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# 1. Introduction

Technological change affects everyone. It alters our daily lives at every level: social, economic, and political. Until now, the real estate industry's reaction to these fundamental changes has been muted, even though real estate's vulnerability to digital disruption is as profound as any other industry.<sup>1</sup>

The results of the Deloitte Global study, "[Industry 4.0: Are you ready?](#)," show that technological development and mobility will require consumers and employees to adapt the way they live, work, and consume.

Price pressure and fierce competition are a powerful catalyst for introducing technological innovations to building technology. These drivers – combined with the growing importance of data – are poised to upend business models and introduce new players in the market.

For real estate service providers, the imperative is to address two key questions:

- What drivers and trends will decisively impact the future of real estate services?
- How should real estate service providers adapt their business models and services in order to remain successful going forward?

Real estate service providers can stay ahead of the curve by working with clients to develop and implement effective strategies to meet the demands of tomorrow. In this report, we look at some scenarios for how these changes can play out, along with ways that real estate service providers can respond to them.



## 2. A glimpse into the future

In the world of real estate, a growing number of deals rely on data analysis. From faster, more accurate appraisals to sophisticated forecasts, the use of analytics can lead to smarter decisions about property investments.

Considering all the data that real estate and its users generate, it seems likely that companies specializing in big data processing will enter the real estate services market. These “data collectors” enjoy competitive advantages such as innovative employees and established, data-supported business models. They also have the cash to acquire companies and technologies that can help them break into new markets. Attributes like these put big data companies ahead of many incumbent firms, which face a learning curve in adopting data as a business model.

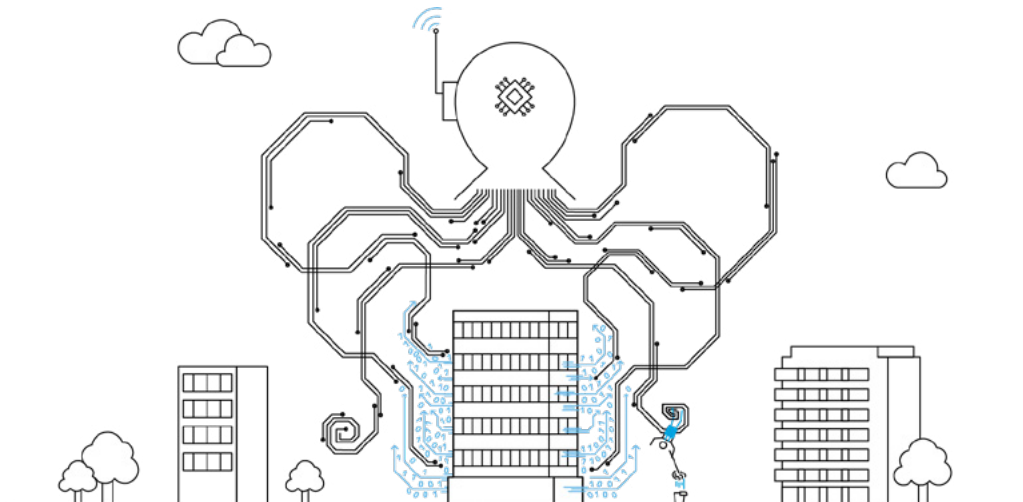


Fig. 1: Large quantities of data make the market attractive to new players from the technology industry

So far, the business case hasn't been strong enough for technology and data companies to make a concerted entry into real estate services. But they're forming partnerships and alliances. They've also shown a keen interest in building systems automation for newly-constructed and existing buildings. Specific examples include Alphabet (Nest), Samsung (SmartThings), and Amazon (Alexa). The upshot? Although these companies initially took their large-scale, billion-dollar investments to the residential market, the commercial market is the next logical step.

If big data companies take over technological development in the real estate services industry, asset and property managers may lose significant influence—not only in shaping the work environment going forward, but over their own business model as well. To maintain their hold on the customer relationship, real estate service providers may need to reinvent their value proposition and make it crystal-clear to the customers they serve.



