

Real Estate Asset Manager Benchmarking Survey 2018

Digital Transformation

Our study provides an overview of the current state of progress and trends in digitisation as well as valuable findings on outsourcing intensity for various services within the real estate industry.

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By Annett Anschütz

With Susanne Eickermann-Riepe, Ralf de la Camp-Gruber und David Nadge

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A Executive summary

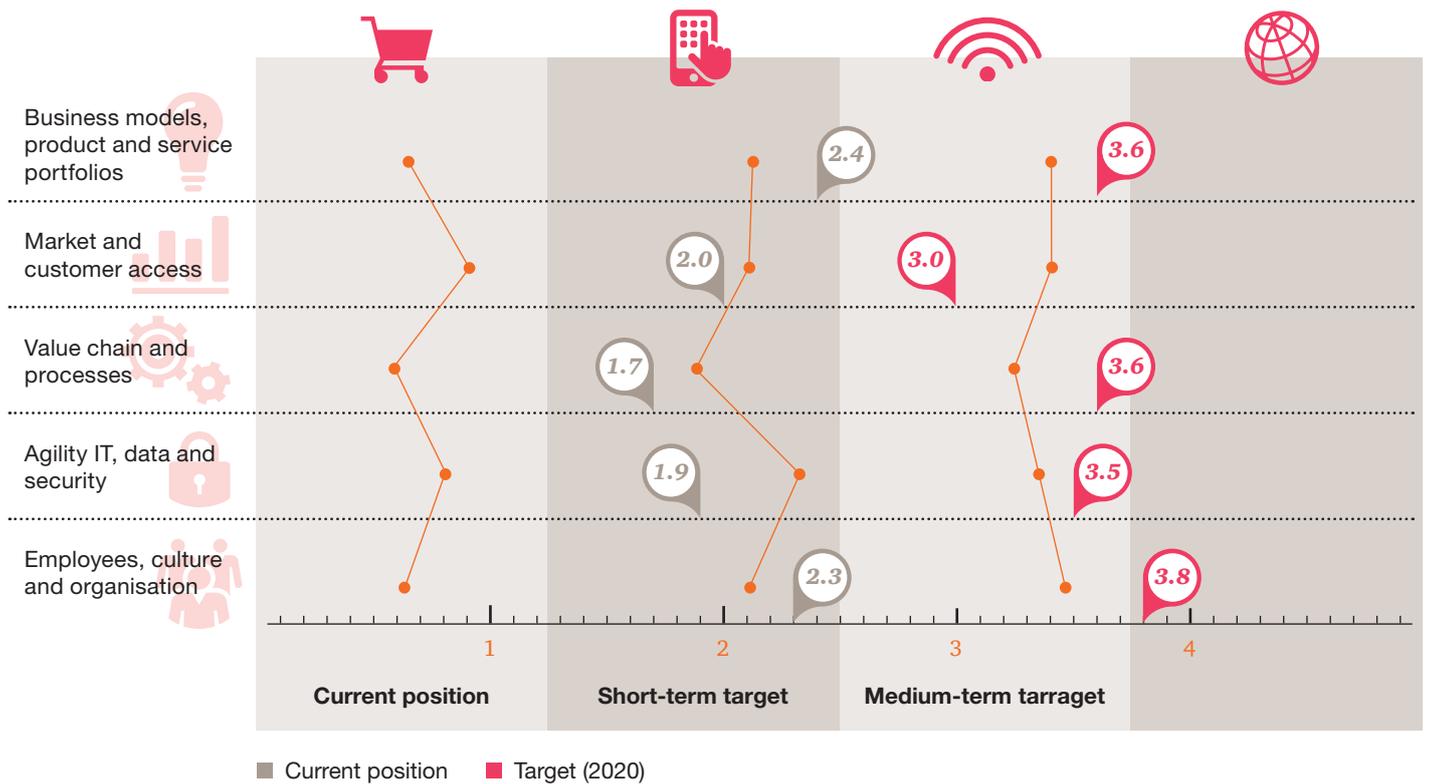
This study is based on a survey of real estate asset managers and fund managers covering the topics of digitisation strategies, digital maturity and outsourcing intensity. The results presented here describe the current state of digitisation and outsourcing in the companies surveyed. The findings show that most of the participating companies are already on the way to becoming digital players. However, some challenges must still be overcome to successfully achieve this objective. For the next three years, the survey participants have set ambitious goals to forge ahead with their digital transformation initiatives, from processes to business models.





Impending change: the industry intends to evolve into a digital player by 2020

According to the companies surveyed, the real estate industry currently rates an average of 3.83 on a scale of 1 to 10.



Degree of digitisation and cooperation to be intensified

The survey participants plan to further digitise their services and intensify collaboration with partners (e.g., start-ups) and suppliers by 2020. Due to increasing user demand, the supply of digital real estate will grow: sensor technology, the Internet of Things (IoT) and broadband access will soon be important criteria when choosing real estate.

Using competitive advantages: the multi-channel concept and digital distribution channels to be consistently expanded

Digital distribution channels are to be further expanded over the next three years. The use of social media will become increasingly important. Using interactive communication via multiple channels to promote positive customer perception and to utilise individual information and advertisements (also in real time) is seen as a competitive advantage.

Focus on end-to-end processes: increase agility and flexibility by using real-time data

The greatest efforts must be made here for companies to reach their aim (digital player) by 2020. Their actions will seek to leverage real-time data and to respond to market changes in an agile and flexible way. Many companies are in the process of drawing up a digital roadmap, or have already done so, to implement the necessary expansions. However, numerous stand-alone solutions can still be found in the real estate industry. By 2020, the companies surveyed plan to optimise their IT and data architecture so that they can conduct real-time analyses for reporting, budgeting, research and asset management.

Increased investments are planned for the coming years

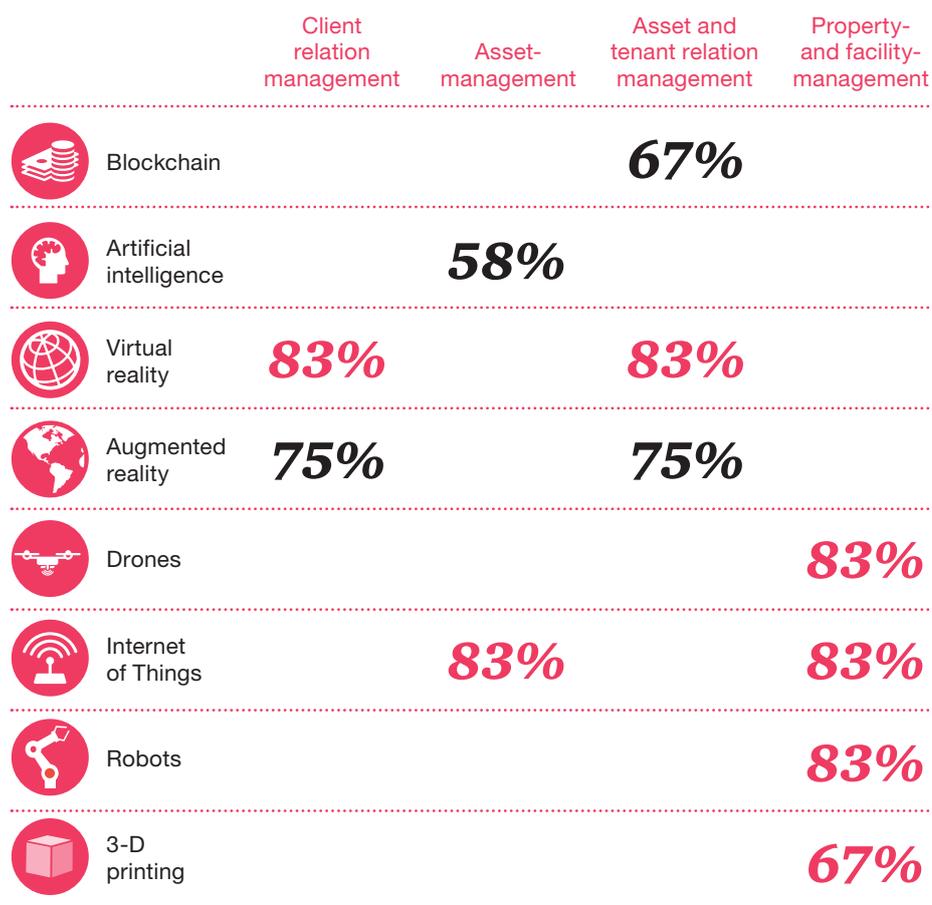
The expansion of resources and capabilities related to digital transformation is expected to continue through 2020. The IoT is already an integral part of the workday with mobile devices, electronic check-in, sensors and the like. As digitisation increases, cybersecurity and data protection will become increasingly important.

Property management and facility management are the areas with the greatest potential

The industry expects the eight essential technologies to have the biggest effect in the area of property and facility management. Asset management and tenant relation management came in second place. The processes in these areas are generally routine-driven and offer a great deal of potential for automation. Unsurprisingly, these areas have the highest rate of outsourcing in the industry (up to 93%).

IoT and virtual and augmented reality will have the biggest impact on the industry

Some 83% of participants consider the IoT to be one of the main factors that will influence the value chain. An increasing amount of data is exchanged over the internet; real estate is becoming smarter and smarter. By 2020, between 25 billion and 80 billion devices will be connected to the internet. Already today, sensors and a central database can be used to monitor energy consumption and safety systems and to optimise maintenance and repair work. The same percentage of participants consider virtual reality (VR) and augmented reality to be technologies that will play an important role in marketing. The creation of virtual worlds will make it possible to view real estate objects from anywhere in the world using VR glasses or to conceptualise and design spaces and real estate from the ground up.

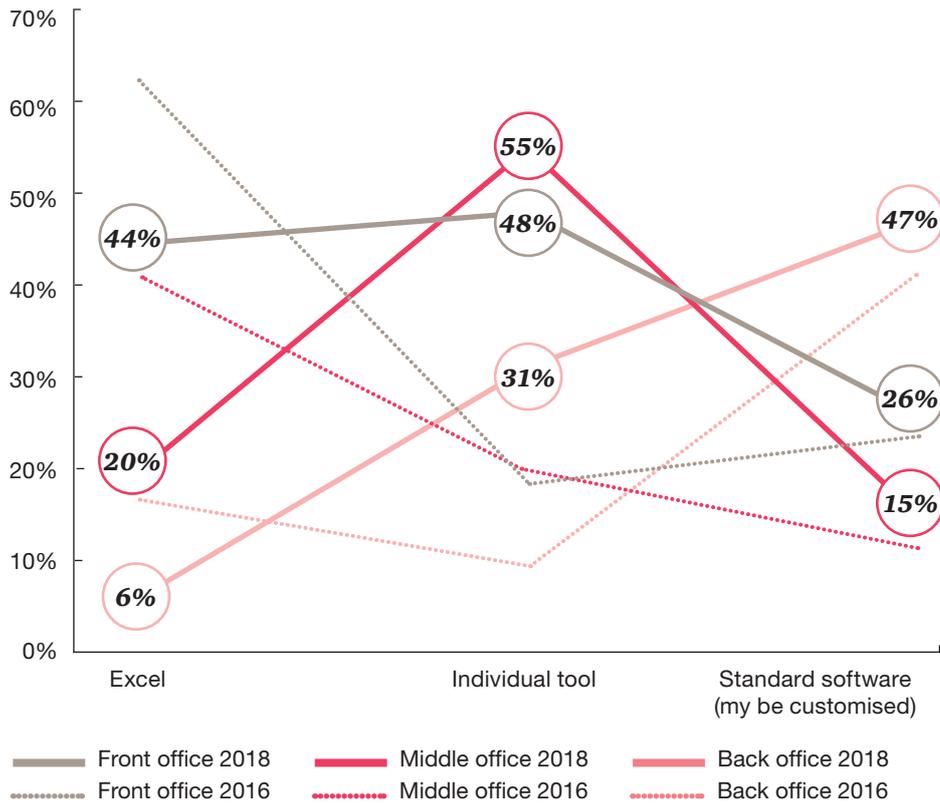


Artificial intelligence ranks in the mid-range

Half of the companies surveyed (42% and 58%) attach great importance to artificial intelligence. This can be explained by, among other things, the fact that this technology is already being used sporadically in the real estate industry. Smart contracts, legal tech, machine learning and speech recognition should all be mentioned here. The fields of application are diverse, ranging from personalised and targeted customer contact to contract management right through to translation programs and intelligent, self-learning facility control. The potential for automation alone is estimated to be around 40% through the use of artificial intelligence across the entire value chain of the property.

Individual tools are predominant: use of Excel applications is declining

The use of Excel has decreased in the front, middle and back office. In the front and middle office, hardly any Excel or special applications are used; instead, software solutions are mainly developed in-house. In the back office, the use of standard software continues to be widespread, as in the previous year. The predominance of individual special solutions and proprietary developments has increased in the front, middle and back office.



We believe that this survey is an useful tool for any manager who wants to further advance their business and take digital transformation to the next level of industrial strength. We live in a dynamic world that is changing with increasing speed and is full of chances and opportunities! Be innovative and set new standards in digitisation.

“Cloud and big data applications are already widespread.”

“The most important thing is to ensure that innovative software can be integrated faster and more flexibly.”

“Other new capabilities, like data mining, are being met with more and more interest.”



B Introduction

We invited all of the leading real estate asset managers in Germany to participate in the survey. The 18 asset managers who provided answers to our questions have a total of more than €415.838 billion in assets under management (AuM). The study thus represents a market share of 13.9% of total AuM.¹ Compared with our *Benchmarking Survey 2016*², whose respondents managed a total of €130.36 billion in AuM, the market share in AuM among the participating German asset managers has almost doubled. Taking a look at the figures: 95% of AuM are distributed to participants with their headquarter in Germany, the other 5% are located in Sweden (3.2%), the United States (0.9%), United Kingdom (0.3%) and France (0.4%). This change is indicative of the growing relevance of our survey with respect to the topic of digitisation in the real estate industry.

¹ The German fund industry had around €3 trillion AuM at the end of October. (Source: BVI, October 2017). In terms of Europe as a whole, our study covers a market share of 1.8% AuM, based on an estimated fund volume of €22.8 trillion AuM (Source: statista, Value of total assets under management in Europe from 2007 to 2016 [in trillion euros]).

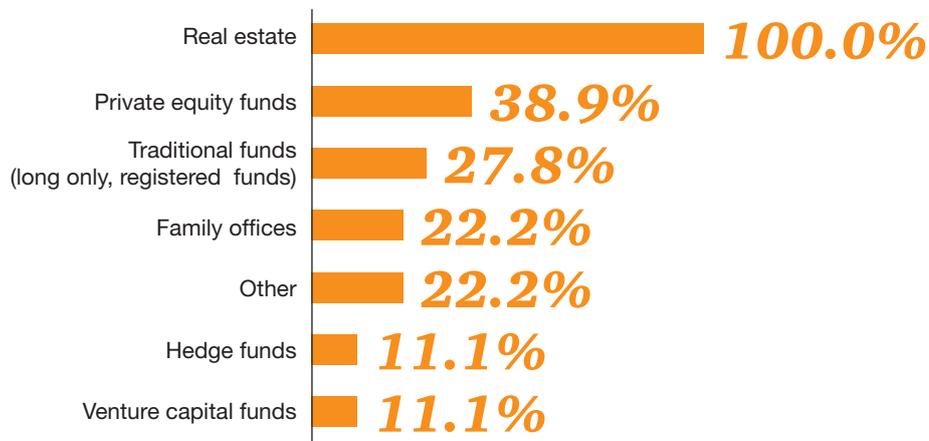
² Cf. PwC, European Real Estate Asset Manager Benchmarking Survey 2016, 2016.



In the following chapter, we will shed more light on the range of competitors by comparing business models across products and customers.

All survey participants are active in real estate asset management within their own industries. Almost half of them also conduct activities in the private equity segment. One-fifth of participants reported working in a further segment as well.

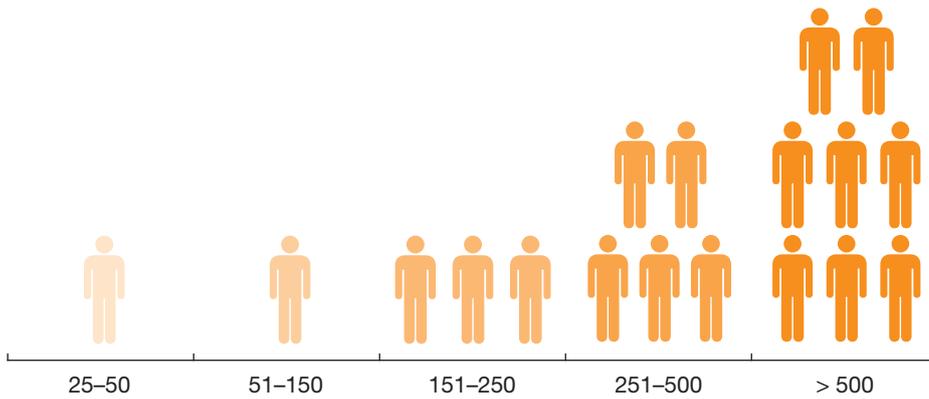
Fig. 1 Which industry segments do the survey participants work in?



%-information based on number of participants

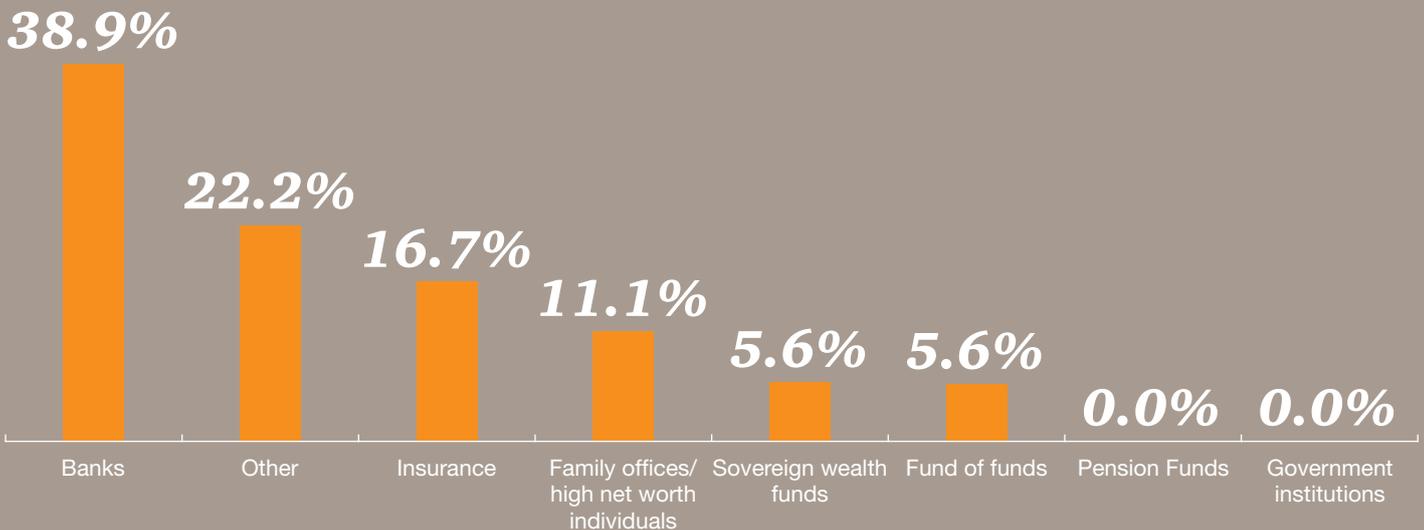
In comparison to the previous year (2016: more than half of respondents had between 25 and 250 employees; 22% reported more than 250 employees) the proportion of large companies in this year's survey is striking. Around three-quarters of the participants have more than 250 employees, with more than half of this group reporting more than 500 employees. Together, these two groups manage about 93% of the AuM.

Fig. 2 How many FTEs do the survey participants employ?



Around 40% of respondents cited banks as a business model. However, just 22% of respondents were actual banks, the rest mostly being subsidiaries of corporate banks. A further quarter chose the „Other“ category (e.g., real estate investment and funds). In actual fact, more than three quarter of participants were active in real estate investment and funds (77.8 %). Service KVG (service capital management company, AIFM) represented (16.7%). No actual insurance companies, family offices and high net worth individuals were represented among the participants.

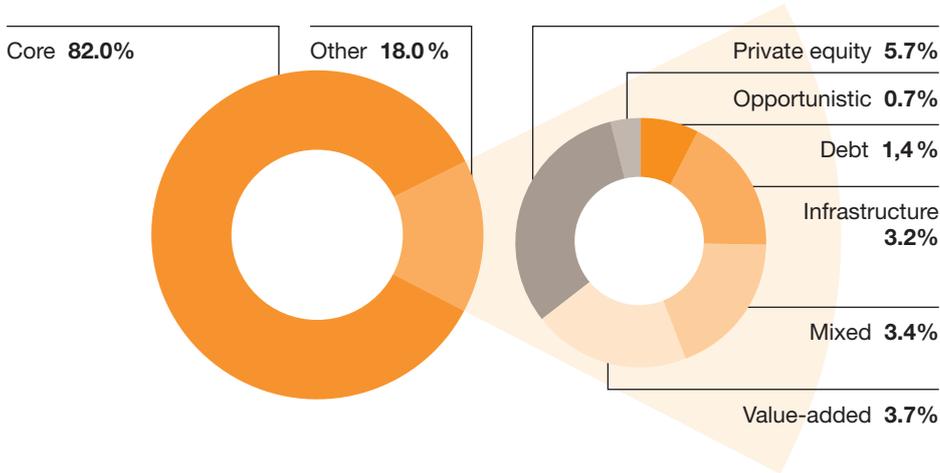
Fig. 3 What describes best the business model of participants?



% figures

All survey participants report focusing on pure core products, with some 82% of AuM being in the core sector. One out of three respondents also reported infrastructure and opportunistic investment strategies. The majority of asset managers rely on different investment styles to generate the required returns, with around 42.9% of them reporting three investment styles. Only 21.4% of respondents are specialised in a single style.

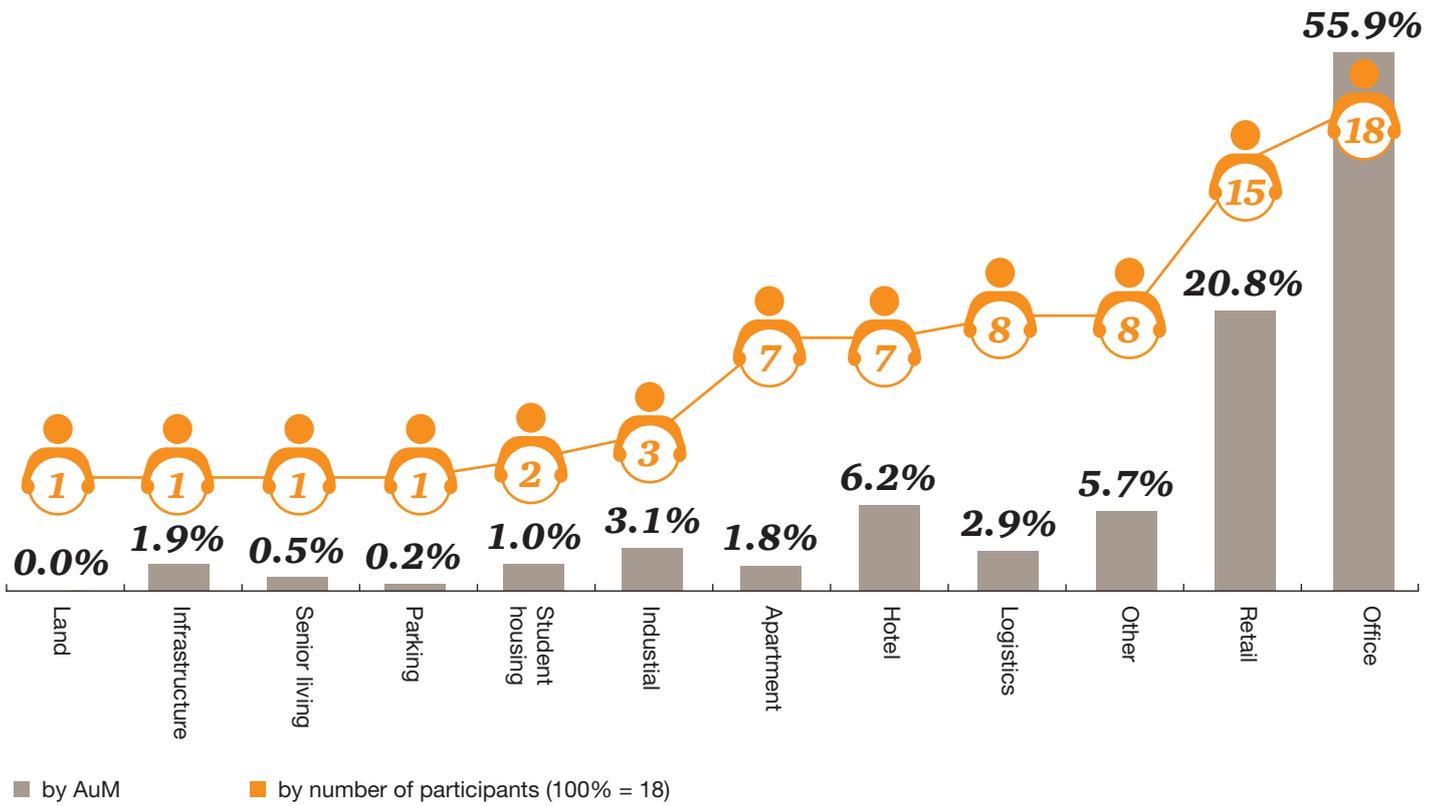
Fig. 4 What investment strategies are applied by the participants?



