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A report from the Deloitte
Center for Financial Services

2020 commercial real estate outlook

Using digital and analytics to revolutionize tenant experience

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KEY MESSAGES

- **Tenant experience** is a top priority, which requires companies to put tenant and end-user preferences at the center of every business decision.

- **Data control, access, and analysis** are expected to become more critical as data generation and leveraging data continue to rise.

- Companies should more fully embrace **artificial intelligence** (AI), which can not only enhance operational efficiency but also help identify risks and opportunities much more quickly than current technologies and processes can.

- **Cybersecurity and tenant data privacy** are becoming top priorities, as the commercial real estate (CRE) industry now has access to a wider variety of personal data such as user location, communication, behavior, and sentiments, and cyber threats are increasingly real and pervasive.

- While real estate market changes will offer new opportunities for employees, CRE organizations would have to **attract and retain talent** using data science and analytical capabilities, as well as **retool and reskill** the existing pool to ensure they have the right skills. Collaborating with proptechs should help CRE organizations bridge the talent gap in the short term.

The real estate industry of tomorrow

Location, experience, analytics

SINCE THE COMMERCIAL real estate industry began, *location, location, location* has always been the traditional mantra. Not anymore. In our 2016 smart buildings report, we predicted the new mantra would be *location, information, analytics*. Now, the industry has evolved even further. As we look to 2020 and envision the next decade, the most successful commercial real estate companies could follow the mantra: *location, experience, analytics*.

Over the past five years, our annual outlook series has analyzed the evolving CRE industry landscape and ecosystem influences. Our 2019 outlook highlighted institutional investors' growing preference for companies that invest in technologies to make buildings future-ready.[1] We also pointed to changing talent models and a need to embrace alliances with proptechs to more rapidly address the changing nature of real estate. As we look to the milestone year of 2020, it has become urgent for CRE companies to prioritize tenants' and end users' needs, given the increasing influence of technology and changing customer preferences.

Our 2020 outlook surveyed 750 CRE executives—owners/operators, developers, brokers, and investors—in 10 countries during the summer of 2019 to assess how, and to what extent, emerging technologies and analytics are helping leaders make more informed location decisions and create a more memorable tenant experience over the next 18 months. Here's what we learned:

1. Tenant preferences are changing, due to increasing urbanization and globalization, changing workforce demands, such as flexible location and workspaces, and technology advancements, such as AI and Internet of Things (IoT).

2. Most respondents rated *tenant experience* as a top priority. Yet, for a majority, *digital tenant experience* is not a core competency.

3. Executives acknowledge that the benefits of IoT and AI technologies are not limited to tenant experience. They also can raise operational efficiency and lower costs.

When it comes to tenant experience–related technology investments over the next 18 months, 36 percent of respondents expect their organizations to hold the line, 42 percent anticipate a moderate increase, and 14 percent plan to significantly increase. (See figure 1).

Here are some leading examples of technology innovation in the CRE space, illustrating how location, experience, and analytics can come together:

- CBRE's enterprise-grade experience platform, Host, enables contextually smart workplace experiences and efficient portfolios by connecting data from previously unconnected devices and sensors in a building and leveraging machine learning algorithms. Using Host, everyday workplace experiences such as booking meeting rooms or individual desks, connecting with colleagues, or ordering coffee become more intuitive and easier.

- JLL's geofencing tool, PinPoint, evaluates the nuances of shoppers' behavior by analyzing mobile data. It assesses the quality and quantity of time consumers spend shopping and uses data and analytics to generate insights. The company plans to share the information with both retail and investor clients to help them make more informed leasing and location decisions.

- Alibaba's futuristic FlyZoo hotel in Hangzhou, China, uses a combination of a mobile app, AI-based facial recognition, and a digital assistant called Ask Genie to create more personalized and secure guest experiences, from reservations to in-room services.[2]

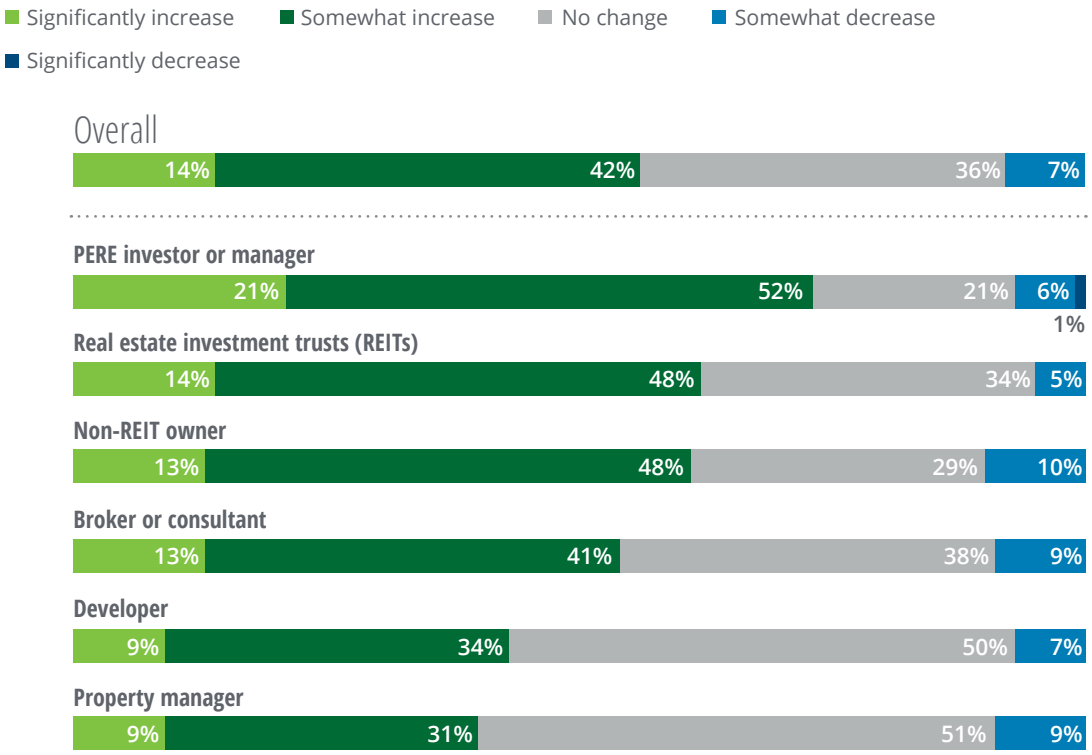
- Alabama Power's neighborhood of 62 smart homes in Birmingham uses IoT technology, Amazon's Alexa, voice-activated security, and a mobile app to offer secure, personalized, convenient, and efficient facilities and services to its residents.[3]

In this year's outlook, we explore the various technologies that are reshaping tenant and end-user experience, looking first at how IoT and mobile apps are changing the front-end experience. We then examine the growing importance of data and how AI and digital reality technologies are becoming the backbone of most digital real estate organizations. Finally, we analyze how the increased use of technologies typically increases data privacy and cybersecurity issues, both of which are becoming core business issues.

FIGURE 1

Ninety-two percent of respondents plan to maintain or increase their tenant experience–related technology investments

Anticipated change in amount of investment



Source: Deloitte Center for Financial Services analysis.

Sector performance: Moderate optimism prevails, despite global economic volatility

How is the CRE sector performance changing?

The prevailing global and US macroeconomic environment seems to be raising uncertainty on the nearer term trajectory of the US and global economies, impacting decision-making across industries. The CRE sector is not immune to this reality.

Deloitte's economists continue to raise concerns about the growing volatility of the global economy.[4] The heightened US-China trade discussions, continued deceleration in the Eurozone and China, uncertainty over Brexit, and the political situation between China and Hong Kong are expected to weigh heavily on global trade, investments, and equity markets.[5]

Closer to home, there are concerns about the possibility of a US recession. While industrial production[6] declined year-over-year in the first two quarters of 2019, retail sales grew.[7] However, base fundamentals indicate that the US CRE market remains on a strong footing. Some of the key highlights include:

1. The April 2019 AFIRE survey shows a sustained global investor confidence in US CRE.[8]

2. Rental growth increased, and vacancy levels steadily decreased across property types.

3. Total transaction volume increased 2 percent year-over-year to US$119 billion in the second quarter of 2019.[9]

4. Banks tightened CRE lending standards, although loan demand remained strong.[10]

5. The Real Capital Analytics Commercial Property Price Indices (RCA CPPI) rose 2.4 percent sequentially in the second quarter of 2019. The national all-property index was up 6.5 percent year-over-year in the second quarter.[11]

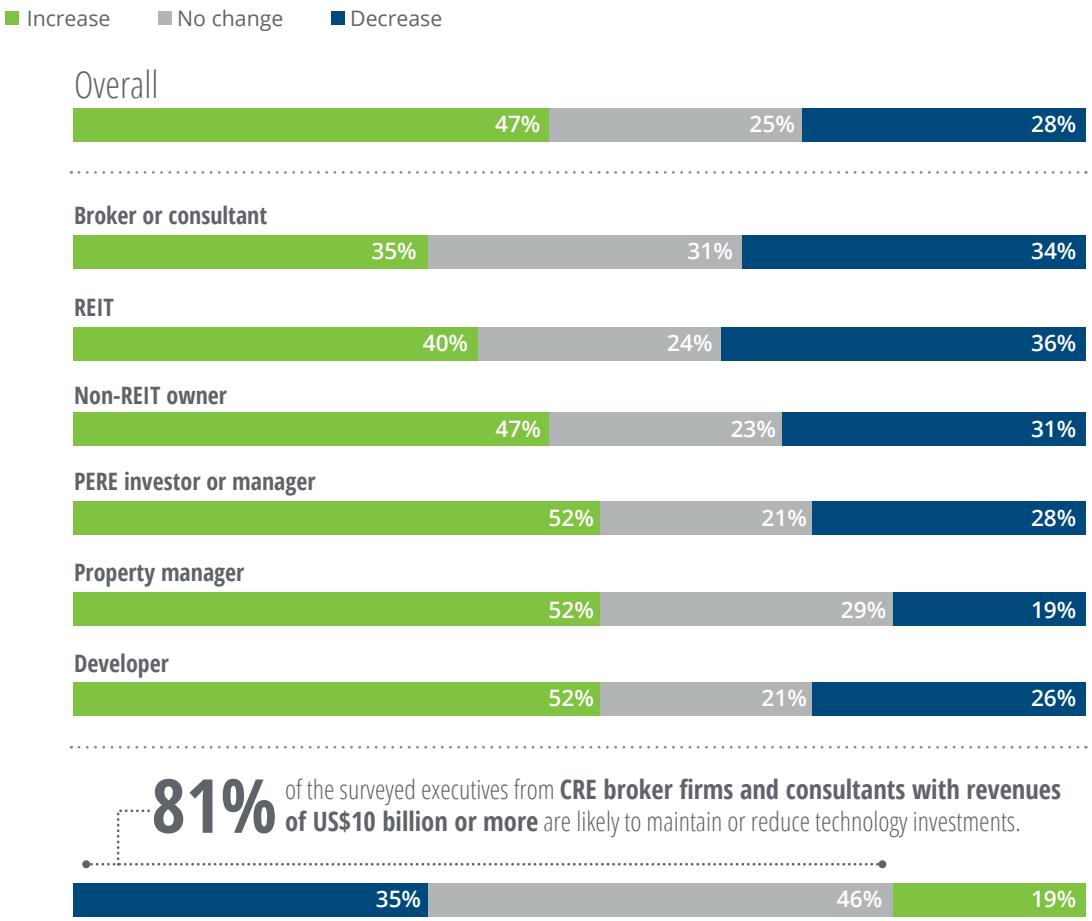
6. Average commercial property cap rates remained stable and trended at 6.6 percent in the second quarter of 2019.[12]

Interestingly, more than 70 percent of our surveyed CRE executives plan to maintain or increase their overall technology investments even if an economic slowdown occurs (see figure 2). In contrast, 81 percent of the surveyed executives from CRE broker firms and consultants with revenues of US$10 billion or more are likely to maintain or reduce technology investments. This could be because the existing technology budgets of some of the largest brokers and consultants are high, and they are more likely to be further along in capturing and leveraging data and using analytics to generate meaningful insights than smaller firms.