# 3. Transformation through technological innovations

Let's look at some of the more significant innovations affecting the construction, use, and management of real estate.

## Robotics

Between rising wages and improving automation, robotics is becoming an attractive alternative to today's labor-intensive services. Applications include:

- Surface cleaning
- Security services
- Façade cleaning or painting (by drones)
- Inspection of hard-to-reach exteriors (e.g., transmitter masts)

As these examples show, automatic service robot applications are currently aimed at tackling simple, large-scale tasks. Eventually, however, they may take on more complex work, including social functions such as reception or sales. This could upend the personnel structure of real estate service providers.

It's possible that robot manufacturers may not be content to remain suppliers to real estate service companies, putting real estate service providers' share of the building services market at risk. Incumbent providers might head this off by offering services related to the use and maintenance of robotics components. Another option could be to provide the robotic labor themselves via performance-based service agreements. This would require developing the skills to consistently provide well-functioning robots.

## Augmented and virtual reality

Wearables and AR/VR devices are a significant driver of innovation in facilities management – especially when it comes to the mobile workforce.

AR/VR aids in the visualization of technical components. It also plays an important role in locating defective components. AR/VR devices can display corresponding system information directly in the field of view and, when walking around the building, provide location-specific data as well.

### **i** Key terms

#### **Robotics**

Robotics encompasses IT, kinetics, electrical engineering, and mechanical engineering. It involves the use of sensors, actuators, and information processing to create robots that are able to interact with their physical environment.

#### **Augmented and virtual reality (AR/VR)**

AR/VR renders a computer-generated, virtual world that simultaneously detects reality in real time. Sensory impressions such as scent, sight, or sound can give the user a feeling of presence in the virtual room.

#### **Sensor technology**

Sensor technology refers to the use of sensors to measure and monitor changes in the environment. The sensors convert non-technical stimuli into electric signals for data processing.

#### **Internet of Things (IoT)**

IoT refers to the interconnection of physical, intelligent objects in an Internet-based structure. IoT technologies enable different types of end devices to record data and communicate via the Internet.

#### **Building information modeling (BIM)**

BIM is the digital rendering of a building's physical and functional features. BIM systems can also include cost structures and temporal components that help optimize building planning, design, and management.



In the long term, augmented reality is likely to diminish the need not only for labor but for hardcopy plans and documents as well. Consider the challenges of extrapolating three-dimensional reality out of two-dimensional architectural drawings, particularly when it comes to hard-to-reach components such as pipes, ducts, false ceilings, and underground construction. Augmented reality, combined with data such as digitalized building models, can make these and other hidden components visible – similar to x-ray glasses.

Meanwhile, AR/VR is shaking up administrative functions such as order planning and processing. The technology (in conjunction with geoinformation systems) makes it easier to carry out live tracking of employees, route optimization, and resource planning based on technicians' skills and availability. It can also close gaps in onsite expertise by bringing in remote technicians via teleguidance. Finally, AR/VR can optimize supply chains – including product management and logistics – directly through the enterprise resource planning system, freeing onsite employees for higher-value work.

As with robotics, real estate service providers may have to become increasingly involved with operating and maintaining the corresponding systems if they aim to retain market share in this area.

## Sensor technology

Sensors form the foundation of data-driven real estate services. They've become widely available, with prices about half of what they were just five years ago.<sup>2</sup> Sensors can free providers from rigid processes, enabling them to adapt their services on an as-needed basis.

A bridge, for example, might have sensors that enable remote monitoring of its condition. If some aspect of its condition falls below a certain threshold, the sensors trigger an alarm, prompting the dispatch of a repair technician or crew. Similarly, sensors can help real estate service providers pinpoint trouble spots, identify their causes, and order repairs all at one go. By analyzing the data gathered through sensors—date of last maintenance, for instance, or day-to-day resource consumption—providers can also align their services more closely with the user's requirements, improving customer satisfaction.