With respect to asset types, the leading submarket of office is represented among all 18 participants, followed by retail (15 participants). These two asset classes represent around 82% of AuM. Almost one out of two participants offers their clients investments in the categories hotel (39%), apartment (39%), logistics (44%) and other investments (44%, e.g., development). The categories that are underrepresented are land, parking, senior living and infrastructure (each just 6%).

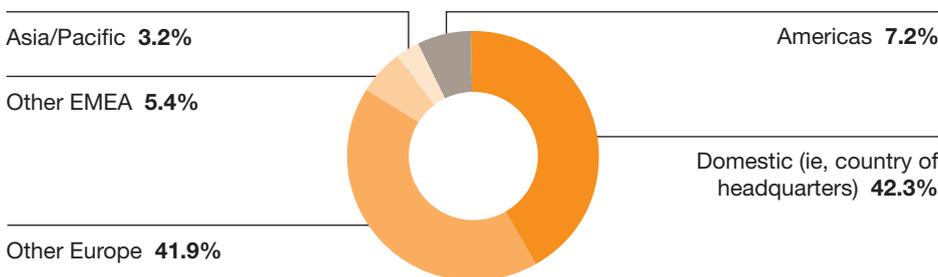
What kind of investment strategies will we see for 2018? According to the PwC study *Emerging Trends in Real Estate® Europe 2018*, investments and developments are expected in the following top trend areas: logistics, residential and development. The focus will be on high-value assets which will still generate growth even in turbulent times.

Fig. 5 Which asset classes are targeted by the survey participants (by AuM and FTE)?



With respect to the location of the investments, there is a strong focus on the German domestic market and on neighbouring European countries (84.2%). Just 15.8% of the AuM are invested outside of Europe. The United States and the Asia-Pacific region still do not play a significant role. This is consistent with the results of *Emerging Trends in Real Estate® Europe 2018*, which foresees solid growth in the European market, even though Brexit remains a cause for concern. Political and geopolitical uncertainty in other parts of the world is driving this development.

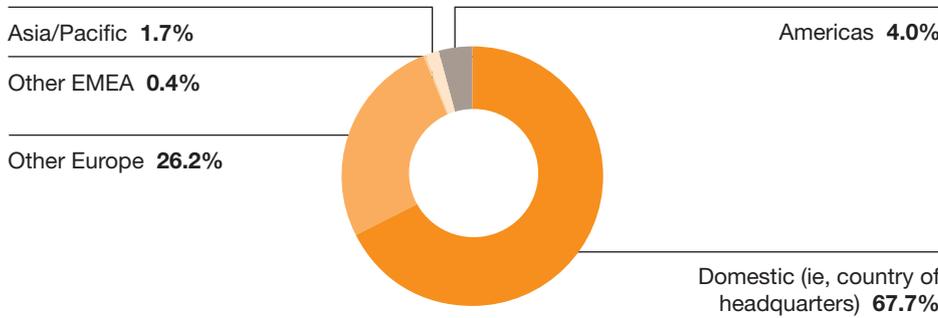
Fig. 6 What is the regional split of the real estate portfolio under management?



%-information relative to AuM of participants

More than two-thirds of the funds originate from the managers' home country. A further 26.2% – a not insignificant amount – comes from European capital markets. American and Asian investors together make up less than 6%, while investors from the EMEA region represent just 0.4% of total equity.

Fig. 7 What is the geographic location of the equity invested?



%-information relative to AuM of participants

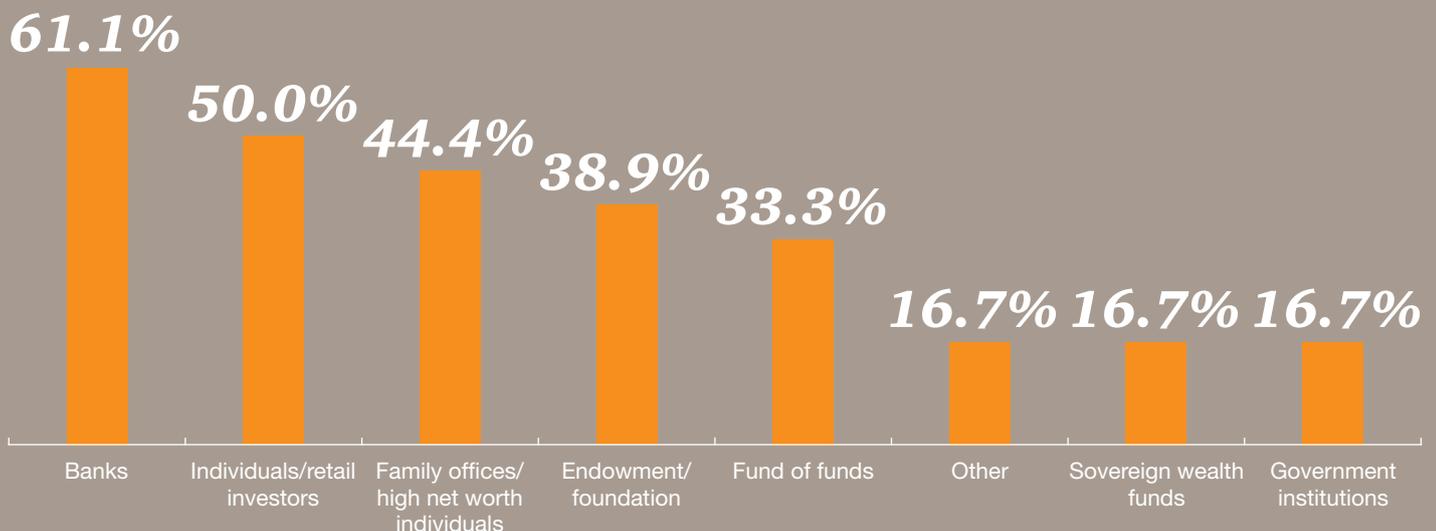


“We focus on high-value assets in the strongest markets which – regardless of what the next downturn may be like – will continue to grow.” an international investment manager

Banks (61.1%) as well as individual and retail investors (50.0%) are the largest groups of investors represented in the survey. They are followed by family offices/high net worth individuals (44.4%) and foundations (38.9%).

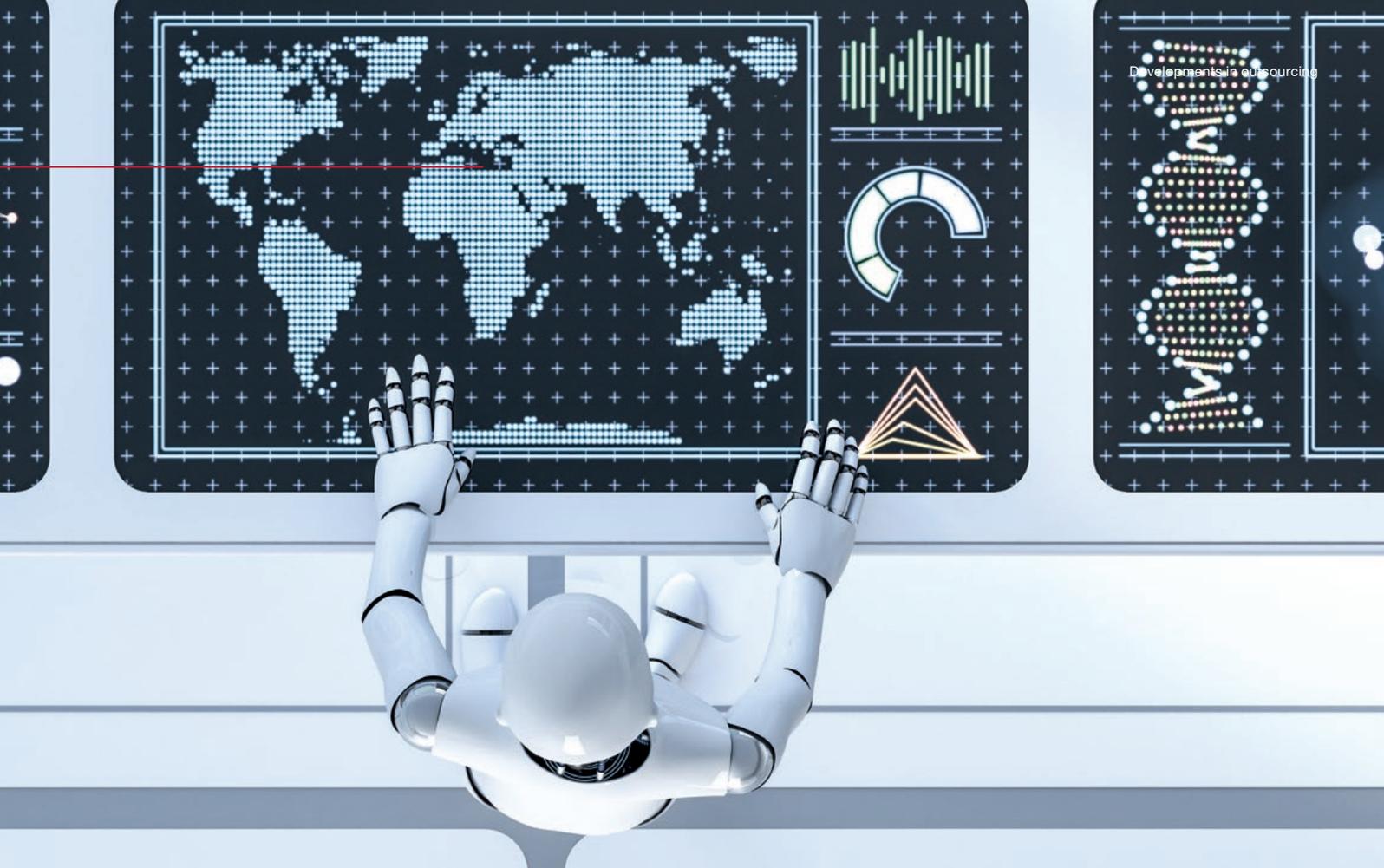
Half of the respondents specialise in specific investor groups. A mere 15% of AuM are administered by specialised managers who service two investor groups at most. Around 65% of managers serve three to four investor groups, and the remaining 20% service five or more client segments with their products.

Fig. 8 Which of the following types of investors/stakeholders invest in the funds/products? (by numbers; 100% = 18)



C Developments in outsourcing





The number of requirements and the magnitude of expectations demanded by legislators and investors continue to grow steadily, putting sustained pressure on margins and administrative costs.

The real estate industry, which was once seen as unsophisticated and highly manual with little automation, is now evolving into an industry with more efficient and standardised processes. This trend is reinforced by a growing number of service providers who – alongside their services for securities in the middle and back office – are expanding to cover the real estate industry and presenting standardised products. Although we are just seeing the beginning of a turnaround, many more far-reaching changes can be expected in the course of ongoing digitisation.

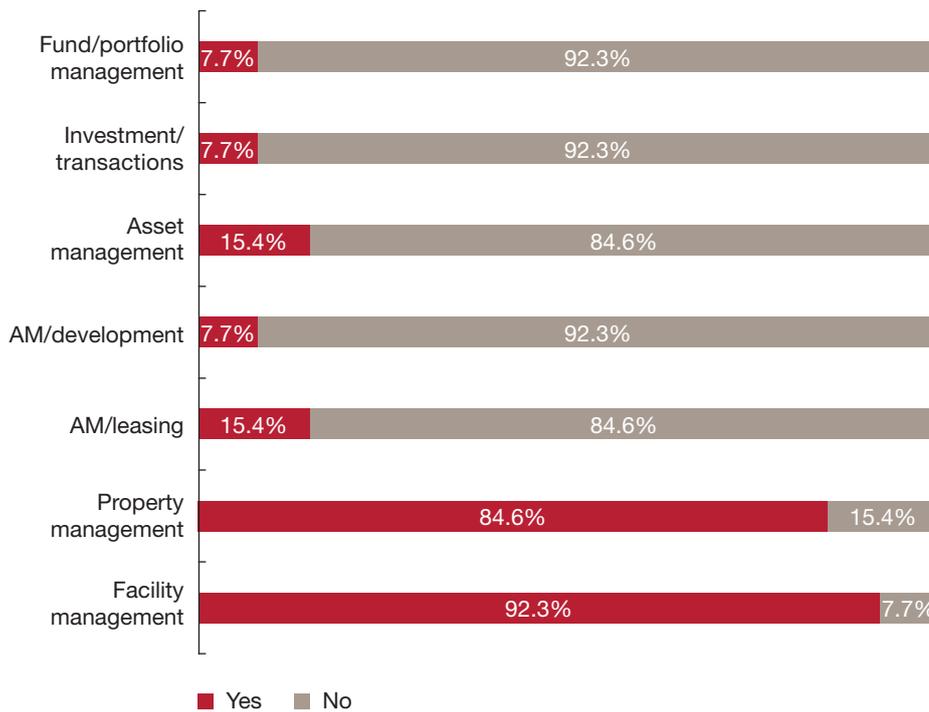
1 Front office

The internal provision of services is standard in fund, investment and asset management, due to the strategic core competence of this business segment. In contrast to last year’s study, we do not differentiate between the categories “in-house”, “internal outsourcing”, “partial outsourcing to third-party providers” and “full outsourcing to third-party providers”.

As in our previous year’s survey, none of the participants reported completely outsourcing all functions. A surprising result was found for leasing and development: despite an above-average level of internal provision, parts of services were also outsourced to external partners. Compared with 2016, these functions were predominantly provided internally, whereby the question arises as to whether the services were “outsourced in-house” and for this reason considered to be internally provided services by the respondents.

There was unanimous agreement among the participants that facility management and, to a lesser degree, property management, do not form part of the manager’s core business, with the highest rates of outsourcing consequently being found in these areas (facility management: 92.3%; property management: 84.6%). There is a slight change here compared with the previous year.

Fig. 9 Have the following front office functions been outsourced?



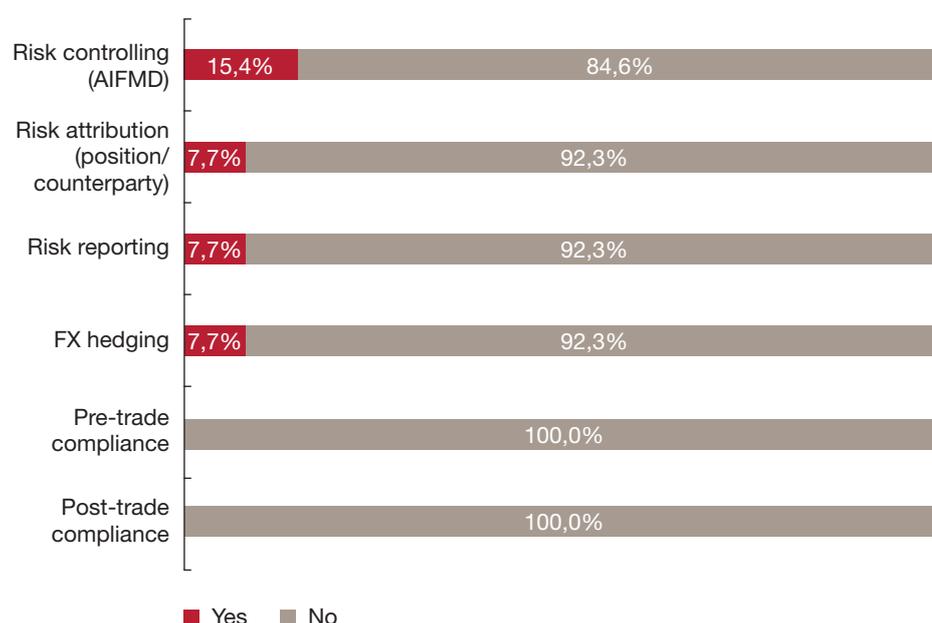
%-information based on number of participants

2 Middle office – risk management

Outsourcing continues to play a lesser role in the middle office (and risk management, in particular), due to both the high level of complexity involved in interfacing with third-party providers and the extremely limited potential to achieve cost benefits.

This year's participants reported providing all functions related to pre-trade and post-trade compliance internally (last year 17% and 22%, respectively, were outsourced). This suggests that the area of compliance is becoming more relevant for participants.

Fig. 10 Have the following middle office functions been outsourced?

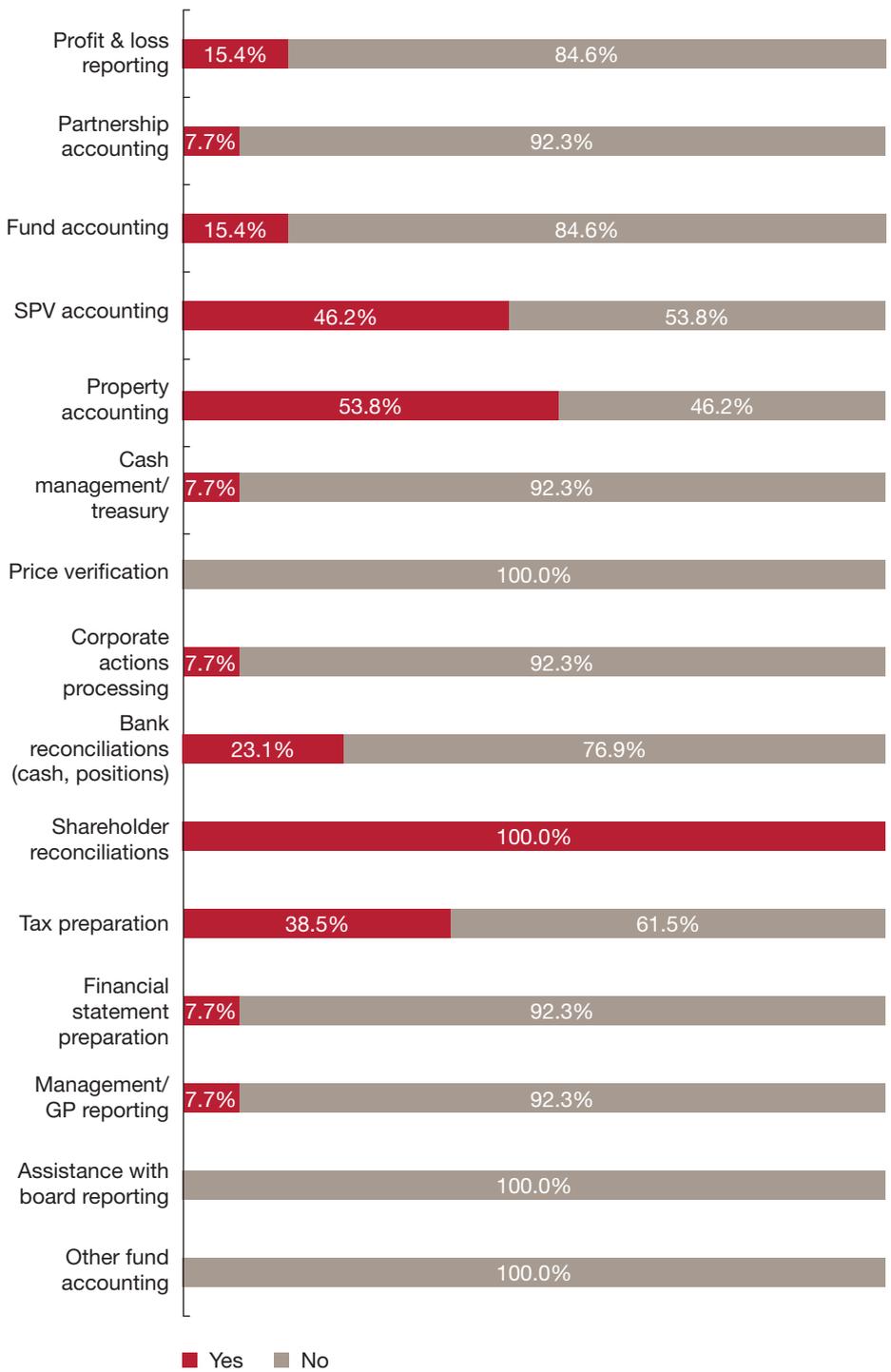


%-information based on number of participants

3 Back office

Among the most important functions of the back office are fund accounting and administration as well as reporting. The chief responsibility is to fulfil the regulatory requirements which apply for accounting, internal and external reporting, tax compliance and information procurement for management and investors. Figure 11 shows for the most part a high degree of internal service provision among the participants. Similarly to the previous year, more than half of respondents outsourced accounting for special purpose vehicles (SPVs: 46.2%) and property accounting (53.8%).

Fig. 11 Have the following back office functions been outsourced?

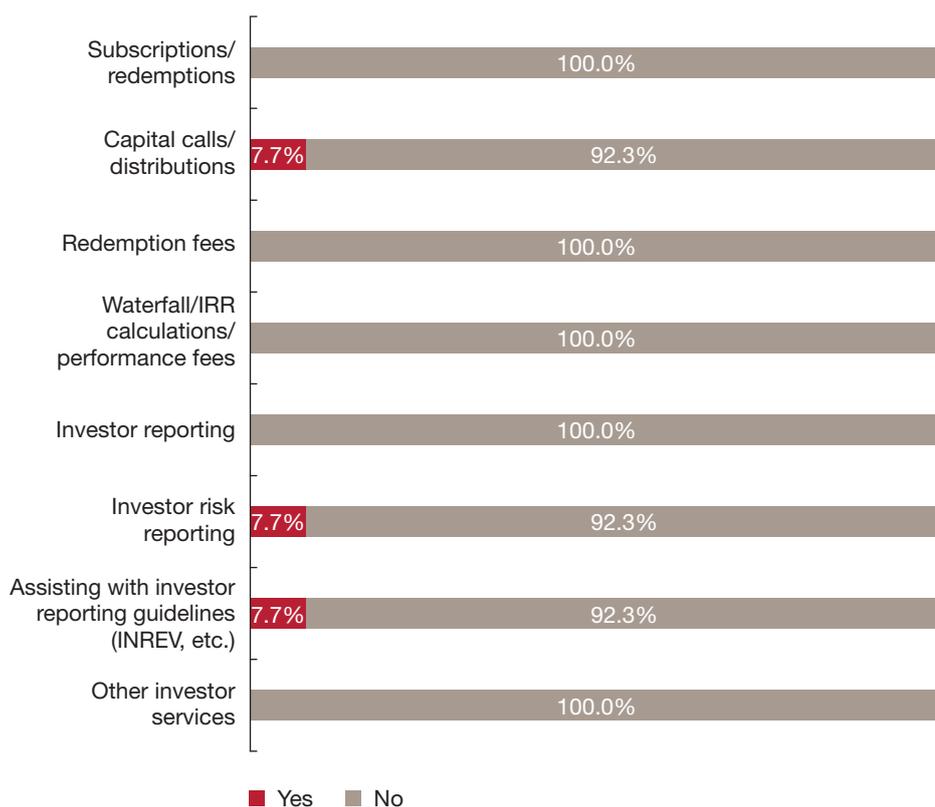


%-information based on number of participants

Fund accounting and partnership accounting are provided internally in 90% of cases (previous year: around 60%). No outsourcing occurred for assistance with board reporting, price verification or other fund accounting. However, a high degree of outsourcing can be observed for the functions of tax preparation (38.5%) and bank reconciliation (23.1%).

Figure 12 also shows a high degree of internal provision of services. Compared with the previous year, the amount of in-house provision has grown and functions are now only outsourced in 7.7% of cases (e.g., capital calls, investor reporting).