FIGURE 2

Seventy-two percent of respondents plan to maintain or increase their overall technology investments in the event of an economic slowdown

Anticipated change in investment, by company type



Source: Deloitte Center for Financial Services analysis.

What do CRE organizations expect in 2020?

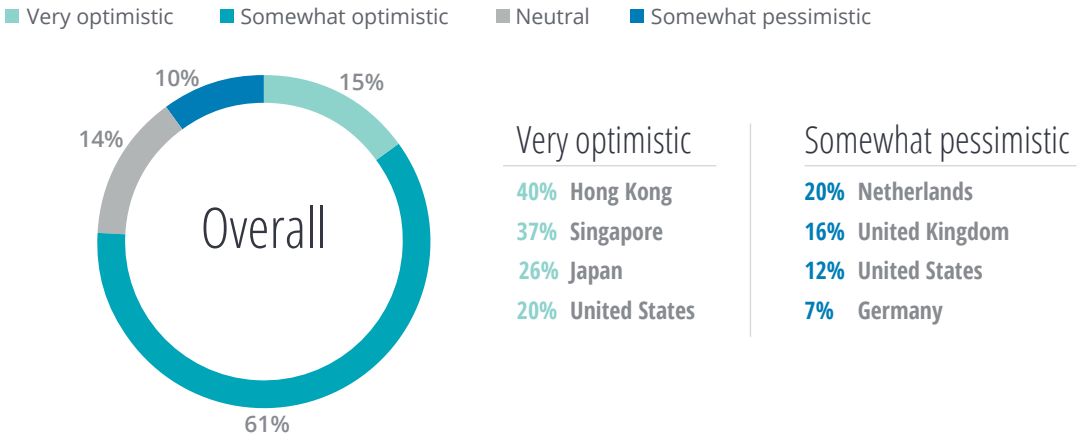
Our survey respondents have a divergent view about how the CRE industry will perform over the next 18 months: 15 percent are very optimistic, 61 percent are somewhat optimistic, 14 percent are neutral, and 10 percent are somewhat pessimistic (see figure 3). This is not surprising; when it comes to economic changes, the industry typically lags the broader economy by six months.

Regionally, respondents from Asia are the most optimistic, followed by those from North America and Europe. A relatively higher proportion of respondents from Hong Kong, Singapore, Japan, and the United States are very optimistic about the industry's performance. In contrast, on an average, 18 percent of Netherlands and UK respondents are somewhat pessimistic about the industry's performance, which is higher than the global aggregate of 10 percent.

FIGURE 3

Respondents from Asia are the most optimistic about CRE industry performance, followed by those from North America and Europe

Performance expectations over next 18 months



Source: Deloitte Center for Financial Services analysis.

The US respondents expect property fundamentals to be moderately positive for the next 18 months (see figure 4):

1. Two-thirds of respondents with a predominant office property portfolio expect growth in rental rates and one-third anticipate a decline in vacancy levels. Respondents with mostly nontraditional properties anticipate the highest rental appreciation. Meanwhile, those with a dominant multifamily properties portfolio expect the highest increase in vacancies.

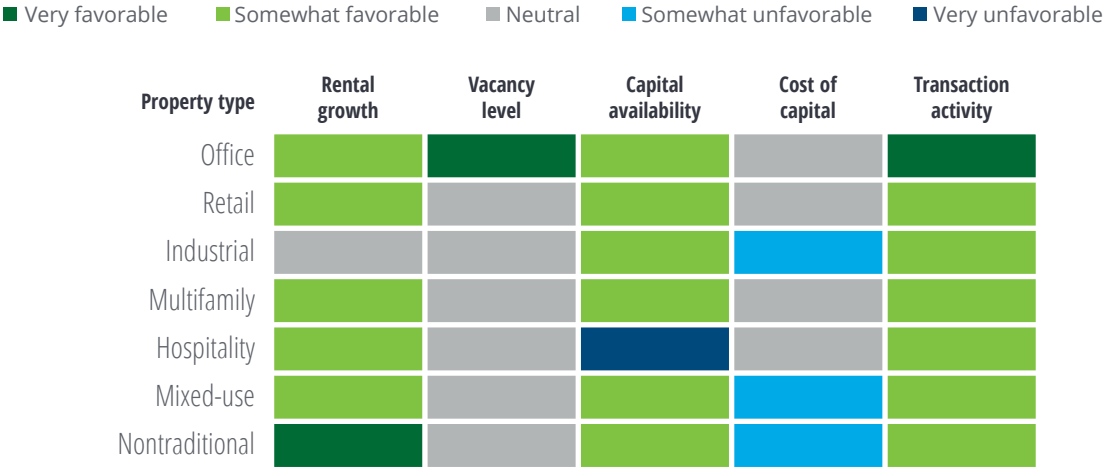
2. A solid 73 percent of respondents expect increases in transaction activity. While 56 percent of our surveyed executives anticipate an increase in cost of capital, 67 percent expect more capital availability. Office property respondents are the most optimistic about the transaction and capital markets—85 percent and 74 percent believe transaction activity and capital availability will grow, respectively, whereas 26 percent anticipate a decline in cost of capital. In contrast, hotel property respondents are least optimistic, with 27 percent and 35 percent expecting a decline in transaction activity and capital availability, respectively, and 52 percent expecting an increase in cost of capital.

Overall, similar to the response from institutional investors in our 2019 survey, CRE executives surveyed consider *interest rate uncertainty*, *geographic market*, and *tenant concentration* risks as their top challenges.

Despite the macroeconomic concerns, the CRE industry, particularly in the United States, seems on solid footing to attract capital. If there is a downturn, the short- to medium-term challenge is expected to be budgetary pressures weighing against the requirement to make technology investments. The most-needed investments would emphasize digitizing the tenant experience, along with back-end operations enhancements to enable bottom-line efficiencies and top-line growth in the longer term.

FIGURE 4

US respondents expect property fundamentals to be moderately positive for the next 18 months



Note: Dark green = more than 80 percent of respondents; light green/blue = 60 to 80 percent of respondents; grey = 40 to 60 percent of respondents; dark blue = less than 40 percent of respondents.

Source: Deloitte Center for Financial Services analysis.

Key questions to drive action

1. As we move cautiously forward, how do I manage the volume of my development activities?

2. How should I balance available capital with current operational and development requirements?

3. If an economic downturn occurs, how should I prioritize my investments in technology enhancements (AI and predictive analytics) and upskilling talent?

Digitization: The door to personalizing tenant experience

How is tenant experience changing?

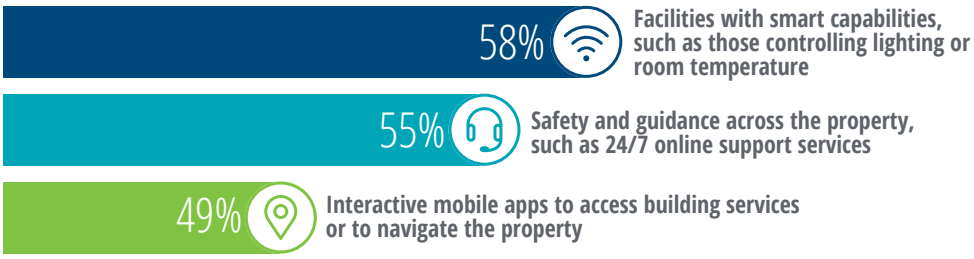
Tenant experience is a top priority for most CRE leaders. The on-demand economy is reshaping tenant expectations about how real estate is consumed, and technology-enabled facilities and personalized experiences are already transforming the CRE industry. Today, creating superior experiences is not just about engaging the tenant. It is also about extending services to the CRE "end user," or the day-to-day consumer of that space: a retail shopper; a resident living in a multifamily property; an employee working in an office space; or a manufacturer using a warehouse. As attention spans wane, it will likely become more difficult to attract and retain tenants and end users. CRE organizations are responding to the growing demand for digital experiences: 64 percent of executives surveyed said they increased their tenant experience–related technology investments over the past 18 months. However, only 46 percent of CRE executives consider it a core competency for their organization. A significantly lower proportion of UK (26 percent) and Netherlands (17 percent) respondents consider digital tenant experience a core competency.

Respondents believe that IoT technology and mobile apps are important elements in enhancing tenant/end-user experience. More than one-half of respondents believe that environmental and security technology investments will improve tenant experience. They also believe that tenants are looking for these features in smart or IoT-enabled buildings (see figure 5).

Singapore's Nanyang Technological University (NTU), for example, is one of the most connected and sustainable university campuses in Asia. Its

FIGURE 5

Respondents consider environmental and security technology investments as the most important ways to enhance tenant/end-user experience



Source: Deloitte Center for Financial Services analysis.

250-hectare EcoCampus comprises more than 200 GreenMark Platinum-certified buildings.[13] Since 2011, NTU has added smart building features such as lighting sensors, smart plugs, and other technologies, lowering energy usage by 26 percent.[14] NTU now aims to achieve 35 percent energy, water, and waste reduction by 2020.[15]

Many consumer-facing industries are using IoT technology in different ways to enhance experience. In the retail sector, luxury brands have embraced a variety of sensor-enabled technologies. Ralph Lauren's New York store, for example, has installed smart mirrors in their fitting rooms.[16] The mirrors' smart lighting enables customers to see an outfit in different lighting. The mirrors also recommend accessories and clothing that create a complete look.[17] Ralph Lauren then offers customers the option to upload merchandise details to their mobile devices if they aren't ready to make a purchase, striving to create a seamless omnichannel shopping experience. According to the company, the interactive mirrors have increased the time consumers spent at the store and tripled growth in store sales.[18]

Surveyed executives believe that tenants are willing to pay a rental premium to be housed in smart buildings. Forty-three percent believed tenants would pay a 6–10 percent premium to be in a smart building, while one-quarter believed tenants would pay 11–15 percent more. A substantially high proportion of multifamily-focused respondents believe that smart buildings will attract rental premiums. Yet, 70 percent of surveyed CRE executives said that only up to 20 percent of their properties are smart buildings.

