

PropTech Global Trends 2024

Annual Barometer



Gouvernement Princier
PRINCIPAUTÉ DE MONACO

Extended
Monaco



ESCP
BUSINESS SCHOOL

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Editorial

Proptech: A Global Catalyst for Real Estate

With a global value of \$643.90 trillion USD, real estate lies at the heart of major economic, ecological, and technological transitions. In 2023, PropTech accelerated this transformation, attracting \$47.94 billion USD in investments and achieving a growth rate of 13.78%. Technologies such as AI, digital twins, and tokenization are redefining every stage of the real estate lifecycle, from building to living, making processes more efficient, sustainable, and interconnected.

Monaco: A Model of Excellence in Real Estate

The Principality of Monaco stands out as a key player in driving innovation in digital real estate. Its ambition to emerge as a European hub for PropTech is supported by several strategic assets :

- **A Visionary Commitment for innovation:** Monaco has long been a pioneering hub for urban innovation. Since the 19th century, the Principality has expanded its territory by 20%. The Mareterra project, a €2 billion investment, epitomizes this vision. This eco-district, which extends Monaco's territory by 3%, seamlessly integrates advanced technologies and sustainability through energy-efficient buildings, renewable energy systems, and a marina. Mareterra is a testament to Monaco's ability to combine luxury, innovation, and ecological responsibility.
- **A State-of-the-Art Digital Infrastructure:** Through its ambitious "Extended Monaco" strategic program, the Principality has established itself as a global leader in technological advancement. This initiative includes cutting-edge developments such as 5G, fiber optics, a sovereign cloud, a digital twin of Monaco, and a robust data platform. Monaco is now positioned as an ideal platform for integrating tools such as Building Information Modeling (BIM) and AI-driven applications. These technologies ensure optimized and sustainable asset management, improving operational efficiency while reducing environmental impacts.
- **Strategic Partnerships Shaping the Future of PropTech:** Monaco's collaboration with ESCP Business School, which spearheads the PropTech Barometer, highlights the Principality's dedication to uniting European industry leaders. This partnership fosters a shared vision for the future of real estate, emphasizing innovation, collaboration, and the advancement of PropTech as a key driver of industry transformation.

In this context, Monaco is ideally positioned to leverage emerging technologies such as AI and blockchain. These innovations are perfectly aligned with the Principality's market dynamics: real estate tokenization enhances liquidity, making the market more attractive to investors, while artificial intelligence enhances services and personalizes experiences to match the high standards of its premium clientele.

The Principality of Monaco, with its ambitious vision of a smart city that blends innovation with digital excellence, offers an inspiring example of how PropTech can transform urban environments while preserving identity and attractiveness.



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

A handwritten signature in black ink, appearing to read 'F. Genta'.



Introduction

to the 2024 PropTech Barometer

The 2024 PropTech Barometer presents an exciting update on the latest technologies, greatest details and most transformative investors in the global PropTech ecosystem. **The value of the real estate market in Europe alone is estimated to climb to the heights of \$174.5 trillion USD in value as of the end of 2024.** This is the moment to invest in our understandings of the companies and technologies that are transforming our future.

We have established a firm foundation of analysis for companies in the PropTech ecosystem by dividing them into four key categories based on the relationship between the company and the life-stage of the real estate asset: **building, investing, managing, and living.**

Across these four categories of analysis, some **\$47.94 Billion USD was raised in 61 countries across the 2023-2024 fiscal year, by 1,739 companies.** However, we do not limit our scope to the past fiscal year alone in this barometer, as we not only highlight the annual update and the latest investment trends. We also provide a more in-depth global update by considering the past 20 years of the PropTech industry, before zooming in to engage with region-by-region and country-focused analyses of the areas of greatest interest from the past fiscal year. Then, we provide a comparative analysis of PropTech markets with competing industries and provide some projections for the future.

Another story of note that emerged in this year's barometer was simply how many companies there were in the Building category completing deals. Most of these deals are relatively small, but upon a closer examination, we noticed a dearth of new technologies, ranging from air filters to advances in robotics, to smart equipment and AI driven solutions. Hence, our first case study focused on the Building Category, while our second dove into a critical emergent technology in the Managing Category: the Market Intelligence Dashboard. Finally, the third and final case study illuminates how the tokenization of real estate is transforming real estate investing.

Readers of this year's barometer will enjoy our deepened focus on explaining the latest trends in technologies this year. Of course, in many of these stories, AI is king. Readers may already be aware of the great work being done by Accenta (France) and Nidus Labs (Spain). Yet, they will also be introduced to an incredible breadth and depth of the latest critically important and transformative technologies of the PropTech ecosystem.



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Four Categories of PropTech Companies

In this year's Barometer, we have relied on our simplified methodology of categorizing all PropTech companies into four categories. These categories are based on the life cycle of a given property. Over years of study, we have found that market pressures rarely allow companies to bridge the gaps across these categories in a single office. Instead, they tend to operate from within one of these four given market niches: Building, Managing, Investing, or Living. As explained in the table below, the Building category involves all of those technologies that are contributing toward the construction of a given element of real estate.



BUILDING

- Drones
- Indoor Mapping
- 3D Printing
- Digital Twins
- Construction Management



MANAGING

- Online search and sales platforms
- Mortgage Technologies
- Real Estate Agent Tools
- Commercial Real Estate
- Property Management



INVESTING

- Big Data and Analytics leveraged to stabilize portfolios
- Risk Assessment Models
- Blockchain
- Crowdfunding

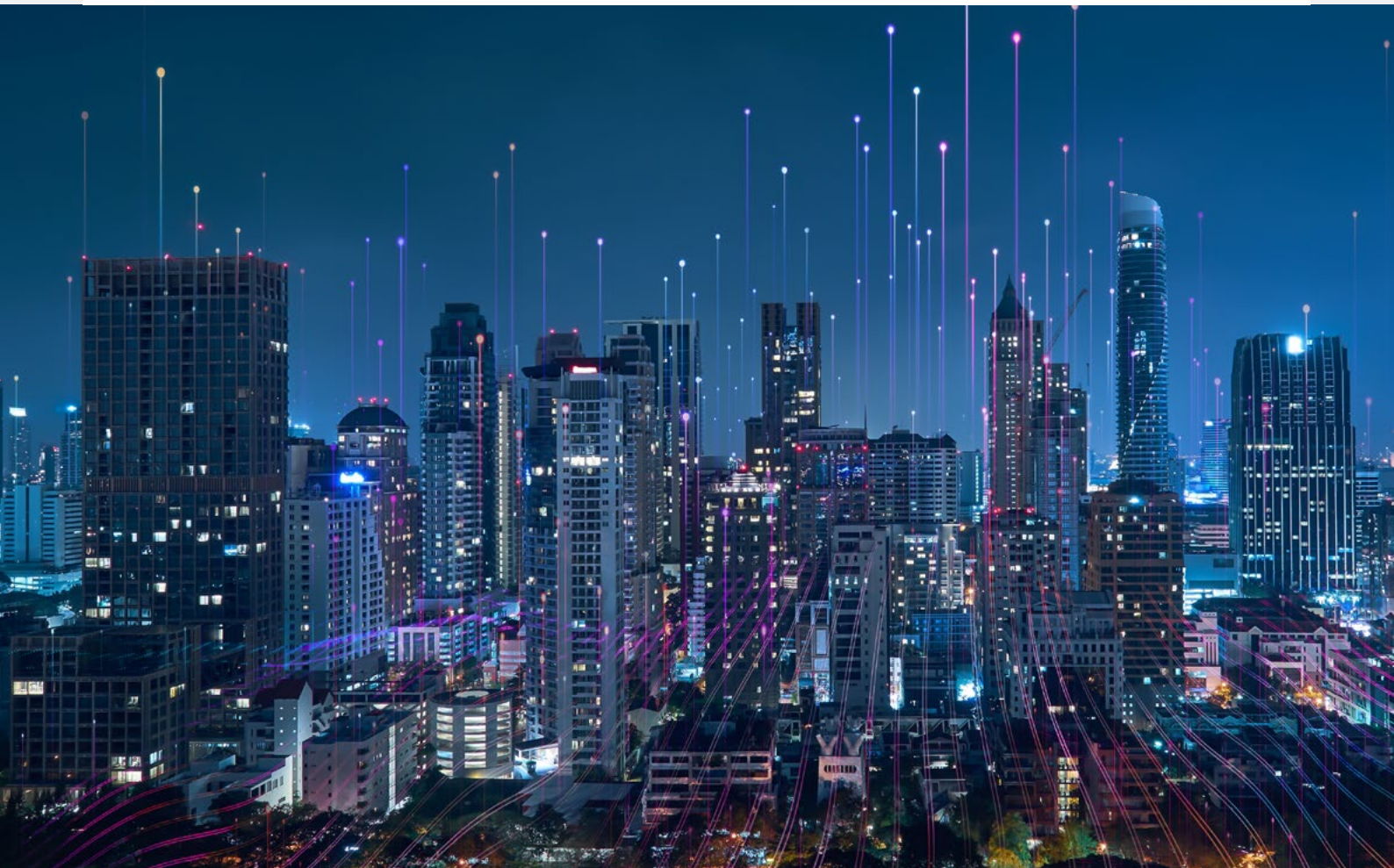


LIVING

- Home services
- IoT Home
- Life/Home, P&C Insurance
- Facility Management
- Smart windows
- Solar panels

Examples of Technology

In the Building category, PropTech innovates by introducing usage of drones, indoor mapping, surveying, permit management, personnel management software tailored to the construction industry, providing digital twins, innovating with new materials, such as bio-concrete, and so much more. The Managing category tends to be the biggest player year after year, with many companies and a massive amount of investment involved in establishing everything from online search, sale and rental platforms, to mortgage technologies, to short-term stay platforms, real estate agent tools – such as market intelligence dashboards, and other forms of property management. The investing category is where we see the market being transformed by the ability of new companies to transform the field of portfolio management and Big Data analytics through the usage of AI and machine learning enabled platforms. Finally, in the Living category, we find the introduction of IoT homes, insurance, facility management, and climate control systems to be standards of the market. We have discussed these categories further in the past PropTech Barometers (including, especially, in the 2022 edition).



Executive Summary

PropTech isn't just an addition to the real estate industry—it's a catalyst transforming every corner of the sector, from construction sites to investment platforms. With real estate valued globally at over **\$634.90 trillion USD** and the **European real estate market alone projected to reach \$174.5 trillion USD by the end of 2024**, the stakes are immense.

PropTech's influence extends across the **entire property lifecycle**, making processes more efficient, secure, and data driven. Take the **13.78% increase in PropTech investments** this past fiscal year, for example; it not only signals growth but highlights a sector advancing at a pace that's outstripping traditional growth rates in the American and Eurozone economies.

Further, we see these impacts in the way technology is shaping property management—a category that has generated **\$44.7 billion** in revenue from **\$40 billion** in cumulative investment. These figures underscore how management technologies, from tenant tools to data-driven decision platforms, are adding direct financial value while improving user experiences.

Similarly, the **Building category**, despite traditionally lower investment, is proving to be a high-return area, generating **\$21.2 billion USD in revenue from just \$6.5 billion in investment**. This points to a pent-up demand for innovative building solutions that could drastically enhance both safety and efficiency. The rise of robotics and AI-driven equipment in construction is just one example of how PropTech is closing gaps and creating new standards in construction efficiency and worker safety.

Globally, PropTech's reach is also reshaping investment flows and regional opportunities. While **U.S.-based PropTech companies raised \$173.5 billion USD** this past year, the UK, France, and Germany are emerging as central hubs in Europe, with **Asia-Pacific countries** like Japan, Singapore, and the UAE also establishing strong footholds. Even smaller markets, from **Brazil's \$2.5 billion USD in PropTech investments** to **Vietnam, Kenya, and the Philippines** are becoming focal points for the next generation of property innovations.

In short, PropTech's impact is widespread and accelerating, driven by significant capital inflows, innovative technologies, and the ability to solve real-world problems in the property industry. These advancements are paving the way for a more integrated, responsive, and high-performing real estate sector, transforming not only how properties are built, bought, managed, and lived in but also creating a ripple effect throughout our economies and communities.

Key facts & Figures

\$634.90

 TRILLION

GLOBAL REAL ESTATE MARKET ESTIMATED VALUE

4 1,739 2,494

CATEGORIES

COMPANIES

INVESTORS

\$47.49

 BILLION

RAISED (2023-2024)

61

COUNTRIES

As a sign of the strength of the potential of PropTech worldwide, **the global real estate market has an estimated \$634.90 trillion USD value as of the end of the 2024 calendar year.** In the 2023 to 2024 fiscal year, \$47.49 billion USD was raised by a total of 1,739 companies.



In this cycle, **2,494 investors were active across the four main categories (building, Managing, Investing and Living) of PropTech companies across 61 countries.** Although there was a consolidation of the landscape in terms of the number of countries that deal makers are headquartered in, the number of investors active in the market making deals, and even a decrease in the raw number of deal-making companies, the PropTech industry still produced a **\$13.78% increase compared to the 2022-2023 fiscal year.** The increase was driven in part by the high value of companies involved in the trend of market consolidation and in part by investment in new technologies.

As measured by their dry powder reserves and recent leadership appointments signaling expansion, top investors include firms like Ares Management – a globally active alternative investment manager, operating in the credit, private equity and real estate markets, and headquartered in the United States. Additionally, giant firms with enormous capital reserves, such as Andreessen Horowitz, are essential players in the PropTech industry. Andreessen Horowitz (also known as AH Capital Management, LLC or a16z) has a total of \$42 billion in assets as of May 2024. They invest in growth-oriented companies, especially early-stage start-ups.

Notably, **the most significant deals** this cycle, such as **Black Knight's \$11.7 billion USD M&A transaction**, highlight the increasing scale of investments combined with the trend of market consolidation. Black Knight is a company that provides integrated technology, services, data and analytics to the mortgage and real estate industries. However, **the big story for investors in this cycle has been AI. AI is transforming PropTech in many ways. AI is being introduced to workforce platforms, modular systems, robotics, workflow systems, data analysis, smart home integration, and more.**

Key Insights in Europe include the pressing need for PropTech solutions to address difficulties in many urban contexts, such as Berlin and Paris. In France, after BpiFrance, leading investors are PE/Buyout firms, such as Ardian, Eurazeo, Capza, Naxicap, Keensight, and Seven 2. Additionally, after the Accenta deal, most deals were concentrated in the Managing category, suggesting much of the French market resembles the trends of the global PropTech market, especially in terms of which types of firms are the biggest investors and which categories of companies are involved in the most deal making. In Spain, the PropTech market has been characterized by a more prominent role of venture capital lately than private equity/buyout firms. The trend suggests that the Spanish market is still in a growth rather than a consolidation phase. Although not yet completed, the recently announced Idealista deal is also of note. Idealista has over 1.4 million listings and is the Iberian market's premier online real estate platform, having also recently expanded into Italy. Following the acquisitions of two Italian software companies - Miogest and Gestim - in 2020, Idealista has introduced 3D tours, virtual home stagings, and other video tour features. While Cinven aims to acquire a 70% stake in Idealista, Apax and Oakley are divesting their holdings. EQT also sells its majority stake in a planned 2.9 billion Euro deal facilitated by JP Morgan.

11.7

Billion USD

Key innovative Technologies Leading the PropTech Transformation

PropTech is reshaping the real estate landscape, with advanced technologies driving operational efficiencies, boosting revenues, and transforming user experiences. Today, let's look at the best-in-class technologies that are setting new standards across the industry.

1

Robotics in Construction



Raise Robotics stands at the forefront of recent innovators, deploying autonomous robots to handle complex construction tasks in hazardous conditions. These robots are not only improving safety but also enhancing precision in construction processes by recording every action in real-time. Supported by Berkeley's Sky Deck, Raise Robotics represents a leap toward safer, more efficient construction. Robotics technologies like these are helping the Building sector generate \$21.2 billion USD in revenue despite attracting only \$6.5 billion in investment, indicating substantial returns.

2

Artificial Intelligence (AI) in Property Management



In property management, AI has become indispensable for improving tenant relations, streamlining operations, and ensuring compliance. Take Modives, an AI-based platform that verifies renter's insurance. Unlike traditional verification methods, Modives connects directly with insurance carriers, analyzing coverage adequacy in real-time. This technology eliminates the guesswork for landlords, reduces compliance risks, and enhances tenant trust. The Managing category, with companies like Modives, raised \$40 billion USD this year, reflecting its position as the most funded PropTech category (2024 PropTech Barometer).

3

Air Quality and Acoustic Agglomeration



In response to growing health consciousness, Vox Aeris developed a groundbreaking air purifier using acoustic agglomeration, which clusters particles for more effective filtration. Originally targeted at younger consumers, this technology has since evolved to serve commercial properties, incorporating energy-efficient designs that meet modern sustainability standards. By catering to a neglected need—indoor air quality—Vox Aeris exemplifies how PropTech is creating healthier living environments for all.

4

Algorithmic Design and Furnishing Solutions



Craffle brings innovation to interior design, allowing users to furnish spaces based on specific style preferences, budget, and room dimensions. Using a proprietary algorithm, Craffle identifies furniture design types and integrates color, context, and budget considerations to deliver a tailored experience. This technology empowers users to personalize spaces, bridging the gap between technology and home living. Craffle is part of the Living category, which raised \$10.3 billion USD this year, demonstrating the demand for technologies that enhance everyday living.

5

Big Data and Market Intelligence Dashboards



Data analytics and visualization tools are becoming essential for real estate managers. The Market Intelligence Dashboard is a prime example, providing real-time insights into property performance. This dashboard allows managers to assess metrics like occupancy rates, tenant satisfaction, and ROI, enabling faster, data-driven decision-making. As a tool that's reshaping asset management, Market Intelligence Dashboards underscore the power of big data in creating more responsive property solutions.

6

Tokenization and Blockchain in Real Estate Investment



Blockchain and tokenization are revolutionizing real estate investments by making property assets more accessible and liquid. Platforms are emerging that allow fractional ownership through tokenized real estate, opening the market to a wider pool of investors. This year, Equity Address raised \$12.5 million USD for its blockchain-based platform, enabling users to co-own vacation properties with flexible scheduling and shared expenses. Such innovations are creating more accessible investment models, which could redefine property ownership.

7

Smart Storage Solutions



Clutter has pioneered on-demand storage through its Smart Storage technology. Using a mobile app, customers can schedule packing and storage services and access their items digitally in a climate-controlled warehouse. Recently acquired by Iron Mountain, Clutter's model provides a seamless, tech-enabled storage solution that's ideal for today's mobile, space-conscious consumers. This kind of on-demand storage highlights PropTech's ability to create practical solutions for modern living needs.

8

Computer Vision and AI in Parking Management



Metropolis leverages computer vision AI to transform urban parking management. By using image recognition and data analytics, Metropolis optimizes space utilization and reduces operational costs, benefiting both real estate owners and urban commuters. Its acquisition of SP Plus—a company specializing in parking management—brought this technology to over 360 cities in North America. Metropolis's computer vision platform is a prime example of how PropTech is creating smarter, more adaptable urban infrastructures.

Each of these technologies is more than just an innovation; they are building blocks for a more resilient, adaptable, and efficient real estate sector. Robotics, AI, big data, blockchain, and algorithmic design are setting the pace for PropTech's evolution, demonstrating that the industry is no longer about just building properties but about building smarter, sustainable environments for everyone.

As PropTech continues to draw significant investments and foster transformative technologies, the potential impact on our global communities and economies is tremendous. By embracing these advances, we're not only improving properties but redefining the standards of living and investment worldwide.

Key Investors in PropTech

1. ARES MANAGEMENT



Focus

Credit, private equity, real estate.

AUM: \$447 billion

Key Moves

Opened Japan office (2024) to expand in Asia.

2. ANDREESSEN HOROWITZ (A16Z)

ANDREESSEN
HOROWITZ

Focus

Early-stage startups, AI-driven innovations in PropTech.

AUM: \$42 billion

Notable Investments

- Loft: A Brazilian real estate marketplace (\$100M Series E).
- Mosaic: Construction automation software.
- Valon: Mortgage technology.

3. JP MORGAN

**Key Platform**

Story (launched 2023) simplifies multifamily management.

Partnership

\$80M fund with Techstars to support diverse entrepreneurs.

4. TECHSTARS

**Investment Approach**

Focus on seed-stage startups.

Activity

Invested in 27 PropTech startups in 2023-2024.

Notable Backings

Craffle (AI-driven furnishing solutions).

5. ABU DHABI INVESTMENT AUTHORITY (ADIA)

**Assets: \$1 trillion**

(sovereign wealth fund).

Platforms:

- Quanta: Big data analytics for real estate.
- Dari: Home services and property transaction platform.

6. GIC SINGAPORE



Focus

Real estate and mixed-use developments globally.

Key Investments

- Paddington Central (UK): Mixed-use urban hub.
- The Student Hotel (Europe): Hybrid hospitality spaces.
- Loft (Brazil): Latin American expansion with \$100M Series E.

7. BPIFRANCE



Role

Dominant French player in PropTech investments.

Focus

Funding early and growth-stage ventures in France.

8. ARDIAN

The logo for ARDIAN, featuring the word "ARDIAN" in a bold, uppercase, sans-serif font, colored in a reddish-orange hue.

AUM: \$169 billion.

Projects

Acquired Costockage (self-storage platform in France).

Emerging Players

1. TEMASEK HOLDINGS (SINGAPORE)

TEMASEK HOLDINGS

Role

Sovereign wealth fund supporting cutting-edge PropTech initiatives.

Focus Areas

Sustainability and digital transformation in real estate.

Notable Projects

Investments in smart buildings and AI-driven property management.

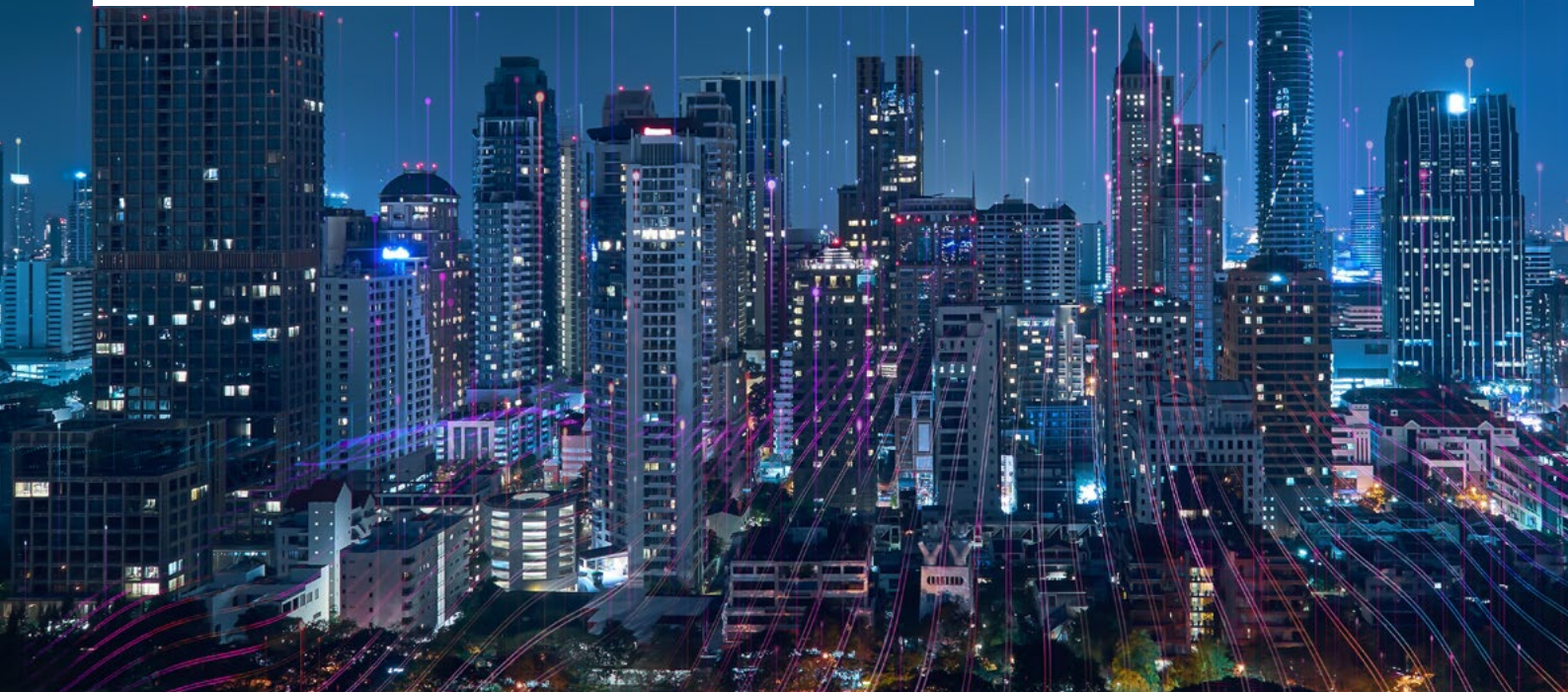
2. EQUITY ADDRESS (DUBAI)

EQUITY ADDRESS

Focus

Fractional ownership of vacation homes.

Funding: Raised \$12.5M (2023).



Global Impact and Figures

2023-2024 INVESTMENT TOTAL

raised across

\$47.94 BILLION

1,739 COMPANIES

LEADING REGIONS



U.S.
\$173.5 billion
cumulative investments.

Europe
France and UK dominate
(**\$23.86 billion**
and **\$13.86 billion**,
cumulative investments,
respectively).

Asia
UAE (**\$1.8 billion**
cumulative investments)
and Singapore
as emerging hubs.

TOP CATEGORIES BY FUNDING



MANAGING

\$40B

Market intelligence
tools, property
management
solutions.



BUILDING

\$6.5B

Robotics,
3D mapping,
smart materials.

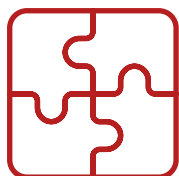
These investors shape the PropTech ecosystem through their investments in AI, blockchain, and sustainable tech solutions.

Chapter 1: Introduction



Why is a focus on PropTech vital?

PropTech touches every element of our lives. Most of the time, if all is well, we don't even think about the roofs over our heads, the condition of the walls around us, or the windows we look through. Yet, technology is transforming all elements of the real estate life cycle all the time. By the end of 2023, there was \$47.5 trillion USD in value locked into residential properties in the United States alone. This is to say nothing of multifamily homes and commercial properties. The value of the real estate market in Europe alone is even greater, estimated to climb to the heights of \$174.5 trillion USD in value by the end of 2024. **Valued at more than \$634.90 trillion USD, real estate investments are the world's largest asset class**, while also being an asset class that is definitionally illiquid. And yet, technology is constantly transforming the way property is built, invested in, managed, and lived in. **Robotics, 3d printing, AI/Machine Learning, and blockchain are just a few of the latest technologies at play.** While new regulations are likely to emerge especially related to certain technologies, including pricing algorithms and tokenization of real estate, it is vital for us to understand the breadth and depth of technologies in the PropTech ecosystem. After all, it is these technologies that are rapidly coming to shape almost every element of the property lifecycle.



What is PropTech?

PropTech is a portmanteau of the terms "property" and "technology." An alternative name for PropTech could be "Real Estate Technology." Through combining technology, real estate, and platform economics PropTech is understood as a subsector of the broader real estate industry. We divide PropTech companies into four categories based on which stage of the real estate life cycle they are primarily engaged with transforming: Building, Investing, Managing, or Living. Within these four categories, it is important to understand that there are industries, such as "Construction

Technology” (ConTech) that might not be automatically presumed to be part of the PropTech ecosystem in certain data sets but are indeed part of our in-depth analysis. In addition to all those materials, mapping, planning, permitting, and managing technologies related to the “Building” element of the property life cycle, this category of companies is also growing with the introduction of technologies like smart equipment and robotics.

When we investigate the Investing category of PropTech companies, many of these companies offer portfolio management platforms or software. Significantly fewer companies are involved with the developments of blockchain and tokenization of real estate as an asset class, however these players are certainly disrupting the existing market. Another core technology, beyond software, apps, and online platforms, for this category is data analytics. Massive collections of data now arrive so quickly they cannot be handled by traditional software. Termed big data, a whole new range of technologies are being created to handle massive and complex investor datasets. Further, big data analytics in all elements of the real estate life cycle is now increasingly enabled by a combination of algorithms, machine learning, and, more broadly, AI.

While the investing category may attract attention due to the promise of operating at the intersections of FinTech and PropTech, it is the Management category of PropTech companies that has traditionally attracted the most fundraising. Of course, PropTech technologies could be relatively simple user-facing software applications (apps) that facilitate searches for vacation rentals. However, complex data-analysis algorithms or business-to-business applications that facilitate the ease of real estate transactions are considered PropTech. Additionally, various forms of financial technology (FinTech), which might be used to facilitate the processes of applying for, evaluating, and providing mortgages - often referred to under a subcategory of companies called “Mortgage Tech” - are also part of the Management category in the PropTech universe. In the 2022 Barometer we summarized the field of PropTech through examining four key categories of companies in further detail (Building, Investing, Managing, and Living). This year, we are excited to maintain this simple rubric, for the ease of understanding the industry.



Where is PropTech most relevant?

PropTech emerged from a combination of innovations in the major American Real Estate markets of New York, Washington D.C. and California in the 1990s. Although Real Estate lagged in the dot com tech boom of the 1990s and potential growth was stymied by the global recession of the early 21st century, PropTech finally took off in the second decade of the 21st century, quickly spreading throughout Europe, Latin America, Africa, and Asia, including significant markets in the Middle East.

In this year's barometer, we will continue our emphasis on significant regions for PropTech. While we give a global update in Chapter 3, Chapter 4 examines the PropTech industry by regions. We begin with the United States, before progressing onward to Europe, and then developing detailed examinations of the markets in France, Spain, and Germany. Finally, we add a regional focus on Asia. Readers will find that PropTech is impacting certain Asian hubs in ways they might expect, such as the People's Republic of China becoming a major leader in the building category in recent years. However, Japan and South Korea still loom large in the tech sector overall. Furthermore, smaller Asian countries and city-states, including Hong Kong and Singapore are becoming significant players, while developing economies like Malaysia and Indonesia are not far behind. In India, we have seen both the growth of the country into the world's most populous market in recent years, coupled with ongoing crises of housing and resources, all while India has become a renowned global hub for the tech sector overall, as well as PropTech in particular. In Africa, South Africa and Nigeria are the most significant new hubs for PropTech, while Colombia, Brazil, and Chile have been attracting attention to Latin American markets. Finally, we have also seen surprising emergent companies establishing strong footing in Latin American states such as Peru and Colombia. In the end, as technology has become increasingly integrated into each element of our daily lives, it seems safe to say that PropTech is increasingly everywhere, all at once.

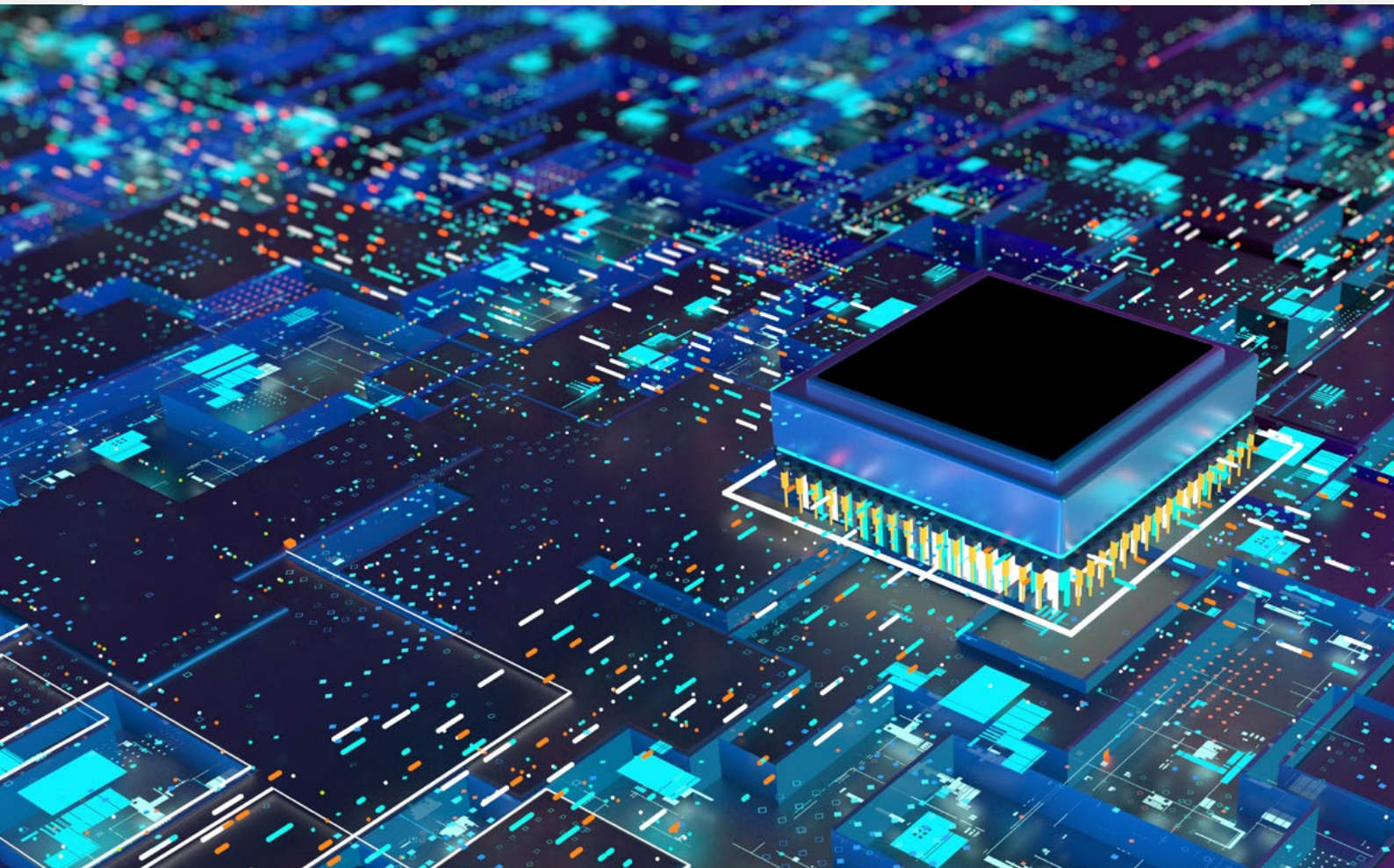


Who does PropTech impact?

Everyone. While it goes without saying that any serious investor in any industry should be keeping abreast of the developments in PropTech for the sake of maintaining an informed perspective on developing a diversified portfolio, it is also of note that those parties interested in PropTech are not limited to financial industry players alone. Ultimately, in our lives, we all live in property.

Whether you are a government, non-profit, or industry employee, someone searching for a short term stay somewhere, a renter, or a homeowner, and you have engaged in any form of property transaction lately, you have likely noticed the hybrid zombie of paper and e-documents that make up the contemporary real estate industry. Young professionals, families, university students, folks who are looking for a flat, or families looking for a home, including those looking for properties for their parents when they retire, your life is probably being transformed by PropTech as you read.

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 the UAE, Indonesia, and Peru. From Singapore to San Francisco, from Macau to Monaco, the innovation of **PropTech impacts us all.** Therefore, we have composed the 2024 PropTech Barometer to speak to the widest audience possible, from industry leaders, students, and government officials to the public.



Chapter 2: The Annual Update

Key Highlights

4

CATEGORIES

1,739

COMPANIES

2,494

INVESTORS

\$47.49 BILLION

RAISED (2023-2024)

61

COUNTRIES







\$5.805 BILLION



13,78%

Increase of \$5.805 billion USD from FY (Fiscal Year) 2022-2023, reflecting a 13.78% growth

Company Categories & Financial Performance

	 MANAGING	 BUILDING	 INVESTING	 LIVING
Total Raised	\$40 billion	\$17.8 billion	\$10.3 billion	\$6.5 billion
Generated	\$44.7 billion in revenue	\$4.6 billion in revenue	\$3.5 billion in revenue	\$21.2 billion in revenue

Investment Trends by Country

U.S. companies led with **\$173.5** billion USD raised



US

Top countries outside the U.S.



UK



France



Japan



Canada

Emerging markets show growth



Brazil



UAE



Hong Kong

Global Revenues, excluding the US

China leads in PropTech revenue generation



China

UAE ranks second, followed by India and the UK



UAE



India



UK

Countries like Colombia, Israel, and Egypt are emerging as significant players



Columbia



Israel



Egypt

The PropTech market in FY 2023-2024 experienced significant growth and consolidation, with leading investments and innovative technologies shaping the landscape. The strong performance in managing categories, along with emerging opportunities in building technologies, signals a promising future for PropTech investment and innovation.

In the 2023 to 2024 fiscal year - ranging from June 1, 2023, to May 31 2024 - a total of **1,739 companies raised \$47.94 Billion USD, with the help of 2,494 investors who completed 1,914 deals**. The relatively smaller number of companies and investors participating in the marketplace reflects a predicted further consolidation of the PropTech market that we highlighted in last year's barometer, as does the consolidation of deals into fewer countries. Still the growth of investments, which increased \$5.805 billion USD from the 2022-2023 fiscal year, represents the significant growth of the PropTech ecosystem. In other words, **the 13.78% increase in PropTech investments has clearly beat out the annualized gross domestic product growth rates of both the American economy and the Eurozone, making up one of the strongest**, and most promising, sectors of the economy in those regions. Venture capital remained strong across all quarters of the fiscal year, although there were massive jumps in Corporate/Strategic M&A deals in the latter part of 2023, with enormous deals completed in Private Equity following suit.

The largest single deal in the fiscal year was Black Knight's \$11.7 Billion USD M&A deal, although Wanda Commercial Management – China's first real estate group that has become well-known for transforming old urban areas and developing inter-regional projects – also completed a significant \$8.3 Billion USD deal, and the top eight deals were all a billion dollars or more. By comparison to last year, this means the largest deals in PropTech continued to grow, as the number two spot this year would have easily secured the number one spot last year, but the range of deals among the top ten is relatively comparable. The signs of a stabilizing market in the PropTech ecosystem may be interpreted by some as an indicator that the exciting times of the PropTech disruptors have come to an end, but this is hardly the case. Indeed, in this year's barometer we pay special attention to the most innovative technologies, the most groundbreaking companies, and the new horizons of the PropTech industry. Compared to the previous barometers we have completed, another exciting addition for this year is more in-depth region by region analysis, so that we might provide additional insights into where there are opportunities to introduce fresh technologies into emerging subsectors of the PropTech market.