Fig. 12 Have the following investor services functions been outsourced?

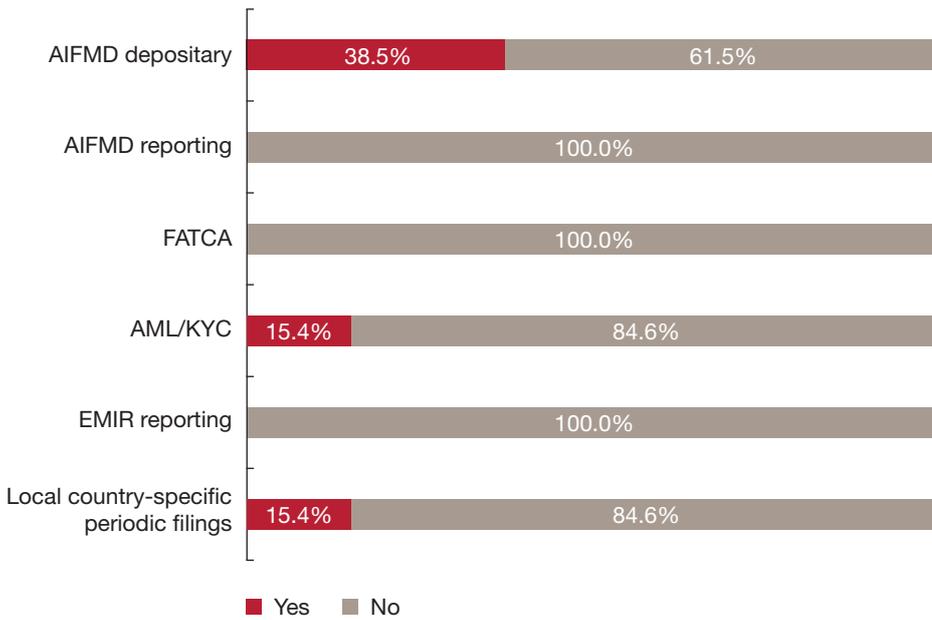


%-information based on number of participants



“Digital technologies are crucial for companies to remain competitive. Digital technologies will help companies reduce costs as well as improve efficiency. It will help companies become future ready as well as improving performance or functionality of a process through technology. These technologies are very important to Companies to help them grow.” Partner, France, AUM >€1bn

Fig. 13 Have the following regulatory reporting functions been outsourced?



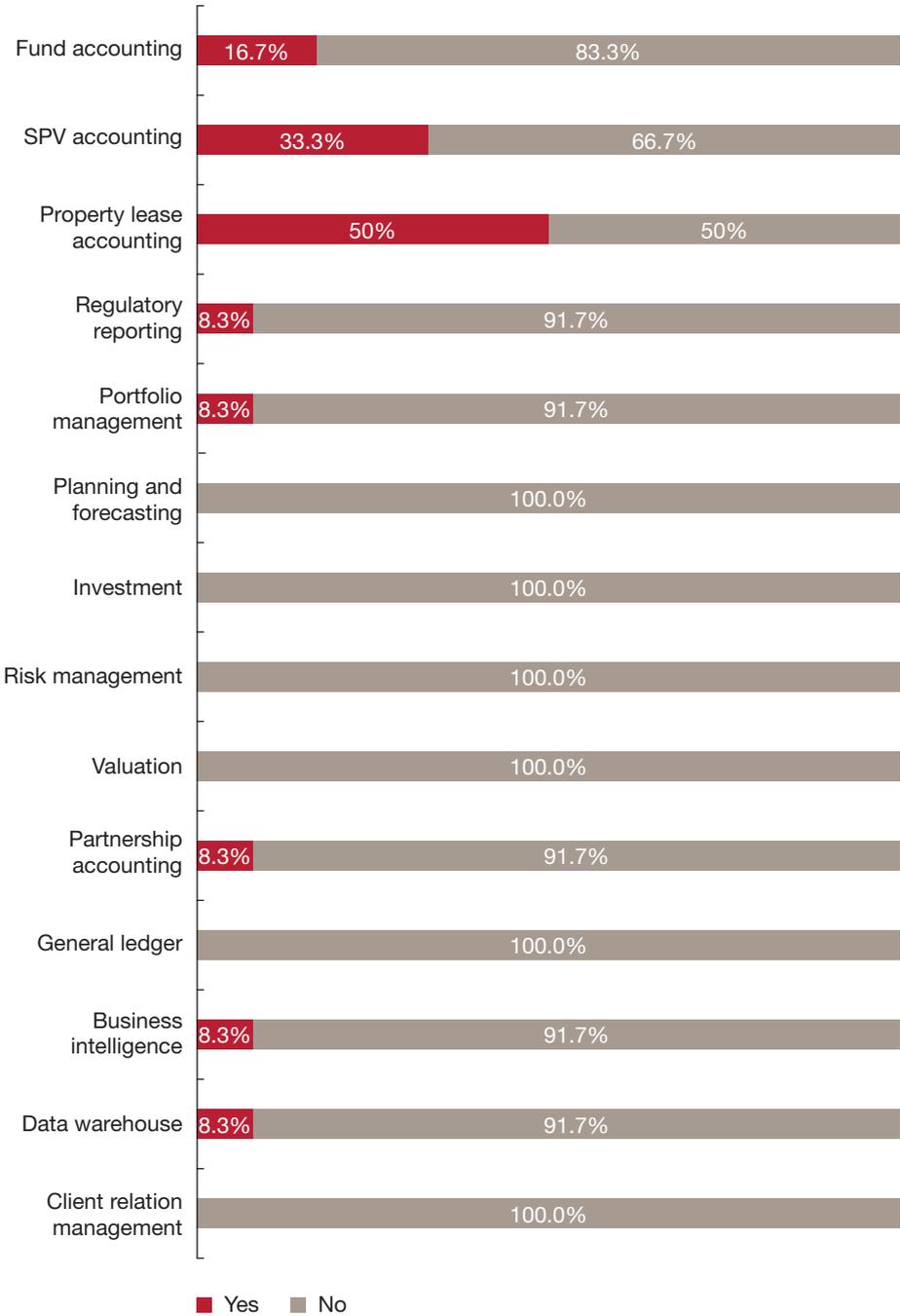
%-information based on number of participants

Reporting requirements continue to become more extensive and complex (see Figure 13). The amount of internal provision has grown in this area compared with the previous year. Now just 38.5% of participants have fully outsourced reporting to the AIFMD depository. No outsourcing occurred for reporting to supervisory bodies under AIFMD, FATCA and EMIR; that is, participants report 100% internal provision of services. Reporting under AML/KYC and compliance with country-specific requirements are among the other areas with little observed outsourcing (15.4%). This result seems conceivable in light of the high level of automation which can be achieved with AIFMD reporting and the handling of confidential customer data in the case of FATCA and EMIR.

4 Outsourcing trends till 2020

In response to the question of which functions could be outsourced in the next three years, half of the survey participants said property accounting (50.0%). This was followed by accounting for special purpose vehicles (SPV accounting), listed by 33.3% of respondents, and fund accounting, named by 16.7%. Many services will also be rendered in-house in the near future (e.g., planning and forecasting, risk management, client relationship management).

Fig. 14 Which of the services would you consider outsourcing within the next three years?



%-information based on number of participants

5 Technology

Digitisation will fundamentally change the IT landscape in companies and the environment beyond, and it will be an important driver for the development and design of new business models and processes. Cloud and big data applications are already widely used, and there is growing interest in other new capabilities such as data mining. The crucial thing is to achieve greater flexibility and speed in integrating innovative software solutions.

Comparison with the previous year’s results on the use of software in the front, middle and back office shows a decrease in the use of Excel (in 2016, it was still the most frequently used software).

In the front and middle office, the software of choice is now neither Excel nor a special application, but rather a proprietary software solution in most cases. Standard software continues to be widely used in the back office, however, as was the case last year. Nevertheless, the predominance of customised solutions and proprietary developments has grown in the front, middle and back office.

The changes suggest that survey participants have recognised and responded to the increased need for investment in digital infrastructure.

In the following chapters, we will delve deeper into the subject of digital transformation, with the intent of providing market participants with an useful guide to accompany them on their journey into the world of digital technology.

Fig. 15 Which software is used in the front, middle and back office?

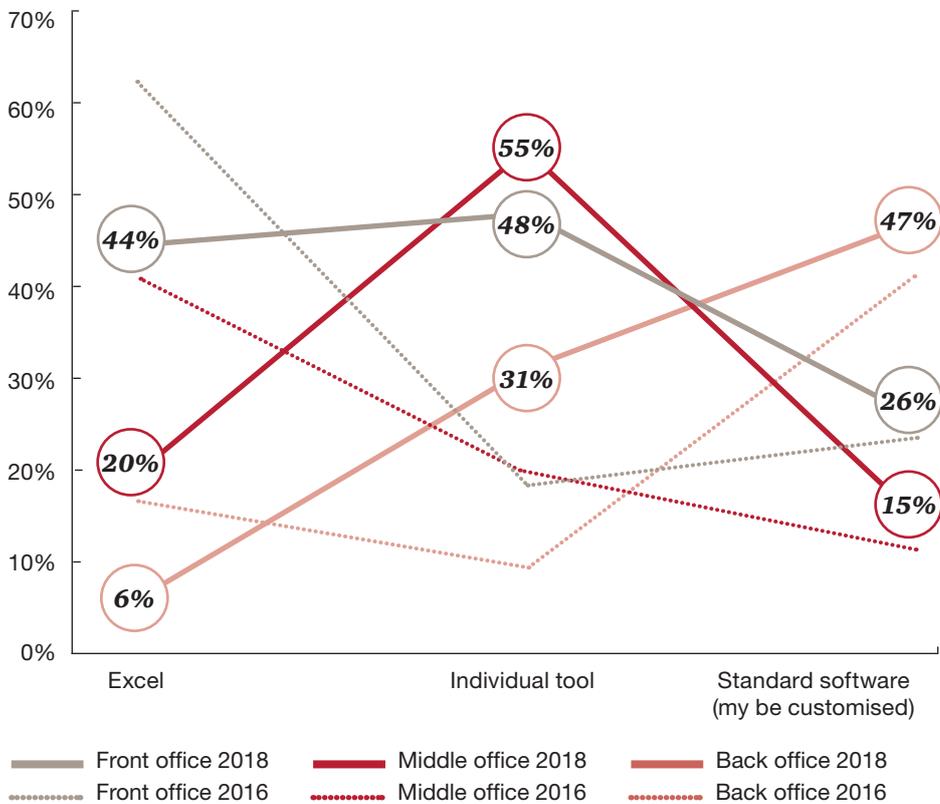
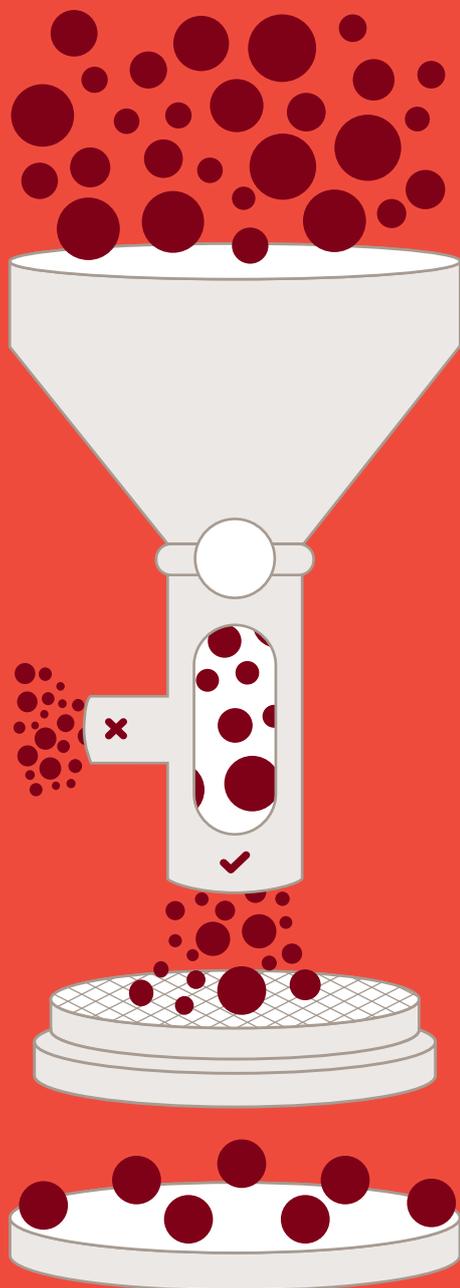


Fig. 16 What software support is provided for the following processes (2015 vs. 2017)?

	Excel		Individual tool		Standard software (my be customised)	
	2016	2018	2016	2018	2016	2018
Front office						
Portfolio management	61%	33%	22%	56%	30%	33%
Planning and forecasting	65%	33%	4%	44%	17%	33%
Investment analysis	61%	67%	30%	44%	22%	11%
Middle office						
Risk management	44%	10%	17%	60%	13%	20%
Valuation	39%	30%	22%	50%	9%	10%
Back office						
Fund accounting	13%	0%	9%	17%	44%	67%
Partnership accounting	17%	0%	13%	17%	30%	67%
SPV accounting	22%	0%	9%	33%	48%	50%
Property lease accounting	9%	17%	9%	33%	48%	17%
General ledger	4%	17%	9%	33%	48%	33%
Regulatory reporting	30%	0%	9%	50%	30%	50%
Other						
Business intelligence	4%	17%	4%	33%	22%	50%
Data warehouse	13%	17%	17%	33%	22%	50%
Client relation management	4%	0%	22%	33%	22%	67%

D Main findings on the state of digital transformation



Eight essential technologies you need to consider

We analysed more than 150+ technologies in terms of their global business impact



Scan

data from companies, start-ups, academia and research



Assess

for cross-industry relevance, technical feasibility, global scalability (in terms of size and growth) and investment requirements



Select

the technologies that are predicted to have the most impact over the next three to seven years





1 The essential 8 technologies

The pace at which new technological innovations are entering the market has grown dramatically in recent years. But which of these technological innovations are genuinely significant for the real estate industry and/or asset management? To find out, PwC scrutinised more than 150 discrete technologies, assessing them in terms of business impact and commercial viability for the next five years (see chart on page 28). This analysis identified eight technologies that we believe will have the greatest impact on the industry in the coming years – we call them the “essential eight”.³ These technologies are: augmented reality, the Internet of Things (IoT), drones, artificial intelligence, 3-D printing, virtual reality, robots and blockchain (Figure 17). These eight technologies will change – and disrupt – existing business models.

By using the two technologies cloud computing and new “user-friendly” user interface, the 8 essential technologies are rapidly gaining acceptance. Therefore, we are talking about the essential 8 + 2 technologies.

But can future challenges be solved by technology alone? Or is it really about discovering new directions? Digital transformation, which is often initiated by technology and followed by evolving customer expectations, new competitors and new business models, requires more than incremental, continual change. Examining the interplay between business, experience and technology (the so-called BXT model⁴) allows complex issues to be approached from all directions

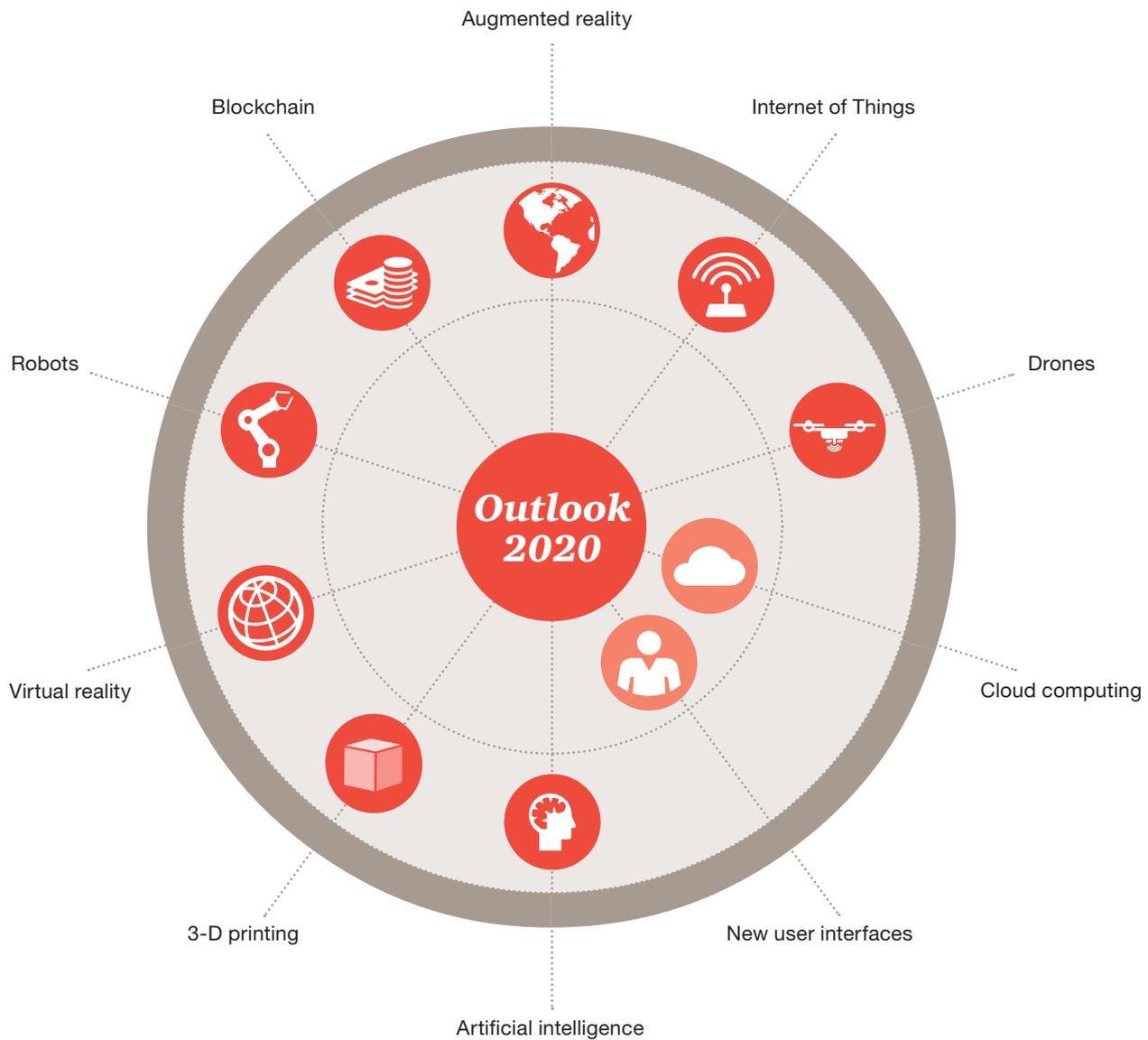
³ Cf. PwC, Tech breakthroughs megatrend: How to prepare for its impact, 2016.

⁴ BXT stands for the three perspectives of business, experience and technology.

which will be illuminated and resolved by different experts. The factor of experience plays a major role: the human being (the client), with all that he has seen and experienced, is the focus here. A unique customer experience can be created by developing prototypes to make innovations tangible and real.

In the following, we present these crucial innovations – the 8+2 technologies – and the related results of our survey (Note: the questionnaire used for the survey only included questions on the “essential eight” technologies and did not include the two new technologies, cloud and new consumer interfaces).

Fig. 17 At a glance: the essential 8+2 technologies



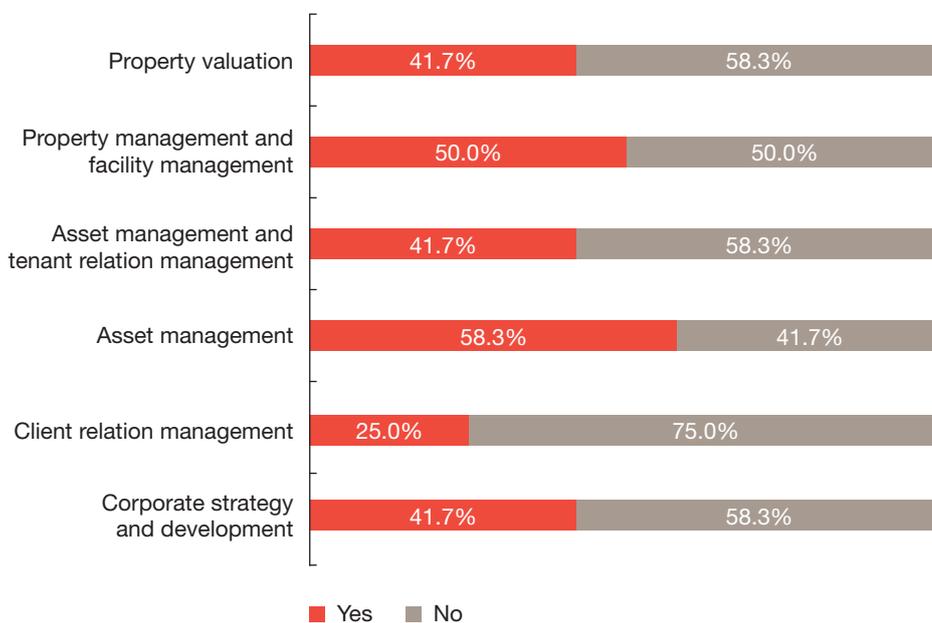
Artificial Intelligence

Artificial intelligence (AI) refers to, in essence, the ability of software algorithms to execute tasks that would normally require human intelligence, such as visual perception, speech recognition, decision making and translation. AI is used in a wide variety of application fields. In addition to machine learning, which focuses on the development of self-learning, comprehending and acting programmes, technologies such as natural language processing, expert systems, and those related to vision, speech, planning and robotics are among those that give machines the ability to learn.



Some 58.3% of respondents believe that AI will influence asset management the most. In addition, almost every other respondent believes that property and facility management will benefit significantly (50.0%).

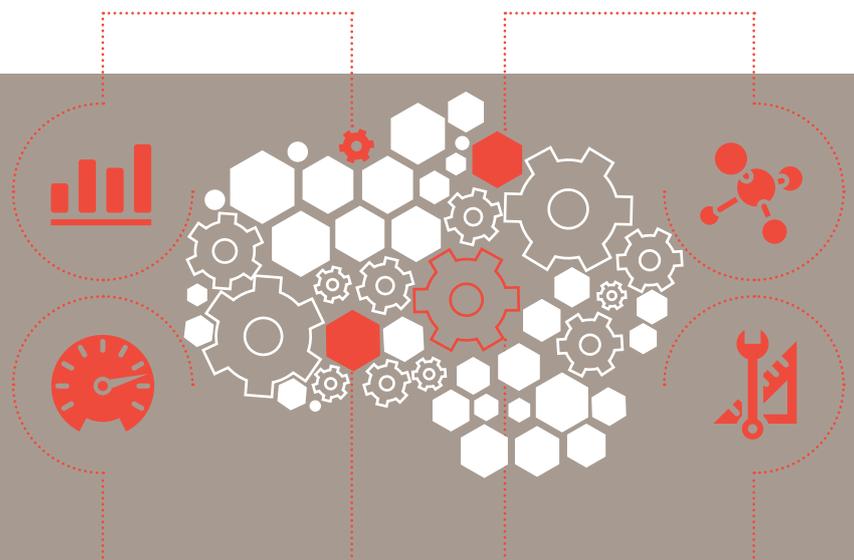
Fig. 18 Which areas do you believe will be impacted by AI?



%-information based on number of participants

Potential applications

- Identity management
- Voting
- Peer-to-peer transactions
- Supply chain management
- Smart contracting
- Provenance/traceability
- Asset registration/ownership
- Trade finance
- Record management



Blockchain

Blockchain is often seen as an enormous tsunami that is headed our way and which has the potential to change the entire world as we know it. It is supposed to have a tremendously disruptive effect. But is that really the case?

Blockchain works like a decentralised and distributed digital ledger that uses software algorithms to reliably and anonymously record and confirm transactions. The log of all these records in the blockchain is publicly visible and can be used by anyone. Once information has been entered, it cannot be changed because the downstream chain verifies all upstream transactions.

But what exactly does the term “blockchain” mean?

A block is a set of transactions that have been verified and have now been added as the next link in the chain. Once a block is written in the ledger, it can no longer be changed. Every transaction is verified to ensure that:

- Nothing has been modified or created outside of the normal process.
- The parties involved have the appropriate permission.
- There are no conflicts between transactions (e.g., double entries).