Mobile apps are a powerful tool to create personalized tenant/end-user experiences. They are also central to successful adoption and implementation of IoT sensor-based connectivity. Among the features and services properties can offer, one-half of respondents cited smartphones and tablets as an integral part of tenant/end-user engagement (see figure 5). Respondents cited app-based entry into the building and emergency contact information to strengthen safety and security, information about environmental impact or sustainability efforts, more real-time property maintenance, and guidance about the neighborhood as the most essential smart features properties could offer (see figure 6).

Our survey responses highlight that mobile app features can play a significant role in making digital

FIGURE 6

Security, building information, and property management details are the mobile app features that would most improve the tenant/end-user experience

Top features cited by respondents as important to improving experience

Source: Deloitte Center for Financial Services analysis.

a core competency for CRE organizations. These include app-based entry; notifications and/or virtual events to enable community-building among occupants; tenant handbooks and newsletters; contact information for property management and maintenance services; and emergency contact information to improve safety and security.

What should CRE organizations do in 2020?

Clearly, IoT-enabled buildings and mobile apps can be game changers for CRE organizations. Here are some ways to consider digitizing and personalizing tenant experience:

Accelerate smart building proliferation. Smart buildings will become the norm over the next five years, according to approximately three-quarters of respondents (see figure 7). While around 60 percent of respondents—particularly those from the Netherlands, Singapore, and the United Kingdom—expect the mainstreaming of smart buildings to happen within two years, US respondents expect a longer tail of five years. Among different property types, close to one-half of industrial real estate-focused respondents have a one- to two-year horizon.

Location has always been one of the most important factors in any CRE decision—purchase, sale, and lease. This will not likely change, but it may not be the only consideration in the future. CRE executives anticipate that smart buildings will have a growing influence on tenants' leasing decisions. While 40 percent of respondents believe that smart buildings and location will have equal influence, 21 percent believe that smart buildings will surpass location as the primary influencer of tenants' leasing decisions.

The rapid adoption of smart buildings is top of mind for CRE executives that participated in our survey. Over the next 18 months, CRE executives cited an aim to increase their smart building portfolios—54 percent plan to scale it to reach the 21–40 percent range. APAC locations—Singapore, Hong Kong, and China—will make the most significant increase in smart building properties in the next 18 months, largely due to rising urbanization and large-scale investments in new technologies and greenfield developments (see figure 8).[19] The region is expected to increase its share of building IoT revenues from 34 percent in 2017 to 36 percent by 2022, while North America's share could decline from 31 percent to 28 percent during the same time.[20] North American countries could possibly learn about how to successfully implement IoT across different property types from some of their Asian counterparts.

IoT capabilities can be added in stages to minimize risk and make investments over time. Companies can make progressively greater investments in existing and new buildings to make them IoT-enabled. They could prioritize investments in smarter systems for energy, security, and parking; later adding electric car charging points and predictive maintenance; and finally, they could add occupant behavior data analysis and predictive capabilities.

IoT capabilities can be added in stages to minimize risk and make investments over time.

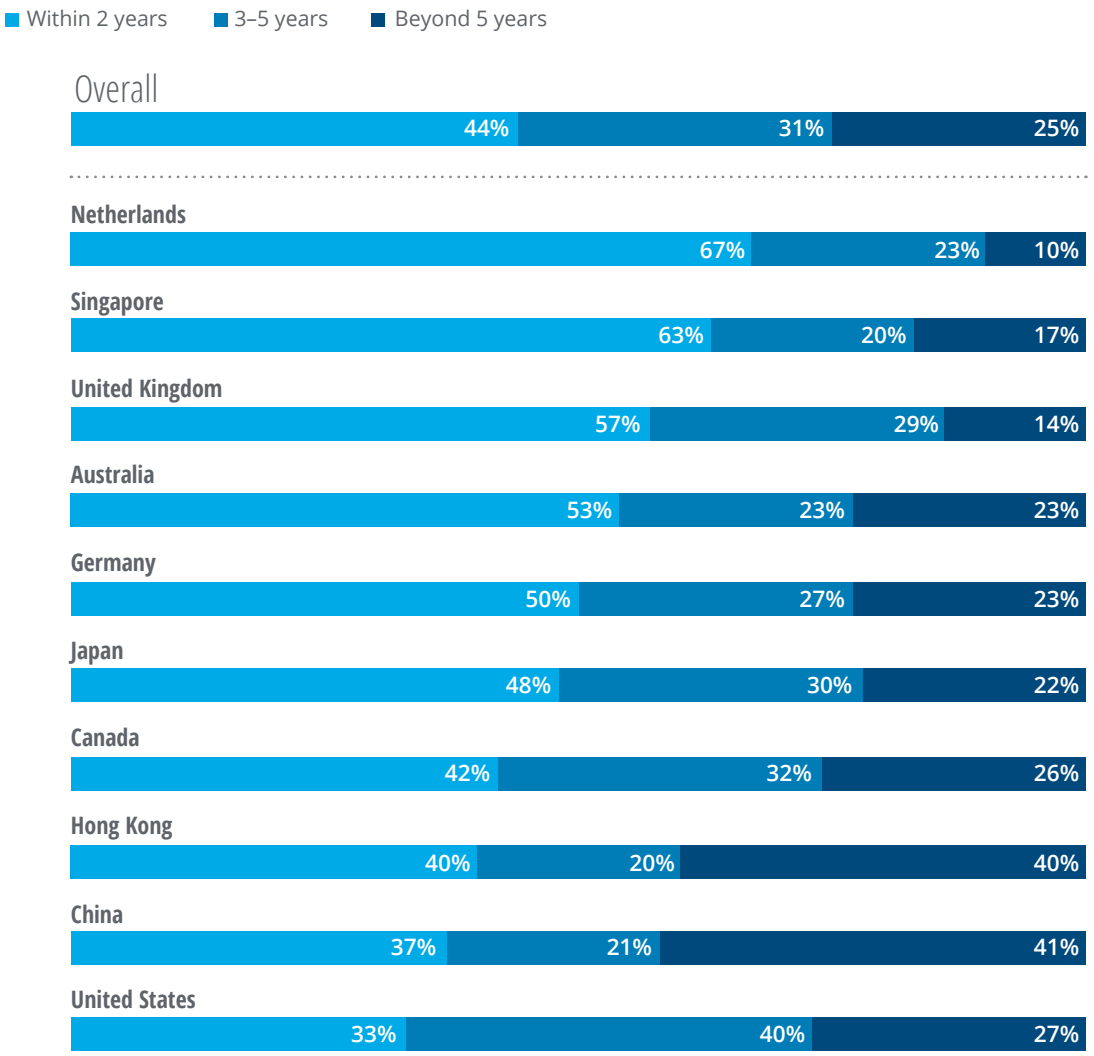
Activate mobile experiences. According to Sensor Tower, the global mobile app market is expected to grow 17 percent per year from 2018 to 2023, to US$156 billion.[21] How can CRE companies differentiate themselves in this crowded space? They could offer a simple, ultraconvenient, intuitive, and interactive app based on a deep understanding of tenant needs and behaviors. CRE owners and operators can use data analytics to assess tenant/end-user preferences, improve

predictive capabilities, and offer unique experiences to every user. Integrating IoT technology with the mobile app, using video, and maintaining a flow of communication with the tenant are other ways to build stronger experiences.

Examples of this are already happening. Dock 72 is a 16-story, 675,000 square feet, IoT-enabled office complex in New York's Brooklyn Navy Yard area. Together, Dock 72 landlords Boston Properties, Rudin Management Company, and WeWork developed "The Dock 72" app, which offers services such as building access, food delivery, shared space reservation, and real-time reporting of maintenance requests, among other things.[22] The building owners and managers plan to combine and analyze the mobile app data with other technologies, such as IoT sensors, to assess usage patterns in real time and create a unified tenant/occupier experience.[23]

FIGURE 7

Netherlands, Singapore, and UK respondents are most optimistic about smart buildings becoming the norm

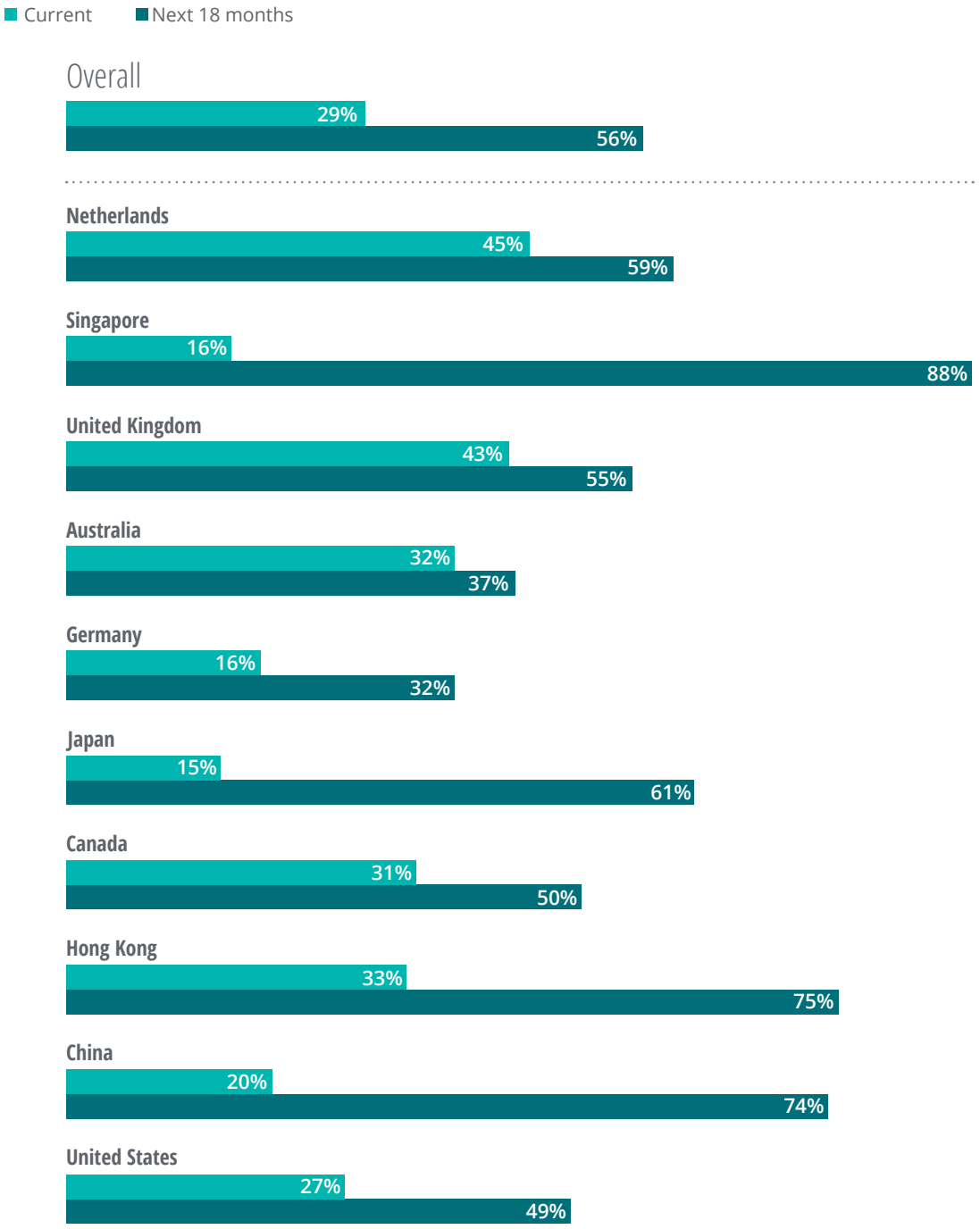


Source: Deloitte Center for Financial Services analysis.

