PropTech Global Trends 2022

Annual Barometer

Gouvernement Princier
PRINCIPAUTÉ DE MONACO

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Content

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Introduction

The Real Estate sector is a historical and strong pillar of the Monegasque economy: His Serene Highness Prince Rainier III has been decisive in promoting this sector, notably by expanding the country's territory by 20% via a sea extension (the Fontvieille district).

It is also a key element of the country's wealth creation: it represents 1,2 Billion of revenue, which is roughly 18% of the GDP.

Most of all, it is a sector which fully embodies Monaco's priority for innovation and sustainability, as wished by H.S.H Prince Albert II.

Driven by the Sovereign Prince's will, the Government has built a full-fledged digital ecosystem, ready to support innovation in Real Estate, notably with three components:

- Leading infrastructures with the first Sovereign Cloud in Europe, 5G and Fiber fully deployed networks and a Digital Twin for all the country
- A commitment to research excellence and an ambition to become an intellectual hub via a partnership with ESCP Business school and promising start-ups
- A will to foster the digitalization of the Monegasque economy via multiple initiatives such as the Blue Fund (a financial support mechanism which has already funded more than 600 projects) and the Government digital training program (more than 20 events and an online course platform resulting in 2800 professionals trained)

We would like to welcome you to this initiative and can't wait to build together the present and the future of Real Estate in the Principality !

Frédéric Genta
Member of Monaco Government in charge
of attractiveness and digital transition

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Executive Summary

The 2022 PropTech Annual Barometer is the third in-depth analysis of a previously little-understood sector. This year, the barometer provides a better understanding of crucial PropTech sector trends across markets, company categories, and global regions. The barometer is filled with easy-to-understand charts and graphs, descriptive text, and illuminated with quotes from industry innovators, improving access for our readers to the present shape of the international PropTech sector. Across this year's barometer, we classify the various PropTech companies as an aid to our readers: Building, Investing, Managing, and Living.

The 2022 Barometer begins with an introduction to PropTech, giving readers a fundamental basis for deepening their understanding of this critical sector. Then, we visualize the recent developments in the PropTech sector by examining investment trends, along with trends in mergers and acquisitions, across company categories and regions. Here, we include two special case studies. The first case study focuses on SPACs and IPOs. The second case study focuses on an in-depth analysis of management companies concerning PropTech and the wider Real Estate industry. Next, we examine the global PropTech industry by region – with an emphasis on the United States, Europe, and Asia – before we engage with a comparison between PropTech and competing industries. Finally, we conclude with an evidence-based outlining of future projections for the ever-changing PropTech sector. Here, a third case study examines the vital importance of the Internet of Things (IoT) and PropTech in meeting the expectations of Paris by 2050.

Readers of this year's PropTech barometer will come away with an improved comprehension of the short and long-term dynamics of the PropTech sector of the Real Estate industry. Indeed, each chapter and section will improve their cognizance of tendencies, shifts, and directions in PropTech. Finally, our closing emphasis on the latest projections in PropTech will provide a firm footing for the coming year.

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Chapter 1: **PropTech, An Introduction**

Who does PropTech impact?

Everyone should be familiar with the latest trends in the PropTech industry. You could be a government employee, who is searching for a short-term stay; you could be a young professional, traveling to a new city on a business trip; you could be a university student, seeking out an apartment or flat to rent by yourself or with mates; you could be looking for a place to settle with your family or for your parents when they retire; you could be an experienced investor looking for a market opportunity or a young business school student attempting to learn about emerging industries.

PropTech is so interwoven with our daily lives that we do not often think about it. Even for laborers in very different industries, the nature of PropTech will impact their lives, simply because the real estate market is so interwoven with the economy of every country on the face of the earth. If we look at the countries where the cost of real-estate to income is the highest on the face of the earth, we might find some markets we expect, like Hong Kong, South Korea, Argentina, and China, as well as some we do not, such as Ghana, Iran, and Cambodia.

From Shanghai to Silicon Valley, from Miami to Monaco, the innovation of PropTech impacts us all. Therefore, **we have composed the 2023 PropTech Barometer to speak to the widest audience possible, from industry leaders, students, and government officials to the general public.**

What is PropTech?

PropTech refers to a combination of technology, real estate, and platform economics. PropTech refers to the digital technologies that clients and practitioners in the real estate industry use daily. These technologies can be software applications (apps), complex data-analysis algorithms, or websites that facilitate the ease of transactions. PropTech overlaps with fields of financial technology (FinTech), construction technology (ConTech), and information management technology (IMT) to provide solutions to everyday problems in the real estate industry.

Typically, **PropTech improves efficiency**. However, PropTech could also contribute to organizational sustainability, client experience, or investor satisfaction. For the sake of accessibility, we break the companies covered in the 2023 PropTech Barometer into four categories: **investing, building, managing, living**. We devote special energy to highlighting the trends in each of these categories and demonstrating their impact on the broader field of PropTech.

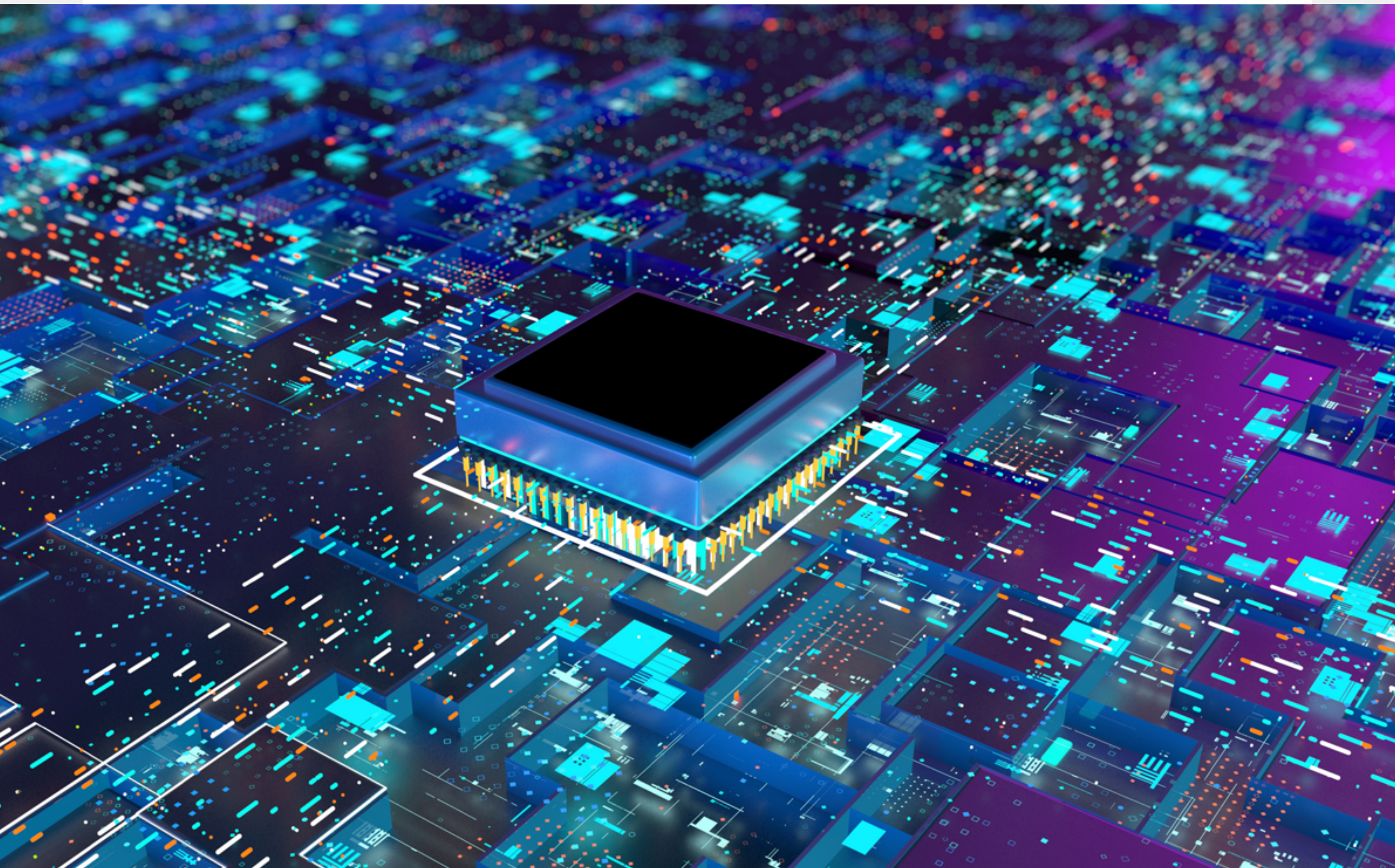
Where is PropTech relevant?

PropTech emerged predominantly in the United States during the early 21st century. At first, technology innovation in the real estate industry lagged. Other industries, including the related FinTech industry, emerged as early as the late 1980s and early 1990s in the U.S. Yet despite its late arrival, PropTech became a major player. **PropTech quickly spread to Europe and has since become a major force in Latin America, the Caribbean, Africa, Asia and the Middle East**.

In **Europe**, PropTech may have originated in France, Monaco, Spain, Germany and the United Kingdom, but it has spread to become a significant force in every real estate market. In **Asia**, PropTech startups are now impacting the most dynamic and largest real estate markets in the world, not just in India and China, but also in Indonesia, Thailand, Japan, and the Philippines. And, in the **United States**, PropTech continues to shape the highest valued real estate markets in the country.

Why is understanding PropTech critical?

PropTech is so deeply integrated with the real estate market that it impacts the nature of every economy in the world. Even in developing economies where we do not often think of high-value real estate as a commodity, **PropTech startups are impacting local businesses**. In the traditionally high-value markets of London, Paris, and New York City, PropTech is part of the marketplace at every turn. Almost every short-term stay transaction in the tourist industry today is facilitated by PropTech, and this is to say nothing of major market disruptors such as Zillow in the United States. The massive diversification and surge of different types of PropTech companies implies that continued innovation in this field will continue to impact every economy in the world in decades to come.



Chapter 2:
Recent Developments in the PropTech Industry

4
CATEGORIES

2,209
COMPANIES

4,693
INVESTORS

$20.41
BILLION RAISED (2021-2022)

67
COUNTRIES

Overview

The focus of Chapter 2 follows recent developments in the PropTech industry during the June 1, 2021, to May 31, 2022, fiscal year. At the end of the fiscal year 2021-2022, 2,209 firms were in operation in the PropTech industry around the world. This is nearly five hundred more companies than were present in the PropTech industry when we composed the first PropTech Barometer in 2020.

Furthermore, in this fiscal year alone, these companies raised about five times their total annual average fundraising rate between 2000 and 2019. To better understand this growth, we continue to classify these companies into our **four foundational categories: "Investing," "Building," "Managing," and "Living."**

BUILDING

INVESTING

MANAGING

LIVING

Industry Trends

$20.41

BILLION RAISED (2021-2022)

The growth in investments, to a remarkable $20.41 billion invested in PropTech during the 2021-2022 fiscal year was in part thanks to the simple growth in the raw numbers of investors in the industry. While there were around three thousand total investors between 2000 and 2019 when we composed the 2020 Barometer, the number of investors remained remarkably high when we narrowed the focus to a single year for the 2021 Barometer. Indeed, there were some one thousand eight hundred investors from 2020 through 2021, who raised $12.05 billion.

4,693
investors

The current trend is: while total investments have nearly doubled, the number of investors in PropTech has more than doubled, reaching a record high of 4,693 investors in a single fiscal year. Thus, this year we will be telling the story of remarkable growth of investments, while also considering how the field of the marketplace has shifted. Does the remarkable increase in the raw number of investors represent a leveling of the playing field? Or, does it represent an awakening of major players to the realization that they, too, should be involved in PropTech?

Sophie Chateau, an ESCP alumni and Head of Investor Relations at LBO France has provided some important analysis on investor trends. She highlights how an increasing number of investors are coming from other industries. Thus, it is important to have financial partners in place who are familiar with the Real Estate industry, for these new players, to better stabilize their investments.

Watch the interview

Most of the entrepreneurs (in PropTech) do not come from Real Estate. So, it's important to make sure their business model can fit into the Real Estate world. Our team combining real estate and venture experiences does this.

Sophie Chateau
Partner, LBO France

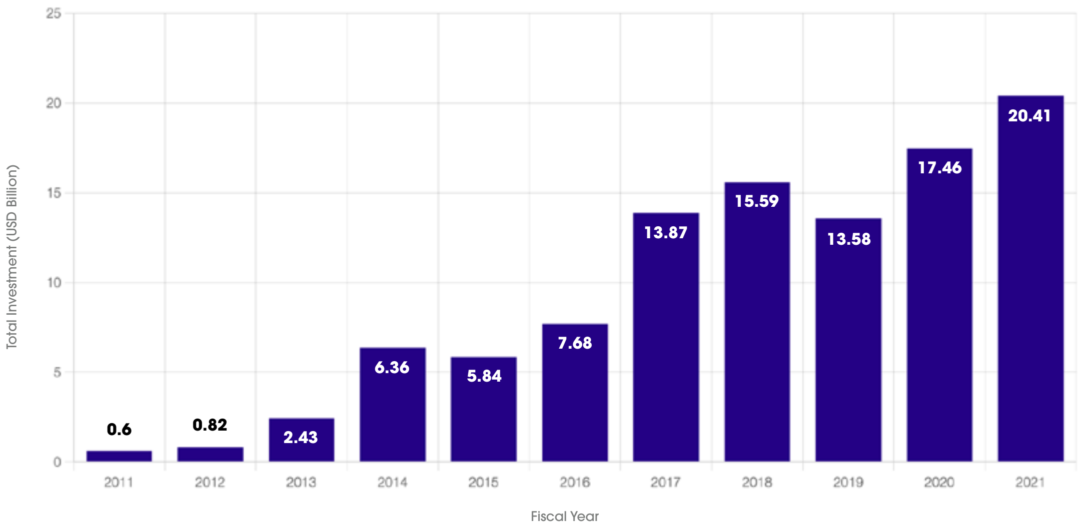
While it is true that the PropTech industry did expand to three new countries over the course of the past few fiscal years (from 64 countries in 2020, to 66 in 2021, to 67 in 2022), the growth of PropTech across borders alone does not explain the growth in investments. Furthermore, with the advances in technologies and the ever-changing nature of the global economy, the PropTech industry has experienced some restructuring in terms of mergers and acquisitions.

67
countries

In this chapter we highlight the specific trends in the activity of mergers and acquisitions and identify the top performing PropTech companies, investors, categories, and geographic markets in an effort to better explain the surprising growth of investments and number of investors in the PropTech industry.

Investment

Figure 1: Investment in PropTech companies over time



17%

YOY increase

Figure 1 shows the amount of new investment in PropTech firms from fiscal year (FY) 2011-12 to FY 2021-22. New investment in PropTech firms has been increasing every year and FY 2021-22 saw a record amount of investment totaling $20.41 billion which is a 17% increase year over year (YOY). Notice the interesting and sizable jump in investment levels in FY 2016-17 in which the investment amount doubled from previous year and then kept climbing up with a slight decline in FY 2019-20, which was clearly due to the uncertainty about economic activity due to Covid-19 pandemic.

Figure 2: Top Investors for 2021-2022

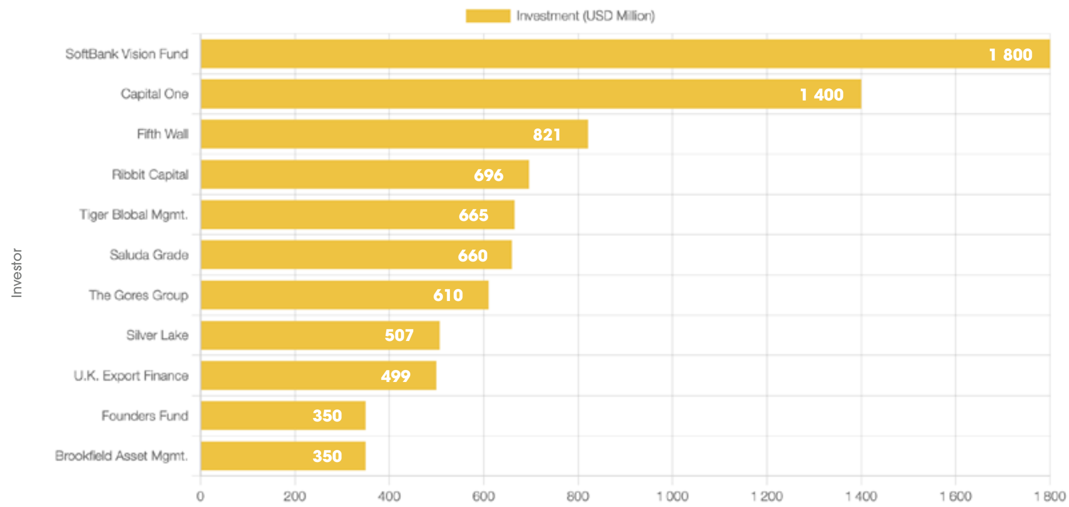


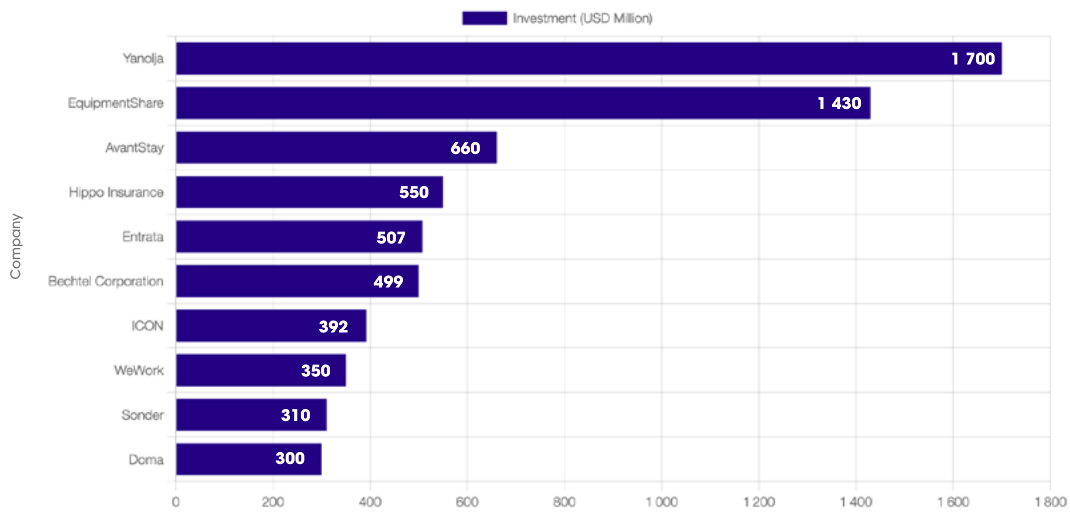
Figure 2 shows the top investors in the PropTech industry in the past one year. Like in the previous year Softbank leads the list having invested more than $1.8 billion, followed closely by Capital One with $1.4 billion. Fascinatingly, Capital One, Fifth Wall, Ribbit Capital, Saluda Grade, The Gores Group, Silver Lake, UK Export Finance, Founders Fund, and Brookfield Asset Management are all newcomers to this top investors list. This highlights the new and increased interest in companies operating in the PropTech industry.

