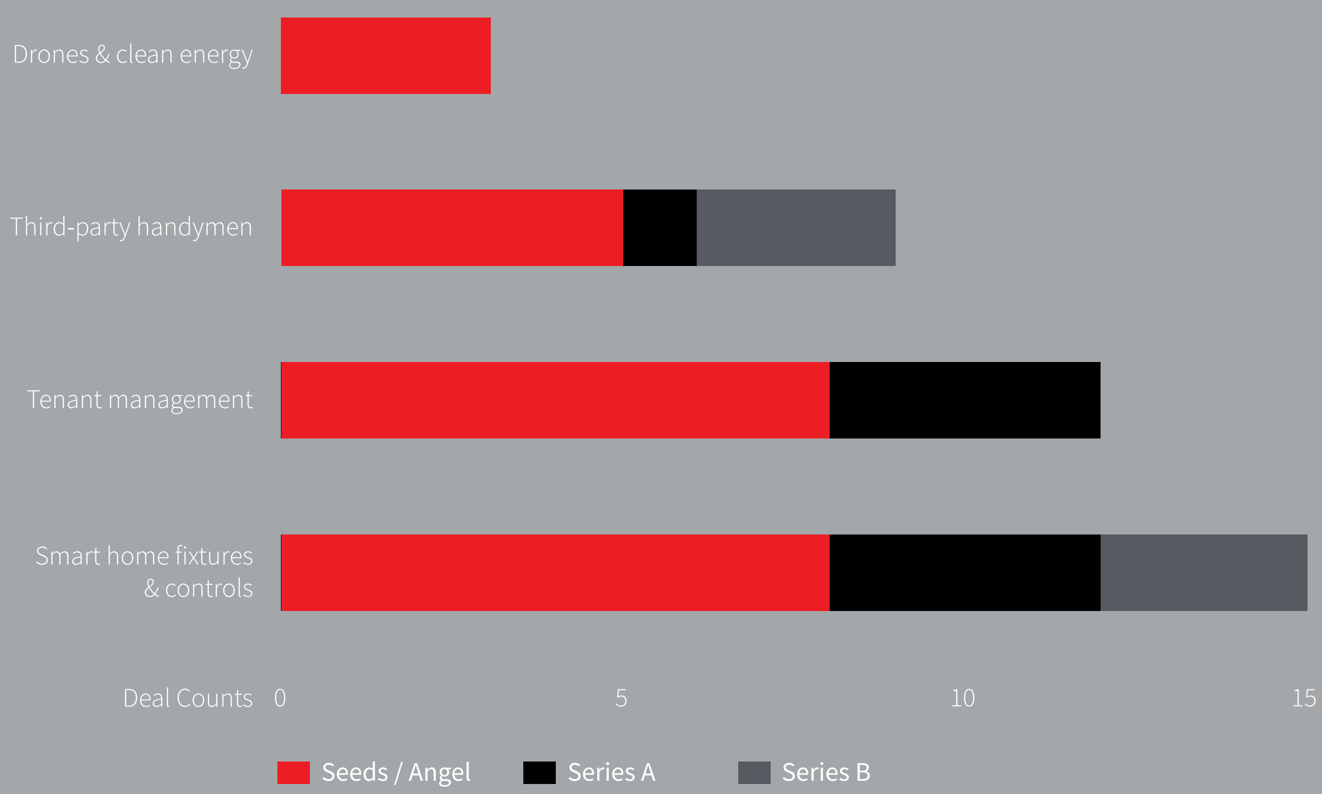
Start-ups that provide marketing, lead generation, CRM and networking tools to property professionals.

Property Management

Start-ups in the property management space provide the tools for property managers to carry out their tasks more efficiently and expand the scope of their work.



Graph 3: Financing status of Project Management vertical by sub-verticals



Drones and solar energy

Thanks to their added value for real estate developers, agents and tenants, the use of drones and solar energy in the industry is getting increasingly popular. Drones provide the means for both marketing properties and remotely conducting building inspections, while solar energy has evolved beyond merely powering homes to become a source of income through the sale of surplus energy.

Smart home fixtures and controls

Tapping into the prevalence of WiFi, smart devices are part of the Internet of Things universe and are used to connect and control disparate parts of the property.

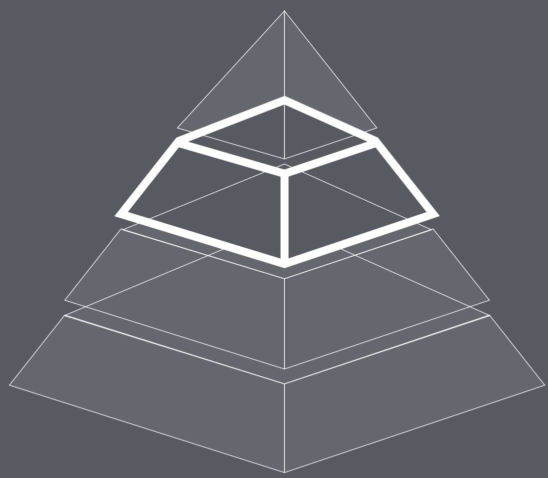
Tenant management

The advent of cloud computing and Internet of Things (IoT) devices has enabled lease management start-ups to keep up-to-date records of tenants, maintenance tickets and space utilisation. In addition, lease management software is now available to help asset managers find and track tenants for their properties.

Third-party handymen

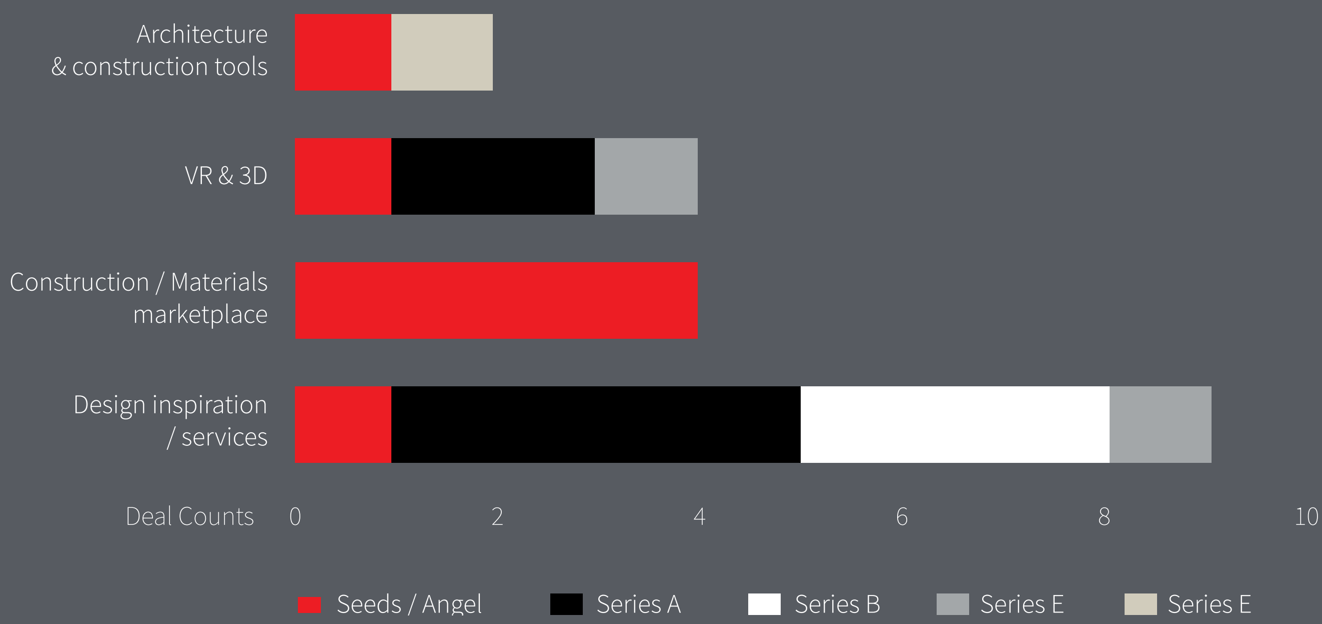
An avenue for property managers and homeowners alike to find reputable handymen for property maintenance.

Property Development



Project development is a space that traditionally has high barriers to entry as it requires intensive capital expenditure and in-depth industry knowledge. Start-ups here reflect these structural considerations as they are largely consumer-focused. This allows them to use readily and cheaply available technologies like virtual reality (VR) or a marketplace, instead of acquiring the expertise and building innovations from scratch, which would be required if they were catering to enterprise solutions.

Graph 4: Financing status of Property Development vertical by sub-verticals



Architecture and construction tools

Focused on removing pain points during the design and construction stages, start-ups in this vertical use cloud technology to digitise records and build a touchstone for architects and engineers.

Construction/Materials marketplace

Like list-and-search start-ups, this vertical brings together contractors and suppliers to potential customers. For example, Revolution Precrafted strengthens this approach by using advanced modular tech and robotics to create homes within 90 days of a designer being chosen by the customer.