FIGURE 8

Respondents from Singapore, Hong Kong, and China plan to make significant increases in smart building investments

Smart buildings as more than 20 percent of portfolio or investments



Source: Deloitte Center for Financial Services analysis.

In summary, IoT and mobile apps are important technologies to help improve front-end experiences for tenants and end users. Soon, tenant, resident, and shopper digital experience solutions could become a required competency for CRE owners and operators. Our survey shows CRE firms see the imperative to invest in these technologies, but most aren't planning to invest in them very quickly.

Key questions to drive action

1. When it comes to digital experience, what are my organization's current capabilities? Is digital a core competency?
2. How do I allocate capital throughout the tenant experience journey to create maximum impact?
3. What proportion of my portfolio should comprise smart buildings, especially if they attract rental premiums?
4. How can my organization maintain the human touch as we make digital a core competency?
5. Which key performance indicators (KPIs) should I use to measure the success of my digital efforts?

Unlock the value of data: Capture, manage, and utilize

How is data usage changing?

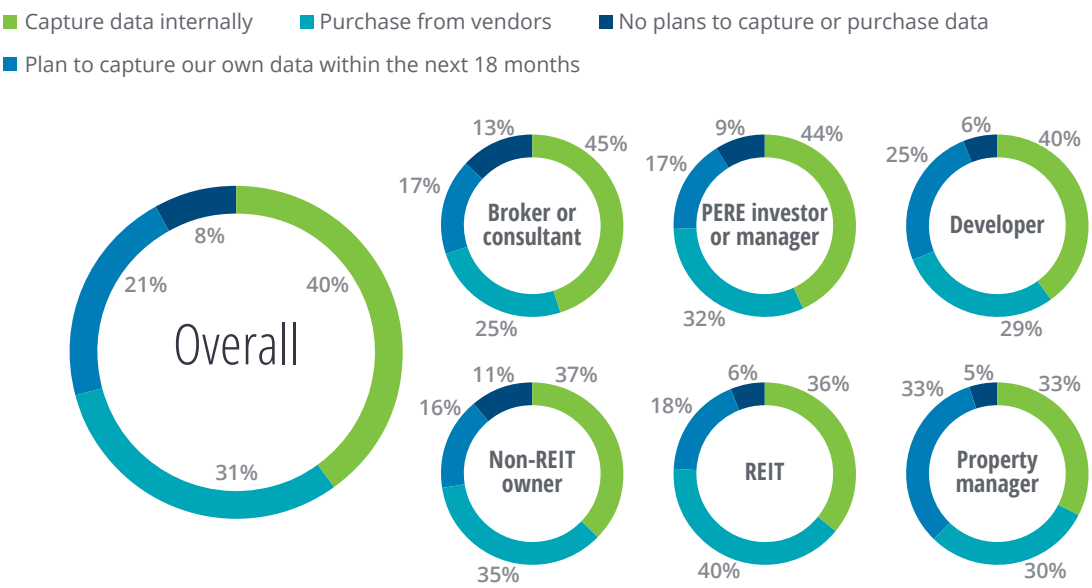
Knowingly or unknowingly, every company is generating heaps of structured and unstructured data. Most CRE companies have not yet fully explored how to capture and use information to enhance decision-making, improve operating performance, and create a differentiated tenant experience. Per our survey, 60 percent of CRE executives said that their organizations are not capturing their own IoT sensor data (see figure 9). There could be many reasons for this, but one of the major causes is likely that many CRE organizations are unclear about who owns the data and who has rights to use it. Nearly two-thirds of respondents consider the building owner or developer as the data owner. The remaining one-third believe it's either the property manager or tenants who owns it, or don't know.

Another reason for limited data utilization could be the evolving regulatory landscape. The European Union's General Data Protection Regulation (GDPR), for example, restricts organizations from using individual data. Regulations such as GDPR may limit a CRE organization's ability to create unique experiences for each tenant/end user.

Among the 40 percent of respondents whose organizations capture data internally, three-fourths are using it for generating insights for decision-making; only one-half share insights with

FIGURE 9

Capturing of IoT sensor data, by company type



Source: Deloitte Center for Financial Services analysis.

tenants. Overall, about one-half of surveyed executives are analyzing data to drive operational efficiency, while four in 10 respondents are using data for more strategic business decisions or future planning activities.

What should CRE organizations do in 2020?

Data generation and usage will only rise in the future. With it, data control and access will become more complex, which means that data governance is a growing imperative for CRE leaders.

Many CRE companies haven't truly felt the need to organize and manage data because they currently aren't fully capturing and leveraging their own data. In addition, some companies that are purchasing data from vendors are unaware of the best way to handle it. To maximize the value of the data they already have, whether collected internally or purchased from a vendor, CRE companies would have to develop platforms, processes, and a governance structure that enable data discovery, availability, management, and usability.

CRE organizations appear to understand the importance of data governance, as nearly two-thirds of the respondents plan to somewhat or significantly increase data governance investments in people, processes, or technology over the next 18 months (see figure 10). This trend is more prevalent among respondents that plan to invest more in smart buildings over the next 18 months. Geographically, a higher proportion of respondents of Asian locations such as Japan, Singapore, and Hong Kong plan to increase their data governance investments. The top reason why these CRE companies are implementing data governance efforts is to use analytics to help improve business decision-making—rent, pricing, tenant preferences, and operational effectiveness.

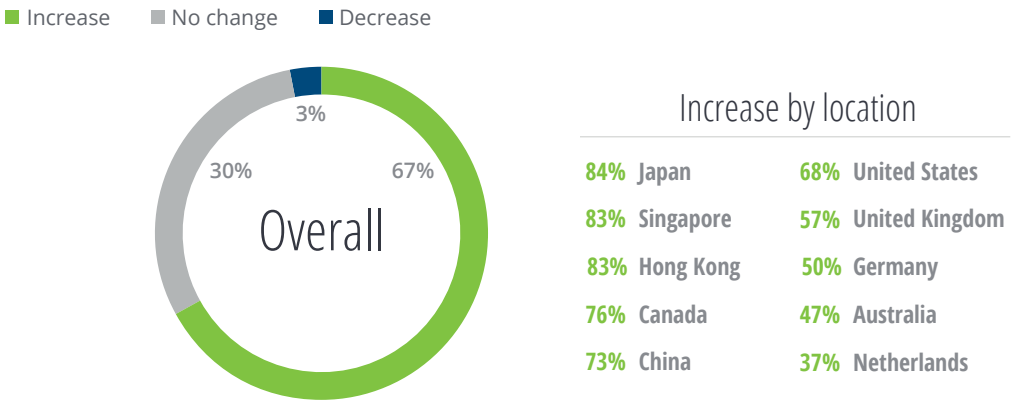
When seeking to unlock the value of data, CRE companies should consider five areas:

Develop a data governance framework. CRE companies should develop a flexible data governance framework that outlines processes, policies, standards, roles, responsibilities, and procedures. Using organizational goals and expected outcomes to design this framework, it

FIGURE 10

Two-thirds of respondents plan to increase data governance investments over the next 18 months

Anticipated change in investments



Source: Deloitte Center for Financial Services analysis.

should be scalable and equipped to manage technology upgrades.[24] Companies should keep in mind the growing amount, sources, value, and complexity of data.

Define roles and responsibilities. Data governance policies should also identify the data management and governance owners and assign responsibilities. This is important even if the data is managed externally, as is the case for 45 percent of our survey respondents. For the remaining 55 percent of respondents, data is managed by a chief data officer or an equivalent C-suite executive or by collaboration across business verticals. The bigger focus, though, should be on recruiting the appropriate talent to manage various data governance activities. CRE companies' decisions to own or outsource data governance efforts can hinge on their ability to attract and retain the right talent.

Enhance clarity on data ownership. CRE companies, managers, tenants, and third-party vendors should be clear about who owns different forms of sensor data captured at their properties. These parties can improve transparency on data ownership by outlining policies at the time of a service contract and avoid any confusion related to the ways in which the data can be utilized. For instance, the data captured by beacons in retail stores could be owned individually or collectively by the retailer, mall owners, and/or the equipment vendors.

Build a data dictionary. CRE organizations should consider using data lakes, a common repository that stores all structured and unstructured data at any scale and in raw format.[25] Next, they would require a data dictionary, a "firmwide policy that defines the terms and attributes of each data element" that can be used across an organization.[26] When put into action, CRE organizations would have to index which specific data characteristics they want to use to support the use of data analytics tools to generate meaningful insights.[27] They should also consider classifying data based on its value and risk, such as personally identifiable information (PII), and ensure compliance with regulations, such as GDPR.

Identify the right technology and tool capabilities. There are a variety of tools and technologies available for every stage of the data governance process. For instance, cloud, business intelligence, and AI technologies can be used throughout the data governance process, from developing data capture to utilization. In another instance, unlike the relatively more complex data warehouse tools, data lake tools can quickly sift through large volumes of data to drive insights and analysis. CRE companies should evaluate and make appropriate choices based on quantity and quality of data they can capture and analyses they wish to perform.

As CRE companies plan to up their investments in technologies and data governance, it is important for leaders to understand and implement an effective data governance strategy that's sized and structured to enable their enterprise data needs.

Key questions to drive action

1. What are my enterprise data and data governance needs?

2. How do I design a data governance framework that meets my organizational data needs?

3. How should I capture structured and unstructured data? What data is critical for me to capture?

4. Do I have a data dictionary? How do I use it to curate the most relevant data and insights for each of my business priorities and needs?