SoftBank

$1.8

BILLION

Figure 3: Top Investment Receiving Companies (2021-2022)



$1.7

BILLION

Figure 3 identifies the top performing PropTech companies in terms of attracting investments. Here again we have a bunch of newcomers to this list compared to last year including top-performing companies. These newcomers include **Yanolja, EquipmentShare, AvantStay, Entrata, Bechtel Corporation, ICON, Sonder, and Doma**. Yanolja, a South Korean company founded in 2005, topped the list by attracting $1.7 billion. EquipmentShare, a company founded in 2014 in Missouri, United States, came in second place with $1.4 billion in funding.

Figure 4: Top Investment Destination Countries (2021-2022)

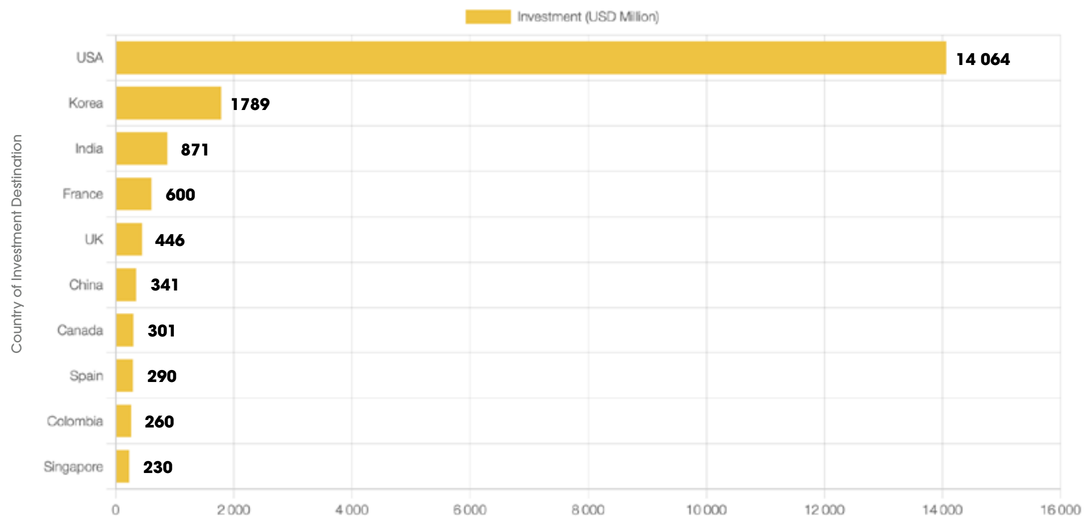


Figure 4 shows the top countries by investment destination. As expected, the United States, host to the largest number of PropTech companies, attracted significantly more investment than any other country with over $14 billion in investment which is close to 70% of the total investment made in FY 2021-22. However, South Korea, which is second on this list with $1.78 billion, was not even in this list last year. Another newcomer to this list is Colombia which attracted $260 Million of investment.

70%

of the total investment made in the Proptech industry (2021-2022)

Figure 5: Top Investment Origin Countries (2021-2022)

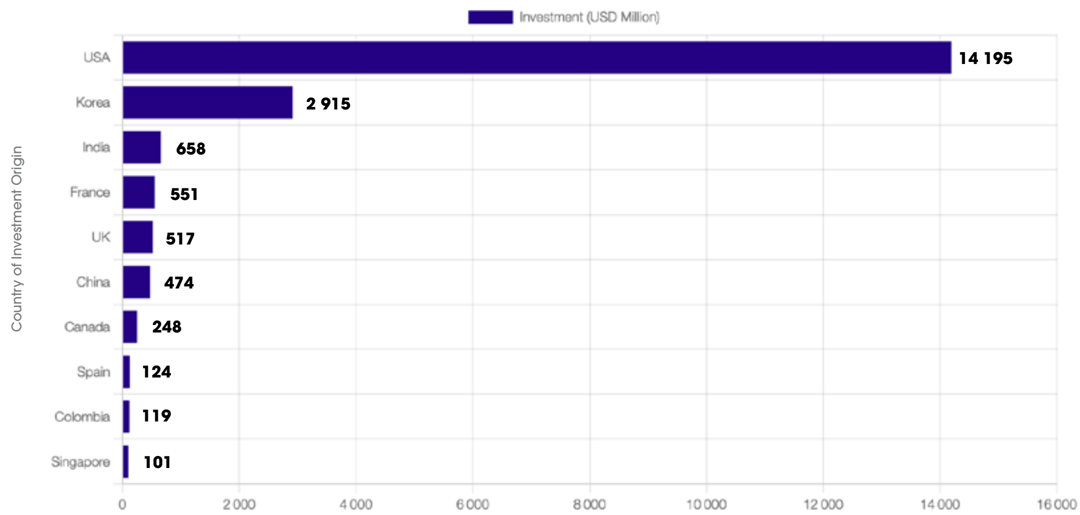
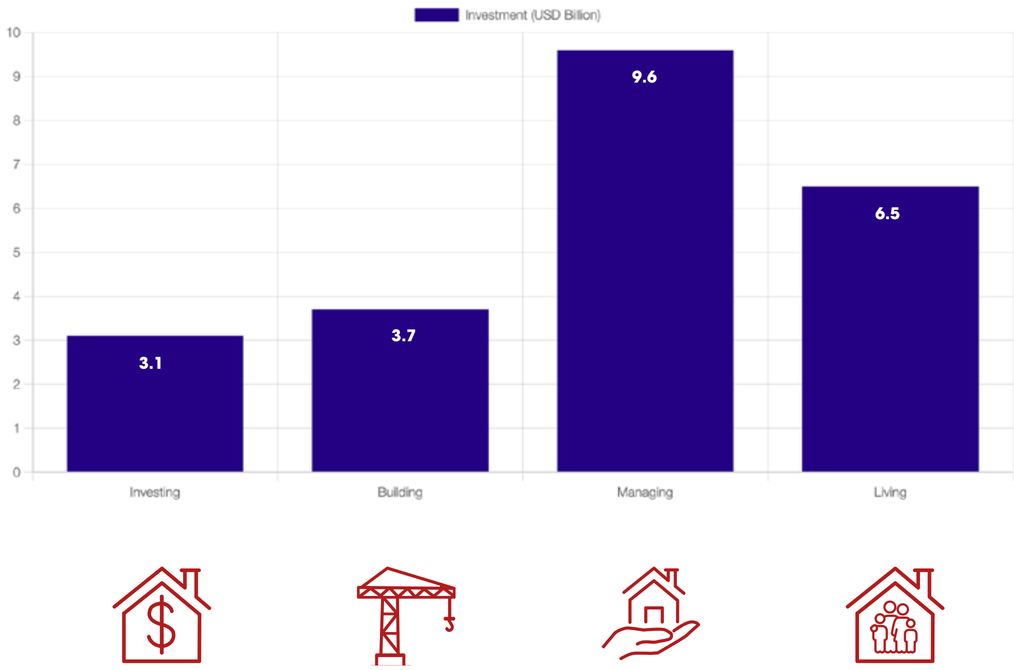


Figure 5 shows the top countries from where investments in PropTech companies originated from. The United States leads this list with over $14 billion in investment and clearly, most of this investment stayed within the country. The United Kingdom, however, came in second place with approximately $3 billion of investment which is almost twice as much as it invested last year. Also note that newcomers to this list are Canada, Israel, Netherlands, and Korea.

Figure 6: Investment by PropTech Categories (2021-2022)

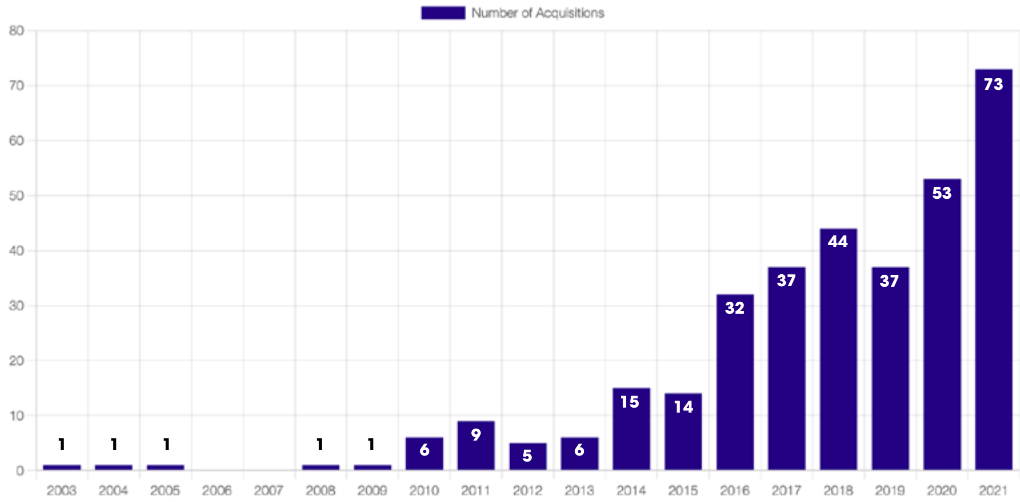


In Figure 6, we see the investment by PropTech companies divided into four key categories of **Investing, Building, Managing and Living** for the 2021 to 2022 fiscal year. We should note that, overall, the financialization of overall markets is still not reflected in PropTech, where investment trends tend to instead match the rest of the Real Estate industry: coagulating in the holdings of companies in the Managing and Living subcategories of the PropTech industry. In short summary, there has been a rapid growth in the amount of capital investment in PropTech companies over the course of the past fiscal year, regardless of category.

The growth of seed capital invested in PropTech initially led to a massive expansion of the market, over the course of the past ten years. However, with increased competition, smaller firms are incentivized to explore cooperative mergers. Furthermore, the top firms are similarly incentivized to explore competitive acquisitions, as their capital investment grows and they have continued access to capital. The result of these long term trends is a clear acceleration of market consolidation in PropTech. For instance, between 2010 and 2015, we did see the number of Mergers and Acquisitions doubled, from just 6 to just 14. However, in the following five years, between 2015 and 2020, **the number of Mergers and Acquisitions more than tripled**. In the following fiscal year there were yet another 20 Mergers and Acquisitions. Proven leaders in PropTech, also have important perspectives on where and how consolidations will occur. For instance, “onsite” consolidations to streamline construction and handover processes at construction sites, which would mean there would be consolidations among companies specific to the building category in our report.

Mergers and Acquisitions

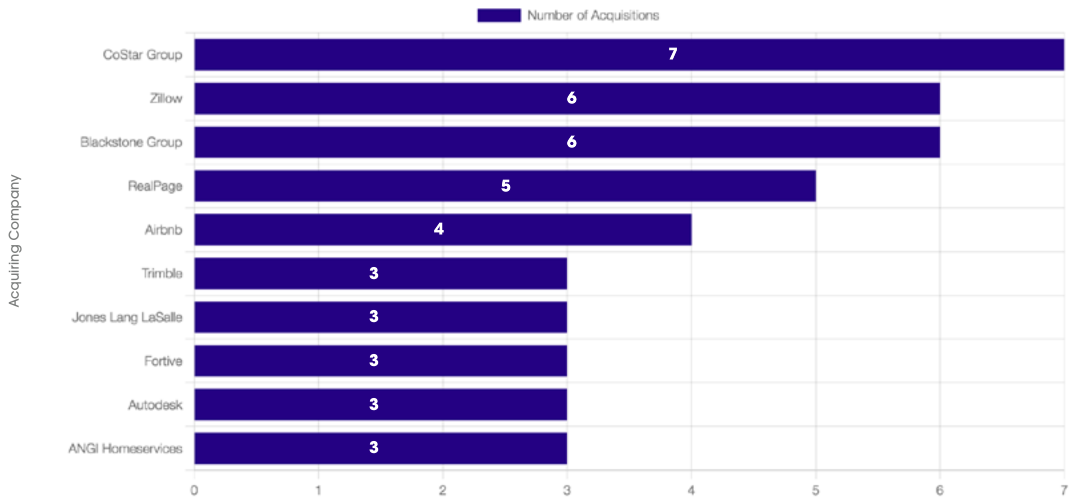
Figure 7: Mergers and Acquisitions in PropTech companies over time



With the record number of Mergers and Acquisitions in the past year (73) and the strong trend toward the acceleration of market consolidation over time, we might wonder why the dip appears in 2019, as there were just 37 Mergers and Acquisitions. We explain this dip through the nature of the fiscal year. We suspect that there was a standard increase in Mergers and Acquisitions during the last two quarters of 2019 and the first quarter of 2020. However, since the COVID 19 pandemic hit at its most severe point during the second quarter of 2020, with all business screeching to a halt as the world went into lockdown, we have calculated that there were virtually no mergers and acquisitions during that quarter.

As businesses began to reopen and receive more investment during the course of the 2020-2021 fiscal year, we begin to see more mergers and acquisitions again. However, the major market disruption of the pandemic did not significantly shape up the top companies that were leading acquisitions. **CoStar, Zillow, AirBnB, Trimble, AutoDesk, and ANGI Homeservices** have all remained top acquiring companies. That these massive companies would remain at the top of the list is not particularly surprising. However, what is surprising is that there are three new companies that have shot onto the top acquiring list.

Figure 8: Top Acquiring Companies (2003-2022)



As Figure 8 shows, **Blackstone Group, Jones Lang LaSalle, and Fortive are all newcomers to the top-acquisitions** list within the past year. Blackstone is a firm that focuses on mergers and acquisitions, founded in 1985 by two former Lehman Brothers employees. However, their previous emphasis has been on private equity and alternative investments. Then, they entered into the market purchasing single-family homes to rent between 2007 and 2010.

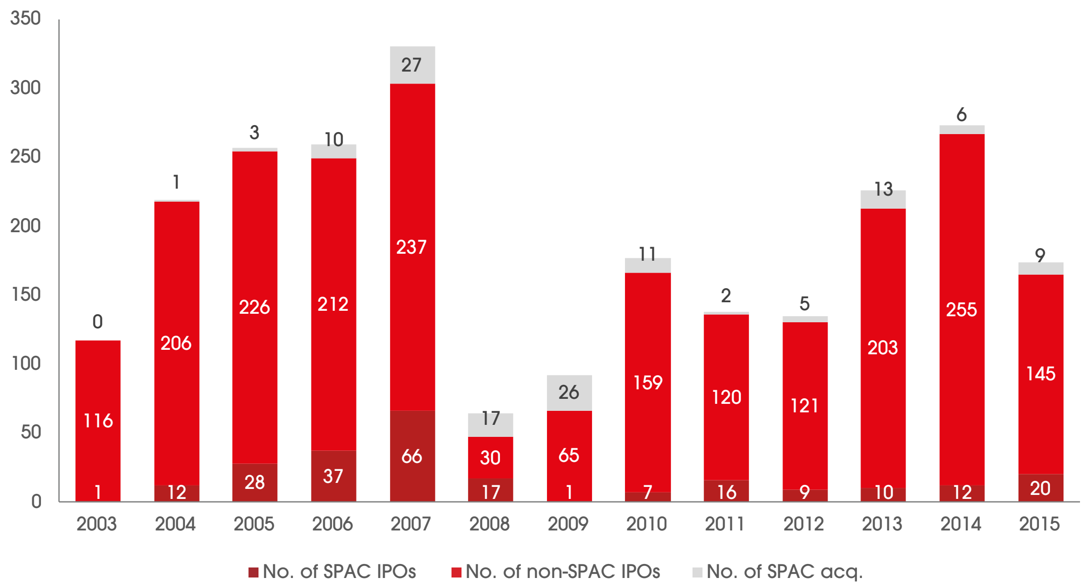
The overall trend with the top acquiring companies is that a few large entities (**CoStar, Zillow, Blackstone, RealPage**), which we would assume have significant interest in acquiring vast numbers of startups, are also acquiring major firms that are decades old, allowing them to diversify their portfolios. Furthermore, some of these massive corporations, like **Zillow** and **AirBnb**, are in fact PropTech startups themselves. Thus, in those cases, if they were to acquire too many similar firms, they would adversely affect competition.

Figure 9: Mergers and Acquisitions by category (2021-2022)

Figure 9 shows the distribution of M&A activity by company category, and like last year, we see most of the activity in the Living category with 45% of acquisitions, followed by the Managing category at 28%. Acquisitions in Living fell around -4%, while managing also slightly declined, falling by around -2%. Furthermore, Building acquisitions, although they represent a much smaller percentage of the share, also fell by around -3%. Only investing acquisitions increased. And, they indeed increased substantially as a proportion of the total, rising from 9% of total acquisitions last year to about 19% of total acquisitions this year.

Case Study 1:
SPACs & IPOs, Bringing PropTech to the Public[1]

Figure 10: SPAC IPOs & Acquisitions vs. Non-SPAC IPOs



A Special Purpose Acquisition Company (SPAC) is sometimes known as a "blank check" company. These companies are a tool that investors use in acquisitions. For one of our case studies, our team examined elements of SPACs and how SPACs help companies through the Mergers & Acquisitions process. Very importantly: a SPAC can be listed on the public stock exchange without going through the typical public offering process. Thus, they are a tool to allow investors to pool funds and finance a merger or acquisition within a given time frame. Stock exchanges such as the NASDAQ or NYSE often see SPACs in their listing. An example of a well-known PropTech company that went public via SPAC is OpenDoor, in December 2020. However, SPACs have also appeared in recent years on the Euronext Amsterdam, Singapore Exchange, and the Hong Kong Stock Exchange. In addition to the above data, SPACs continued to increase in 2019 and 2020, as there were **59 SPAC transactions in 2019 and 248 in 2020, with over 300 in 2021**.

300 SPAC transactions in 2021

[1] In collaboration with Fabio Ojeda Regidor, as part of the ESCP-Monaco Real Estate Technology Innovation research program. A more in-depth analysis of these trends was submitted for degree requirements in the Bachelor in Management program at the ESCP Business School.