Blockchain technology is not just used for cryptocurrencies like Bitcoin, but also for many other tasks, for instance: digital document storage, proof of ownership at a given point in time, retail shares or assets, minimising “Know Your Customer” checks, verifying digital identity, and trustee services. Some countries have already started using blockchain technology for their land registries (e.g., Sweden). What’s more, applications for smart contracts, especially through links with the Internet of Things (IoT) are also conceivable. Blockchain can be an effective technology when at least four of the six following criteria are met for the environment in which a company operates:

- Multiple parties need access to the same data.
- Multiple parties need to be able to update these data.
- The parties involved need to be confident that the data history has been recorded and is valid.
- Intermediaries provide confidence but also increase complexity.
- Interactions are time-sensitive.
- Transactions made by different parties are interdependent.

The majority of respondents (66.7%) believe that blockchain will have an impact on asset management and tenant relationship management. More than half also named the areas of fund, investment and client relation management (both 58.3%). One out of three respondents predicts that blockchain will also influence corporate strategy and business development as well as product marketing.



Fig. 19 How does blockchain work?

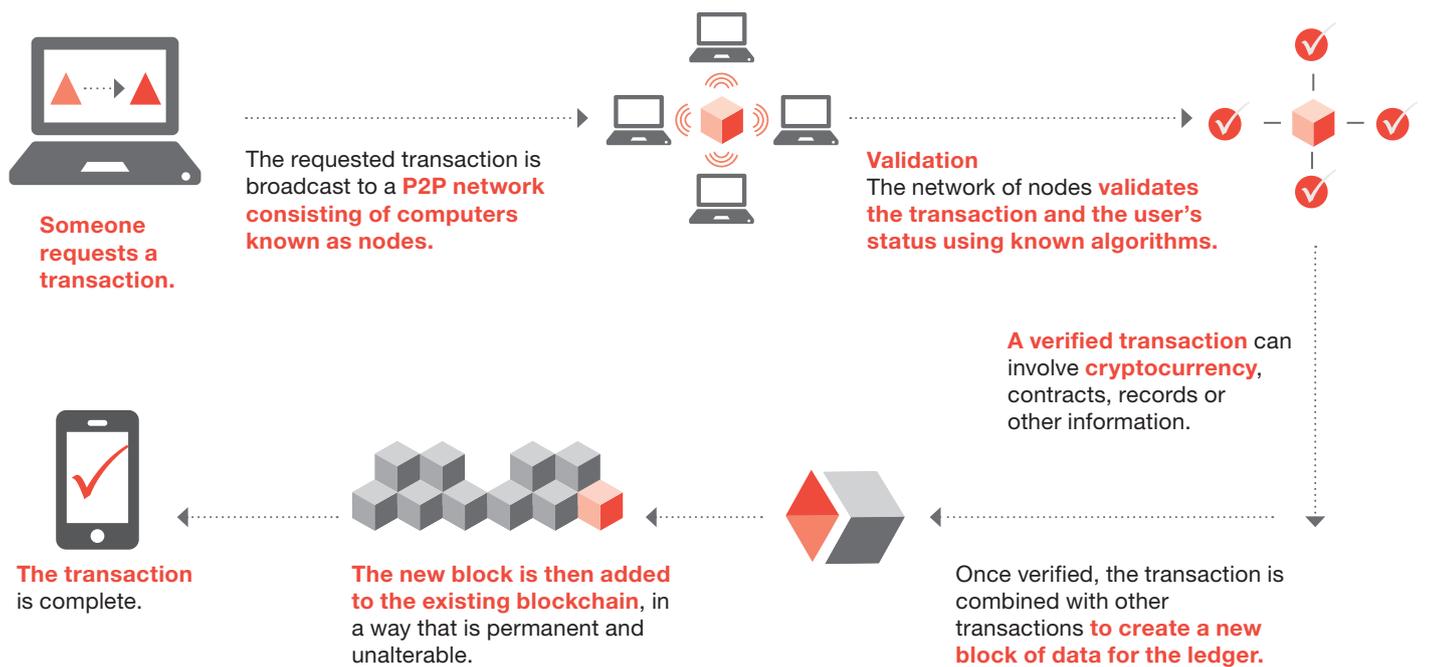
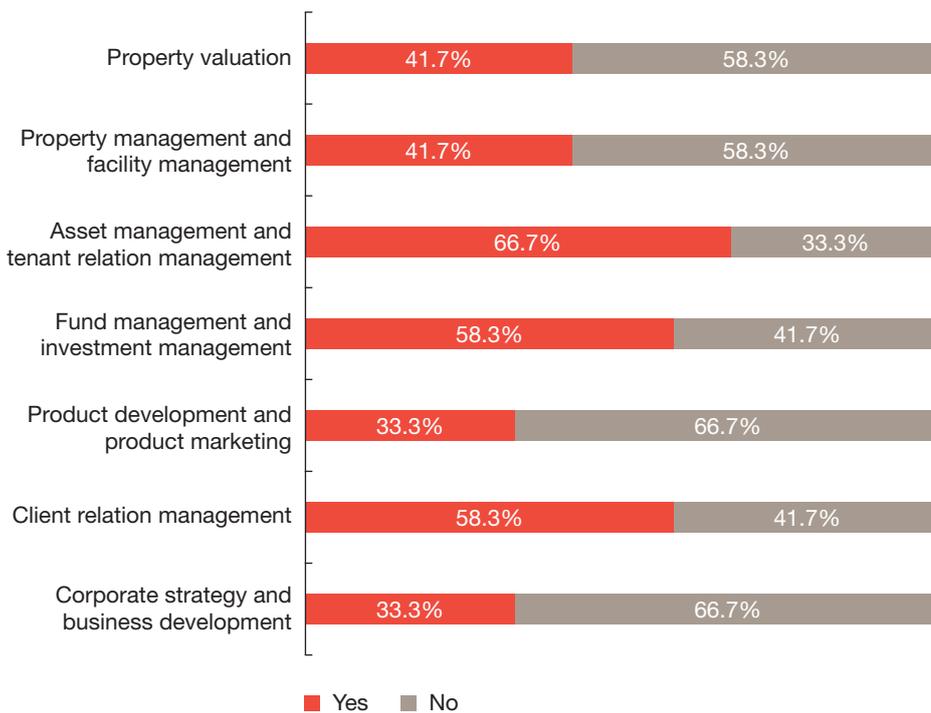


Fig. 20 Which areas do you believe will be impacted by blockchain?



%-information based on number of participants

Internet of Things

The Internet of Things (IoT) describes a network of objects consisting of devices, vehicles and applications which communicate with each other via sensors, software and networks. These objects can collect data through the internet and exchange information with other objects and monitor or remotely control processes. The term IoT refers to all devices that are connected to the internet, that is, devices that are accessible through a network connection (including Bluetooth and LPWAN) and can thus be identified through an IP address.

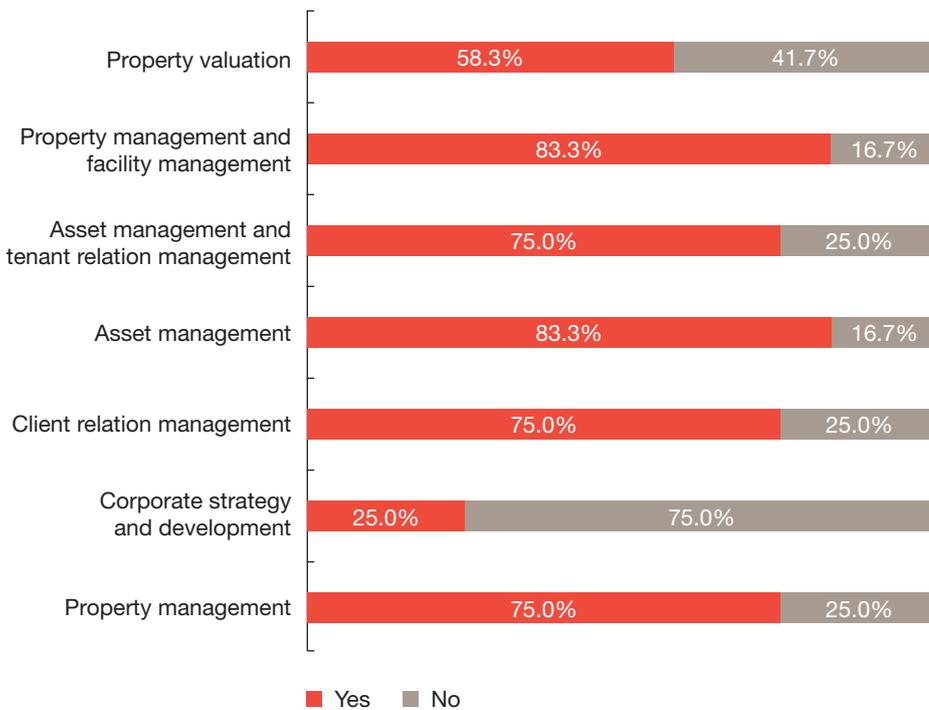
The IoT will significantly affect the two divisions' asset management and property and facility management, say 83.3% of the survey participants. Three out of four respondents also believes that asset and tenant relation management as well as client relation management will be influenced. The impact is expected to be the smallest for corporate strategy and development (25.0%).



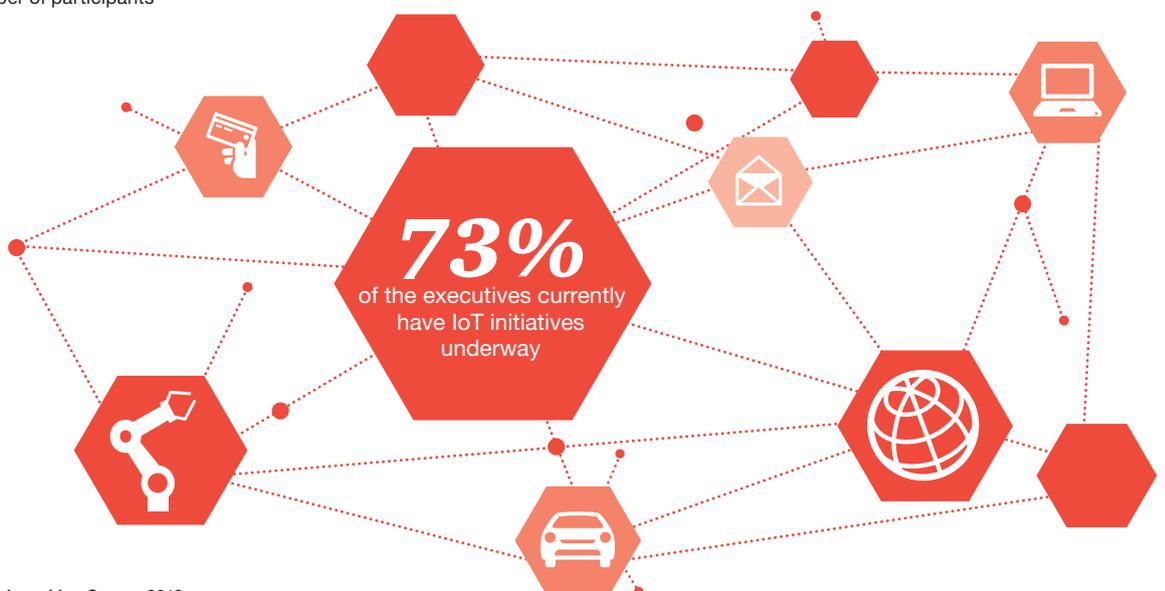
The Internet of Things: Connections for a new world
The Internet of Things is a network of physical objects – devices, vehicles, applications – that can communicate with one another using sensors, software and network connectivity. They can collect, exchange and process data – often without any human intervention.

The Industrial IoT (IIoT) refers to B2B use cases in the manufacturing industry and other sectors such as oil and gas, mining, energy and transportation. The IIoT connects people, places, processes and products with sensors across the value chain to collect and analyse information that can help a company to achieve its objectives.

Fig. 21 Which areas do you believe will be impacted by IoT



%-information based on number of participants



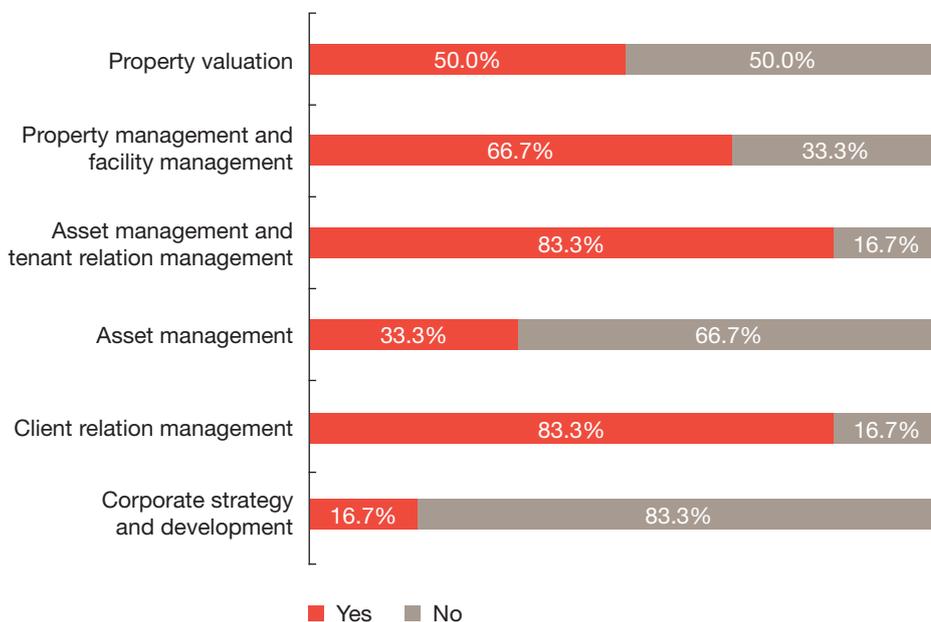
Virtual reality

Virtual reality (VR) refers to the computer-generated simulation of a three-dimensional image or a complete environment within a defined and closed space with which the user can interact in a realistic way. VR is intended to be an immersive experience and generally requires mature hardware, which today is mostly found in the form of a pair of glasses or a helmet.



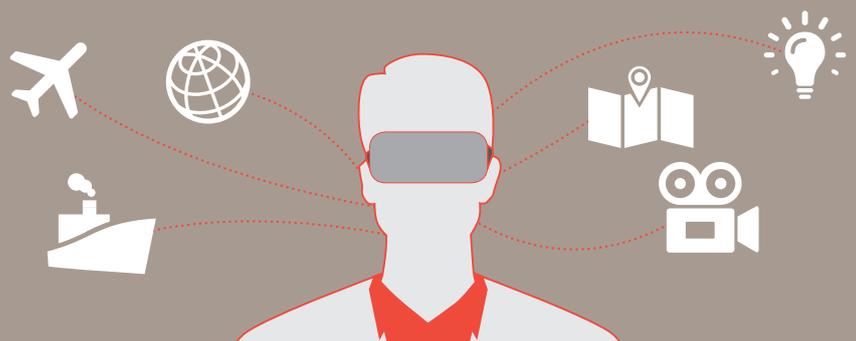
VR has already penetrated everyday life to a relatively large degree, and the majority of survey participants (83.3%) consider it to be a technology that will significantly affect the areas of asset and tenant relation management as well as client relation management. Corporate strategy and development are the areas that VR will affect the least (6.7%).

Fig. 22 Which areas do you believe will be impacted by VR?



%-information based on number of participants

Virtual reality (VR) headsets and VR smartphones immerse the user in a computer-generated 3-D environment in which spatial information becomes real and can be experienced. One example is the projection of a building. Although VR is now often associated with games and the entertainment industry, many promising applications exist for companies, as well.



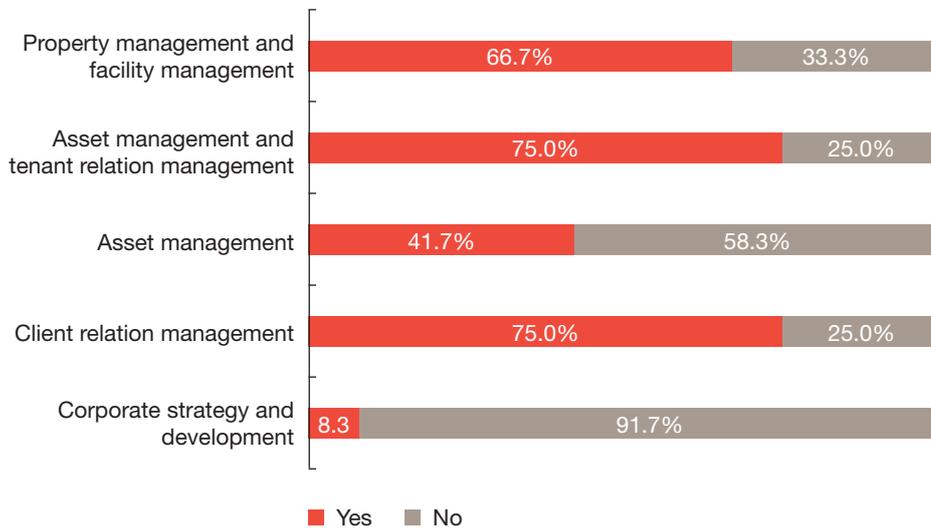


Augmented Reality

Augmented reality (AR) refers to the addition of information or images to the physical environment in the form of a graphic and/or audio file to improve the user experience for a given task or product. This “augmentation” of the real world is achieved via additional devices that render and display this information. While VR is used to create a new reality within a limited framework, AR is used to enrich the existing reality with virtual functions. Among the most prominent examples from the gaming world is the Pokémon Go app, which broke numerous records in 2016.

Three-quarters of respondents named asset and tenant relation management and client relation management as the areas that will be most affected by AR. Two out of three survey participants also named property and facility management. Almost all participants (91.7%) say that this technology will have no impact on corporate strategy and development.

Fig. 23 Which areas do you believe will be impacted by AR?



%-information based on number of participants

In essence, AR bridges the gap between the digital and physical worlds. The popular smartphone-based app Pokémon Go is one of the best-known examples of AR which uses technically generated, detailed visual and/or auditory experiences to enhance a person’s real environment. “Smartglasses” and “hands-free tablets” enable employees to use a variety of AR tools to help them complete tasks more safely and efficiently.



24%
of executives say they will make significant investments in AR over the next three years

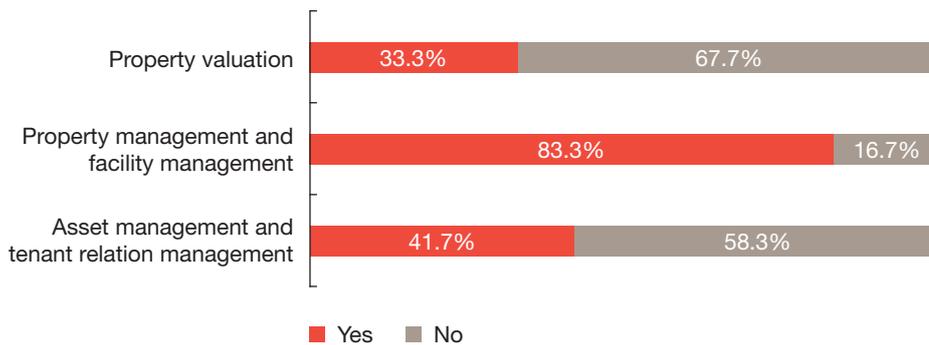
Robots

Robots are electromechanical machines or virtual agents (software robots) that automatically execute, expand or support activities performed by people. Robots act autonomously or follow rule-based instructions.



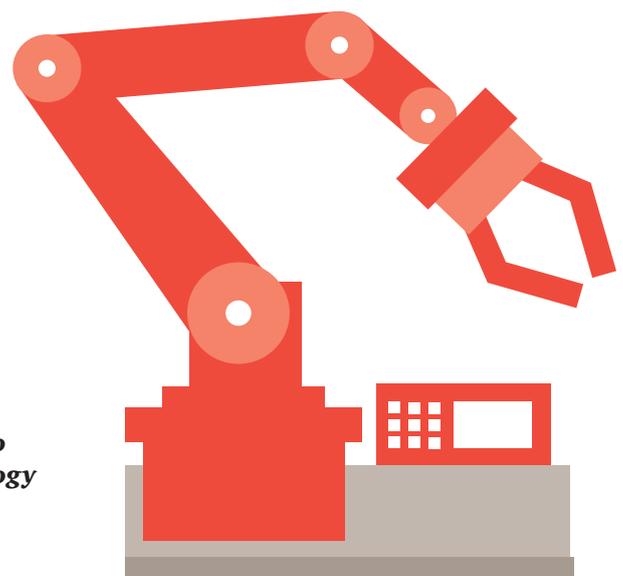
According to our survey, property and facility management will be most influenced by robotics: 83% of respondents believe this will be the case. In contrast, only about one third of survey participants believes that robots will significantly affect property valuation (33.3%), asset and tenant relation management (42%).

Fig. 24 Which areas do you believe will be impacted by robots?



%-information based on number of participants

Robots were once seen as expensive, having limited capabilities, and being restricted to applications in manufacturing. But now they are more powerful, easier to use and more cost-effective, all of which make the technology more desirable and accessible. But competing operating systems, form factors and interfaces are creating a fragmented robotics market. We believe that widespread acceptance will be achieved more rapidly once dominant providers and platforms emerge.



Drones

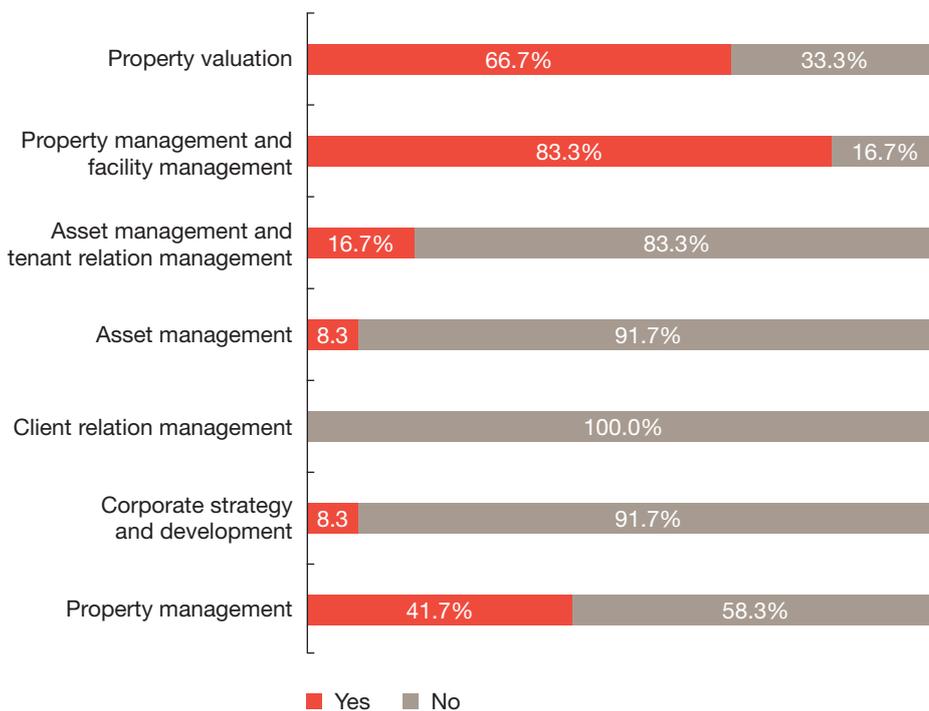
Drones are aerial or amphibious devices or vehicles that fly or move without a human pilot on board, such as unmanned aircraft. Drones can operate autonomously (via an onboard computer) along a predefined flight path or be controlled remotely.