5. How should I factor in talent availability when making data governance decisions?

Artificial intelligence: The analytics backbone

How is AI adoption changing?

AI technologies are evolving fast and redefining the way humans and machines interact. These technologies range from fundamental ones, such as machine learning, to more advanced forms, such as deep learning, natural language processing (NLP), and computer vision. They are used for different purposes, from automating manual processes to enabling sophisticated predictive decisions.[28] AI is in early stages of adoption in the CRE industry, as our survey confirms that less than one-third of the CRE organizations are using it—although Asian locations such as Japan, Singapore, Hong Kong, and China and large CRE brokers (revenue above US$5 billion) show a higher proportion of adopters (see figure 11).

AI technologies' benefits cut across various business processes (see figure 12). However, CRE organizations have yet to develop a deeper understanding of how to use these technologies effectively. Only four in 10 of the surveyed executives believe AI can benefit CRE development. As an example, indus.ai, a San Francisco–based startup, uses computer vision technology to help improve efficiency and productivity at construction sites. It installs multiple cameras at different vantage points on a construction site to capture a 24-hour video.[29] It then feeds the video into its neural network platform, which is trained with millions of construction videos and images, to analyze the movements of workers and vehicles and utilization of machinery.[30] During development, organizations can monitor development activities in real time, and detect deviations between tenant-approved plans and on-site work.

AI can also have a deep impact on location decisions, including more precise property valuations forecasts. For instance, LocateAI uses machine learning to analyze different types of consumer data to help in retail site selection by predicting market potential, identifying success factors, and evaluating the impact of nearby competition.[31]

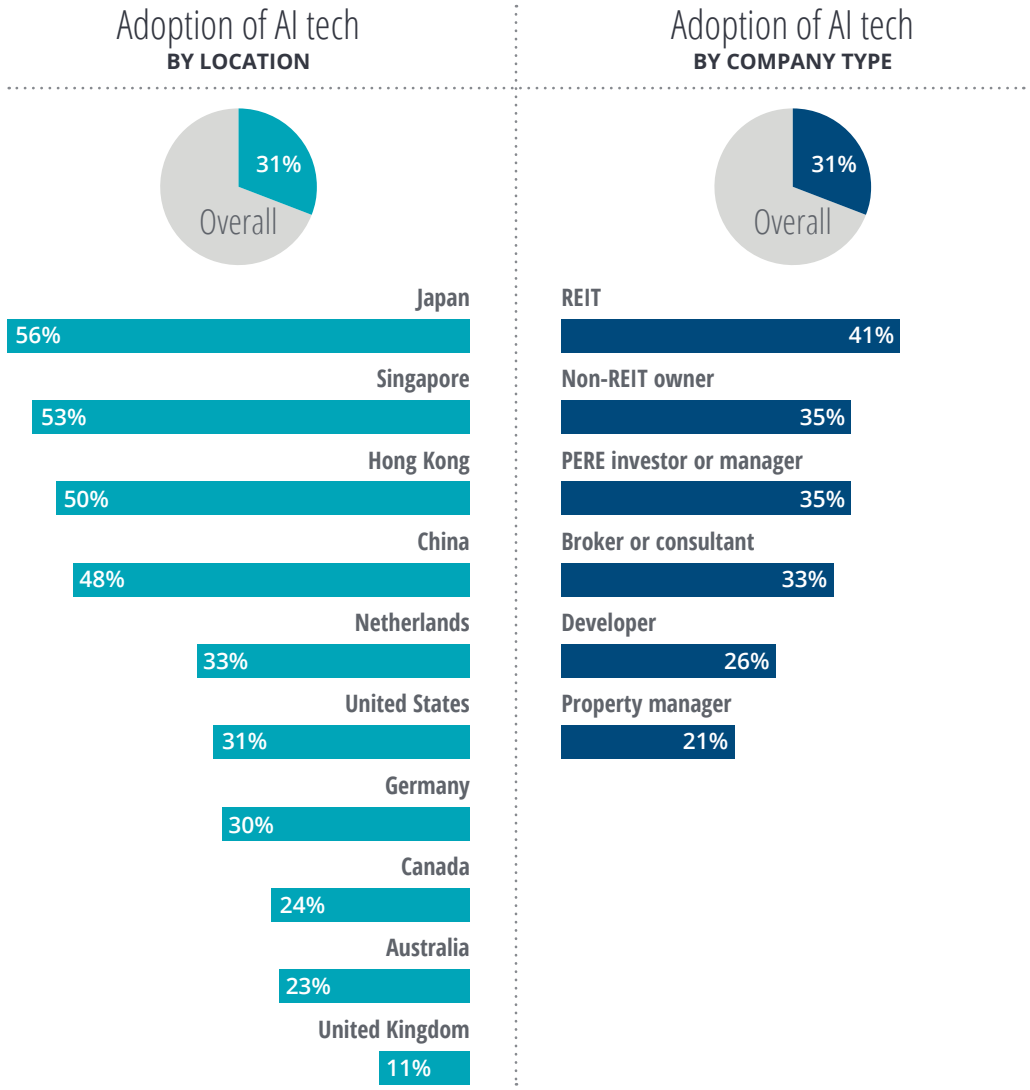
AI technologies are used for different purposes, from automating manual processes to enabling sophisticated predicted decisions.

What should CRE organizations do in 2020?

AI has the potential to create a positive impact on the entire CRE organization, by helping capture, manage, and leverage data more effectively. It can reshape tenant experience by increasing the ease and frequency of interactions with both tenants and end users, add more agility in core business processes, and drive operational efficiency. The technology's predictive capabilities for any and every business decision can have a strong influence on profitability and returns. CRE organizations should leverage AI technologies to analyze new and complex forms of data and automate redundant tasks. This can help organizations enhance their predictive capabilities to make smarter

FIGURE 11

Asian respondents and REITs currently lead in using AI technologies



Source: Deloitte Center for Financial Services analysis.

tenant-related decisions and modernize leases. Advanced AI users can uncover the technology's potential to create new revenue sources. A shortage of requisite talent, though, can be a critical challenge and CRE organizations may need to reskill existing talent, hire new talent with specialized AI skills, or collaborate with proptechs.

Strengthen predictive capability. As CRE companies ramp up their data collection efforts from various technologies such as IoT sensors, mobile apps, and digital reality (DR), the next step is to utilize the data. AI technologies have the potential to evaluate diverse sets of traditional and alternative data with significant speed and accuracy. They can make more sophisticated and accurate forecasts, do scenario-based analyses, and plan for the future. Technology startups, such as Skyline AI, have built large datasets with traditional data points such as rent, vacancy, and

cap rates and alternative data points such as geospatial information, mobile usage, and satellite images.[32] Skyline AI is using machine learning algorithms to make more accurate predictions and fuel transaction and lease decisions.[33] To learn more about the various datasets and their usage, read our report, *Infusing data analytics and AI: The future of smart decision-making for real estate institutional investors and managers*.

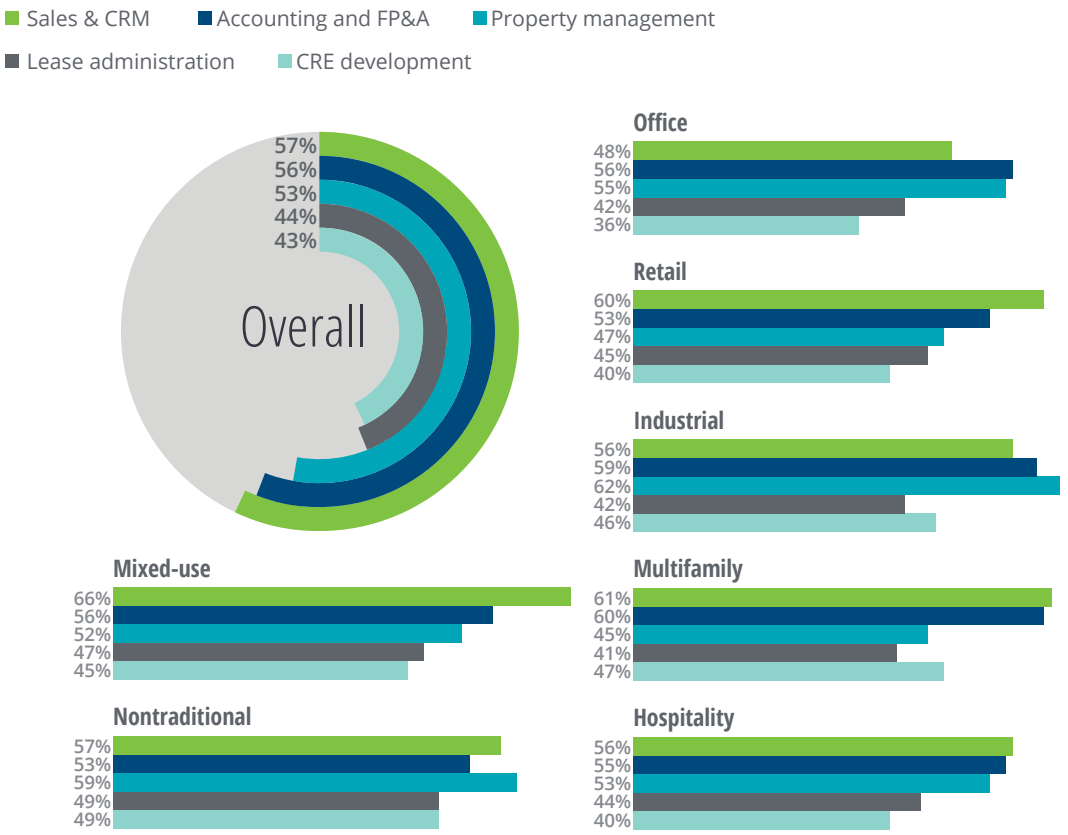
In another application, organizations can evaluate trends and patterns to predict tenant behavior and turnover and make informed tenant selection decisions using AI technologies. Such use can improve financial planning and analysis (FP&A), sales, and tenant relations. More than 55 percent of the surveyed CRE executives believe that AI can benefit sales & CRM and accounting and FP&A departments (see figure 12). As per our survey, organizations that are using AI technologies are more likely to consider digital tenant experience as a core competency. Yet, less than 4 out of 10 respondents who believe that technologies such as AI are changing tenant preference have used the technology so far.

Modernize leases. Automating lease administration is another big AI opportunity for CRE organizations. The industry relies on duration-based leases, commonly classified as

FIGURE 12

Sales & CRM and accounting and FP&A are the top departments that executives believe can benefit from using AI technologies

Departments that could most benefit from AI



Source: Deloitte Center for Financial Services analysis.

short-term or long-term. However, more than six in 10 of the surveyed respondents asserted that tenants prefer flexible leases as opposed to traditional ones. Notable rising demand for flexibility is witnessed in New York City, where the amount of space under flexible lease rose 44 percent year over year in 2018[34] and the United Kingdom, with 76 percent of respondents holding this view. However, moving to a flexible leasing model suggests substantial changes to existing lease administration processes.