Figure 1: Number of companies by category, 2023-2024 FY

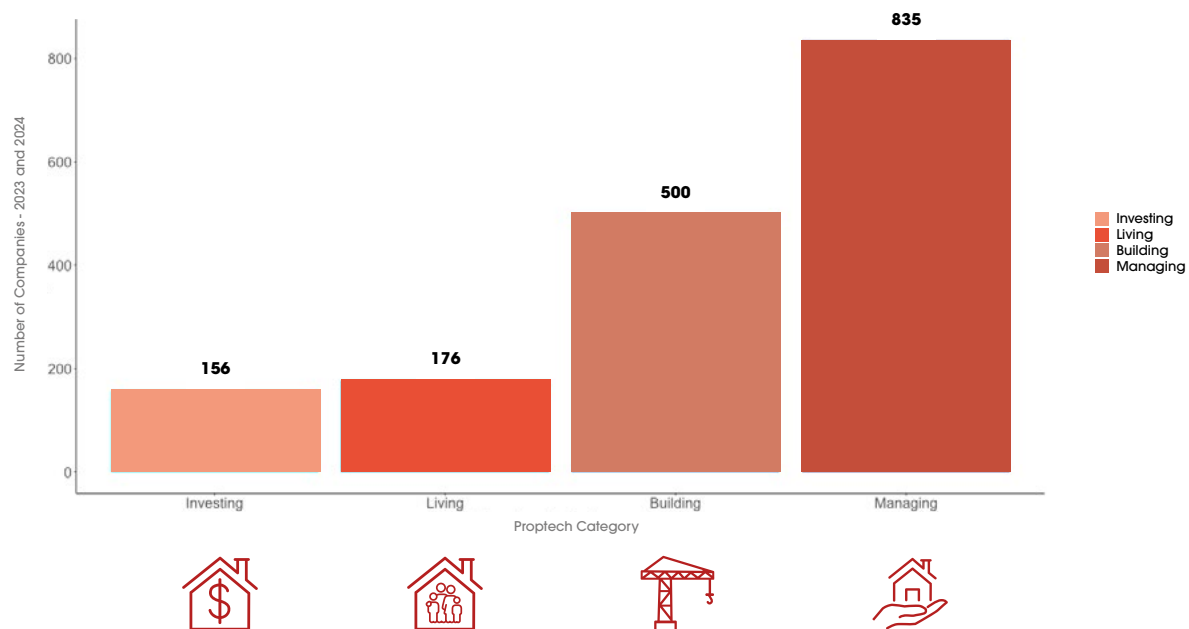


Figure 1 shows the number of companies by company category that were active in the 2023 through 2024 fiscal year. As we can see, the **Managing sector** of the PropTech community **remains strong**, although the **Building** category is **rather strong**, with a large number of companies working on the front end of the real estate asset life cycle, and fewer companies involved in the **investment and living** and working conditions **at the end of the life cycle**.

Among companies active during the 2023-2024 fiscal year, those in the **Managing category have raised both the most all time investments and the most revenue. Managing category companies have totaled \$40 Billion in fundraising and \$44.7 Billion in Revenue.** Next, while the **Investing category have raised some \$17.8 Billion in funds, the companies in this category generated just \$4.6 Billion USD in revenues.** Similarly, the **Living category has attracted \$10.3 Billion USD in fundraising, but made just \$3.5 Billion USD in revenues.** By contrast, the off neglected **Building category have attracted just \$6.5 Billion USD in total fundraising, despite earning some \$21.2 Billion USD in revenues.** The evidence suggests that the category is ripe for investment, especially as a diverse array of technological innovations are impacting all elements of the Building process, from materials to 3D printing and mapping technologies. However, this year, robotics and smart equipment has emerged as a clear leader, with new promising companies like Raise Robotics innovating in the marketplace by creating robotic equipment to compete necessary construction tasks in incredibly dangerous conditions, while making very precise records of the construction process, with their work initially supported by Berkeley's Sky Deck tech innovation start-up platform. The Sky Deck program is both an accelerator and an incubator, operated as a joint venture between the Haas School of Business and the Berkeley College of Engineering at the University of California-Berkeley. The program is a primary feeder of new companies, innovative technologies and personnel to Silicon Valley.



Watch the
interview

RAISE
ROBOTICS



We came from the exact opposite backgrounds. Gary had been in autonomous vehicles. My background was in structural engineering and construction equipment sales. We were looking for new ways to apply new technologies to construction, to these older industries. We'd meet a couple times a week, review potential use cases...go back to customers...pitch...see if they'd bite...once we got into the high precision fastener installations and leading-edge work...that's where we got the most traction...applied to Sky Deck...got in...and the rest is history.



Conley Oster
Co-Founder, Raise Robotics

Although there are fewer investments in the Building sector, there are a very significant number of new and emerging technologies, suggesting the Building category may be more ripe for prospecting investors. At the same time, there are very significant investments in the investing and living and working conditions categories, spread across far fewer companies, suggesting that the investing and living and working conditions categories are ripe for the development of new technologies, especially those addressing off neglected needs, while leveraging cutting edge technologies, such as **Vox Aeris** and **Craffle**.



Watch the interview



This started out addressing consumers' usual neglect toward indoor air quality. This seems to be a trend, especially in younger audiences...and that's why I wanted to design an air purifier that would serve this audience, who was basically unaware of the harm being done by invisible indoor air pollution. That's why I designed an air purifier that uses acoustic agglomeration technology, which later evolved into a commercial ventilation retrofit with particulate clustering and energy efficiency benefits.

Selene Sari
Founder, Vox Aeris



Vox Aeris



We started out in the pre-GPT era, building our proprietary algorithm that classifies furniture pieces by design type...(so)...This allows us to understand the furniture from a design standpoint. Then, we took it further by incorporating color, dimensions, and additional context. So that's how we developed our 'Craft My Style.' Basically, you give us your budget, and we furnish your space within that design style and budget.

Angela Kim
Founder & CEO, Craftle



Watch the interview

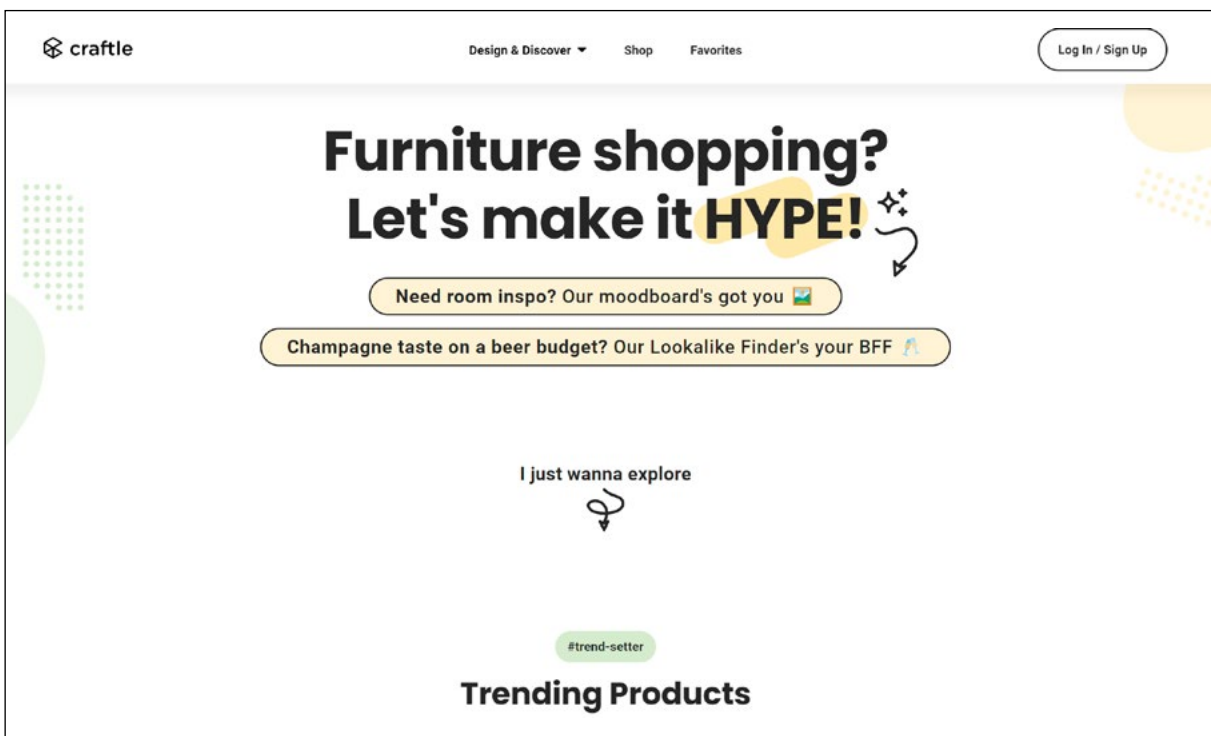


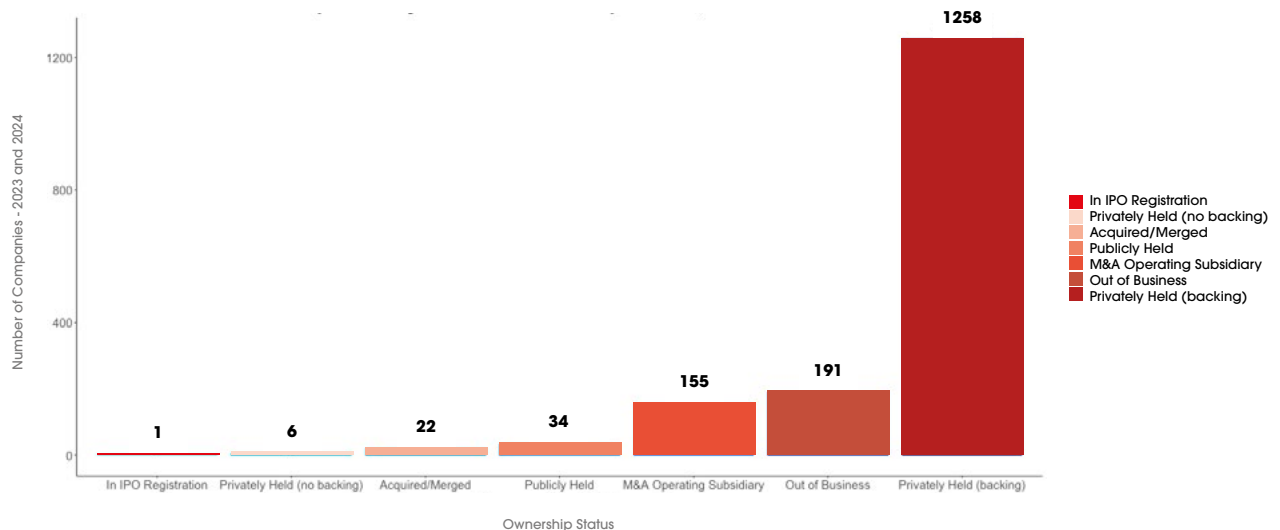
Figure 2: Companies by Known Ownership Status, 2023-2024 FY

Figure 2 shows the number of companies by known ownership status as of June 2024. **The vast majority (1,258) were privately held with backing, while a tiny portion were privately held with no backing (6).** Additionally, while a roughly comparable portion were either Out of Business (191) or M&A transactions where the resulting agreement ends with the key PropTech company Operating as a Subsidiary (155), comparatively small numbers were either publicly held or acquired/merged (22). Finally, one single company, **Royalty Management Holding Corporation**, whose work in the PropTech industry focuses on real estate permit transactions and patents, was in active IPO registration at the time of the data pull. What is significant about the above data is that the evidence suggests that while there are a significant number of mergers and acquisitions, relatively few numbers of these deals end up with companies ending operations in a full acquisition or merger. Instead, they more often continue operations as operating subsidiaries of the acquiring firm. **Regardless, in the coming year, it is very likely that the vast majority of PropTech companies will remain privately held.**



Figure 3: Mergers & Acquisitions by Category, 2023-2024 FY

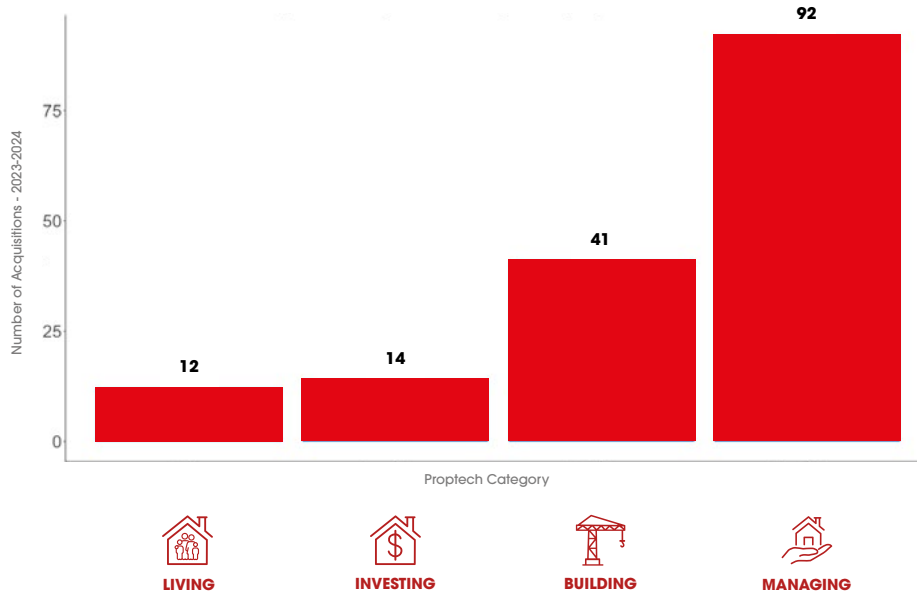


Figure 3 shows breakdown of the **159 Mergers and Acquisitions deals** by company category for the 2023 - 2024 fiscal year. While the **Managing category accounted for nearly 58% of the deals**, with 92 total mergers and acquisitions, the **Investing and Living category (with just short of 9% and 8% of the total each)** make up a smaller share of the deals than the **Building category alone**. The **Building category showed a strong performance from M&A deals in the past year, with a bit more than 25% of the total**. Although the number of deals was still much smaller than the Managing category, as we shall see, the Managing category makes up a much larger share of the market. Consequently, the evidence suggests that **while there is more space in the Building category for new companies and investors to merge, the chances that a Building category company will be involved in a significant M&A deal are relatively greater**. The situation likely reflects the nature of construction technology companies, where a company operating in a very specific niche develops a very promising technology and subsequently, they become a ripe target for an acquisition.

159

Mergers and Acquisitions deals

58%

Managing category deals

Figure 4: Total Fundraising for PropTech Companies Active in 2023-2024 FY, by Category and Fundraising Size

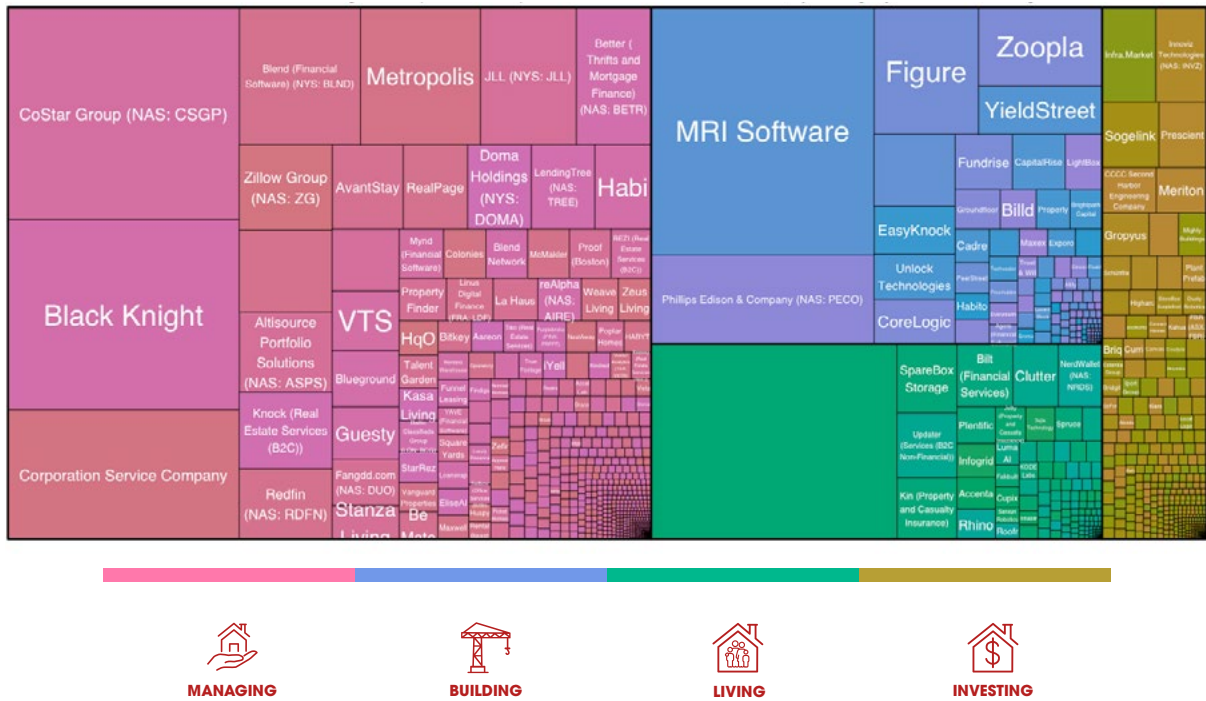


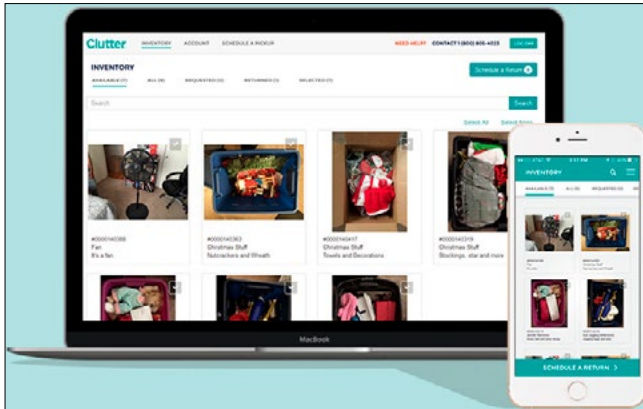
Figure 4 shows the All-Time Total Fundraising totals for PropTech companies that were active in the 2023 to 2024 fiscal year. **The Building category has raised \$6,486.03 Million USD, while the Living category has raised a total of \$10,306.63 Million USD.** An example of a top deal maker in this category is **Clutter**.



Clutter

Clutter is a provider of on demand storage and moving services, including being the largest provider of "Smart Storage" technology. Smart Storage is arranged through an app that allows for scheduled arrival of moving labor and packing services to a location, so that the customer does not even need to pack most of their belongings. Each item is photographed and digitally cataloged in an online-accessible inventory. The items are then shipped to a climate-controlled storage facility. By viewing items in the inventory, customers can then select to have each item delivered on demand.

Founded in 2014, Clutter has been listed on CrunchBase's website lists of US acquired companies with more than \$10 million in revenue and Shopzilla Alumni founded companies.



Clutter

Clutter was acquired by Iron Mountain (Systems and Information Management) for \$60.6 million USD on June 29, 2023. As Iron Mountain is primarily a storage business with the rest of their revenue stemming from value-added services, the acquisition will bring Smart Storage technology to Iron Mountain's service platform.

Despite the success of many companies in the Living and Building categories, the Building and Living combined still have not raised as much as the active companies **in the Investing category, which have raised a total of \$17,761.6 Million USD, while the Managing category rose far above the rest.** With more than double the fundraising of the Investing category, **Managing category companies active in the 2023-2024 fiscal year have raised an all time total of \$40,036.19 Million USD.** In part, this fundraising has to do with the fact that **the managing category has attracted the most investment in technological solutions that directly address common problems** that appear in the management of property. For instance, landlord tools, like Modives, are companies that often attract a significant amount of attention and develop user bases quite quickly. In the case of **Modives**, the specific problem they address is the verification and record keeping associated with renter's insurance.



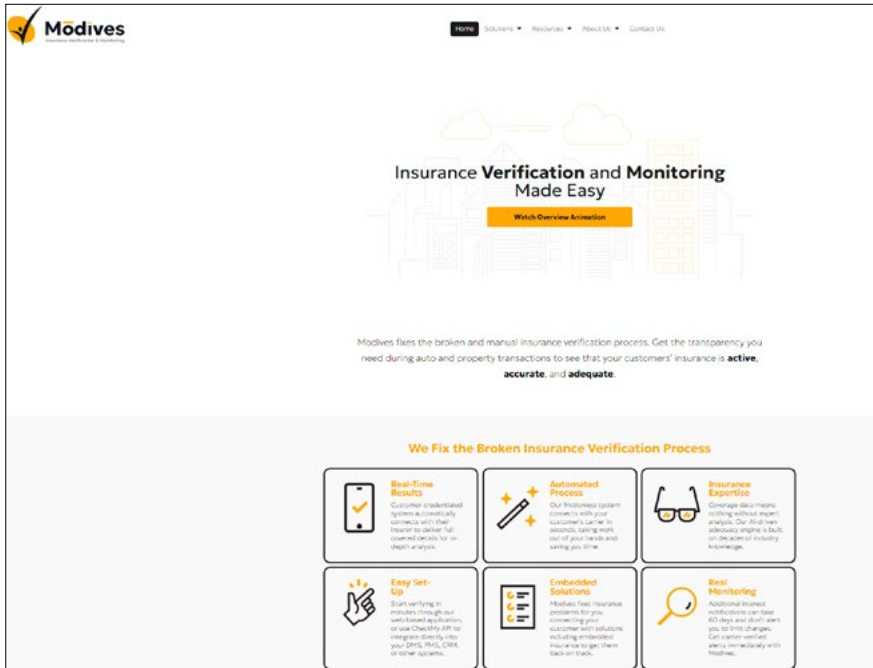
Watch the interview



The big difference in technology is we are not dependent on the upload of a declaration page and scanning it using AI or Machine Learning... but rather, we are helping the consumer connect with their carrier...analyze it through our own AI-driven adequacy engine, which looks at the coverages themselves and matches them with those required by the property. Also, using our decades of industry experience working with insurance to make sure that logic is correct, and that coverage is what it should be."

Joel Samen
Chief Marketing Officer, Modives





Across the cycle, we saw enormous deals completed by **MRI Software** which totaled **\$350.059 million**, being by far the largest deal maker of the Investing category, with a total of 2% of the share of total fundraising among the 156 companies in the category. As a transformational developer of real estate software, MRI has been providing solutions for owners, occupiers and agents for decades. Their software helps automate workflows, aids with budgeting and forecasting, improves debt management, allows users to visualize complex data, provides strategic planning for investments along with portfolio analysis, and provides compliance management, including for affordable and public housing programs. Although it may be surprising to see a company involved with affordable housing making such an enormous impact, when one considers the breadth and dept of MRI's software solutions, it is easy to see how it rose in the ranks of real estate software developers.



MRI reached this year's total fundraising heights through a series of four deals. They began when they raised \$338.09 million of debt financing on November 27, 2023 and an additional \$249,000 of debt financing on February 10, 2024. These deals followed upon two previous debt financing deals, being \$1.19 million on September 30, 2023 and \$10.53 million of debt financing on June 30 of 2023. Further, among PropTech

companies active in the 2023-2024 fiscal year, MRI Software has the highest all time fundraising numbers, totaling \$5.93 billion, a status in part explained by the company's storied history. The company began as Management Reports Incorporated in 1971 but was known as Intuit Real Estate Solutions after the company behind TurboTax' fame acquired MRI's suite in 2002, before being renamed in 2009, after an acquisition by a private equity firm.

The financiers for MRI Softwares debt financing deals span a range from T. Rowe Price OHA Select Private Credit Fund and North Haven Private Income Fund - two private business development firms in New York City - to lenders such as Golub Capital, Crescent Capital Group, Ares Management, and Antares Capital, with the aim of supporting further acquisitions for the expansion of MRI massive and influential software suite. Furthermore, as announced in October of 2023, the MRI Agora platform will use the OSCRE Industry data model - a free access and open standards model - to facilitate the integration of potentially disparate software applications through improved decision making and data standards. The improved technology will result in making software systems integration faster, safer, and less costly. Hence, PropTech watchers should be on the lookout for more acquisitions led by MRI to be shifting the PropTech ecosystem through 2024 and 2025.

Similarly, between CoStar Group (\$5.75 Billion), Black Knight (\$5.15 Billion), and Corporation Services Company (CSC, \$3.50 Billion), more than a third of the Managing category fundraising is accounted for by just three behemoths. CoStar is a global leader in providing commercial and residential real estate information, analytics and online marketplaces, while CSC is a global leader in the providing of business administration and compliance. **Where the field gets more interesting is the Living and Building categories, where less overall fundraising is balanced by a more diverse marketplace in terms of technologies that companies are offering.** For instance, while the big players in Investing operate with a range of technologies that are relatively similar, Infra. Market, Innoviz Tech, and Sogelink - the top three companies active in 2023-2024 by all-time fundraising, offer a range of technologies.

For instance, **Infra.Market** (\$596.35 Million USD) is a one-stop online platform for building materials, while **Innoviz Tech** (\$558.98 Million USD) focuses on LiDAR sensors and perception software. Finally, **Sogelink** provides SaaS-based business software that services the construction industry, providing solutions for project management, design and engineering, and safe construction. Thus, within the Building category, even the top players are focusing on a relatively wide array of technological solutions.

INFRA.MARKET

INNOVIZ™
TECHNOLOGIES

sogelink



Overall, while some of these major players were involved in the largest deals of the cycle, such as Black Knight, MRI Software, Corporation Service Company, and CoStar Group, others, such as Zillow Group – the American tech-giant that disrupted the entirety of the global real estate market with the innovations of its online marketplace since its founding in 2006 – are represented in the long-term data, but only completed, relative to their overall fundraising, rather small deals in the cycle. For instance, Zillow Group’s deal was a \$270,000 USD PIPE deal, while AvantStay – the hospitality platform that has redefined how people work, travel, and invest – completed two smaller General debt deals, being \$3.12 and \$.43 million USD respective, which nonetheless, contributed to their significant all time total of \$702.67 million USD, keeping them in the top 20 of all time fundraisers active in the past fiscal year.

Figure 5: Top 10 Investments Origin HQ Country, 2023-2024 FY

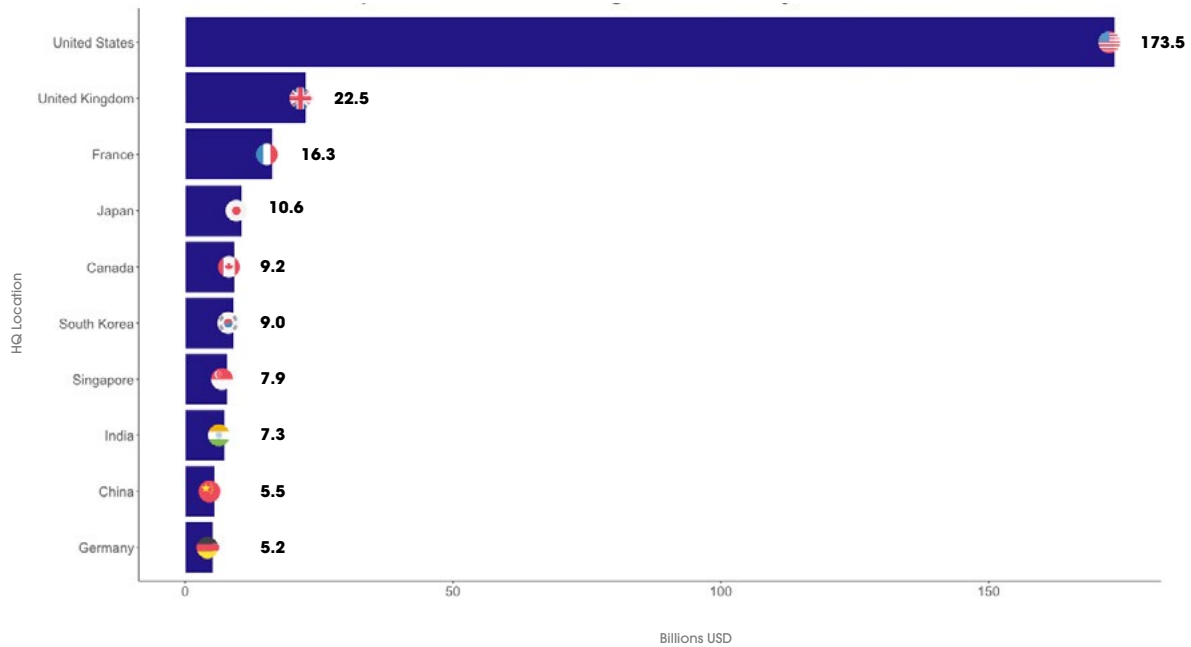


Figure 5 shows the global investments in PropTech by country, as organized by the HQ location of PropTech companies. Given the global nature of the PropTech ecosystem it is safe to say that some of the investments in companies headquartered in the United States are going to offices in Europe, much like the earlier established pattern with GIC Singapore, which has a quite active European office. Importantly, GIC Singapore is the investment corporation of the Government of Singapore. With a global network of ten offices in a variety of countries, spanning the continents, GIC Singapore has invested widely across developed market equities, private equity, and real estate, as well as in choice industries, such as the PropTech industry. With an aim of achieving returns that beat out global inflation on the 20-year horizon, GIC Singapore has an impressive longer-term strategy. At the same time, **the data shows that the American players continue to dominate the market, having raised a total of \$173. Billion USD as of the 2023-2024 fiscal year.**



173.5

Billion USD

Figure 6: Global PropTech Investments, 2023-2024 by HQ Location, without the US

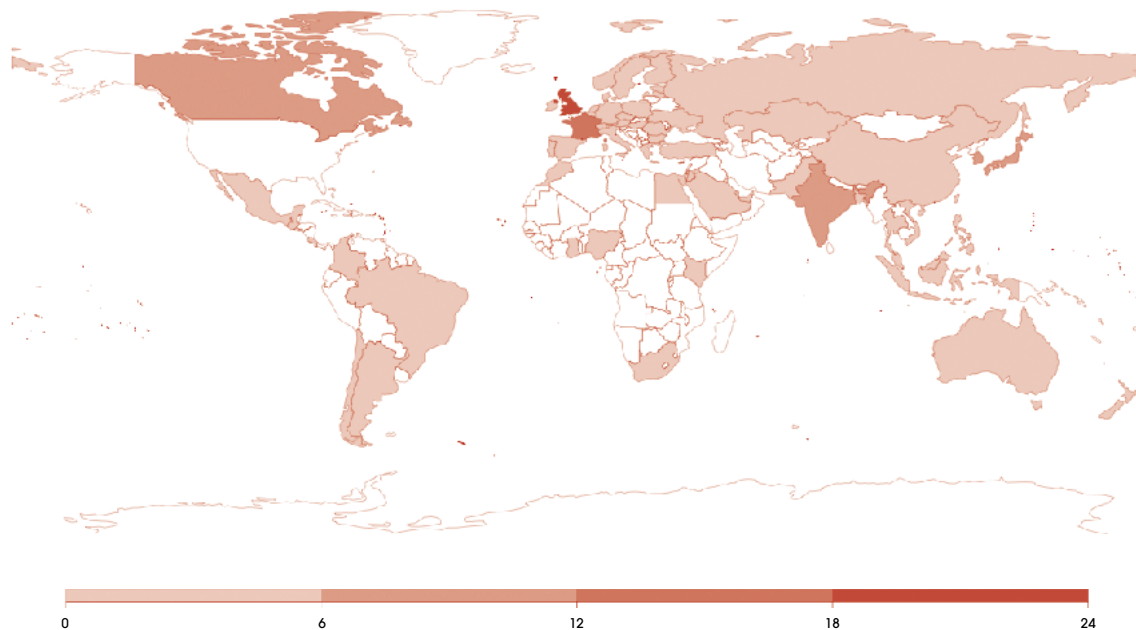


Figure 6 provides a visual aid for understanding the global PropTech investments for the past year, organized by the country of the headquarters of the company. **Notably, after the UK, France, Japan and Canada took up the top slots, India and China have both fallen in rankings compared to previous years.** At the same time, **Germany has resecured its spot in the top ten**, and the **strong performances of South Korea and Singapore** represent a trend of emerging top performers from small, particularly wealthy, nations. By the same token, if we expand the list to the Top 20 countries, we notice several **exciting emerging PropTech markets such as Brazil (\$2.5 Billion USD), the UAE (\$1.8 Billion USD), and Hong Kong (\$1.6 Billion USD).** Of course, Brazil often ranks among the world's largest economies, but Hong Kong and the UAE are further evidence of the trend of emerging PropTech super players in markets concentrated in small areas of incredibly high real estate value and excellent funding to encourage their growth as emergent tech hubs. Further, there are classic European tech hubs on the top 20 list, such as Spain (\$2 Billion USD), Ireland (\$3.3 Billion USD), and the Netherlands (\$3.6 Billion USD). At the same time, while the funds and resources are smaller, we see some growth in select developing markets, including, but not limited to: Vietnam, Indonesia, the Philippines, Thailand, Kenya, South Africa, Nigeria, Ghana, Colombia, Costa Rica, Guatemala, Chile, Argentina and Mexico.

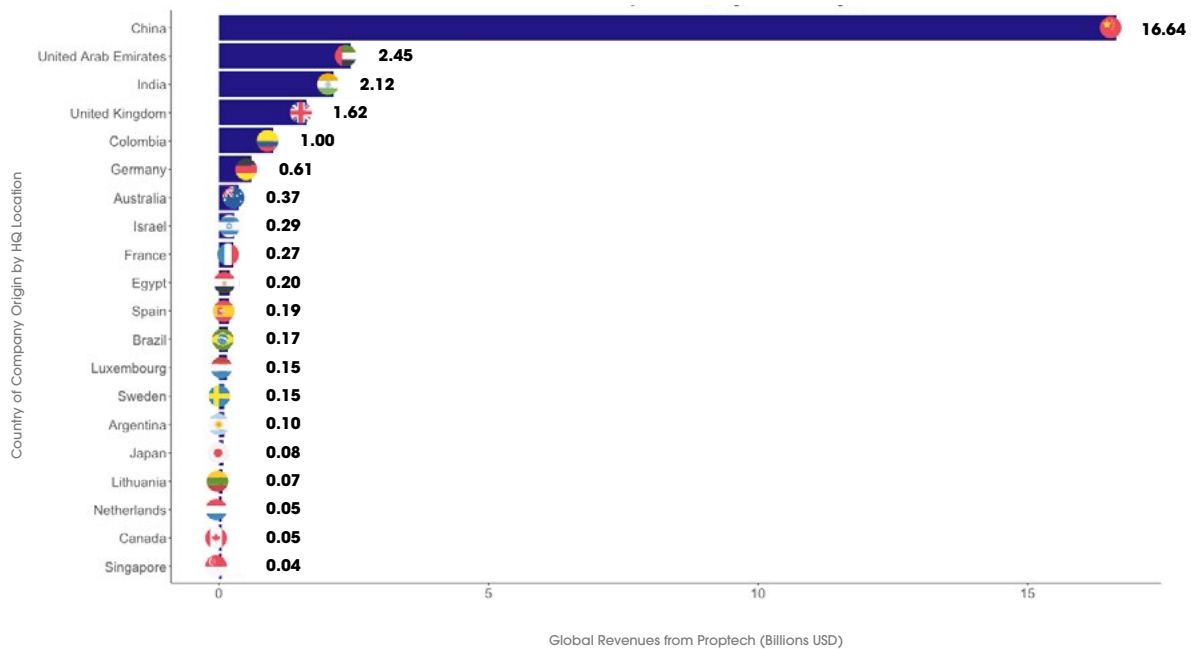
Figure 7: Global Revenues in PropTech, by Country, excluding US, 2023-2024

Figure 7 shows the global revenues of PropTech companies from the 2023-2024 fiscal year excluding the United States. As we can see, no country outside the United States is close to the People's Republic of China in terms of revenue generation for PropTech companies. However, **it is somewhat surprising to see that the United Arab Emirates is second on the list, well ahead of India and the United Kingdom.** Furthermore, Colombia, Israel, and Egypt are shaking up the mix, coming in alongside Germany, France, and Spain. There is little doubt that the countries that are generating more revenue tend to have more robust PropTech markets, such as China, India, and the United Kingdom, in that their markets tend to be more diverse, and may not necessarily even be dominated by the managing category. As we shall see later, **although the Managing category dominated the deals market in Spain this past year, the German market was more evenly split between Building and Managing, while the top deal in France was in the Living category.** It is important to keep in mind the balance of the approaches of the four categories of PropTech companies (Building, Investing, Managing, and Living) as we consider investment trends.

Investment Trends

Key Highlights

- **Decline in number of PropTech investors** creates new opportunities for entrants despite fewer players.

- **JP Morgan:** Launched the "Story" platform in 2023 and partnered with Techstars on an \$80M fund in 2022.

- **Techstars:** Key investor in PropTech startups, with a focus on diverse entrepreneurs, thanks to their partnership with JP Morgan.