In 2007, the Pan-European Hotel Acquisition Company N.V. became one of the *first*, if not the first SPAC listed on a European stock exchange. Since 2007, signatures of SPACs have proven to be relatively efficient and inexpensive, compared to other means of raising capital and the process of IPOs. SPACs often provide higher valuation, less dilution, increased certainty, increased transparency, less regulation, and fewer fees than IPOs. Nevertheless, as figure 8c shows, we are seeing that SPAC IPOs were quite high up until 2008. Also, around 2006, SPACs proved to be a valuable means of acquisitions.

With the increasing trends of acquisitions in coming years, we would expect to see increasing numbers of SPACs as well. Perhaps most famously, **WeWork** announced it would go public via SPAC in March of 2020. However, other famous companies, such as **OpenDoor**, **Offerpad**, and **Matterport** also announced or completed SPAC mergers in 2020. SPACs in PropTech are attractive because the capital needs in PropTech companies tend to be higher than other industries, such as software.

SPACs managers are also attractive because they can spend a significant amount of time with PropTech practitioners and company leadership, learning deeply about the business models, and therefore educating the broader market more easily than other means of attracting investors. The robust environment of Mergers and Acquisitions (M&A) in PropTech also makes this particular sector attractive for SPAC players. Finally, there have been some changes in the PropTech market recently that have coincided with the SPAC boom. In short, the pandemic forced innovation, while SPACs were out searching for fast-growing companies, and PropTech businesses were growing at unforseen rates, creating a need to access new capital more quickly than before in order to continue to scale. These factors have grown to stimulate SPACs as a feature of the PropTech world.

Case Study 2:
An Analysis of Property Management [2]

“Property Management” refers to one of the five sub-categories that belong to the Management category in “PropTech Global Trends 2021 - Annual Barometer.”
The Management category includes all companies and startups that provide services related to rental search and property sales in the real estate sector. The Property Management subcategory in Technology corresponds to technologies that help monitor, preserve and improve the management and value of rental income properties, such as tenant and payment management, as well as cutting-edge communication, design and service tools.
From the data provided by Venture Scanner, we have data on **2345 Real Estate Technology companies**. Of these, **242 correspond to the Property Management category**, or about **10%**.
For the subsequent analysis, **4 sub-categories** are constructed within the Property Management category, which are assigned according to the description provided by the company itself.

Direct or specific property management:

Companies that focus primarily on direct property management (Representing **43%** of companies)

Financing:

Companies that manage payment between tenants, landlords, financial services or asset managers (Representing **30%** of companies)

Communications:

Companies that facilitate communication between tenants, owners, managers, occupants, neighbors and service providers (Representing **16%** of companies)

Digitalization:

Companies with a specific focus on delivering a technological product (Representing **11%** of companies).

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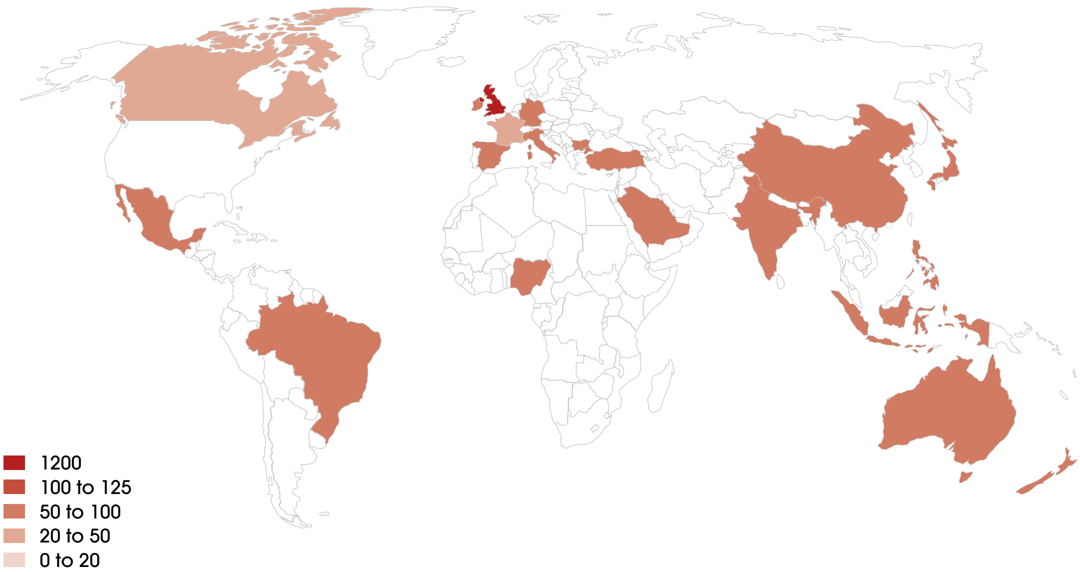
[2] In collaboration with Carla Penafiel, as part of the ESCP-Monaco Real Estate Technology Innovation research program.

A geographical analysis of the same companies revealed that most companies are concentrated in the United States, followed by the United Kingdom. Then significant concentrations of companies exist in Western Europe, with just a few companies sprinkled in Eastern Europe, Saudi Arabia, Israel, Brazil, Mexico, Nigeria, India, China, Japan, Indonesia, the Philippines, Australia, and New Zealand. Through eliminating the United States from the geographical analysis, we can get a better sense of the geographical distribution in Figure 11, which shows Management companies worldwide, excluding those based in the United States.

Figure 11: Management companies worldwide excluding the USA



Management company acquisitions were a relatively minor feature of total M&A in PropTech between 2010 and 2017, as there was an average of just one acquisition per year. Suddenly, in 2018, there were five total acquisitions, followed by four in 2019, and three in 2020. Again in **2021, we saw a large jump in acquisitions, totally eight in the fiscal year**. Following these trends, we would expect acquisitions to decline in the short term, but for overall market consolidation to prove to be the long term trend.

When we examine the data of investments and investors in the Management category, our Direct Management sub-category attracted by far the most investments in the 2021-2022 fiscal year, totally **$2 billion**, followed by our Digitalization sub-category ($800 million), Financing ($200 million), and Communications ($100 million). Thus, within this category, we can suggest that the most significant concentrations of investment are occurring in the fields of Direct Management and Digitalization.

$2

BILLION

invested in the Direct Management sub-category

Figure 12 shows the top 10 business management companies that have received investments since 2021, as well as the amount invested in millions of dollars for each company. The company with the largest investment is **Clikalia**, whose investments totaled **US$595 million** between 2021 and 2022.

Figure 12: Top 10 companies and their investment in millions of dollars (2021-2022).

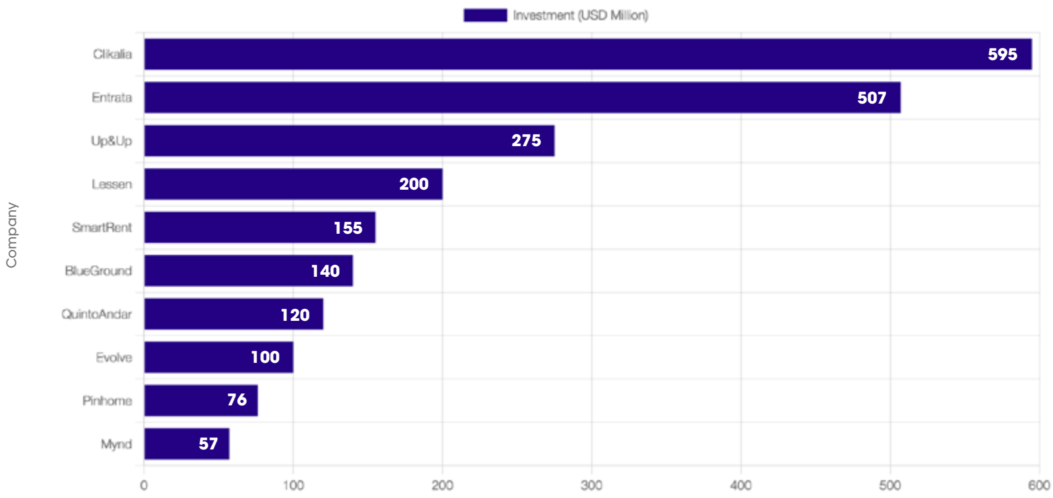


Figure 13 shows the top 10 companies that have invested in companies belonging to the business management category with the respective amount in millions of dollars in the years 2021-2022. We see major cross-industry market players, such as **Jaws Ventures** and **Deutsche Bank** right at the top of the list.

Figure 13: Top 10 investing companies and their investment in millions of dollars (2021-2022).

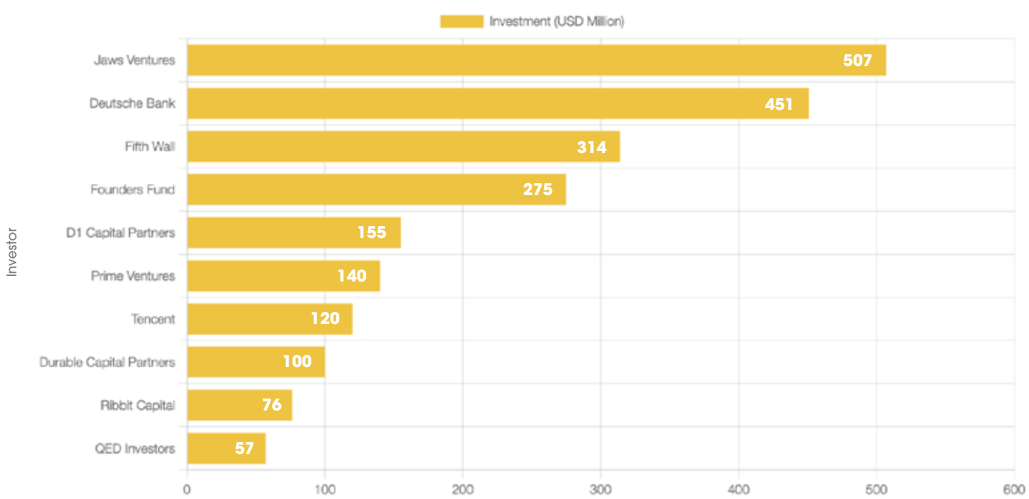
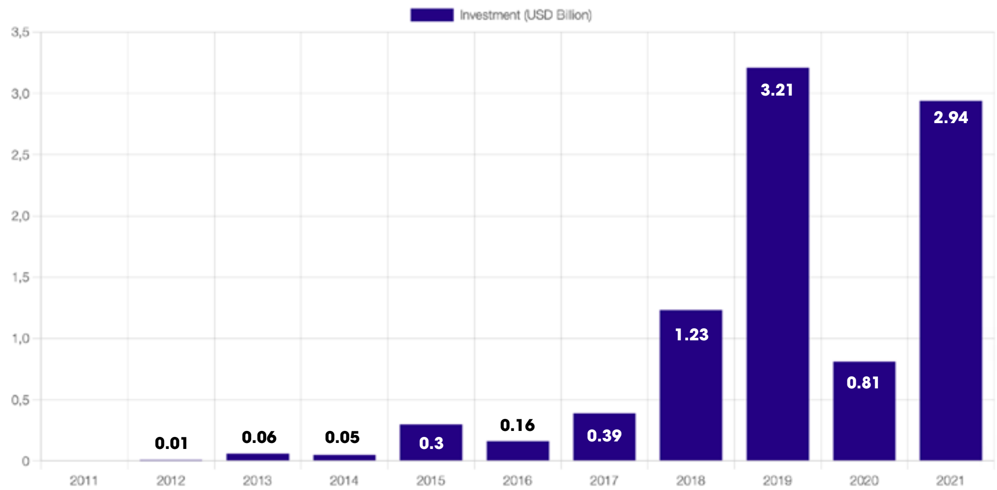


Figure 14 shows the total investments in millions of dollars for the years 2003 to 2021. During 2019 there was a significant increase in investments in the category of business administration, although we see this trend decline in subsequent years. We can assume that this is because the economic downturn of the Covid-19 pandemic was actually locked in during the 2020 fiscal year. **The major jump in the following year is likely, similarly, a sign of the economic recovery**.

Figure 14: Total investments over the years (2003-2021).



We can conclude the Management category shows positive performance over the years in this case study. Specifically, **a significant boom is observed in companies focused on Digitization at their core**. Although the category of **Direct Management is seen as one of the most relevant to growth**, it is important to mention that it is the broadest category and includes those companies where there is no particular focus on any of the other three categories. Thus, this consideration may have weighted the results of the data in favor of the Direct Management category in contrast with the more narrowly tailored definitions of Communication, Digitization and Financing.

Chapter 3: **The Global PropTech Industry**

4
CATEGORIES

2,209
COMPANIES

4,693
INVESTORS

$108.68
BILLION RAISED (2000-2022)

67
COUNTRIES

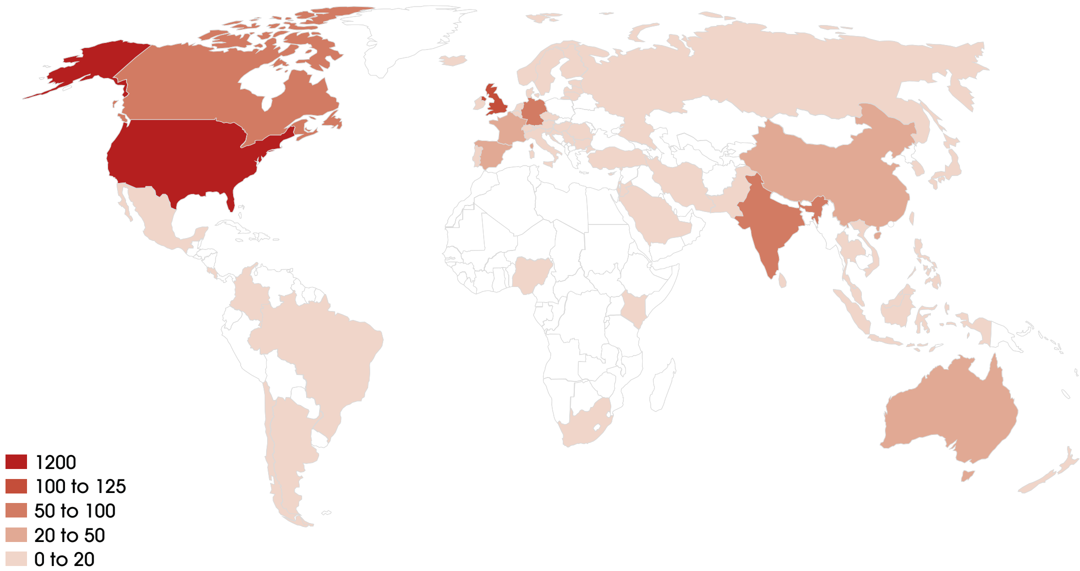
Overview

The global PropTech industry has experienced enormous growth in the past 22 years. The industry now covers more than two thousand companies, more than four and a half thousand investors, and 67 countries. Since last year's report, we have seen PropTech emerge in three new countries. Of course, the percentage of companies is still predominantly centered in the United States, but we are starting to see larger and larger roles in the market played by companies in Continental **Europe, China, India, Canada,** and **Australia**.

67
countries

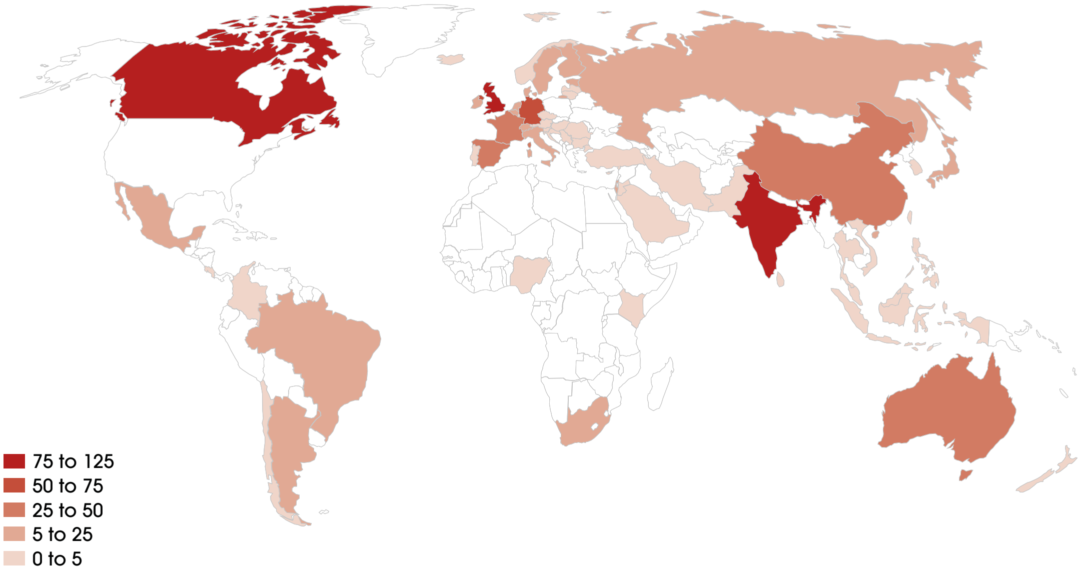
Industry Trends

Figure 15: Global Distribution of PropTech Companies



According to Figure 15, which shows the global distribution of PropTech companies, the **United States** is leading the change with most companies. The gap to the rest of the world is significant, with **more than a thousand companies differentiating the United States from the next competing countries**. The next most significant market is the United Kingdom. However, if we remove the United States from consideration, some interesting trends emerge.

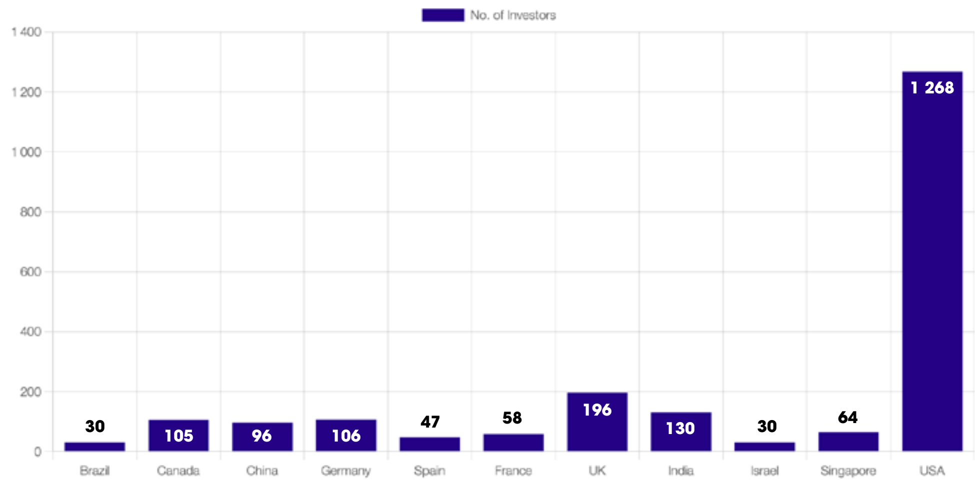
Figure 16: Global Distribution of PropTech Companies excluding USA



most active markets

In Figure 16, we can see the **United Kingdom, India, Canada**, and **Germany ranking as the most prominent active markets**, followed by China, Australia, and France. Even though member countries of the European Union are present on this list, individual EU states have not yet become as significant for real estate technology investment as the US and UK, or even India and Canada. That said, European countries like Germany, France, and Spain have been picking up the pace. Furthermore, European and Asian partnerships, or African and Asian partnerships, could present a significant way for this market to shift in the coming decades.