Nearly two-thirds of CRE executives believe that AI technologies can increase the speed and accuracy of mundane tasks in lease administration.

In general, CRE companies follow manual and laborious lease administration processes that often result in cost overruns, speed and accuracy issues, and higher potential for fraud. Automating the leasing process—administration, accounting, and analysis—can have immense influence on tenant satisfaction. According to our survey, nearly two-thirds of CRE executives believe that AI technologies can increase the speed and accuracy of mundane tasks in lease administration. Forty-six percent of the respondents feel advanced AI capabilities can automate tenant services such as invoice generation. In addition to helping automate invoice processes, AI technologies can also make them digital and smarter by detecting duplication and fraud.[35] It can also help evaluate potential earnings for new tenants and existing lease renewals. Companies can consider using robotic and cognitive technology solutions to build lease administration systems that are flexible and scalable. They can even look for solutions that connect different leases and property and equipment with the building sensors, which would enable smarter decision-making. For example, AppFolio offers AI-powered leasing assistance and advanced utility management systems that help improve operational efficiency by automating redundant tasks and using integrated reporting to track leasing performance.[36]

Explore new revenue opportunities. The ultimate value that CRE organizations can derive from the use of AI is generating new revenue sources. As a very basic example, data about people's movement within a building can potentially be sold to advertisers or urban planners to help them in their decision-making. In another instance, CRE organizations can collect in-store shopping behavior data, use AI technology to identify patterns and generate insights, and then sell those to institutional investors to facilitate investment decisions. CRE organizations could then sell the same insights to their retail tenants, which could influence decisions related to in-store inventory, etc.

Companies can consider different business models—sell the data or insights, or pay per use or for a subscription fee. For example, WeWork recently acquired a spatial analytics firm, Euclid, which uses Wi-Fi signals to analyze the space usage of employees.[37] Through this acquisition, WeWork is developing a "workplace-insights solution" and plans to sell it to other businesses that want to create an augmented employee experience.[38] In an interview with TechCrunch, WeWork's chief product officer, Shiva Rajaraman, commented, "WeWork is moving towards becoming the Google Analytics for space."[39]

Address talent issues. The use of AI technologies does have talent challenges. Many employees fear job redundancies as AI automates jobs. CRE organizations would have to redeploy talent in a manner that is more targeted and

focused on how and where workers spend their time. CRE organizations would have to invest in reskilling and retooling existing employees. They would also need to add people with specialized skills such as AI experts and data scientists for effective use of the technology. Fifty-two percent of the respondents globally and 57 percent from the United States consider lack of adequate skills as the top challenge in adopting AI technology. Companies can consider collaborating with proptechs, which specialize in developing and implementing AI-based solutions, to alleviate talent issues in the short term. Along with reskilling and hiring, CRE organizations would need to use appropriate change management tactics to maintain employee morale.

CRE organizations seem to have only scratched the surface when it comes to using AI technology, with 63 percent of surveyed CRE executives planning to use it in the future. The differentiator for any CRE organization may lie in its ability to coalesce the use of AI technology across its business and enhance predictive capabilities to result in smarter location decisions and improved tenant experiences.

Key questions to drive action

1. What business objective do I plan to achieve by investing in and deploying AI?

2. How do I evolve my existing data and technology platforms to make them AI-ready?

3. How and where do I deploy AI in my business?

4. Can I create new revenue opportunities from the use of AI technology?

5. What skills do I need in my organization to adopt and leverage AI technology?

Digital reality: Enable early-stage tenant connections

How is the use of digital reality changing?

The recent *Lion King* movie, Snapchat lenses, and *Pokémon Go* have one thing in common—the use of digital reality technologies to create and augment virtual and immersive experiences for users. Digital reality (DR) includes augmented reality (AR), virtual reality (VR), mixed reality (MR), 360-degree videos, and immersive technologies.[40] The capabilities and commercial uses of these technologies is not limited to the entertainment industry alone. Worldwide spending on AR/VR is expected to grow at a five-year CAGR of 78 percent, to reach US$160 billion by 2023.[41] Such growth is expected as companies move from exploration of DR technologies to actual business implementation. DR technologies could redefine the way we interact with digital information—from screens and hardware to gestures and emotions.[42]

DR technologies are being used in design, marketing, and operations in various industries to help enhance coordination without colocation, provide a futuristic experience to customers, and drive operational efficiency. In health care, the Dutch health technology company Philips uses MR technologies in its image-guided therapy platform for minimally invasive surgeries, which has saved time and improved patient experience.[43] And employees at Ford use VR tools to work on automotive designs in real time with their colleagues at different locations.[44]

For the CRE industry, the overall adoption remains low as less than one-third of our survey respondents currently use any DR technologies (see figure 13). Like AI technologies, respondents from Asia, especially Japan and Singapore, are the most prolific users of DR. In contrast, the United Kingdom, with 15 percent adoption, and the Netherlands, with 17 percent usage, are among the lowest users. Institutional investors and managers and large brokers are the highest users of DR technologies. For example, BNP Paribas Real Estate uses DR technology for remote property viewing through holoportation, which enables users to interact with objects and holograms of other people in a virtual environment.[45]

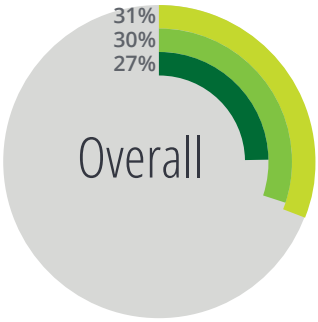
The initial applications of DR in real estate were related to the use of VR tools in the residential sector. For instance, residential brokers and agents used VR to offer property tours anytime, anywhere, along with showcasing space design possibilities. The CRE segment is a late entrant in the DR space and has been using the technology for marketing and sales of upcoming developments. For instance, similar to the residential sector, SL Green Realty Corp. introduced a VR tour of its upcoming high-rise office building, One Vanderbilt, in New York.[46] In another example, in Australia, Queensland-based Allaro Homes' use of AR/VR technologies to sell residential, office, industrial, and restaurant properties during the development phase resulted in 80 percent sales conversion compared to the prior 20 percent, and improved employee efficiency and productivity.[47]

FIGURE 13

Asian respondents currently lead in using DR technologies

Current adoption of DR technologies, by technology type

Currently using augmented reality technology
Currently using virtual reality technology
Currently using mixed reality technology



Augmented reality

Highest adoption		Lowest adoption	
63%	Singapore	16%	United Kingdom
58%	Japan	22%	Canada
43%	China	23%	Netherlands

Virtual reality

Highest adoption		Lowest adoption	
64%	Japan	10%	Netherlands
53%	Singapore	14%	United Kingdom
45%	China	17%	Australia

Mixed reality

Highest adoption		Lowest adoption	
52%	Singapore	7%	Netherlands
50%	Japan	11%	Australia
38%	China and Hong Kong	15%	Germany

Source: Deloitte Center for Financial Services analysis.

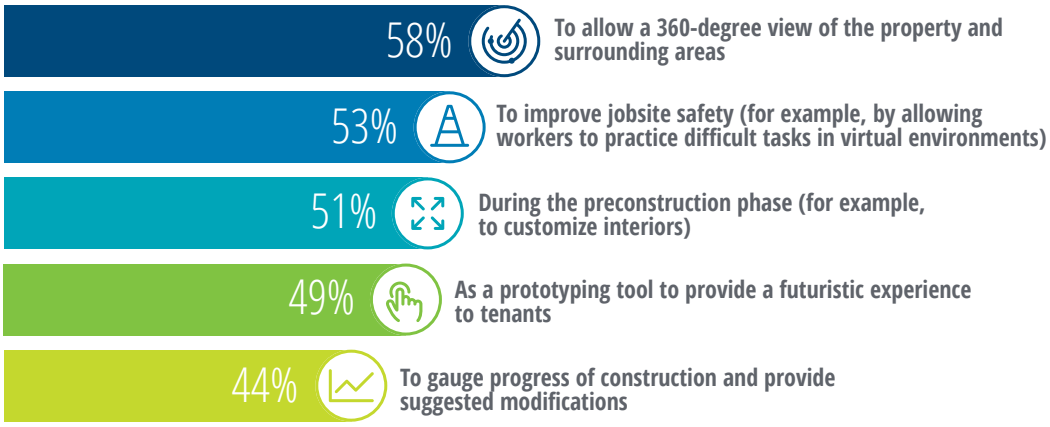
What should CRE organizations do in 2020?

Close to 60 percent of surveyed CRE executives said their companies plan to use DR in the future. There appears to be merit in using DR technologies to attract, retain, and engage tenants during the development phase of a CRE project. Companies can also drive operational efficiency and bolster employee experience.

Use DR during property development. Paper-based plans or traditional computer-aided design models perhaps limit owners'/developers' ability to completely customize a property to each tenant's preference. With DR, owners and developers can use prototyping tools and offer potential tenants a futuristic experience at the predevelopment stage. Companies can also offer a 360-degree view of the surrounding areas (see figure 14). For instance, using VR technology, owners/developers can help potential tenants imagine future development with a lot of detailing, including furniture and fixtures. They can gauge tenant reactions and preferences and customize the finished physical space. Currently, 58 percent of surveyed CRE executives consider tenant preference during the predevelopment stage. The use of DR technologies would enable more CRE organizations to weave in tenant preferences at this early stage.

FIGURE 14

CRE companies use DR in the development process for a variety of reasons



Source: Deloitte Center for Financial Services analysis.

During the development stage, these technologies would allow both owners/developers and tenants to monitor progress against plans and suggest modifications. Among the variety of DR technologies, 45 percent of the surveyed CRE executives feel that MR is most effective in enhancing tenant experience.

Bolster operational efficiency and employee productivity and safety. DR technologies lend a predictive element to the development process. Architects and designers can use DR to virtually collaborate, create, and visualize the complete design of a building in a more immersive setup. CRE executives can move things around in the plan and see the corresponding impact on the building structure and design.

DR can also be used to simulate training for on-site jobs, which would better equip workers. At the site, AR/VR technologies can increase worker precision and accuracy as they can constantly see a visual image of the final plan. Supervisors can get a 360-degree view of the site and remotely monitor the activities. In case of on-site injury, paramedics can virtually connect with experienced doctors and offer faster medical help.