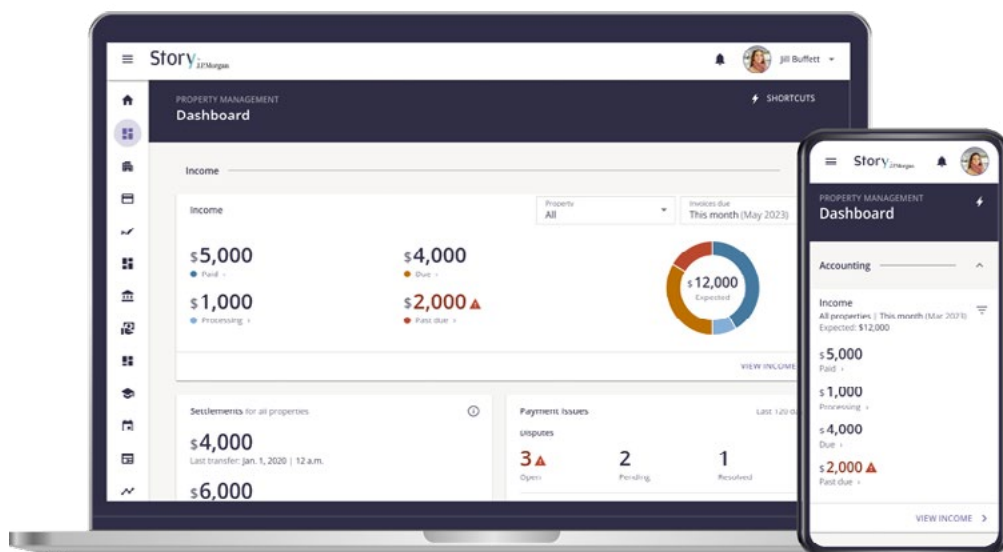
- **Abu Dhabi Investment:** Launched Quanta and Dari platforms in 2022, driving the PropTech ecosystem in the UAE.

- **Equity Address:** A Dubai-based startup that raised \$12.5M by November 2023 for fractional ownership of vacation homes.

- **GIC (Singapore):** Named **Institutional Investor of 2023**, made key investments in Europe (Paddington Central, The Student Hotel) and Latin America (Loff's \$100M Series E).

- **Growth trends** include new opportunities in developing markets, especially in Asia and Latin America, as well as new regions of the United States, despite the saturation of the PropTech market in California and New York

While the number of investors in PropTech has declined significantly compared to the previous fiscal year, this consolidation of the investing side of the PropTech ecosystem suggests that there are, therefore, increased opportunities for new investors to enter the marketplace. Still, prospectors and disruptors should be aware there are some enormous players active in the PropTech investing habitat as well. For instance, JP Morgan in the United States, while having a huge amount of Assets Under Management, is also bringing innovation to PropTech. In 2022, JP Morgan launched its multifamily management platform, called **Story**. The platform, which was rolled out in 2023, offers property owners and operators streamlined and simplified processes for managing their portfolios, allowing them to scale their businesses more easily. Further, **Techstars**, one of the most active investors in PropTech startups, has an \$80 million USD partnership with J.P. Morgan that was established in 2022 and allowed Techstars to invest in diverse and overlooked entrepreneurs across nine US cities. The fund aims to elevate over 400 companies across major American cities, including in the process of developing new tech hubs in Atlanta, Detroit, New Orleans, Miami, and Oakland, in addition to traditional markets like Los Angeles, New York City, Chicago, and Washington, D.C.



Story J.P.Morgan

Figure 8: Top Global Investors active in the 2023-2024 fiscal year by Assets Under Management (AUM)



In addition to JP Morgan and Morgan Stanley, other gargantuan investors that have begun to transform the PropTech ecosystem include Abu Dhabi Investment, as the United Arab Emirates, like Singapore, has become one of the relatively small but rich countries that is leading the PropTech revolution. Abu Dhabi Investment, for instance, is a sovereign wealth fund that is owned by the Emirate of Abu Dhabi in the United Arab Emirates, which manages the Emirate of Abu Dhabi's oil reserves, which contribute substantially to its \$1 trillion in managed assets. In 2022, Abu Dhabi Investment launched Quanta and Dari, two new platforms in partnership with Advanced Real Estates Services (ADRES), a key PropTech venture developer. While **Quanta** is a platform supporting big data analytics, providing information on transactions, supply, financing, and performance, **Dari** is a company that provides app-based home services, such as cleaning, childcare, car washes, pest control, and other sanitation needs, in addition to property search, sale, rent, and purchase features.

Quanta

DARI داربي

The growth of investing in the Gulf States is not just limited to the United Arab Emirates city of Abu Dhabi but can also be tracked in the city of Dubai. Equity Address is a financial platform that is designed to facilitate the co-ownership of vacation homes as real estate assets. Users invest in a portfolio of homes in prime locations utilizing a detailed dashboard to manage transactions. They access perks such as fractional ownership, future gains, flexibility in scheduling, and shared expenses.

As a relatively young and nimble start-up, Equity Address was founded in 2021 in the United Arab Emirates and capitalized with an initial \$100,000 in funding from a group of private investors, including Mohit Gupta, Abhishek Madhukar, Puneet Gupta, and Aashish Raj, several key supporters of PropTech in Dubai. The company raised \$12.5 million of venture funding as of November 2023, to further scale their operations, making them a regional leader in fundraising. Indeed, two competing Saudi companies, Konn (Riyadh) and Mabaat (Jeddah) – which specialize in design to build homes for investors and an online rental management platform for short-term travel stays, respectively- have not yet matched Equity Address' fundraising, despite being relatively similarly sized and aged companies. **The success of Equity Address' fundraising may be an early sign that investments in cultivating PropTech in Dubai are paying off. Although the industry is relatively young in the region, Dubai is emerging as a leader - as also indicated by the choice to host the 2nd Annual Mideast PropTech summit in Dubai in January 2024.**

Of course, Abu Dhabi investment is active in markets beyond Abu Dhabi and Dubai as well. Similarly, GIC (Singapore) is a sovereign wealth fund, and represents a relative newcomer to the PropTech ecosystem in that they began investing more directly in PropTech venture funds starting just five years ago in 2019. Active elements of the Europe playbook for GIC Singapore include a Net zero play, which became the first net zero carbon development for the UK in 2020, the London office of Paddington Central – an 11-acre mixed-use development nearby a picturesque canal in the heart of London –where GIC acquired a 75% stake in 2022, and a hybrid hospitality play, combining traditional hotels with other services, where GIC acquired a substantial stake in The Student Hotel in 2022. In October 2023, they acquired a 35% stake in Hotel Investment Partners, an operator of a real estate investment firm based in

EQUITY
ADDRESS

Barcelona, Spain and also an owner of resort hotels in Southern Europe. Thus, it is not a surprise that **Private Equity Real Estate News (PERE News) named GIC the greatest institutional investor in 2023**, while also naming them the Hotel and Leisure Investor of the year.



GIC is the second largest investor among active investors as measured by number of investment professionals, indicating that their foothold in the PropTech marketplace can grow rapidly in the coming years. This does not just include Europe, but also Latin America. An example of one of the companies that GIC Singapore has invested in is Loft, which completed a Series E VC round in August of 2023 for \$100 million USD in the form of convertible notes from Andreessen Horowitz, Fifth Wall, GIC Singapore, and others, with the aim of using the funds to drive expansion in Brazil and more broadly in Latin America in the coming years. As Loft is an operator of an online property searching platform facilitating the sale, purchase, and rental of both residential and commercial properties, the platform's planned expansion into Brazil is indicative of a broader observable trend where there is space in developing markets, especially for companies in the Managing Category, even though the Managing category may feel relative saturated and deeply competitive in the United States. Top Active Investors in PropTech are increasingly paying attention to these new opportunity niches in the PropTech ecosystem with each passing year.



Figure 9: Most Active Investors by Raw Number of Investments, 2023-2024 FY

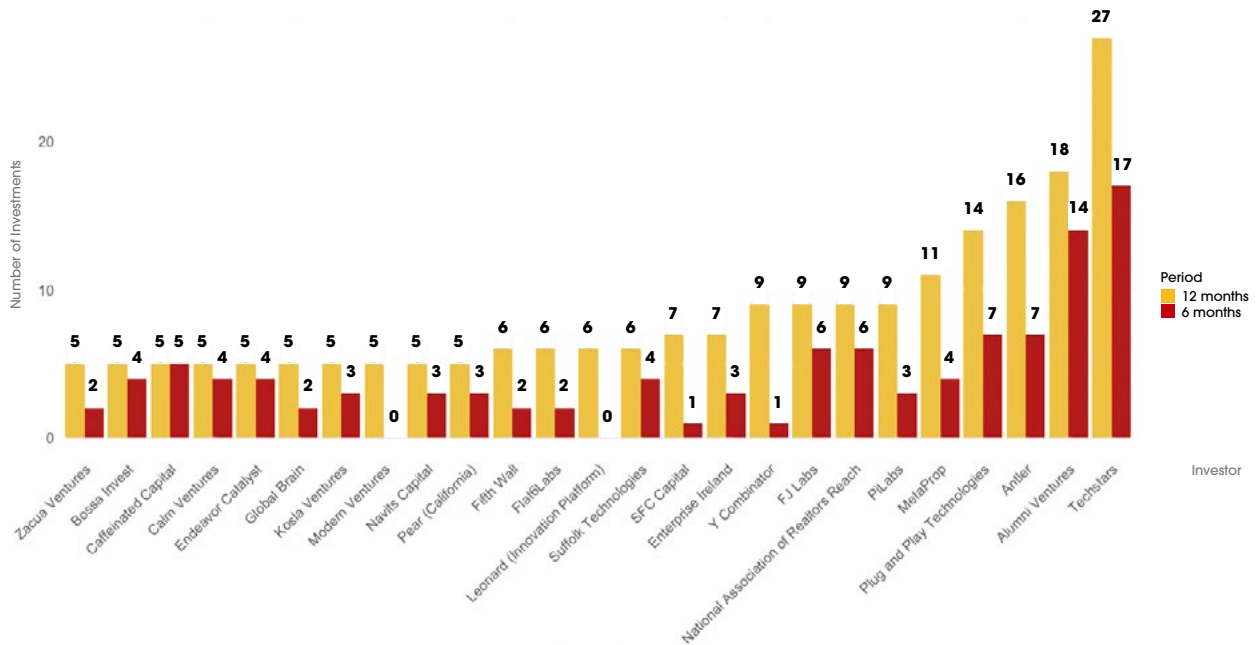


Figure 9 shows the investments made by raw investment count of the most active PropTech investors over the course of the first six months of the 2023 - 2024 fiscal year, as well as the entirety of the 2023-2024 fiscal year. Clearly, many investors made a significant portion of their annual investments, often half or more than half, in the summer and fall quarters of 2023.

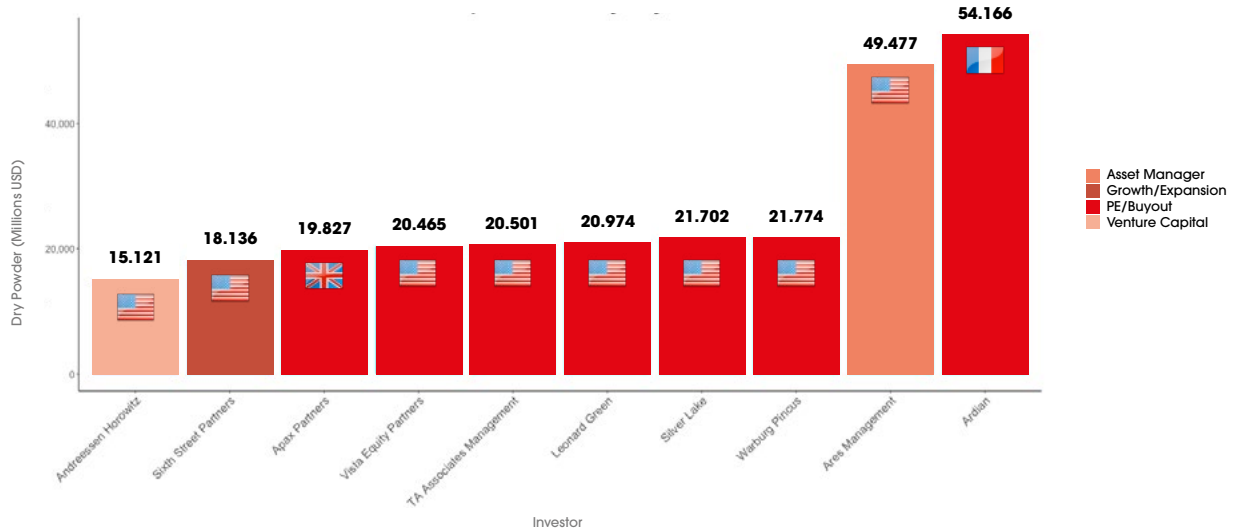
The top three most active investors were Techstars, Alumni Ventures, and Antler Ventures.

- **Techstars** was the most active investor for the year, with 17 investments in the first six months, and another ten investments in the second six months, for a total of 27 investments made over the course of the year.
- Similarly, a significant portion of the most active investors, including **Alumni Ventures**, National Association of Realtors Reach, and FJ Labs had more active investments in the first half of the year.
- Yet, other major players, such as Metaprop, Plug and Play Technologies, and **Antler Ventures**, seem to have ramped up their investments in the PropTech ecosystem in the winter and spring quarters of 2024.

What the data suggests is that there is not necessarily a “best” time of the year to approach these investors for the burgeoning new disruptor, when the reality is that it is best to follow their funding cycles and open calls, as well as attend key events.



Figure 10: Global Top Investors by Dry Powder

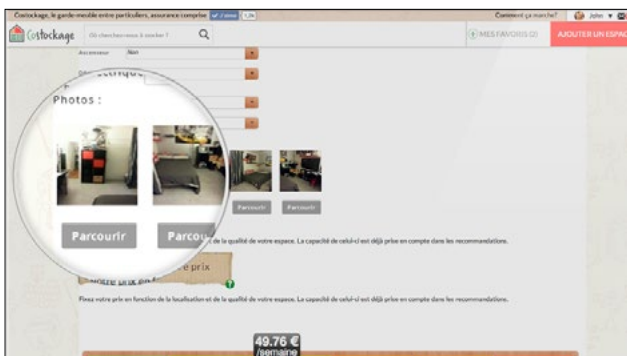


While understanding which are the most active investors in the PropTech ecosystem, it is also important to understand which investors have the most “dry powder” - or the measure of cash and low-risk marketable securities that are easily converted into cash - a given investor has at their disposal.

Figure 10 shows the top PropTech investors across the globe ranked by their access to dry powder and categorized by their investor type, along with the country of their headquarters. For instance, the leader by this measure is **Ardian**, a France-based independent private equity investment company and one of the largest European-headquartered private equity funds, with a grand total of \$169 billion in Assets under management. In January 2024, Ardian announced the acquisition of Costockage, a French company that specializes in self-storage.

Costockage was founded as an online marketplace for rental of storage units in 2012. In 2017, they launched **Kostok**, which operates storage spaces with an innovative digital approach, now at 10 centers, across France. Although the amount of the deal has not yet been disclosed, Ardian has clearly continued its active long-standing investments in traditional real estate, while expanding its horizons in PropTech.

ARDIAN



Costockage

Another expansion by a top investor firm measured by dry powder is Ares Management Corporation, a leading global alternative investment manager with \$447 billion in assets under management. Ares also just announced the opening of an office in Japan during the past fiscal year, a move that expands on their existing offices in China, Hong Kong, Singapore, and South Korea. The opening is planned for 2024.

Figure 11: Global Top Investors by Dry Powder to AUM Ratio

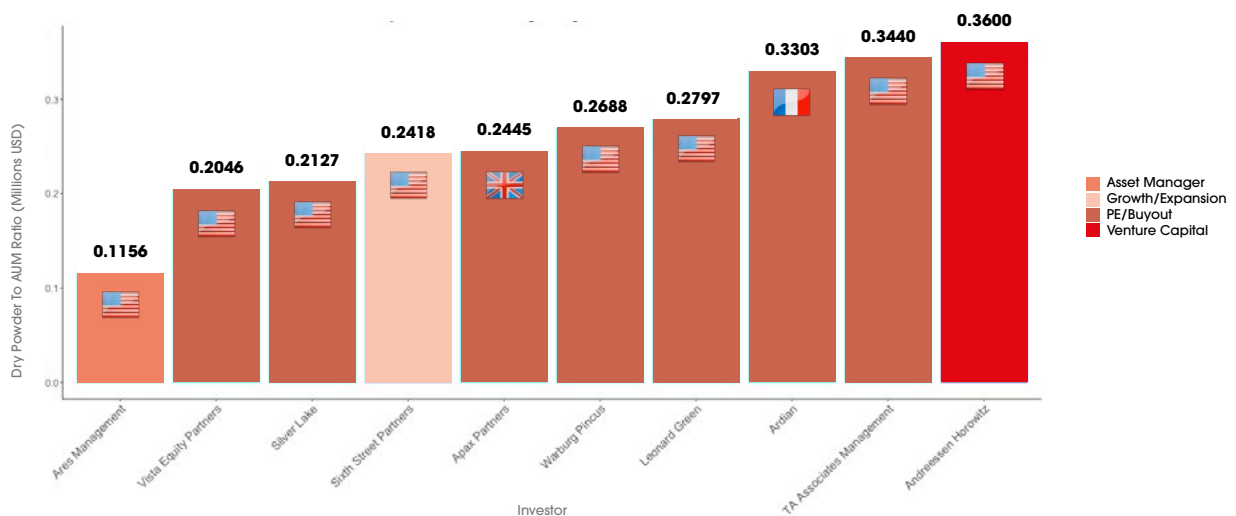


Figure 11 shows the top investors by measuring their access to dry powder as a ratio of their assets under management. Here, we see that while **Ares Management** and **Ardian** have a significant amount of dry powder, that relative liquidity also represents a relatively large portion of their assets under management, being \$447 billion and \$169 billion, respectively. Investors on the top of this list, at **Andreessen Horowitz**, might be more willing to tap large amounts of dry powder when compared to those at Ares Management, as they are less likely to face liquidity issues in the near term and are bolstered by their \$42 billion in assets.

Further, Andreessen Horowitz is already a key investor in PropTech companies such as Setpoint, Loft, Divvy, Flow, Flyhomes, and Topkey, to name a few. While Divvy operates a freemium model platform that eliminates fees from the basic usage of their platform and issuance fees for smart credit cards, Flyhomes is the world's first AI-powered home search. Thus, it is easy to see that investing in new technologies and



ARDIAN

ANDREESSEN
HOROWITZ

fundamentally new approaches to existing markets are key features of Andreessen Horowitz' investment strategy in the PropTech ecosystem. They have also invested in the mortgage technology of Valon, as well as the construction technology of Mosaic and Doxel. To say the least, Andreessen Horowitz' team has certainly recognized the technological value that PropTech companies are bringing to market.

Figure 12: Top 10 Global investors with an office in Europe by last investment type, 2023-2024 FY

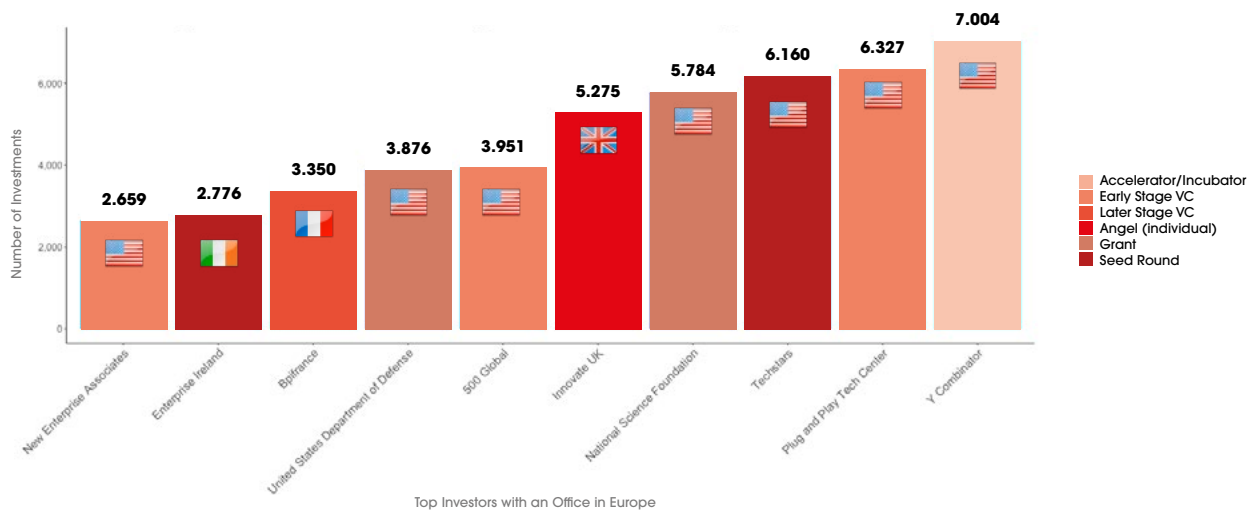


Figure 12 shows the top global investors with an office in Europe for the 2023 - 2024 fiscal year, as measured by their total number of investments. **The data is a reminder that it may not necessarily be a European investor that could be involved in some of the biggest and most innovative PropTech plays in the European market. Instead, we have a number of American accelerators that have a significant foothold in Europe, including the giants: Y Combinator, Plug & Play Technologies, and TechStars.** These three top players represent the earliest, most active, and most impactful accelerators in the market. Y Combinator, for instance, helped to launch globally renowned companies, such as Airbnb, DoorDash and Coinbase. Plug and Play has raised over \$9 billion for its portfolio, boast over 300 VC investors in its ecosystem. Finally, Techstars continues to back some of the freshest and most innovative entrepreneurs on the market, including the leaders of Craffle and Raise Robotics, who feature in the interviews of this year's barometer. At the same time, these giants are also involved in a variety of investment types. For instance, while BPI France and Y Combinator were recently involved in Later Stage VC deals and Plug and Play was involved in an Early-Stage VC deal, Techstars was involved in a seed round.

Figure 13: Top 10 Deals, 2023-2024 FY



Figure 13 shows the largest deals of the 2023 - 2024 fiscal year. We reported the Intercontinental Exchange (ICE) acquisition in the 2023 Barometer, as the deal was announced already with a plan of merger in May 2022. Black Knight is primarily a data analytics and software company operating to serve the housing finance industry, especially mortgage lending and servicing, but also secondary markets. Thus, the key technology at play could be argued to be Black Knight's data analytics. However, negotiations that took nearly a year resulted in an amended merger agreement as of March 2023. Shares were then rolled over in August 2023 and the deadline for Black Knight shareholders to submit elections was September 1. Thus, the deal was only finally completed on September 5, 2023, making it the top deal to be completed during the 2023-2024 fiscal year.

Figure 14: PropTech Deals, 2023-2024, by Company Category

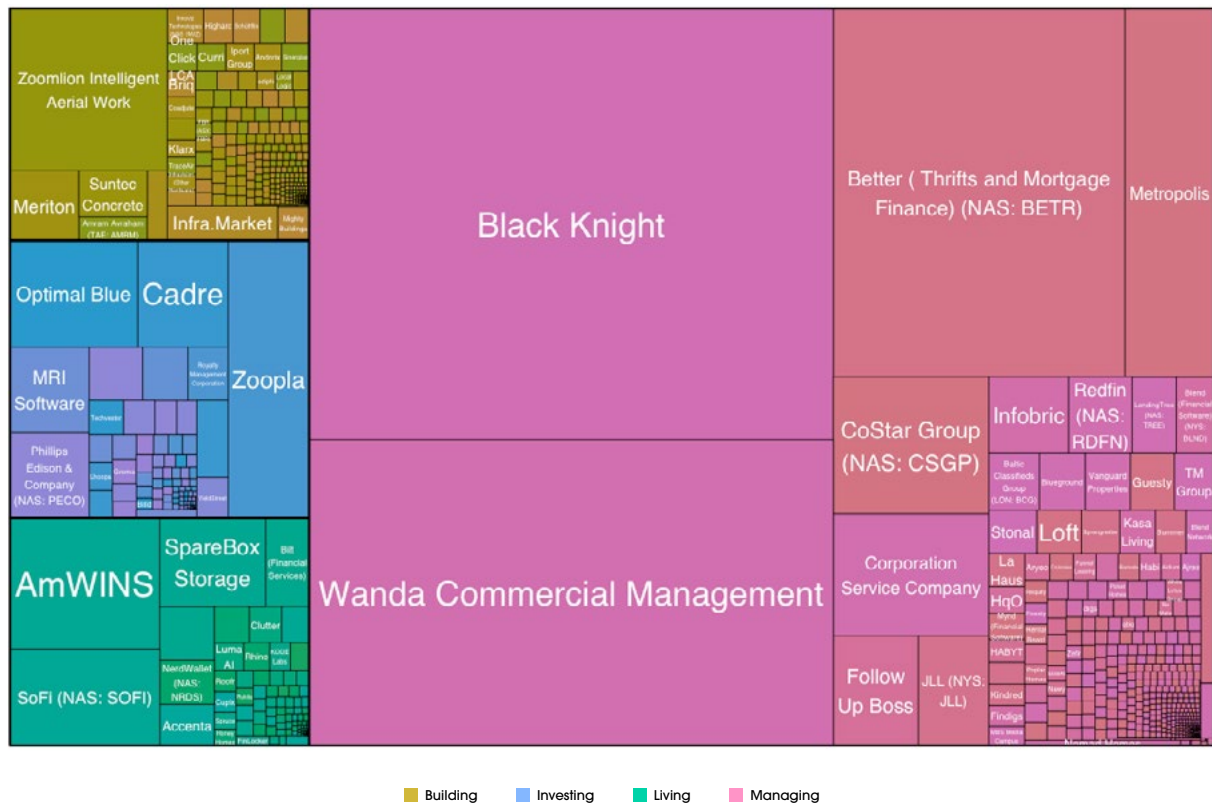


Figure 14 gives an overall portrayal of the deals in the PropTech ecosystem over the course of the past fiscal year. As we have indicated above, **the performance of the Managing category is now more than half of the market share in terms of funds raised in a single fiscal year.** While the long-term fundraising totals, as previously indicated, are much more balanced, the deals completed in the past year were overwhelmingly dominated by Managing category companies. **This does not simply include the top six deals in the category, all of which were more than a billion USD each, but it also includes over 150 small deals that were less than a million USD each.** The nearest competitor in terms of small deals under a million USD was the Building category, with 106 deals. The reason the numbers of these small deals are significant is because they typically represent the very early initial seed funds of small startups. A category that is seeding more startups now will almost certainly see a larger share of the market in the future. There is simply more action in the Managing category and it's worth keeping that dynamic in mind as we consider our global PropTech Update of the past two decades of the industry in [Chapter 3](#).

Chapter 3: Global PropTech Trends (2005-2024)

Key Highlights

9,053

COMPANIES

18,453

INVESTORS

\$461.95

BILLION

97

COUNTRIES

Over the course of the past 20 years, the major players in the PropTech industry have been in the United States. Of the \$461.95 Billion USD that has been raised for investments in the PropTech industry, \$304.767 Billion of those funds were raised in the United States. Another \$52.90 Billion USD were raised in China, with major European players, being the United Kingdom, Germany, and Spain, having raised \$23.88, \$13.86, and \$13.38 Billion USD respectively.

Figure 15: Top 10 Companies by Investment Size in Millions USD and Company Category

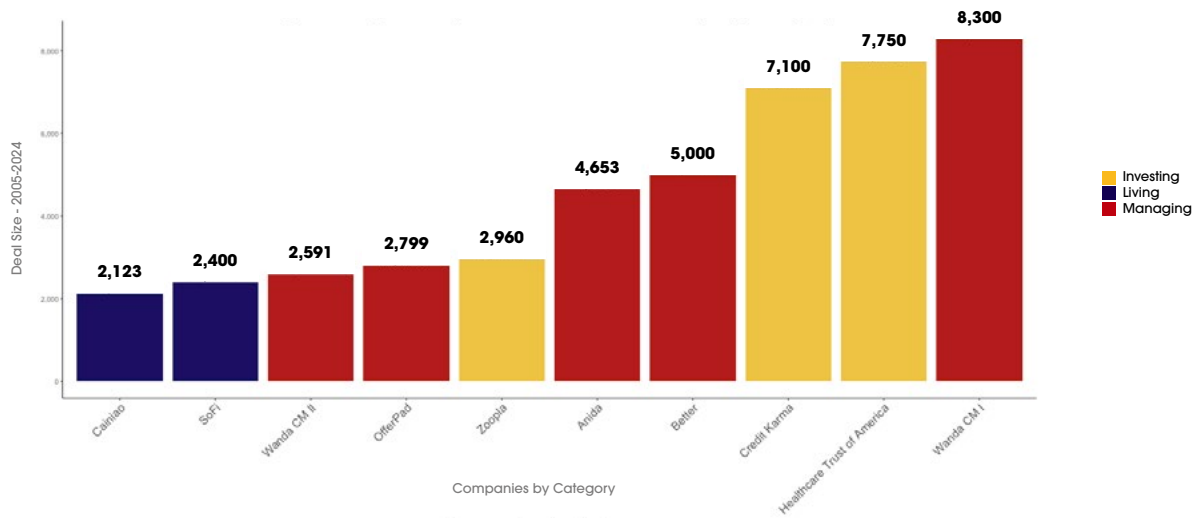
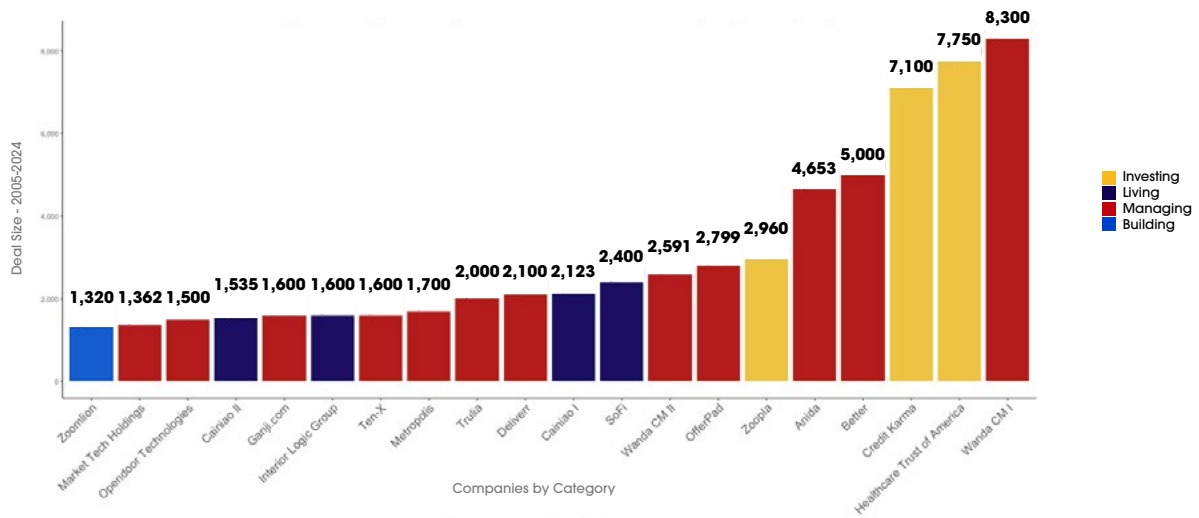


Figure 15 shows the top ten deals in PropTech in the past two decades. Importantly, some of these deals are by companies that have very robust businesses. For instance, SoFi first became well-known for their student-loan lending operations, although they later emerged in the PropTech ecosystem, first as a provider of mortgage refinancing and secondary lending, and even more recently as a provider of primary mortgages. Consequently, when **SoFi** went public through a special-purpose acquisition company (SPAC) deal, raising \$2.4 billion at a \$9 billion USD valuation, the company secured a spot on the list of top PropTech deals for years to come. Similarly, the Intuit acquisition of **Credit Karma** in 2020 sits neatly at the intersection between the FinTech and PropTech industry. Since Credit Karma is well-known for their credit scoring technology, and most of the household debt in the United States is tied up in mortgage debt, it's easy to understand how integrating Intuit's suite of financial software with Credit Karma's scoring technologies has major implications for more junior investors, who are looking to make waves in the real estate sector. While the Better and Wanda deals have been reported on above, this year's **Wanda** deals outpaced last year's Healthcare Trust of America (HTA) deal such that it became one of the largest ever deals. Here, HTA is primarily a provider of investment strategy and big data analytics to investors, while simultaneously managing their own investment portfolio. Somewhat similarly, Wanda Real Estate Group is a major developer of inter-regional projects in the People's Republic of China (PRC), aiding in the transformation of older urban areas into contemporary metropolises.



Figure 16: Top 20 Companies by Investment Size in Millions USD and Company Category



While the Top 10 deals in the past decade look relatively mixed, if we broaden the scope to the Top 20 deals, as illustrated by Figure 16, we can see a distinct trend emerge: **more than half of the money being raised in these major deals is being generated for the Managing category of companies.** In part, this is likely because not all the managing deals have their value more closely tied to the value of the assets that they manage, and therefore are more consistently able to achieve greater valuations. At the same time, there is incredible technological innovation in the Building category of companies, but we just don't see the technological innovation and patents themselves as major disruptors, somewhat surprisingly. Indeed, the only Building company on the Top 20 list is **Zoomlion Intelligent Aerial Work**, a company that has developed an enormous fleet of smart construction equipment. Intelligent construction



Zoomlion

equipment, such as Zoomlion's products typically offer a combination of contemporary scientific advancements in robotics, sensors, and controllers, as well as software solutions that combine the use of Big Data analytics and AI, along with other technologies, to improve the efficiency and the vital safety features of equipment. The combination of these technologies allows intelligent construction equipment to collect, store, analyze, and process information, while also executing appropriate actions and engaging in rapid decision-making facilitated by the operator.

Zoomlion Intelligent Aerial Work was acquired by Roadrover - which is primarily a provider of automotive electronic solutions, including in navigation and audio systems, smart seating systems and more - through a \$1.32 Billion USD (CNY 9.42 Billion) LBO on February 23, 2024. Although the reasoning for the deal may appear opaque at first glance, a closer read reveals that Roadrover is in turn predominantly owned by the plural majority shareholder, Zoomlion Heavy Industry Science, the original parent company of Zoomlion Intelligent Aerial Work. Additionally, since Zoomlion Intelligent Aerial Work was previously held by several outside investors, the deal represents a significant assessment by the parent company that its PropTech investment is indeed bearing enough fruit - quite literally, in the case of annual revenues - that they believe these revenues can be large enough to service the debt taken by Roadrover through the buyout package. In other words, they represent an assessment by the parent company, Zoomlion Heavy Industry Science, that their intelligent building equipment can transform portfolios, in addition to the marketplace.

The logo for Cainiao, featuring the word "CAINIAO" in a stylized font with a blue exclamation point, followed by the Chinese characters "菜鸟" (Cainiao) in white on a blue square background.

CAI
N!ΔO 菜鸟

Similarly, **Cainiao** and comparable companies have been fundamentally transforming the way we live and work through their integration of smart hardware technologies (for delivering packages), artificial intelligence (for assessment of packaging processes), and software that enable differentiated digital capabilities within our network, including a widely used logistics application (Cainiao App). Yet, Living category companies only tend to occupy the middle of the pack. While we are seeing a massive and consistent concentration of capital in the managing category, it is important to note that the distribution of capital has been spreading across the globe for the past several decades of growth for the PropTech industry.

Investment Trends

Figure 17: Total Capital Invested by Investors Active in PropTech, 2005-2024

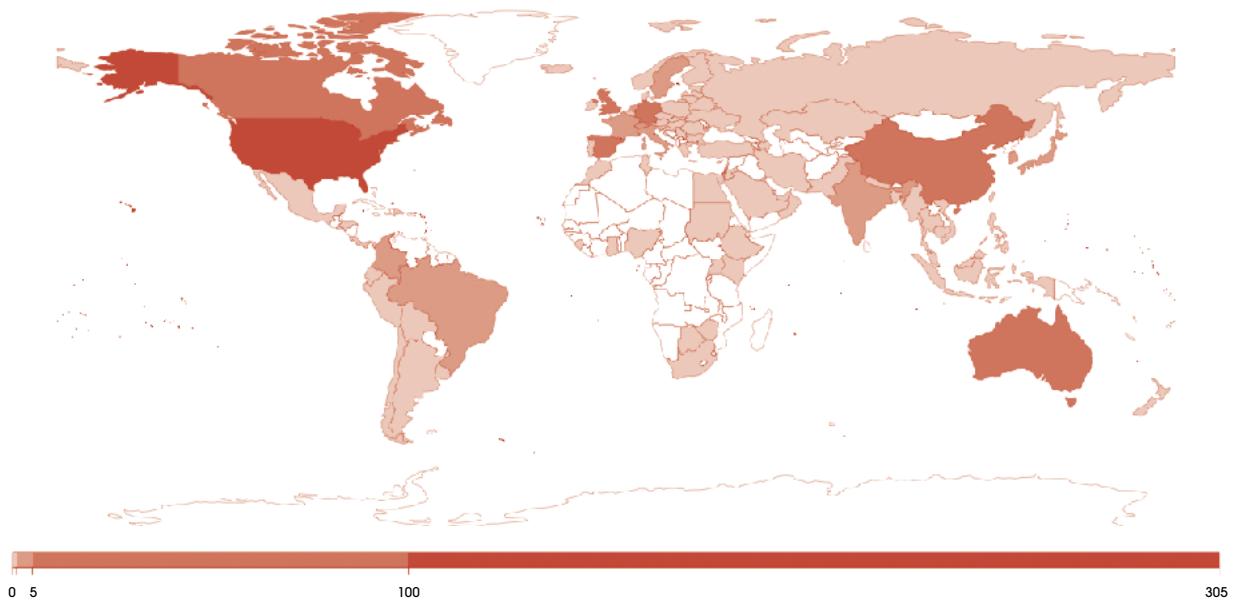


Figure 17 shows the distribution of capital by Investors who are active in the PropTech industry by investor origins location for the past two decades. Previously, we mapped the distribution of PropTech companies in the world and found very distinct trends. The largest number of companies in our 2021 and 2022 data were clearly located in the United States, although India, the UK, and Germany were a second tier of top players. In 2023, we shifted the focus to look at the global distribution of PropTech investments and observed that China was the only second tier player, with Germany, the UK, and Spain forming a third. This year, we are taking a long-term vision. As you can see, **the total capital invested by investors active in the PropTech industry remains concentrated in the United States, with \$304.77 billion USD invested by US -based investors from 2005 and the end of the 2023-2024 fiscal year. China emerges in the second tier as a stand alone, yet again, with \$52.90 billion USD invested, while the UK, Germany, and Spain form a third, with \$23.86, \$13.86, and \$13.38 billion USD invested, respectively.** Yet, some interesting trends emerge when we compare this distribution to the funds raised by PropTech companies in the past two decades.