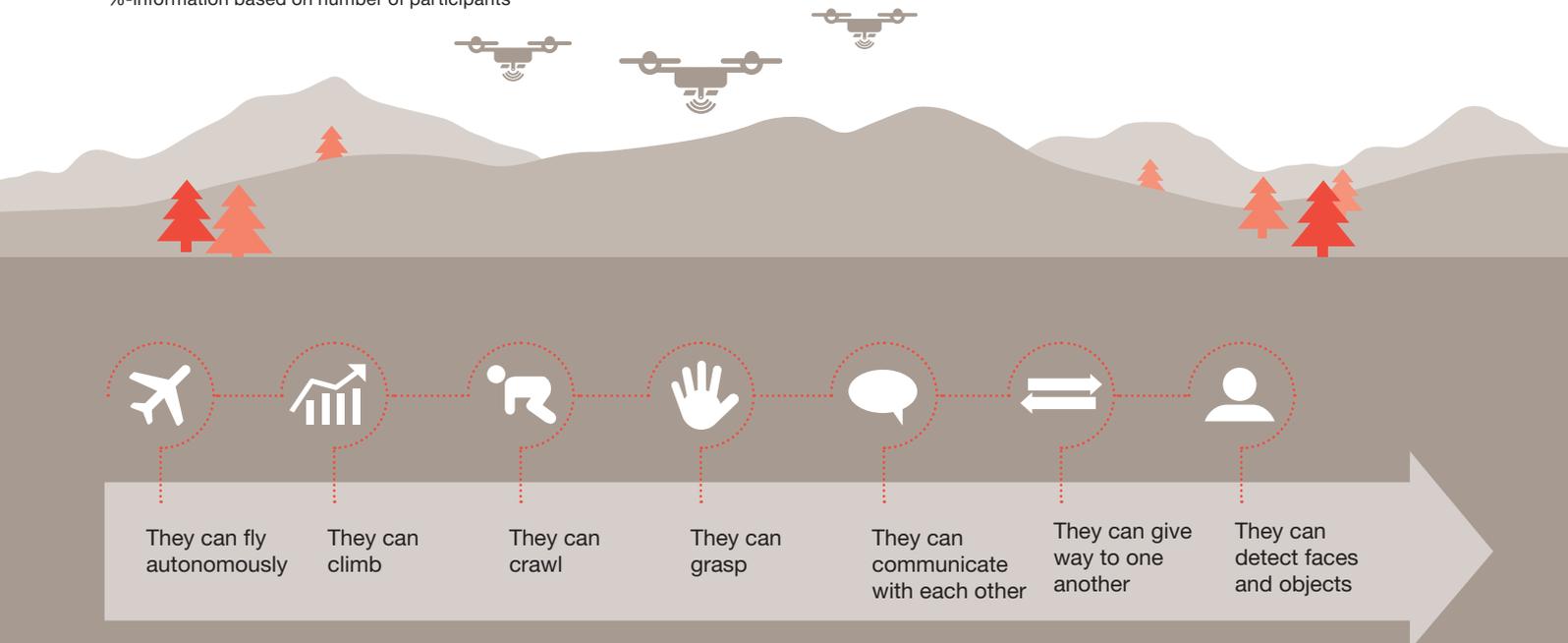
The greatest potential for this technology is seen for property and facility management: 83.3% of survey participants answered thusly. Two out of three participants (66.7%) believe that real estate valuation will be heavily influenced, as well. None of the respondents saw client relation management as being influenced.

Drones extend existing aerial photography and sensor data collection methods. Because drones are short range, they complement other data sources, including satellite imagery, manned aircraft, and ground robots. Service providers aggregate these sources, filter, analyze, and deliver results to a smartphone or other display.

Fig. 25 Which areas do you believe will be impacted by drones?

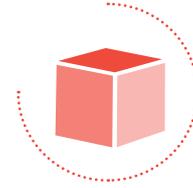


%-information based on number of participants



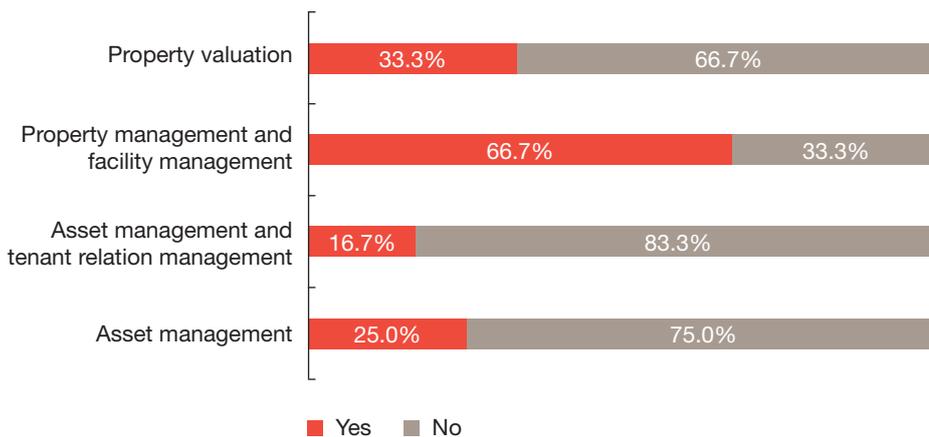
3-D printing

3-D printing refers to additive manufacturing techniques for creating three-dimensional objects which are based on digital models and are created by layering or “printing” successive layers of materials. 3-D printing makes use of innovative “inks” such as plastic, metal and, more recently, concrete, glass and wood.

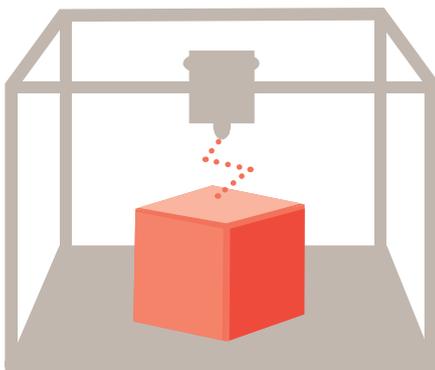


The greatest potential is expected for property and facility management, named by 66.77% of respondents.

Fig. 26 Which areas do you believe will be impacted by 3-D printing?



%-information based on number of participants

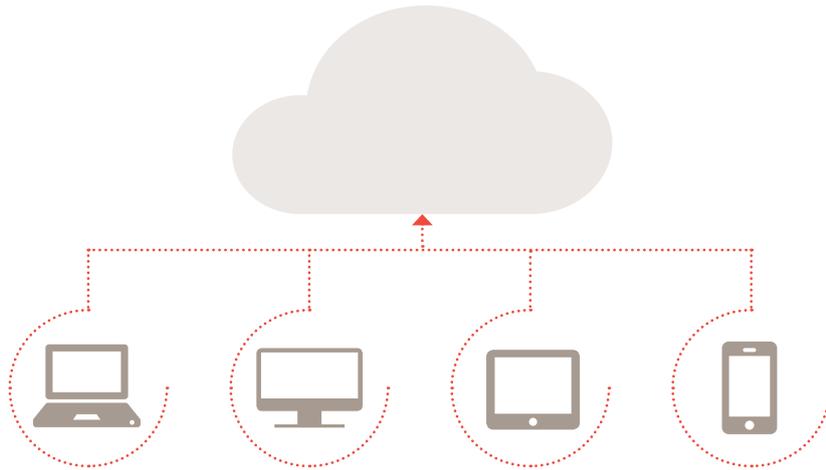


Why 3-D printing will change manufacturing

Technologies for 3-D printing (also known as additive manufacturing) make it possible to produce physical objects based on digital models by combining or “printing” successive layers of materials layer upon layer. These technologies have the potential to turn any business or even your living room into a prototype workshop or factory. As the quality of 3-D printing increases and the price of the technology drops, additive manufacturing is moving into production facilities as they are benefitting from a growing number of industries.

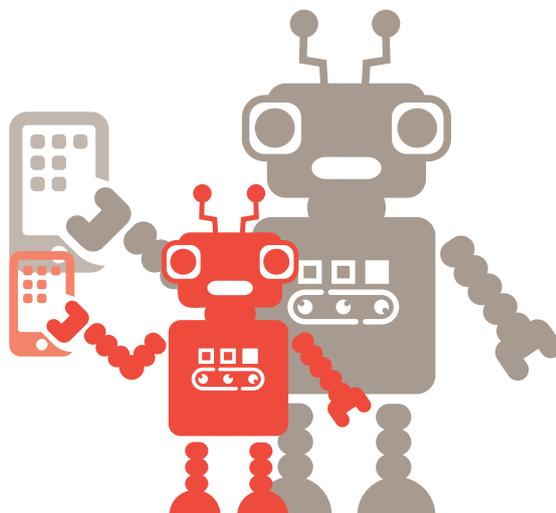
Cloud

Cloud computing is the location-independent delivery of IT management services; the necessary resources can be requested from the internet via web-based tools and applications. Companies that use cloud services can save their files and applications on external servers and can access their data over the internet from anywhere in the world. Cloud computing consists of three main service categories: infrastructure as a service (IaaS), platform as a service (PaaS) and software as a service (SaaS).



New user interfaces

New user interfaces establish new types of interactions between users and computer systems, especially through the use of input devices and software. Some of the latest trends in new user interfaces include chatbots and interfaces like Alexa, Google Home and Apple's Siri.



2 Disruptive impacts on the value chain

The new technologies described above will have a large impact on business models – particularly on strategies, customer engagement, operational needs, people and talents – and compliance, which will lead to new products, more extensive communications, increased efficiency, new requirement profiles and further regulations.

It is still difficult to predict what impact the “essential eight” technologies (see Figure 17) and the resulting changes will have for real estate asset managers. It is estimated that around 40% of the whole real estate value chain alone could be automated using AI systems.

The survey participants were not asked about their predictions for the other essential technologies such as cloud and customer interface.

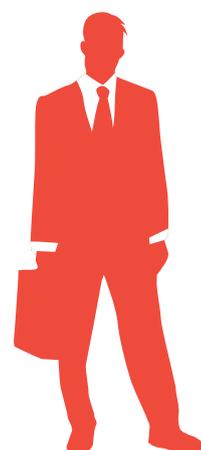
In our survey, we were interested in which of these technologies will change the different processes of real estate asset managers from front office to back office. We grouped the traditional core processes into six clusters:

1. Portfolio management and investor relations
2. Investment management
3. Asset and tenant relation management
4. Property and facility management
5. Risk and liquidity management
6. Fund administration

In our analysis, we highlight the technologies that are anticipated to have greatest impact and we address the fields of application that can already be found in the value chain today.

“Today’s world consists of intermediary markets. The future in the emerging world of blockchain will offer marketplaces without intermediaries and direct interfaces between supply and demand. We also have to remember that changes in the asset management industry which are driven by blockchain technology will occur as a series of gradual developments rather than through a Big Bang-like revolution.”

Francois Genaux, Financial Consulting Leader PwC Luxembourg



2.1 Portfolio management and investor relations

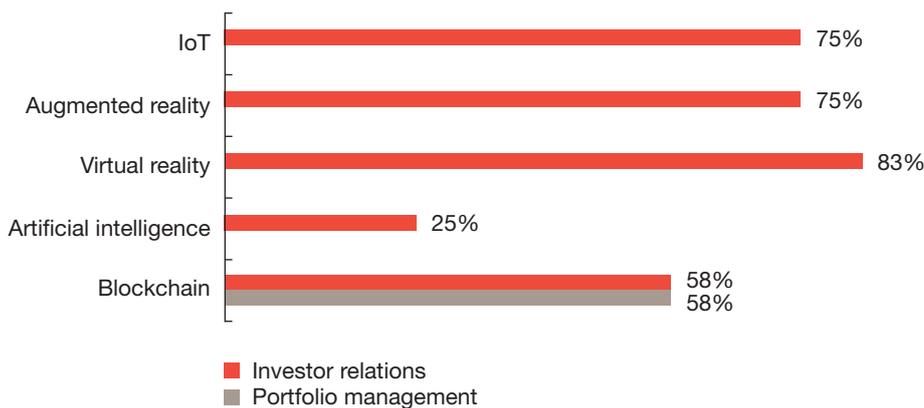
Some 83.3% of survey participants consider **virtual reality** (VR) to be the technology with the largest influence on investor relations. This is probably due to the fact that this technology is already highly advanced and the use of simulations and visualisations is seen as a catalyst.

Looking at the current fields of application for VR, we assume that they cover mainly marketing and customer communication. In investor relations, VR can be used, in particular, during the acquisition of properties and the coordination of institutional investors. This process can be used together with augmented reality in project development to promote marketing.

Three out of four survey participants expects that the **IoT** and **augmented reality** will provide additional impetus. The respondents' assessments are in line with the expectations of the CEOs who participated in our 20th Annual CEO Survey⁵: the majority of CEOs said that the IoT will either have a significant influence on the industry (33%) or lead to a transformation of the entire industry (27%). Investors increasingly expect information and transparency on their investments – and that data be available at all times, in the right quality and quantity. This information needs to be accessible from anywhere in the world using different channels (websites, smartphones, tablets or even digital wristwatches).

Some 58.3% of respondents believe that **blockchain** will have a significant impact on portfolio management and investor relations. It is quite conceivable that very complex and inefficient processes involving a large number of intermediaries (e.g., the subscription and redemption of fund units) will be completely transformed and simplified by blockchain processes in the future.

Fig. 27 Which technology has the biggest impact on investor relations?

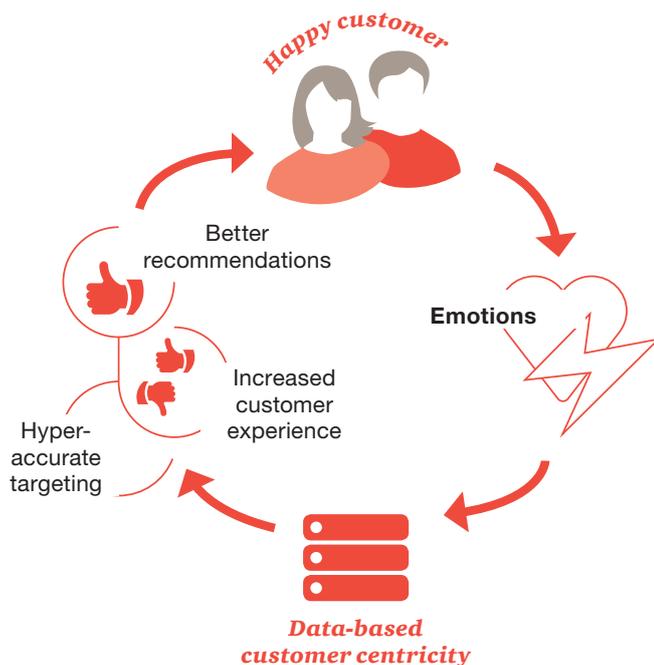


⁵ Cf. PwC, 20th CEO Survey, 2017, www.ceosurvey.pwc.

In our view, **artificial intelligence** (AI) and **blockchain** will have a much stronger effect on portfolio management in the medium and long term than VR or AR. Budgeting, planning and control processes, in particular, can be executed more efficiently and effectively using artificial intelligence than is the case today. However, only 25% of the respondents expect artificial intelligence to be a relevant technology for investor relations. We assume that machine learning will be helpful for risk optimisation, especially through the increased availability of data and the linking of market and portfolio data. AI will develop its full potential through the connection with software robotics (robotic process automation). Highly repetitive processes, such as evaluating listings during deal sourcing, will result in more efficient and cost-effective acquisitions.

The availability of the data obtained (sensors and drones) and their visual processing (VR, AR) will change the nature of the interaction between investors and companies in the long term. In the individuals/retail investor segment, in particular, the shift away from mass communication and towards a personalised dialogue on an emotional level will result in a significant competitive advantage. There is a disruptive factor: mobile technologies and the IoT will greatly influence investor behaviour. Smartphones and tablets will be increasingly used to search for information or to compare services and prices.

Fig. 28 Using data-driven marketing to boost customer satisfaction



If we go one step further, digitisation extends not just to the processes but also to the products. Investment products become digital when they are distributed online. Initial fund initiators use **digital distribution channels** to expand their business model. Internet-based transaction platforms allow investors (e.g., private clients) to subscribe to investments online. Online portals such as the one run by eFonds AG provide a digital distribution channel. The company's homepage contains a list of intermediaries which automatically forwards to the distributors' internet site. The process is entirely paper-free with no time-consuming advisory process. There is also digital distribution directly via the initiator. Participants such as Patrizia Grund-Invest are already blazing a trail here by offering their customers the opportunity for online subscription via their "eDirektzeichnung" portal (other participants will soon follow). **Online subscription** is being driven by the use of novel user systems, such as innovative solutions for payment systems and bank transactions, which allow customers to make purchasing decisions from the convenience of their own home (24/7). **Robo-advisors** do away with the need for customer advisory services. Already common practice in the US, this trend will increase in Germany too, whether to save on costs or gaining new client groups (so-called mobile millennials).

Data-driven marketing: Data can be used successfully to boost customer satisfaction. Here we see great potential in the area of marketing and investor relations. Currently, huge sums of money are being invested to win and retain customers or call attention to a product. But the success of marketing efforts cannot always be clearly measured and the reach tends to be relatively moderate. A new approach known as "hyper-accurate targeting" could be an improvement, as it makes it possible to get the right message to the right person at the right time (Figure 28).⁶

As discussed further in Chapter D in the section titled "Market and customer access", **social media** plays an important role in the industry: it becomes a compulsory part of our daily life. Today, social media, blogs and websites offer unlimited opportunities for the users to express their emotions and opinions. Some of it can help to boost sales, and some can change company's image (positive or negative). Tools known as social media monitoring (or social listening) allows the user to monitor, identify and assess what customers and other recipients think about a brand, product or even a person. Being able to identify and assess what the recipients thinks, also to contact people that praise the brand of a company and making them more engaged or to get immediately signal about complains will save a huge time. The use of internet protocols (known as adaptive internet protocols, or AIPs) and web crawlers (also called spiders or searchbots) makes it possible to automatically monitor social media platforms. Sentiment analysis is conducted to better understand customers' emotions and feelings.

None of the respondents think that **drones** will have a direct influence on the area considered here. This seems plausible if the use of drones is pushed in the real estate industry, especially in the planning and management phase, and in the infrastructure sector for maintenance and repair measures.

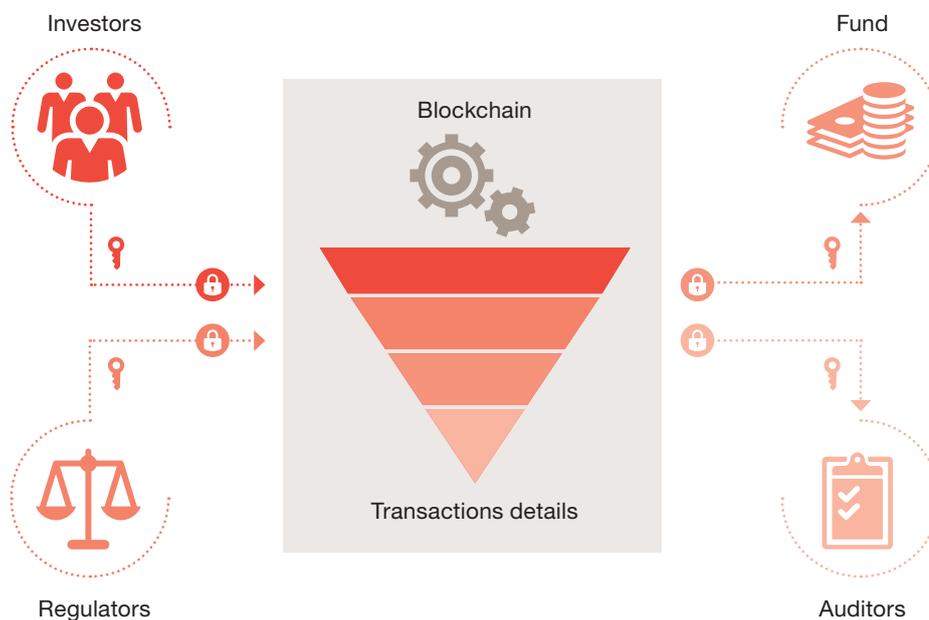
⁵ www.patrizia.ag.

2.2 Investment management

In a world that is becoming increasingly globalised, real estate funds are seeking to diversify their portfolios at the international level. Cross-border transactions have now become commonplace for real estate funds, but they are usually inefficient due to high transaction fees and the slow pace of transactions. A cross-border ledger with blockchain technology could solve this problem. Indeed, many companies have already recognised the problem and are working on blockchain-based products which can revolutionise this process.

One company that has already attracted a lot of attention in this area and been able to build up partnerships with several international banks is Ripple⁷. Ripple is a real-time settlement system, currency exchange and remittance network. It is built on a distributed open source internet protocol, a consensus ledger and a native cryptocurrency (XRP). According to the company, Ripple makes it possible to execute secure, immediate and almost free global transactions of any size without chargebacks. It supports tokens which represent fiat currency, cryptocurrency, commodities or any other unit of value. Ripple is based on a public database which uses a consensus process to enable payments, exchanges and remittances in distributed processes.⁸ With a transaction speed of 3.3 seconds and a cost per transaction of just 0.0004 US dollars, Ripple has the potential to significantly improve the efficiency of cross-border transactions.⁹

Fig. 29 The reporting process as revamped by blockchain



⁷ Ripple, <https://ripple.com/>.

⁸ Cf. Coindesk, Ripple Explained: A Medieval Banking with a Digital Twist, Mai 2014, www.coindesk.com/ripple-medieval-banking-digital-twist/.

⁹ Cf. Ripple, How XRP Stacks up Against Other Digital Assets, December 2017, <https://ripple.com/xrp/xrp-stacks-digital-assets/>.

In addition, blockchain allows investors and issuers to operate on a peer-to-peer basis without intermediaries. Some companies are already using this business model, including REAL, Bitproperty and ATLANT. It generally works like an online platform for crowdfunding. The use of smart contracts and blockchain technology gives the platform a high degree of security and transparency. Property owners and real estate developers can request that their assets be converted into tokens on the crowdfunding platform and listed. Investors can review the investment objects on the platform and invest directly using the necessary tokens, and also track the development of their portfolios. The concept is designed so that the investors are paid their share of the rental income every month, minus a management fee that is paid to the platform. When an investor is ready to sell their shares, they can do so at any time on the platform.¹⁰

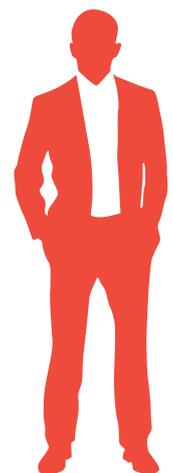
Some 58% of the companies surveyed believe that **blockchain** will change investment management. The fact that this figure isn't higher is likely due to the current degree of market maturity for this technology. While there is a lot of hype surrounding cryptocurrency right now, further fields of application have barely been tested and are mostly known to only a few pioneers. The idea and appeal of blockchain is, among other things, to ensure that the correctness of the information recorded in blockchain is guaranteed by numerous public reproductions and that in the future certain cost factors, such as the use of clearing houses and other central trusted third parties (notaries, public offices, banks, etc.), will be eliminated.¹¹

In collaboration with the proptech company EVANA, PwC has launched a research project to determine the **potential of artificial intelligence in the real estate industry**. While today it may still take real estate advisors several days to compile specific information from contracts or statements of account for a real estate transaction, these tasks will be completed in seconds using AI in the future. The speed and precision of valuations for countless real estate figures can be increased tremendously using AI – with a significantly lower error rate.¹²



“Many projects in the real estate segment exhibit a high degree of manual – and non-value-adding – activities, such as simply typing up the figures needed to perform NOI analyses. In the future, such tasks can be easily completed by artificial intelligence. It will become the advisor’s right-hand man.”¹³

Jan Brügelmann, Director, Real Estate Deals, PwC Deutschland



¹⁰ Cf. REAL, www.real.markets/.

¹¹ Cf. PwC, Blockchain und Smart Contract, 21.06. 2017.

¹² Cf. PwC, PwC forscht mit EVANA zu künstlicher Intelligenz in der Immobilienbranche, 04.10.2017, www.pwc.de/de/pressemitteilungen/2017/pwc-forscht-mit-evana-zu-kuenstlicher-intelligenz-in-der-immobilienbranche.html.

¹³ *ibid.*

With AI, we are just at the beginning. The first real estate investors are already testing technologies that use AI but so far only collect data and offer at the most some legal evaluation possibilities. Using AI for commercial analysis functions to quickly deliver initial results in addition to data collection still remains a vision. This requires an algorithm that independently extracts data (e.g., invoices for additional costs) and conducts analyses to uncover risks and opportunities. Specifically, the process works like this: the algorithm makes it possible to read out and digitise countless documents in a time-saving and cost-efficient way. The data contained therein are automatically sorted and categorised by key word, and can then be exported in any data structure or format. Providers of this kind of intelligent software solution generally also provide the corresponding data space, to which various users are given access via apps or individual access permissions.