Design inspiration/services

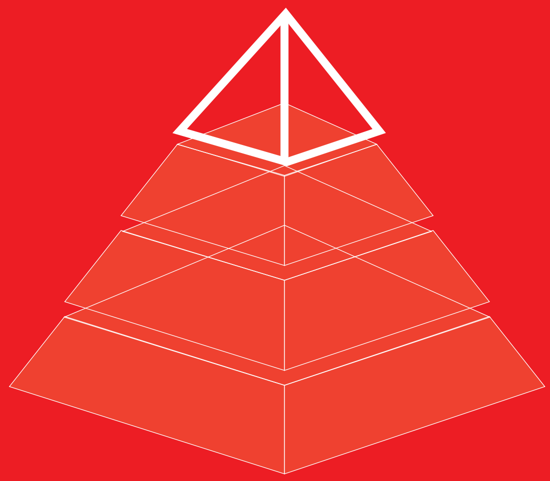
See it, like it, buy it. Unlike Pinterest where users post designs that inspire others, most design inspiration/services start-ups use design inspiration as a means of compelling customers to buy their products. Many of these start-ups allow customers to upload their floorplans and receive customised design plans.

VR and 3D

Intended for architects, brokers and buyers alike to better visualise a property, VR and 3D are technologies used to provide a hassle-free viewing experience and reduce design mistakes.

Investment and Financing

The investment and financing space is in its budding stages and focuses on providing fresh options to retail property investors and buyers. These options take two forms – crowdfunding and fintech. Existing fintech start-ups in the personal loans market such as WeLend now readily provide personal loans that can be used for rent and mortgage payments.



Graph 5: Financing status of Investment and Financing vertical by sub-verticals

Crowdfunding

Like Kickstarter for property developments, these platforms present would-be investors with lower barriers to entry due to the smaller amounts accepted, while enabling property developers an alternative means of fundraising.

Personal loans

Instalment payment platforms for housing rent and mortgages could potentially act as a form of securitisation. Fintech start-ups are trying to take on the burden of payments in exchange for monthly instalments from users.

Proptech by *geography*

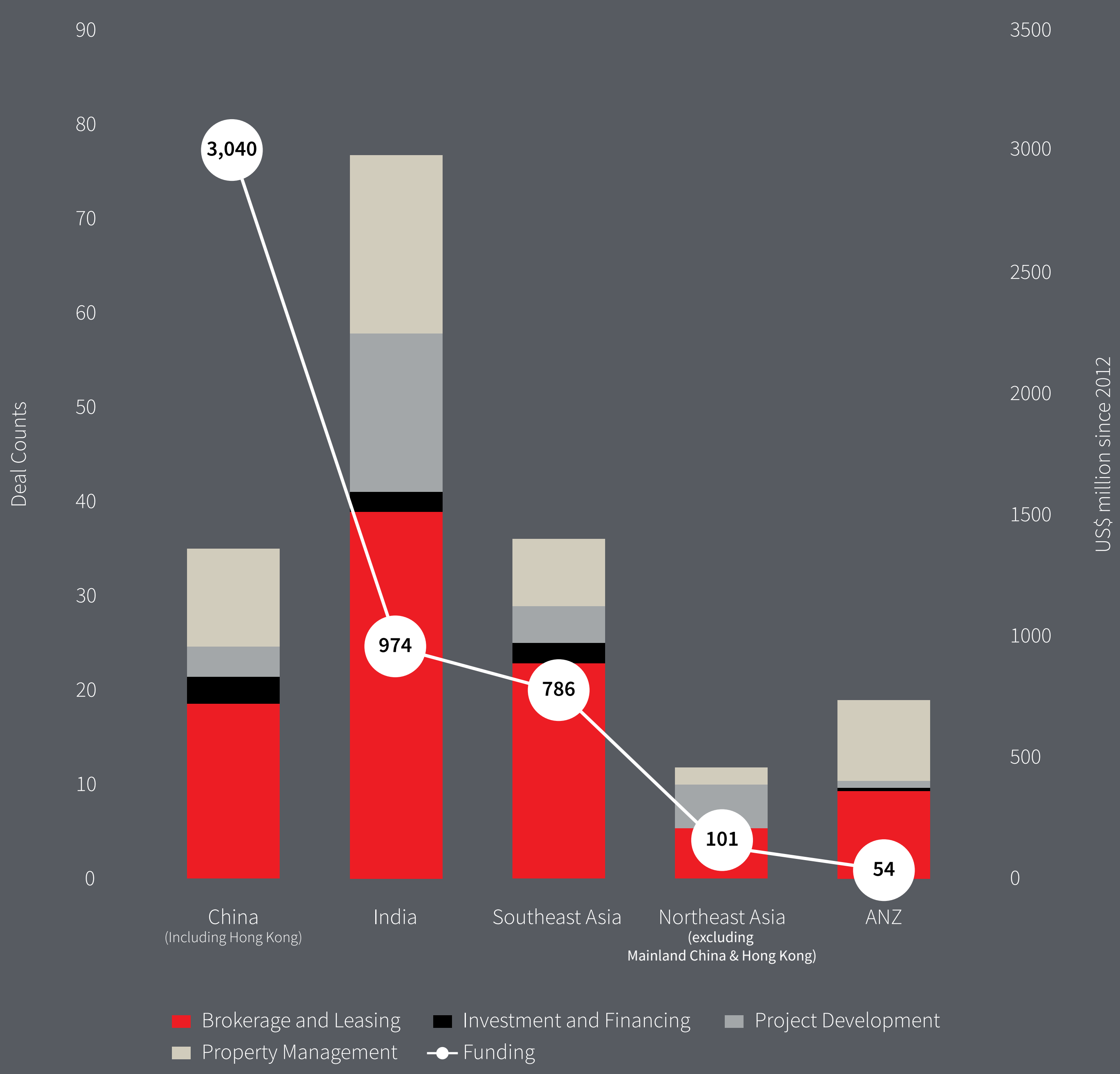
All regions - Start-up Concentration

Across the Asia Pacific region, China (including Hong Kong) and India are the two most dynamic markets for proptech. India tops the list in number of deals while China (including Hong Kong) surpasses other regions in funding values. Other regions (Southeast Asia, Northeast Asia excluding Mainland China & Hong Kong, and Australasia) are catching up but the gaps between them and the two leaders are still considerable, especially when comparing at a country level.

Among the proptech verticals, Brokerage and Leasing appears to dominate in all examined regions. Specifically, start-ups in Brokerage and Leasing have received nearly 90% of total Asia Pacific proptech funding since 2012. Notably, despite a thriving regional fintech landscape, real estate seems to receive limited attention from the regional fintech community as Investment and Financing is low on both deal count and funding values.

There are several economic, social, technological and political factors that could affect proptech's development within the region.

Graph 6: All Regions – Start-up Concentration



Economic factors

Asia Pacific is home to some of the largest emerging markets like China and India, and rapid urbanisation is occurring across the region. Research from the United Nations (UN) shows that between 2000 and 2016, 40 out of 47 cities with the fastest growth rate in population are in Asia; 20 of them are in China alone[21]. This will result in a wider pool of users with diversified needs. And this is where proptech start-ups can come in and use technology as a competitive advantage to thrive across all four verticals.

Social factors

The middle class has become the rising force in consumption across Asia Pacific. It is estimated in 2015 that Asia Pacific's middle class account for 46% of the global middle class and represent over US$10 trillion of consumption. These figures will increase to 65% or around US$38 trillion by 2030[22].

In addition, millennials – one of the largest generations in history – are reaching their prime spending years[23] and about to reshape the real estate market with their distinctive spending habits and expectations. In Asia Pacific, it is estimated that by 2020, 50% of the region's population will be millennials[24]. Economic uncertainty, job losses, supply scarcity (in some markets like Singapore and Hong Kong) coupled with more liberal spending habits compared with their parents' generation, make it unattractive and difficult for millennials to own a house. Thus, they tend to lean towards flexible options (i.e: renting) or collaborative consumption (i.e co-working space). These demographic trends present excellent opportunities for proptech start-ups in Brokerage and Leasing as well as Investment and Financing to offer new products and services aimed at affordability for this customer segment.

However, consumer behaviours remain a formidable challenge to proptech's growth within the region. Many countries here are low-trust societies. Due to a lack of transparency in many local property markets, consumers are likely to favour human interactions for high-value assets like real estate. This behaviour is more entrenched among baby boomers, who remain the main buyers of real estate. It is estimated that by 2017, the population of baby boomers (age ranges from 50 to 74 years old) make up 20% of Asia's total population[25].