Sensors offer efficiencies in other areas besides maintenance and repairs. An intelligent climate control system can recognize when users leave the room, adjusting the heating or cooling in response. Lighting controls can automatically adapt to personal requirements. And then there's the ability for sensors to provide location-specific information such as floor plans, operating instructions for technical office equipment, or the number of people inside. This can help services providers with a variety of planning, from meals in the building's cafeteria to evacuations in case of an emergency.



## Internet of Things

The Internet of Things (IoT) is made up of everyday objects embedded with sensors and other technology that allow them to pick up data and pass it on to other objects. For instance, that intelligent climate control system mentioned earlier might also detect debris and deploy housekeeping robots for cleaning. Similarly, sensors in potted plants could communicate with automated watering systems. IoT is the underlying principle of intelligent building automation.

According to the International Energy Agency, IoT technology could lower the energy consumption of residential and commercial buildings globally by as much as 10 percent between 2017 and 2040.<sup>3</sup> It could reduce workloads for real estate service providers as well. Imagine vehicles turned into mobile high-tech workshops, equipped for any contingency and avoiding empty runs due to a lack of replacement parts or tools. Intelligent data linking provides all necessary building information for route planning. Even more futuristic: If a replacement part doesn't fit or isn't available, it can be remanufactured via 3D printer.

## Building information modeling

Building information modeling (BIM) uses 3D models to show what a facility looks like and how it functions. This digitized construction offers a way to complete construction projects more efficiently, keeping them within the specified timeframe and budget. It also supports building management by providing precise information around structure, piping, cable paths, and obstructed facilities.

In the future, real estate service providers will have to be able to analyze complex BIM options and use them to benefit property users and owners. Bear in mind that BIM is a key step in the ongoing digitization of all building information related to planning and implementation. Put another way, BIM's virtual building model can serve as a data foundation for tomorrow's digital service model.

Robotics, AR/VR, sensors, IoT, BIM – eventually, the real estate services industry will take up all of these technologies. But how quickly will existing inventory become digital building inventory?



## Predictions

1. New technologies significantly affect the real estate industry.
2. Robotics and its end products (robots, drones, etc.) become increasingly important to facilities management. The relationship between people (employees) and technology gain increasing sensitivity.
3. New technologies continue to attract new players to the market. Real estate service providers consider integrating technology among their services so they become harder to replace.
4. Greater availability of building and user data leads to an inc





## 4. Digitization in new construction and existing buildings

In the previous section, we introduced the major technical innovations affecting real estate services. What's striking is how, up to now, most have remained at the industry's periphery. Why? For one thing, real estate services have been profitable (though low-margin) businesses for decades. So the pressure to adopt new technologies hasn't been strong. But what would happen if real estate did become more digital?

### Digitally-optimized new construction

Modern building management thrives on new construction – as well as comprehensive renovations and innovative construction techniques. For that reason, internet-connected sensors and devices have quickly become a competitive requirement for commercial real estate owners. By 2020, Gartner estimates, there will be over 20 billion connected IoT devices with roughly 2.5 billion sensors in smart buildings.<sup>4</sup>

Cities where demand for real estate is greatest will be the first to outfit for new technology. Thanks to higher rents, investment costs for new buildings and modernizations might be higher as well. In any case, the result will be an expectation of rapid technologization, particularly in city centers.

As the technologies described in the previous section become more important to building planning and construction, real estate service providers will have a chance to distinguish themselves via digitization. The best example of this is BIM, which opens the door for real estate service providers to get involved during the first phase of the property lifecycle and optimize the building in view of later service concepts.

### Digital upgrading of existing buildings

It's hard to forecast the demand for turning existing buildings into smart buildings. But it's easy to see that existing buildings, because there are more of them, offer greater potential for digitization than new buildings.