\$304.77

Billion USD

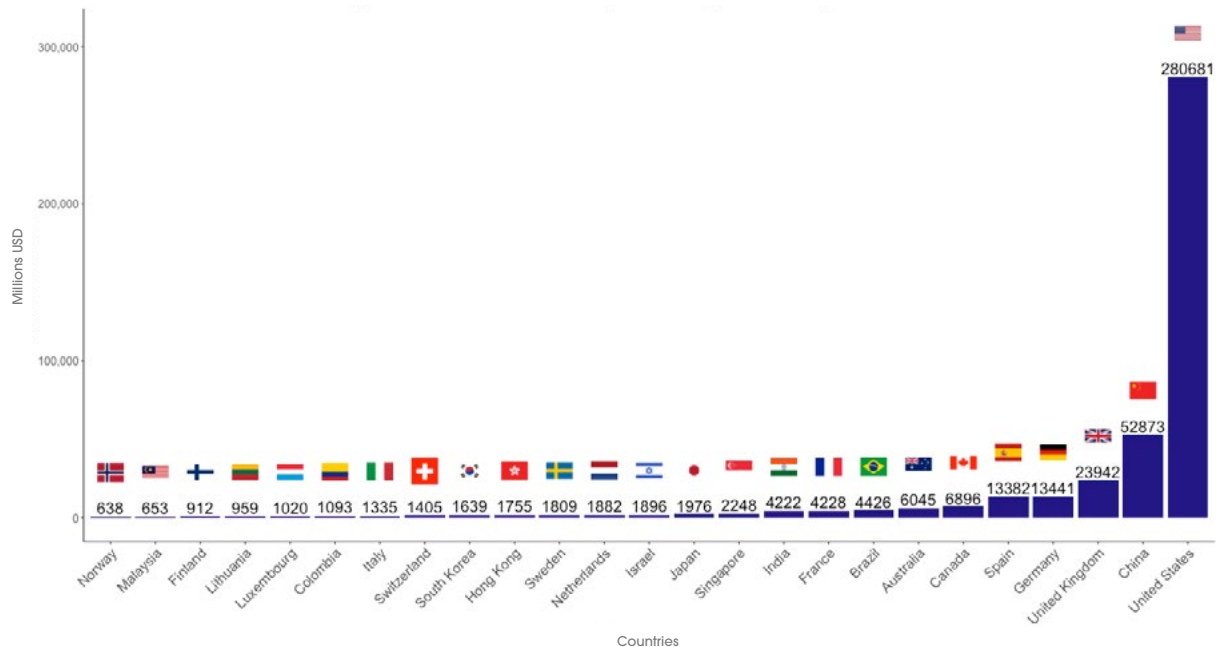
Figure 18: Capital Invested in PropTech by Country, 2005-2024

Figure 18 shows the distribution of funds raised by PropTech companies between the 2005-2006 FY and the end of FY 2023-2024. Most notably, while the top end of the distribution has not changed in terms of the rank of countries, **the amount of capital invested in the PropTech companies in the United States, the United Kingdom, and Germany is lower than the amounts of investments originating from those countries.** By the time we approach Spain, Australia, and Brazil, however, the investments are virtually the same. In the case of India, there's slightly greater investment in PropTech companies than the investments originating from India in the PropTech space. When we have such differences, we can suggest that this is because, in essence, **the United States also functions as an “investment originator” country for the global PropTech marketplace**, whereas India is, relatively speaking, an “investor receiving country.” This does not mean that there are not substantial PropTech investments originating from investors in India. However, it does suggest that the large distribution of PropTech companies in India-long term, as suggested by the data of the past PropTech barometers, makes India a ripe market for receiving investments.

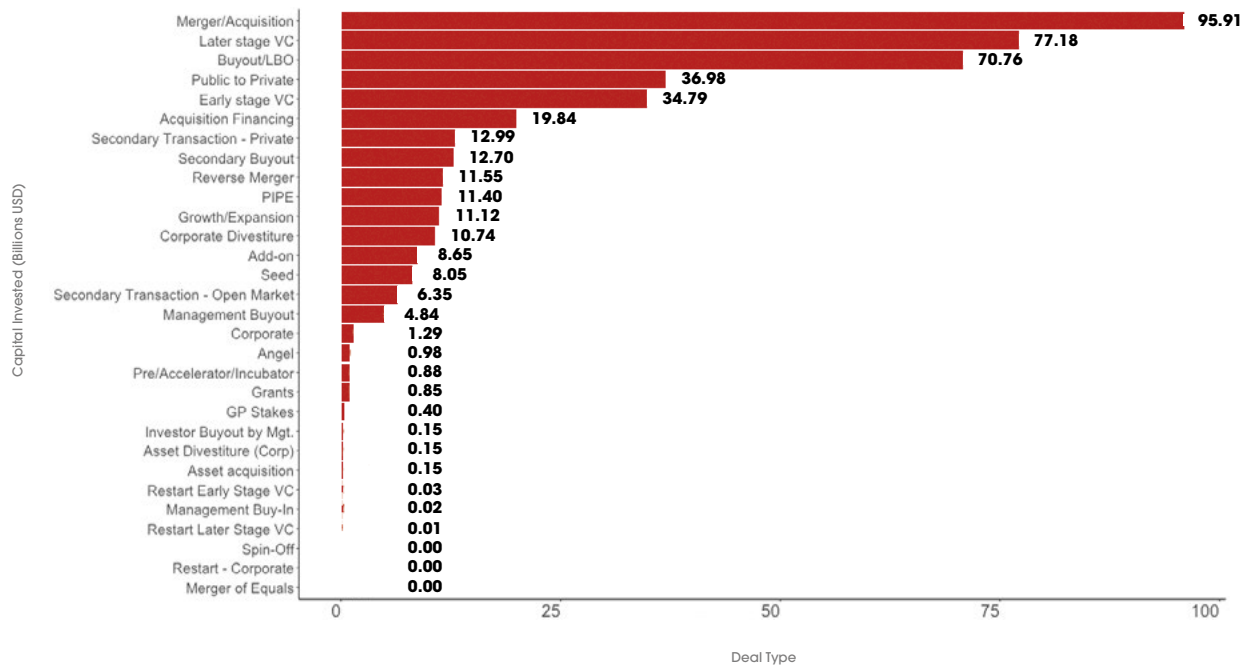
Figure 19: Capital Invested by Deal Type, 2005-2024

Figure 19 shows the capital invested by deal type, over the course of the past 20 years. As we can see, **most of the capital has been accumulated through just a few types of deals, with M&A deals, Later Stage VC deals, and Buyout/Leveraged Buyout (LBO) deals leading the pack. A second tier is made up of Public to Private and Early-Stage VC deals, while a third tier is made up of Acquisitions Financing and IPO deals.** The enormous amount of financing devoted to Mergers and Acquisitions is a sign of the market consolidation we have discussed in previous editions of the PropTech Barometer. Yet, the Later Stage VC deals are also of note. A Later Stage VC deal is a sign that a company is relatively mature, and still is worthy of substantial start-up investment. From a financial perspective, this distribution is showing a trend of increased maturity of PropTech companies. They are viewed as long-term viable leaders, with a reliable product and established market niche. For instance, a great example of a Later Stage VC deal completed in 2021 was by Cloud Kitchens.

Cloud Kitchens provides software to make it feasible for restaurants to open delivery-only locations, which expands their market reach, and then also makes said distribution incredibly cost-effective for food providers. Thus, Cloud Kitchens is utilizing revolutionary software to help transform the way we eat at home. Consequently, Microsoft, Ankush Gera, and Chimera Capital joined forces in November 2021 and invested \$850 million USD of venture funding in exchange for a combination of promised repayments for debt and equity shares in the company. The funds were used to fuel the expansion of Cloud Kitchens across the United States, Latin America, the United Kingdom, and the Middle East. Although Cloud Kitchens has faced difficulties stemming from the post-pandemic decline in delivery demand, the overall model of ghost kitchens - locations nearby areas of high-delivery demand, which don't have a storefront, and are entirely focused on delivery, coupled with a substantial digital presence - is becoming increasingly a phenomenon that helps meet the need of office spaces or residents in said high-traffic areas.

Despite the major impact that Later Stage VC deals have on the market, it is also notable that there is a substantial portion of the PropTech capital, to the tune of \$34.79 billion USD, which has been put into Early-Stage VC deals in the past two decades. These Early-Stage deals, of course, are what has fueled much of the technological innovation, especially across the United States, Europe and Asia. In the following chapter, we begin to break down more insights of the PropTech industry by regions.

CloudKitchens®

\$850

Million USD
Fundraising/Later Stage VC
deal

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

In this chapter, we break down our analysis of the PropTech industry by regions. We pay special attention to highlighting the most significant investors in the PropTech market, as well as the most important deals. Here, we hope to highlight the important aspects of the core of the PropTech Industry in the United States, before turning special attention to Europe, including a select focus on the markets of France, Spain and Germany. Finally, we round off the chapter with an analysis of the continent of Asia, especially paying attention to the growth-oriented Tiger and Baby Tiger markets of East and Southeast Asia.

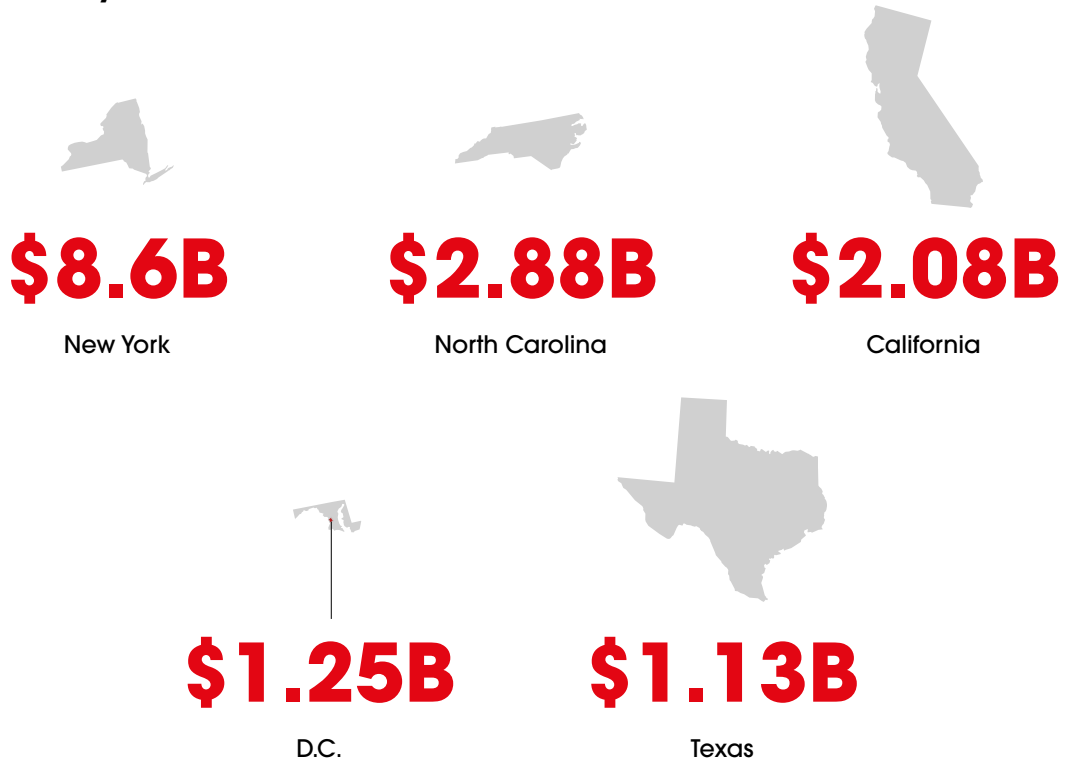


The United States

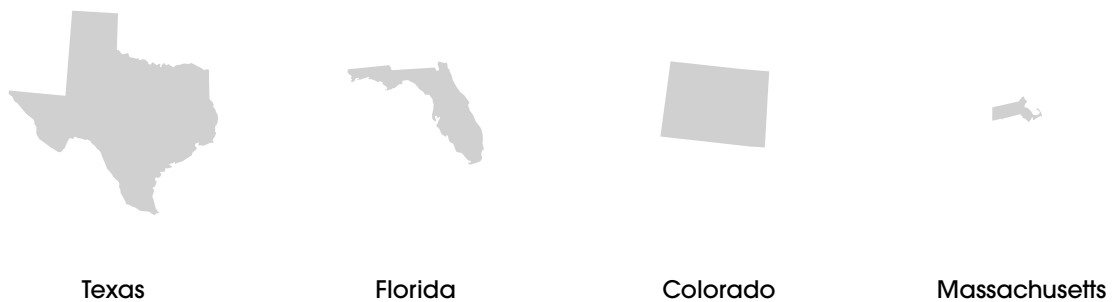


Key Highlights in U.S. PropTech (2023-2024)

Top States by Investment



Emerging Markets



Major Deals & Innovations

Better

\$5B

Reverse merger, went public, launched One-Day Mortgage.

 metropolis

\$1.7B

Acquisition of SP Plus, expanding AI-powered parking management.

Bedrock Energy

\$8.5M

Raised to develop geothermal HVAC solutions.

Leading Investors

Top by Activity



Y Combinator

techstars

Techstars



National Science Foundation (NSF)



U.S. Department of Defense

US Department of Defense (USDOD)

Top by Capital (focusing on AI in PropTech)



ANDREESSEN
HOROWITZ

Growth Potential

Rust Belt

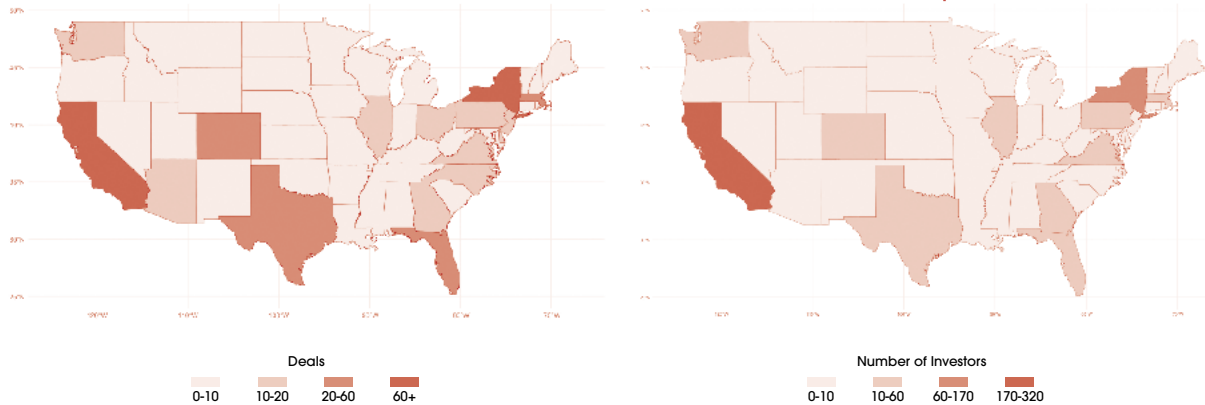
Increasing investment in Ohio and Illinois.

Untapped Markets

Companies headquartered in the high-value real estate markets of Hawaii, Alaska, Vermont, and Rhode Island remain underrepresented in PropTech.

The U.S. PropTech landscape is growing rapidly, with new investment hotbeds and innovative deals transforming real estate technology.

Figures 20a & 20b: Comparison of Raw Deal Count and Investor Count by US State, 2023-2024 FY



Figures 20a and 20b give the comparison between the raw count of deals and investors distributed by state, across the United States for the 2023-2024 fiscal year. As we can see, while **investors remain heavily concentrated in California (319) and New York (161)**, a second tier of investors emerging Texas (51), Massachusetts (42), Florida (34), and Illinois (30), before a third tier emerges in Pennsylvania (21), Washington (20), Colorado (14), DC (14), Georgia (14), and Virginia (14). Yet, the raw count of deals shows more stratification.

Deals are still concentrated, perhaps in a more balanced fashion, **between California (161) and New York (124)**, with a second tier being Texas (59), Florida (42), and Massachusetts (42), while the third tier still includes Colorado (21), Washington (20), Illinois (17), and Georgia (14). Yet, this tier also includes Ohio (18), Delaware (17), and North Carolina (14), as well as Arizona (14). Clearly, Florida, Texas, Colorado, and Massachusetts were all active locations for PropTech deals in the past year.

At the same time, just because the largest number of investors and deals remain concentrated in the states of California and New York, it is not necessarily the case that the largest amount of capital is engaged in those deals. Last year, we saw a surprising amount of capital invested in the Healthcare Trust of America deal in Arizona. This year, North Carolina and Texas emerge as significant, yet surprising, locations for top PropTech fundraising.



319

investors in California



161

investors in New York

Figure 21: PropTech Deals by US State, Millions USD, 2023-2024 FY

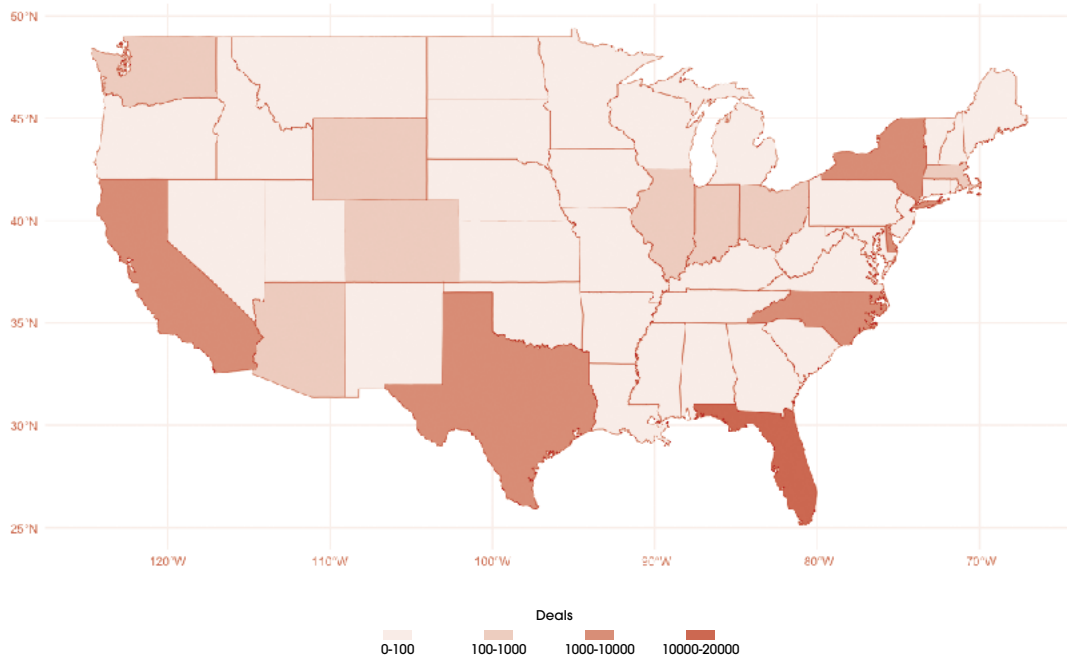


Figure 21 shows the distribution of PropTech deals by state for the 2023-2024 Fiscal Year. PropTech companies in New York raised the most by far, collecting some \$8.6 billion USD, followed by a surging North Carolina (with \$2.88 billion USD) and a lagging California (\$2.08 billion USD). DC (\$1.25 billion), Texas (\$1.13 billion) and Delaware (\$1.03 billion USD) rounded out the top five.

As noted above, as Texas is a relatively surprising location for fundraising it is also worth highlighting that some of these impressive numbers result from the long-term processes of transforming the state’s economy. Traditionally an oil state, there are at least some PropTech companies in Texas looking toward a greener future. For instance, **Bedrock Energy** is a provider of construction services that are fundamentally transforming the



heating and cooling of real estate, having raised \$8.5 million for autonomous geothermal HVAC technology. Situated with a company headquarters deep in oil-country, in Austin, Texas, **Bedrock energy is looking toward the future of buildings, and catalyzing the green transition of the real estate industry.** While many new construction buildings are fitted with standard delivery for natural gas, Bedrock Energy has been developing autonomous drilling technology and subsurface simulation software to provide for widespread, affordable, and accessible geothermal heating and cooling solutions. **Founded in 2022, Bedrock energy raised \$8.5 million in seed funding from Wireframe Ventures in October of 2023.** The funds will be used to accelerate the manufacturing and deployment of core geothermal technologies, to aid the introduction of all-electric geothermal HVAC systems and help real estate properties achieve Net Zero standards during construction and maintenance. Further, the company has one active patent for geothermal well construction technology, and a pending patent for drilling technology, making it a ripe offer for an M&A deal soon.

Bedrock Energy

\$8.5

Millions

If we set aside New York and California, where the big PropTech companies and most well-known disruptors got their start, major deals in Delaware, Texas, and North Carolina included the likes of AmWins (Charlotte, North Carolina, completing three deals: \$1 billion, \$839 million, and \$763 million), **Corporation Services Company** (Delaware, \$983 million), **Optimal Blue** (Plano, Texas, \$705 million), and **Meriton** (Irving, Texas, \$250 million). Among these AmWins is notable as it provides a network of insurance brokers the ability for global coverage across a vast array of real estate asset classes, ranging from residential to commercial, while Meriton focuses on HVAC technology. Meanwhile, Corporation Services Company is a provider of a variety of corporate and business services and Optimal Blue is an online mortgage provider. Another significant player is also **Fundrise**, an investment platform, which uses technology to reduce

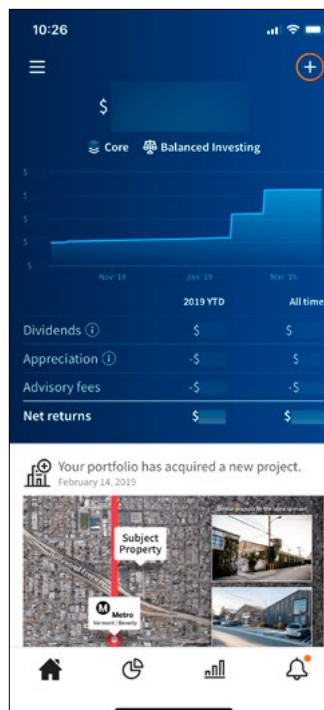
AMWINS

CSC

optimalblue

M
MERITON

FUNDRISE



Fundrise

friction in the investment process and secured \$125 million USD in debt refinancing this past year. This is to say that the top of the field is quite diverse in this case, although it is notable that both Optimal Blue and Meriton are based in Texas.

Optimal Blue is the operator of an online mortgage platform - based in Plano, Texas - that caters to industry professionals, especially originators, lenders, and investors, further underscoring the promise of the PropTech industry in Texas. The aim of the platform is to connect originators with secondary investors, while providing them with loan-level price data, and enabling them to enhance their workflow efficiencies, stay competitive, and confidently execute lending strategies. Their pricing and eligibility engine - the **Optimal Blue PPE - is utilized by 64% of the Top 500 mortgage lending companies in the United States**. On September 14, 2023, Constellation Software, a leading provider of software services headquartered in Toronto, Canada, acquired Optimal Blue for \$705 million USD. Optimal Blue will continue as an operating subsidiary under the merger agreement. Previously, Optimal Blue was operating under an agreement between Capital Analytics and Black Knight. While Compass Analytics acquired a stake in the company in 2020, Black Knight acquired a stake in 2022. Then, when Intercontinental Exchange (ICE) Mortgage Technology - as a leading provider of data, technology, and market infrastructure - acquired Black Knight, ICE Mortgage Technology negotiated the sale of Optimal Blue as part of the deal.

Notably, there was virtually no PropTech investment in companies headquartered in several states with hot real estate markets, including Hawaii, Alaska, Vermont, and Rhode Island, suggesting that these markets could be good locations for breakout players soon. Additionally, states in the rustbelt, including Ohio (\$761.33 million USD), Michigan (\$40 million USD), Indiana (\$113.21 million USD), and Illinois (\$591.79 million USD) range indicate these states are beginning to show their potential as well. With relatively affordable real estate and solid access to capital, we should not be surprised to see more companies headquartered in the states of the rustbelt in the near future, where PropTech companies are already becoming part and parcel of the process of urban renewal. Further, if we look at the most active investors in American markets, the start-up and accelerator scene is quite alive and well.



64%

of the Top 500 mortgage
lending companies in the US

Figure 22: Top 10 American Investors by Primary Investment Type and Total Investments

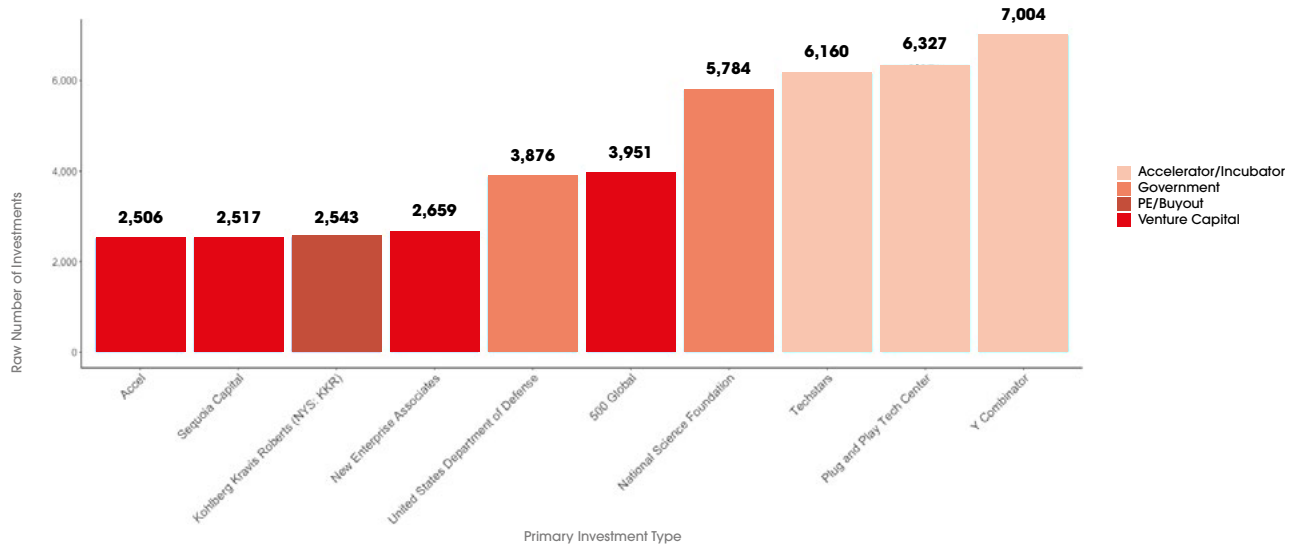


Figure 22 illustrates the top ten American investors active in the PropTech ecosystem, as measured by the total number of investments they have made and controlled by color for their primary type of investments. As we can see, **the Accelerator/Incubator firms remain the most active investors in the field**, although the government supported investments made by the National Science Foundation (NSF) and US Department of Defense (USDOD) remain enormous. **Next, we have the venture firms**, 500 Global, New Enterprise Associates, Sequoia Capital and Accel. In the midst of the pack, finally, Kohlberg Kravis Roberts (KKR) is a leading global investment firm that specializes in private equity and buyout deals. Importantly, KKR has recently acquired a \$1.64 billion Student Housing portfolio from Blackstone’s REIT, meaning they have become deeply invested in the student housing industry and are likely to be keen to similarly invest or partner with PropTech companies operating in that space. **Still, for disruptors hoping to make a splash, while it would certainly behoove them to submit proposals to Techstars, Y Combinator, and Plug & Play Technologies, they might also want to consider the lay of the land in terms of which investors have the most access to dry powder.**

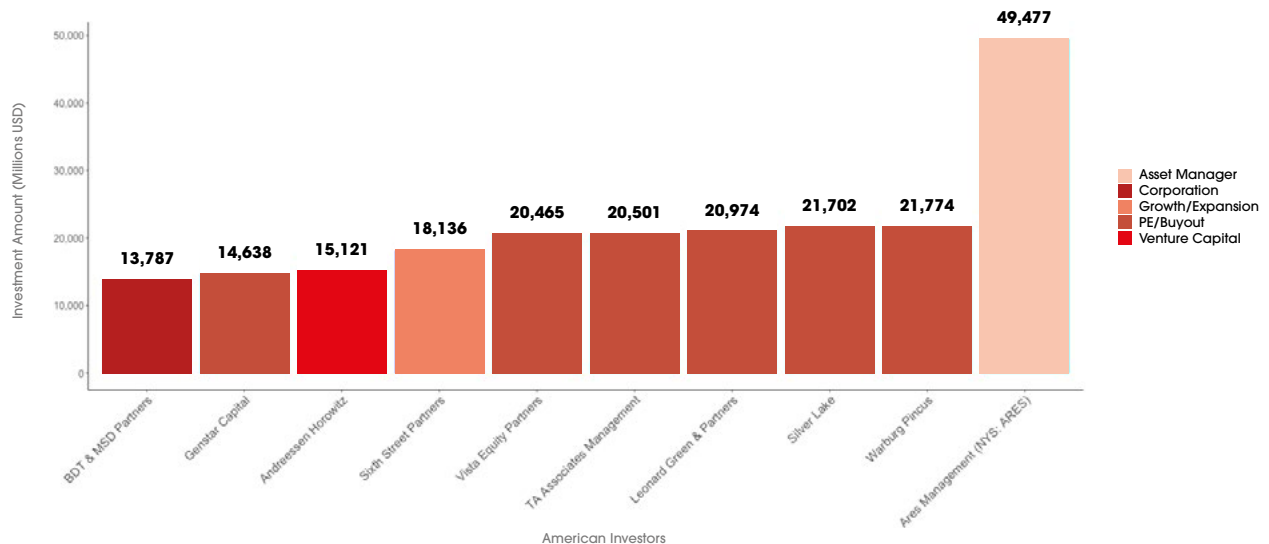
Figure 23: Top 10 American Investors by Dry Powder and Primary Investment Type

Figure 23 is an illustration of the top ten American investors as measured by their dry powder, or the amount of capital that they have on-hand that is not committed to a specific deal and is therefore available to potential founders of PropTech companies. **The largest of these firms, Ares Management**, appointed a new co-head of Real Estate (Julie Solomon) during the 2023-2024 FY. Additionally, the firm is expanding abroad, and has appointed Bryan Southergill (a former KKR executive) to head the firm's real estate team in the region. **After Ares Management, however, most leading investors with large amounts of dry powder, per data pulled on June 1, 2023, were private equity and buyout firms.** Partnered corporations (BDT & MSD Partners and Sixth Street Partners) also have significant access to dry powder, as does Andressen Horowitz (AH), the Venture Capital firm with the greatest access to dry powder in the PropTech ecosystem. After all, AH recently reported that they have raised \$7.2 billion across five funds to fuel future investments, including \$1.25 billion dedicated to improving the use of AI in building and construction trades, \$1 billion towards applications, and \$600 million towards founders and companies supporting American interests. These signals indicate that AH may be looking to build off their \$350 million USD 2022 investment in Adam Neumann's new company, Flow.



Figure 24: Top 10 PropTech Deals in the US, 2023-2024 FY

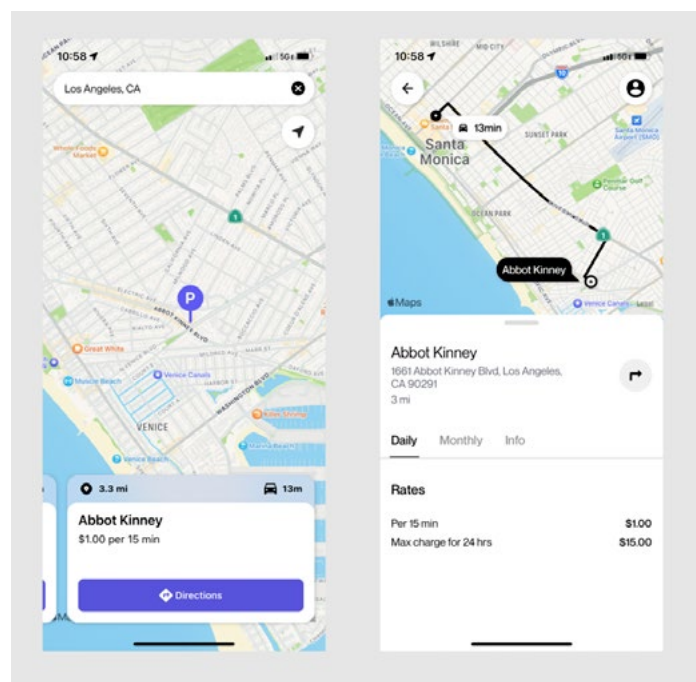


Figure 24 shows the top American PropTech deals of the 2023 - 2024 fiscal year. In addition to the enormous Black Knight and Better deals, AmWins and Corporation Services Company (CSC) had huge deals as well. Better Home & Finance Holding Company is a renowned top-industry player, as the - if not, one of the - world's most prominent digital-first homeownership company focusing on elements of the mortgage process, although they also now assist with the process of titling property and homeowners' insurance as well. The company has combined numerous forms of technological innovation, from big data analytics to machine learning, to provide fresh thinking with a deep customer focus while revolutionizing the process of obtaining a mortgage.

In August of 2023, Better acquired Aurora Acquisition - a special purpose acquisition company (SPAC) - through a reverse-merger for \$5 billion USD. The result of this enormous deal was to move Better to the public trading market, as the company began to be traded on the Nasdaq Stock Exchange with the ticker BETR in March of 2023. Although the deal was announced in March, it was only completed in April. While the \$5 billion USD moved for the reverse merger represents the total invested

equity of the deal, the deal also increased the valuation of the company, from \$2.7 billion beforehand, to \$7.7 billion USD afterward. Given that Aurora Acquisition was formed as a SPAC in 2020, it seems that this deal was in fact years in the making. Ultimately, Better's SPAC deal unlocked \$565 million USD of fresh capital, which included a \$528 million convertible note from SoffBank and additional equity from NaMa Capital. Ultimately, the long-haul series of deals delivered \$1.3 billion USD to Better's balance sheets, funneled through Aurora Acquisition, which is significant considering Better itself is an industry giant and claims to have funded more than \$100 billion USD in mortgage volume across six years. Finally, both investors and industry watchers should be on the lookout for reviews on the performance of a new product: the one-day mortgage. The one-day mortgage allows customers to go online, get pre-approved, get their rates locked, and get a commitment letter in just 24 hrs. As this product was only released in January 2023, it will likely continue to disrupt the market for years to come.

After Better, **Metropolis' \$1.7 Billion dollar deal to acquire SP Plus' parking facility management services is a striking example of an AI-enabled platform seeking to expand its coverage. After all, Metropolis is a developer of a computer vision operating model that is revolutionizing the efficiency of parking spaces in urban areas.** Computer vision models focus on enabling computers to identify and understand moving objects and people in images and videos. Through utilizing this path breaking field of computing, **Metropolis can improve revenue generation and reduce operating expenses, enabling real estate partners to optimize net operating income.** For asset owners, Metropolis is improving access to contemporary parking amenities, as well as multi modal mobility options. Through a combination of debt and equity as established by a Series C venture round that included, among others, the participation of BDT & MSD Partners, Vista Equity, Assembly Ventures, and Temasek



Metropolis

Holdings. While the \$1.7 billion USD transaction was supported by \$650 million of debt financing, the funds were leveraged to make a critical acquisition: SP Plus, a parking management and ground transportation company. SP Plus primarily provides a range of ancillary services, including valets, shuttles, taxis, municipal meter collection, and enforcement. Thus, these services will be incorporated into Metropolis' North America-based platform operations, in over 360 cities, serving millions of consumers and processing over \$4 billion in payments annually.

While we have examined the details of AmWins, SoFi, CSC, and CoStar elsewhere, very little attention has been paid to the socio-political import of the Cadre deal. **Cadre** is an online real estate focused investment platform aimed at institutional and high net-worth investors, founded by Ryan Williams, Joshua Kushner, and Jared Kushner in 2014, two years before the Kushner family saw its rise to fame through their affiliation with the Trump Administration in the United States. **Cadre is the developer of a data-centric investing platform designed to compel real estate investment opportunities, using data science to reduce the time it takes to analyze assets, identify market trends, and pursue opportunities.** The company's technology enables investors to diversify their portfolios, mitigate risk, and tap into compelling long-term returns. Founded in 2014 by Ryan Williams, Joshua Kushner, and Jared Kushner, **the company was first backed by two early-stage VC rounds, totaling \$64.40 million USD, with later stage VC rounds, including some undisclosed financing, bringing their fundraising totals to at least \$133.40 million USD.** Key investors included Peter Thiel JD, Mark Cuban, and Jeffrey Jordan (with the latter representing Andreessen Horowitz).

With the acquisition of CADRE by Yieldstreet in November 2023, Yieldstreet expanded their portfolio of products that focus on opening private market investment to new investors. Previously, Yieldstreet provided investors with a platform for acquiring investments in art, real estate, legal and other industries. Thus, CADRE's acquisition represents a contribution to their real estate portfolio, as the CADRE platform will allow users to unlock the potential of investing in high end real estate. Since Yieldstreet's investment minimums start at a mere \$5,000, it is safe to say that they had previously emphasized the democratization of investment, successfully broadening their user-base, but at the same time leaving the high-end real estate market relatively untouched.

The logo for CADRE, consisting of the word "CADRE" in white, uppercase, sans-serif font, centered within a solid black square.

In January 2024, Yieldstreet announced they had completed the acquisition of CADRE, solidifying Yieldstreet's leadership in the private market investing platform ecosystem, as they now cater to low end, mid-range, institutional and high net worth investors alike, with more than \$9.7 billion in value held in investments across the two platforms. Now investors will have access to an unparalleled range of private market asset classes presented through a bespoke investor experience - including the managing of tax advantaged accounts and portfolios, to proprietary secondary market capabilities - and much much more, all on one, seamless, unified platform.



Europe



Investor Landscape



148

Investors
United Kingdom



72

Investors
France



62

Investors
Germany

Top AUM Investors

Major UK-based firms lead by assets, with French and Swedish firms also showing significant influence.