Table1: Summary of Drivers and Challenges of Asia Pacific's Proptech

	1	2	3	4
Drivers	Rapid urbanisation and the boom of megacities	The rise of the middle class and millennials	Improved technology-savviness among consumers	Selective support from governments
Challenges	Consumer behaviour in property purchasing that leans towards human interactions for better trust.	Rigid governmental regulations towards new business models or new technologies that could challenge the traditional ways of doing things		

Technological factors

Proptech in Asia Pacific is accelerated by technological sophistication of consumers. Asia accounts for 50% of total Internet users in the world[26]. Besides, Asia Pacific tops the world in growth of smartphone traffic to the Internet[27]. As consumers get savvier, online shopping is booming in the region, paving the way for an 'Amazon experience' in the real estate market. Additionally, the rise of millennials in Asia Pacific's population will boost consumer preference for using technology.

Political factors

Governmental regulations have not always been able to catch up with changing technology, presenting a hurdle for proptech start-ups. Policy challenges are the most visible in peer-to-peer accommodation start-ups – those similar to Airbnb. A notable example to show the substantial impacts of governmental policies on start-ups is the closure of Roomorama, a short-term and vacation property rentals platform headquartered in Singapore. It is reported that Roomorama had to deal with regulatory issues regarding its business model in many markets including Singapore[28]. Roomorama itself cited "regulatory headwinds" to be one of key reasons that "make it ever more challenging" to keep operating in the industry[29].

Blockchain is also facing resistance from governments of some countries, notably China. One of the largest cryptocurrency exchanges in China, BTCChina (BTCC), officially ceased domestic trading operation in September 2017[30] as a result of the government's ban on initial coin offerings.

However, there have been countries supportive of blockchain and its potential for real estate. Specifically, governments of several other countries within the region have been active players in blockchain acceleration. Japan has already legalised Bitcoin and is considered the most advanced country in the crypto field globally. India's government is also collaborating with corporates to further blockchain's development within the country. While China may be regulating its financial markets tightly with a ban on initial coin offerings, it is still encouraging firms to research blockchain and considers it "a good technology" [31].

China (including Hong Kong)

Home to six out of 31 megacities in the world[32] in 2016, mainland China presents a highly dynamic proptech landscape. Despite having only 23 out of 179 proptech start-ups in Asia Pacific, mainland China has received the nearly 60% of Asia Pacific's proptech funding from 2012 to June 2017, with most of the funding flowing into Brokerage and Leasing vertical.

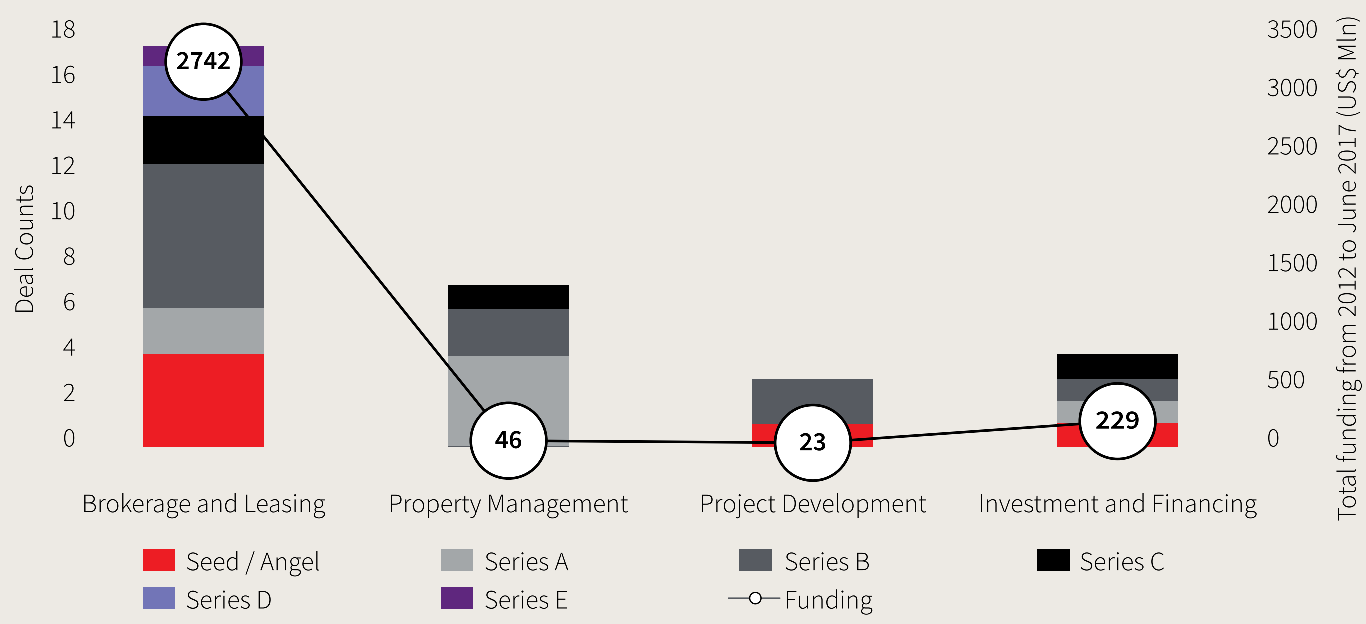
Brokerage and Leasing start-ups in mainland China are driven by the country's strong desire for house ownership[33]. Notably, while millennials' home ownership remains rare around the world, up to 70% of Chinese millennials have their own house. It is also revealed that up to 94% of Chinese millennials plan to buy property within the next five years, which is significantly higher than developed markets' figures, let alone the rest of Asia's[34].

Chinese consumers have become highly tech-savvy since the rise of WeChat. This dominant channel of communication and transactions – 700-plus million active users and counting[35] – has accustomed them to the use of the Internet as the easiest means to make purchases.

In support of the growing home purchase market, the Property Management vertical in mainland China has also begun to enjoy its day in the sun, especially in smart home fixtures and controls.

Unlike mainland China, Hong Kong is a relatively mature market with great illiquidity. Such status, however, presents great opportunities for proptech to grow as the market itself has numerous challenges that traditional players cannot solve yet. Proptech start-ups' participation would help improve productivity and lower the cost of doing business. Hong Kong clients are reported to be open-minded and willing to try out new methods, which indicates traditional ways of doing business in Hong Kong real estate market are not as effective as they would like yet[36]. Brokerage and Leasing is also the most popular vertical among Hong Kong start-ups. Several sub-verticals in Brokerage and Leasing that Hong Kong's start-ups are concentrated in include Sales, Marketing and CRM, and Smart home fixtures and controls.

Graph 7: China – Start-up Concentration



Mainland China's and Hong Kong's proptech in 2018

China's property market risks facing a slowdown as regulations continue to tighten. The government has taken several measures, such as increasing down payment requirements and mortgage rates[37] and closely monitoring building-related regulations to curb speculation and rein in the property market. Sales values of residential buildings are expected to decline compared to 2017 levels, especially in smaller cities[38]. Housing price growth will also be more stable[39].

A slower market would affect China's proptech landscape across all verticals, especially those that support property purchasing. In fact, proptech players specialising in property listing and brokerage like Lianjia, FangDD, and 5i5j have been criticized for exacerbating issue in the market: they were reported to offer 50 to 70 percent lending for the downpayment, which speculators could use to secure a leverage ratio higher than a bank's mortgage[40].

If the government continues to implement restrictions, 2018 will be a challenging year for real estate agents. It was reported that in 2017, Lianjia, 5i5j, and FangDD had to close numerous outlets in Beijing and other big cities as the home market stalled due to the government's cooling measures[41].

However, proptech start-ups that support property rental or leasing could expect a relatively good 2018, as the rental and leasing market is predicted to boom, especially in Tier 1 and 2 cities, thanks to policy stimulus[42].

In Hong Kong, home prices are projected to soar by 10 percent in 2018, and could potentially grow by as much as 20 percent[43]. Hong Kong's stable economic conditions and greater demand compared to supply are the main factors driving the real estate market. Sustaining strong property demand would benefit Hong Kong's proptech start-ups across all verticals.

An affordability crisis in housing and office markets would reinforce the growth of co-living and co-working spaces in Hong Kong. Despite being a new initiative in Hong Kong, co-living has attracted an increasing number of owners and investors to convert their residential properties, hotels and guesthouses into co-living schemes since 2015[44].

Similarly, co-working providers already have 560,000 square feet in operation in late 2017 and their footprint in Hong Kong is expected to continue growing in 2018[45]. Besides, the retail market's recovery is a positive sign for proptech start-ups operating in such areas as data analytics, virtual reality (VR), cloud computing, as this segment is utilising technology rapidly to improve shoppers' experience. For example, data analytics could enable developers to decide on the right mix of stores or other experiential offerings to attract more shoppers while VR can allow shoppers to try on clothes virtually[46]. Known as one of the most exciting destinations for shoppers, Hong Kong's retailers will definitely not miss the opportunity to maximise shoppers' experience with new technologies.