Figure 17: Top Investor Countries (2021-2022)



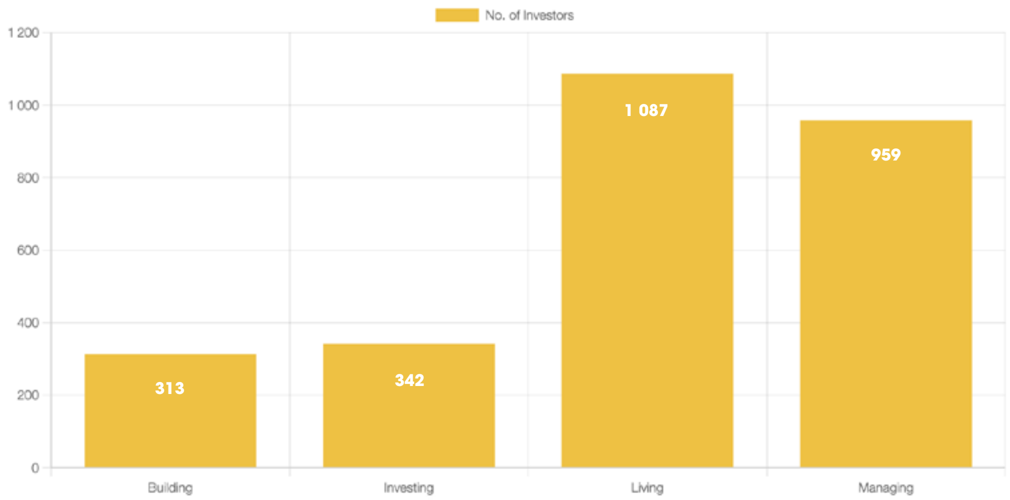
As home to the largest PropTech sector in the world, it is not surprising that the **United States also leads the number of investors in the PropTech industry**. **India** and the **UK** follow in this ranking. **India and China are the countries with the most interest from investors in Asia**, the vast majority of which are domestic. In recent decades, Singapore has also been a location producing a significant number of investors. However, although China and Singapore were represented in the data we analyzed on top countries by number of investors from 2000-2022, these two countries were not represented in the narrower dataset from 2021-2022.

Country leading the number of investors in the PropTech industry

India is the highest-ranked country outside of the established and developed markets of North America and Europe in the PropTech sector. It is relevant to highlight that homeownership has increased in India over the last few years due to a growing population with increased social mobility. India-based real estate tech companies should benefit from a flourishing home market in years to come. Furthermore, we see Israel joining the ranks due to a growth of the tech sector and Brazil emerging as a center of investors due to a combination of factors that we saw also in the case of India.

highest-ranked country outside of North America and Europe

Figure 18: Investors by PropTech Company Category (2021-2022)



1087

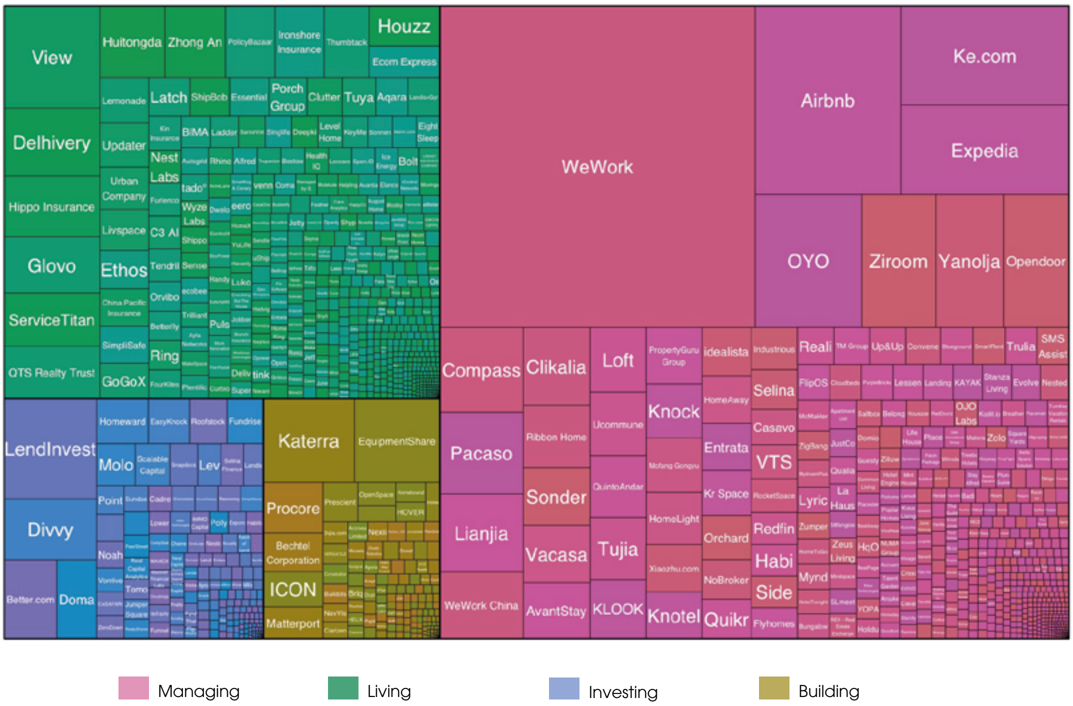
investors

959

investors

If we take a narrow examination of 2021 to 2022 the total number of investors by category, as shown in Figure 18, both Living and Managing categories have two to three times the number of investors as the Investing and Building categories, with Managing being the top category of investors. However, if we broaden the examination to 2000-2022, to examine the long term trends, we notice that the Living category overtakes the Managing category in terms of attracting investors' attention, while Investing and Building remain comparable. The long-term trend indicates **"Living" and "Managing" categories are at least three times more attractive as measured by the total number of investors**. Indeed, "Living" and "Managing" total 1087 investors and 959 investors respectively. The other two categories – "Investing" and "Building"- are not considered unpopular but attract around 300 investors each, totaling 342 and 313 investors, respectively.

Figure 19: Investment Received by Company Category and Company (2021-2022)



[Figure 19](#) shows the **relative share of investments received in each PropTech category** and, within each category, the relative share of each company for 2021 to 2022. While many companies are operating in each PropTech category, only a handful of companies dominate.

This concentration of market power is very pronounced in categories with smaller overall shares. **"Building" and "Investing" have no more than 3-4 major market players. LendInvest** remained at the top internationally, although we also see familiar players like **Divvy**, **Better.com**, and **Doma** remained at the top as well. In the **Building category: Katerra, EquipmentShare, Procore**, and **ICON** dominated the market in terms of attracting investors in the past year, while companies like Bechtel Corporation and **Matterport** are also toward the top. We tended to find there were not as many shake-ups in the rankings in the Building category in general in long-term data as well.

In the **Living** category, we see companies like **Delhivery** (India), **Huitongda** (China), and **Glovo** (Spain) toward the top of the list. We also see **Hippo Insurance, Thumbtack,** and **ServiceTitan**. The global trend of the Living category appears to have the most negligible market concentration — in that the top 12 companies do not exceed **50%** in combined market share — our data suggests the past year led to some reconcentration of investments in the United States, or at least **more investment growth in the United States than in other markets**.

The largest category, "**Managing**," has the top five companies making up around **50%** of the market share. Here, we see familiar names at the top of the 2021-2022 data: **WeWork, Yanolja, Picasso, Ribbon Home, Entrata, Orchard, Vacasa, Sonder, AvantStay,** and **Knock**. But familiar names represented at the top in the 2000-2022 measure, such as **AirBnB** and **Expedia** in the US did not perform as well in terms of attracting investors in the past year.

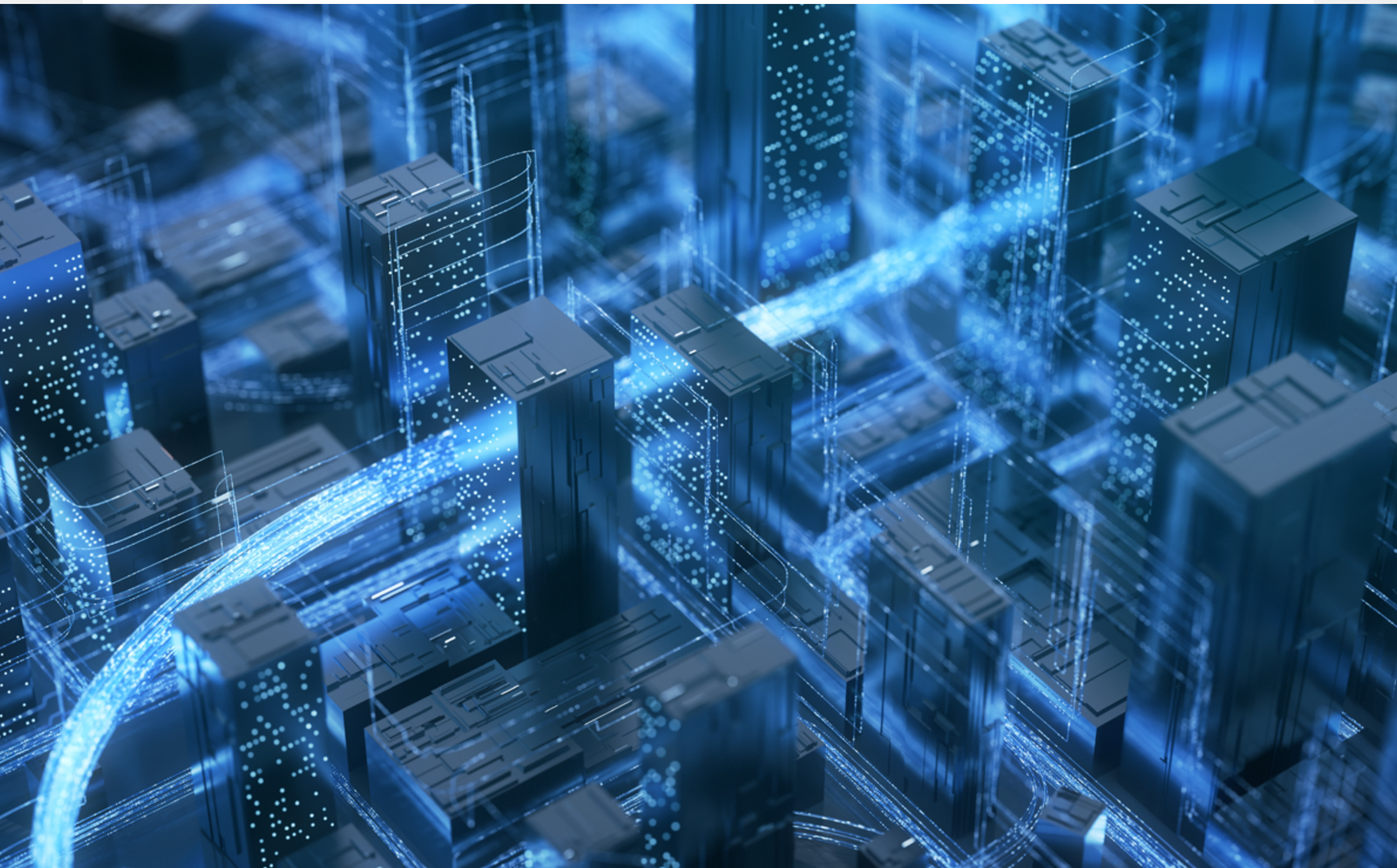


Figure 20: Investment Type Distribution Over Time

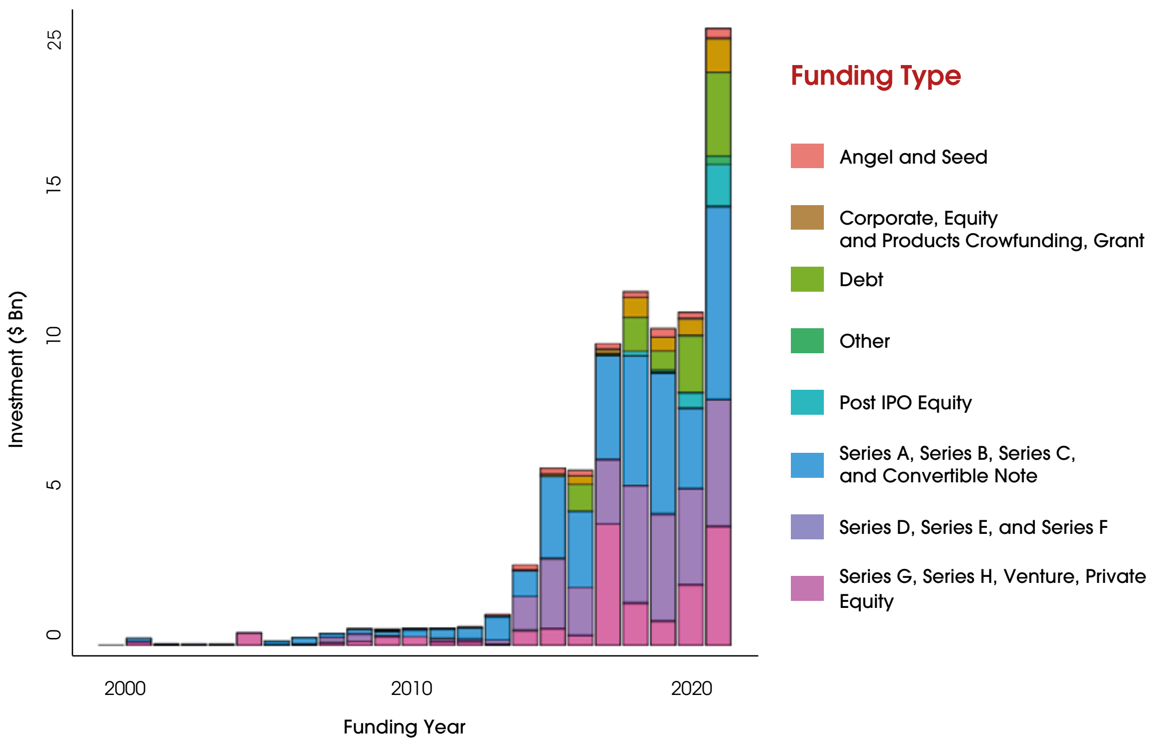


Figure 20 is a measure of the types of funding that companies received over time. As expected, **we do not see many Series D, E, F, G, H, Venture and Private Equity sources of funding until later in the industry life cycle**. However, what is most notable is that there is a **dramatic growth of Series A, B, C, and Convertible Note** funding in the years of 2015 through 2021, with a bit of a compression during the 2020 fiscal cycle.

We can explain this in terms of the **dramatic growth of PropTech startups and diversification of the PropTech industry**. Furthermore, as governments attempted to stimulate economies after the onset of the pandemic, there was simply more capital available to seed startup ventures in 2021. Although grant funding was a significant source for technology innovation in previous decades, we can see that it never really became a significant source of funding for PropTech, even when combined with Corporate, Equity, and Product Crowdfunding.

Figure 21: Investment Type by Company Age

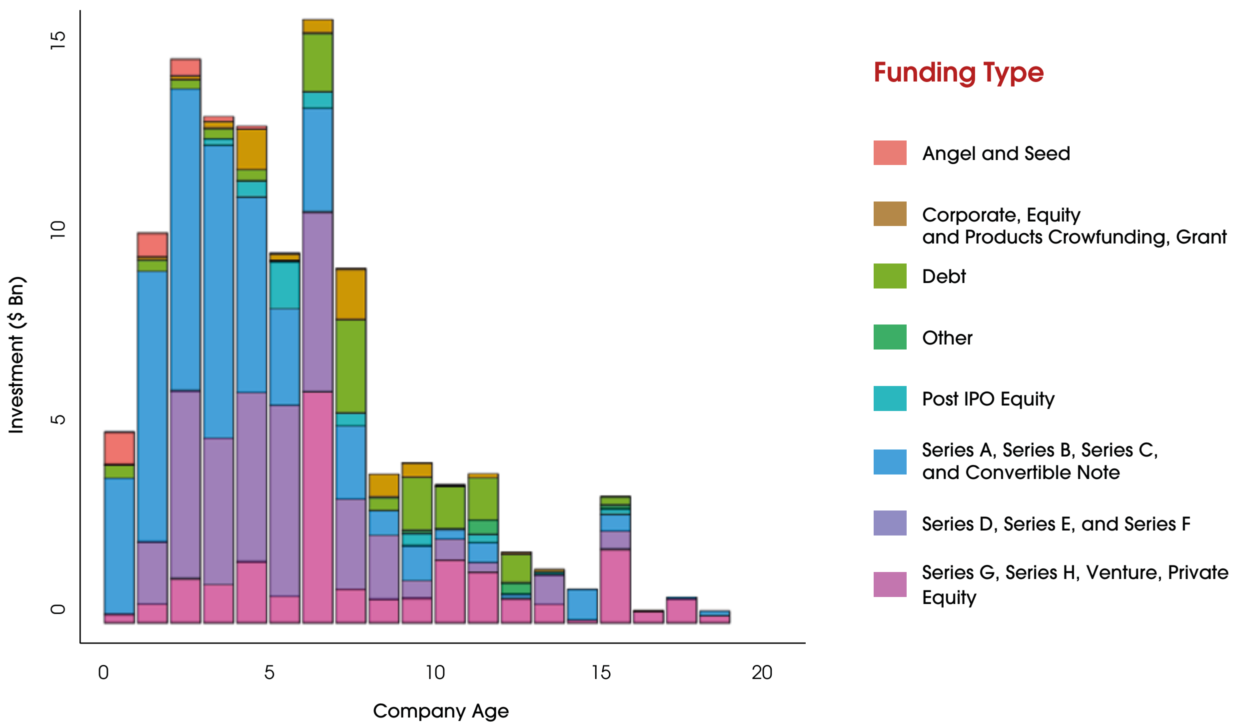


Figure 21 shows the volume of investment funds raised by Company Age and type of funding for PropTech companies. Interestingly, on average Year seven is when a company can expect to attract the highest amount of investment, which is slightly later in the growth cycle. The amount drops off every year. This may indicate the year when a company may undertake its Initial Public Offerings (IPOs).