And smart building solutions are multiplying. One example is indoor navigation, which uses GPS-like technology to help users find their way around. In another application, a specially-equipped vehicle can drive through a building, record up to 50,000 square feet per hour, and immediately render the information in 3D. Besides navigation, this also helps with measuring the building and processing data from CAD and BIM programs. According to Deloitte Global, by 2022, at least a quarter of all uses of precision digital navigation are predicted to include an indoor leg or an entirely indoor journey.<sup>5</sup>

A second type of solution is climate control. The Semperoper, an opera house in Dresden, Germany, offers an example of this. Severely damaged by flooding in 2002, the Semperoper has since been outfitted with sensors that track changes in the fabric of the building. These include temperature and moisture at certain locations. Sensors transmit data wirelessly because cable installation is disallowed in the historic building.<sup>6</sup>



As the technology for smart building matures, it will likely find applications among regular households and commercial properties as well. For instance, real estate service providers might use sensors in shopping malls to directly connect with owners and offer services to end customers. The result could be stronger tenant engagement and customer relationships.

Ultimately, the cost-benefit ratio will determine how quickly existing building inventory goes digital. Since the investment is more likely to pay off in highly sought-after locations, that's probably where we'll see the first wave of digitization.

For real estate service providers, another potentially disruptive aspect of digitization is the flow of data from building users. Could this data become a second source of revenue in the future?



## Predictions

1. Relative to newly-constructed buildings, the existing building inventory offers even greater market potential for digitization. Technologies that are purpose-built for existing buildings are implemented more frequently in the future.
2. Big cities see the greatest digitization of newly-constructed and existing buildings, thanks to a more favorable cost-benefit ratio.
3. With the arrival of new technologies in building construction and operation, even real estate service providers increasingly have to deal with new, downstream technological developments.



## 5. Transformation through modified user behavior

So far, we've discussed a number of technologies and their applications in the real estate industry. But not everything that's technologically possible ends up being implemented. Only the applications that provide a building's users with added value – or enable owners to engage in marketing or optimize returns – will get the necessary investment.

In order to become a value-added integrated service provider, it's important to understand how user requirements might change over time. This way, providers can continue offering services that are in line with the demand. Consider the office sector, where users (employers as well as employees) have ever-increasing requirements around flexibility and space optimization.

The Deloitte Global study "[Global Human Capital Trends 2018](#)" outlines disruptive changes that demand efficient flexibility and radical innovation from companies. In today's networked organizations, a combination of technology, physical space design, new leadership approaches, and new work practices must all come together to achieve this goal. This requires collaboration among HR, IT, and the business to build an integrated, customized work environment. Adaptable and flexible workspaces are one key to enabling productivity.<sup>7</sup>

There is a trend towards offices with a residential feel, so the office becomes a place where people want to hang out as they would at a trendy coffee shop or, indeed, on their sofa at home. It is believed that diverse environments are key to fostering a collaborative and creative work environment.<sup>8</sup>

As technology becomes more integrated, mobile devices and modern infrastructure is a requirement and will pave the way to work from nearly anywhere in the future. Pressure from employees for greater freedom and flexibility means that companies will have to address an increased demand for mobile, technological equipment, and modern workplace concepts. Attractive, innovative conditions are an essential element of success for modern companies in the current war for talent.

This approach isn't new. It became a trend in the 1990s. While the initial aim was to economize space by having employees share workspaces, more recently society has embraced simultaneous communal work and use of infrastructure (coworking) to improve work quality even beyond the borders of the company. Thanks to new technologies that make a flexible, variable workplace relocation technically possible, and even socially appealing, this development has once again picked up speed. Thus, the inventory of coworking proposals grew in the last three years by 72 percent to roughly 13,800 office buildings.<sup>9</sup>