India

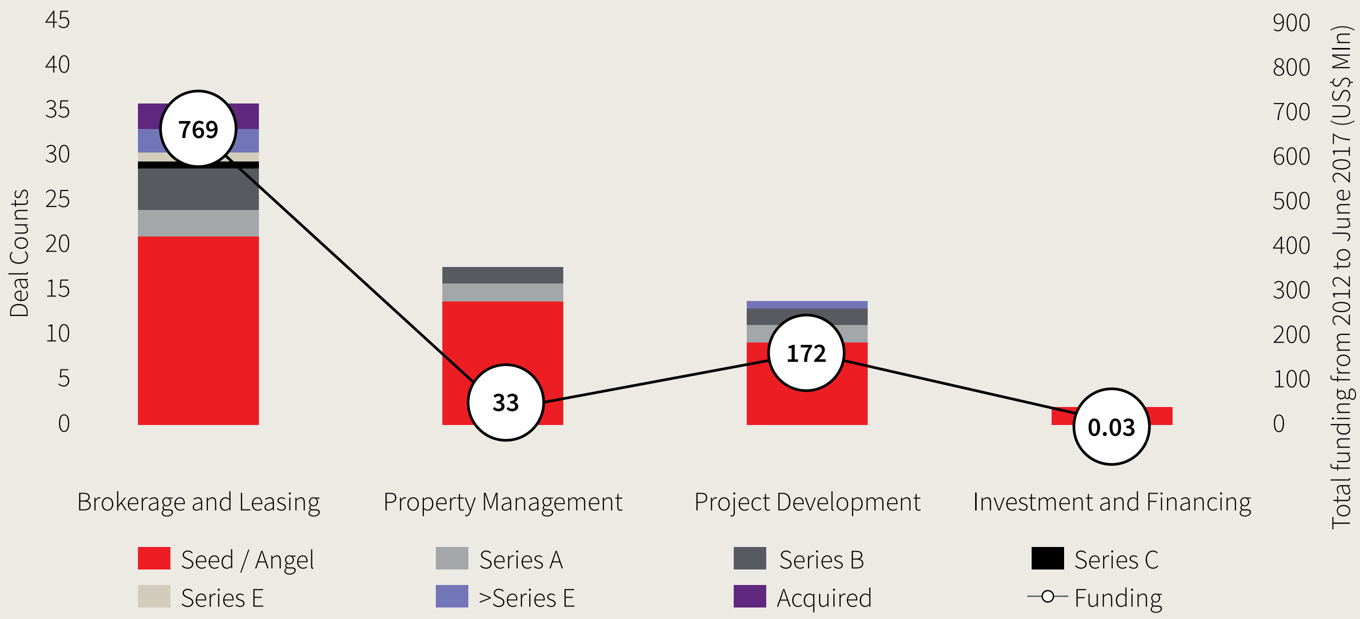
Like China, India's proptech sector is fuelled by its rapid urbanisation; in fact, real estate is one of the largest industries in India[47]. India has the largest number of start-ups (77 of 179 funded proptech start- ups). However, compared with China (including Hong Kong), there are many more start-ups in Seed and Angel funding stages, which could partly explain why the country receives less overall funding than China (including Hong Kong) despite outnumbering it in deal count.

Brokerage and Leasing dominates India's proptech scene. This is due to the growth of the Indian middle-income population. It is estimated that the country's middle class is almost half of its total population, and among the highest-consuming middle class groups in the world[48]. With e-commerce rising in India, consumers are turning to the Internet to purchase goods and services, thereby creating the potential for a robust online property market. But it must be noted that such changes in purchasing habits would take time as most Indians still prefer direct interactions to settle property transactions.

In addition, Indian proptech start-ups are subject to governmental regulation challenges as extensive paperwork is normally required to transact a property.

India's proptech scene further diverges from China (including Hong Kong)'s as seen in its active Project Development and Property Management verticals. Growth in these verticals are led by start-ups that focus on residential home improvement/design (Livspace) and maintenance (Homejoy). With 60 million new homes expected to be built between 2018 and 2024[49], demand for such services in India can only increase.

Graph 8: India – Start-up Concentration



India's proptech in 2018

For India's real estate market, 2017 was a year of reforms. The Indian government took several strong measures such as the Real Estate (Regulation and Development) Act (RERA) and Goods & Services Tax (GST) and Demonetisation, which were considerable setbacks for the real estate industry[50]. Yet, this short-term pain is deemed necessary as these reforms are aimed at increasing market transparency for a more sustainable development of the country's real estate in the long term.

Market reforms would benefit the Indian proptech scene considerably. First, it would guarantee more sustainable growth in property demand. Second, an improvement in the market transparency could potentially prompt a change in consumers' behavior towards online shopping for real estate in the country.

In 2018, start-ups operating in the residential market are expected to face more challenges compared with their peers in the commercial market. The housing market is still in gradual recovery while the commercial market (i.e., offices, malls, etc.) in major cities like Bengaluru and Mumbai is expected to perform well, thanks to continuing demand[51]. Notably, start-ups that specialize in co-working spaces would have a favourable year, following a robust 2017 with around 1.2 million square feet absorbed in major cities. Such momentum is predicted to continue in 2018 as large corporates are also looking to co-working spaces to maximise their productivity[52].

Viewpoint: Unmet needs remain in India's crowded playing field

However, the lack of institutional trust in the secondary market caused by fake listings or unprofessional brokers is a serious challenge to potential home buyers. There is a real need for reliable information and professional service.

Vaibhav Agrawal
Associate Partner
Lightspeed India
Partners Advisors

Tech-enabled brokerages such as FastFox (Lightspeed is an investor) are a welcome medium to help home buyers and tenants overcome these challenges as they give the assurance of accurate information and professional service.

We also see new needs evolving – young, migrant workers (between 20 to 32 years old) tend to move jobs frequently and see no point in buying, especially since rental rates are much lower compared to purchase prices. The emergence of an eco-system around renting makes it a much more attractive proposition.

In the future, there are two competing forces – the traditionally local nature of the property business and the stagnation of supply. Whoever is able to build the brand that connects supply with buyers will win the market. There are opportunities for proptech firms who are able to serve the consumers most efficiently and transparently.

Southeast Asia

The Southeast Asian countries examined in this report are Indonesia, Malaysia, Singapore, the Philippines, Thailand and Vietnam.

Southeast Asia's proptech sector is much younger and smaller compared with two giants like China and India. Following the regional trend, Brokerage and Leasing is the pioneering vertical, receiving 96% of total funding. Most of the start-ups in this vertical (except for PropertyGuru, which raised US$129 million in 2015) are relatively young compared to start-ups from other regions.

Within the region, Singapore, with its supportive start-up eco-system, is the obvious leader. However, Singapore's limited population and size is not ideal for scaling. The growth trajectory of Singaporean proptech start-ups like PropertyGuru would be to operate throughout the region to gain sufficient scale[53].

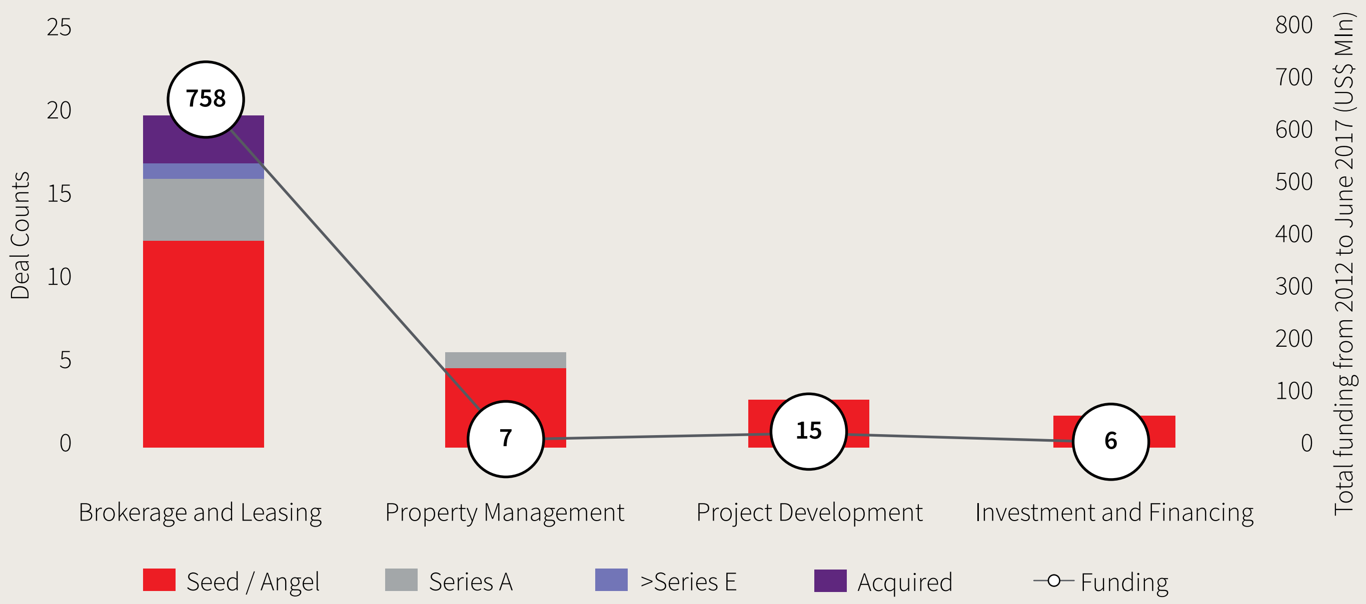
Malaysia also has several proptech players, notably iProperty Group, which was acquired by News Corp's Australian real estate website company REA Group Ltd for US$414 million in 2015. Other countries like Indonesia and Thailand also have some local property search portals but their scalability remains largely unproven given limited product sophistication and relatively underdeveloped markets[54].