After this seventh year, investment in a PropTech company decreases sharply to around **$1 Million**, on average. This is because companies that have survived for more than 7 years tend to be well-established, well-reputed, and financially stable. Therefore, such companies typically do not need large sums of money right after the IPO. It is important to note that given the recent upsurge in the number of new PropTech companies and the recent spike in investment within this sector, any future changes to this graph would need to account for such updates to better represent the investment activity in the PropTech sector.

$1

MILLION
average investment in a PropTech company”

Figure 22: Top 10 PropTech Companies by Investment (2021-2022)

$ 21,9 Bn
Commercial Real Estate Search
USA

$ 6 Bn
Short-Term Rentals & Vacation Search
USA

$ 3,6 Bn
Property Management
CHN

$ 3,3 Bn
Short-Term Rentals & Vacation Search
USA

$ 3,1 Bn
Short-Term Rentals & Vacation Search
IND

$ 2,1 Bn
Long-term Rental / Sale Search
CHN

$ 2,1 Bn
Home Services
USA

$ 2 Bn
Long-term Rental / Sale Search
GBR

$ 1,9 Bn
Hotel chain & global booking platform
KR

$ 1,9 Bn
Long-term Rental / Sale Search
USA

Figure 22 shows the relative sizes of the Top 10 PropTech firms in the world. Alongside **WeWork**, we see a major Indian company, **OYO** is the only company with investments over **$3 billion**. The other Top 5 companies are **LendInvest** (UK), **Yanolja** (South Korea), and a tie between two American companies: **Katerra** and **Equipmentshare**.

In previous measures of the same data, we had seen **Ke.com**, a Chinese firm that is a major provider and manager of housing, including secondary housing and flats in major Chinese cities, at the top. Known as “Beike” the platform enables real estate agents to list second-hand, new property, and rentals, connecting them to prospective clients. However, we suspect market restrictions in the Chinese economy hurt the potential of the firm to attract investors. OYO, in India, is a similar user-oriented platform to Ke.com, focusing primarily on the hotel and holiday industry, connecting clients with over 23,000 hotels, one million rooms, and 125,000 holiday homes across the country.

We can see from these platforms that the technology of companies like **Baike** and **OYO** is similar to the technology of companies like **Expedia** and **AirBnB**. However, while Expedia had been at the top of our measures for total investments attracted in long-term trends, we do not see it represented at the top in the 2021-2022 data.

The UK-based LendInvest is the only European firm that has made it onto the list. The newcomer on this list is Yanolja, a South Korean company that has received **$1.9 billion** in investment so far. We will address Yanolja's magnificent rise further in Chapter 4 on "The PropTech Industry by Regions." The overwhelming trend among the leading companies in investing is the technologization of their products and processes.

Watch the interview

> **This is the way of the future. We should be using technology and the power of computation to test out all of these examples, to test out a lot of scenarios, and to feed us back with the right solutions... No engineer does a high rise building without running simulations and checking the loads on every structural element. PropTech is providing the tools for architects and for engineers; the tools for those that drive good decisions.**

Dr. Benjamin Coorey
CEO of Archistar

Chapter 4: **The PropTech Industry by Regions**

Overview

In this chapter, we examine the PropTech industry through an analysis of key regions of growth and potential growth. **The United States**, having birthed the PropTech industry, is of course the leader of the market. Nonetheless, we should pay special attention to innovations occurring in **Europe** that are unique to the European market. Similarly, we cannot ignore that the world's largest and most populous real estate markets are in **Asia**. Thus, distinct from past reports, we devote special attention to the regional markets of Europe and Asia in this year's PropTech Barometer. Finally, we want to acknowledge some emerging markets in **Latin America, the Caribbean, Africa,** and the **Middle East**. Hence, we close this section with a consideration of the data on those emerging markets.

The United States: A Once and Future Innovator

4
CATEGORIES

1,287
COMPANIES

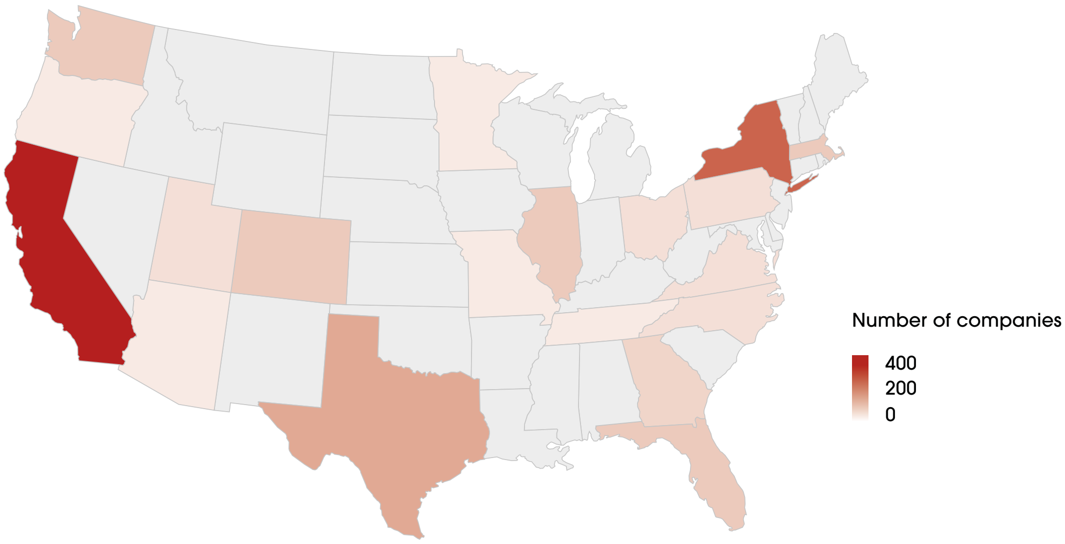
3,030
INVESTORS

$67.32
BILLION RAISED (2000-2022)

As reported in the earlier chapters of this report, the US leads the global PropTech industry in several key indicators. The US has the highest number of PropTech companies with a total of **1,287 companies** which account for 58% of all PropTech companies in the world. Furthermore, the US attracts the most **investors** with a total of **3,030** which make up **64% of all investors in the world**. Consequently, the US also leads the way in attracting the most investment in PropTech companies at **$67.32 billion** for the period of 2000 to 2022, and this amount accounts for 62% of all investment made in the PropTech companies. For all these reasons, we include a separate chapter in this report focusing on trends and patterns of the industry within the US.

64%
of all investors in the world

Figure 23: Geographic Distribution of PropTech companies in the US



[Figure 23](#) shows the geographic distribution of PropTech companies within the United States as of June 1, 2022. With a total of 1,287 PropTech companies, **the U.S. remains the center of the global market. Unsurprisingly, the State of California – home to Silicon Valley – contains the largest share of those companies** (36%). Furthermore, the State of New York – home to the global financial capital, New York City, also one of the highest valued real estate markets in the country – made up the next highest share (16.4%). The next four major states all also have major real estate markets: **Texas** (6.1%), **Washington** (4.4%), **Massachusetts** (4%), and **Illinois** (3.8%). However, each has a different flavor of the local market that spurs innovation.

1,287

companies

36%

California

In **Texas**, many major cities (El Paso, Dallas, Houston, Ft. Worth, College Station) have high tax rates, which drive up valuations, but the state itself has very low tax rates in an attempt to attract businesses to the state. In **Washington**, Seattle is a secondary tech-hub, comparable to Silicon Valley. In Massachusetts, the market is driven by Boston, a location of “old money” - by American standards - where luxury housing drives much of the market, as in New York City. Similarly, in Illinois, the major economic center of Chicago attracts much of the business of the real estate market. The drop in California’s share of the market (from 38% down to 36%) reflects the overall growth of these other areas, in the case of **Texas** and **Washington**, as well as the diffusion of PropTech into more traditional real estate markets, in the case of **Illinois**, **Massachusetts**, and **New York**.

While it is not a surprise that the distribution mirrors the distribution of technology companies in the United States, it is notable that Silicon Valley seems to be on the decline as a proportion of the market share. However, we have not yet seen the growth of unexpected new market centers. Instead, technological innovation in real-estate seems to be creeping into and influencing some of the more traditional – and previously slower to change – real estate markets of **Boston, New York City,** and **Chicago**.

Boston, New York, Chicago, Seattle, Houston, Dallas, and Silicon Valley have several features in common: They all have a high-density of highly educated potential real estate investors. They also feature some of the world’s leading research universities nearby and have been centers for young businesspeople to flock to seeking opportunities for decades. Thus, they are considered safe bets for potential start-ups in the PropTech sector. We might combine these factors to underscore factors that PropTech startups should look for when seeking a potential market: **a robust supply of well-educated labor, potential investors, steady markets with strong guarantees of returns, and environs that are generally conducive to business.** However, the question becomes will these innovation hubs also become increasingly decentered following the trends of the Real Estate industry in the United States as a whole. Being a PropTech disruptor for industry leaders could mean throwing caution into the wind and seeking out establishing physical offices in areas that are not where business has been traditionally conducted.

16.4%

New York

6.1%

Texas

4.4%

Washington

4%

Massachusetts

3.8%

Illinois

Watch the interview

Being a disruptor means more than just trying to do something a bit differently. You fundamentally have to be willing to look past existing practices and norms to find solutions that could be significantly better for customers than currently exist.
The innovator's dilemma is powerful in that incumbent players have little incentive to disrupt businesses in which they enjoy a dominant position. By not being constrained by how things are currently done, entrepreneurs can delight customers, reduce costs and friction, increase transparency and make things simpler. At Roofstock we're working to make the process of real estate investing ten times better.

Gary Beasley
CEO and Co-Founder, Roofstock

Figure 24: US PropTech Companies by Category (2021-2022)

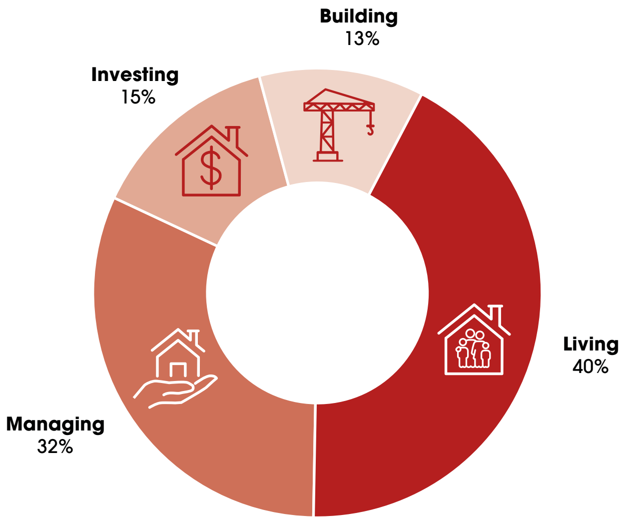


Figure 24 shows the distribution of US PropTech companies in each category. There are a total of 387 PropTech companies in the U.S. measured in the 2021-2022 data. The **Living category** accounts for about 33% of the market in the past year, compared to **41%** in the long-term trend for 2000-2022. **Managing** represented 35.9% of the market in the U.S. in the past year, while it represents a very comparable **33%** of the market in the long term data. In the past year, where we have seen the growth in companies is in the **Building** and **Investing** categories, which grew from about the **25%** of the market-share they represent in the long-term data, to a total of **30.7%** of the market in the past year.

In part, the low number of companies involved in the building category in the US may also be a reflection of a systemic problem of the market, where the US faces a shortage of new affordable housing. On the other hand, the relatively large number of companies involved in Living and Managing may also reflect the ease of technology integration in these categories. Regardless, the data shows that companies entering into the building and investing categories in the US will face less competition than those companies entering into the living and managing spaces.

387

PropTech companies in the United States

Figure 25: Top PropTech Companies in US by Investments Received

we
$ 21,9 Bn
Commercial Real Estate Search

airbnb
$ 6 Bn
Short-Term Rentals & Vacation Search

Expedia
$ 3,3 Bn
Short-Term Rentals & Vacation Search

view
$ 2,1 Bn
Home Services

Opendoor
$ 1,9 Bn
Long-term Rental / Sale Search

KATERRA
$ 1,6 Bn
Construction Management

EquipmentShare
$ 1,6 Bn
Construction Equipment Rental and Sharing

COMPASS
$ 1,5 Bn
Real Estate Agent Tools

Pacaso
$ 1,5 Bn
Long-term Rental / Sale Search

Hippo
$ 1,3 Bn
Property insurance company

Figure 25 shows that WeWork Inc. is leading the Top 10 PropTech Companies in the US concerning their cumulative investment funds. With over $21.9 billion in investment funds raised up to June 1, 2022, its dominance in the PropTech sector remains unchallenged, not only in the US but also in the entire world. In the past, we saw major firms like **AirBnB** raising as much as **$6 billion**, or **Expedia** raising as much as **$3.3 billion**. But that was not the case this past year. After WeWork, the rest of the companies in the Top 10 have each raised approximately **$1.6 billion** or less which makes WeWork Inc. at least ten times larger than most competing firms in the Top 10.

$21.9
BILLION RAISED
on the US market

Even though WeWork co-founder Adam Neumann famously resigned from his position as CEO in 2019, he was retained as a consultant and the company. Furthermore, more recently, Netscape co-founder Marc Andreessen seeded capital in Adam Neumman's new venture, Flow. Flow aims to address the shortage of homes in the US (now 3.8mn), while helping to solve the problems of cities pricing out talent, and social isolation in modern cities - where few residents talk to their neighbors - with a form of co-housing model.

airbnb

$6

BILLION RAISED

Even as EquipmentShare, Katerra, Picasso, and Hippo Insurance continue to grow, typical industry giants, including WeWork, AirBnb, Expedia and OpenDoor could easily re-emerge to dominate US investments received for at least a few more years. That said, Hippo Insurance, Divvy, and Katerra have remained toward the top in their respective categories of investment for several years running and we expect this trend to continue as well, so long as there are no major industry disruptions of these top performers.

Figure 26: Investment Received by US Company Category and Company (2021-2022)

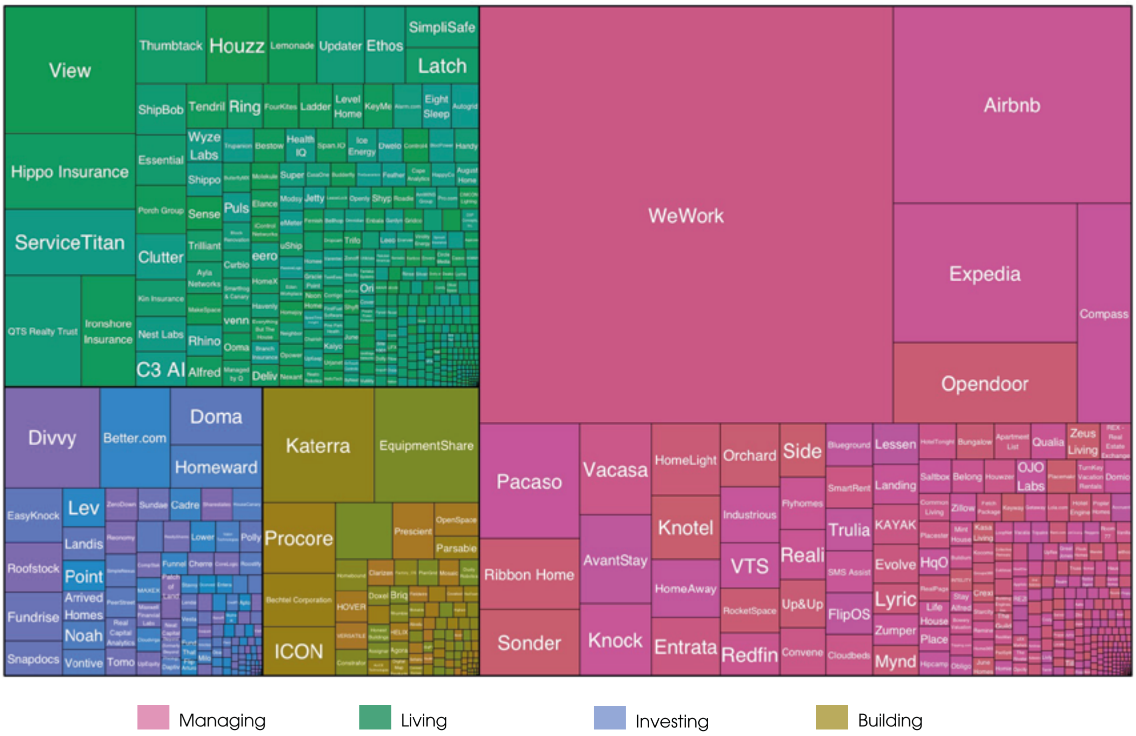


Figure 26 shows a similar distribution for US PropTech companies when compared to the global market trend. We see some familiar players in the 2021-2022 update and the long-term data. For instance, in the Managing category, we see **WeWork, Picasso, Ribbon Home, Sonder, Vacasa, Entrata,** and **Orchard**. However, we do not see **AirBnB, Expedia,** or **OpenDoor**. In Investing, we see **Better.com, Divvy, Doma,** and **Easyknock,** although **Roofstock** has clearly increased their investments received. Although **View** was represented toward the top in long-term data, we do not see them toward the top of the 2021-2022 fiscal year. However, we do see familiar players like **Hippo Insurance, Service Titan,** and **Thumbtack** retained significant attention from investors.

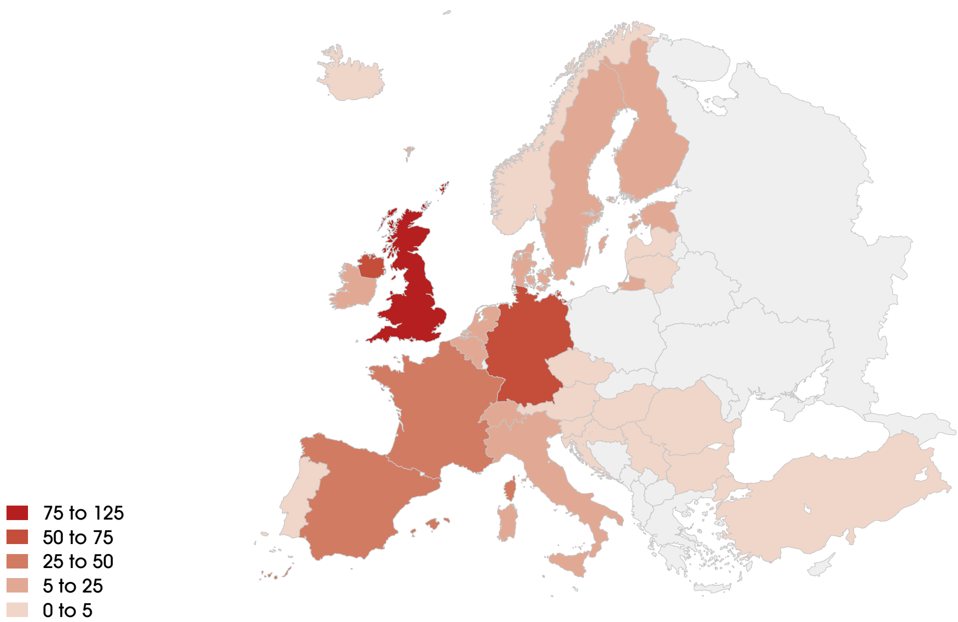
Overall, the US appears to be a microcosm of the PropTech sector, showing patterns reflected globally as well. The market concentration for the “Managing”, “Building”, and “Investing” categories is similar in the US, with just three companies dominating the PropTech category. Market concentration is more pronounced in the “Living” category with just six dominant companies (as opposed to 12 in the global distribution).