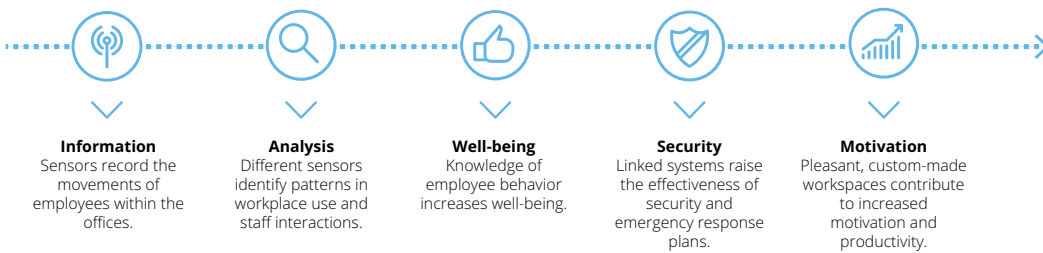


Fig. 2: Possible effects of technological development on office real estate

Regardless of office style, providers are optimizing these spaces through data-supported space management. An appointment calendar automatically reserves conference rooms and, in the morning, sends directions to the nearest available workspace via the user's phone. This requires movement tracking software/tools.

On-demand spaces offer additional potential for flexibility. If employees cannot or do not want to go into the company's location, they can use an app to book a prepared, equipped workspace for use in a building that's not completely occupied. Locations could also include airports and train stations.

In these respects, technological progress will bring conceptual diversity and geographic distribution to office life. Day-to-day work is becoming more mobile and virtual. With increasing spatial separation, the importance of connectivity among colleagues will continue to rise.

In the future, it will become more and more important to link employees by means of a stable and innovative technical infrastructure and to support collaboration. As a result, it will be essential to monitor and use the volume of data created. This likely will hold true across all types of commercial use. For example, in retail stores, digital transformation will bring new technologies such as smart-tagging/smart checkout, innovative user-friendly experiential stores, seamless payments, and improved customer experience.<sup>10</sup>



Fig. 3: Effects of technological development on retail real estate



## Predictions

1. New technologies significantly change the use of real estate, ushering in space efficiency, flexibility, and qualitative improvements for office users.
2. Declining demand for space (and the associated trend toward a rental market) plus an ongoing war for talent drive the modernization of existing spaces.
3. Technological outfitting – along with collaborative, digital office concepts – become a significant lever for office space providers, as well as for employers' intent on standing out from the competition.
4. These trends likewise affect all other commercial types of real estate, fundamentally changing usage as a result.
5. Real estate service providers become familiar with new technologies. They highlight their technical prowess in order to maintain market share.



## 6. Big data determines the industry's future

Between technology and the increasing requirements of users and owners, personal and building-related data will accumulate on a large scale. Those who can use this data in a profitable way will be well-positioned for future success.

### The near future

As networking technology continues to advance, it's likely to create increasing amounts of data around buildings, their use, and their users. At the same time, opportunities to derive practical knowledge and from this data are on the rise. If it's possible to systematically compile and analyze data from all relevant aspects, then entirely new applications for operating, leasing, financing, and purchasing real estate will come into being.

In addition to declining demand for space and emerging user requirements for technical infrastructure, data produced on the property – as a potential additional source of income – will be a driving force for adapting existing spaces to modern needs.

### New competitors

Real estate is already an enormous source of data today, and it stands to become even more so in the years ahead. This holds both risks and opportunities. Potential competitors from the technology sector may have an advantage due to their existing business models for the profitable use of big data. It's a safe assumption that they will further refine this capability and gear it toward obtaining and using real estate/user data.

The entry of important actors from outside the industry – a process already underway – can have major effects on the sector's market structure. The market is gradually expanding in the direction of complex, interconnected, high-tech, and automated services. Here, well-financed and technologically-leading generalists that can offer a standardized global service strategy will be in a position to solidify their competitive advantages.

### New business models

The opportunity for real estate service providers is that they currently sit at the data source. If done right, they can enjoy a competitive advantage in setting up data-driven services and staying in contact with users, owners, and the property itself. But what would this business model look like?