Top Deals



UK's Zoopla deal ranks highest, while **Germany** has the largest share of top deals overall.

Deal Focus

64%

64% of deals center on **property management**; **construction tech** also strong, while tenant-focused and investment platforms see limited activity.

This distribution highlights the UK's dominance, France's surprising growth, and Sweden's role in innovation within European PropTech.

It will not surprise our readership that the greatest number of investors in PropTech in Europe are located in the United Kingdom. However, it is a slight surprise that France beats out Germany when it comes to the raw number of investors in the PropTech Industry. Nonetheless, since the French economy is part of the “old guard” of continental Europe, it is also not a terrible surprise to see France leading the pack by our measure of raw numbers of investors this year as well.

Figure 25: European Investors, Raw Count by HQ Country, 2023-2024 FY

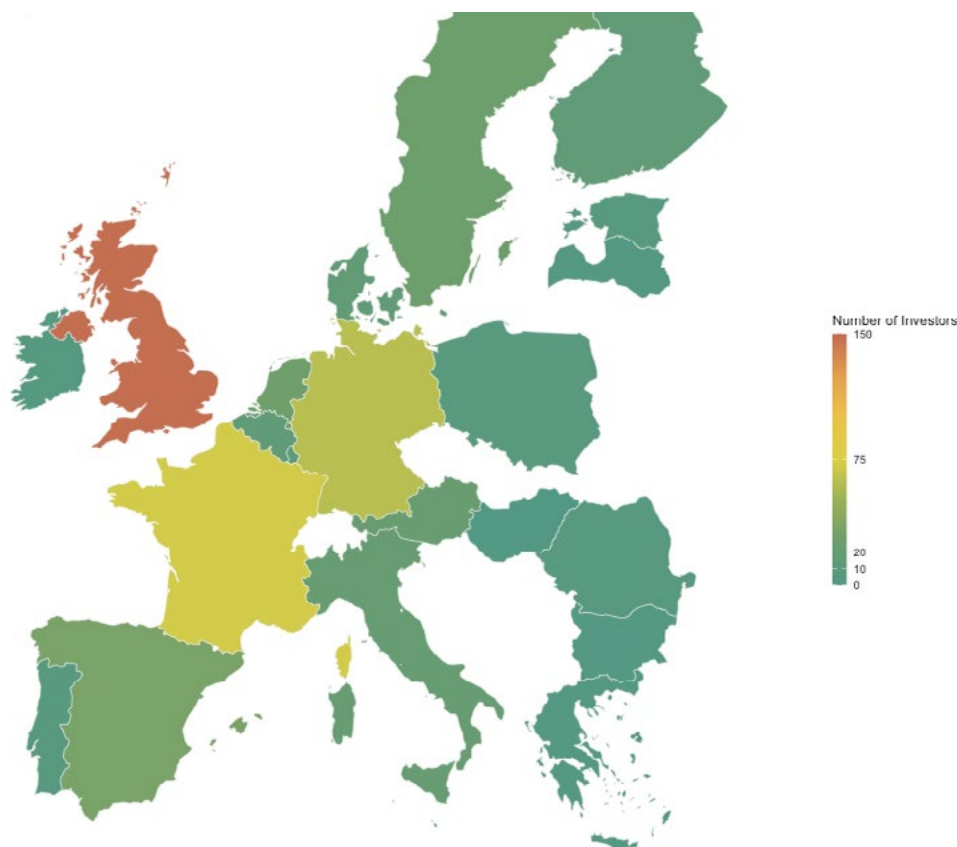


Figure 25 shows the raw count of European investors active in the 2023 - 2024 fiscal year by country in Europe. **The United Kingdom had more than twice the investors of France (148 compared to 72), while Germany was not terribly far behind France, with 62 total investors.** Spain (32) and Switzerland (34) were virtually tied in the fifth and fourth spots respectively. Next, the Netherlands and Sweden (27 and 26 respectively) came in sixth and seventh. Austria (22) came in eighth with Italy (20) not far behind, while Denmark (15) and Norway (15) were tied for the number ten spot. Given the above balance of top players, it also follows that the top investors in Europe, as measured by assets under management (AUM), have their headquarters located in the United Kingdom.

Figure 26: Top 20 European Investors by Investor Type & HQ Location

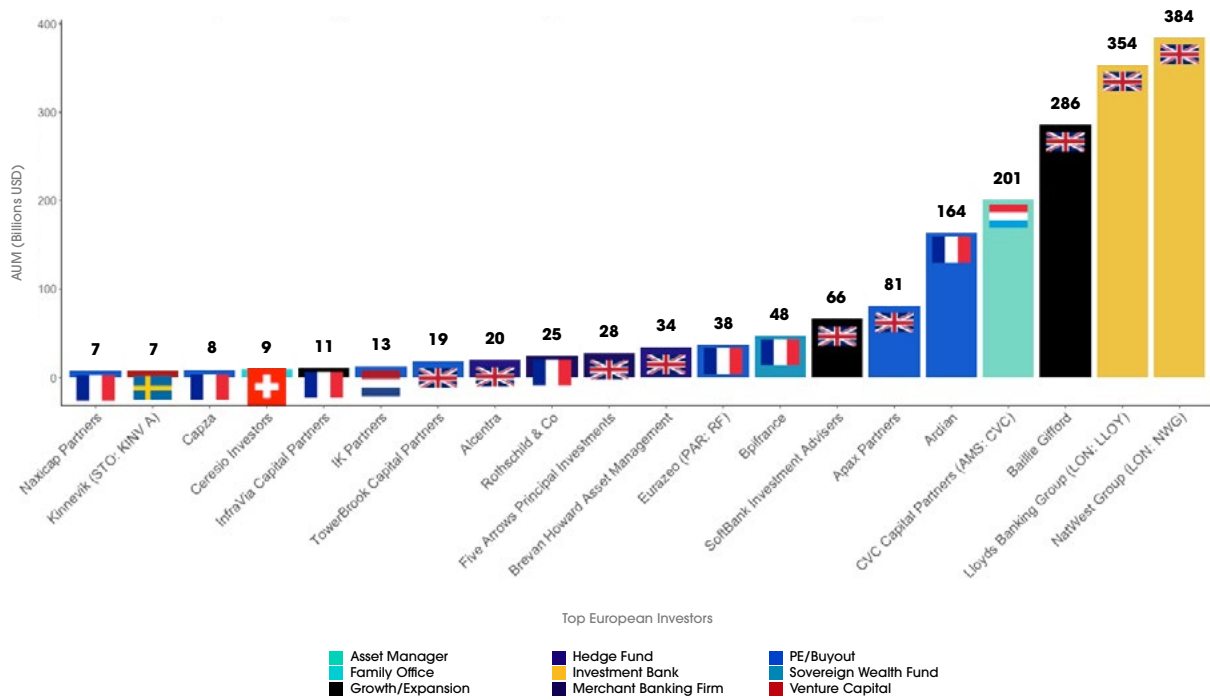


Figure 26 shows the top 20 European investors by their Primary Investment Type and HQ location by country, as indicated by their national flag. Of course, **nearly half of the list are firms in the United Kingdom, with the large investment banks (NatWest Group & Lloyds Banking Group) leading the pack.** Institutional investors, like Bpifrance’s sovereign wealth fund still hold prominent positions, of course. Then, in the middle of the pack, there are a host of PE/Buyout firms, much like the United States, including the French firms Ardian and Eurazeo, along with the British firms, Apax Partners and TowerBrook Capital Partners. Surprisingly, the only significant Venture Capital firm on this list is located in Sweden. Even with their impressive \$7.398 billion USD of AUM, they barely squeak into the top 20 investors in Europe as measured by assets, just barely ahead of the French PE/Buyout firm Naxicap Partners, which has some \$7.25 billion USD total AUM. That said, a Swedish company, Infrobrick, managed to take second place in the largest and most significant deals in Europe. So, we should not discount Sweden as a country of both investment origins and technological innovation for the global PropTech industry.

Figure 27: Top 25 PropTech Deals in Europe, 2023-2024 FY

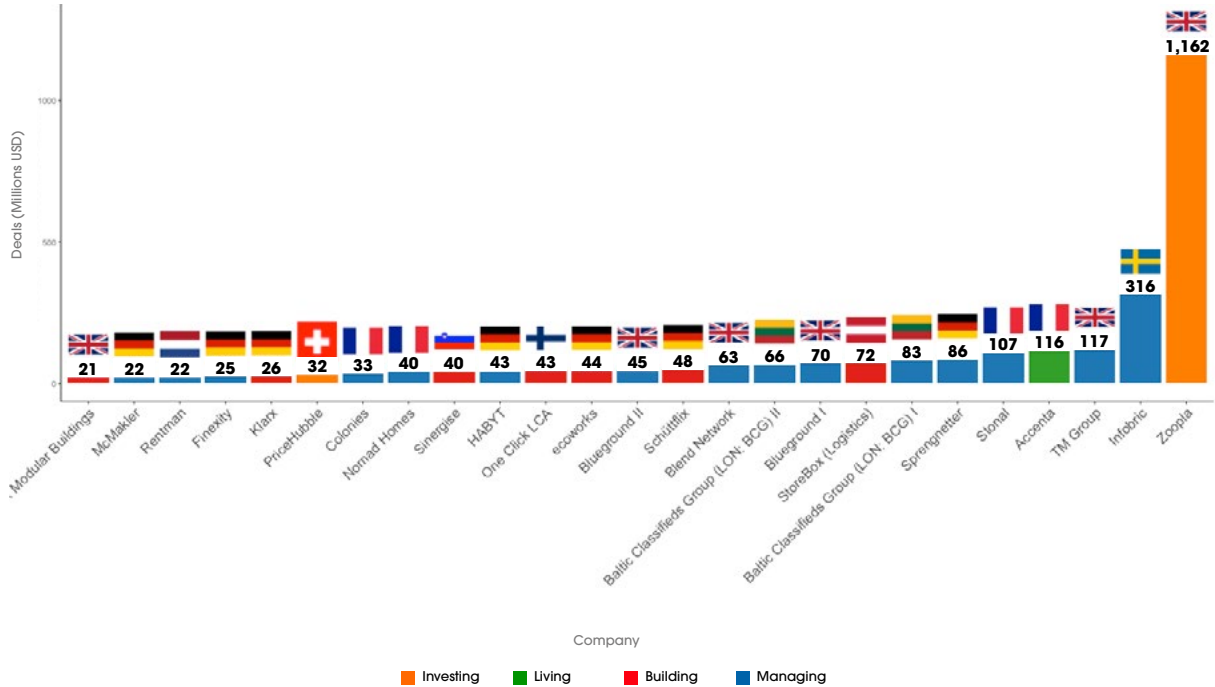
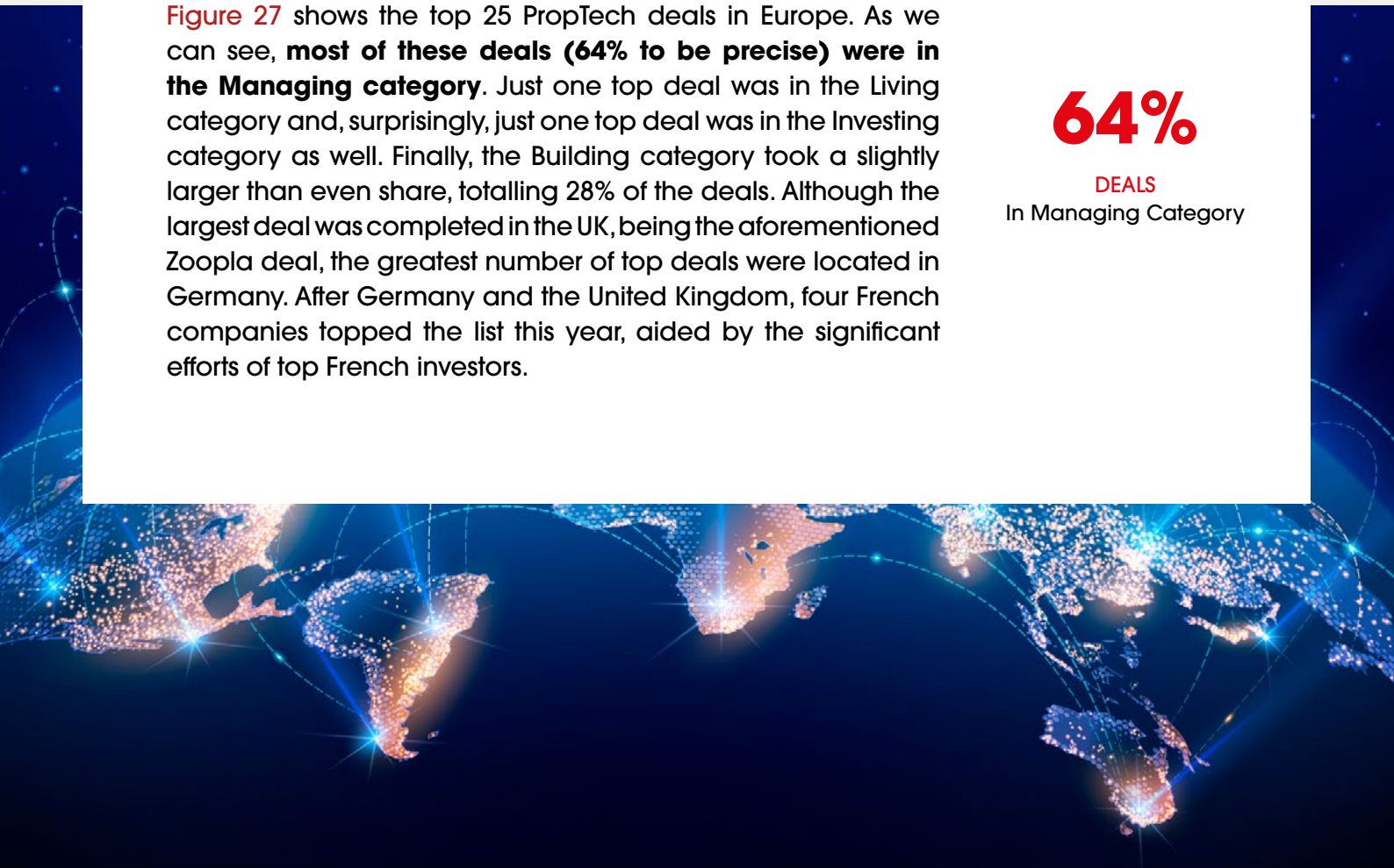


Figure 27 shows the top 25 PropTech deals in Europe. As we can see, **most of these deals (64% to be precise) were in the Managing category**. Just one top deal was in the Living category and, surprisingly, just one top deal was in the Investing category as well. Finally, the Building category took a slightly larger than even share, totalling 28% of the deals. Although the largest deal was completed in the UK, being the aforementioned Zoopla deal, the greatest number of top deals were located in Germany. After Germany and the United Kingdom, four French companies topped the list this year, aided by the significant efforts of top French investors.

64%
DEALS
In Managing Category



FRANCE



When we set aside BpiFrance as an institution, the French investment market looks quite like other leading PropTech investment markets, with However, as the market begins to segment a bit more, there are a significant number of large venture capital firms, which offer promising opportunities for teams of PropTech fundraisers **major players being predominantly PE/Buyout firms, such as Ardian (\$164 billion USD AUM), Eurazeo (\$37.92 billion USD AUM), Capza (\$8.34 billion USD), Naxicap Partners (\$7.26 billion USD), Keensight Capital (\$5.96 billion USD), and Seven 2 (\$5.42 billion USD).** and eager PropTech disruptors.

Figure 28: Top French Investors by Investor Type & Assets Under Management (AUM)

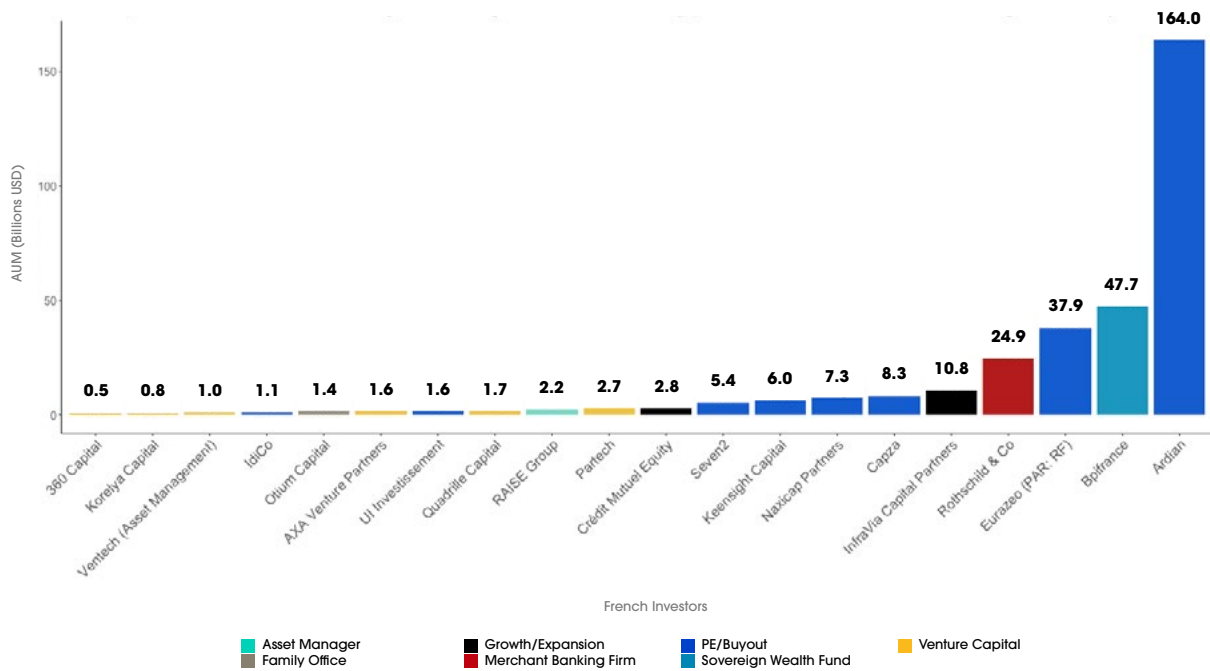


Figure 28 shows the top French investors by investor type and assets under management (AUM). Notable, while the aforementioned **PE/Buyout firms are leading the top of the pack**, there are a couple of spots held by Growth/Expansion firms, such as Credit Mutuel Equity and InfraVia Capital Partners. That said, the bottom half of the top firms represent significant opportunities for PropTech fundraisers. Each of these are venture capital shops, no doubt seeking to quickly expand their AUM. For instance, 360 Capital, Korelya Capital, Axa Venture Partners, Quadrille Capital, and Partech are all significant VC firms in France.

Figure 29: Top PropTech Deals in France by Category and Month of Completion, 2023-2024 FY

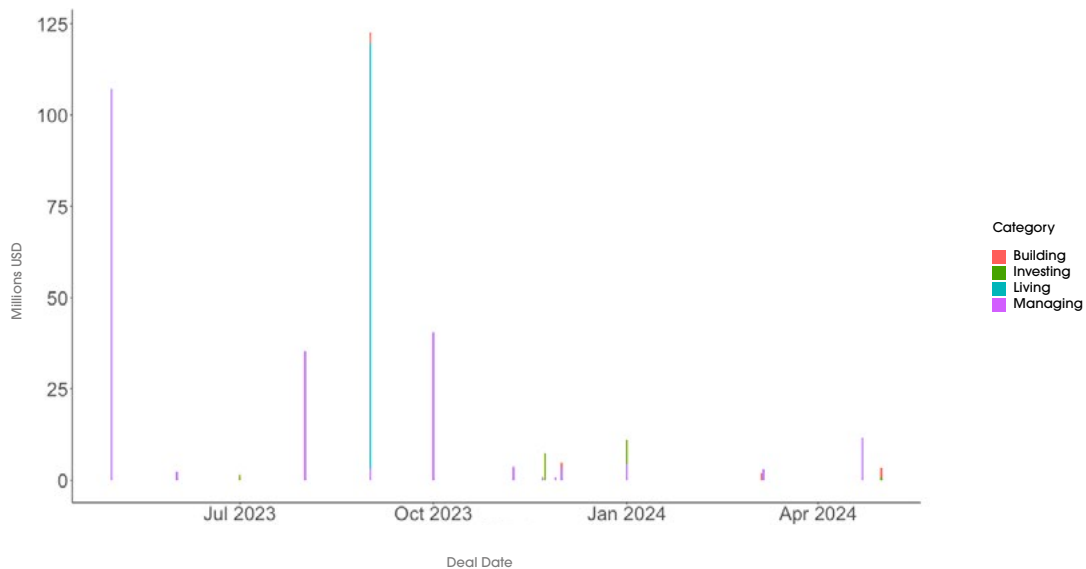
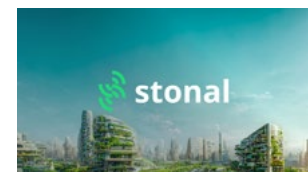


Figure 29 shows the top PropTech deals made by French companies, color coded by their category and organized by their month of completion during the 2023-2024 FY. The **Accenta** deal in the living category was quite significant (\$116.4 million USD). However, the next four of the largest deals were all in the Managing category, with the top deal by far being **Stonal** (\$107.14 million), Europe’s leading AI-powered SaaS platform for real estate data management. The next three following deals were by **Nomad Homes** (\$40.00 million USD), **Colonies** (\$33.21 million USD), and **Zefir** (\$11.48 million USD) respectively. While Nomad Homes aims to simplify the process of buying property, Colonies has created smart living and housing solutions by designing and managing fully furnished properties, and Zefir is the first collective real estate sales platform, thus fundamentally transforming the market through facilitating agent-level cooperation. Overall, we observe that few French deals are made in the Investing category, suggesting that there may be significant opportunity for players in the relatively populated French investing sector to enter the PropTech space, develop new platforms and transform the industry. Additionally, there were just a few companies that made deals in the Building category in the past year in France. Although these deals feature

accenta.



Accenta



nomad



colonies
A PLACE TO BE

ZEFIR

innovative companies like **La Fabrik A Yoops**, which just received \$259,000 USD in VC funding to support their tiny-homes wooden-home solution to abatement homelessness and low income housing supply difficulties in French cities.



SPAIN



In comparison to the French market, the Spanish PropTech market differs in the nature of the largest investors. **In Spain, Venture Capital is playing a more significant role than PE/Buyout firms, suggesting that the market is also still in a “growth phase”** as opposed to a “maturation and consolidation phase.” Of course, the big news of this year is a recently announced Idealista deal. Idealista is the leading online real estate marketplace based in Spain, having built a platform that provides for the buying selling and renting of properties. Idealista investor EQT (of Sweden) has announced plans to sell its majority stake in Spain's most notable and prominent online search and sale real estate platform, which they had previously purchased in 2020, in a 2.9 million Euro deal to be facilitated by Morgan Stanley. The private equity firm Cinven plans to acquire a 70% stake of Idealista, while Apax and Oakley advised funds will sell their holdings.

With a rotating stock of over 1.4 million listings, Idealista has ensured they hold a leading position in the Iberian markets and have maintained a strong foothold in Italy. In the wake of two 2020 acquisitions of Miogest and Gestim, two key PropTech software developers, Idealista began to add new features to their website almost every week. They included 3D tours during the global pandemic. They also added Virtual Home Stage, Virtual Tour Search filters, Video Tour features, and more. For agents, the platform allows for perpetual advertising in exchange for a recurring subscription fee. Further, the back-end agent tools of data analytics services and mortgage brokering services have been improved in recent years through the development of more streamlined interfaces backed by more complex, and accurate, algorithmic-drive data processing. Further, EQT, which acquired Idealista in 2020 at a 1.3 Billion Euro evaluation, will retain 18% stake as a minority holder. In effect, the deal has ensured that Idealista has more than doubled their valuation in just four years. However, of course we will only have better data on the final numbers once the deal has been completed.

Figure 30: Top Spanish PropTech Investors, by Preferred Investment Type & Assets Under Management, 2023-2024 FY

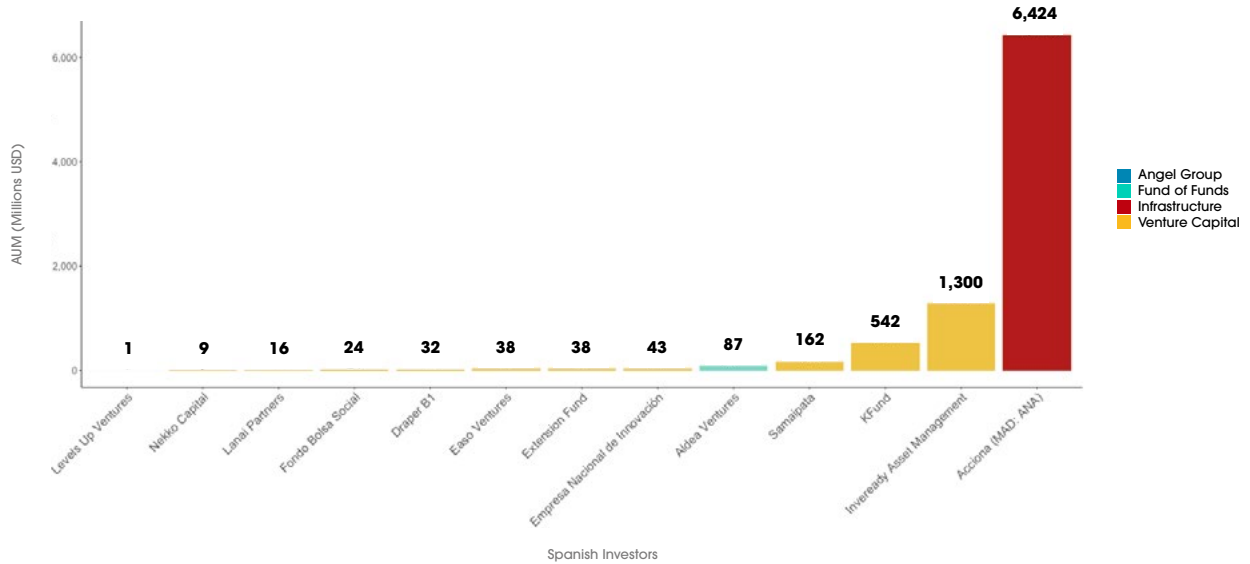


Figure 30 illustrates the top investors in the PropTech ecosystem in Spain, as measured by their total Assets Under Management (AUM). As we can see, aside from Acciona, which is primarily an Infrastructure investment firm (although they have also completed some deals in the PropTech space) and Aldea Ventures (which is a “Fund of Funds” operation, primarily), and Level Up Ventures (which is a form of venture capital - in that it is a pool of wealth of private individuals awaiting investment in a specified business or businesses), every other major Spanish investment firm is explicitly a Venture Capital outfit. **What this suggests is that the Spanish market is ripe for new companies, seeking to court these major venture firms.**



Figure 31: Top PropTech Deals in Spain, by Category & Month of Completion, 2023-2024 FY

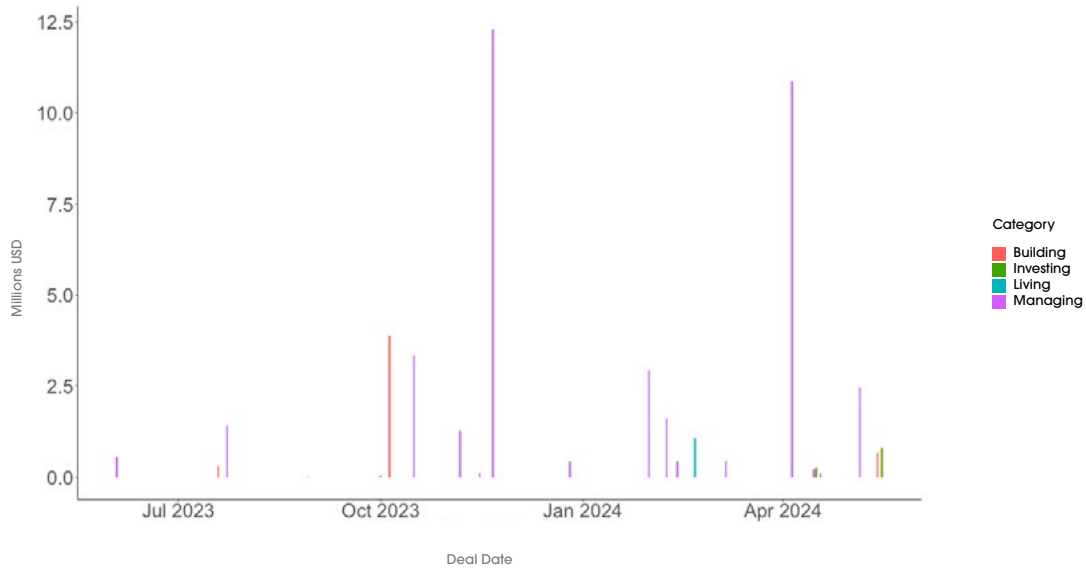
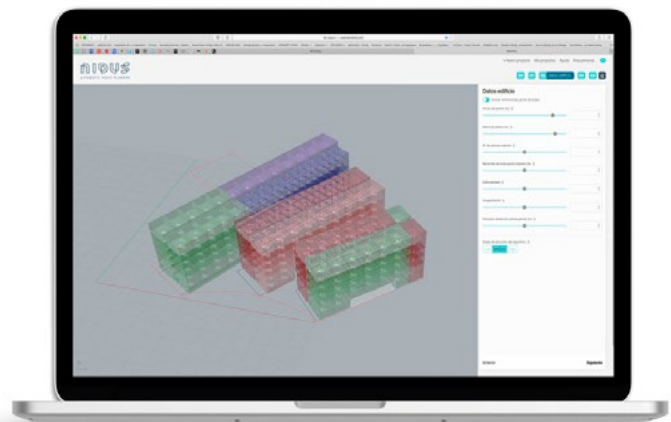


Figure 31 shows the top PropTech deals in Spain by category of the company and month the deal was completed during the 2023-2024 fiscal year. Much like France and the United States, **the most significant deals are almost all accumulated in the Managing category**, with Be Mate (\$12.31 million USD) and Aticco Living (\$10.87 million USD) being the top overall. The third most significant deal was SAALG Geomechanics (\$3.88 million USD) - a Building category company - but then the next five were all managing. Finally, Cubicup (\$1.08 million USD) rounds out the top ten with a significant deal in the living category. This is not to say that there are not innovative and inspirational Spanish companies working in the living, investing, or building space. For instance, **Nidus Labs** is an AI-powered web application that automates building design processes and optimizes the number of housing units for a development, maximizing return on investment.





Watch the
interview

nidus
AUTOMATIC SPACE PLANNER

“

Imagine someone in 2020, building something that resembled artificial intelligence without even realizing it. Looking back now, it all seems so natural, you know? At the time, we were in the middle of the jungle with a knife between our teeth, forging a path without knowing what lay ahead. And now that we've created this powerful tool that's transforming the entire industry, it feels like it was meant to be all along.

”

Ana Lozano-Portillo
Founder, Nidus Labs



GERMANY



The German PropTech market offers some interesting comparisons to the American, French, and Spanish markets. Much like the Spanish market, **Venture Capital plays a significant role**. While there is at least one PE/Buyout in the top investors, PE/Buyout oriented firms don't play nearly as significant a role when compared to the French or American markets.

Figure 32: Top German PropTech Investors by Preferred Investment Type & Assets Under Management (AUM)

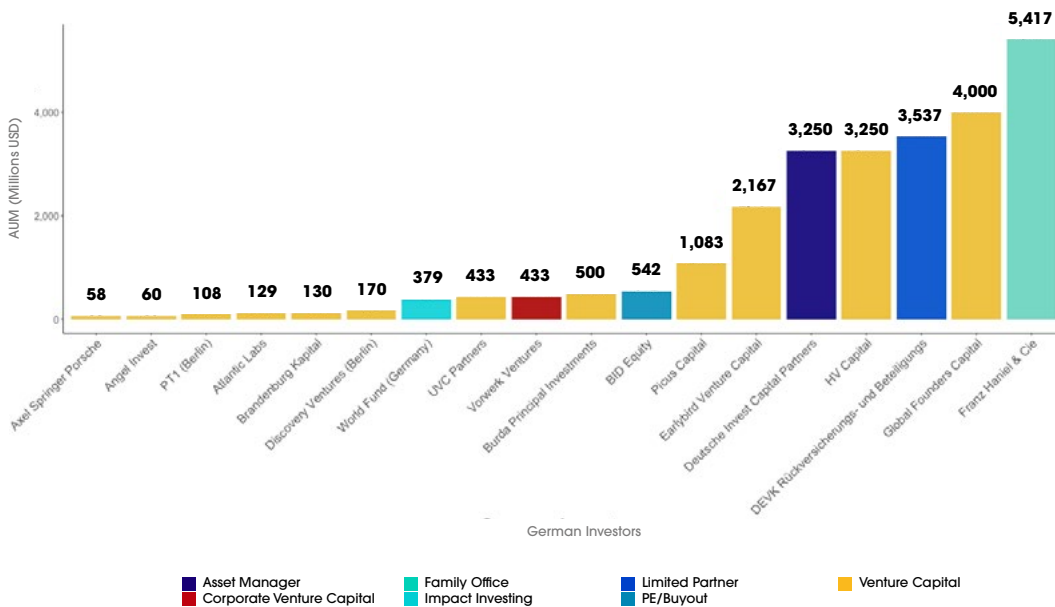


Figure 32 shows the top PropTech investors in the German PropTech sector by their investor type and organized by those firms with the most Assets Under Management. **The largest investor by AUM is a Family Office in Germany (Franz Haniel & Cie), while a Limited Partnership (DEVK Rückversicherungs-und Beteiligungs) and an asset manager (Deutsche Invest Capital Partners) take the number three and four spots, respectively.** However, **Venture Capital firms take up more than half of the top twenty spots and are relatively evenly distributed among the top places in the count.** Further, Vorwerk Ventures is also a form of venture firm, albeit an explicitly corporate venture office.

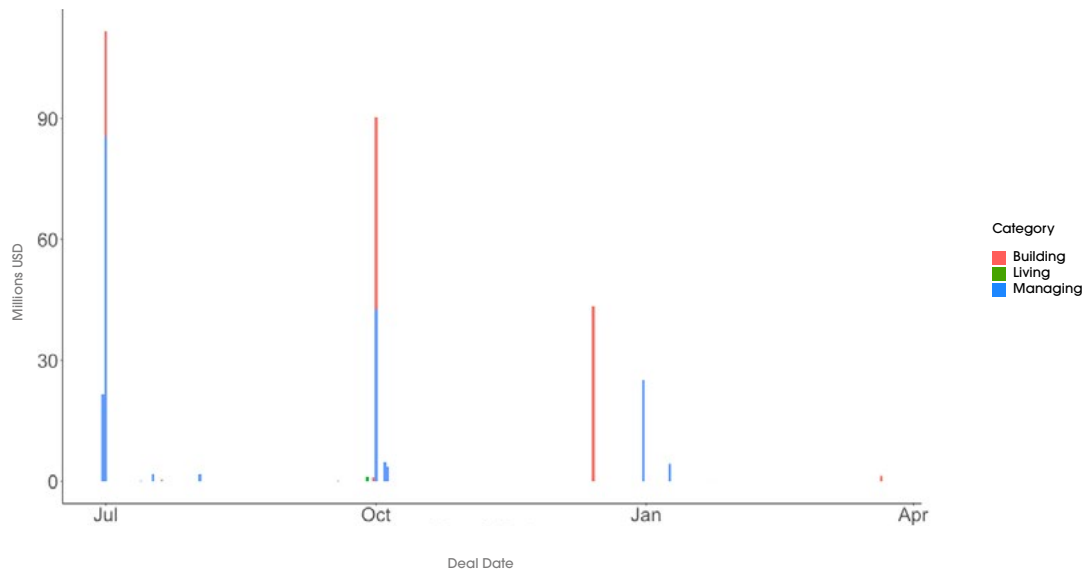
Figure 33: Top PropTech Deals in Germany by Category & Completion Month, 2023-2024 FY

Figure 33 shows the top PropTech deals in the Germany market by category and organized by the month the deal was completed during the 2023-2024 fiscal year. Much like the French, Spanish, and American markets, **the Managing category deals made up a significant share of the market.** Yet only two of the top five deals were in the Managing category. Still, they were quite significant in size, when compared to the top deals of the French and Spanish markets, with the real estate firm Sprengnetter – a firm that specializes in valuation services, software development, and more – raising \$85.62 million USD, and HABYT – a company that offers flexible housing in 25 global cities, including private and shared apartments, across Europe and Asia – raising \$42.60. At the same time, the Building category in Germany outperforms those of France and Spain, as three of the top five deals were in the Building category, as Shutfilix – a company that connects contractors with materials providers and disposal services – ecoworks – a company using AI to solve energy efficiency – and Klarx – a company that provides digital solutions to source construction machines – raised \$47.80 million, \$43.50 million, and \$26.06 million respectively. However, there were only a few deals in the Living category and almost no deals in the investing category in the past year, suggesting that the **Germany PropTech market might also be ripe for new companies to break into the investment space with new technologies, as they are likely to have few competitors in the fundraising space for startups.**

Asia

The dynamics of the ProPTech ecosystem in Asia are similar in several ways, when compared to several other markets. For instance, when we look at assets under management (AUM), sovereign wealth funds hold the largest slots, like in France, where BpiFrance reigns supreme. However, when we examine dry powder resources, venture firms emerge at the head of the pack, much like the American market. In the past, Israel and other markets, such as Turkey and Iran, or countries in the Arabian Peninsula, showed significant activity. However, few deals were completed in Western Asia this year. The situation contrasts with the activity further eastward.