Europe: A Focus on the Future

The PropTech landscape in Europe faces distinct challenges when compared to North American markets in that the segmentation of countries and legal systems creates additional hurdles for transnational market cooperation. Furthermore, the increased separation between the markets of the EuroZone and the **United Kingdom** in the wake of the British government opting out of the European Union has mired some potential trans-European collaborations. Nonetheless, PropTech investments in European countries are also distinct from counterparts in other regions in no small part because the governments of the European Union have placed a more significant emphasis on addressing climate change.

The greater emphasis on incentives to address climate change is especially apparent when European Union markets are compared to counterparts in the United States, Brazil, India, and the People's Republic of China. In Figure 27, we aimed to get a sense of how the PropTech market is shaped across Europe.

Figure 27: Prevalence of PropTech Companies in Europe



As we can see from Figure 27 **PropTech companies are concentrated in the major Western European economies**, with **Germany**, as the fourth largest economy in the world, unsurprisingly coming out near the top, just behind the **United Kingdom**.

"We tend to be very digital centric. We use CRM tools. We use automation... and as a digital start-up company, we have far more agility to take advantage of whatever channels and platforms become available. If the new consumer behavior is TikTok, we will not say 'No! We will not explore TikTok!'. If YouTube is the place to be, we will be there...
... We know Real Estate is not a very transparent industry. There is not a lot of knowledge about how valuations are being done, how the debt structures are operating, where is the capital coming from, how do you work together with the central bank. It's the only asset class in the world where you can leverage up to 90-100%. There's a lot in Real Estate that takes a long time to understand and people do not understand well, so what I think is what PropTech is really doing here. It is shining more light on the Real Estate industry."

Jonathan Teh
Co-Founder of Setting HQ, Berlin, Germany

Innovative tech hubs in Berlin, Hamburg, and other German cities have helped to spur innovation, as has the governmental support of German universities, which provide solid labor pools of talented engineers to drive innovation. **France** and **Spain** have also become significant players in the PropTech market in recent years.

Colonies, founded in 2017, is currently one of the most successful PropTech companies in France, measured by total funding, focusing on a co-living model of housing, sitting at **$213 million** in funding, with their Series B funding containing $180 million alone. The second most funded PropTech company in **France** is an ESG strategy planning and consulting firm: **Deepki**.

deepki

$213

MILLION IN FUNDING

Founded in 2014, they are headquartered in Paris and emphasize helping real estate stakeholders make transitions toward ESG efficiency, along with developing sustainable buildings. **Luko**, a Home Insurance company headed by Benoit Bourdel and Raphael Vullierme, remains a top contender in French PropTech, having secured $85 million in funding. Notably, all of the top three companies by funding in French PropTech take consideration of European government discussions about climate change policy seriously and all three have incorporated addressing climate change into their business models.

luko

$85

MILLION IN FUNDING

One of the advantages that European PropTech companies have in international markets derives from one of the aforementioned challenges they face. Because European companies are already used to markets with substantially different tax requirements, and other forms of regulations, they have a competitive advantage. Additionally, their leadership tends to be more cosmopolitan than American companies, with more adept language abilities, and a more honed sense of how to work internationally. Furthermore, **there are specific markets in Europe** (such as Vienna, in Austria, for example) **where the Real Estate sector has been relatively strong**, but the potential of PropTech to break into the market remains virtually untapped. We see similar circumstances in Scandinavian countries, and also Portugal.

Because of the nature of the landscape of the Real Estate market in Europe, combined with the realities of the European PropTech market, there are three clear potential avenues for growth for European PropTech companies. The first is to break into existing innovation hubs, while considering extensions to **"Second cities," which is an approach that would be best suited for markets in Spain, France, Germany,** and the **United Kingdom**. The second is to expand into untapped European markets, where existing PropTech competition is light, but the potential for Real Estate profitability remains relatively stable, such as in Scandinavian countries, Portugal, and Austria.

relive

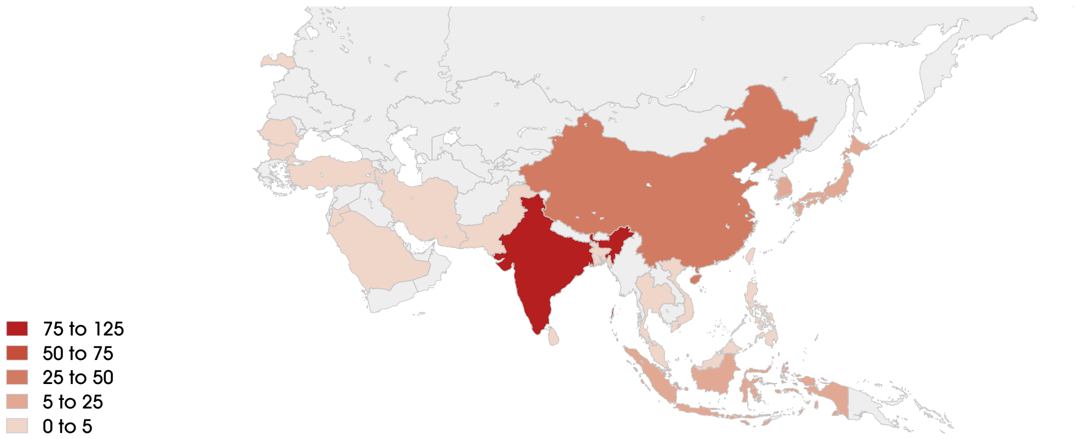
$1

MILLION IN FUNDING

In **Portugal**, for instance, half of investments in 2020 were from foreigners, rather than Portuguese, and Portuguese startup **Relive** recently raised €1 million in funding from early stage VC (Shilling Founders Fund, Accel, Bynd, Indico Capital Partners and Portugal Ventures). Finally, another potential for European PropTech expansion would be to tap the expertise of European leaders to work transnationally, such as expanding into enormous and competitive Asian markets, or developing markets of Latin America and Africa. The competitiveness of Asian markets should be taken into consideration, although the potential for capital growth in the region does seem substantial.

Asia: Big Waves in the World's Most Populous Markets

Figure 28: Prevalence of PropTech Companies in Asia



PropTech companies in Asia are an often neglected, but rapidly expanding subsector of the PropTech industry. Figure 28 shows a comparison of the PropTech companies by country, from a continental perspective. Situated in the **Levantine subregion of Southwestern Asia** - also sometimes referred to as **"the Middle East"** - The PropTech Zone in Tel Aviv, **Israel is becoming a new hub**. In 2019, Flashpoint (from the UK) opened a Tel Aviv based office and decided to **invest over $100 million in Israeli startups**. Between 2018 and 2022, **PropTech in Israel grew enormously**, over 800% and reaching almost **100 companies**, with almost twice that number of small startups reported in 2022 according to Israel's ConTech Construction Innovation Zone.

800%

growth
(2018-2022)

Similarly, major markets have begun to grow across the region, from West to South, as well as from Southeast to East Asia. We saw major growth in countries such as **Saudi Arabia, Turkey,**

Iran, Pakistan, Bangladesh, Thailand, Vietnam, Malaysia, Taiwan and the **Philippines**. However, the major players in **Asian markets are naturally located mostly in Southeast, East, and South Asia: Indonesia, South Korea, India, China,** and **Japan**. With an enormous property market, PropTech in India is expected to reach $1 trillion in 2030, compared to $120 billion in 2017. Similarly, China is a major player in the market, with a burgeoning PropTech industry securing footholds in major cities with **75%** of all companies being located in **Beijing, Shanghai, Shenzhen,** and **Hangzhou**, with **Hong Kong** and **Guangzhou** following closely behind, having **19** and **15 companies** respectively as of 2021.

$1

TRILLION
expected
in India in 2030

Watch the interview

We think of ourselves as disruptors; we are finding a new way of doing things, as the older ways fall away. A better way of doing this is, of course, not without risk... We are disrupting how affordable homes are being financed. That is what we are doing next. In that, we are also disrupting how the disruptor can invest and generate yield. We make those elements connect in a better way that was not possible before.

Darius Mahtani Cheung
CEO & Founder, 99 Group, Singapore

In **Southeast Asia**, the PropTech industry is bolstered by a comparatively cheaper labor supply than in East Asia, making the region more comparable to South Asia in terms of concentration of potential high-value real estate nearby tech innovation hubs and affordable supplies of labor for construction. Recently, the Singaporean based PropTech startup, **99 Group secured $52 million in Series C funding** specifically to expand into Indonesia. However, Indonesia itself already has a substantial PropTech market. For instance, CoHive, a locally founded provider of managed co-working spaces was founded in 2015 and secured **$37 million** in funding.

$52

MILLION
in series C

These sums may appear relatively paltry compared to major firms in the American and European markets. Yet given the opportunity cost comparison of Southeast Asia to the rest of the world, they are quite substantial. Gasoline in Indonesia is half the cost of gasoline in Spain, for instance, while a one bedroom apartment in a downtown area is about one third the cost. These distinctions in opportunity cost suggest that **Southeast Asia's megacities of Bangkok (Thailand), Ho Chi Minh City (Vietnam), Jakarta (Indonesia), and Metro Manila (the Philippines) will provide ripe opportunities for investment in years to come**, although investors will also have to keep in mind there are particular pressures in the region that result from greater vulnerabilities to climate change.

yanolja

$6.7

BILLION VALUATION
IN 2021

As hinted at above, **PropTech in East Asia is a major market to watch**, simply because of the demographics and technology innovations available in major Chinese tech-hubs such as Beijing, Shanghai, Shenzhen, and Hangzhou. The story to watch in **South Korea,** however, is the development of **Yanolja**, a super-app that was launched by a former janitor, Lee Su Jin. Yanolja means, "Hey Let's Play!" in Korean. They began with short-stay hotels in 2005, before adding transportation options to their app platform. Now, the company has begun to provide cloud-computing software to aid hotels and travel companies in the digitalization of their platforms, revolutionizing tourism and business travel in the country. In June 2022, Forbes reported that the 2021 valuation of Yanolja was $6.7 billion. While one might expect top 10 players to come from Beijing or Tokyo, Yanolja, building off of the major successes of recent years, broke into the Top 10 of our measures of "Investment Received by Category" for the Managing Category of the past fiscal year.

Another new player to watch in the region, this time hailing from Tokyo, is Sumatasu. **Sumatasu offers direct online real estate purchases**, and has raised a total of $16 million since its 2018 inception. The market in **Japan** remains difficult, however, as there are a comparatively small number of homes in circulation in the market in a given fiscal year. For instance, there were only 15% of the homes in circulation in 2020, compared to approximately **80%** in the United States and the United Kingdom. What this means is: Japanese cities like Tokyo have a comparatively less liquid market than some other cities in the region, such as Seoul, Busan, and Incheon in South Korea. Furthermore, **the South Korean government plans to support massive construction of new housing** in South Korea, providing more than **800,000 new units in Seoul** and other major cities by 2025, meaning the housing supply in South Korea is going to increase on the balance when compared to Japan. Furthermore, housing supply is not limited to government initiative. In 2021 in Seoul alone, there were **83,300 housing construction permits issued**, suggesting the city will remain ripe for investment for years to come.

15%

homes
in circulation

Chapter 5: **Competing Industries**

Investment

Figure 29: Investment, Real Estate compared to competing industries (FY 2021-2022)

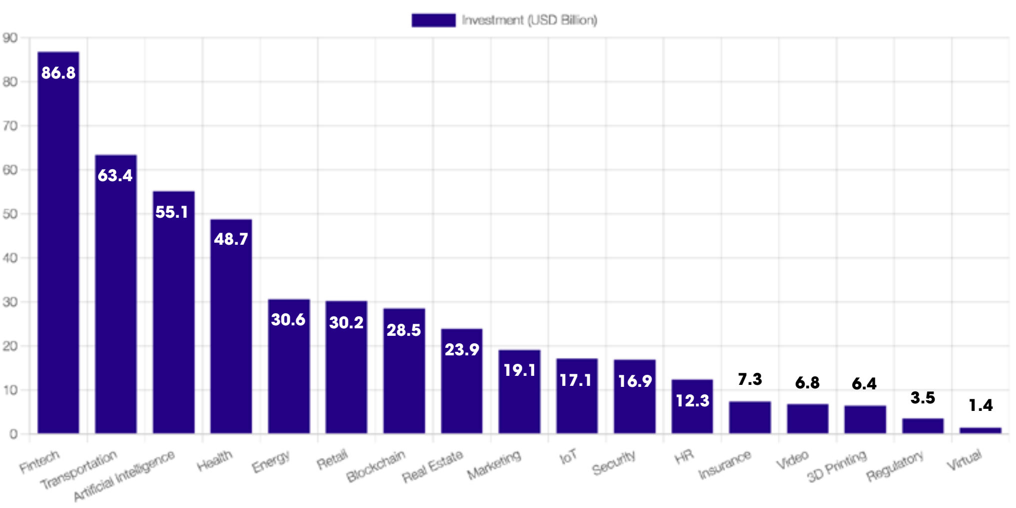


Figure 29 shows us that **major investments are still consolidated in FinTech, Transportation, Artificial Intelligence, and HealthTech**. FinTech is by far the most financialized market, but also retains the most invested in industry companies, with a total of $86.8 billion. The next three largest sectors - being Energy, Retail, and Blockchain - barely make up the same amount of investments counting them together.

FinTech

$86.8

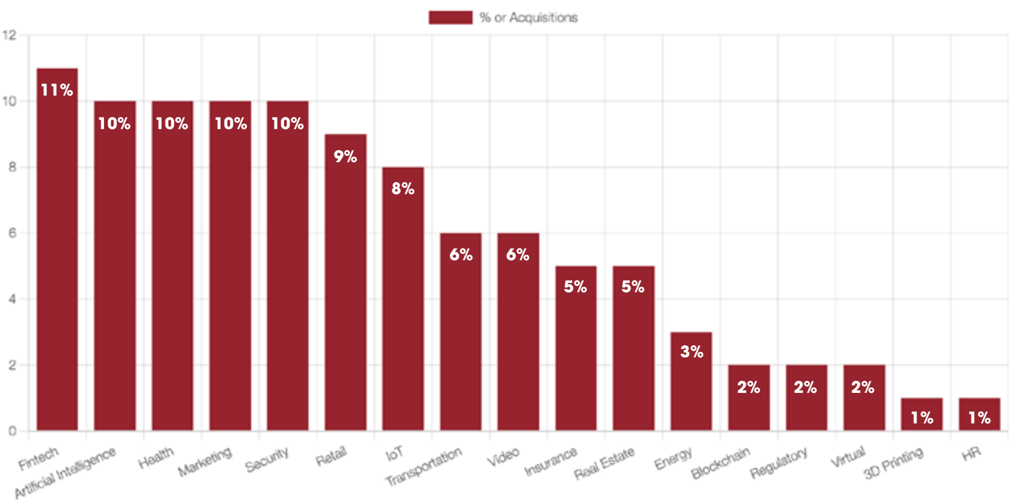
BILLION

Similarly, the next four industries - being **Real Estate, Marketing, IoT,** and **Security,** make up a significant market share, a total of $77 billion of investments. Yet as individual sectors, they are clearly much smaller than FinTech. What this means for future predictions, however, is that FinTech is the most exposed to market pressures or any declines in the market. Other industries, such as Real Estate, marketing, IoT, and Security are less exposed, and would therefore make comparatively stable investments in the case of a market downturn. FinTech may have much of the glamor, but **PropTech offers greater comparable stability**.

In order to ascertain a broader sense of market trends, we also ran comparisons of several factors of the Real Estate market with other industries. For instance, we compared acquisitions by sector, acquisitions over time, narrower comparisons of acquisitions between Real Estate and a few other sectors (such as Artificial Intelligence, FinTech, and Health). Next, we compared investments of Real Estate compared to several other sectors, while more closely examining investments by category of company.

Acquisitions

Figure 30: Comparison of acquisitions by sector (FY 2021-2022)



What we see in Figure 30 is that the **trend of market consolidation in FinTech, Artificial Intelligence, Health, Marketing** and **Security** are still making up a significant portion of acquisitions, combining to cover almost **50%** of all acquisitions. The next **39%** of all acquisitions are occurring in **Retail, IoT, Transportation, Video, Insurance,** and, finally, **Real Estate**. These trends show us that while market consolidation in Real Estate is a long-term trend, especially with relation to PropTech, the acquisitions represent only half of those in the competing Healthcare and FinTech sectors.