Build partnerships with stakeholders. As more CRE companies plan to pilot DR technologies, they could benefit from partnering with stakeholders such as tenants and suppliers, who may share best practices around DR adoption efforts.[48]

Overall, DR technologies have immense potential in extending connection and personalization to tenants at the property development stage. That being said, the technologies' potentials are not fully understood today as capabilities continue to evolve. CRE organizations would also have to consider potential information and privacy risks as it relates to theft of intellectual property (IP), such as development plans.[49]

Key questions to drive action

1. Which DR technologies are likely to be most beneficial for my portfolio?

2. At which stage of the development process would DR technology offer maximum value?

3. When would DR be fully operational and ready to be applied in my organization?

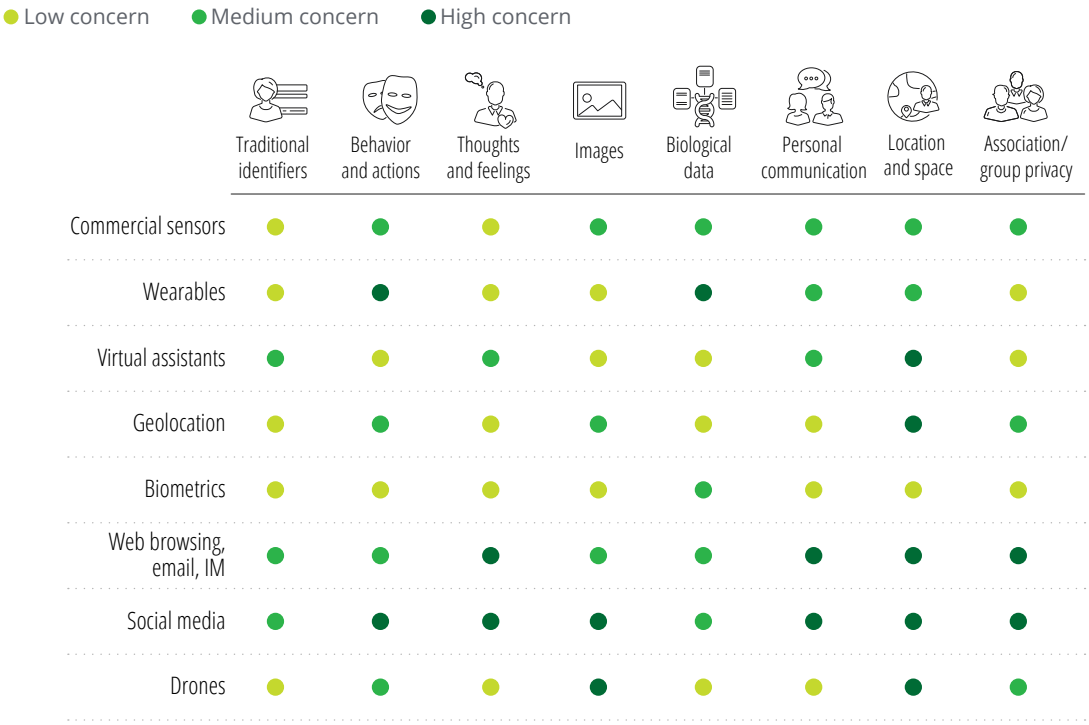
Cybersecurity and privacy: Critical for the successful digital tenant experience

How are cybersecurity and tenant privacy changing?

As the use of technologies such as the IoT, AI, DR, cloud, and mobile apps grows, the magnitude and complexity of cyber threats are expanding, too. The most interesting development is that, although most lessees are corporations, CRE organizations have incredible access to personal data such as tenant/end-user location, communication, preferences, behavior, and sentiments. Some of the preferences could include work and mobility patterns of tenants/end users and the services they consume. In addition, hotel and retail sectors are using facial recognition technologies to identify customers and assess their sentiment and feelings.[50] As such, there is a much greater risk of cyberattacks and/or privacy breaches (see figure 15).

FIGURE 15

Potential of technology/tool to encroach on individual privacy, by type of privacy[51]



Source: Val Srinivas, Sam Friedman, and Tiffany Ramsay, *Reimagining customer privacy for the digital age: Going beyond compliance in financial services*, Deloitte Insights, May 20, 2019.

The attack surface and vectors are widening as more CRE organizations partner with external vendors. For example, smart buildings can collect a host of data on building operations and personal information of tenants, employees, and customers. The information is tracked and captured through multiple sensors, which are connected to the systems of several vendors, and increase the risk exposure. In addition, many CRE organizations outsource data management to third parties, which may raise more concerns about data security.

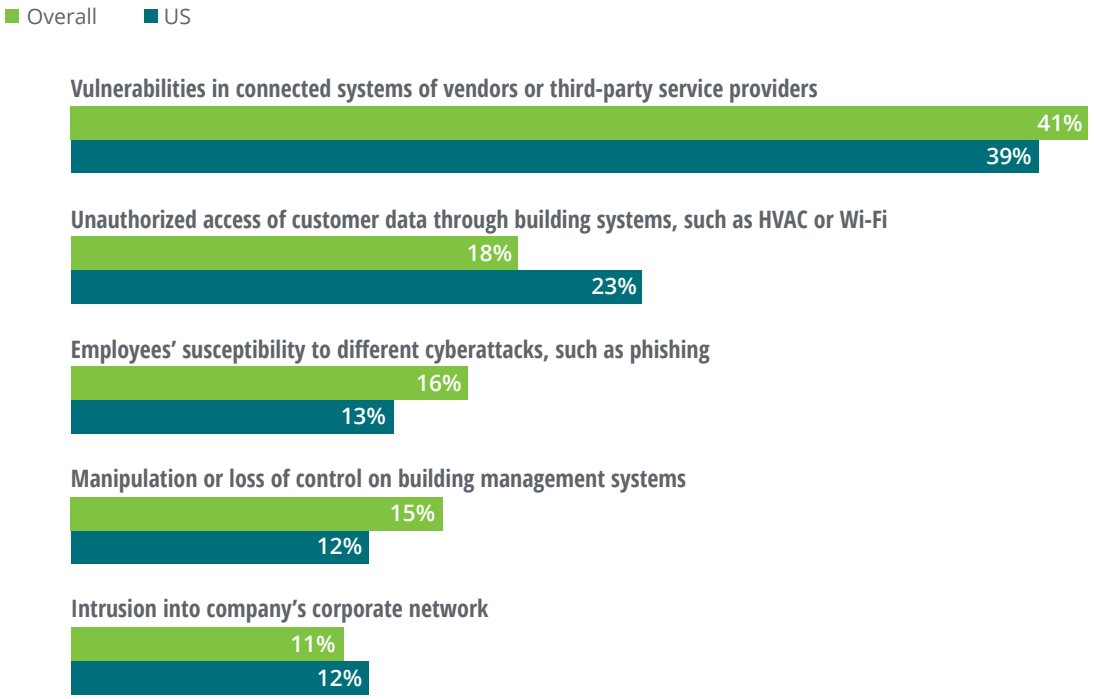
CRE organizations are beginning to realize the inherent risks of managing data through external entities, as 41 percent of the surveyed respondents consider vulnerabilities in connected systems of multiple vendors and third-party service providers as the biggest data security risk (see figure 16). Vulnerabilities could also come through the unsecured ways to store or communicate real estate plans with federal, state, and local government agencies. Apart from external stakeholders, perpetrators can also attack different building systems such as security; life safety; and heating, ventilation, and air conditioning (HVAC), which would be well-integrated in smart buildings.

In the first half of 2019, reported data breaches, across industries, rose more than 50 percent compared to the same period last year.[52] Surveyed CRE executives consider a decline in company/property valuation, tenant relationship damage, and theft of PII as the top three potential impacts of a data breach. Given the concerns about increased privacy risks and a surge in data breaches, governments and regulators are also introducing stricter norms to protect personal data and privacy, which may have a cross-border impact.

FIGURE 16

Vulnerabilities in connected systems is perceived to be the biggest data security risk

Top data security risks



Source: Deloitte Center for Financial Services analysis.

For example, the European Union's GDPR requires all organizations—including CRE companies—to obtain express opt-in consent from citizens to collect their data and promptly notify them of data breaches, or risk paying steep fines.[53] Citizens also have additional privileges such as the "right to access" and the "right to be forgotten," which enable them to know if and how their personal data is being used and to demand the erasure of all personal data.[54] Organizations that breach GDPR could face penalties up to 4 percent of their annual global revenue or US$22 million, whichever is higher.[55] The United States may not be too far behind and many states, led by California, have passed privacy regulations such as the California Consumer Privacy Act (CCPA), while other states have ongoing privacy legislative initiatives.[56]

Forty-five percent of surveyed CRE organizations have developed in-house cyber resilience capabilities to limit the exposure of private data and the potential impact of a data breach. This number rises to 70 percent for respondents whose companies have increased technology investments focused on tenant experience. CRE organizations, however, need to cover a lot of ground as they deal with today's continuously evolving cybersecurity and privacy risks.

Forty-five percent of surveyed CRE organizations have developed in-house cyber resilience capabilities to limit the exposure of private data and the potential impact of a data breach.

What should CRE organizations do in 2020?

Due to growing vulnerabilities, an emphasis on cybersecurity is becoming foundational to the adoption and use of new technologies. For some organizations, cybersecurity and privacy concerns tend to limit use of emerging technologies such as the IoT and AI. For instance, 44 percent of respondents chose data and privacy issues as one of the biggest challenges in adopting AI technologies. As such, CRE organizations should strengthen leadership and board involvement, address talent and vendor issues, and incorporate privacy by design.

Strengthen leadership and board involvement. It is imperative for CRE leadership to make cybersecurity and privacy strategic priorities. When asked about the biggest challenges in managing cybersecurity, nearly 40 percent of surveyed CRE executives identified *lack of management support and funding*, *absence of cybersecurity strategy*, and *poor understanding of cyber risks and security* as top concerns (see figure 17). Boards and top management of CRE organizations can be better informed of potential threats and security risks, thereby increasing their engagement on cybersecurity issues and helping align requisite resources.

Alleviate the talent shortage. Forty-five percent of all surveyed organizations and 58 percent of REITs face challenges in managing cybersecurity due to the absence of skilled cybersecurity professionals. CRE organizations could tackle the talent shortage by adding more automation across cybersecurity processes to improve speed and efficiency and help manage with fewer resources.[57] Organizations could also outsource some cyber capabilities. According to *Deloitte's future of cyber survey 2019*, 85 percent of the 500 C-suite executives overseeing cybersecurity highlighted that they outsource a part of cybersecurity operations to vendor and manager services providers.[58]

FIGURE 17

Absence of skilled professionals is the biggest challenge in managing cybersecurity

Biggest challenges in managing cybersecurity	Overall percentage	Top response: BY LOCATION	Top response: BY COMPANY TYPE	Top response: BY PROPERTY TYPE
Lack of skilled cybersecurity professionals	45%	51% US	58% REIT	56% Multifamily
Lack of management support, such as inadequate funding	39%	43% Netherlands, Australia	42% Mixed-use	44% Retail
Lack of cybersecurity strategy	38%	47% Germany	42% Developer, PERE investor	47% Nontraditional
Poor understanding of cyber risks and security	37%	50% Hong Kong	48% Property manager	40% Hospitality

Source: Deloitte Center for Financial Services analysis.