The primary challenge in the region seems to be changing consumers' habits. Even in a more developed market like Singapore, getting people to make decisions on high-value assets like property with minimal human interaction remains difficult[55].

Regardless, the consumer focus of proptech start-ups in Southeast Asia may prove a boon in the long run. The existing internet user base of 260 million is expected to grow to 480 million users by 2020, while online advertising spend is projected by Google and Temasek Holdings to increase from US$2.1 billion in 2015 to US$9.9 billion in 2025[56].

Notably, we have begun to bserve that start-ups in Singapore (pre-funding stage), such as Averspace, use blockchain to allow home buyers to complete transactions directly with home owners.

Graph 9: Southeast Asia – Start-up Concentration



Southeast Asia's proptech in 2018

Increasingly within the region, Singapore appears to be the only country that has a market mature enough for proptech. 2018 would mark the end of the country's property market downturn[57]. Both residential and office markets have passed inflection point and are on track to recovery, backed by strong economic prospects and improved market sentiment[58].

A healthy property market will certainly promote Singapore's proptech scene. 2018 could potentially witness new deals or expansion plans for Singapore's proptech start-ups. In fact, 99.co, a Singaporean list and search start-up, opened the year by buying UrbanIndo, the largest property portal in Indonesia with over 1.2 million active listings. The acquisition is essential to the Singaporean start-up's goal of being the No. 1 proptech company in Indonesia[59].

However, there are also challenges ahead for the Singaporean proptech community. Specifically, start-ups that support house rental would be affected by the continuing weak demand in the rental market[60]. Brokerage and leasing start-ups, would probably face increasing pressure to offer high value-added services, such as financing advice or linking homeowners with interior designers. Such high use of technology is an inevitable trend that should be sustained in an advanced market like Singapore.

Northeast Asia

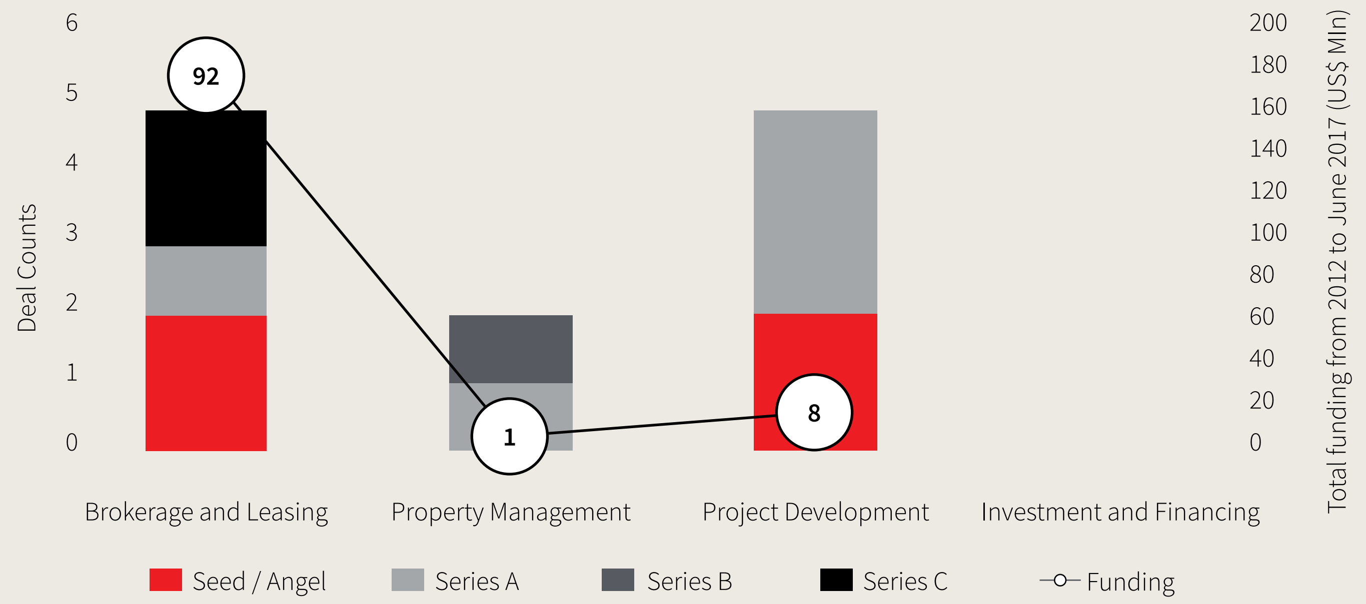
(excluding mainland China and Hong Kong)

Due to relatively mature markets and a declining population growth rate, Northeast Asia, namely Taiwan[61], Korea's and Japan's proptech scenes are less vibrant than the three previously examined regions.

Among examined markets in Northeast Asia, Japan appears to be the most exciting. With the initiatives of Abenomics – increased public infrastructure spending, depreciation of the yen, and quantitative easing by Bank of Japan – the country's real estate market has become bullish with investment rising 10% year-on-year for the first half of 2017; transaction volumes are expected to keep growing[62].

The use of technology in Japan's real estate sector has been increasing for the past couple of years driven by the government's focus on encouraging entrepreneurship. Both government and real estate stakeholders are leveraging technology to expand the property market and maximise its reach. The Japanese government is even planning to use blockchain technology to underpin their property registries to prevent tampering[63]. A bullish real estate market, together with technology savviness, would make Japan's proptech scene promising in the coming years.

Graph 10: Northeast Asia (excluding mainland China and Hong Kong) – Start-up Concentration



Northeast Asia's proptech in 2018

Japan's real estate market had a good 2017, thanks to improving economic conditions, low interest rates and a thriving tourism industry[64]. This bodes well in general for proptech, but not all proptech start-ups will reap the same benefits. Specifically, proptech start-ups operating in short-term rental would be adversely affected by tighter regulation for short-stay accommodation that will go into effect by June 2018.

Under this new rule, hosts are required to register with the local government and will only be able to offer short-stay rental (for stays < 30 days) for a maximum of 180 days per year, which can be further shortened in accordance with local government's decision. Once the limit is reached, hosts will have to wait until the next year to offer short-term rent again. Also, short-term rentals for apartment buildings will be challenging as well because of a revision in the Standard Management Bylaws for apartment buildings that requires 75% of apartment owners vote in favor of allowing short-term letting in the building[65].

Meanwhile, South Korean proptech start-ups, specifically those that operate in the residential market and support house purchasing, are likely to have a challenging year, due to stricter government regulations to curb speculative demand, such as high taxes on capital gain for owners of multiple houses in overheated areas[66].

Viewpoint: The true meaning of “smart” cities is taking an issues-first approach by focusing on the unique challenges cities face

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General Manager,
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The goal of Kashiwa-no-ha Smart City, which first took shape in 2009, was to tackle issues that Japanese cities face, such as the threat of natural disasters as well as the the need to build a vibrant and healthy metropolis for residents for all ages. We aimed to create a city that manifests our global future by focusing on three themes: harmonious co-existence with the environment, healthy long life, and generation of new industries. The vast townscape extends over 300 hectares, and the development will continue to 2030 for multiple facilities with different uses, including high-rise apartments, large shopping malls, shops and offices, hotels, universities and large co-working spaces where entrepreneurs will gather.

One area Kashiwa-no-ha Smart City is focused on is sustainable energy usage in our buildings. Hitachi jointly developed the Kashiwa-no-ha Area Energy Management System (AEMS) with real estate company Mitsui Fudosan and architecture firm Nikken Sekkei to collect power usage data from facilities ranging from offices to apartment complexes, which are located in different districts within Kashiwa-no-ha and optimize load sharing for the whole town.

Multiple power users with different usage profiles are able to rely on data gathered in real time to realise efficient load balancing. For example, peak usage can be reduced by applying power generated with solar panel system along with power purchased during the evening at off-peak rates and stored in large lithium ion batteries for the peak periods in the day. In case power transmission is disrupted by natural disasters, power stored in batteries can be supplied, and the power cost for the whole town can be reduced by cutting peak usage by commercial facilities and offices. The result is significant energy savings and contingency planning for the entire town.