Figure 31: Comparison of Acquisitions by Sector

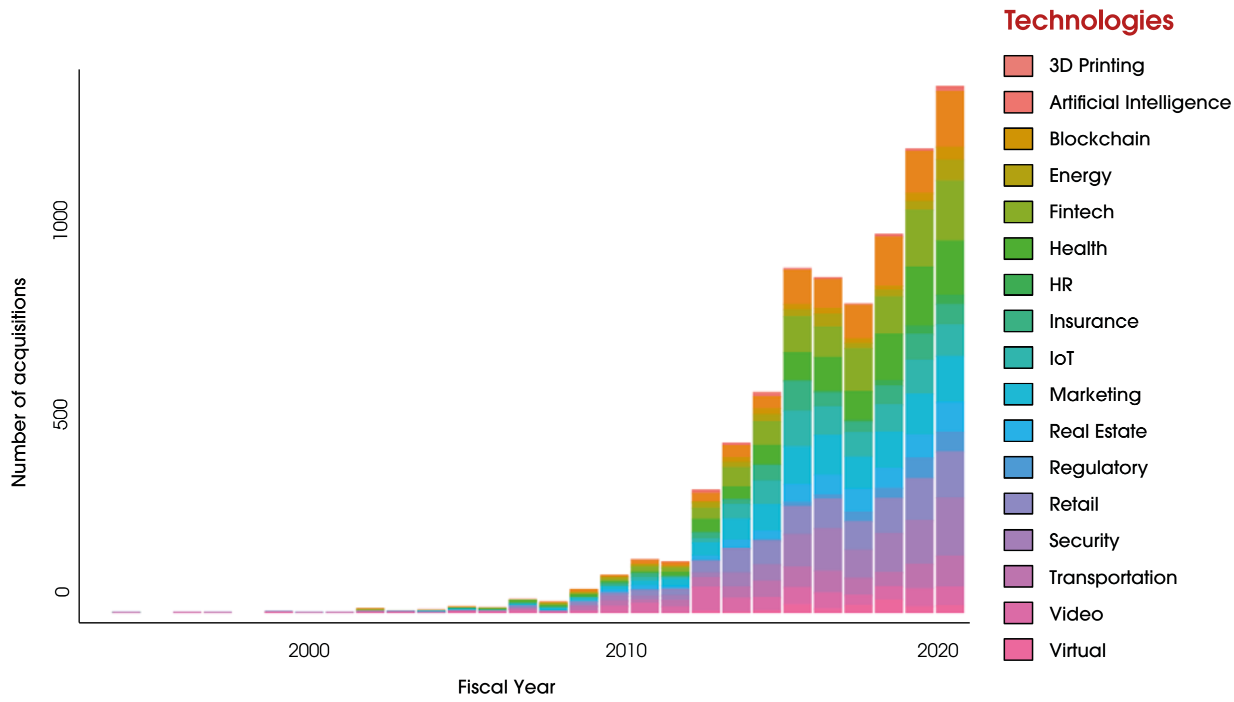


Figure 31 also gives us a raw comparison of acquisitions by sector of the economy, so that we can see the nature of acquisitions in competing sectors side-by-side with the Real Estate market. What we are seeing is that the number of acquisitions, and therefore the market consolidation, in **Security, Retail, Health, FinTech,** and **Artificial Intelligence** are all significantly increasing trends. Around 2010, only Security was showing the beginning of this trend of growth in acquisitions. Around 2015, we saw major increases in the raw numbers of acquisitions in Health, Retail, and FinTech. Although acquisitions in Real Estate and Artificial Intelligence did grow, we don't see major growth in acquisitions among these sectors until 2016 through 2020. That said, the acquisitions in Artificial Intelligence have shot upward in the past few fiscal years, and Real Estate has still not consolidated by the same amount.

What Figure 31 means for us, is that we can predict Real Estate will significantly increase in the number of acquisitions in the coming year, following market trends, even if still a bit behind these other key sectors, including even smaller sectors, such as Blockchain, Video, Regulatory, and 3D Printing.

Notably, each of these smaller sectors are very technology dependent, with a large number of startups. What this all means is that the geography of mergers and acquisitions is ripe for savvy PropTech investors. To help us narrow the analysis a bit, we focused on just six competing sectors in the past couple of years, in an attempt to examine the short term trends of technological growth.

Figure 32: Comparison of Acquisitions by Sector (2015-2022)

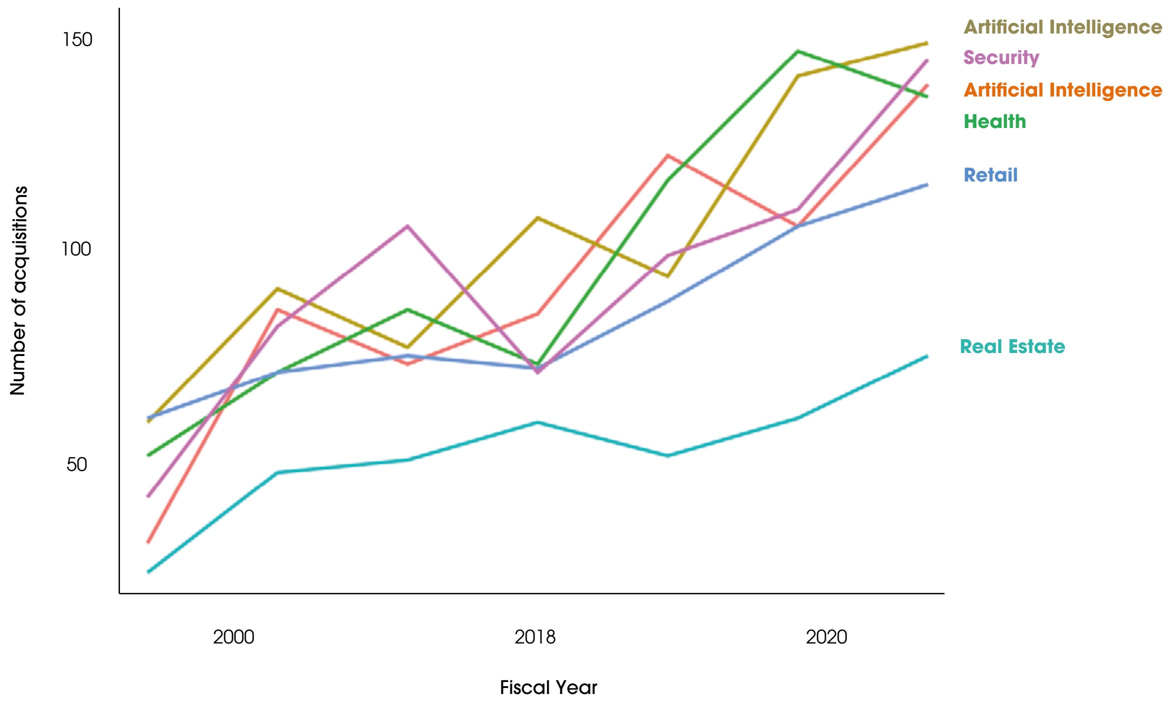


Figure 32 shows us a few very important market trends. The analysis is of the raw number of acquisitions among five key sectors (**Artificial Intelligence, FinTech, Health, Real Estate, Retail,** and **Security**) from 2015 through 2022. In fact, while the raw numbers of acquisitions in Retail and Health are still very high, the data shows that those sectors may have consolidated to the extent that the numbers continue to trend downward in coming fiscal cycles.

Furthermore, even as market trends in Security and Artificial Intelligence show the long term trend is an increase in raw numbers of acquisitions, the numbers year to year are more erratic. Market consolidation in FinTech is also relatively erratic, although the trend is more stably upward when compared to Security and Artificial Intelligence.

By comparison with these five sectors shows that Real Estate is a more stable sector and consolidations have been increasing more slowly. However, the overall trend for acquisitions is much more consistently upward.

Chapter 6:
Future Projections

> **I'm a big believer in the idea that technology can be a force for good. If we harness it, activate it, and thoughtfully iterate, we can apply technology to solve any number of challenges.**
> **As an entrepreneur, I see the following: you have facts, and then you have fiction, also known as a dream. Between facts and fiction, you have belief. To be a successful entrepreneur, you have to believe that you can turn your dream into reality, more so than anyone else, and it can be lonely. And then you have to be relentless in your pursuit to prove it. Then what used to be considered fiction becomes fact.**

Dr. Rao Mulpuri
CEO of View

Overview

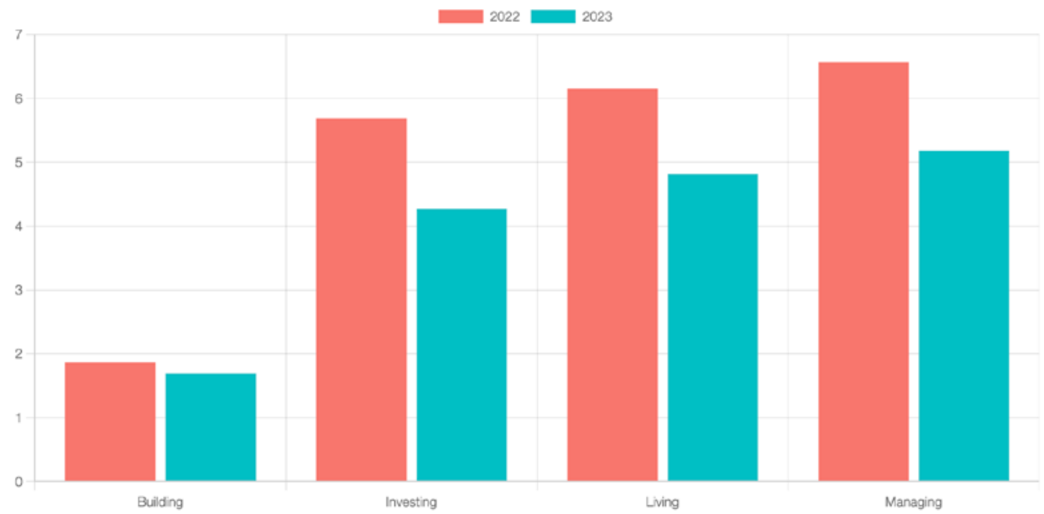
This chapter focuses on projections for the PropTech industry in the fiscal year 2023. **Our primary hypothesis is that leaders in PropTech will continue to be perseverent**. In the previous chapters, we examined the patterns and trends in the recent and distant past. That analysis set the stage to get a glimpse of what we can expect to see in the fiscal year 2023. This means that the year 2022 represents the time period from June 1, 2021 to May 31, 2022. Similarly, the year 2023 represents the time period between June 1, 2022, to May 31, 2023.

Before we move onto the trends in the projections, we briefly explain the process of making these projections. We used past data on the investment made in each PropTech company starting from the year 2000 up until June 2022 to make these predictions. We observed the investor identity, its region, along with data on receiving company identity and its region. We also used information on the type of investments that were made in the past along with the date of that transaction.

We combined all these data and put a time series structure on it. Next, we used machine learning to predict the investments at the transaction level for the year 2023. Finally, we aggregated the predictions at the company category, year, and country-level to show these aggregate trends. These are baseline projections expected given the past trends of investment. If something extraordinarily unexpected happens in the year 2023, the projections may change to some extent.

Investment

Figure 33: Predicted Investment by Category (2022 - 2023)

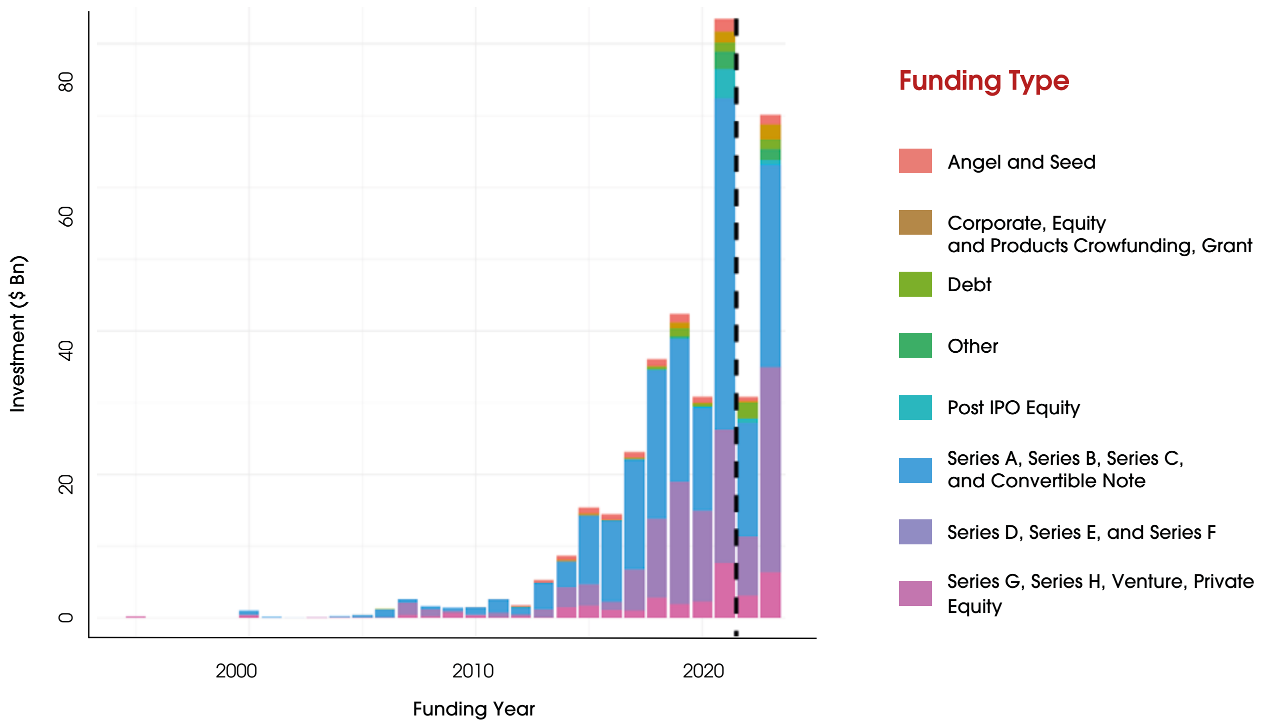


What we see from our models is that we expect an overall decline in investment across all four categories of PropTech for the 2022-2023 cycle based on year-on-year comparisons. Our model predicts an **Investing category** decline from $5.69 billion to $4.26 billion, representing a decline of about $1.43 billion, or around 25%. Similarly the **Managing category** is predicted to decline from $6.57 billion to $5.17 billion and the **Living category** is predicted to decline from $6.15 billion to $4.82 billion. The **Building category** saw the least decline in our predictive modeling, with a just $.17 billion decrease from 2022 ($1.86 billion) to 2023 ($1.69 billion), or around 9%.

2022	$5.69 BILLION	$6.57 BILLION	$6.15 BILLION	$1.86 BILLION
2023	$4.26 BILLION	$5.17 BILLION	$4.82 BILLION	$1.69 BILLION

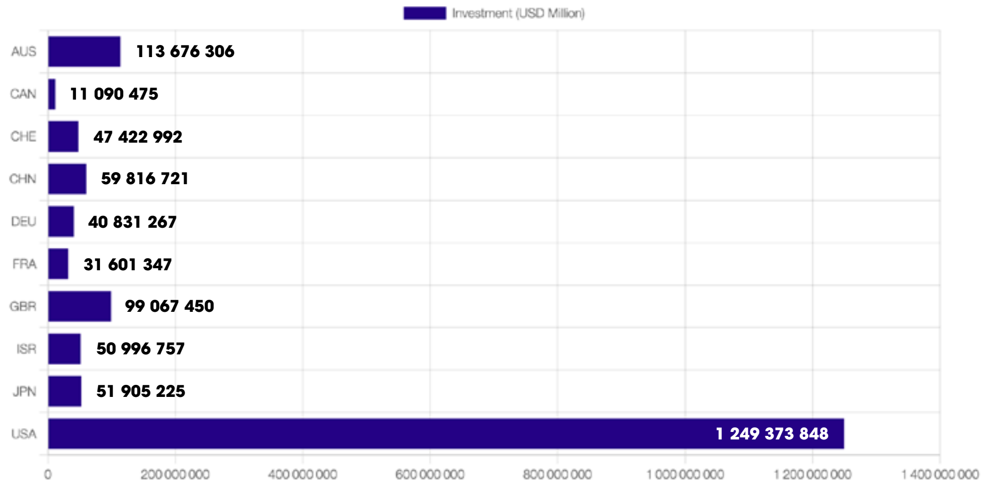
Therefore, while the Building category saw the least investments, it also saw the least declines. Given the market outlook, and because the Building category is more driven by raw-demand for housing and work-spaces, we expect that any future declines would not be as substantial in this category, if the pattern holds. While investments in Managing and Living companies will likely decline by a substantial amount in any future market downturns, they are still not as dependent on raw capital as the Investing category. Thus, **we expect PropTech investing companies to absorb the greatest market impacts from any slowdowns during the 2022-2023 business cycle**. We might also consider how this will impact the Real Estate sector, in comparison to other sectors of the economy.

Figure 34: Amount of Investment Projected for 2022-2023



Our projections in the type of investment for 2023 also show long-term trends of slight decline, when compared to the highs of 2021. We should remember that many countries injected capital into European and American economies during 2020, in an effort to restart their economies after the pandemic lock-downs. The result was an enormous jump of capital available in the market and in various types of investments in 2021. However, by 2022, inflationary fears and other market factors have contributed to an overall pull-back in spending that is also reflected in our projections data. Some stabilization of the market as a whole should result in a "return to normal" for investors. That said, if we compare the data to the 2019 and 2018 fiscal year projections, what we see is a long term increase, resulting in more than **$60 billion** invested in PropTech projected for 2023, with particularly strong growth in Series A, B, C and Convertible Notes funding as well as Series D, E, and F funding.

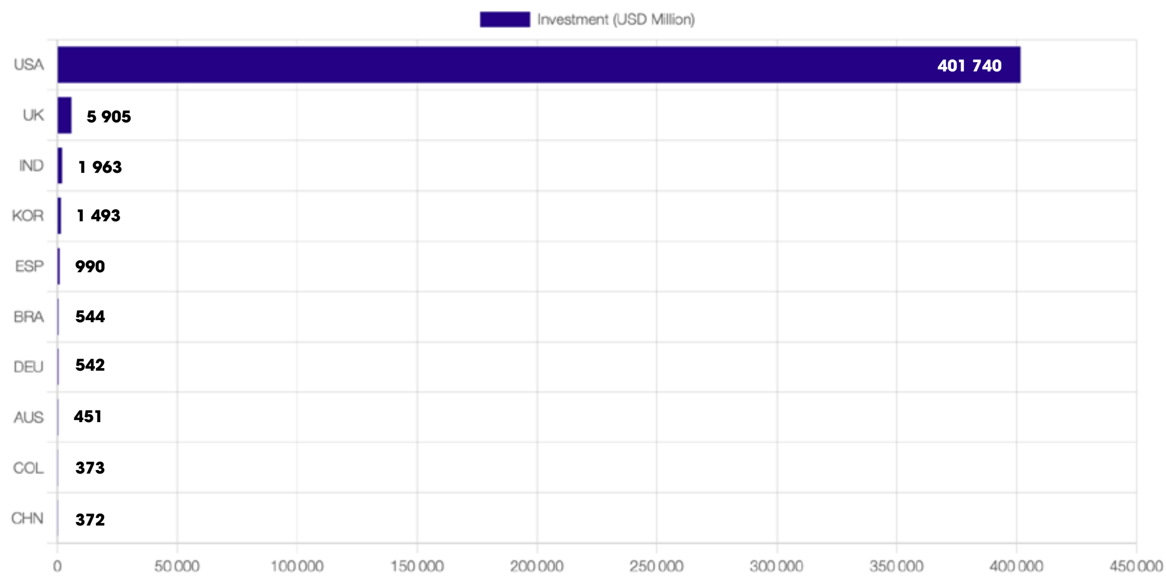
Figure 35: Projected Investment 2023, Country of Origin



When we measure our projections for the investments in terms of country of origin, we expect to see certain predictable players rising to the top. The U.S. is projected to be the country of origin of $208.65 billion by 2023. Far behind the United States, **Great Britain** is projected to be the origin of **$3.47 billion** of PropTech investments. Our other players are much smaller: with **Germany** (**$694 million**), **Australia** (**$455 million**), and **Japan** (**$415 million**) rounding out the top five. For the remainder of the top ten, we expect to see **Switzerland, Israel, China, France,** and **Canada** all remaining significant countries of origin for PropTech investments. Of note: almost all of these countries are also increasing specific incentives related to addressing climate change in ways that will also stimulate growth in the PropTech industry.