AI will also have an important part to play in the increasingly extensive and complex world of real estate transactions. Due diligence can be streamlined and made more secure through automated data analysis, with AI support for the remaining manual activities. Apps for routine tasks in due diligence (legal tech) are on the rise, thanks to the use of machine learning algorithms. For instance, the law firm Greenberg Traurig Germany, LLP and EVANA have jointly developed the GRETA tool, which automatically evaluates legal and commercial data relevant for due diligence in consolidated form, separately (up to object level) as well as contractual components. It is based on EVANA's extensive database, which makes it possible to process all transactions digitally and to produce reports with interdisciplinary compatibility.¹⁴

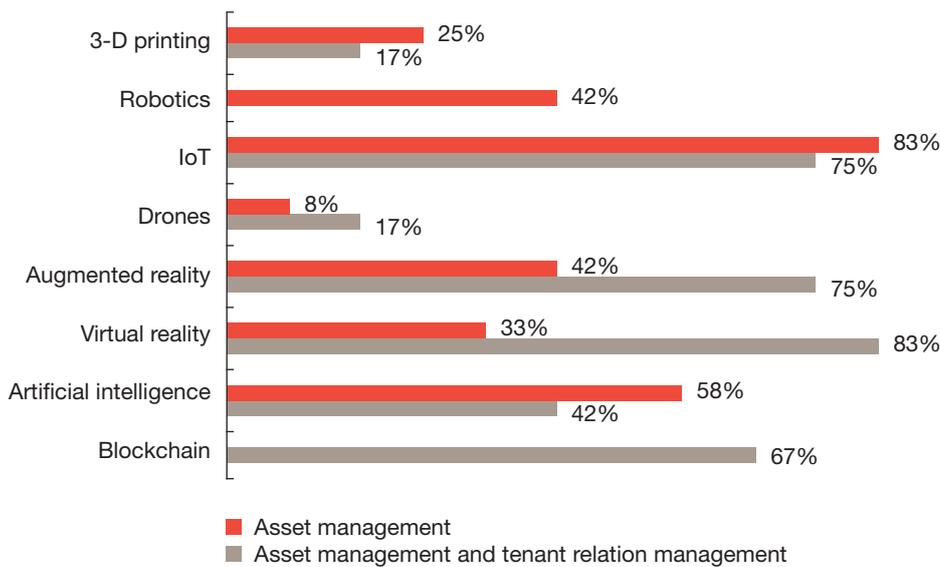
Although our survey participants believe that **drones** will have no impact on investment management, we would nevertheless like to outline how they could be useful. In addition to applications for the maintenance of real estate objects, drones can be used in versatile ways during the acquisition and sale of properties, for example, to capture high-quality aerial images to appeal to the customer on an emotional level or to provide information to sellers and investors, such as a 360-degree overview of the condition of the property, and thus give them a greater sense of security. Drones can also be used inside and outside of buildings for 3-D tours, which are becoming increasingly popular. Short video clips can be used to brief investors on the project's progress – using a first-person perspective that makes it look as if they are on site. This approach allows investors to review the situation at their leisure, whether in the office or at home.

¹⁴ Cf. ZIA, GRETA – das digitale Due-Diligence-Tool, <http://innovative-immobilienwirtschaft.de/greta-das-digitale-due-diligence-tool/>.

2.3 Asset and tenant relation-management

The majority of companies surveyed (83.3%) said that the **IoT** had the biggest effect on asset and tenant relationship management. This allows large amounts of data on physically and virtually linked objects to be collected and utilised. It is particularly useful for planning real estate strategies, since having detailed and precise knowledge of building usage allows you to produce more detailed and accurate budgets. But the IoT can also be used for continuous measurement and surveillance of compliance with service level agreements (SLAs). The IoT simplifies sharing or leasing facilities too, since charges are based on actual usage rather than a flat rate (e.g., for meeting rooms). Tenants (users) are provided with comprehensive and detailed information from sensors and actuators (electronic signals). Respondents thought that **virtual reality** was only highly significant with respect to tenant relationship management. For example, virtual home staging can speed up the process of finding new tenants considerably. However, the options for using it in asset management are currently limited, for example to visualisations when planning renovations and refurbishments.

Fig. 30 Which technology has the biggest influence on asset management and tenant relation management?



%-information based on number of participants

Two out of three participants (66.7%) believe that **blockchain** will have a significant impact on asset and tenant relation management. The reason for this should come as no surprise: **blockchain** technology not only enables more efficient transactions, it also allows a new type of contract to be used: smart contracts allow actions that are recorded in the “smart contract” to be triggered automatically (with no human input). Any actor in the blockchain, whether human or machine, can enter into secure, tamper-proof contracts. There is no need for an independent, centralised authority.¹⁵ With smart contracts, transactions self-execute once all parties meet the pre-specified conditions. The software can normally automatically identify whether all parties have provided their services. A smart contract is not a civil law contract. It is a procedure that can monitor and document a defined, legally relevant activity.¹⁶

For example, smart contracts can be used in the real estate industry for short-term leases. One company that has specialised in this area is Midasium. It has developed a software program for asset and property managers to use to manage their portfolios’ cash flow. Essentially, the software generates smart lease contracts that automate a large number of an asset or property manager’s receivables/payables. The benefits are obvious: less time spent reconciling cash flow items (e.g., transactions and rent payments) and property expenses, greater transparency and control for overseeing and approving property expenses and a reduction in accounting and compliance costs.¹⁷

On average, half of the surveyed companies (asset management: 58.3%; asset and tenant relation management: 41.7%) said that **AI** is highly important in this area. One reason is that there are already a number of instances where this technology is being applied in the real estate industry. Key concepts here are smart contracts, legal tech, machine learning and speech recognition. These are applied in a number of areas such as targeted use of customised client contracts, contract management, translation programs and self-learning building controls.

Leasing processes are increasingly digital: processes can be controlled automatically by **digital tenant management**, allowing them to be designed more efficiently and effectively. In conurbations such as Berlin or Hamburg where there is a shortage of residential space and high demand, the leasing process can often be drawn-out and costly. There are many manual process steps that can be automated: Advertising the apartment, online-based application process, assessing prospective tenants and management of documents and data. These will normally be supported by a digital CRM software solution linked to the property manager’s software. Tenant searches can be almost completely digitised using matching algorithms. The added value for managers and owners is clear: Reduction of administrative tasks which are costly and time-consuming.

¹⁵ Cf. PwC, Blockchain and smart contract automation: an introduction and forecast, March 2016; PwC, Die Zukunft der Blockchain heißt Smart Contract, 08.09.2017.

¹⁶ Cf. Joachim Schrey; Thomas Thalhofer, Rechtliche Aspekte der Blockchain, 2017.

¹⁷ Cf. Midasium, Smart Tenancy Contracts, <http://midasium.herokuapp.com/smart-tenanc>

2.4 Property and facility management

The IoT will also have a considerable impact on property and facility management (property management: 75.0%; property and facility management: 83.3%) and generate new services. For example, sensors will no longer be restricted to windows and doors but will also be deployed at the workplace. They provide a cost-efficient way to record usage or occupancy in real time, or for example to record posture and stress levels. So in future, the smart office may even help to increase our wellbeing at the workplace.

IoT and smart office: Sensors can be linked to a central database to monitor energy consumption and security systems and optimise servicing and maintenance. Additional costs are billed automatically. Software tools already used in facility management include energy controls and smart controls (e.g., temperature, light, ventilation), predictive maintenance based on status checks, needs-based cleaning (sensors record usage levels and transfer the data to a ground plan on which a colour-coded display of usage and time superimposed), RFID usage and anti-theft devices. These tools can be enhanced by connecting them to IoT components. The devices collect data using automated workflows and automatically check that reports are compiled (e.g., on energy consumption), automatically regulate room temperature, record turn around times to monitor contractor agreements, or even send orders to suppliers. Analysts estimate that between 25 and 80 billion devices will be connected over the internet by 2020.¹⁸ Electricity and water meter readings can already be taken automatically. Peak loads can also be identified to purchase resources more cheaply. Tools commonly used for recording visitor behaviour on retail websites can be used in facility management to analyse tenants' usage behaviour.

Fig. 31 Which technology has the biggest influence on property and facility management?



%-information based on number of participants

¹⁸ Cf. PwC, Q&A: The Internet of Things, 07.12.2017.

Drones are increasingly used in property and facility management as they can complete a large number of routine tasks more efficiently than human beings. Not surprisingly, nearly four out of five respondents (83.3%) see also this disruptive trend in property and facility management (just 41.7% for property management alone). Where else will drones significantly influence our daily working lives? Drones are used in high-security situations where they can be used to reduce the safety risks many employees and contractors face when carrying out their work. In the real estate industry, performance monitoring and preventive maintenance measures are essential for extending life cycles; this applies in particular to critical equipment that can cause significant damage if it malfunctions. Drones can create high-resolution images of areas that are otherwise difficult to access; this is frequently all that is needed to quickly assess their condition or identify potential vulnerabilities. As well as high-resolution images, drone technology can also provide infrared and X-ray images which can then be used to identify structural problems or hazardous leaks, preventing potential hazards to human beings and materials.

But simply deploying the drones is not enough to deal with the challenges facing real estate managers today. The data and images provided by drones must be processed using a sophisticated asset management software program that includes historical records, maintenance standards and other sensor information to allow the need for maintenance – for example, where there are corrosion, cracks and leaks – to be identified, or various surveys to be carried out. The tool needs to record and evaluate these different types of data in real time so property managers can compare the current status of their facilities with previous image and sensor data and manufacturing/industry standards before determining the next steps to take in the asset management life cycle. Finally, maintenance and repairs are planned directly by the asset management tool, helping to reduce down time.

Close to half of the companies we surveyed see **AI** as beneficial for this sector, for example with respect to **predictive maintenance**. Machine-learning technology coupled with specific statistical techniques can be used to identify hitherto hidden patterns.

While technical facilities are still currently maintained reactively, or at intervals that are based on the experiences of maintenance technicians or manufacturers, predictive maintenance can predict the right maintenance interval by intelligently analysing operating and status data.¹⁹ This helps to prevent downtime due, for example, to water damage or other problems. Maintenance intervals can be set precisely based on data-backed forecasting and self-learning algorithms. Internal and external data (e.g., meteorological data) can be linked, allowing other factors to be taken into account and a targeted response mounted to the actual problem at the specific site. This saves time, reduces costs, increases reliability, extends up-time and helps to prevent accidents or damage.

¹⁹ Cf. PwC, Predictive Maintenance in der Energiewirtschaft, 11.12.2017, www.pwc.de/de/energiewirtschaft/digitalisierung-in-der-energiewirtschaft/predictive-maintenance-in-der-energiewirtschaft.html; Predictive Maintenance 4.0 – Störungen vermeiden durch intelligente Datenanalyse, 28.07.2017, www.pwc.de/de/industrielle-produktion/predictive-maintenance-4-0-stoerungen-vermeiden-durch-intelligente-datenanalyse.html.

Chatbots are starting to deploy AI and will eventually automate tenant communication processes. Handling tenant enquiries will soon be fully automated and completed in real time. Digitisation of customer services will follow when the latest web applications such as digital housekeepers, chatbot technologies and tenant relationship apps gain wider acceptance. Chatbots will raise tenant/landlord interaction to a whole new level of service. The system deploys artificial intelligence for continuous learning whilst at the same time ensuring high quality by applying best practice guidelines. The client or tenant can use an app to contact the landlord or a service centre directly and report their concern (damage, defects etc.). This option is already being tested by a few managers. All property managers will eventually have to follow suit given the increase in customer expectations around availability and response/processing times. Tenant enquiries about operating cost charges, damage, faults or even losses can be answered promptly and transparently. Chatbot technology provides upgraded service options that move properties into the high end bracket. For example, property managers can provide a 24-hour service, direct appointments between client and contractors, a cleaning service or even acceptance of deliveries, saving time and costs and increasing customer satisfaction.

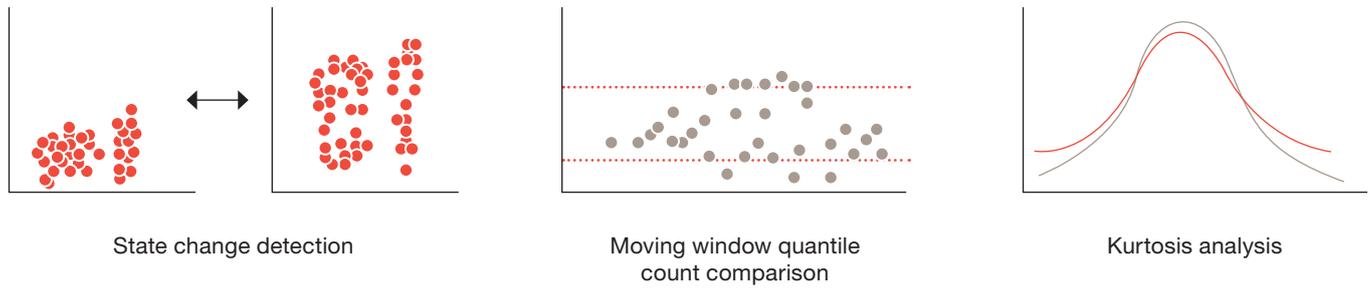
Analysis of other studies suggests that facility management (FM) is the area where AI is seen as having the greatest impact. This is the area with the highest potential for automation, since FM still includes many labour-intensive, repetitive activities: monitoring systems, analysing data from cameras and drones, cleaning, waste management, catering etc. Close on two thirds of respondents (66.7%) thought **3-D printing** had potential. While this technology is already being used in the automotive and aerospace industry as well as the medical sector, it might also in future change or even do away with process workflows in the real estate and construction industries and have a significant impact on manufacturing processes. Many different types of materials are already used for 3-D printing, including concrete, glass, plastics and wood. Using 3-D printing allows a wide range of goods to be fabricated in a low-resource and hence cost-effective manner. The first ever 3-D high-rise building (pod skyscraper) has been designed in Tokyo. It consists of modular dwellings designed to be built on site using a huge 3-D printer.²⁰ This is particularly exciting in terms of sustainability since manufacturing using a 3-D printer does not just reduce the amount of materials used but also the road miles and thus ecological pollution such as that caused by CO2 emissions. The regulations and standards in each country will determine how far they advance on 3-D printing.

Initial applications for the new **blockchain** technologies (only 41.7% of the survey participants believe that blockchain will significantly affect property and facility management) can already be found in the real estate sector: payment with crypto currencies, electronic land registries and automated property registers, signing of smart contracts and machine-to-machine contracts (M2M contracts) and real estate tokenisation (e.g., Bitproperty platform, ATLANT or REIDAO).

²⁰ 20 Cf. Haseef Rafiei, Pod Vending Maschine, [www.haseefrafiei.com/pod-vending-machine](http://www.haseefrafiei.com/pod-vending-machine;); www.dailymail.co.uk/sciencetech/article-4447278/Student-designs-Pod-Vending-Machine-skyscraper-concept.html.

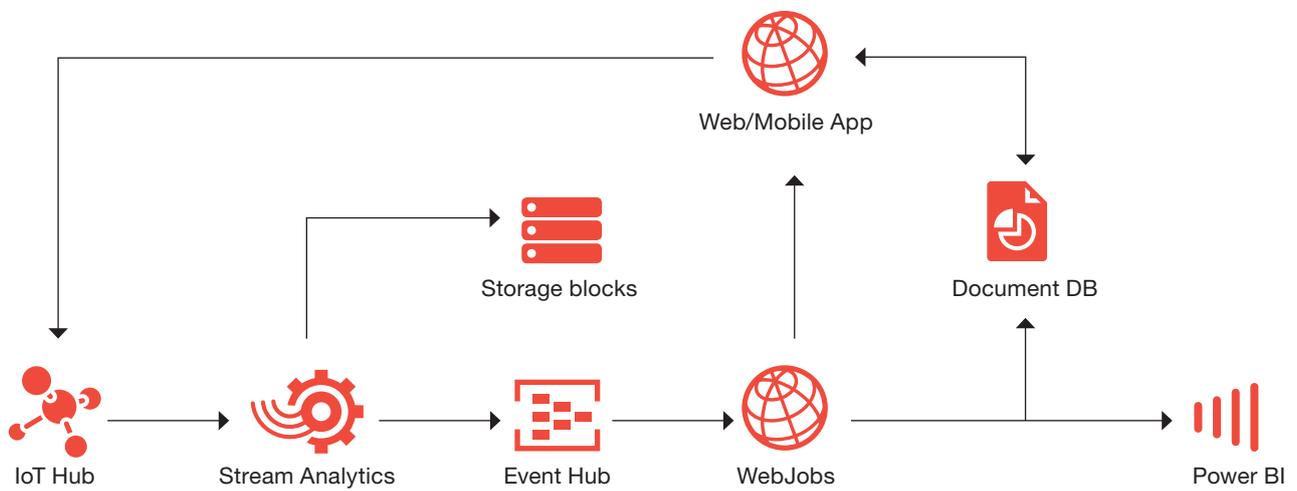
Fig. 32 Microsoft Azure IoT and Advanced Analytics Suite

Applied algorithms and statistical procedures



Specific statistical methods and machine learning techniques made hidden data patterns visible and yielded meaningful models.

Microsoft Azure IoT and Advanced Analytics Suite



Microsoft Azure cloud services expedited model development and were used as scalable IoT and advanced analytics platform.

2.5 Risk and liquidity management

The impact of various crises such as the financial markets crisis or the subprime crisis, and the transformation of the real estate sector following implementation of the AIFM Guidelines and the German Capital Investment Act (Kapitalanlagegesetzbuch, or KAGB) has led to a considerable increase in the importance of transparency and professionalism in risk and liquidity management. Risk managers face major challenges: they are required to meet increased demands for information and transparency (from management, investors, regulators), a bewildering array of regulatory requirements (KaMaRisk, EMIR, MiFID II, Solvency II etc.), complex legacy systems, various stakeholders, each requiring different information, whilst simultaneously ensuring data remains of the highest quality. Risk management activities will have to change considerably due to new data availability and handling options.

Conventional risk management systems used in real estate are exclusively focused on historical values and run stochastic simulations, some based on linear correlations.

“Many companies fall short on identifying risks early based on good indicators, even though there are now appropriate predictive approaches such as predictive analytics that can deal with this.”

Thomas Tilch, Partner, PwC Deutschland



The new generation of risk management will also include future assumptions and run hypothesis-backed simulations based on specific (non-linear) correlations. These focus attention on the impact of global (e.g., demographic and social changes, climate change) and individual trends (empty property rates, default, damage etc.) and help to optimise the risk/return ratio of the overall portfolio.

Stochastic and historical models need big data: using **IoT** and **AI** makes it easier to access complex risk-related data that are analysed more quickly and more precisely, increasing the accuracy of risk reports. This includes the time-consuming task of accessing information from different sources within the company, obsolete systems or past manually compiled Excel spreadsheets. As cited in Chapter C under section 5 “Technology” (see Figure 16), the use of Excel solutions in risk management has already been reduced significantly (use of Excel was 10% in 2017 compared with 44% just two years before).

Determining property values based on real time market data – particularly on liquidity and market risk – has a significant effect on growth-oriented funds. Risk reports can now be provided to investors and regulators promptly with greater precision and at higher quality, avoiding duplication and thus saving costs and time.

In **financial control**, **AI** is being used to improve the quality of predictions, for example on the annual budget. Using algorithms based on previous calculations and significant factors for business planning allows predictions to be made that are 60% closer to actual values than financial controllers' budgets based on subjective estimates. Financial control tools can be combined with AI and machine learning and used to apply updates in real time. Where changes are made to the operational budget, the algorithm adjusts the forecast automatically, thus rendering many time-intensive work steps and change loops unnecessary. Anomalies can also be detected and visualised.

There is already a wide range of **business intelligence software solutions** on the market: cross-platform, web front end concepts, standardised input forms and standard applications for enhanced, customised usability. Big data interfaces with legacy systems and external data pools allow comprehensive, customised reporting. There are also well-established software suites in governance, risk and compliance for various types of ad hoc analyses and integrated value risk simulations. Data for analysing investment decisions such as the acquisition or sale of assets, for determining tenant quality or breaches of tenancy agreements, for deciding on lending and investments, as well as early risk detection can be captured, analysed and in some cases also linked to business processes to create added value. All risks can be assessed with respect to probability, incidence and impact. Ad hoc analyses and KPI dashboards can be customised automatically in order to enable a prompt reflection of constantly changing requirements and allow responses to be mounted in a timely manner.

Cyber security continues to gain in importance. New approaches are required to deal with increased networking and the dynamic risks of digitalisation and need to influence strategic business planning. Emergency policies are required on rapid handling of leaks of sensitive data, digital sabotage and other security risks.

2.6 Fund administration

Creating data transparency and reducing complexity are key drivers in fund administration. There will be a greater focus on data management in future due to the steady increase in the amount of data to be processed. Big data, text recognition (also known as optical character recognition or OCR), sensors and IoT can be used to gather the complex, high-volume data which are then analysed electronically by business analytics, robotic process automation, machine learning or AI. VR and AR as well as man-machine interfaces can be used to communicate the complex issues to the physical world.

The fund management value chain is becoming increasingly fragmented as it tries to keep in step with the rapid digitisation of the real estate industry. Key fund management processes here include fund accounting, financial control, investor reporting, property valuation and financial control of outsourcing activities.

Until a few years ago, annual reports were still compiled manually in a highly time-consuming process. External data, itself usually obtained from a variety of different sources, were then entered in a process that was just as time-consuming and error-prone. The challenge is how to find smart ways to structure and convert the data. Companies are increasingly turning to web portals which allow users to access all key information with just a few clicks and allow reports and analyses to be generated in real time.

Manual processes are increasingly becoming automated. **Digital bookkeeping** allows procedures to be automated, with vouchers and business records scanned, allocated using OCR software and processed. Self-learning double-entry bookkeeping assistants and automatic account transfers make routine business easier. Burdensome filing of accounts are a thing of the past with the digital accounts voucher archive where purchase and supply invoices are arranged chronologically by date and each invoice can be accessed at the click of a button.

And with **e-payment services**, gone also are the days of manually recording individual transactions that can mount up in practice. Data is exchanged (in hard copy or encrypted e-mail) via a computer centre where the transactions are digitally processed using an API²¹ interface into voucher packets for the journal, with offset accounts saved simultaneously. Once accessed, transactions are linked to each voucher packet in the form of a digital voucher

A number of major European banks are currently working on a technical system to enable transfers in real time, 'instant payments'. This is driven by the entry into force of the Payment Services Directive which has stipulated since 2012 that cross-EU transfers should only take one day (two days in hard copy). Major internet companies such as Google, Apple, Amazon and PayPal are already working intensively on mobile and rapid payment solutions. New fintech providers are already developing pay apps such as Cookies and Payfriendz that enable instant transfers between friends, or payleven and Barzahlen which can be used to make transfers to companies and online shops. The benefits of real time transactions are clear: no more long waits and a solvency check within seconds. This is one more step towards mobile payment in real time.

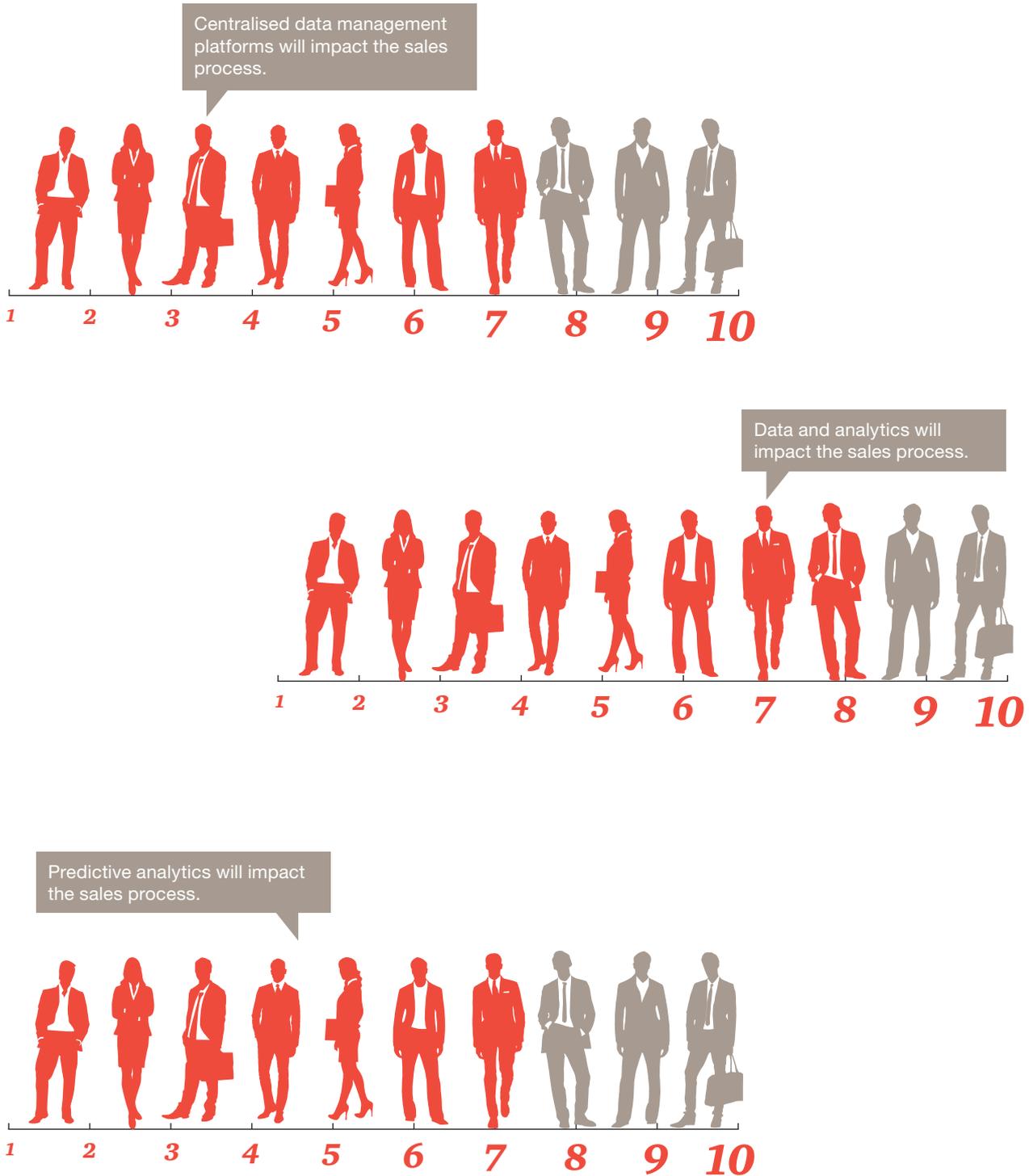
²¹ API: application programming interface.