Development of Kashiwa-no-ha AEMS was inspired by the Great East Japan Earthquake, which occurred on 11 March 2011. It exposed the vulnerability of urban infrastructure, such as risks of power outage. There is a need to provide stable energy supply even in times of disaster, and we were put in charge of overall system development and operational support. The largest obstacle was that exchange of power between buildings in different town districts was prohibited under the existing regulatory system. Blackouts may occur if appropriate power exchange cannot be made, so we entered negotiations with the Ministry of Economy, Trade and Industry which oversees the electric power industry regarding deregulations. Ultimately, a community grid system using direct current and AC/DC converter was built to avoid disruption of existing power grids. We created power exchange systems between town districts in Japan.

Most people focus on showcasing of new technology when they think of smart cities, but Kashiwa-no-ha Smart City demonstrates that the issues-first approach that focuses on solution of issues for Japanese cities should be the true meaning of “smart” cities. In this particular project, our goal was to determine how we could meaningfully apply the AC/DC technology to cities in Japan, a nation frequently hit by natural disasters. Going forward, we aim to create safer and more comfortable cities, and incorporate new technologies such as the Internet of Things to achieve our goal.

Australasia

(Australia and New Zealand)

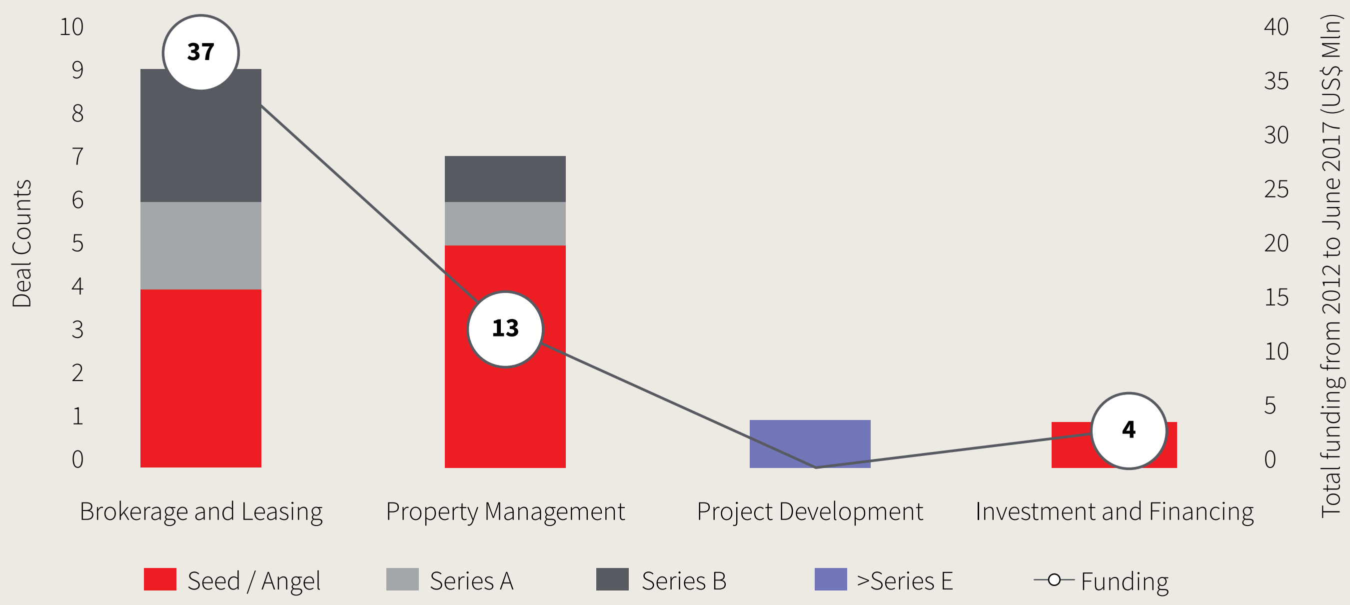
Australasia's start-ups are primarily in Brokerage and Leasing, and Property Management. The former is due to the relatively lower barriers to entry into the space while the success story of construction software firm Aconex, which has completed an Initial Public Offering, has encouraged more start-ups to look into that space. Of the US$37.4 million invested in the Brokerage and Leasing vertical, US$24.8 million went into a pair of agent-matching start-ups – OpenAgent and LocalAgentFinder.

Australia's strong desire for home ownership offers a catalyst for proptech start-ups, especially those in the Brokerage and Leasing vertical. Also, the Australian government has been supportive towards fintech, with policies and regulations assisting fintech start-ups and innovators to develop, test and globally launch their products and services[67]. It is expected that the number of deals and funding values in the Investment and Financing vertical would progress considerably as a result.

Australia's legal and business similarities with the UK favour the growth of proptech as they make it easier for local start-ups to replicate successful business models available in the UK[68] – a very dynamic market for both proptech and fintech.

Compared with Australia, New Zealand proptech is not as active. It is expected that proptech in New Zealand will remain latent for the near future.

Graph 11: Australasia – Start-up Concentration



Australasia's proptech in 2018

Australia's real estate market is expected to soften in 2018. The residential market is likely to cool down, with moderate growth and price fall in capital cities[69]. The commercial market is facing an imbalance between supply and demand, nevertheless the office market is predicted to grow well and outperform all other commercial markets in 2018 to 2019[70].

A grimmer outlook would require Australia's proptech community to be more cautious. However, the market's strong performance in previous years has strengthened Australia's proptech eco-system as it helps draw attention from venture capitalists and established property players to the proptech community.

For example, Charter Hall, a leading Australian property group, has launched the country's first proptech accelerator program to attract proptech entrepreneurs in a 13-week programme with benefits worth up to US$400,000 in partnership with corporate innovation hub Collective Campus[71].

Meanwhile, New Zealand proptech startups could hopefully expect more favorable conditions as the real estate market enjoys a big infrastructure boost and reforms by the government in 2018[72].

What is the *future of proptech* in Asia Pacific?

The continuing power of disruptive technologies

Aside from blockchain, which has been discussed in the previous sections, there are several other disruptive technologies that could reshape the real estate industry in Asia Pacific.

Artificial Intelligence (AI) is too promising to be missed in the real estate industry. AI could transform it in a number of ways, such as machine learning in search engines that could precisely address a customer's needs and adapt with their changing preferences; image recognition that enables customers to classify, tag and organise images of properties in real-time; and chatbots that help automate real estate processes such as appointment bookings or information provision[73].

The future opportunities of real estate powered by AI are vast. Despite being less technologically advanced compared with United States or Europe, Asia Pacific is very active in developing AI, especially in countries like Japan, China and Singapore. The region has been predicted to become the primary global market for AI[74]. Even though the percentage of AI-powered services (i.e., location intelligence) within the real estate industry in Asia Pacific is still limited compared with the United States and Europe (10% vs 87%), the potential for high growth is undeniable given the substantial size of Asia's real estate market[75].

Another new technology that is worth noting is 3D printing. 3D printing could transform the commercial real estate market considerably, especially in the Project Development vertical as it enables construction activities to be faster, of a higher quality and at lower costs. Looking ahead to the future, tenants might consider using 3D printing technology for spatial design purposes while real estate developers could also evaluate tenants' impact and usage with this technology to make informed decisions about location and development[76].

Considering other thriving disruptive technologies such as Virtual Reality, drones, predictive analytics, etc., it is expected that the real estate industry on both the global and Asia Pacific's stages would be transformed tremendously within the foreseeable future.

Let's examine the new technologies and risks emerging in proptech.

Cyber-security risks in the real estate market

As real estate businesses have started to utilise more technology in their operations, they are facing more cyber risks. The real estate industry can be considered a vulnerable and high-value target for cyber risks. In a real estate industry outlook survey conducted by KPMG in 2017, up to 30% of surveyed real estate leaders confirmed that their companies had experience a cyber-security incident within the last 24 months[77]. Even the commercial sector, which is subject to fewer cyber risks owing to their low exposure towards individual consumers, is facing new cyber threats due to the rise of smart buildings where tenants can have building management systems on their smart phones[78].

In Asia Pacific, the risks of cyber threats in the property market are apparently high due to increasing reliance on technology. In fact, the region has numerous vulnerable targets for cyber-attacks, except for China, which can be considered to have strong cyber security capabilities[79]. Specifically five countries – Australia, New Zealand, Japan, South Korea and Singapore – are dubbed the "Cyber Five" due to their considerable vulnerability towards cyber-attacks. With the majority of proptech start-ups in the residential market, and considering the region's fast acceleration in digitalised infrastructures like IoT and Smart Cities, proptech in Asia Pacific is not immune to the dangers of cyber threats.

Emergence of new technologies

Along with the continuing development of advanced technologies in proptech such as blockchain, AI, VR, 3D printing, etc.; 2018 will witness emergence of new technologies. Notably:

BIoT: The convergence of blockchain and the Internet of Things (IoT) is probably one of the most impressive technological trends in 2018. BIoT would certainly unleash a whole new range of services and businesses, among which smart homes and smart buildings would certainly be among those that benefit the most from the combination of such technologies. BIoT would allow entities to access real-time data from sensors and moreover the data would be fully protected thanks to blockchain[80].