Most likely, it would focus on combining information at the building, service, and market levels. With the rising prevalence of BIM, along with sensors in systems engineering and in rental spaces, increasing amounts of data will appear. This data will contain insights about the operation, capacity utilization, and condition of the building and the systems installed in the building. As a result, owners and users will increasingly expect preemptive detection of technical malfunctions. Real estate service providers also will have to guarantee the building's reliability of performance as a minimum requirement.

At the service level, providers can bundle a customized service package by means of data analysis. This can be a more effective way to look after real estate users and owners. It can also be a more efficient way to arrange service delivery (versus customized maintenance intervals and optimized route planning).

In general, providers will have to determine who uses what, and how, in a way that serves users and owners while shoring up the competitive position of today's real estate managers.

In addition to cost- and benefit-optimized use of real estate for customers, different operator models can be simulated in detail based on data analysis before a purchase decision, with crucial parameters related to financing and marketing as part of the analysis. In the future, with the complete networking of property, it may be possible to carry out technical due diligence reviews semi-automatically since the technical history and the current condition of the components can be generated automatically via BIM. Reviews from technicians, lawyers, and advisors – not to mention uncertainty on the parts of both buyers and sellers – can be reduced to a minimum, with real estate service providers potentially taking up some of the effort directly.

## A strategic partner to owner and users

Real estate service providers – the ones who deliver user-centric services and defect-free buildings – are looking after satisfied customers. They can use insights from their data to help their actual customers, the real estate owners. In fact, besides its ability to increase customer satisfaction, lower turnover rates, and reduce cost, a capacity for structured data analysis can help to position providers as a strategic partner in optimizing and stabilizing returns.

This kind of partnership is essential to tomorrow's real estate service providers. Along with owners and users, they will be responsible for the quality and effectiveness of technology and strategic concepts. This means a higher bar for performance but also an opportunity to improve margins. It's likely that performance-based remuneration for services will become an option.