Figure 34: Raw Deal Count, PropTech Deals in Asia, 2023-2024 FY

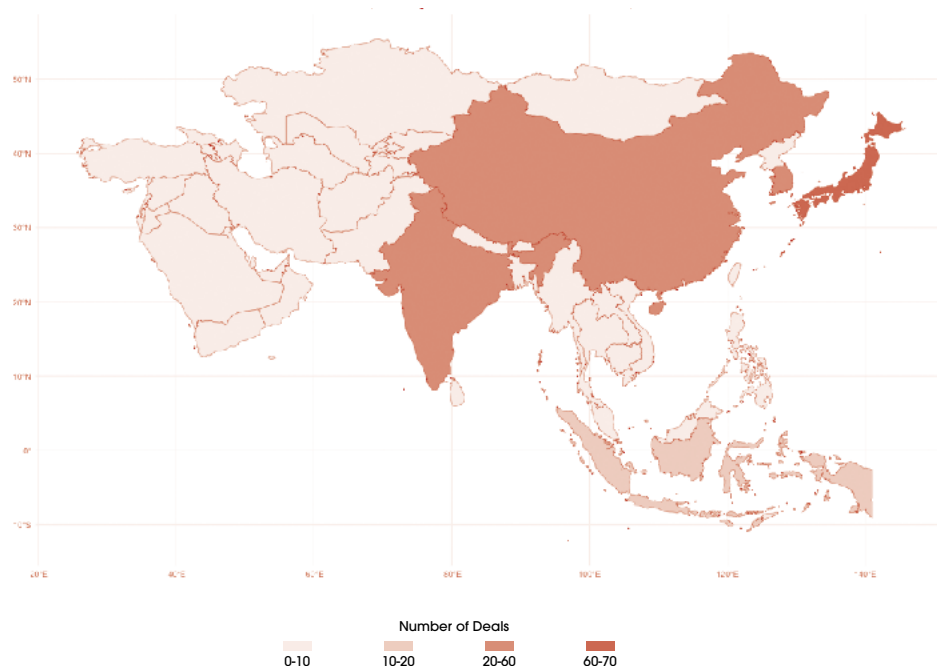


Figure 34 shows the raw deal count of PropTech deals in Asia in the 2023-2024 fiscal year. **Japan (65), India (60), South Korea (51) and China (51) were virtually balanced in the number of deals completed in the past year, while Singapore (21), and Indonesia (13) came in fifth and sixth. The Philippines (7), Malaysia (6), Hong Kong (6), Vietnam (5), and Bangladesh (4) made up a second tier of active markets, while Pakistan (2), Thailand (2), Azerbaijan (1), and Kazakhstan (1) made up a third tier.** However, the largest investors who are breaking into the PropTech space, as measured by assets under management are not in Japan, China, or South Korea, as one might expect, but actually in Singapore, Southeast Asia's gateway between the South China Sea in the East and the India Ocean to the west.

Figure 35: Top 20 Investors in Asia by Type, HQ Location, and Assets Under Management, 2023-2024 FY

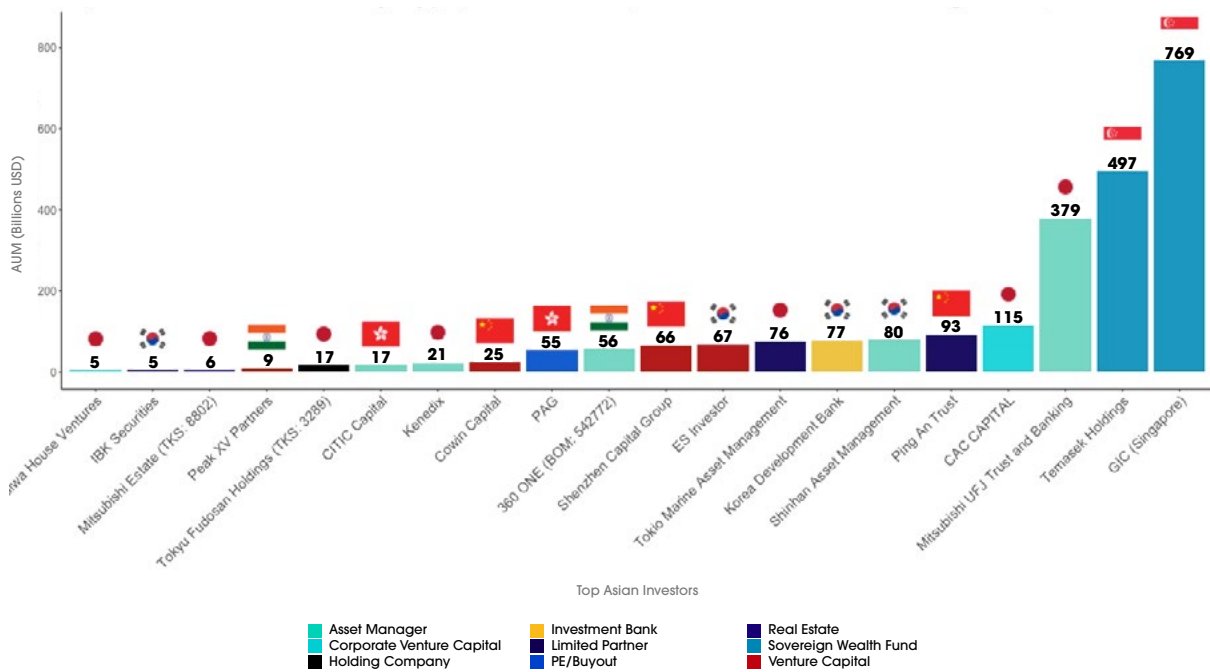


Figure 35 shows the top 20 investors in Asia by their type, location, and AUM for the 2023-2024 fiscal year. **The top two investors by AUM are Sovereign Wealth Funds (GIC, Singapore and Temasek Holdings) located in Singapore.** The next two spots are held by an asset manager (Mitsubishi UFJ Trust and Banking) and a corporate venture capital firm (CAC Capital), both located in Japan. The limited partner, Ping An Trust of China – an insurance firm – took the number five spot, while the next two spots were taken by two South Korean firms, Shinhan Asset Management (an asset manager firm), and Korea Development Bank (an investment bank). While Tokio Marine Asset Management (a limited partnership headquartered in Japan) took the number eight spot, two venture capital firms rounded out the top ten, one from South Korea (ES Investor) and one from China (Shenzhen Capital Group). However, when we shift our lenses to examine dry powder, venture capital plays an even more significant role.

Figure 36: Top 20 Investors in Asia by Type, HQ Location, and Dry Powder, 2023-2024 FY

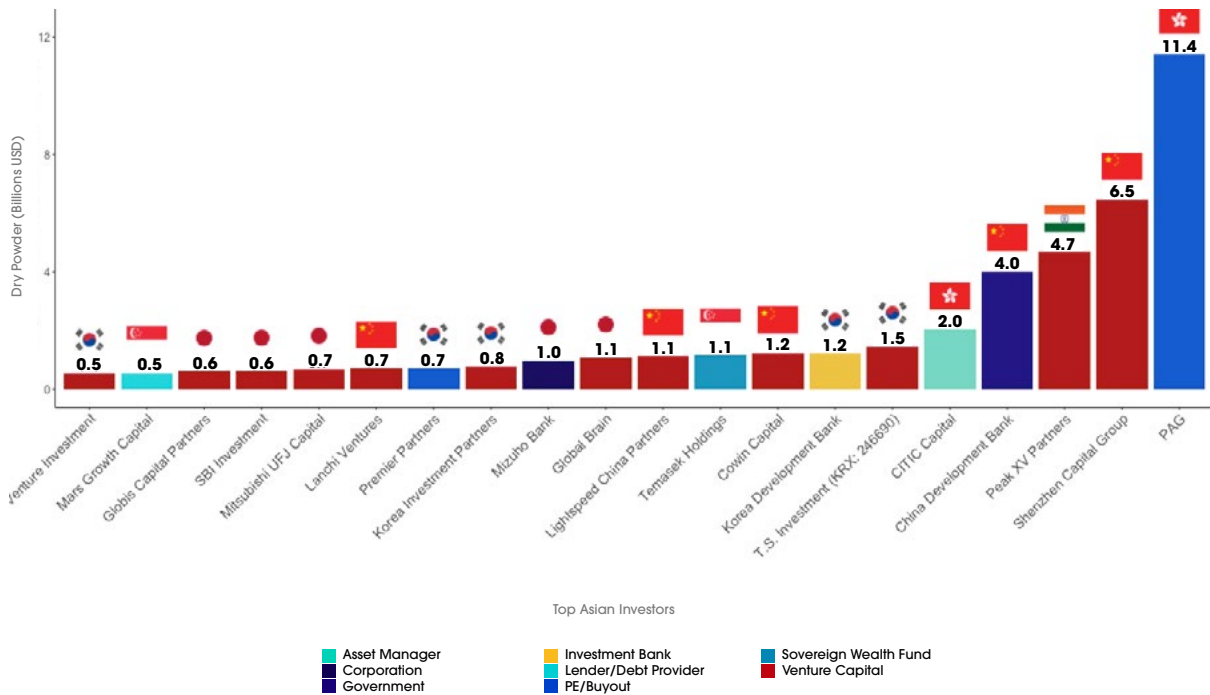
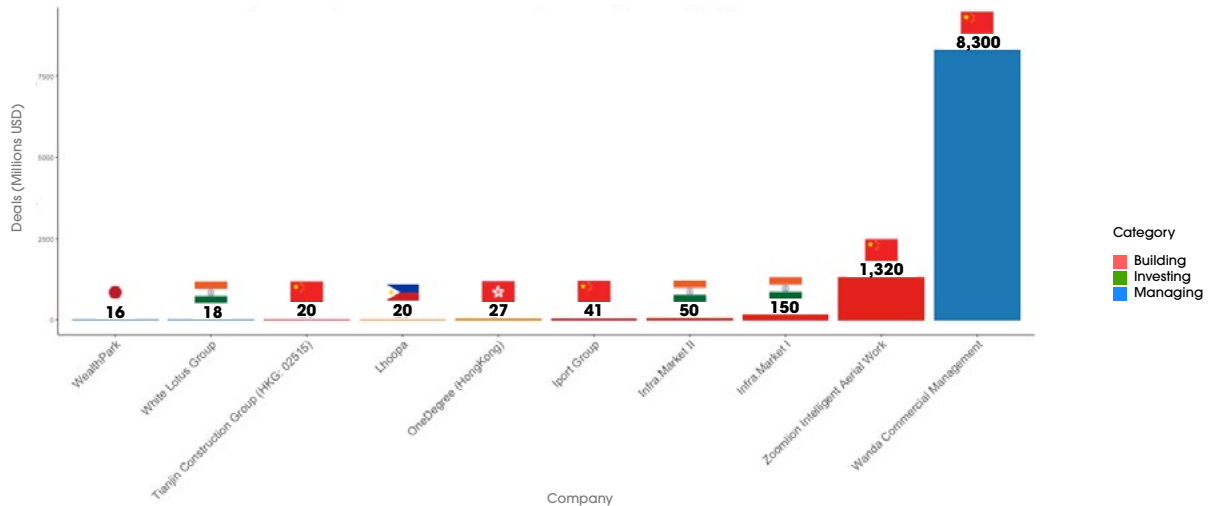


Figure 36 shows the top 20 investors in Asia by type, location, and their dry powder. As we can see, **Venture Capital firms make up twelve of the top 20 slots**, just as they did in Germany. However, it is also the case that when we compare to the European region, said firms are rather dispersed by their country of headquarters location. Yet, in Europe we would expect all the top investors to essentially be in the United Kingdom, and we know that the capitalization of the market in the Asia Pacific is much more broadly dispersed. For instance, while the top Venture players by Dry powder, being Shenzhen Capital Group (China) and Peak XV Partners (formerly Sequoia Capital India and SEA) are located in the largest countries by population in the region, most of the rest are evenly distributed between South Korea, China, and Japan.



Figure 37: Top Ten PropTech Deals in Asia by Country & Category, 2023-2024 FY



INFRA.MARKET

Figure 37 shows the top ten PropTech deals in Asia by country, category, and amount for the 2023-2024 fiscal year. The largest deals were in China, including the Wanda Commercial Management deal and the Zoomlion deal. After Zoomlion and Wanda Commercial Management, the largest deals in Asia during the 2023-2024 fiscal year was completed by Infra Market. **Infra Market** is a developer of a massive, efficient, online procurement marketplace designed to serve the real estate and building materials industries. Their centralized platform aggregates client demands, connecting them with their supply chain, while creating affordable credit options, and establishing efficient logistics for delivery and tracking. They have established a presence in 22 of 28 states in India, have more than 100 dedicated manufacturing units and operate more than four thousand individual retail locations, along with more than 25 exclusive brand outlets. They are transforming the ecosystem by leveraging technology and scaling innovation. Additionally, they operate the country's only ISO-certified world-class R&D center. Infra Market completed three deals during the year, including an undisclosed amount of debt financing in September, with details of that deal yet to be released. However, they also completed a deal raising \$150 million USD of debt financing earlier in the fiscal year and even more recently, they raised a rather significant \$50 million in venture funding from LIQUIDITY Group – the world’s leading AI-driven direct lender – and Mars Growth Capital – the Singapore-based investment firm that focuses on debt and growth equity in Europe and the Asia-Pacific - on May 28th, 2024, putting their pre-money valuation at \$2.55 billion USD.

Chapter 5: Competing Industries

This chapter considers the relationship between PropTech and competing industries, especially those industries that are closely comparable to PropTech. Thus, for the purposes of comparison, we are examining primarily industries that are dependent on technological innovations and disruptions to traditional markets. For instance, we are especially interested in 3D Printing, AgTech, Autonomous Cars, AI/Machine Learning, Climate Tech, Ed Tech, eSports, FinTech, HealthTech, and Virtual Reality (VR). Certain competing industries, such as Autonomous Cars have median deal sizes that are stronger than PropTech across every single month of the fiscal year. While others, such as 3D Printing are much more variable.



Key Insights: Competing Industries Overview (2023-2024)

PropTech vs. Competing Sectors

- » **Consistent Deal Sizes**
PropTech's median deal size remained steady (\$1.19M to \$3.4M) compared to more variable sectors like 3D Printing and Virtual Reality.

- » **Comparable Sectors**
PropTech's deal size and volume are most like Robotics and Drones, as well as AgTech and EdTech.

High-Performing Sectors

- » **Autonomous Cars**
Outpaced PropTech in median deal size consistently.

- » **AI/Machine Learning**
Attracts more deals, but with smaller individual deal sizes, indicating high investor interest but vulnerability to market compression.

Largest Deals

Top Deal by Climate Tech



\$38.9B

IPO led the sector

Significant HealthTech Acquisition



acquired ShockWave Medical for

\$13.1B

Notable FinTech LBO

GTCR

\$13.1B

acquired Worldpay for

showcasing FinTech resilience

Emerging Trends



Artificial Intelligence (AI)/Machine learning (ML) Growth
Increased share of market activity despite economic pressures.



FinTech Stability
Strong performance despite high interest rates, signaling investor confidence in FinTech's resilience.



Figure 38: Median Deals in PropTech by Month in Comparison with Select Competing Industries, 2023-2024 FY

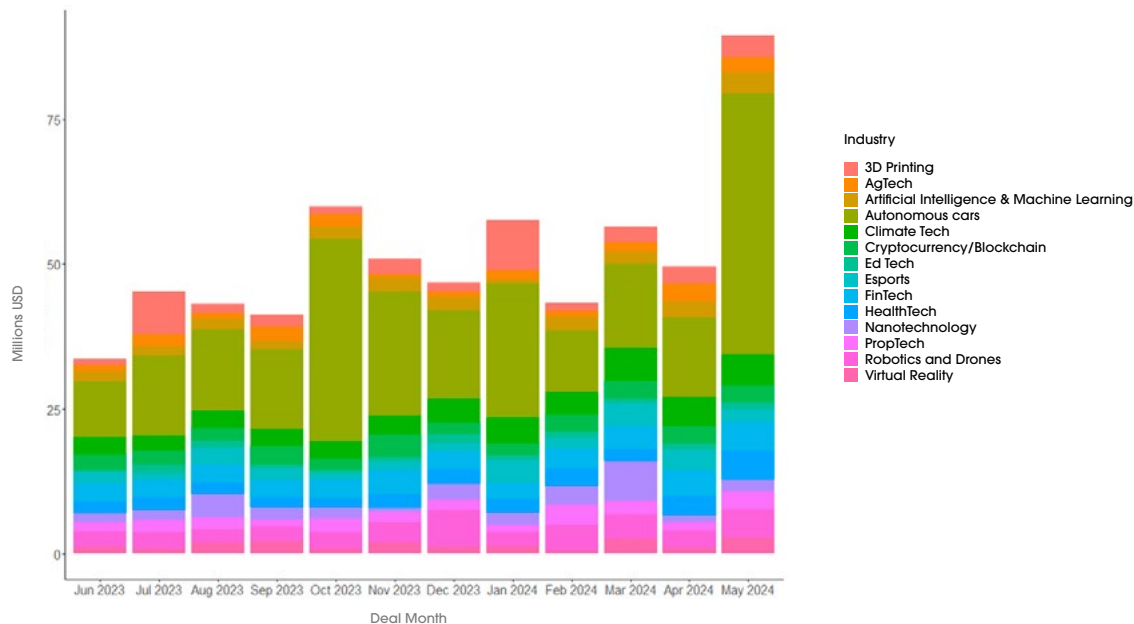


Figure 38 shows the median deal size in the PropTech industry by month for the 2023-2024 FY set in comparison with several competing industries. In June 2023, for instance, the median deal size in 3D printing was more comparable to smaller industries, like Virtual Reality and EdTech. However, in July 2023 and January 2024, 3D Printing had a higher median than any other competing industry besides Autonomous cars. **The PropTech industry was much more consistent across the fiscal year, with median deal sizes ranging from \$1.19 million USD in September 2023 to \$3.4 million USD in February 2024.** For the months with relatively smaller deals, PropTech was most comparable to Virtual Reality, AgTech, and EdTech. For the months with the higher medians, PropTech is more comparable to eSports, Climate Tech, FinTech and Robotics and Drones. Of course, the medians of certain industries may be relatively low, because there are a very significant number of small deals completed in those industries. A good example of this would be AI/Machine Learning. The best performing month for AI/Machine Learning had a median deal size of \$3.775 million USD in May 2024, although the average month in the year would see a median deal size of around \$2 million USD, making the median deal size roughly comparable to the average month of the PropTech industry's median deal size across the fiscal year (\$2.05 million USD). And yet, we hear much more about AI in the news than PropTech, while AI is also widely regarded as a hotter industry. To explain the discrepancy between the data and public perception, we can examine the raw count of deals across the year to begin to ascertain the root cause of these apparent discrepancies.

Figure 39: Raw Count of PropTech Deals by Comparison with Competing Industries, 2023-2024 FY

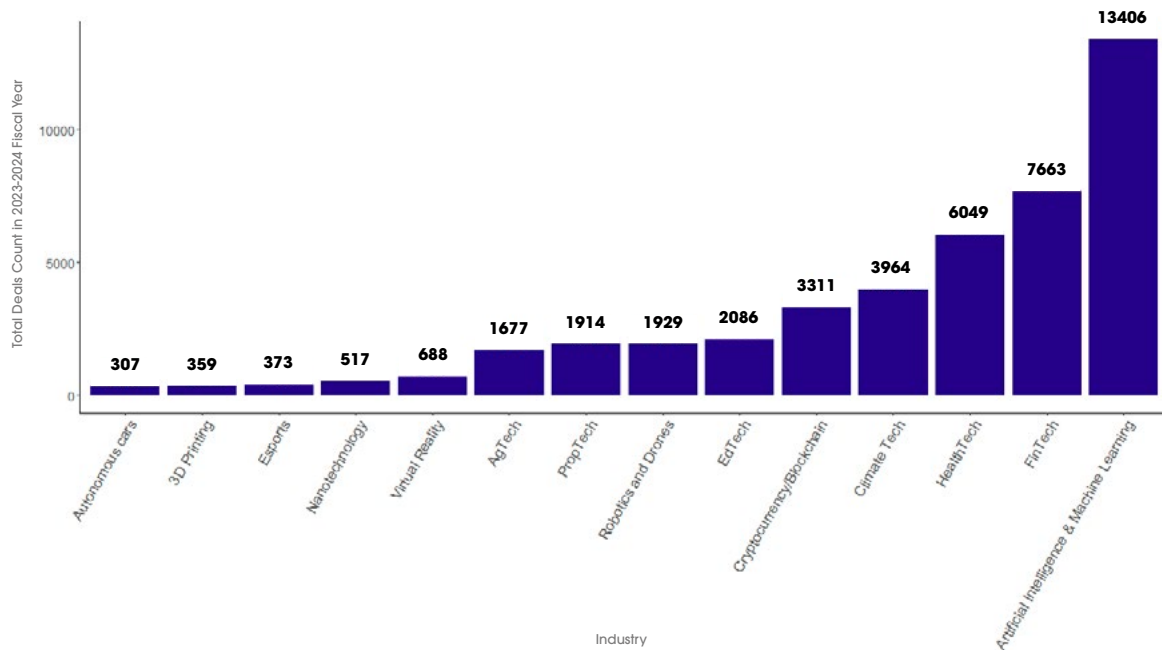


Figure 39 shows the raw count of PropTech deals by comparison with competing industries for the 2023-2024 fiscal year. As we can see, **the very strong industries that are renowned for the amount of capital involved, including AI/Machine Learning, FinTech, and HealthTech have a very large number of deals that have been completed during the fiscal year.** Yet, the evidence from Figure 39 suggests that a much larger number of deals in these industries are very small, making companies working in those spaces quite vulnerable to the market forces of consolidation and compression. **Industries that are more comparable to the amount of activity present in the PropTech Industry range from AgTech (1,677 deals) to Robotics and Drones (1,929 deals) and EdTech (2,086 deals).** By considering all measures thus far, this suggests that the PropTech industry is most comparable in terms of the amount of deal activity and the size of the median deal to the Robotics and Drones industry.

2,086

Deals in EdTech

1,929

Deals in Robotics and Drones

1,677

Deals in AgTech

Figure 40: Top 500 Deals, Select Competing Industries, 2023-2024 FY

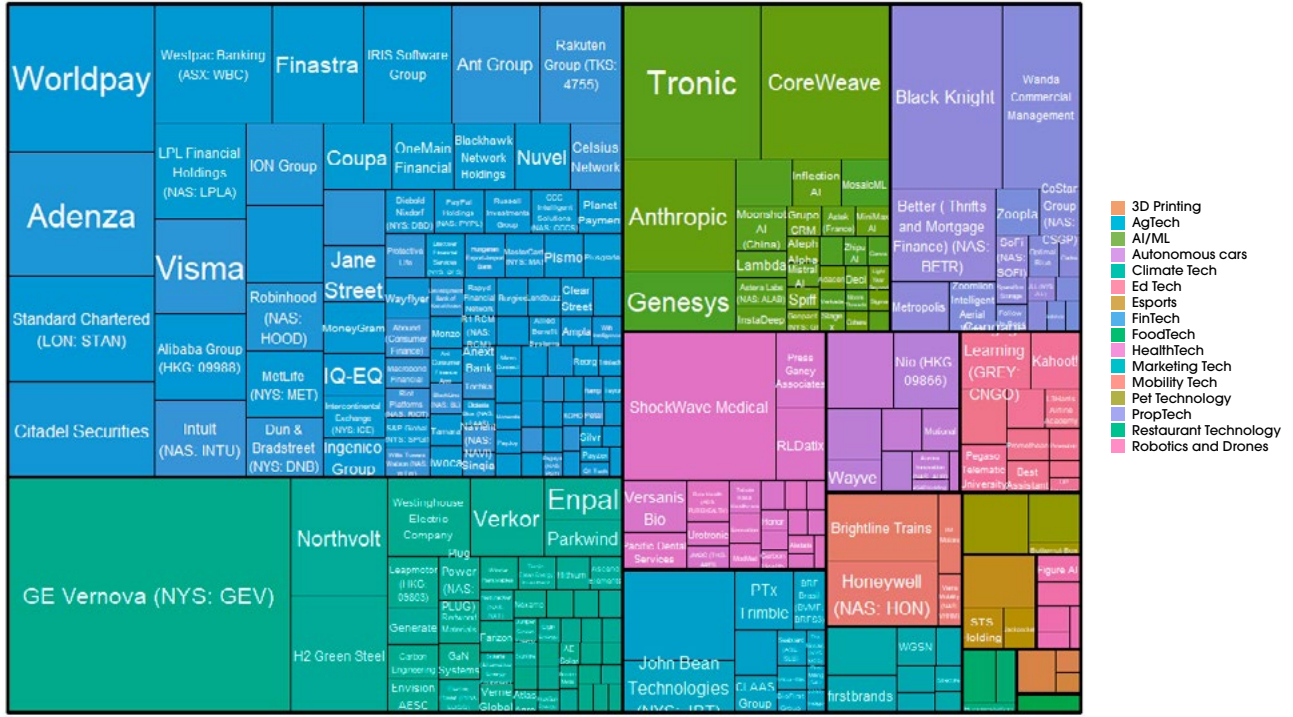


Figure 40 illustrates the top deals of select competing industries of the 2023-2024 fiscal year. As we can see, **the most significant amount of capital was raised in the FinTech, Climate Tech, and Artificial Intelligence/Machine Learning (AI/ML) industries, while HealthTech was also quite significant. The largest deals were GE Vernova (\$38 billion USD, Climate Tech), ShockWave Medical (\$13.1 billion USD, HealthTech) and Worldpay (\$12.5 billion, FinTech).** GE Vernova, despite being an off spin of a major market player, was the shakeup of the season. GE Vernova was spun out of General Electric as a combination of nuclear, hydroelectric, steam, and wind power technological solutions. Their mission is to electrify the planet while simultaneously decarbonizing it. In a surprisingly stellar performance, the company raised \$38.9 billion USD in its initial public offering (IPO) on the New York Stock Exchange on April 2, 2024. Additionally, the company’s total revenue placed well above its comps set mean (\$3.73 billion) at a grand total of \$33.76 billion USD.



\$ 38 B

Climate Tech



\$ 13.1 B

HealthTech



\$ 12.5 B

FinTech

In the HealthTech industry, the top player of the cycle was ShockWave Medical, a medical device company. ShockWave Medical especially focuses on the development and commercialization of novel technologies to improve the care and treatment of patients with cardiovascular diseases, by making use of sonic pressure waves. This IVL (intravascular lithotripsy) technology minimizes the invasiveness of surgery, is easier for providers to use, and thus improves outcomes for patients with certain types of cardiovascular diseases. Not surprisingly, the company's technology has been highlight celebrated and the company was acquired by Johnson and Johnson for \$13.1 billion USD on May 31, 2024, on the final day of the 2023-2024 fiscal year. The acquisition signifies a shift among Johnson and Johnson's leadership, as well as among other leaders in the healthcare industry, back toward research and development of core technologies improving patient outcomes for common diseases in the wake of the global pandemic. Now that investment in vaccines has declined, industry leaders are looking ever more toward technological solutions for the future to treat other major problems for society.

The number three slot in the top deals among competing industries in the past year was taken by a FinTech company, Worldpay. Worldpay is an operator of an electronic payment and banking platform that is intended to deliver one-stop-shop payments. Worldpay offers debit and credit card processing, cloud based payment solutions, mail payments, phone payments, card machine payments, and POS payments through a unified platform. Thus, they are providing a technological solution to integrate the past worlds of phone and mail payments, which are still quite commonly used, with the contemporary world of cloud-based payment solutions. Thus, the private equity company GTCR saw the promise in Worldpay's technology and acquired the company through a \$12.50 billion USD leveraged buyout offer (LBO) deal on February 1, 2024. The deal resulted in a \$18.5 billion USD valuation for Worldpay, which had also raised \$62 million of debt refinancing in September of 2023.

While it is surprising to see that Climate Tech took the top place among competing industries, it is also notable that four of the top ten deals were in the FinTech industry, including Worldpay, Adenza (\$10.5 billion), Finastra (\$6.3 billion) and Ant Group (\$5.98 billion). Much of the market map is comparable to the previous fiscal year, with one notable change: AI/ML has begun to take up a larger share of the market, with the HealthTech industry, surprisingly, taking up a smaller share. Also notable is that the FinTech industry deals remained as a quite substantial portion of the market, given the nature of market pressures which might have led some investors to assume that they would perform less strongly when compared to the previous fiscal cycle. However, investor confidence has remained relatively strong, despite interest rates remaining high and borrowing remaining strained. The evidence suggests the FinTech industry may indeed be more resilient than previously hypothesized.

Chapter 6: **Projections**

In this chapter, we focus on the future projections of the PropTech industry. We are especially keen to develop increasingly accurate predictive analysis on how PropTech companies develop over time, as well as thinking through the opportunities that are provided to investors in the PropTech space.



Key Insights on PropTech Future Projections

Growth and Investment Potential

- PropTech is poised for growth, with strong predictive analysis helping investors spot profitable opportunities.
-

Company Success by Age

- Young PropTech firms have a high early success rate, especially within 4 years, with 5-9-year-old companies showing even better chances due to proven stability and operations.
-

Top Companies by Opportunity Score

- Companies like Crassone, Dimedia, and Huspy rank high in opportunity scores, suggesting strong potential for M&A exits, while Accenta stands out as an IPO candidate.
-

Innovation Highlights

- Crassone (Japan) leads in urban renewal infrastructure, Accenta (France) drives decarbonization tech, and Huspy and Dimedia simplify property transactions through digital platforms.
-

Emerging Markets

- Technologies standard in mature markets (like PropTech software) have significant potential in emerging regions, as seen with Kotini's efficiency solutions in the UK.
-

Top Deal Trends

- Major deals in Climate Tech, FinTech, and HealthTech indicate capital trends relevant to PropTech, with high-opportunity companies ripe for M&A.
-

Future Directions

- PropTech aligns with sustainability and tech advancements (AI, IoT), creating fertile ground for investment in sustainable, innovative real estate solutions.
-

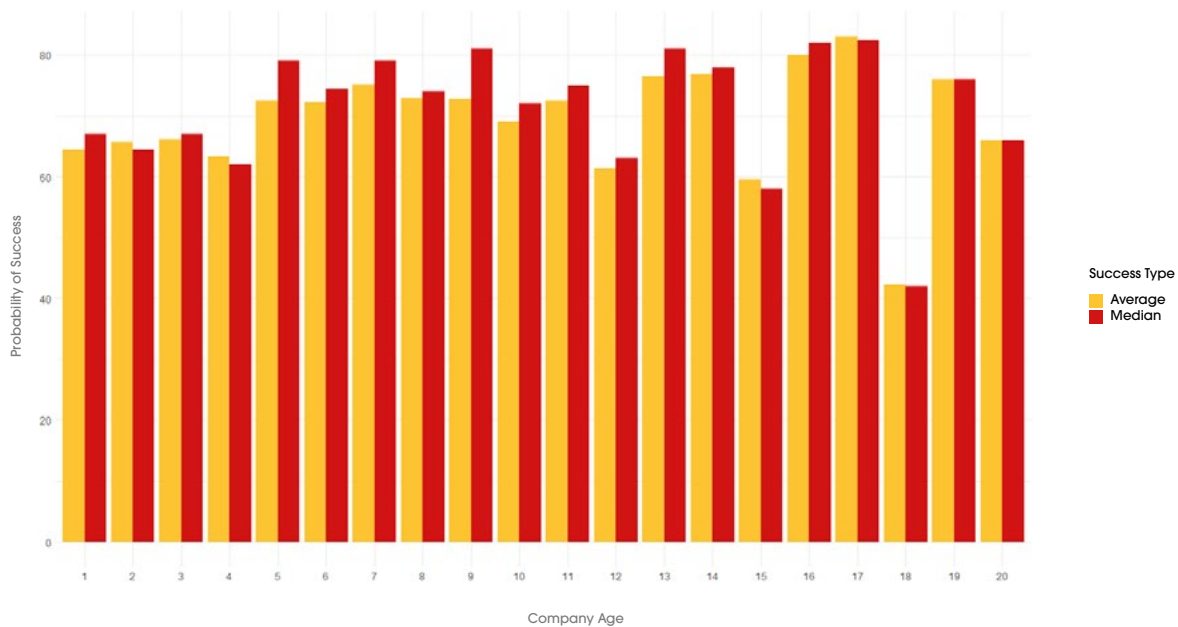
Figure 41: Probability of Success by Company Age

Figure 41 shows the probability of a success of a company as shaped by the age of that company. To be sure that we were not skewing the results, we measured both the median and the average probability of success. Here, a successful exit is considered either an IPO or some form of M&A deal. As we can see from Figure 45, young companies tend to be successful in the PropTech industry, as their average probability of success remains greater than 50% for the first four years. However, for those companies five to nine years of age, the probability of success is higher. These are companies that will have a proven track record of managing operations, research and development, product delivery, and, importantly, fundraising. These companies also tend to be larger and have additional assets (hard, liquid, personnel, and, most importantly, unique proven uses of technologies) that make them attractive for acquisitions. The record then becomes more checkered in the 10-to-17-year range, although the trajectory of success is still upward, with a robust mixture of predicted exits being mostly comprised of M&A deals and IPOs, although the likelihood of an IPO does tend to increase over time.

Figure 42: Top Active Companies by Opportunity Score & Predicted Exit Type, 2023-2024 FY

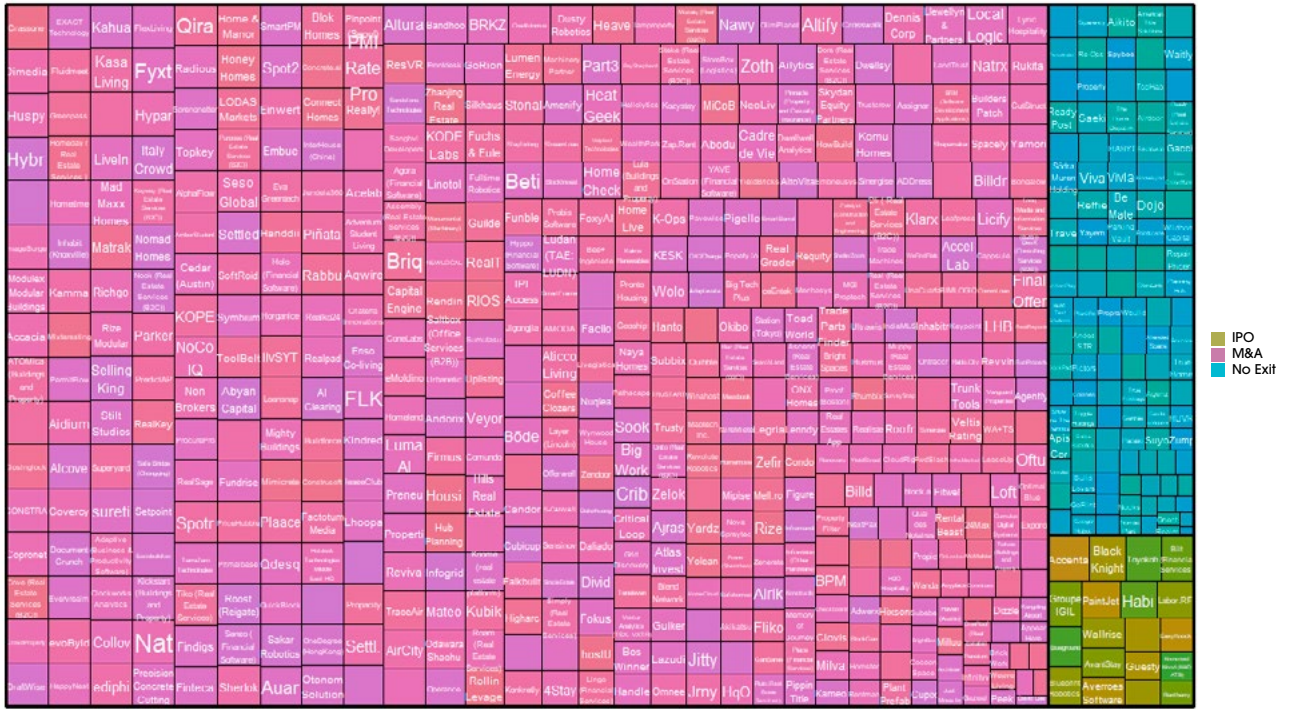


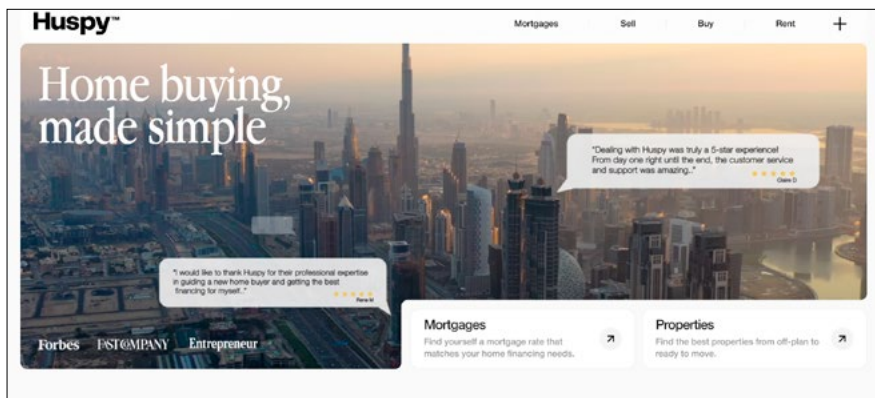
Figure 42 shows a list of the top active companies in the PropTech ecosystem from the 2023 to 2024 fiscal year, organized by their opportunity score and predicted exit type. As we can see, there are many companies with high opportunity scores (those over 80, for instance) that have an M&A as their predicted exit type. This includes innovative companies, like **Crassone**, **Dimedia**, and **Huspy**. By comparison, there are considerably fewer companies that made deals in the past fiscal year that are predicted to achieve status through an initial public offering (IPO). However, beyond the promise of Black Knight, which we have already highlighted elsewhere in this year’s Barometer, we find there are several innovative companies that are likely to achieve an IPO status. However, **Accenta** represents one company with a very high opportunity score, which has a good likelihood of achieving IPO status, with promising numbers.



Among these companies of distinct promise, the aforementioned top four are balanced with two managing category companies, one building and one living. **Crassone** is a Japanese provider of home building infrastructure services intended to deliver estimations for demolition work, along with exterior housing construction work. Thus, Crassone is developing critical technologies that can forever transform the necessary process of urban renewal. Similarly, **Accenta** is contributing critical technologies to urban renewal. However, their emphasis is on the decarbonization process, combining artificial intelligence and machine learning to examine the inter-seasonal storage of thermal energy, with the aim of fitting buildings with a low-carbon boiler system to meet their thermal needs. Notably, Accenta raised EUR 108 million in a venture round led by EREN Group and Credit Mutuel Impact in September of 2023, with the aim of strengthening Accenta's position in France and expanding to other locations across Europe.