It is estimated that the IoT the market in the Asia Pacific will grow at a Compounded Annual Growth Rate (CAGR) of 10.2% from 2016 to 2023[81]. Also, China and India in particular, are the two leading destinations of funding in blockchain. Although it will take some time until we witness start-ups in the region utilise BIoT within the proptech landscape, the huge potential of such combined technologies in the property market coupled with the region's dynamism in technology adoption would indicate it will not be too long.

Nanotechnology: While nanotechnology is not a brand new technology, the increasing expansion of its applications is exciting. Nanotechnologys has started to disrupt construction and advanced building materials. Several notable examples include self-cleaning windows; high strength concrete; and thin, lightweight, super-efficient insulation. It is estimated that by 2025, up to half of new building materials might contain nanomaterials[82].

Asia Pacific is expected to be a rising hotspot of nanotechnology. Specifically, the global market for nanotechnology is forecast to reach US$110 billion by 2022; in which Asia Pacific ranks as the fastest growing market with a CAGR of 24%, driven by growing research and development efforts[83]. Asia Pacific has many countries topping the list of leading patenting countries in nanotechnology. According to StatNano, South Korea, Japan, Taiwan and China occupied the ranks from second to fifth in Top 10 countries in Nanotechnology Patents published by United States Patent and Trademark Office[84] in 2016.

IoT - Smart lock: Smart lock is an IoT device that allows one to lock or unlock a door using smartphone and even remotely[85]. The device is gaining increasing popularity as it will not only transform property management but also e-commerce and last-mile delivery. Smart lock is considered an example of how properties adapt to the age of online shopping as it will solve the growing concern of last-mile delivery for types of properties like gated communities or those with a single drop-off point[86].

Asia Pacific is anticipated to be the market with highest CAGR of 18.2% from 2017 to 2023 for smart lock adoption, thanks to the increase in the construction of buildings and Internet penetration[87].

Several smart-lock start-ups have sprouted in the region. Beijing-headquartered Yunding Network Technology claims to be the leading company in smart-home security system sector in China, with over 60% market share of smart locks in the smart apartment segment. According to the company, it covers over 40 metro-cities markets in China using over 50 patents of algorithm, design and lock structure[88].

Another prominent example is AMADAS, a South Korea-based developer and supplier of smart lever locks. AMADAS has been awarded nine international patents and is a partner of big corporates such as Hyundai Construction[89]. Igloohome is a Singaporean startup that has developed a smart door lock integrated with Airbnb. Remarkably, the smart lock can work without the Internet, which makes it suitable for deployment even in areas with unstable internet connections, such as basements, beaches, mountains, etc[90].

Proptech in commercial real estate

Currently, proptech is dominated by start-ups focusing on the residential real estate market. This is a common trend both globally and in Asia Pacific. According to a report by CB Insights, there are globally only 53 active proptech start-ups for the commercial market[91]. One reason could be the larger size of residential market, which makes it more likely for a start-up to succeed and thus, get funding more easily[92].

The main issue is really the more complex nature of transactions in the commercial market – high transaction volumes and values are often accompanied by multi-party involvement as well as little data availability and transparency. The commercial real estate industry has always been discreet about some aspects of its operations such as lease rental rates, property prices and valuations to preserve competitive advantage[93]. Such practices make it hard for start-ups to venture into the commercial real estate market.

However, changes are coming. There have been a few factors that would accelerate proptech in the commercial property market in Asia Pacific.

Smart Cities: Smart cities initiatives are being implemented all over the world. Asia Pacific is no exception. Singapore is actively pushing its Smart Nation programmes; India has its Smart Cities Mission, which aims to turn 100 cities all over the country into smart cities. More than 500 cities in China have started or will start their smart city transformation in 2017[94]. Japan and South Korea also have their own smart cities, even though the scale might not be on the same level compared to China and India.

The evolution of smart cities will prompt the need for smart property development and management, giving a boost to proptech. For example, smart cities are highly data-driven, as extensive data collection and analysis are necessary to fully realise the benefits of smart cities. This would create opportunities for commercial real estate players to act on data they possess to make more informed decisions regarding which locations to invest in, what the appropriate tenant mix would be, or how to improve valuation methodologies. These questions could be answered effectively with the support of proptech start-ups that are specialised in predictive analytics.

Blockchain: The power of blockchain also expands into the commercial real estate market. Blockchain could improve the property search process, accelerate pre-sale due-diligence, ease leasing and subsequent property and cash flow management, and finally empower informed decision-making[95]. As a hotspot for blockchain, Asia Pacific could soon expand this technology's application into various industries including real estate, specifically the commercial sector.

Spill-over effects: Successful cases of worldwide proptech start-ups operating in the commercial market would act as an inspiration and catalyst for start-ups in Asia Pacific to step up and venture into this sector. On the global stage, an increasing number of start-ups have realised that the commercial market has been neglected. Some notable names include VTS (a merge of Hightower and VTS), the software solutions provider that helps real estate professionals and owners manage property sales and leasing, as well as Floored (which was acquired by CBRE), a specialist in 3D graphics and technology for the hospitality and real estate industry[96].

The rise of proptech-focused funds, accelerators and the increasing participation of incumbents

In recent years, we have witnessed an increasing number of funds fully dedicated to proptech. The number of initiatives and amount of corporate venture capital led by real estate incumbents is accelerating the growth of proptech.

In Australia, there is a fund fully dedicated to proptech called Esho Ventures. Esho Ventures approaches proptech start-ups in an unconventional way by screening their ability to leverage Facebook Messenger[97]. Targeting series A start-ups, the fund is stated to focus on the landlord–tenant relationship, the impact of millennial lifestyles on the real estate market, and construction technology.

Established incumbents are also getting more involved in the start-ups community as they realise working with start-ups – be it in an investment or partnership model – is an effective way to keep up with proptech developments. In May 2016, Singaporean leading property developer CapitaLand, announced it would set up a US$110 million start-up fund[98]. In 2016, real estate company Savills invested in the pre-Series A round of Pegaxis, a Singaporean start-up offering an online marketplace connecting property managers and services providers and an online suite of tools for managers to track procurement activities.

JLL has implemented a number of initiatives to foster proptech regionally. The company was the main sponsor of the region's first proptech hackathon in August 2017, Hood Disrupt. JLL also launched an Indian technology venture in 2016, which has already invested in Foyr.com specialising in virtual reality and augmented reality to facilitate interiors customisation. The company also launched a new global business unit, JLL Spark, which will identify and deliver new technology-driven real estate service offerings and is helmed by two former Silicon Valley veterans[99].

Viewpoint: Building a Smart Nation isn't just about technology. It's also about people, businesses and users in the wider economy*

Jacqueline Poh
Chief Executive
Government Technology Agency of Singapore

Photo Credit: Courtesy of Singapore Computer Society

What defines a smart city?

Turns out, there are no hard and fast definitions.

As cities around the world turn to technology to improve services for their citizens, no two develop along exactly the same lines. In some, environmental sustainability and open data are top priorities; in others, a comprehensive e-payment system or fast, widespread connectivity may be what people value most.

In Singapore, it's not quite about taking an all-inclusive approach. We are focusing on areas such as transport and healthcare, as well as the need to develop integrated nation-wide digital platforms. For example, the government is planning to build a Smart Nation Sensor Platform, which will collect, integrate and analyse data from sensors across the country. Insights from this data could serve a variety of purposes in the areas of security, transport or environmental protection.

Building a Smart Nation isn't just about technology. It's also about people, businesses and users in the wider economy. The public sector and the private sector have to work together. We do want to push the boundaries together with the private sector, and we've been looking at different ways in which we can bring in research partners, start-ups and industry users to pilot solutions with us.

If Singapore is to become a Smart Nation – a country in which everything from homes and healthcare to urban mobility and day-to-day operations is transformed by technology — then this relationship with the private sector needs to be transformed as well. There will be no lack of opportunities for collaboration. To encourage this relationship, GovTech has launched initiatives such as the InnoLeap programme, which provides a platform for government agencies to share problem statements and discuss possible solutions with the private sector, academic research institutes and institutes of higher learning.

We welcome industry partners to share ideas and suggestions on building the Smart Nation. We want to see how the tech industry can walk with us on this journey, and to see if you have solutions we haven't thought of. We're asking for imagination, flexibility and creativity.

*This is a condensed version of the remarks made by GovTech's Chief Executive, Ms Poh, at two events. The full versions can be found on https://www.tech.gov.sg/TechNews/DigitalGov/2017/06/Closer-collaboration-for-the-Smart-Nation and https://www.tech.gov.sg/TechNews/Innovation/2017/07/Smart-way-to-build-a-Smart-Nation.

Proptech – a land of unicorns?

It is estimated that nearly one-third of the world's private unicorns — start-ups valued at over US$1 billion— are headquartered in Asia. Within Asia Pacific, eight out of 15 countries are reported to have at least one start-up that has managed to raise over US$100 million. China holds the leading position with over 70% of Asia's billion-dollar start-ups[100].