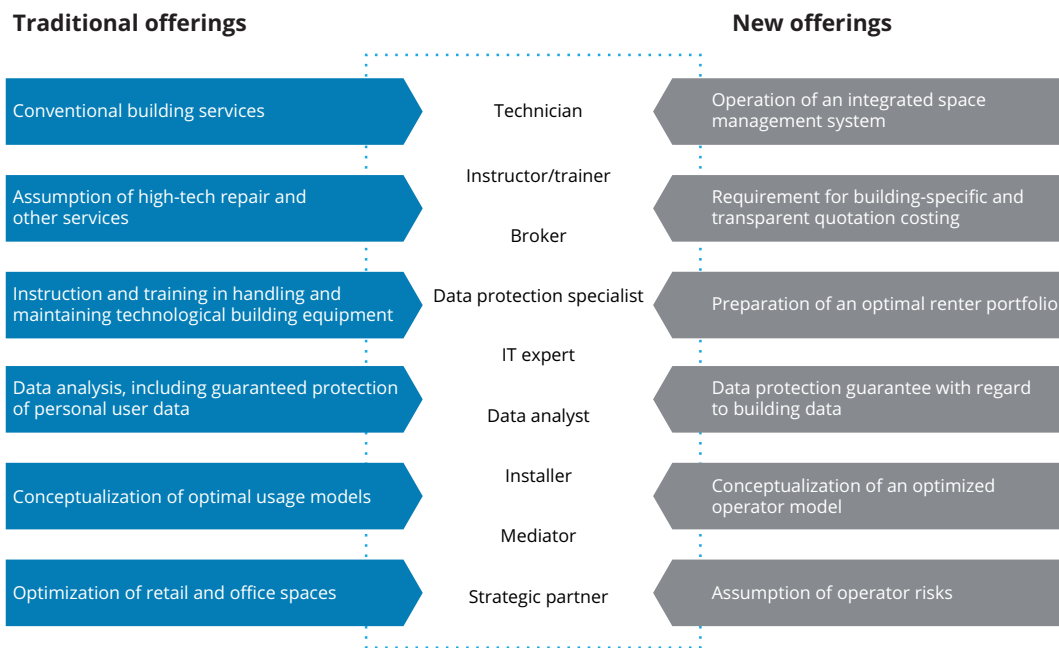


Fig. 4: The future roles of real estate service providers

## The battle against access to data

Data is an essential component of tomorrow's business foundation. But benefiting from it will require settling the question of who controls the data. Legitimately and understandably, both owner and user will claim the right to "their" data.

Under those circumstances, real estate service providers have a few options. One is to own and operate the relevant technological systems themselves. However, this would be a significant investment.

The more obvious solution is to intensify the collaboration with users and owners. Digitization means integration and networking. Issues, tasks, and business models become more intertwined, requiring specific know-how and skills. If providers want to avoid handing over these services (and control over the data) to third parties, they must develop the appropriate expertise through their own employees or company partnerships. Once these are in place, they can set about establishing the infrastructure and architecture they need without losing control over the data.





## Regulatory hurdles to data use

Data security will have a decisive impact on the success of new business models. Part of this will involve modernizing and adapting data protection provisions. That said, how much providers can transform their business models remains to be seen (particularly with processing of personal and movement-related data, which requires anonymization). There are repeated examples of the collision of digital progress with regulations. For example, in Germany the introduction of Google's Street View was much postponed due to violation of privacy rights. Ultimately, Google threw in the towel – they would no longer update the images despite high demand.

Another important issue: Building user privacy. Privacy is a key priority due to all the data that sensors collect. IoT should make buildings user-friendly; only employees should access personal data. This is especially relevant in coworking arrangements involving multiple companies. Now, with the General Data Protection Regulation (GDPR) in effect in Europe, organizations in the real estate sector will need to be sure they are compliant.<sup>11</sup> Consequently, cyber risk and privacy must be at the forefront – with collaboration from real estate companies, operators and IT companies to ensure security in the modern workplace.

For all these reasons, data-driven business models require a critical eye. The big advantage for real estate services is that they can function effectively even with anonymized data and other legal restraints.



## Predictions

1. As property data becomes an important source of income, it will drive the adaptation of existing spaces to modern requirements.
2. Greater availability and usability of data prompts technology firms to position themselves as a connector of users and providers. Eventually, they become direct providers (or even purchasers) of management services.
3. The market for real estate service providers gradually expands in the direction of complex, high-tech services. The opportunity lies in linking existing subject matter expertise with new ways to serve users and owners and creating lasting added value.
4. Real estate managers who are unable to adopt these new digitally focused offerings gradually leave the market.
5. The focus on digital will remain, despite data protection laws.



## 7. The skills of tomorrow's real estate manager

Potentially radical changes in the real estate industry will have specific meaning for talent.

Like the automobile industry, where IT-trained specialists now carry out work that mechanics used to do, the delivery of services in the real estate industry will become increasingly technical. Optimized (automated and digital) processes and sequences will change the provision of work. What they won't do is change the expertise needed to manage non-digitized inventory. The result? A bifurcated labor force, with one part geared toward building services for new, digital buildings and the other focused on more traditional jobs for buildings who have not gone digital.

As robots, drones, and sensors replace operational activities, users will be able to handle portions of those activities either automatically or directly as part of self-maintenance. The latter becomes relevant primarily when it isn't worth using robots or drones. Rent reductions can motivate users to take care of such simple activities themselves. On the balance, this can economically benefit both sides of the transaction.

Tasks that the user doesn't want to handle will likely be made simpler thanks to wearables, data-transferring system technology, and the networking of end devices through digital systems and sensors. These can guide employees through tasks so that they need less technical expertise than today. As a result, technical labor will essentially become interchangeable and service providers could potentially source out this work to the technology companies that enter the market.