In the managing category, **Huspy** and **Dimedia** focus predominantly on two different aspects of technological solutions: platforms and software. Huspy, to begin with, is a developer of an online mortgage service platform that is



intended to ease the home-buying and selling process. The company's platform simplifies the mortgage process, removing friction, and increases the availability of cost-effective solutions to one of the greatest hurdles to home ownership: finding and securing a mortgage. And they do all this through a web platform and paired mobile app that eliminates the need for paperwork. More broadly Dimedia has been providing software development and



systems management solutions across the industry, while still focusing on their core product, which is a CRM software specially developed to meet the needs of real estate agents and agencies. Agencies can more easily manage the properties they have to offer and create customer relations across the Southern Slav states of Croatia, Serbia, Bosnia, Hercegovina, and Montenegro. Further, Njuskalo, the largest Croatian digital marketplace acquired Dimedia early in the 2023 fiscal year, as a further sign of the prospects of Dimedia’s technological contributions to the real estate property management space, especially as Njuskalo claims some 80% of the total number of business customers in the real estate sector in the sub-region. Thus, it’s important to remember that certain technologies and innovations that might be considered taken for granted in the North Atlantic and Northern Europe might provide avenues for ripe investment opportunities when applied to new regions and markets.

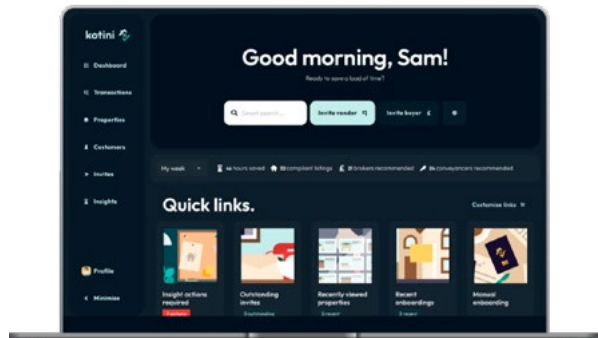
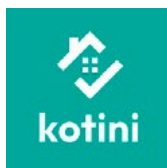
One technology being developed in Northern Europe that would be fruitful to invest in for additional regional markets would be to follow the trend of integrating real estate agent tools. For instance, in the United Kingdom, Kotini is providing unique solutions to common problems in the United Kingdom property market, since agent tools are essentially quite disparate, and a hybrid mix of paper-based and electronic approaches to record keeping, verification, and more.



Watch the interview

“ Think of anything...opening an account, working with your bank, buying anything, ordering food. Digital 1st is the experience you have. And then, over in the estate agency world, in the UK, and probably in lots of other countries...it’s just not digital first. Kotini is about closing that chasm between the expectations of the consumer...and the market. ”

Kieran Witt
Founder, Kotini



Companies introducing technologies into new markets and developing revolutionary approaches to solve some of the industries oldest problems are likely to be better investments for keen investors. Fortunately, it is possible to assign a quantitative metric to rank the opportunity that is presented by an individual company.

Figure 43: Number of Active Companies by Opportunity Score, 2023-2024 FY

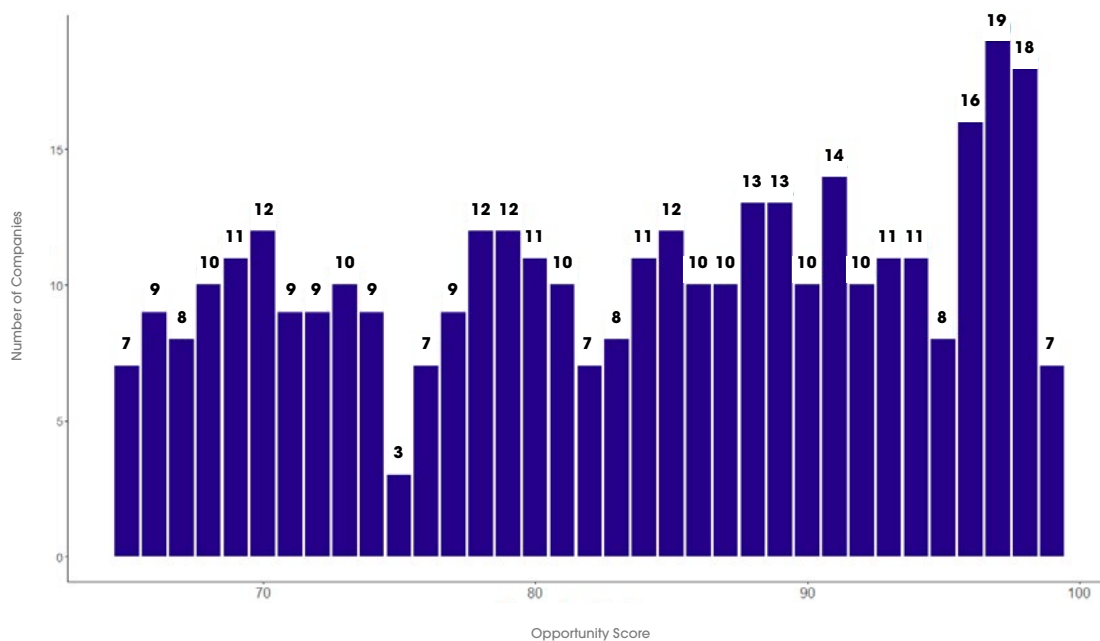


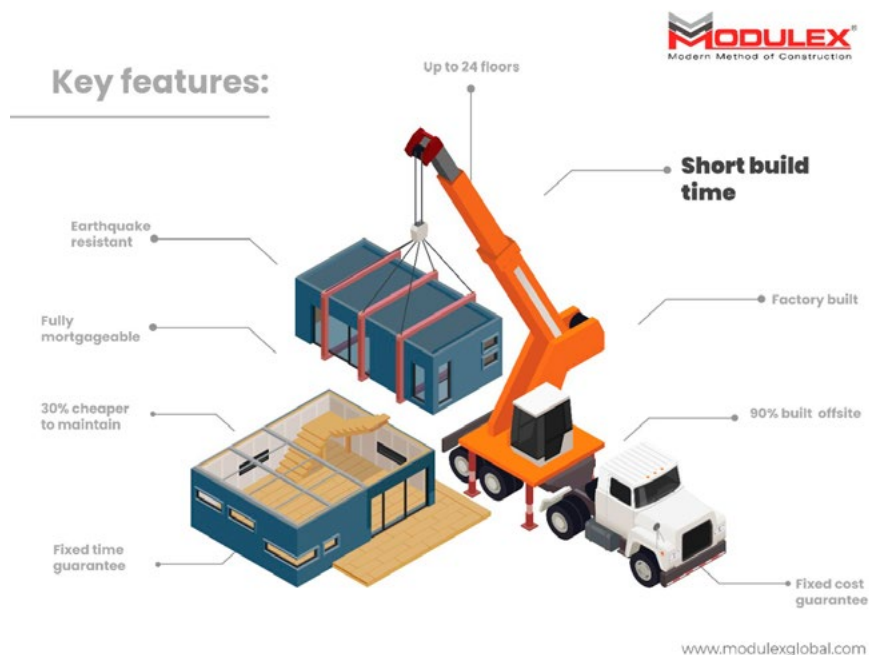
Figure 43 represents the number of companies in a given tier of Opportunity Score for the 2023 to 2024 fiscal year. What we observed is that the number of companies in each tier tends to increase with the opportunity score, suggesting there are a large number of PropTech companies that are ripe for future M&A deals. However, among those companies with the top opportunity score, we have just eight companies, including the aforementioned Accenta, Crassone, Dimedia, and Huspy. Beyond these four, the companies with the top opportunity score are **Hybr**, **Inspection Go (iGo)** and **Modulx Modular Buildings**. Among these next three companies, another two are managing category companies, while one is a building category company. To begin with, Hybr is an operator of a rental platform that seeks to provide solutions to the student housing sector, by connecting student renters directly with the



landlords. The company raised GBP 3.24 million in seed funding from Blackwood Ventures and Adjuvo in November 2023 to expand its impact in a shorter time frame, supporting millions of students across the United Kingdom, in their effort to find the right housing, enabling them to achieve more with their studies.

While Hybr focuses on the rental market, iGo focuses on easing friction in the process of home buying. iGo is a home inspection software company that enhances the workflow of businesses and independent home inspectors. The software platform has a proven track record of providing agents with free repair estimates, while increasing agent referrals and market shares for inspectors, which is important since the home inspection stage of a property purchase is still often conducted with a flurry of paper and hand scribbled notes about what a thorough inspector may find, quickly organized into a readable format for the buy, and guided by the agent. The process has typically been confusing for everyone involved in the past, and iGo is part of the solution.

The final company with a top opportunity score for the 2023 to 2024 fiscal year is **Modulex Modular Buildings**, a provider of steel modular buildings utilizing 3d volumetric cold rolled steel technology. Their business is also carbon net-zero certified, further enabled by AI and IoT technological solutions to provide the U.K., U.S., and E.U. with housing and infrastructural needs swiftly, although they have also serviced projects in India as well. As a global pioneer in the Building category and construction technology, more specifically, Modulex Modular Buildings is an indicator of several observable trends: 1) being the development of new materials using technological solutions to advance R&D; 2) being the enabling of technological solutions through the application of cutting edge computing technologies (including AI, Blockchain, and IoT), and 3) striving to edge ever-closer to a carbon net-zero future. We highlight these trends further in the next case study.



Case studies

1 Building Category

The Building Category of the PropTech ecosystem covers a vast array of technologies. To begin with, we have those technologies involved with assessing the viability of a building site, managing the project, and organizing the affiliated permissions, certifications, and permits associated with a project. We also have all of those technologies that are associated with the materials used in construction, which can involve any element of the process, ranging from concrete, to wood, to substitutes, and glass, and even including even 3D printing. Further, building category companies include all of those companies developing robotics and smart construction equipment, as well as quality control, assembly, and delivery of a project through handover to the new management. Needless to say, given the natural ingenuity of humans, and the way that we strive to constantly improve our domiciles, it is somewhat surprising that the Building category has not attracted as much investment historically. At the same time, as we shall see in this case study, it is easy to see how this category could attract much more attention in the near future.



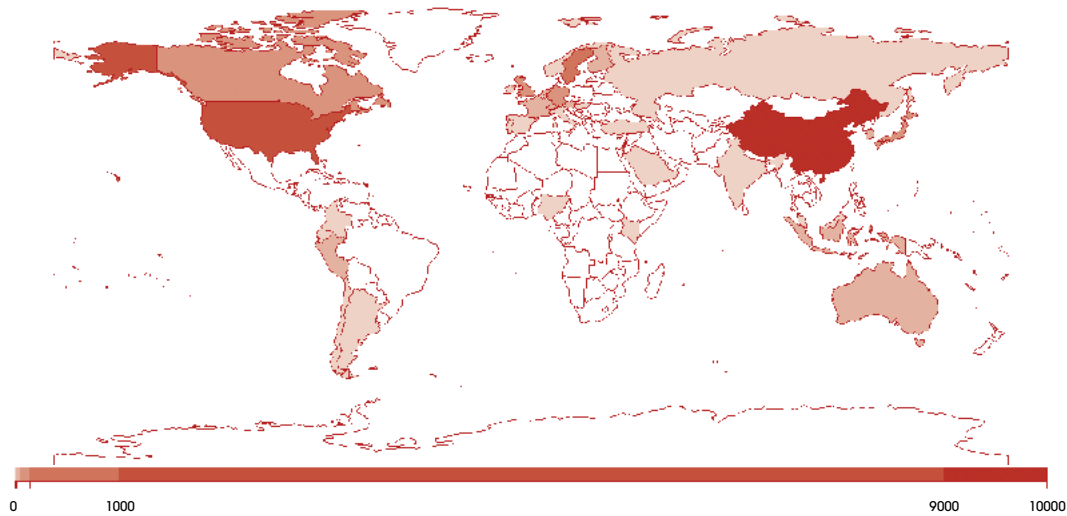
Figure 44: Deal Size by Company HQ Origin Country

Figure 44 shows the distribution of deals during the 2023 to 2024 fiscal year in the Building category. As we can see, there is an enormous concentration of deal capital in the People's Republic of China, rising far above the rest, with nearly ten billion raised (or \$9.75 billion USD to be precise). Coming in second, the United States only raised \$1.11 billion USD in the Building category, while the third and fourth place countries, Sweden and Israel, raised \$323.52 million and \$175.97 million USD respectively. In a second tier, Canada, Germany, Japan and the United Kingdom all raised between \$50 and \$100 million USD. Finally, in a third tier of leaders, Australia, Finland, Austria, France, Netherlands, South Korea, Indonesia, Peru, Singapore, and Switzerland all raised between \$10 and \$50 million USD. Among the most notable trends are the simple fact that the United Kingdom is relatively far down the list, and certain long-term global leaders, such as Spain, are not present in the Top 20. Consequently, it is clear that Building category companies still have space to grow in these markets. Although we might argue that the placement of the United Kingdom is a result of the relative financialization of the PropTech market, in the case of some other leaders, such as France and Spain, the relative need for new real estate and residential buildings is so significant, that the present indicators are signs of room for growth. Other signs of growth suggest that Building category companies, including those headquartered in Europe, may be able to make more progress riding the waves of developing economies where construction is a much more significant player in the overall market, in part because rapid urbanization is a key demographic feature of those countries. Indonesia and Peru would be examples of these markets.



\$ 9.75 B



\$ 1.11 B

Figure 45: Top 20 deals in the Building Category, by Type, Size, and HQ Country, 2023-2024

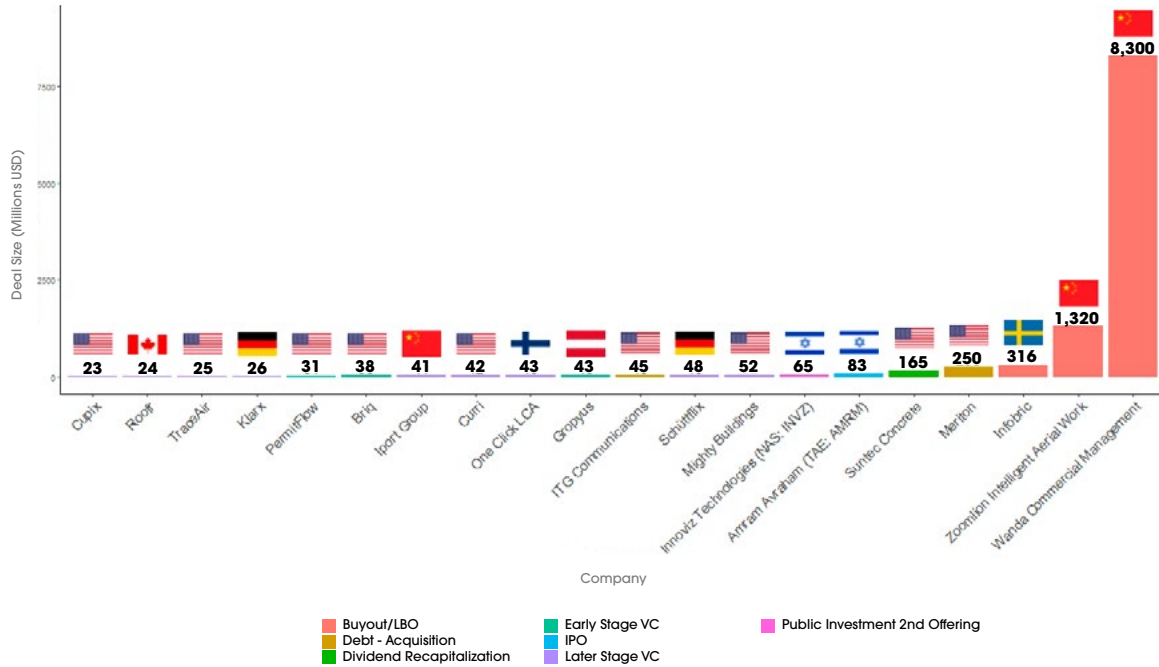


Figure 45 shows the top PropTech deals in the Building category from the 2023-2024 fiscal year. As we can see, the top deals are by Chinese, Swedish, American, and Israeli companies, while two German companies, an Austrian company, a Finnish company, and a Canadian company round out the Top 20. Although the big players are Buyout/LBO deals in the PRC and China, VC deals in the United States are more significant among the top deals. Much like the rest of the PropTech industry, the concentration of the greatest number of top companies here is clearly still in the United States, but the fact that the PRC has the largest deals on the list shows the promise of scaling in a much larger market by measure of population. American companies with major deals in the Building category included Meriton (\$250 million), SunTec Concrete (\$165 million), Mighty Buildings (\$52 million), ITG Communications (\$45 million), Curri (\$42 million), Briq (\$38 million), PermitFlow (\$31 million), and TraceAir (\$25 million). Within this list, these companies engage with the production and patenting of a vast array of technologies.

For instance, is a leader in the field of HVAC manufacturing and systems, while **SunTech Concrete** is a leader in the concrete industry. These companies develop and test new technologies



every year, but they may not attract the glitz and glamor of fad or meme-motivated investment strategies. That said, there are certainly companies that are more well known for their contemporary appeal, such as **Mighty Buildings**, a constructor of beautiful, sustainable homes utilizing modern designs and technologically enhanced processes that reduce time, labor costs, and waste for a project. Building off the needs for the ever growing industry, companies like Curri are developing logistics platforms to grow sales, cut risk and enhance CX with software advances. Other companies, like Briq and ITG Communications focus more on industry and providing, with ITG Communications focusing on the construction of cable and associated communications facilities as it caters to the B2B sector, while Briq also caters to the B2B sector, but focuses on providing financial automation of operations to small businesses and contractors for projects. Similarly, PermitFlow is primarily a B2B operation, although the technological innovations it provides are incredibly important, as PermitFlow simplifies the process of preparation, submission, and tracking of permits.

Scandinavian construction companies have long been leaders in the development of robotics and materials technologies, as have Germany companies, so it is not a surprise to major leaders from these countries. Israeli companies, especially in Tel Aviv, have been emergent in the tech sector, and this year's data may prove a sign of this. However, the indicators of the health of the industry could be more fragile to geopolitical conditions than several other markets. Construction and building companies in Israel have come under international scrutiny, and it is unclear if investors will be willing to continue to establish a footing in the region should the degree of existing conflict continue or deepen.



Mighty Buildings

Figure 46: Top 20 deals by Type and HQ Country - Excluding US

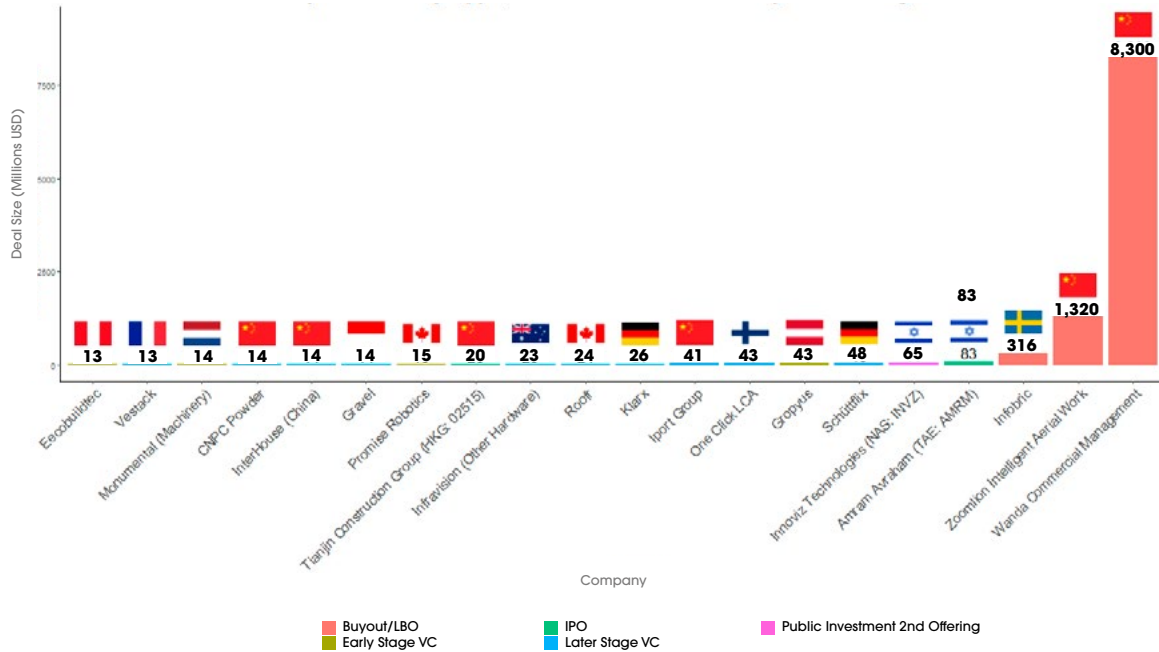


Figure 46 illustrates the Top 20 deals in the Building category of the PropTech industry excluding those companies that are headquartered in the United States. Given the extreme size of the Chinese market, one might expect a significant portion of the American slots to be taken up by Chinese companies. Indeed, when we exclude the eight American companies from the list, we do add three more Chinese companies, being Tianjin Construction Group, InterHouse (China) and CNPC Powder respectively. However, this is also where we see companies from the Netherlands, being Monumental (Machinery), Indonesia, being Gravel, and Peru, being Eecobuildtec making more of an impact. Notably, these companies are solving specific problems of their markets, while providing solutions that are truly global in nature and could improve workflows in markets elsewhere. **Gravel**, for instance, has developed a construction workforce platform that makes it simple to find qualified and trustworthy construction workers, by democratizing access to blue collar workers across boundaries, as well as providing auxiliary residential repair and maintenance services. Further, Gravel has begun to offer materials sourcing online through their platform, allowing for further easing of labor shortfalls



during the building process. On the materials and services side, **Ecobuildtec (recently renamed “Ecobuildnext”)** is providing inexpensive and quickly assembled housing, through providing modular systems, and civil work design flows that service specific industrial sectors, particularly mining. However, their core technologies may be used to abate the housing crisis more broadly, and the company is keenly aware of this possibility as they seek to expand their market. Regardless, technology and innovation remain the key to expanding the PropTech market in the Building category. Thus, it is not a surprise to note that the vast majority of the market deals are completed early/late stage VC, Accelerator/Incubator, and Seed Round deals.

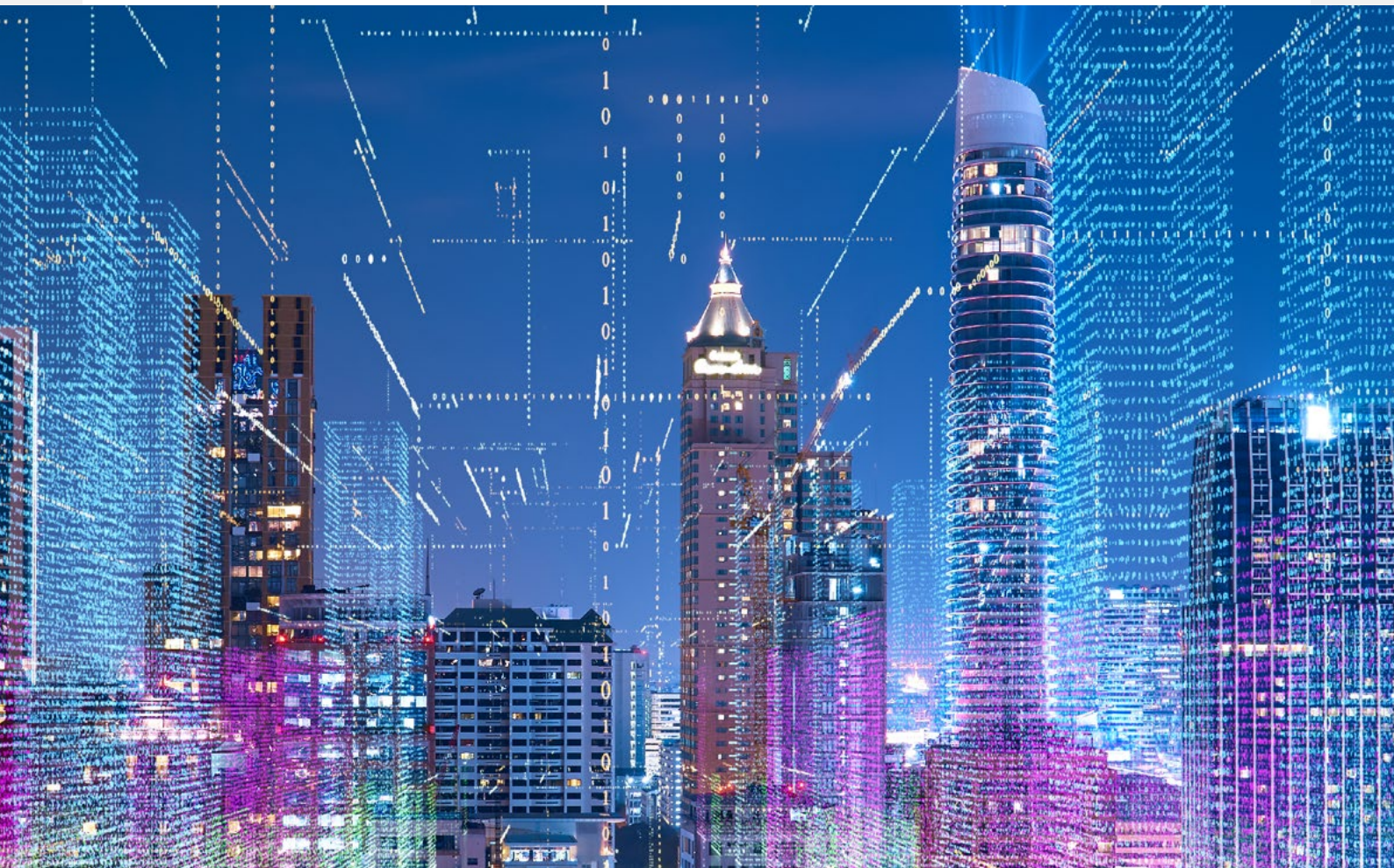


Figure 47: Number of Deals by Deal Type

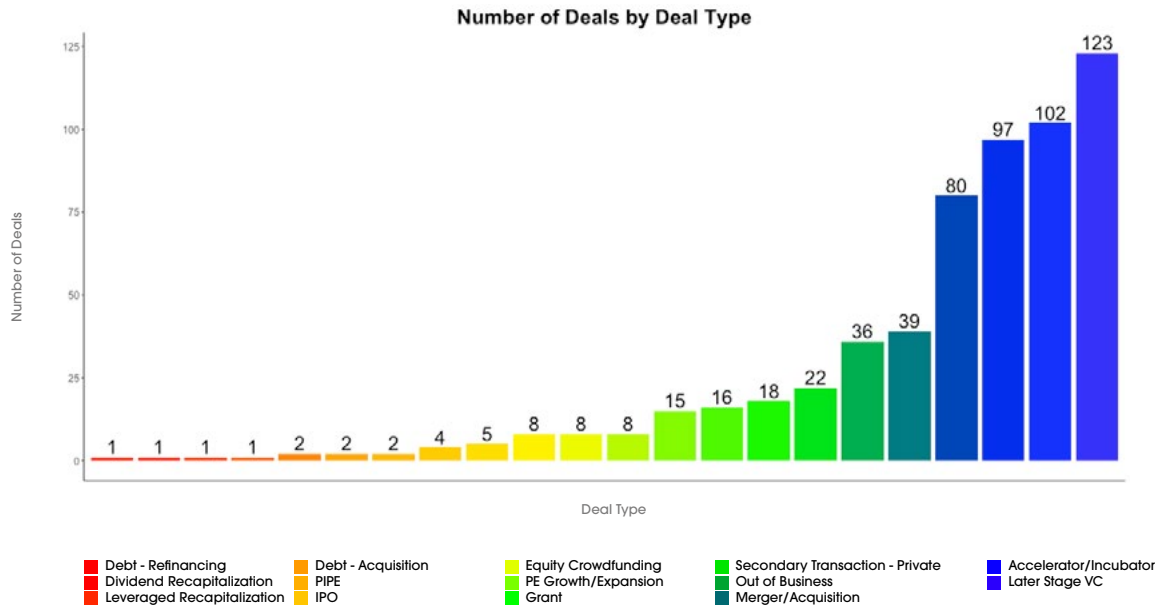
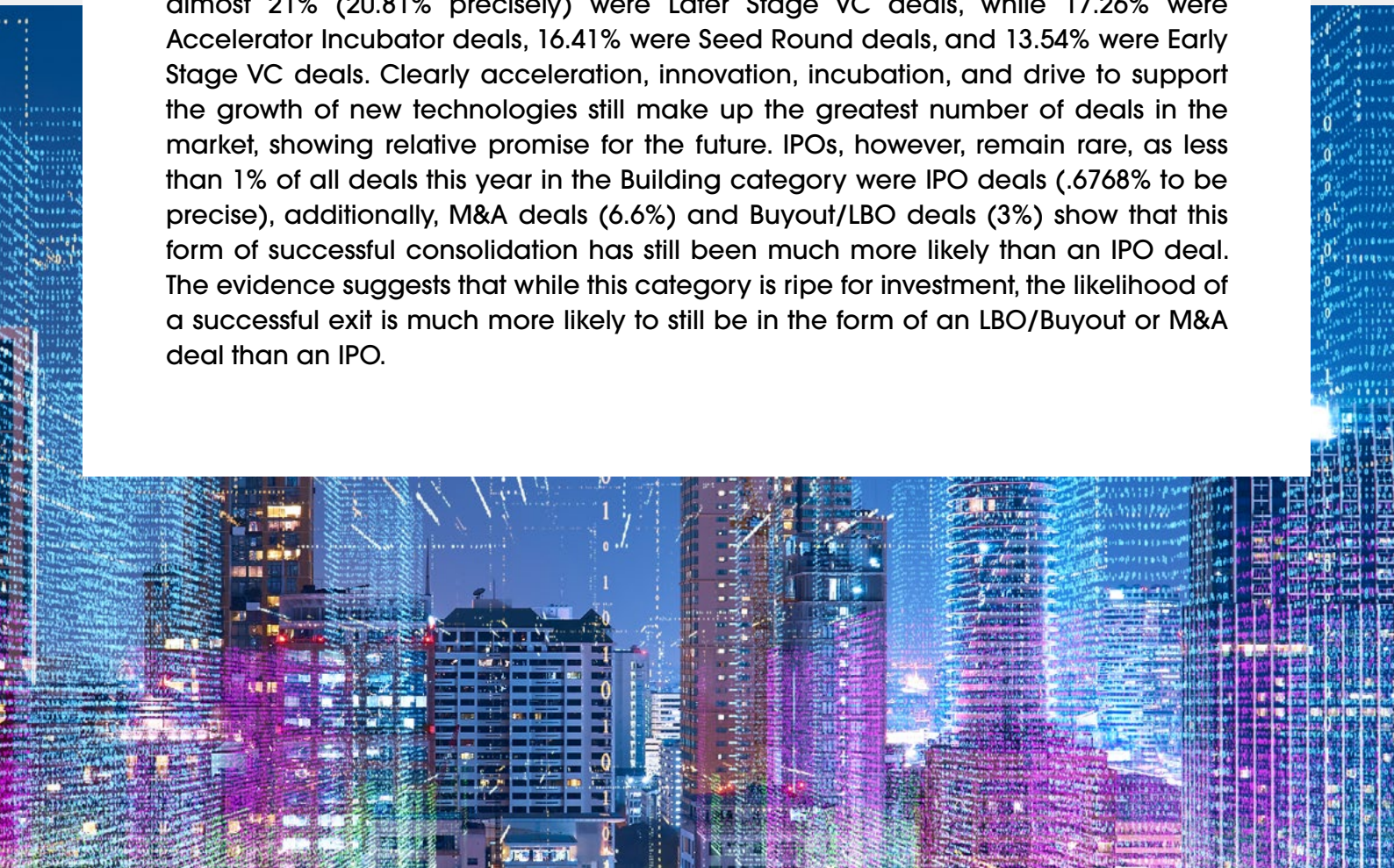


Figure 47 shows the total number of deals in the Building category of the PropTech market for the 2023 - 2024 fiscal year as broken down by their deal type. Of these, almost 21% (20.81% precisely) were Later Stage VC deals, while 17.26% were Accelerator Incubator deals, 16.41% were Seed Round deals, and 13.54% were Early Stage VC deals. Clearly acceleration, innovation, incubation, and drive to support the growth of new technologies still make up the greatest number of deals in the market, showing relative promise for the future. IPOs, however, remain rare, as less than 1% of all deals this year in the Building category were IPO deals (.6768% to be precise), additionally, M&A deals (6.6%) and Buyout/LBO deals (3%) show that this form of successful consolidation has still been much more likely than an IPO deal. The evidence suggests that while this category is ripe for investment, the likelihood of a successful exit is much more likely to still be in the form of an LBO/Buyout or M&A deal than an IPO.



2 Market Intelligence Dashboards¹

There are a vast array of tools that have been adopted by the real estate agents over the past several years. These can include everything from adopting Canva for advertising purposes to DocuSign, to email marketing software and social media. However, market intelligence dashboards, featuring the ability to process large selections of data quickly, have only become more available more recently. These are essentially business intelligence tools used to visualize data. They can create a better understanding of the market audience, competitors in the market, and key features of the market geography as core aspects of their analysis. In the Real Estate sector major advances in market intelligence platforms have recently been pioneered by RealPage and Slate.AI. Market intelligence dashboards have become relatively common when one engages in the search for long-term residential properties, such as houses and condos (or “co-ops” as they are termed in some cities, such as New York). However, there is little information widely available about the impact of these technological advances on the short term rental market.

The short term rental market is typically defined by units that are rented between one and seven days, or slightly longer, with the supply side of this market either being property managers (including for hotels) or independent hosts (such as those who might rent their properties on AirBnB or similar services). On the demand side, individuals seeking these properties are typically individuals who are in either an urban, suburban, or rural setting for a short period of time and typically travel a significant distance to arrive at that setting. They may be traveling with family, or for work. They may be families seeking to attend the drop off of their students at dorms, or public events and ceremonies, such as graduations, weddings, and funerals. They are typically engaged in either work or leisure, or a combination of the two during their stay. With such a diverse array of individuals who may be renting short term stays, it has been nearly impossible in the past for property managers to attempt to analyze this market without any tools.

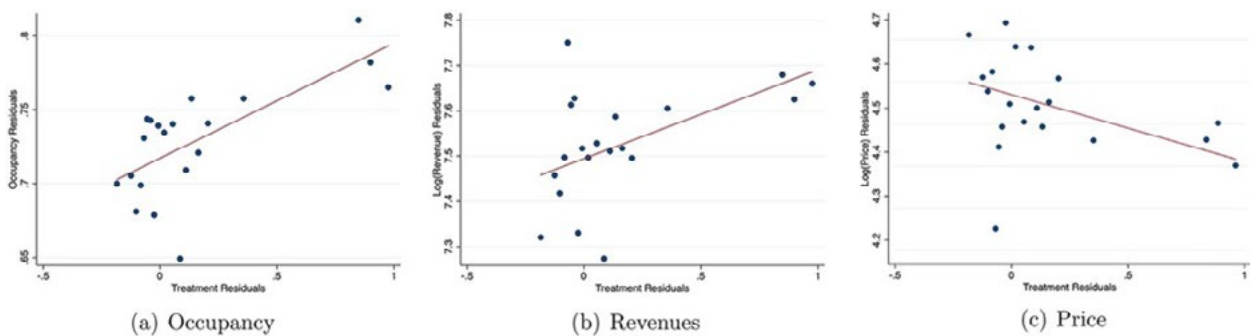
Further, independent hosts often participate in the short-term market for a combination of financial reasons (seeking extra income), or social and cultural motivations (such as those offering “authentic cultural stays”), whereas property managers (PMs) are more like intermediary operators or companies that are simply seeking to maximize profits and returns. Overall, the short-term market is thus so diverse that it has a high turnover rate for PMs, along with a relatively low barrier to entry, but a relatively high

¹ “Property Management Technology Adoption in the Short-Term Rental Housing Market”, by Sophia Göppinger, Jaime Luque and Gianluca Marcato, published in Real Estate Economics 52, 1197-1225 (2024).

barrier for survival and success. The low barrier to entry means that the market is very fragmented, supply can become quite volatile, and competition can shift from nonexistence to intense in very short periods of time. Occupancy levels are also much more difficult to track in this market, due to the large number of informal property managers that exist and the explosion of the AirBnB market.

In this case study, 2,000 AirBnB listings in Madrid were analyzed over 18 months. Property managers were counted in the study if they adopted the market intelligence dashboard software at least once during the survey period. One of the key features of adopting the technology straight away, of course, was an increase in the relative transparency of the market for property managers. The analysis shows how market intelligence data impacts occupancy levels, daily pricing, and revenues. Since pricing algorithms are not designed to produce a bias in favor of an individual property manager, the argument is that those PMs who use them will have a better knowledge of the overall trends of the market.

Figure 48: Occupancy, Revenues, and Price after the adoption of a MIB (Market Intelligence Dashboard)



(Image Credit: Real Estate Economics, Volume: 52, Issue: 5, Pages: 1197-1225, First published: 25 June 2024, DOI: (10.1111/1540-6229.12504))

Figure 48 shows the occupancy, revenues, and price after the adoption of a market intelligence dashboard by a property manager. Surprisingly, market intelligence dashboards saw a relatively low adoption rate, given the potential value that they offer for property managers. Just 16% of AirBnB listings had property managers that made use of a market intelligence dashboard. The results for these property managers were quite dynamic, however. They reduced inoccupancy. Occupancy rates dramatically increased, by a total of 13.3%, after the adoption of the market intelligence dashboard. The 13.3% increase in occupancy rates drove revenues up in a similar fashion, totalling a very substantial 11.6% increase in revenues. Finally, although it might be intuitive that such software would seek to optimize prices upwards, there was a 15.8% drop in the daily average prices of these properties. Thus,

property managers that add the use of a market intelligence dashboard secure a competitive edge. They leverage the data to outperform their peers, while less tech-savvy PMs are likely to find themselves increasingly struggling and even potentially exit the market because of the lower return performance of their invested properties. While we should note that the results of this case study should not be extrapolated onto the long-term stay/rental or purchase market, it does follow that certain markets will behave in a different fashion. Additionally, it's important to note the price decline associated with the adoption of market intelligence dashboards in this case. If the data were to show a price increase, there is at least a chance that such a platform could run afoul of existing laws that are designed to criminalize price fixing, as the American Department of Justice has recently contended in a newsworthy lawsuit against RealPage. However, in this case, because the data shows that the increased revenues for short term rentals are coming from a decline in prices and an increase in occupancy rates, investors can rest assured that the evidence suggests a completely different conclusion: the adoption of technology is contributing to greater equilibrium in the market.