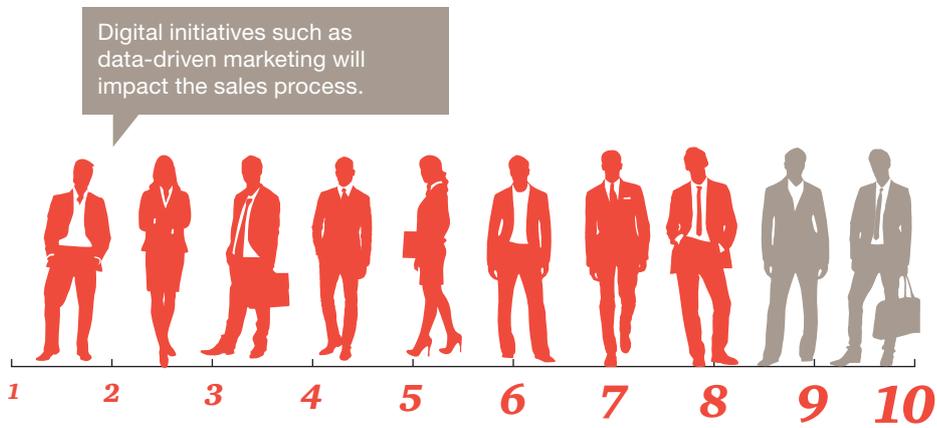
Here too the trend towards paper-free working will increase, possibly culminating in complete digitisation. This can only be achieved with a robust digital framework, since “digitisation won’t work without standard software”²².

For our investigation into the sales process we asked participants on the impact of technological changes in the sales process. On a scale from 1 to 10 respondents rated the impact of five different technologies on the real estate industry and the sales process in particular (see Figure 33 on page 58 and 59).

²² Inaugural speech by Klaus Freiberg, COO of the residential property company Vonovia.

Fig. 33 Please rate the impact of the following technologies on the real estate industry on a scale of 1 to 10, with 10 being the highest possible.





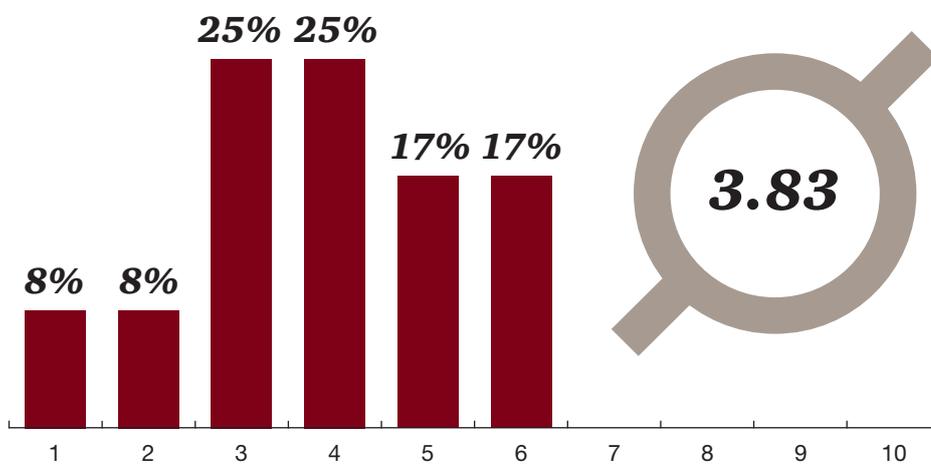
E Outlook



1 Digital users on the increase

We are just at the start of the digital transformation. The companies surveyed rated the digital maturity of real estate industry as 3.83 on a scale from 1 to 10 (with 10 being the highest possible); none of the companies rated itself above 6.

Fig. 34 How digital is your organisation?



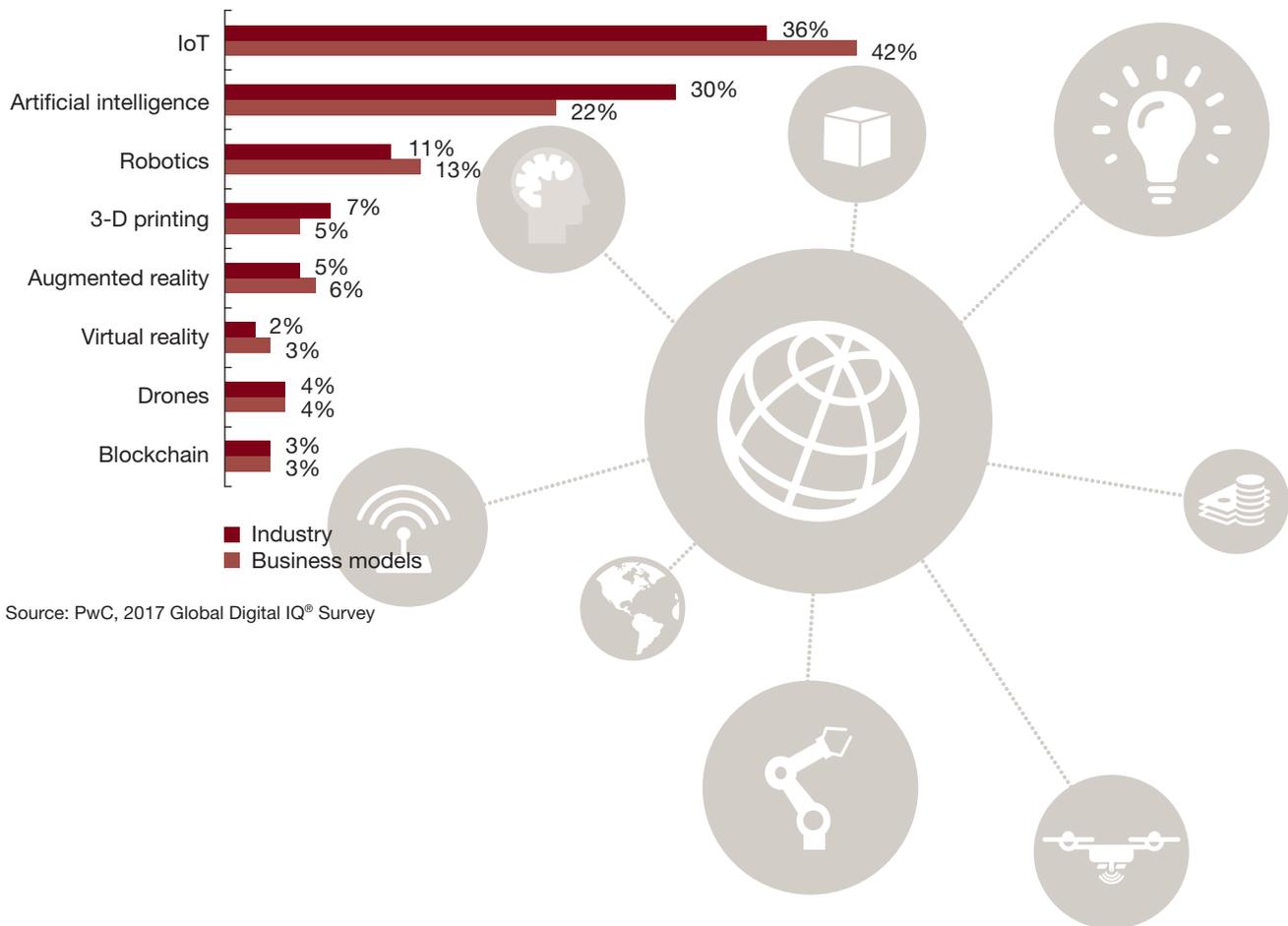
%-information based on number of participants

The industry consensus was that technologies make an important contribution to increasing performance. Technology can be used to make processes quicker and leaner, data more transparent and they can also lower costs through automation and reduce time-consuming review and approval loops. Complex issues can also be visualised and made explainable.

When asked what technology would be the most disruptive over the next five years, respondents put the Internet of Things at the top in the 2017 Global Digital IQ® Survey (business models: 42%). In future the workplace will be increasingly mobile and paper-free thanks to increased usage of cloud technologies, digital platforms and virtual datarooms. Work steps will increasingly be automated and digitalised. Contracts, meetings, minutes, acceptance transactions can already be recorded and edited using automated systems. The use of smart metering will also increase.

AI and robotics were ranked in the second and third places. Blockchain technology is not generally viewed as a disruptive technology for the next five years.

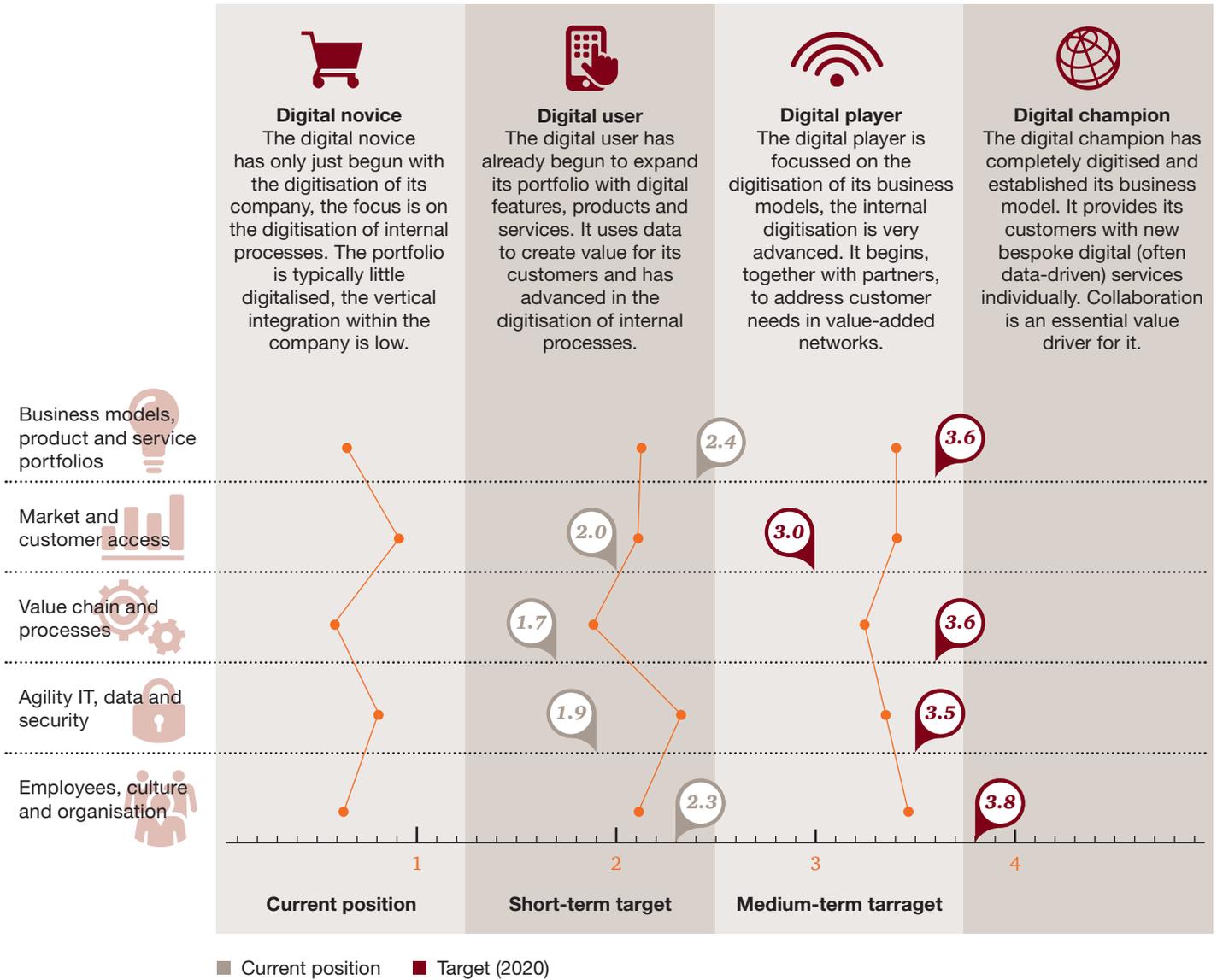
Fig. 35 Which of the following technologies will be the most disruptive for you in the next five years? Please select one.



Source: PwC, 2017 Global Digital IQ® Survey

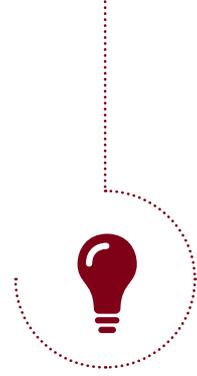
In our survey we asked participants to rate their current digitisation status and their target in this area on a scale of 1 to 5 (1 = low, barely present; 5 = advanced, mature) for five different areas. Figure 36 visualises the results of this comparison.

Fig. 36 Please rate the actual and targeted digital maturity of your organisation in the following dimensions on a scale of 1 to 5, with 5 being the most mature.



Most of the real estate industry companies surveyed said they are at stage 2 – Digital User. This also corresponds to our market appraisal.

We now look in more detail at the results in the individual dimensions of the transformation.



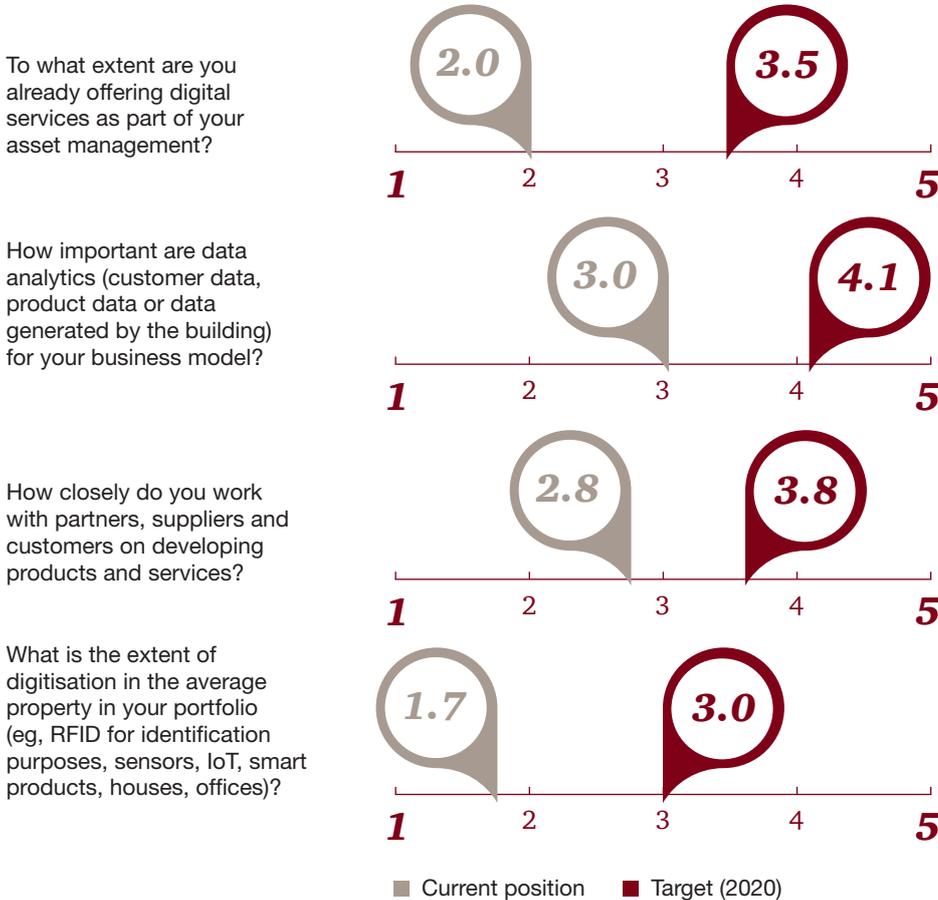
Business models, product and service portfolios

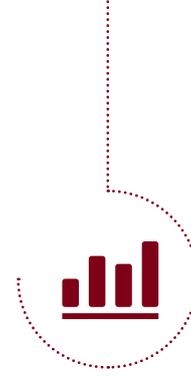
The survey participants currently score the maturity of their company with respect to the business model as 2.4. They all stated that they intend to increase digitisation of their services and intensify cooperation with partners and suppliers in the next three years. Intensity of cooperation is scored at 2.8 and is expected to increase to 3.8 by 2020. This means that in future there will be greater exchange of information with partners, suppliers and clients. This will increase transparency for clients. We believe that developing new products will be increasingly driven via partnership networks and that cooperation will also intensify in this area.

The current importance of big data and data mining for analysing customer behaviour and product data for the business model is scored at 3 by the participants. Their importance will increase further by 2020 (4.1 on the scale). Companies have high expectations: they believe they will have a better understanding of their market environment, meet customer needs better and be better placed to identify specific patterns by analysing these types of data. Decision makers will base their decisions on analysis of complex datasets and use of models.

The score for our question on the extent to which the average property in the portfolio is already digitised is 1.7; it is expected to be 3.0 by 2020. We conclude from this that the digitisation level in future will be a key purchase criterion for property transactions. The supply of digital properties is currently still low but we will soon see a change here with the increase in demand from users: Sensor technology, IoT and broadband connections will soon be important criteria when deciding on a property.

Fig. 37 Business models, product and service portfolios





Market and customer access

On average participants place themselves in this area at 2.0 on the scale currently and 3.0 for 2020.

Participants currently use more than one distribution channel to distribute their products. Digital distribution channels are expected to expand further over the next three years. This is because customers are increasingly basing their purchasing decisions on internet research (e.g., on social networks and forums). This is complemented by respondents’ plans to expand customer interactions. Use of social media will continue to gain in importance. Even today every major company has a Twitter, Facebook or LinkedIn account. Interactive communication over multiple channels to promote positive customer perception and use individual notifications and advertisements (in real time where appropriate) thus presents a competitive advantage for many participants.

Fig. 38 Market and customer access



Pricing is a key tool marketing that acts as a signal in sales and marketing. The key aim is to achieve prices that are in line with the market. Dynamic pricing, where discounts are offered automatically on the basis of customers’ potential, purchasing history and relevance, will continue to gain in importance since fixed prices are toxic in a highly competitive environment. Respondents are well aware of this and have scored themselves in the mid-range here (2.2). It is likely that pricing will be in real time within three years thanks to AI and IoT and that there will be more individual prices for different client groups.

Use of customer data is gaining in relevance due to the possibilities offered by AI and big data. Currently rated on the scale as 1.9 by the companies surveyed, maturity should reach 3.0 in three years' time. The days of customer information being held in a decentralised, unsystematic way and collected in a time-consuming manner from different Excel spreadsheets but for reasons of "silo thinking" not fully utilised are numbered. Comprehensive and complex data can now be recorded centrally (substantial data utilisation) using various apps, touchpoints and BI software solutions and fed into the legacy system in an integrated way. This allows information on products and sales as well as customer experiences to be monitored and reviewed for optimisation purposes.

Core processes (portfolio management, asset management, reporting and financial control)

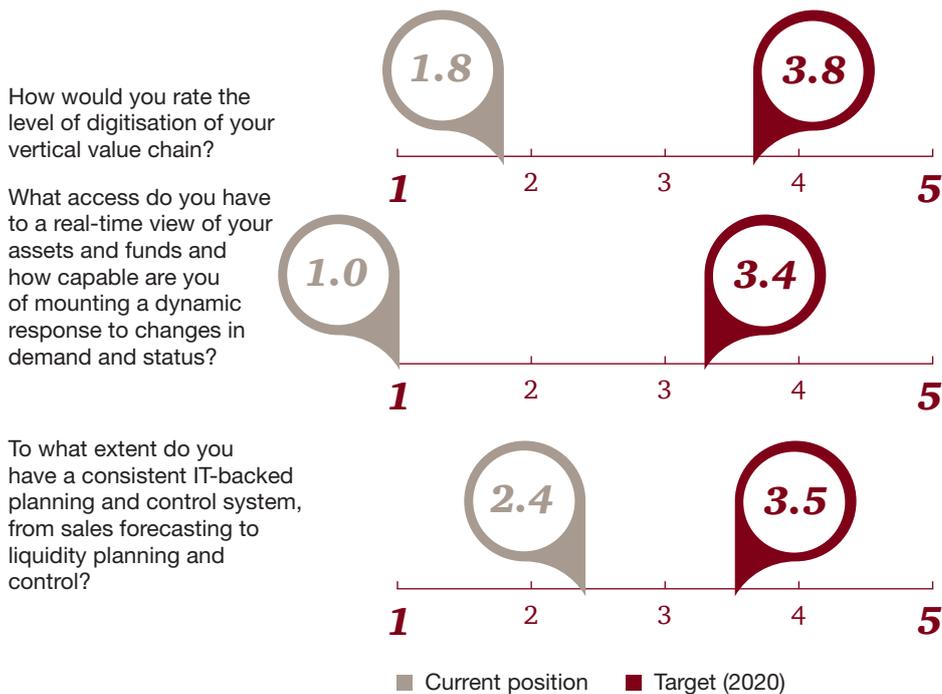
With an average rating of 1.7 on our scale, participants are still relatively at the start of the path towards Digital Champion on the value chain and core processes dimension. The greatest efforts are required here for companies to reach their target of 3.6 by 2020.

With respect to the level of digitisation – from product development to asset management and IoT connection and digital monitoring, control, optimisation and automation – respondents are currently at 1.8 on the scale. The maturity of the value chain is expected to increase by 2 points on the scale to 3.8 over the next three years. More investment is required to achieve this.

Use of real time data is currently still underdeveloped since the data capture systems required for this do not support direct connections to building managers or service providers. This rules out flexible responses to changes for the time being. By 2020, respondents are planning to introduce measures to achieve a maturity of 3.4 (currently 1.0). This suggests that more sensors, meters and equipment and funding will be deployed to enable dynamic changes.