In view of the numerous drivers mentioned, the future of proptech is bright in Asia Pacific. We anticipate that its funding values in Asia Pacific in 2020 alone could reach US$4.5 billion.

As proptech is the convergence of property and technology, we believe that the growth of proptech depends concurrently on the state of the real estate market and technology savviness.

In order to understand where this could lead, we have mapped a number of markets in Asia Pacific onto a matrix consisting of the real estate market size and digital savviness to identify the countries offering the best conditions for proptech to thrive, and thus which have the highest chances of nurturing unicorns in this field.

Each country's real estate's market size is measured by the Total Investable Real Estate Universe estimated by JLL while Digital Savviness is measured by Networked Readiness Index (NRI) – an index reflecting "how well an economy is using information and communications technologies to boost competitiveness and well-being" by the World Economic Forum[101].

NRI is a composite indicator made up of four main categories and 10 subcategories with 53 individual indicators. It measures a country or territory's performance in Environment (political and regulatory environment, business and innovation environment); Readiness (infrastructure, affordability, skills); Usage (individual usage, business usage, government usage) and Impact (Economic impacts, Social impacts). With its comprehensive scopes, NRI can be justified as an indicator to measure the technology savviness of one country or territory.

The total investable real estate universe (in US$ billion) and NRI of each country and territory will be converted into a 10-grade scale since they have different units of measurement.

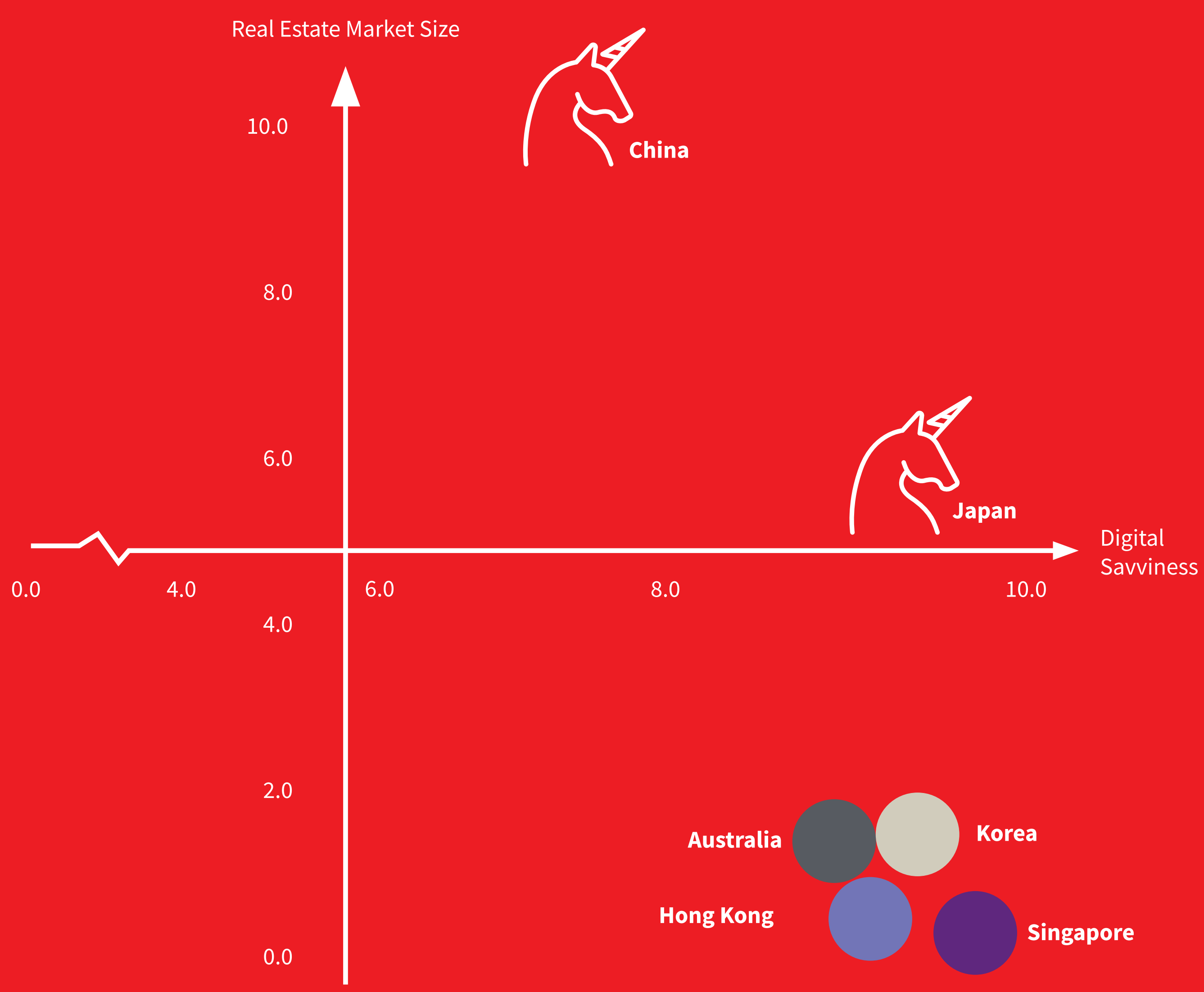
Based on the mapping, we expect that mainland China and Japan are the two countries that have the most chance of proptech unicorns as the local markets are big enough for start-ups to scale and their level of technology savviness would encourage stakeholders to embrace technology as a solution for their different needs in the property market (i.e., purchasing, renting, developing, etc.). In fact, mainland China already has several proptech unicorn such as Lianjia, which claims to have 7% market share in China's online and offline real estate market and is expanding aggressively with active presence in 36 cities all over China as in April 2017[102]. Other proptech unicorn names include Mofang Gongyu, Fangdd, and Aiwujiwu.

Japan's significant real estate market size coupled with its technological edge puts the country's proptech start-ups in good stead. Japan's proptech has good growth potential in the Brokerage and Leasing vertical, especially in short-term leasing as the country may soon face a shortage of short-term accommodation due to an increase in inbound tourism in view of the upcoming Tokyo Olympics[103].

There are other countries that scored relatively highly in technology savviness, but their relatively small local markets will always pose a challenge towards growing market share and scaling. Growth requires penetration into other markets, which requires greater resources and capacity as it demands a deep level of local knowledge. Well-established start-ups in these markets (Korea, Australia, Hong Kong, Singapore) could still expand their market reach and become a regional unicorn through partnerships with locals players, investment or even mergers and acquisitions.

India is another one to watch. The country has lagged behind mainland China, Australia, Japan, Singapore and Hong Kong – these five markets alone account for 83% of commercial real estate investment flows in Asia Pacific in 2015[104] – but it is projected to join the group in the next decade. The sheer number of proptech start-ups is testament to the potential of India's real estate growth.

However, at this stage it is not possible to quantify India's Total Investable Real Estate Universe due to challenges in capturing data as a result of a lack of transparency in transactions.



Viewpoint: The win-win proposition for start-ups and corporates

C31 Ventures was set up to execute strategic investments in start-ups for CapitaLand. This means investing in capability building that is aligned with CapitaLand's strategy to support the core business.

We have the opportunity to leverage our significant asset base across multiple real estate classes and geographical locations to offer start-ups an opportunity to scale with us.

Beyond strategic investments, C31V also continues to shore up CapitaLand's internal innovation capabilities through multiple engagement points. Marrying the scalability of a start-up together with the large customer base of a corporate is a win-win proposition for all parties in delivering a superior product and experience.

Ervin Lim
Head
CapitaLand C31 Ventures

Embracing the potential

With rapid urbanisation, the emergence of the middle class and millennials, improved consumers' technology sophistication as well as governmental support in select countries and verticals, proptech in Asia Pacific seems to possess all the necessary ingredients to thrive.

Yet, it can only reach its full potential once certain conditions are in place, namely greater flexibility and openness in regulation, as well as an evolution in consumer habits.

The high concentration of start-ups in terms of both deal count and funding values in the Brokerage and Leasing vertical compared with other verticals like Investment and Financing, Project Development and Property Management, are indicative of the immaturity and relatively limited technological capabilities of start-ups in Asia Pacific compared to established markets like the United States or Europe.

But proptech here is catching up fast, especially in countries like China and India. Asia Pacific possesses significant potential in various disruptive technologies, notably blockchain, with its possibility to scale across the large markets of Asia. The implication is clear: this region is an already thriving market for both real estate and technology.

With corporates waking up to the opportunity to overcome inefficiencies in their business lines and maximise their reach, start-ups, too, will begin seeing a growing market for their products and more interest from these corporates. This will result in new partnerships and perhaps some important new real estate players in the region.

This is just the start of the proptech story in Asia Pacific. We look forward to seeing it unfold in the coming years.

The image featured on this page and on the cover is of JiLL, JLL's humanoid robot receptionist created by Softbank robotics. Based in JLL's Sydney office, she runs all front-office activities[105].

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