The US are projected to be the origin of **$208.65 billion** PropTech investment by 2023

Figure 36: Projected Investment 2023, Country of Destination



Among the notable trends in PropTech investment, we were able to create projects for the country of destination for new investments for 2023. Notably, these projections are much lower than our total investments by country of origin measures, because we are measuring only external investments. Nonetheless, what we are expecting is that **investments** ($401.74 billion) **will move toward the United States** in 2023, where markets are high value and offer substantial returns. **Great Britain will be a country of destination of substantial** ($5.905 billion) investments.

$401.74

BILLION
projected investment
for 2023 in the US

$5.905

BILLION
projected investment
for 2023 in the UK

The next major player for destination countries may come as a bit of a surprise: India ($1.963 billion), **South Korea** ($1.493 billion), and **Spain** ($990 million) round out the top five. However, it is important to note that PropTech is clearly making waves in each of these three countries. India has long had a notable start-up industry and has been a producer of top talent for decades in the tech world. South Korea emerged as a major player in the Pacific Rim by the 1990s and has more recently become the hub of Yanolja, one of our top performing companies in the world for the 2022 PropTech Barometer. Finally, companies in Spain have also been making waves aiming to increase investments in PropTech. It is also exciting to see some new countries on the top ten list. While **we might expect Germany, Austria** and **China** to land in the top ten, **Brazil and Colombia represent new burgeoning markets** for PropTech companies in South America.

Projected 2023 PropTech investment in India, South Korea and Spain

$1.963

BILLION

$1.493

BILLION

$990

BILLION

Overall, the declines in investment we project must be taken in stride. Clearly there are also new opportunities for PropTech investors in this dynamic market. The trends remind us of the advice of **Dr. Rao Malpuri, CEO of View, "The key is to be perseverant,"** which is important advice to keep in mind for our final case study.

Case Study 3:
IoT, Buildings & Expectations of Paris by 2050[3]

Our team's final case study this year focused on the global goal of decarbonization by 2050. This case study examined the use of the Internet of Things (IoT) technology as a means **to optimize construction and maintenance of green buildings in the field of PropTech**. More specifically, the study examined how IoT technologies could be of use for retrofitting buildings to upgrade existing buildings. Focusing on two IoT companies in the U.S. residential sector and examining two different scenarios :
• 1) the increase in activity projected in the next 30 years without mitigation measures.
• 2) the implementation of the Net Zero Emissions (NZE) agenda timeline of 2050. Between current status and NZE goals, Nationally Determined Contributions (NDCs) are used to set stepping stones to realistic decarbonization.

Figure 37: US Residential Sector's Expected Carbon Emission Evolution if NDC & NZE Goals are 100% Fulfilled

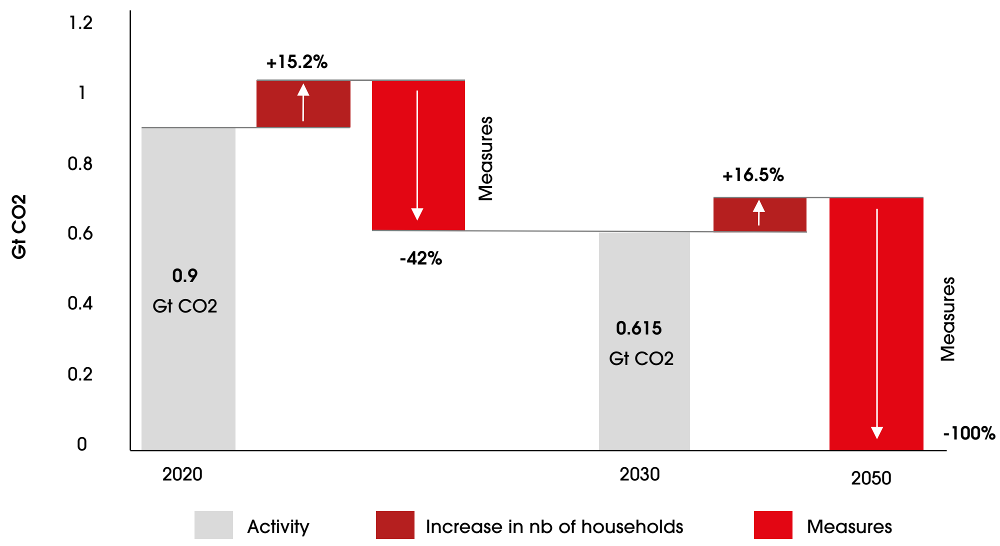


Figure 37 demonstrates a visual representation of the U.S. residential sector's expected increased carbon emissions and what is needed to decarbonize the U.S. market in the next three decades. This data relied on a compilation of projections in numbers of households in the United States, NDC and NZE goals established by 2005 data.

[3] In collaboration with Coralie Vergerolle, as part of the ESCP-Monaco Real Estate Technology Innovation research program. A more in extended analysis of these trends was submitted for degree requirements in the Bachelor in Management program at the ESCP Business School.

Carbon emissions in 2020 are used as a baseline for this case study, as measured in $GtCO_2$. Then the increase in number of homes projected between 2020 and 2030 was calculated, resulting in a **net increase** of +15.2% $GtCO_2$. Thus, the necessary decrease to meet NDC goals in the U.S. would result in a **-42%** decline in $GtCO_2$, or .615 $GtCO_2$ by 2030. Furthermore, the number of homes is expected to cause carbon outputs to increase again by **+16.5%** between 2030 and 2050. Thus, the changes required for total decarbonization by 2050 will still be significant.

$GtCO_2$

+15.2%

The timelines in this case study thus assume that all new buildings must be zero-carbon ready by 2030, while **50%** of existing buildings need to be retrofitted to zero-carbon levels by 2040, and more than 85% of all buildings would have to be zero-carbon ready by 2050. This is where IoT technologies come in.

85%

zero-carbon ready by 2050

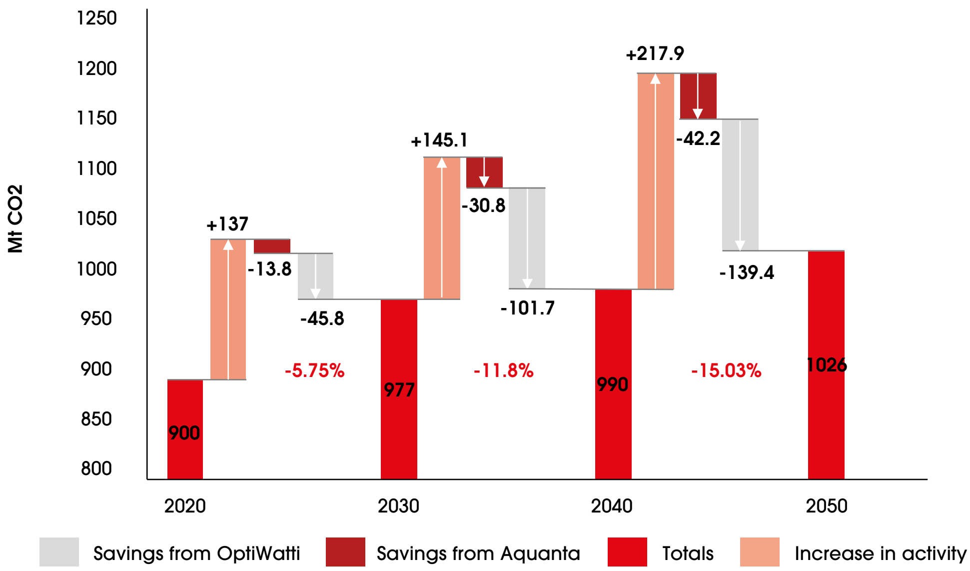
IoT technologies play an important role in creating adjustments to the normal use of home appliances, reducing inefficiencies. Most energy consumption in homes is taken up by space heating, followed by water heating, air conditioning, lighting, and refrigeration, respectively. However, a significant portion of U.S. energy consumption in homes, more than 20% - is also taken up by “other” types of energy consumption.

20%

other types of energy consumption

It is important to remember that some types of energy saving measures, such as electric vehicles, might increase “other” types of energy consumption in the home. This does not negate the positive impact of adopting electric vehicles, but rather presents a new problem that IoT technologies might be able to solve. While technologies will have to be implemented incrementally to the building sector, in accordance with the Paris Agreement, adopting IoT technologies in the field of PropTech could introduce important ways to cut costs, improve efficiencies, and make some financial gains.

Figure 38: Potential Savings using Aquanta & OptiWatti Technologies (2020-2050)



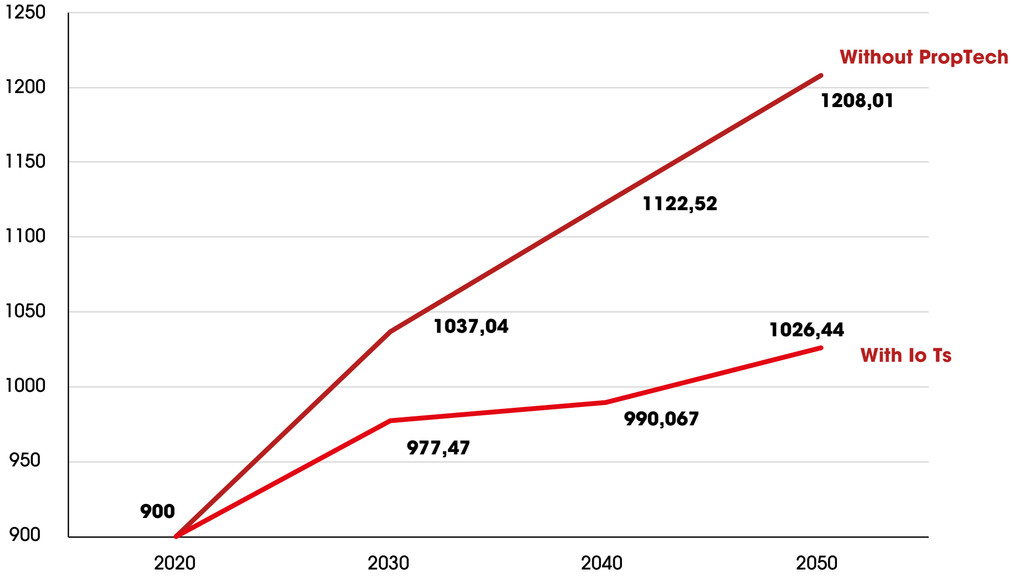
In this case study, two key IoT technologies were compared to illustrate the total possible savings of carbon outputs in the U.S. residential market. Importantly, the case study shows that we cannot entirely offset the expected growth of carbon outputs measured in $MtCO_2$ between 2020 and 2050 using these two technologies alone. Nevertheless, they do represent two successful offset measures. **The first IoT technology is Aquanta**.

Aquanta is a smart electric and gas water heater controller. Because water heating makes up the second largest portion of carbon outputs produced by the US residential market, **Aquanta was identified as a potential technology to adapt to NDC and NZE goals**. Aquanta is therefore an important technology to adopt to treat an existing problem in the market.

Optiwatt is a bit distinct from Aquanta, in that it specifically addresses a distinct problem of emissions that is predicted in the future. Currently, EV charging stations do not represent a major share of the energy consumption of US homes. However, as electric vehicles are increasingly adopted as a carbon saving measure and fossil fuel dependent vehicles are phased out of the market, Optiwatt addresses a problem of the future. It is a forward thinking solution for the market.

Indeed, the case study showed that while Acquanta could account for incredibly significant savings of $MtCO_2$ outputs (**13.84** by 2030, another **30.753** by 2040, and another **42.15** by 2050), the projected savings through adopting Optiwatt now are even more significant. Across these two technologies, the projected growth of carbon emissions is not completely reduced, of course. However, it is significantly stabilized.

Figure 39: Comparison of Carbon Emissions in the US Residential Sector (2020-2050 Projections) with and without IoT



Overall, it is clear that an adoption of a wide variety of IoT technologies in the PropTech sector is key for the future of Real Estate markets. Real Estate markets must address the realities of climate change to remain profitable and PropTech is providing solutions. Figure 39 shows the nature of carbon emissions projections for the US residential market. Clearly, without the contributions of IoT, the market will continue to have increased carbon emissions.

We might expect the carbon emissions to be accelerating. However, the nature of increased regulations and adoption of green construction technologies will provide for some deceleration of carbon emissions in our model. That said, this deceleration is made much more significant through the adoption of IoT contributions to efficiency problems. Simply put: IoT's reduce inefficiencies and therefore reduce excess consumption of energy. Overall, the case study shows that there will still be a net increase of 14.08% with IoT by 2050. However, the contribution of IoT is also a reduction of **-20.14%**. Clearly, the path forward for the global community is through PropTech.

+14.08%

net increase of CO_2 emissions with IoT by 2050

Focus on Monaco: **where digital and real estate are at the core**

Foreword

Dear readers,

We are now celebrating the third edition of our Global PropTech barometer, which we are proud to publish each year with our partners from ESCP Business School, and especially Prof. Jaime Luque.
In addition to the regular sections of the barometer covering the trends and dynamics of the PropTech industry, we decided to include a focus on the country which launched this initiative together with ESCP: the Principality of Monaco.
Although bounded by its territory of two square kilometers, Monaco has become an emblematic player in the field of digital transformation and boasts exciting cases involving its century-old real estate industry.
You'll discover examples covering a wide range of real estate activities, such as architecture and construction, building information modelling, land management, as well as our own DIgital Twin.
We hope you'll enjoy these cases as much as we do, as real-world evidences of the potential of Monaco in the field of PropTech!

Diego Bonaventura
Head of Digital Economy,
Princely Government of Monaco

Case Study:
Optimizing property management with a SaaS solution (Abyla)

Stonal is one of the leading SaaS platforms for asset and property managersStonal acquired Labéo, the publisher of Abyla software, in 2020, and fully integrated this software in its global solution.

This service is part of the “Building Information Modelling” (BIM) range of technical solutions, which is the foundation of digital transformation in the architecture, engineering and construction industry. BIM involves creating and managing information for a built asset, in order to produce a digital representation of an asset across its lifecycle, from planning and design to construction and operations.

The Principality of Monaco has been committed to better understanding and digitizing its real estate assets from a very early stage. For this purpose, it acquired licenses for Abyla's technical asset management tools in 1998. The presumption was that good knowledge of its assets (surfaces, components, equipment) is an essential condition to ensure their efficient management and maintenance.

Designed for asset and property managers, Stonal offers an integrated platform to visualize the assets, query the database, organize datarooms, share the information with stakeholders, maintain the assets, control budget allocation and comply with regulatory requirements.

Beyond the technical management of buildings, discussions are ongoing between the Administration des Domaines and Stonal, related to new use cases such as risk mapping, regulatory obligations and removal of reservations.

Watch the interview

“The perfect knowledge of the assets (surfaces, components, equipment) is an essential condition to ensure the efficient management and maintenance of buildings. It will also become critical to ensure the net zero commitment of the real estate industry.”

Robin Rivaton
CEO of Stonal

Case Study:
Boosting construction with 3D platform technology

The capabilities of the 3D platform support the whole process of construction design, from the architectural perspective to structural calculation, 3D rendering, and technical management, with the help of dedicated and advanced software interconnected by a unique environment.

This technology has a crucial impact on architecture and in construction as the ability to present designs (for instance, as architectural 3D floor plans) in digital form are a true game-changer for the delivery of the building.

MZA MONACO, a Monégasque company, has developed a solution with the support of Dassault Systèmes.

The need for a dedicated platform involving 3D modelling emerged with highly complex architectural buildings, where the technical interaction between actors is very demanding in terms of speed and customization. It turned out that technological support for architects and complex geometries can no longer be offered and developed by 'traditional' tools.

This is why MZA focused on a platform approach which connects ideas, architects and engineers.

Over the years, this company supported architectural firms such as Zaha Hadid, Frank Gerhy, Alexandre Giraldi, Santiago Calatrava, among others. According to the managers of MZA, the construction market is moving in the direction of an integrated built environment, where information will be exchanged between teams and companies with complete governance over data access, simplified design reviews and better decision making.

Watch the interview

We think the future of next architecture is moving in a new direction, where shape and structure are no longer different entities.

Francesca Lorenzet
Client Manager at MZA

Case Study:

Building a smarter and more sustainable environment with a Digital Twin

Watch the video

A digital twin is a digitized copy of a city, a completely virtual scale model. It was first used in the construction of buildings and infrastructure, then expanding to entire urban units.

The Princely Government of Monaco wanted to implement a digital tool with two objectives: improving the daily life of citizens and optimizing decision making. The key idea was to benefit from advanced computation and 3D vizualisation capabilities, which would serve as a prospective tool enabling the evaluation and simulation of future transformation impacts on several indicators (involving topics such as urban well-beign, construction planning or the environment).

The 3D Digital twin of the entire Monaco Principality's territory was initiated by the Princely Governement, which entrusted Siradel (an ENGIE group company) and SMEG (Monégasque Electricity and Gaz company) for its development. They developed a digital twin with unrivaled accuracy and deployed a unique digital services platform for the operational management of departments and partners.

With digital technology as the basis for the management of the projects led by the Principality's Operational Departments, the platform has been deployed on a first strategic topic : the coordination of public-private construction work. Its first users are all the Principality's operational services departments including the Urban Planning Department, the Prospective, Urban Planning and Mobility Department and the Public Works Department.

Other use-cases such as resiliency in regards to climate change impacts (urban heat islands, floods) and environment through green cadastre are also under co-development.

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WITH THE SUPPORT OF Gouvernement Princier PRINCIPAUTÉ DE MONACO / Extended Monaco

About Extended Monaco

Extended Monaco is the program in charge of the digital transformation of Monaco Principality, funded and implemented by the Prince's Government through the DITN Team (Interdepartmental Delegation in charge of digital transition). Very high value created from a very limited space is a common feature shared by Monaco and digital technology. Thus, for our Principality, digital technology is an unprecedented opportunity to perpetuate and extend its societal model, to make it ever more attractive and to further boost its international aura. Since 2019, Extended Monaco launched several initiatives whose aim is to benefit both Monégasques and those who choose the Principality as their place of residence, for their business or for tourism.

Learn more: www.extendedmonaco.com - https://eme.gouv.mc/barometre/barometre-2022/