Fig. 39 Core processes (portfolio management, asset management, reporting and financial control)



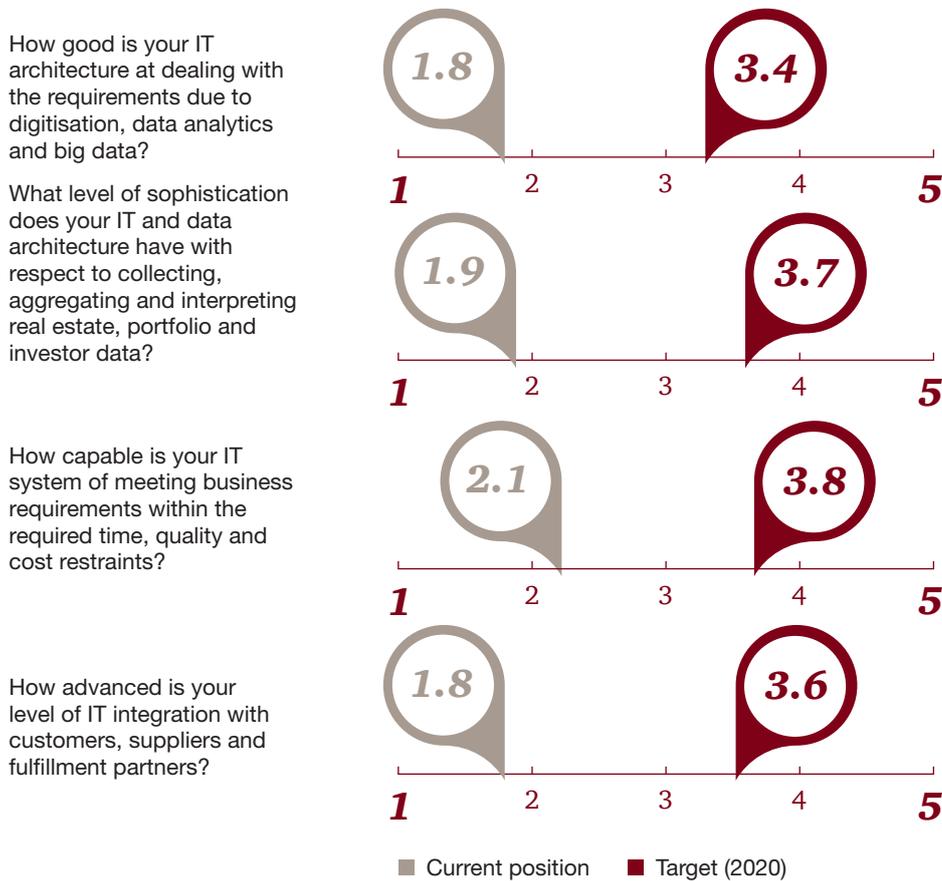
End to end approaches will come to the fore in process design, complemented by real time information. Participants scored their IT-supported processes in planning and controls at 2.4 (moderate maturity). They intend to achieve a maturity of 3.5 by 2020. There are already a large number of proptechs and software manufacturers specialising in this area. Data linking and chatbots will allow changes to be updated or tweaked automatically in the respective records (e.g., macro-economic and micro-economic changes can be adjusted in real time in the respective forecasts, impact on funding strategy identified at an early stage and controlled pro-actively).

IT architecture

On average participants place themselves in this area at 1.9, with a target of 3.5 for 2020. The current IT architecture frequently has only a limited capacity to integrate increasing requirements. Many companies are about to or have already compiled a digital roadmap to undertake the expansions required. But there are still many one-off solutions to be found in the real estate industry. Survey participants plan to optimise their IT and data architecture by 2020 to allow them to produce analyses for reporting, budgeting, research and asset management in real time.



Fig. 40 IT architecture



They rated themselves as average (2.1) with respect to the performance of their IT. Their target for 2020 is to set up an IT landscape that can respond agilely to new and constantly changing requirements: IT and business working together. The IT department will no longer be used only to protect highly complex data structures, but in future will also contribute on ideas and help to design rapid prototypes. This is already evident in the employment market where a range of industries are desperately trying to recruit experienced IT specialists.

Back office tasks in particular are often outsourced with external administrators having access to the company's IT systems. Access to the systems and folders is controlled by access rights to prevent unauthorised knowledge transfer or use of data. In a digital world enabling seamless, secure data transfer will become increasingly important (e.g., for complete order tracking by customers, or inventories by suppliers).

Organisation, compliance and business culture

On average participants place themselves in this dimension at 2.3 and 3.8 for 2020.

Companies possess a large amount of data but do not have the capacity to use these data, whether extensive or granular, in a way that is beneficial or adds value. The companies surveyed currently achieve an average level of maturity (2.2) and are clear that action is required over the next three years. New skills and capacities are top priority, in data science or core analysis for example.

Further work is needed to build up resources and capacities to keep up with the digital transformation by 2020. Respondents currently achieve a maturity of 2.1. The IoT, with mobile devices, electronic check in, sensors etc, is already firmly embedded in daily routines. As digitisation increases, cyber security and data protection will continue to gain in importance. Therefore, we expect investment to increase in the next few years.

As we explain in more detail in Chapter 5.2, companies can only achieve a successful digital transformation with the commitment and support of top management. The larger corporates have already formed their own department to cover this and appointed a Chief Information Officer responsible for the digital transformation. So it is not surprising that the average maturity score here is 3. Respondents have set a target of 3.9 by 2020. We feel that this matches the plans for developing and implementing a comprehensive IT strategy in many companies, but also the increase in awareness of managers for the importance of the digital transformation.

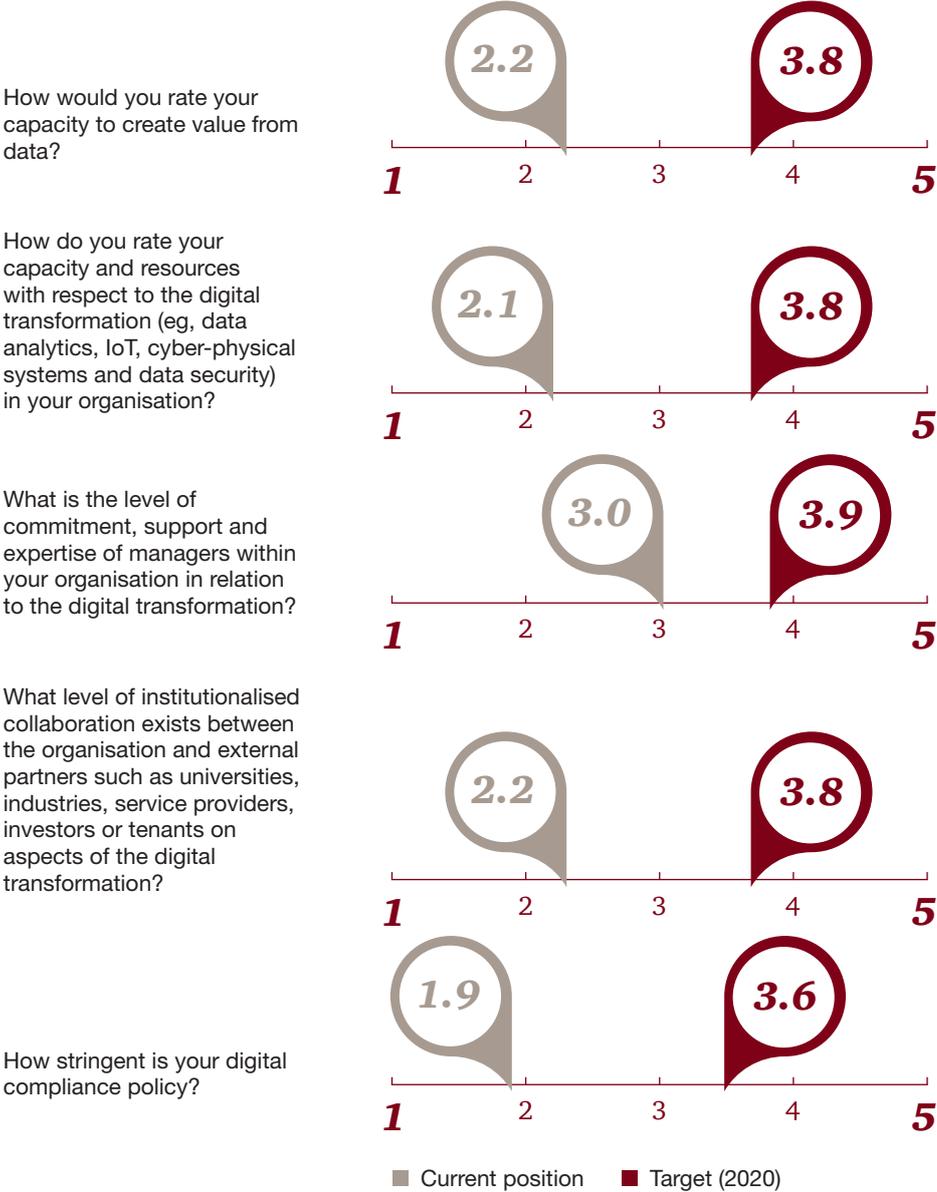
Respondents currently seldom work with external partners such as universities, service providers or other third parties. They currently achieve a maturity level of 2.2 but intend to increase it to 3.8 by 2020. They see open cooperation as a catalyst and assume that it will intensify further through the use of open platforms for cross-sectoral research.

Digital compliance is still relatively immature in the companies surveyed (1.9). A large number of measures are planned to address this by 2020 such as the creation of digital compliance guidelines for the whole organisation that is optimally supported by a digital industrial control system (ICS)²³.



²³ ICS: Overarching term for automation solutions for controlling technical processes.

Fig. 41 Organisation, compliance and business culture



2 How do you become a digital player?

There are specific factors companies need to take into account if their digital transformation is to succeed, rather than turning into a nightmare.

Several PwC studies²⁴ show that market participants view the biggest obstacles to implement digital transformations is the lack of human resources, the absence of a clear strategy, opaque data structures, insufficient data quality and obsolete IT systems and software landscapes. Data protection, investment costs and employee acceptance, however, are not viewed as critical factors.

PwC has provided advice and assistance on a range of different transformation projects in leading industrial companies and has developed a blueprint for successful digital transformation of companies based on the experience it has garnered. This consists of six simple steps that are summarised below:

Step 1: Map out a strategy and digital maturity

You need clearly defined targets, sufficient time, precise steps and a clear prioritisation.

Firstly, evaluate your own digital maturity and set clear targets for the next three to five years. You need to perform a detailed evaluation of each department to ensure your approach covers the whole company and avoid organisational bunker mentalities. It's important to understand what strengths can be built on and what systems or processes will be required for future solutions.

PwC has developed a digital maturity model for this that consists of four stages. Most companies are currently at stage 2, Digital User, as confirmed by the results of our survey.

“You don't need a digital strategy to succeed in this world, you need a business strategy for the digital age.”²⁵ #worldinbeta



²⁴ Cf. PwC, 2017 Global Digital IQ Survey; PwC, 2016 Global Industry 4.0 Survey; PwC, 20th CEO Survey, 2017.

²⁵ www.pwc.co.uk/world-in-beta.html.

“Digital transformation has significant benefits added to it and our portfolio managers prioritise digital transformation as they understand the criticality of it in today’s business environment. We have initiated and completed a few digital transformation projects in our portfolio businesses and have seen the improvement in their market positioning which is driving our value considerably.”

Managing Director, Germany, AuM 250–500 million Euro

Secondly, once targets are set, you need to prioritise the measures that will bring the most value to your business. You don’t need a digital strategy to succeed in this world, you need a business strategy for the digital age. So make sure the digital transformation is aligned with your company’s overall strategy. And consider what you could gain over the long term by collaborating with customers, suppliers, proptechs or even competitors. Take the long-term view and consider what impact new applications – in these fast-moving times – and changes in customer behaviour could have on your business model, customer relations and other areas.

C-suites need to find answers to:

1. Do we have a sustainable innovation strategy and process?
2. Have we quantified the impact of new technologies? If not, how can we do that?
3. Do we have an emerging-technologies road map? If so, are we keeping it up to date?²⁶

Check your digital readiness by asking yourself the following questions:²⁷

1. Am I introducing new digital technologies such as AI, IoT, blockchain etc., to demonstrate how tech-savvy I am, or do I have a clear idea of how they will transform business over the long term?
2. Has the organisation’s digital potential been identified? Do I know how many digital treasures are hidden in my own data and information? And do I know how to collect and use them?
3. How much of the knowledge and information within the company am I already providing to my employees to help them make better, quicker decisions and choose to concentrate on their core competencies?
4. Does my performance assessment system concentrate on my employees’ strengths with continuous focus on their personal development?
5. Are new technologies not just introduced but actively promoted and integrated into daily routine? How many managers are championing the digital transformation? And what about top management?

Completing the transformation and driving the cultural shift needed can take years. It’s critical to provide clear leadership from your top management, but equally important is convincing major stakeholders (managers) who will need to implement the desired adjustments and changes across the organisation. Measures such as

²⁶ Cf. PwC, Tech breakthroughs megatrends: How to prepare for its impact, 2016, www.pwc.com/gx/en/issues/technology/tech-breakthroughs-megatrend.html.

²⁷ Cf. PwC, „Wir sollten mehr Vertrauen in die Technologien haben und weniger auf die Gefahren schauen“, 15.12.2017.

technology roadshows and invitations to innovation hubs have helped get everyone on board. Once all top managers are convinced and motivated to champion and implement the transformation you can go on to the next step.

Step 2: Set up a pilot project

Practice has shown that launching a pilot project can be useful. Use it to establish proof of concept and demonstrate the business value of your digital concept. Target a confined scope, but highlight the end-to-end processes.

Create cross-functional teams that can concentrate wholly on the project and think in new directions outside existing company limitations. These pilot teams will often need to design pragmatically to compensate for standards or infrastructure that don't yet exist. At the same time they will gain an insight into the various departments and gain a good understanding of the functions and interactions across the whole ecosystem. They will be in a good position to assess the impact of changes that may be needed in IT, security, tools, and process and people capabilities.

Consider collaborating with start-ups, universities, or other industry organisations to accelerate your digital innovation.

The knowledge gained – and failures – from the pilot project are important milestones for future actions. Build on the lessons learned to map out in detail the IT architecture you need.

Step 3: Define the capabilities you need

Identify which capabilities are needed to enable the new digital business model. You'll need to consider four strategic dimensions: organisation, people, process and technology.

Fine-tuning your organisation

Check whether you need new organisational structures. These could include incubators, centres of excellence or new functions such as a digital officer. In future, companies need to be able to mount an agile response, or radically transform, to survive a world of volatility, uncertainty, complexity and ambiguity.²⁸ The increasingly rapid pace of change is a major challenge, particularly for traditional companies with hierarchical organisational structures that have grown up over decades. In order to respond quickly and appropriately they will need to break up traditional structures. Collaborating with start-ups or setting up in-house ideation labs is a good way to achieve this. The road to a digital future will be long and hard for analogue companies but the first companies are already showing a pioneering spirit and engaging intensively with the transformation of their companies.

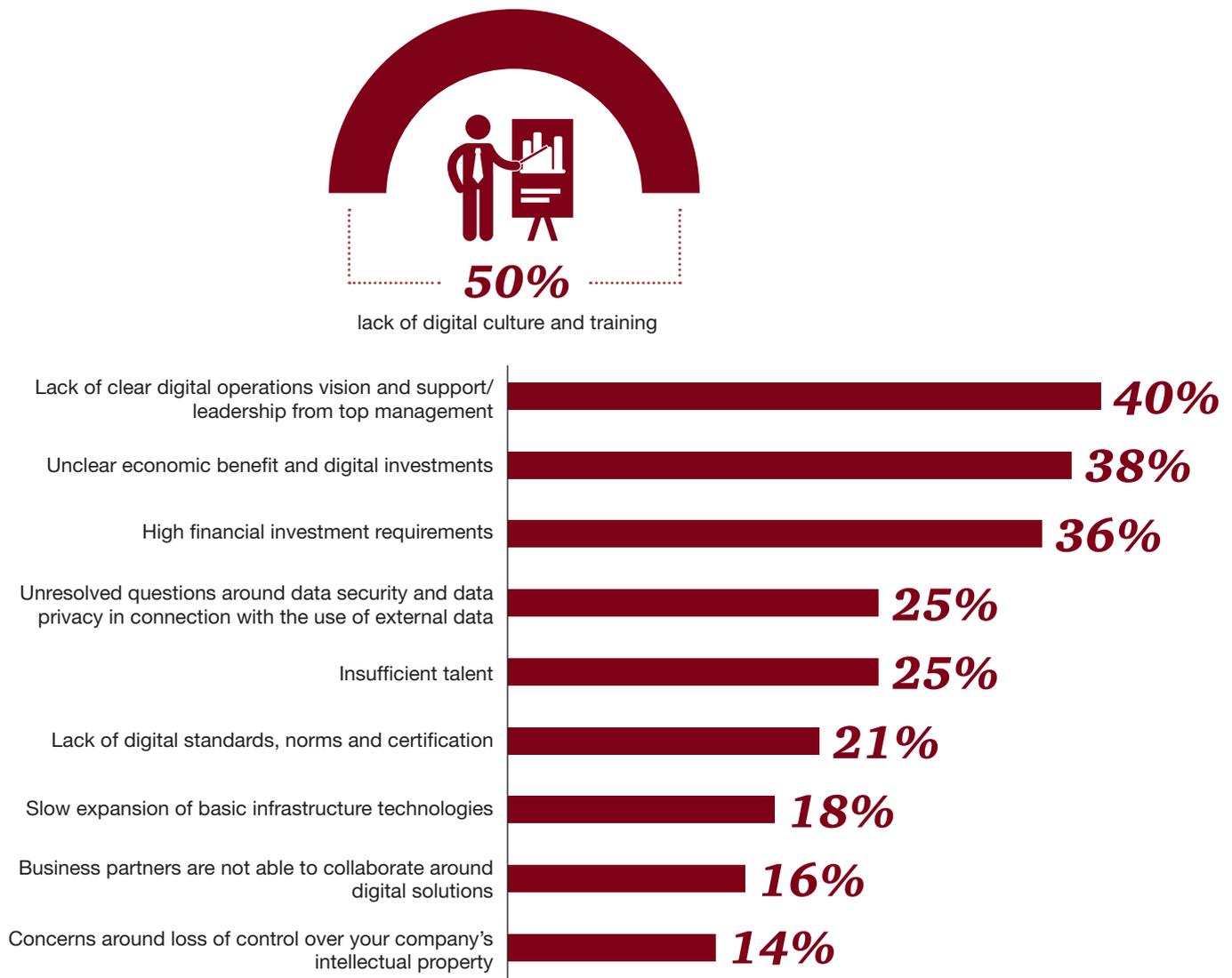
Focusing on people

The biggest inhibitors for transformation are the human factor and existing business culture. This was also the outcome of *PwC's 2016 Global Industry 4.0 Survey* (Figure 42): 50% of the 2,000 managers of industrial companies surveyed identified the lack of an understanding of the new digital culture and the right training was the biggest challenge for expanding digital capabilities. Lack of a clear digital operations vision and support/leadership from top management was seen as an additional barrier (40%).²⁹ To attract people with the right skills, you need a strategy for recruiting new employees or training existing ones. You also need to introduce new roles in your company, like data scientists, user interface designers, or digital innovation managers. And job profiles need to be updated to take into account the new digital skills that are required.

²⁸ Cf. Georg Giersberg, Unternehmen stehen vor einem radikalen Umbruch, FAZ, 18.12.2017.

²⁹ Cf. PwC, Industry 4.0: Building the digital enterprise, 2016.

Fig. 42 What are the biggest challenges or inhibitors for building digital operations capabilities in your company?



Improving processes and data security

This focuses on an end-to-end process perspective. Having a strong user interface that encourages new models of cooperation is essential if the company is to respond flexible to new needs and enable consistent user experiences across different channels. This means digital trust will be increasingly important (for employees and customers alike). New processes need to be set up for data security, access rights control and establishing standards for managing sensitive customer data, and compliance processes. You need to ensure you are complying with regulatory requirements such as the EU General Data Protection Regulation which comes into force on May 25th 2018. This regulation is relevant for anyone working with personal data: owners, managers, developers and architects. Data protection should not be seen as an irritant by companies (particular where violating the new Data Protection Regulation means a fine of 4% of annual turnover)³⁰ but an opportunity to differentiate it from the competition. In Particular, since trust over data collection is essential for acceptance and success.

³⁰ Cf. IZ newsletter, 11.01.2018.

Implementing new technologies

Ensure that the IT landscape is sufficiently agile to respond quickly and flexibly to new requirements. Working solutions and an agile approach are the best way to continuously improve and expand your services.

Step 4: Become a virtuoso in data analytics

Become a data virtuoso: Identifying and gathering the right data, deploying it for the right purposes and effectively analysing it will be critical for making the right decisions. Defining and developing a data analysis strategy will require a focus on: predictive analytics and forecasting, prescriptive analytics and automated feedback to the organisation and employees.

Improve your data management: This includes regularly cleaning up and maintaining data as well as deleted obsolete data. Identify 'functional use cases' at the development phase. Build your own data pool, based on real-time cross-functional and external data, as well as a suitable analytics tools connected to existing and new data sources.

Choose a data platform: When choosing your data analytics platform, the ideal should be one single integrated solution. Existing ERP systems do not have full capabilities to handle the complicated and complex data trends, analytic methods and algorithms that need to be used to provide the more advanced business intelligence and foresight that will be needed.

Step 5: Paradigm shift

Change your digital culture to retain the best talent. This means abandoning functional silos and creating a collaborative mindset that crosses company boundaries and faces outward to partners and customers.

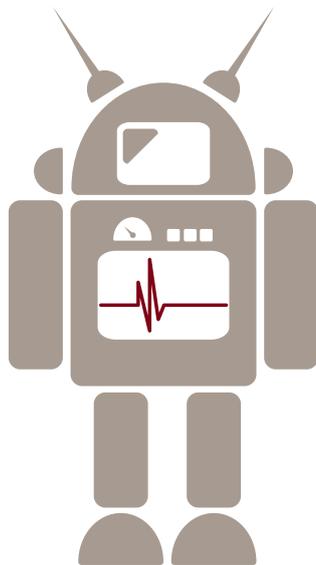
Digital transformation will only be successful with committed management (C-level) and a high prioritized management agenda. Consider whether to task the CIO, a CDO or other executive to lead the effort. Some companies also establish a digital council that actively manages the development of digital enhancements, products, and services from the idea stage (strategy) through the rollout in operating units (execution) and provides a cross-functional support to the teams.

Step 6: Find the approach that's right (for you)

First movers achieve breakthrough performance by going a step further to understand consumer needs and use of digital technologies to create and deliver value to the customer in a creative, innovative solution.

Companies can evolve their market offering across four layers moving from a traditional, physical core product to a comprehensive digital ecosystem. In the earlier development stages, use partnerships or cooperate with platforms. The success of your approach is driven by the number of involved partners and the intensity of their relationships. Incentives can be set in line with the business culture and suitable benefit sharing models developed that compensate everyone fairly for their contribution. If you are worried about sharing knowledge, you may prefer acquisitions. But look for ways to deal with potential obstacles such as differences in technical standards so that you can profit from this type of collaboration, even if you do not fully control the entire value chain.

“Be innovative and set new standards in digitisation.”



Contacts

Editorial board

Annett Anschütz

Manager

Real Estate Consulting

Tel: +49 89 5790-6607

annett.anschuetz@de.pwc.com

Ralf de la Camp-Gruber

Senior Manager

Real Estate Consulting

Tel: +49 89 5790-6857

ralf.de.la.camp-gruber@de.pwc.com

David Nadge

Manager

Real Estate Consulting

Tel: +49 89 5790-6848

david.nadge@de.pwc.com

Sponsors of the survey

Julia Arlt

Director

Innovation Real Estate

Tel: +43 1 501 88-2830

julia.arlt@at.pwc.com

Susanne Eickermann-Riepe

Partner

Real Estate Consulting

Tel: +49 69 9585-5909

susanne.eickermann-riepe@de.pwc.com

Researchers and interviewers

Annett Anschütz

Ralf de la Camp-Gruber

Adam Flach

Katharina Götzen

Florian Huber

Marc-Philip Kunzmann

Katrin Müller

David Nadge

Felix Wollenhaupt

If you would like to discuss any of the issues raised in this survey in more detail, please speak with your usual PwC contacts or anyone listed below.

Uwe Stoschek

Real Estate Leader EMEA
uwe.stoschek@pwc.com

Amaury Evrard

PwC Luxembourg
amaury.evrard@lu.pwc.com

Kinga Barchon

Real Estate Leader CEE
kinga.barchon@pwc.com

Jeroen Elink Schuurman

PwC Netherlands
jeroen.elink.schuurman@pwc.com

Wolfgang Vejdovsky

PwC Austria
wolfgang.vejdovsky@pwc.com

Guillermo Massó

PwC Spain
guillermo.massó@es.pwc.com

Ann Smolders

PwC Belgium
ann.smolders@pwc.com

Arne Engvall

PwC Sweden
arne.engvall@pwc.com

Geoffroy Schmitt

PwC France
geoffroy.schmitt@pwc.com

Kurt Ritz

PwC Switzerland
kurt.ritz@ch.pwc.com

Susanne Eickermann-Riepe

PwC Deutschland
susanne.eickermann-riepe@pwc.com

Craig O. Hughes

PwC United Kingdom
craig.o.hughes@uk.pwc.com

Elisabetta Caldirola

PwC Italy
elisabetta.caldirola@pwc.com

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