At the other end of the continuum, real estate service providers will have to hire well-educated specialists with analytics and IT expertise to fill data analysis, programming, and other positions that deliver strategic added value to customers.<sup>12</sup>

In the future, real estate service providers may need to help customers develop their systems and processes, as well as provide much more expertise to support customized building technology. With the right employees, they can develop a stronger connection with customers.

In the process, real estate service providers must aim to train parts of the workforce so they can make the leap from installer to instructor. In addition, service providers will have to create completely new job descriptions and recruit the appropriate talent. Only in this manner can they cover newly-emerging responsibilities. Considering the high demand expected for employees that fit these profiles, this will become a big challenge.

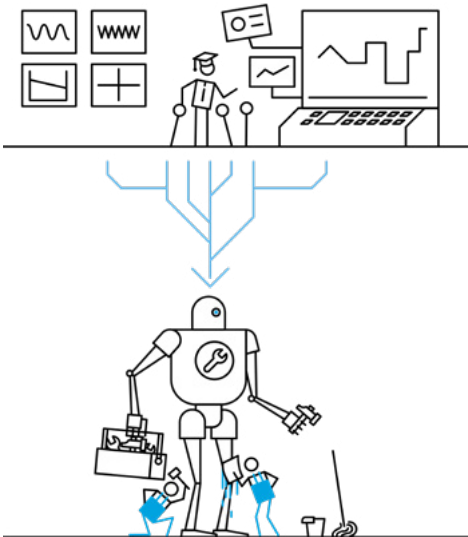


Fig. 5: Job descriptions of employees of real estate service providers will drift apart



## Predictions

1. Robots, drones, and sensors replace many operational activities.
2. Users assume monitoring and service functions in order to save on rent and ancillary costs.
3. Positions with real estate service providers become much more heterogeneous, particularly based on the degree of digitization among managed buildings.
4. Real estate service providers evolve from installer to instructor.
5. Increasingly, real estate service providers help to develop customers' systems and assume responsibility for their functionality.



# Conclusion

## Disrupt or be disrupted

In the years ahead, digital innovation will significantly alter not just real estate but also the business models of real estate service providers. These changes may shift responsibility, expertise, and risk in the industry, thereby shifting margins as well.

Despite rapid technological development, change in the real estate industry seems likely to occur in stages. The speed of change largely depends on the pace of new construction and modernization, as well as on the readiness of owners and investors to invest in real estate inventory. As a result, conventional building technology and infrastructural service will be a declining, but ongoing, part of the business model going forward.

Nevertheless, the long-term prospects for real estate services are positive only if they adapt to altered conditions early and help shape the change. That means preparing for change today. A turning point will be the assumption of operator risks. Without that happening, it's unlikely that users and real estate owners will yield control over real estate and technological systems, and thus the data.

The assumption of larger operator risks requires solid planning on the revenue and cost side. This will involve developing enhanced analysis and utilization capabilities at the employee level in order to minimize the actual risk of this new business model. In light of today's relatively low-margin, risk-averse environment, it's also clear that greater return must accompany any assumption of additional risks.

The volume of user data that the industry generates today has piqued the interest of international technology companies and other new market participants. Right now, digital heavyweights have the advantage in terms of digital skills and data applications. However, monetization of data can overcome low margins and lure these tech firms into the real estate world.

Real estate services of the future must evolve from building and systems management to the integrated management of spaces for users. In this new model, the manager becomes a performance manager with highly productive employees supported by advanced technology and analytic tools. For the most part, real estate service providers already have the data (Who's talking to whom? Where is it taking place? Internal or external? Which spaces will be used by whom, how intensively, and for what reason?). However, this information is scattered across organizational silos, making it hard to use proactively or treat as an expanded core product of the service portfolio. Changing this is the first step in changing the overall business model and fortifying it for digital's new era.

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# End notes

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