3 Tokenization of Real Estate²

This case study focuses on the tokenization of real estate as an asset class. The tokenization of real estate involves the combination of two relatively distinct asset classes in the market, which are almost opposites. On the one hand, the real estate industry is typically viewed as relatively low tech, but stable in terms of the investment value of properties. On the other hand, blockchain technology is quite advanced, but the tokenization of assets on the blockchain has typically been viewed as relatively volatile, especially after the scares of cryptocurrency markets in recent years. There are more than 75 companies in the PropTech industry that were active deal makers in the past year that are involved with developments in blockchain technology in some fashion. Many of these companies are investment platforms that are using developments specifically in cryptocurrency and payments. Considerably fewer, around 10%, are focused on the actual tokenization of real estate as an asset class. Yet, the promise of tokenization for real estate is real, as it provides a way for investors to diversify their portfolios and create more stable foundations for a flexible stack of assets, while allowing for the necessity of hyper-liquidity and rapid reallocation when necessary, enabling investors to more quickly respond to and capitalize on rapidly changing market conditions.

We only have reliable deal data on a total of 54 companies that have PropTech or real estate technology at the core of their focus and include tokenization in the focused descriptions of their companies core activities. Among these, the top fundraisers are Everyrealm (\$70.91 million, USA), Finexity (\$32.53 million, Germany), RealBlocks (\$30.70 million, USA), Parallel Markets (\$21.33 million, USA), and Early Works (\$15.02 million, Japan). A second tier of fundraisers includes MBD Financials (\$10 million, Singapore), Zoth (\$6.5 million, India), and Aething (\$5 million, USA). Even setting the leaders aside, which are naturally concentrated in the United States, there are precious few companies that have entered the blockchain market in the PropTech ecosystem in core European markets. For instance, there are just two companies in France (Konkrete and Vave) that include the tokenization of real estate in the official description of their core operations. Consider other European markets, there are just six similar companies in Switzerland, five in Germany, just two in Spain (both naturally headquartered in Valencia), just one each in Portugal, the Netherlands, and Italy. Meanwhile, the global leaders for fundraising in this profitable niche of the PropTech ecosystem are the United States (\$236 million), German (\$32.5 million), Singapore (\$17.5 million), Japan (\$15 million), the British Virgin Islands (\$13.4 million), and Switzerland (\$11.1 million). When developing economies like Vietnam

² This case study is joint work with Mathieu Miron and features the findings in his master thesis.

and Chile have outpaced key European markets in their fundraising for this cutting-edge technology, we must begin to wonder why European economies have not yet fully embraced this new technology. The answer likely lies in the well-known history of these markets as being rather slow to adapt. Another hypothesis lies in the suggestion that developing markets might be keen to adapt this new technology more quickly, due to the promise it offers them. Blockchain technology, of course, contributes to other elements of the transaction process by improving the liquidity of real estate, through working as though it were a ledger, allowing for increased speed and automation of transactional operations. Advocates also suggest that tokenization could enable new ways of financing home acquisitions for millions of households across the globe, thanks to the endeavors of collateralization and fractionalization of real estate. Together, both collateralization and fractionalization remove enormous barriers for smaller investors, so these elements of blockchain technology are also important to understand.

One of the key elements of tokenization of an asset is understanding how the process of creating a “token” works. In real estate tokenization the individual asset, let’s say a building, is broken down into conceivable parts that can be owned, such as apartments. Each apartment can be represented by a digital token, or the entire building can be represented by a digital token. In principle, the token is like a certificate of ownership or a deed to a property. It establishes ownership. However, a token differs from a deed, in that the process can a) increase liquidity, b) streamline processes, c) enable fractional ownership, d) aid in the process of securing funding and raising capital, e) enable easy compliance with regulations, and f) perform legal security checks. Smart contracts can automate the operational processes of the tokenized asset, making transactions much more efficient. In the realm of fractional ownership, tokenization is a key means of enabling fractionalization of an asset. Fractionalization thus also makes it easier to purchase real estate, as indicated above. Further, tokenization of real estate that is presently under development can be a means of securing investor funds, or even used to raise money for initiatives while selling the asset. Finally, in the realm of regulation and security, smart contracts can automatically enforce municipal, state/provincial, and federal purchase and sale regulations, while performing KYC (know your customer) and AML (anti-money laundering) checks to secure transactions.

In terms of thinking about how to tokenize real estate, there are also several different elements of the typical real estate asset class that can be tokenized. To begin with, land tokens can represent total or fractional ownership of the land and property itself. Next, rental tokens can be tied to the income stream from tenants in rental properties. Finally, operation tokens can capture profits from business operations on the property. However, there are typically two paths to tokenization that seem most common: 1) being the equity method and 2) being the debt/loan method. Both use special purpose vehicles (SPVs), which are subsidiaries created by parent companies used to isolate risks and reallocate assets to investors. In SPVs, property investments are typically held within the SPV itself, while companies can transfer property ownership

to an SPV and sell off that entity, thus paying capital gains tax, which is typically less than the property sales tax on any given transaction. In the case of the equity method, the asset is simply fractionalized and distributed by the SPV. In the case of the second method, the SPV emits debt instruments that are related to the real estate asset. After careful study, the most rapidly adaptable method in key European markets, such as France, Spain, and Germany, is the latter method. The hurdles to tokenization of real estate are simply lower with the second method, as initial total ownership by an SPV does not need to be established first.

Ultimately the path toward tokenization of real estate in Europe is also subject to contemporary discussions regarding new pending regulations for cryptocurrency and the entirety of the blockchain industry. At the same time, European regulators seem keen to tackle the issue in such a fashion as to not be too aggressive, as there is a taste for allowing for the development of a European flagship company to compete with existing American counterparts. As the European Union will likely adopt a pragmatic approach to the issue of regulation, all eyes are toward a possible solution for RWA tokenization in general, while providing counterbalances to developments in the North Atlantic (with American competitors), as well as in the Pacific and Africa (with Chinese competitors). Thus, there is a motivation to arrive at a solution that will rapidly benefit the European economy as a whole. In the end, real estate tokenization is inevitably part of the future of real estate investment. It allows for a technological overlay that is much needed in a rather typically old fashioned, yet stable, asset class. Tokenization also promises ownership of on-chain fractions of real estate properties with a very low bar to entry, thus entitling the owners of tokens to yields and liquidity in emerging secondary markets. But cutting inefficiencies and transaction costs, tokenization enhances the process of democratizing investment capabilities for all.



Chapter 7: **Focus on Monaco:** Towards a Digital Monaco AI as Foundations for a Smart Real Estate Ecosystem

MONACO

2 Km²

Population

38 367

vs.

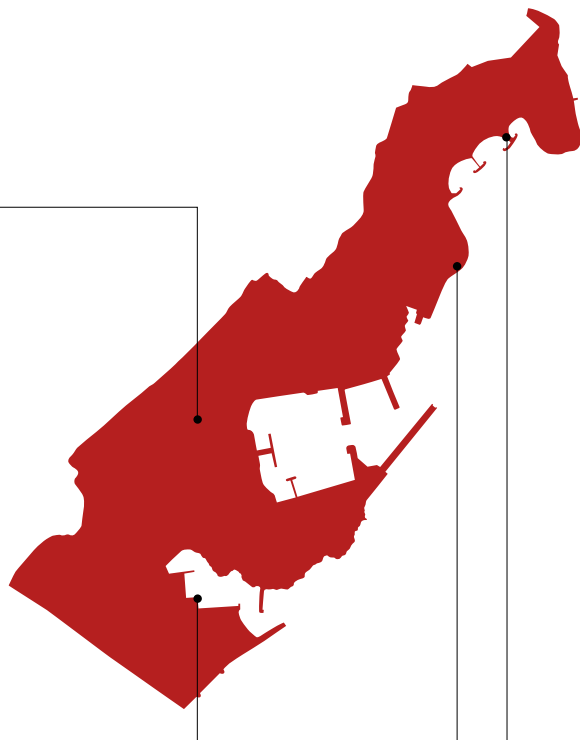
58 326

Active employees

Average population density of

18,445.7

inhabitants per km²



high-impact structuring projects: offshore extension

- **Mareterra district:** extension territory + 20%
- **Larvotto:** The first artificial beach in the Mediterranean
- **Fontvieille:** more than 22 hectares developed on the sea

EDITORIAL

Preparing for the AI Revolution to address modern urban challenges.

The Principality of Monaco is charting a visionary course, combining its historical heritage and geographical constraints with cutting-edge technology to meet modern urban challenges. As a compact city-state, Monaco, which has twice extended its territory by building on the sea (Fontvieille: 22 hectares gained and Mare Terra: a 6-hectare extension), cannot extend its borders ad infinitum. Instead, it must innovate within the limits of its two square kilometers, reconciling preservation and progress to build a sustainable, attractive, and resilient future.

Central to this transformation is Monaco's commitment to leveraging advanced technologies such as Digital Twins, Building Information Modeling (BIM), and the Internet of Things (IoT). These tools are laying the groundwork for a robust data infrastructure that should support intelligent decision-making, sustainable urban planning, predictive maintenance, and enhanced property management. By focusing on data collection and digital modeling today, Monaco ensures its readiness to fully harness the potential of artificial intelligence (AI) tomorrow.

BUILDING THE FUTURE... RESPECTING THE DNA

As a city-state, Monaco faces the dual challenge of addressing modern urban issues, such as mobility and sustainability, while safeguarding its cultural identity. Technologies like Digital Twins and BIM should help optimize land use, anticipate challenges, and ensure resilience, enabling Monaco to grow responsibly without compromising its unique charm.

IoT and real-time analytics should be leveraged to manage traffic, conserve resources, and reduce emissions. These innovations will allow Monaco to meet global urban challenges on a compact scale, creating solutions tailored to its geographical and historical context.

Sustainability at the Core

Monaco's longstanding commitment to sustainability is reinforced by these technological advancements. With tools like IoT and Digital Twins, the principality should reduce energy consumption, optimize resource management, and minimize its environmental impact. Smart initiatives such as waste management, traffic optimization, and green infrastructure further strengthen Monaco's leadership in sustainable urban development.

A Model for Urban Attractiveness

By seamlessly integrating AI-driven solutions with its legacy, Monaco is enhancing infrastructure, optimizing services, and providing tailored experiences for residents and visitors. This approach not only addresses modern urban challenges but also secures Monaco's status as a global hub for innovation, exclusivity, and sustainability, attracting top-tier investors, innovators, and high-net-worth individuals.

Conclusion

Monaco's journey toward becoming a smart city is a testament to its ability to harmonize legacy with progress. Through the integration of Digital Twins, BIM, IoT, and AI, the principality is redefining what it means to be a city-state, setting new standards for sustainability, efficiency, and resilience while preserving its iconic identity.

This chapter explores Monaco's visionary approach to AI-driven urban evolution. By harmonizing innovation with heritage, Monaco sets a global benchmark for cities seeking to thrive in the 21st century—intelligently, sustainably, and without erasing the foundations of their past.



Diego Bonaventura
Head of Digital Economy,
Princely Government of Monaco

A handwritten signature in black ink, appearing to read 'Diego Bonaventura'.



The Principality of Monaco, known for its high living and innovation, is embracing cutting-edge technologies to redefine urban living. In the domain of PropTech, the integration of Digital Twin, Building Information Modeling (BIM), and the Internet of Things (IoT) is paving the way for smarter, more efficient, and sustainable urban environments. What is the transformative potential of these technologies and the role of artificial intelligence (AI) in shaping Monaco's real estate future?

DIGITAL TWIN

A leap into PropTech and real estate innovation

A **Digital Twin** is a sophisticated, virtual replica of a physical entity, system, or environment. More than just a static model, it is continuously updated with real-time data from its physical counterpart through the integration of sensors, IoT devices, and advanced simulation technologies. This dynamic interplay enables users to visualize, analyze, and refine processes with a level of precision that was previously unattainable.

Digital Twins are transformative tools, bridging the gap between the physical and digital worlds. They unlock unparalleled insights and operational efficiencies, offering a powerful resource for planning, management, and innovation. Embracing a Digital Twin is not just a technological leap but a strategic move towards sustainable and smart urban development.



Monaco's unique geographical constraints and high-density urban fabric present both challenges and opportunities. A Digital Twin offers the city the ability to reimagine its urban landscape, enhancing decision-making processes at every level. The capacity to simulate and analyze urban scenarios allows Monaco to tackle its land scarcity, optimize infrastructure, and foster a harmonious balance between development and environmental preservation.

More than just a planning tool, a Digital Twin can elevate the quality of life for Monaco's residents. By leveraging real-time data, it creates opportunities for greener spaces, smarter services, and more efficient resource management. It also sets the stage for Monaco to become a beacon of PropTech innovation, attracting global attention and investment.

A New Era of Urban Planning and Development

Imagine a living map of Monaco that evolves in real-time. A Digital Twin serves as a virtual canvas where planners can envision the city of tomorrow. It allows architects and policymakers to simulate the impact of new buildings, green spaces, or infrastructure projects with unparalleled accuracy. How will a new residential tower affect sunlight in a neighboring district? What are the long-term environmental effects of expanding a transportation network? These questions can be answered with the precision of a simulation but grounded in reality.

The insights gained are not confined to future developments. A Digital Twin empowers planners to revisit and optimize existing structures and layouts, ensuring that Monaco evolves sustainably without compromising its iconic charm. Risks, such as those posed by natural disasters or overpopulation, can be anticipated, and mitigated before they materialize, preserving the delicate equilibrium of the city.

Advancing Sustainability

Monaco's commitment to sustainability finds a powerful ally in the Digital Twin. This digital infrastructure provides the tools to measure, monitor, and manage the city's environmental footprint. Carbon emissions from buildings and vehicles can be tracked in real-time, enabling targeted reductions. Water and energy resources, vital in a densely populated area, can be allocated and conserved with surgical precision.

The ability to simulate green initiatives—such as the introduction of renewable energy systems or waste reduction programs—adds another layer of impact. These simulations not only predict outcomes but provide actionable insights, ensuring that Monaco's efforts are both effective and efficient. By aligning environmental management with cutting-edge technology, Monaco fosters its position as a global leader in sustainable urban development.



Reimagining Traffic and Mobility

Monaco's compact geography and dynamic urban landscape present unique mobility challenges. With its limited land area, steep topography, and one of the world's highest population densities, the principality must accommodate residents, daily commuters, and a constant influx of tourists—all within just 2 square kilometers. Traffic congestion, a scarcity of parking, and overcrowded public transit systems highlight the pressure on Monaco's infrastructure. These issues are compounded by the environmental impact of emissions, making sustainable and efficient transportation solutions a top priority. Addressing these challenges requires innovation and foresight, paving the way for transformative approaches to mobility.

A Digital Twin transforms traffic management from a reactive to a proactive endeavor. Real-time traffic data offers insights that allow for the optimization of routes, reducing congestion and emissions.

The potential doesn't end there. Autonomous vehicles, expanded public transit networks, and smart parking solutions can all be tested and refined within the digital realm before physical implementation. The result is a transportation network that is not only efficient but also tailored to the unique rhythm of Monaco's urban life.

Strengthening Resilience and Preparedness

A city as iconic as Monaco must also be prepared for the unexpected. Whether facing natural disasters, infrastructure failures, or public health crises, a Digital Twin acts as a sentinel. By simulating emergency scenarios and predicting vulnerabilities, it ensures that Monaco is always one step ahead. Real-time updates provide the situational awareness needed to make informed decisions during critical moments, safeguarding both people and property.

Catalyzing Economic Growth and Innovation

The implementation of a Digital Twin does more than optimize Monaco's internal operations; it positions the city as a global leader in PropTech. By creating a digital foundation, Monaco invites innovators, startups, and research institutions to collaborate, fostering a vibrant ecosystem of technological advancement.

The economic ripple effects are profound. New business models emerge, driven by data insights and enhanced operational efficiencies. Tourism, a cornerstone of Monaco's economy, can be reimagined with personalized experiences powered by real-time analytics. Meanwhile, the global prestige of becoming a showcase for Digital Twin technology attracts investment and talent, solidifying Monaco's reputation as a forward-thinking city-state.



BIM

A catalyst for smarter building design



Building Information Modeling, or **BIM**, is a transformative process that involves creating and managing digital representations of the physical and functional aspects of buildings. Far beyond traditional architectural blueprints, BIM integrates data throughout a building's lifecycle, from conception and design to construction, operation, maintenance, and eventual renovation or demolition. It serves as a collaborative platform, bringing architects, engineers, contractors, and property managers together to work on a shared, data-rich model.

BIM offers unprecedented clarity and efficiency. By consolidating information into a single, accessible framework, BIM facilitates better decision-making, streamlines operations, and fosters sustainability. For Monaco, a principality characterized by high-value real estate, limited land resources, and a commitment to sustainability, adopting BIM represents a significant leap forward.

For instance, imagine planning a new luxury residential building in Monaco. BIM allows developers to assess how the building's orientation affects natural light and ventilation or how its design integrates with surrounding structures. By simulating these factors digitally, developers can create designs that enhance energy efficiency while preserving Monaco's iconic skyline.

Streamlining Construction and Reducing Costs

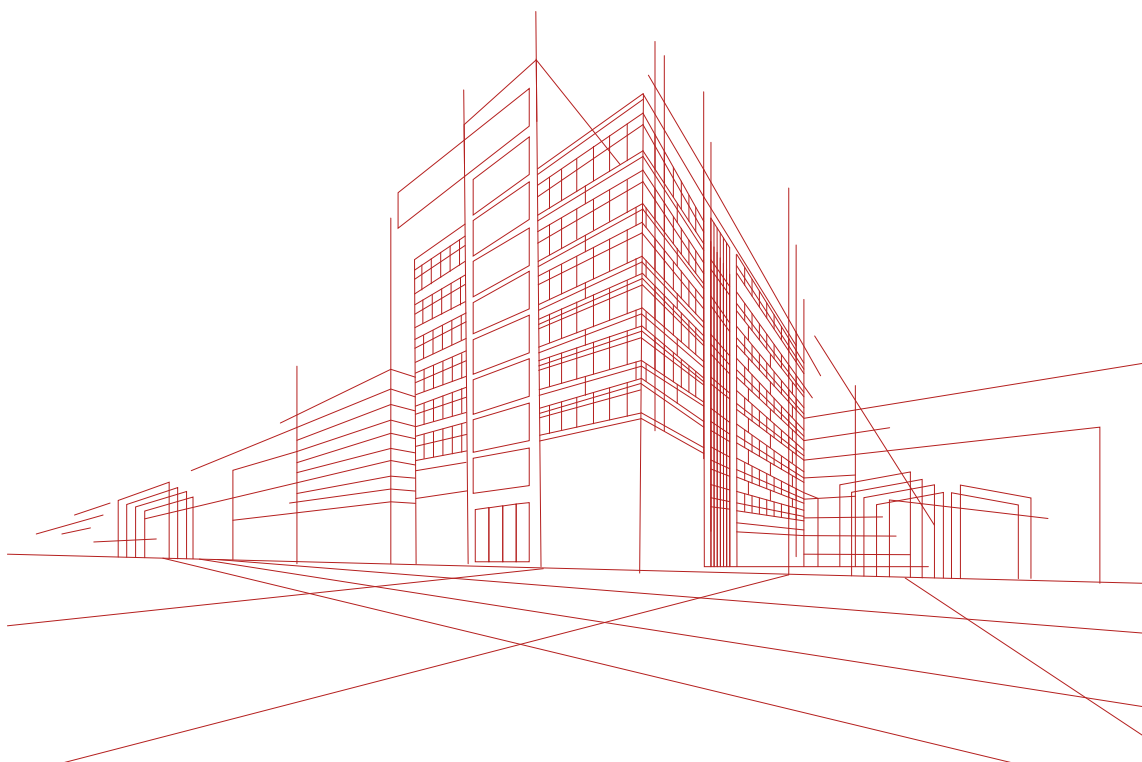
BIM's benefits extend far beyond the drawing board. During construction, it acts as a centralized repository of information, reducing errors and eliminating redundancies. Contractors can use BIM models to visualize each stage of construction, identify potential clashes (such as overlapping utilities or structural conflicts), and make adjustments before physical work begins.

This level of precision translates into significant cost savings. In a market like Monaco, where construction costs are already high due to land scarcity and premium materials, minimizing waste and avoiding delays are critical. BIM ensures that every euro invested is used efficiently, making projects more financially viable and less prone to unexpected overruns.

Enhancing Building Lifecycle Management

Once a building is completed, BIM continues to deliver value by supporting operations and maintenance. The detailed data embedded in BIM models provides property managers with a comprehensive understanding of the building's systems, materials, and maintenance needs. From tracking the lifespan of HVAC systems to scheduling routine inspections, BIM makes managing properties both proactive and precise.

For Monaco's real estate market, this level of detail is particularly advantageous. High-net-worth clients expect flawless property management, and BIM enables service providers to anticipate and address issues before they arise, ensuring a seamless experience for residents and tenants.



Driving Sustainability and Environmental Responsibility

Monaco has long been committed to environmental preservation, and BIM is a powerful tool in advancing these goals. By integrating environmental data into building designs, BIM enables developers to reduce energy consumption, optimize resource use, and minimize a project's carbon footprint.

For example, BIM can model the impact of implementing green roofs on a building's energy efficiency and thermal regulation. It can also analyze water usage patterns, helping to implement conservation measures in a city where resources are finite. By adopting BIM, Monaco reinforces its reputation as a leader in sustainable urban development.

Fostering Collaboration and Transparency

In Monaco's fast-paced real estate sector, where projects involve multiple stakeholders, effective collaboration is essential. BIM's shared platform ensures that all parties—from architects and engineers to contractors and public/private clients—are working with the same up-to-date information. This transparency reduces misunderstandings, aligns expectations, and accelerates decision-making processes.

For example, developers can use BIM to create virtual walkthroughs, allowing clients to experience a property before it's built. These immersive visualizations not only enhance communication but also help secure buy-in from investors and regulators, making projects more likely to succeed.

Preparing Monaco for the Future of Real Estate

The integration of BIM into Monaco's PropTech ecosystem is more than a technological upgrade; it's a strategic move that positions the principality for long-term success. By embracing BIM, Monaco lays the groundwork for future innovations, such as Digital Twins and AI-driven property management. These technologies, combined with the robust data foundation provided by BIM, will redefine what's possible in real estate.

Moreover, BIM's emphasis on efficiency and sustainability aligns perfectly with Monaco's vision of a smart, resilient, and environmentally conscious city. From luxury developments to public infrastructure projects, BIM ensures that every new initiative contributes to the principality's prosperity and sustainability.

HOW IoT WORKS

The heartbeat of the city

The **Internet of Things (IoT)** is revolutionizing urban management, transforming cities into dynamic, data-driven ecosystems. IoT refers to the network of interconnected devices and sensors that collect, share, and act upon real-time data. When applied to Monaco infrastructure, IoT creates opportunities for smarter, more efficient, and sustainable urban development.

By integrating IoT with Digital Twin technology can harness data to enhance decision-making, improve residents' quality of life, and address the challenges of modern urbanization.

IoT acts as the sensory system of a city, capturing data from a wide range of sources. These include:



- **Traffic Sensors:** Measuring vehicle flow and pedestrian movement to optimize traffic lights and reduce congestion.



- **Smart Lighting:** Streetlights that adjust brightness based on activity or time of day, saving energy while maintaining safety.



- **Environmental Monitoring:** Sensors tracking air quality, noise pollution, and water conditions to guide environmental policies.



- **Waste Management:** Smart bins alerting collection services when they are full, streamlining waste collection routes.



- **Smart Parking:** Systems detecting available parking spaces and guiding drivers to them, reducing time spent searching for parking.



- **Energy Grids:** IoT-connected grids balancing supply and demand dynamically for greater efficiency.



- **Water Management:** Sensors monitoring usage and detecting leaks to conserve resources.



- **Connected Public Transportation:** Real-time tracking of buses, trams, and trains for enhanced commuter experiences.



- **Smart Tourism:** Digital solutions providing visitors with tailored recommendations and real-time updates on attractions.

The Power of IoT and Digital Twin Integration

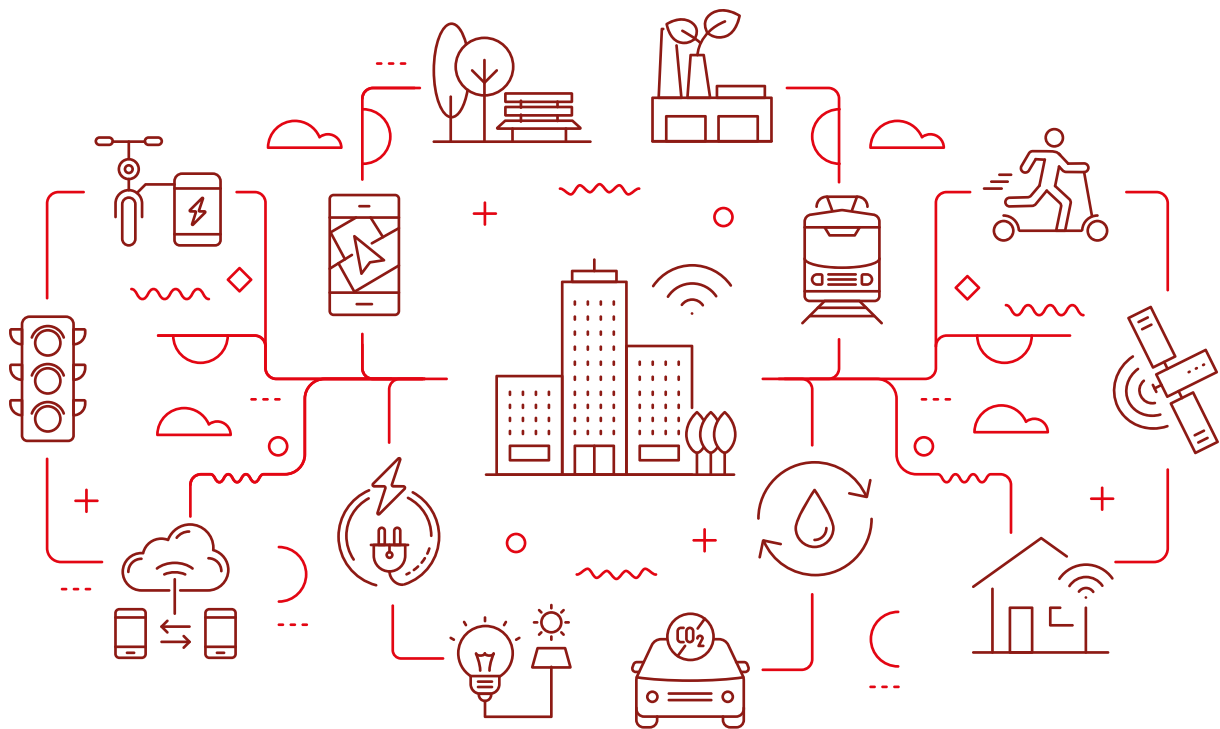
While IoT captures the pulse of the city, Digital Twins provide a comprehensive platform to analyze and act upon this data. When the real-time insights from IoT devices are integrated into a Digital Twin, city administrators can visualize and simulate scenarios to make informed decisions.

Enhancing Urban Planning

With IoT data flowing into Digital Twins, city planners can create detailed simulations of infrastructure projects. For example, before constructing a new project or expanding public transit, planners can assess its impact on traffic flow, emissions, and neighboring communities.

Improving Resource Efficiency

IoT-enabled Digital Twins allow to optimize resource usage. Smart energy grids, combined with data on building occupancy and energy consumption, can reduce waste and prioritize renewable energy sources. Similarly, water management systems can detect leaks in real-time, saving precious resources.



Monitoring City Health in Real Time

IoT sensors provide continuous updates to the Digital Twin, enabling city managers to monitor urban systems in real time. If air quality sensors detect a rise in pollution levels, immediate action can be taken, such as rerouting traffic or adjusting industrial activities. Similarly, during major events like the Monaco Grand Prix, IoT data integrated into the Digital Twin can help manage crowd flows and ensure public safety.

Real-Time Crisis Management

During emergencies such as floods, fires, or accidents, IoT sensors provide real-time data to Digital Twins, enabling rapid and coordinated responses. For instance, traffic sensors can identify the fastest evacuation routes, while environmental monitors alert authorities to hazardous conditions.

Specific Applications: Bringing IoT to Life in Monaco



- **Traffic Management:** Integrating traffic sensors and cameras into a Digital Twin, supports modelling congestion hotspots and implementing dynamic traffic controls, reducing delays and emissions.



- **Smart Lighting:** IoT-controlled streetlights save energy by adjusting brightness based on weather, activity levels, or time of day. These systems also enhance safety by illuminating areas where sensors detect activity.



- **Environmental Sustainability:** Air quality monitors feed data into a Digital Twin, helping policymakers identify pollution sources and craft targeted interventions. Noise sensors assist in urban zoning decisions to mitigate sound pollution.



- **Waste Efficiency:** IoT-equipped waste bins communicate with collection services, ensuring timely pickups while reducing unnecessary trips. Integrated with Digital Twins, this system provides insights into waste patterns to inform recycling campaigns.



- **Public Transport Optimization:** IoT sensors on buses and trains share location and capacity data, allowing to adjust schedules dynamically based on demand. Commuters benefit from real-time updates on arrivals and delays.



- **Tourism and Hospitality:** Smart tourism solutions enhance visitor experiences by offering interactive maps, recommending less crowded attractions, and providing instant language translations.

Building Sustainable and Livable Cities

The integration of IoT with Digital Twin technology is not merely about operational efficiency—it represents a paradigm shift in urban living. The continuous feedback loop between real-world sensors and virtual simulations fosters a proactive approach to city management.

This integration supports sustainability goals by reducing energy consumption, optimizing transportation, and minimizing waste. Moreover, it elevates residents' quality of life through safer streets, cleaner air, and smoother mobility.

For example, leveraging IoT-enabled Digital Twins could predict peak energy demand during summer and prepare by scaling up alternative energy production. Similarly, by analyzing pedestrian and vehicle data, planners can design safer intersections, reducing accidents.



BUILDING THE FUTURE

How Digital Twin, BIM, and IoT combine to create a powerful data foundation

The modern city is a complex mosaic of systems, structures, and stakeholders, all interconnected in ways that demand precise coordination and innovation. As urban centers embrace digital transformation, technologies like **Digital Twin**, **Building Information Modeling (BIM)**, and the **Internet of Things (IoT)** are revolutionizing how we design, operate, and live in these environments.

When these technologies converge, they create a unified, robust data foundation—an invaluable resource for intelligent decision-making and holistic management. This integration fosters smarter cities, more efficient real estate operations, and enhanced quality of life for residents.

- **Digital Twin, The Virtual City's Core.** At the heart of this transformation lies the **Digital Twin**, a dynamic virtual replica of a physical asset, building, or even an entire city. This digital model continuously evolves by ingesting real-time data from IoT devices, simulations, and operational systems.
- **BIM, The Blueprint for Precision.** **BIM** enhances the lifecycle management of individual buildings by providing detailed digital representations of structures. These models contain not only physical dimensions but also data on materials, systems, and usage patterns.
- **IoT, The City's Sensory Network.** The **IoT** acts as the sensory layer of this ecosystem, embedding intelligence into the physical world through interconnected devices and sensors. IoT provides the real-time data necessary to make Digital Twins and BIM models responsive and actionable.





Convergence: A Unified Data Foundation

The integration of Digital Twin, BIM, and IoT technologies creates a comprehensive and dynamic data foundation. This unified system captures and organizes data at every scale—individual buildings, neighborhoods, and citywide operations—enabling seamless collaboration and holistic management.

Intelligent Infrastructure

Combining these technologies allows for the development of infrastructure that adapts to the needs of its users. For example, IoT data on traffic patterns can be fed into a Digital Twin to model and implement dynamic traffic light systems. BIM adds precision by mapping the physical layout of roadways, ensuring that any changes are compatible with existing structures.

Holistic Decision-Making

A unified data foundation enables stakeholders to analyze problems from multiple perspectives. Urban planners can evaluate how a new development will affect both building energy efficiency (via BIM data) and citywide emissions (via Digital Twin and IoT data). This integration fosters smarter, more sustainable decision-making.

Real-Time Integration

IoT ensures that the data feeding into Digital Twins and BIM models is always current, enabling real-time monitoring and adaptation. A building manager can receive alerts about HVAC inefficiencies and address them immediately, or a city administrator can reroute traffic in response to an unexpected accident.

Seamless Collaboration

A powerful data foundation aligns all stakeholders—architects, engineers, city planners, property managers, and policymakers—on a single platform. By providing access to consistent, real-time data, it reduces errors, accelerates timelines, and promotes innovative solutions.

The fusion of Digital Twin, BIM, and IoT is more than a technological achievement; it is a blueprint for building resilient, adaptive, and intelligent cities of tomorrow.

Unlocking the Future of Real Estate: The Transformative Power of AI with Digital Twin, BIM, and IoT

AI thrives on large datasets, making the rich, interconnected information from **Digital Twin, BIM, and IoT** an ideal foundation for its applications. AI systems excel at analyzing patterns, identifying inefficiencies, and making predictive insights that humans cannot easily discern.

Predictive Analytics and Maintenance

One of the most significant applications of AI in real estate is its ability to predict future scenarios. By analyzing historical and real-time data, AI can forecast maintenance needs, energy consumption, and even tenant behaviors.

For example, IoT sensors within a building's HVAC system send performance data to the Digital Twin, which AI analyzes to predict when a system component is likely to fail. This enables property managers to address issues proactively, avoiding costly downtime and improving tenant satisfaction.



Autonomous Building Management

AI can also power autonomous building systems that optimize themselves in real time. AI algorithms use data from IoT-connected devices and BIM models to adjust lighting, heating, and ventilation based on occupancy patterns, weather conditions, and energy prices.

For Monaco's real estate market, this creates a compelling value proposition: properties that are not only sustainable but also capable of providing unmatched comfort and efficiency.

Enhanced Design and Construction

AI-driven analytics can guide architects and engineers during the design phase of a project. By integrating BIM models with AI, professionals can simulate the long-term impact of various design choices, such as materials, layouts, and energy systems. This reduces costs, improves environmental performance, and ensures that developments align with Monaco's sustainability goals.

Personalized Services for Tenants and Residents

AI enhances the real estate experience by delivering personalized services to tenants and residents. Smart home systems can learn individual preferences for lighting, temperature, and entertainment, while concierge AI systems offer tailored recommendations for dining, shopping, or cultural events.

This level of customization aligns perfectly with Monaco's reputation for exclusivity, creating unparalleled living experiences.

The Urban Scale: AI-Enhanced City Management

Beyond individual buildings, AI amplifies the benefits of Digital Twins and IoT on a citywide scale. For a densely populated yet meticulously planned city-state like Monaco, AI can address urban challenges with unmatched precision.

Traffic Flow Optimization

Using data from IoT sensors embedded in roads and vehicles, AI can model and predict traffic patterns. Integrated with Monaco's Digital Twin, AI-driven systems can optimize traffic signals and reroute vehicles dynamically, reducing congestion and emissions.

Sustainability Initiatives

AI enables cities to monitor and manage resource consumption in real time. By analyzing IoT data on water, electricity, and waste, AI algorithms can identify inefficiencies and recommend improvements, ensuring Monaco remains a leader in sustainable urban living.

Resilience and Risk Management

AI-powered simulations in Digital Twins can predict the impact of natural disasters, such as floods or storms. This allows city planners to develop proactive strategies, ensuring resilience and minimizing disruption.

Vision for AI-Enhanced Real Estate

For Monaco, the integration of AI with Digital Twin, BIM, and IoT represents a vision of unparalleled innovation and sustainability. By leveraging these technologies, Monaco aims to:

- **Optimize Urban Planning:** AI will enable Monaco to simulate future developments, ensuring harmony between luxury, functionality, and environmental stewardship.
- **Enhance Resident Experiences:** Personalized AI-driven services will define the next generation of high-end living in Monaco's real estate market.
- **Lead in Sustainability:** AI-powered insights will ensure efficient resource use and align with Monaco's commitment to green urban development.
- **Drive Global Innovation:** By pioneering AI-enhanced real estate, Monaco will cement its status as a global leader in PropTech and smart city innovation.



CONCLUSION

Monaco's path to ai-driven real estate with Digital Twins, BIM and IOT

Monaco is at the forefront of adopting PropTech innovations to create a smarter, more sustainable urban landscape. By integrating Digital Twins, BIM, and IoT, the principality is building a robust data foundation that supports groundbreaking AI applications. This visionary approach will not only enhance the efficiency and sustainability of Monaco's real estate sector but also set a global benchmark for smart cities. Monaco's commitment to leveraging technology underscores its role as a leader in exceptional living and urban innovation.





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About Extended Monaco

The Extended Monaco program is unparalleled globally. It marks the first instance of a government harnessing the full potential of digital technology across all public policies and economic sectors simultaneously. Launched by HSH Prince Albert II in April 2019, it is spearheaded by Frédéric Genta, Secretary of Monaco for Attractiveness and Digital Transformation.

Designed to benefit both Monégasques and residents alike, whether for business or tourism purposes, the program focuses on various domains such as smart city initiatives, administration, healthcare, education, and infrastructure. Its core priorities include enhancing the already exceptional quality of life, ushering in a new era of economic prosperity, and elevating the efficiency of public services.

For further details, please visit our website at extendedmonaco.com.

<https://eme.gouv.mc/barometre/proptech-global-trends-2024/>