Pay attention to third-party risks. While partnering with third-parties could provide additional capabilities, it could be a source of a breach as well. Before contracting with vendors and third-party service providers, companies should evaluate the due diligence of their data governance model, robustness of their IT systems, their financial health, the performance of prior service level agreements (SLAs), and compliance with regulations. The SLAs could specifically include clauses around the expected levels of security, rules on sharing information and conducting random audits, and penalties on breaches of any SLA clauses.[59] Once contracted, CRE companies should involve the vendors as part of their broader circle of trust and share intelligence, as one weak node can risk the entire network.

Incorporate privacy by design. As risks increase, CRE organizations would need to incorporate privacy upfront into the design of new technologies and processes. A proactive approach would work better as CRE organizations aim to gain a better hold over the channels that create the biggest data security risks. To get better control over the personal data while dealing with third-party systems, organizations could build protocols that need to be followed consistently. CRE organizations could use advanced access rights mechanisms such as multifactor authentication (MFA) to control access to critical information and scrub personal information before storing it in databases. Some of the MFA options include facial recognition, one-time use passwords, fingerprinting, iris scans, and voice analyzers.[60] Other, more secure and advanced access control measures include vein readers, DNA/genome sequencing, and location-based technologies such as geofencing and geotagging.[61]

In summary, high attention to and rapid action on cybersecurity and tenant data privacy are important to comply with different regulations, increase tenant loyalty, and maintain brand and

reputation. CRE organizations could consider cyber insurance to protect against unexpected cyber incidents and reduce tenant concerns.

Key questions to drive action

1. Which technologies are better able to help me protect privacy and meet compliance requirements?
2. How can I combine my cybersecurity and privacy strategies to effectively tackle the evolving risks?
3. What role can sourcing companies play in addressing cyber and privacy resource shortfalls?

Real estate-as-a-service: Beyond imagination

REAL ESTATE IS no longer just a physical space. The industry is at an inflection point: The ways in which real estate tenants and end users engage with their physical surroundings is evolving rapidly. Along with these changes, expectations are evolving, too. As a result, CRE companies would have to change their mindset and look at real estate-as-a-service, which means creating augmented and memorable experiences using the physical space and moving away from thinking about just the functional uses. This could require companies to fundamentally rethink location, space requirements, users, and user preferences.

Of equal importance, while shifting to this service mindset, CRE companies could also have to strengthen their analytical and predictive capabilities. They may have to be more deliberate and preemptive, so they can better sense changing tenant demands and adapt their services to accommodate those shifts. CRE organizations also should change their mindset about target customers; across various property types, these increasingly include end users and not tenants alone.

Given the rapid changes in tenant and end-user expectations, companies may find it challenging to visualize the ideal experience. But the trick really is for CRE leaders to use data to understand tenant behaviors and create unique experiences. Companies that remain in the weeds and are evaluating operational efficiency alone are likely to be at a competitive disadvantage.

It's now or never for the CRE industry. CRE leaders should be proactive and preemptive, open the aperture, and embrace and adapt to the winds of change.

The next decade is truly beyond imagination!

Survey methodology

IN JUNE 2019, the Deloitte US Center for Financial Services fielded a global survey and elicited responses from 750 Commercial Real Estate (CRE) C-suite executives from 10 countries across the Americas, Europe, and Asia Pacific. The survey included CRE owners, developers, and property managers with market capitalizations ranging from less than US$1 billion to more than US$30 billion; private equity real estate investors and managers with assets under management ranging from less than US$1 billion to more than US$40 billion; and CRE brokers and consultants with revenue ranging from less than US$250 million to more than US$10 billion. The survey had a diverse representation of CRE executives focused on a variety of traditional and nontraditional properties.

In addition to asking questions about business sentiments and expectations, the survey asked respondents about their preferences, beliefs, actions, and challenges regarding key topics such as tenant experience, data utilization, cybersecurity, and the role of technologies such as IoT, AI, and DR.

Endnotes

1. Daphne Tomlinson, "The smart building space attracts high levels of investment in Q1 2019," Memoori, April 16, 2019.
2. Anthony Pearce, "Alibaba's Flyzoo hotel in Hangzhou is staffed by robots," Globetrender, August 5, 2019.
3. Nell Lewis, "The 'living laboratory': Inside a neighborhood of smart homes," CNN Business, August 8, 2019.
4. Dr. Ira Kalish, *Weekly global economic update*, Deloitte Insights, August 13, 2019.
5. Ibid; Yew Chiew Ping, "Commentary: Why it's not in Beijing's interest to rock the Hong Kong boat," CNA, August 13, 2019.
6. Board of Governors of the Federal Reserve System, "Industrial production and capacity utilization," press release, August 15, 2019.
7. US Census Bureau, "Advance monthly sales for retail and food services, July 2019," press release, August 15, 2019.
8. AFIRE, "AFIRE 2019 international investor survey points to strong fundamentals for commercial real estate in the US and growing concern about external risks," press release, April 2, 2019.
9. Subscribed data from Real Capital Analytics, Q2 2019.
10. Board of Governors of the Federal Reserve System, "Senior loan officer opinion survey on bank lending practices," August 5, 2019.
11. Subscribed data from Real Capital Analytics, Q2 2019.
12. Ibid.
13. IES, "NTU EcoCampus," accessed August 21, 2019.
14. Ibid.
15. Ibid.
16. Rustam Tagiev, "Smart fitting rooms: How they work and why stores need them," Facelet, December 5, 2017.
17. Ibid.
18. Ibid.
19. Zion Market Research, "Global smart building market expected to reach USD 61,900 million by 2024: Zion Market Research," press release, March 20, 2018.
20. Memoori, "The Internet of Things in smart commercial buildings 2018 to 2022," 2018.
21. Sensor Tower, "2019-2023 mobile market forecast," March 28, 2019.
22. Boston Properties, "Dock 72," accessed August 3, 2019.
23. Propmodo, "Tenants are now getting a portal to buildings' operating systems," June 7, 2018.
24. Christopher Tozzi, "Why and how to create an agile data governance policy," Syncsort, August 2, 2017.
25. AWS, "What is a data lake?," accessed August 8, 2019.

26. Deloitte, “Data and technology infrastructure: The cornerstone to an effective regulatory reporting program,” August 20, 2018.

27. Ibid.

28. Jeff Loucks, David Schatsky, and Tom Davenport, *State of AI in the enterprise, 2nd Edition*, Deloitte Insights, October 22, 2018. **AI** includes a set of technologies such as machine learning, deep learning, natural language processing, and computer vision. **Machine learning** is the ability of statistical models to develop capabilities and improve their performance over time without the need to follow explicitly programmed instructions. **Deep learning** is a complex form of machine learning involving neural networks, with many layers of abstract variables. Deep learning models are excellent for image and speech recognition but are difficult or impossible for humans to interpret. **NLP** allows users to extract or generate meaning and intent from text in a readable, stylistically natural, and grammatically correct form. NLP powers the voice- and text-based interface for virtual assistants and chatbots. **Computer vision** is the ability of computers to identify objects, scenes, and activities in a single image or a sequence of events. The technology analyzes digital images and videos to create classification or high-level descriptions that can be used for decision-making.

29. Rebecca Baird-Remba, “Brookfield is building Manhattan West using AI,” *Commercial Observer*, October 23, 2018.

30. Ibid.

31. LocateAI, “Artificial intelligence powering retail site selection,” accessed August 20, 2019.

32. Guy Zipori, “The (data) science of the deal: How AI will transform commercial real estate,” *Forbes*, January 23, 2019.

33. Ibid.

34. WeWork and CBRE, “The financial benefits of agile real estate,” WeWork, July 1, 2019.

35. Ron Schmelzer, “Artificial intelligence is making increasing headway in the enterprise back office,” *Forbes*, July 10, 2019.

36. AppFolio, “AppFolio launches new AI leasing assistant and utility management offerings,” press release, June 27, 2019.

37. WeWork, “WeWork deepens technology offering by acquiring spatial analytics leader Euclid,” press release, February 11, 2019.

38. Ibid; Connie Loizos, “WeWork just made its first acquisition of 2019, snapping up a visitor identity and behavior company,” TechCrunch, February 7, 2019.

39. Betsy Mikel, “WeWork just made a disturbing acquisition. It raises a lot of flags about workers’ privacy,” *Inc.*, February 17, 2019.

40. **Virtual reality** creates a digital environment that replaces real-world environment; **augmented reality** overlays digitally created content into the real-world environment; **mixed reality** seamlessly blends the user’s real-world environment and digitally created content in a way that allows both environments to coexist and interact; **immersive** is a deeply engaging, multisensory, digital experience that can be delivered using VR, AR, 360-degree video, mixed reality, and other technologies. Formats vary.

41. International Data Corporation, “Commercial and public sector investments will drive worldwide AR/VR spending to $160 Billion in 2023, according to a new IDC spending guide,” press release, June 4, 2019.

42. Allan V. Cook et al., *Digital reality: The focus shifts from technology to opportunity*, Deloitte Insights, December 5, 2017.

43. Philips, “Philips showcases unique augmented reality concept for image-guided minimally invasive therapies developed with Microsoft,” press release, February 24, 2019.

44. Anmar Frangoul, “Designers at Ford are using virtual reality tools to work with colleagues remotely,” CNBC, May 8, 2019.

45. BNP Paribas, “Holoportation: BNP Paribas invents the property viewing of the future,” May 25, 2018.

46. Lois Weiss, “VR tours put the ‘real’ in real estate,” *New York Post*, April 25, 2017.

47. Sue Williams, “How gaming technology is transforming commercial real estate,” CommercialRealEstate.com.au, February 5, 2018.

48. Allan V. Cook et al., *Digital reality*.

49. Ibid.

50. CB Insights, *Facial recognition is already here: These are the 30+ US companies testing the technology*, June 5, 2019.

51. Val Srinivas, Sam Friedman, and Tiffany Ramsay, *Reimagining customer privacy for the digital age: Going beyond compliance in financial services*, Deloitte Insights, May 20, 2019.

52. James Sanders, “Data breaches increased 54% in 2019 so far,” TechRepublic, August 15, 2019.

53. EU GDPR.ORG, “GDPR key changes,” accessed September 23, 2019.

54. Ibid.

55. Ibid.

56. Carole Piovesan, “How privacy laws are changing to protect personal information,” *Forbes*, April 5, 2019.

57. Deloitte, “The future of cyber survey 2019,” May 2019.

58. Ibid.

59. Claudio Dodt, “Vendor, consultant and contractor security,” INFOSEC, accessed August 21, 2019.

60. Mike Wyatt, Irfan Saif, David Mapgaonkar, *New perspectives on how cyber risk can power performance*, Deloitte University Press, July 2016.

61. Ibid.

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Industry leadership

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