



Real Estate + Real Innovation

**Topics, trends and technologies for the
digital real estate industry**

Whitepaper

March 2022



Foreword

"The real estate industry is facing numerous challenges ..." — this is often the opening sentence to current articles about the future of the industry. And indeed, the real estate industry is moving more and more into the public eye due to increasing socio-political and regulatory tasks. The tasks range from the creation of affordable living space in the housing industry and the need to adapt development models on the commercial property market to the new workplace models. In addition, those involved in the market must equally deal with the changed view of sustainability criteria, which are now summarized under the abbreviation ESG (Environmental, Social, Governance).

Again and again, the question arises 'if' and 'how' technical innovations can contribute to overcoming these challenges. The appeal this task has for managers and specialists lies in exploiting the possibilities of the rapidly developing technologies in a meaningful way and thus sustainably changing the organizations and processes of the real estate industry.

But how do you find a common denominator between real estate + real innovation? In the following articles, we venture a look into trends, topics and technologies that will likely occupy the industry in the digital future. Our expedition begins with the opportunities for digitization of homes, buildings and cities as part of a 'smart infrastructure' and continues with impulses for a future-oriented IT architecture to shape the 'smart enterprise'. Finally, we would like to address the important role of corporate culture and employees in the implementation of digital transformation as well as for IT security.

We wish you a thought-provoking read.

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SMART CHANGE

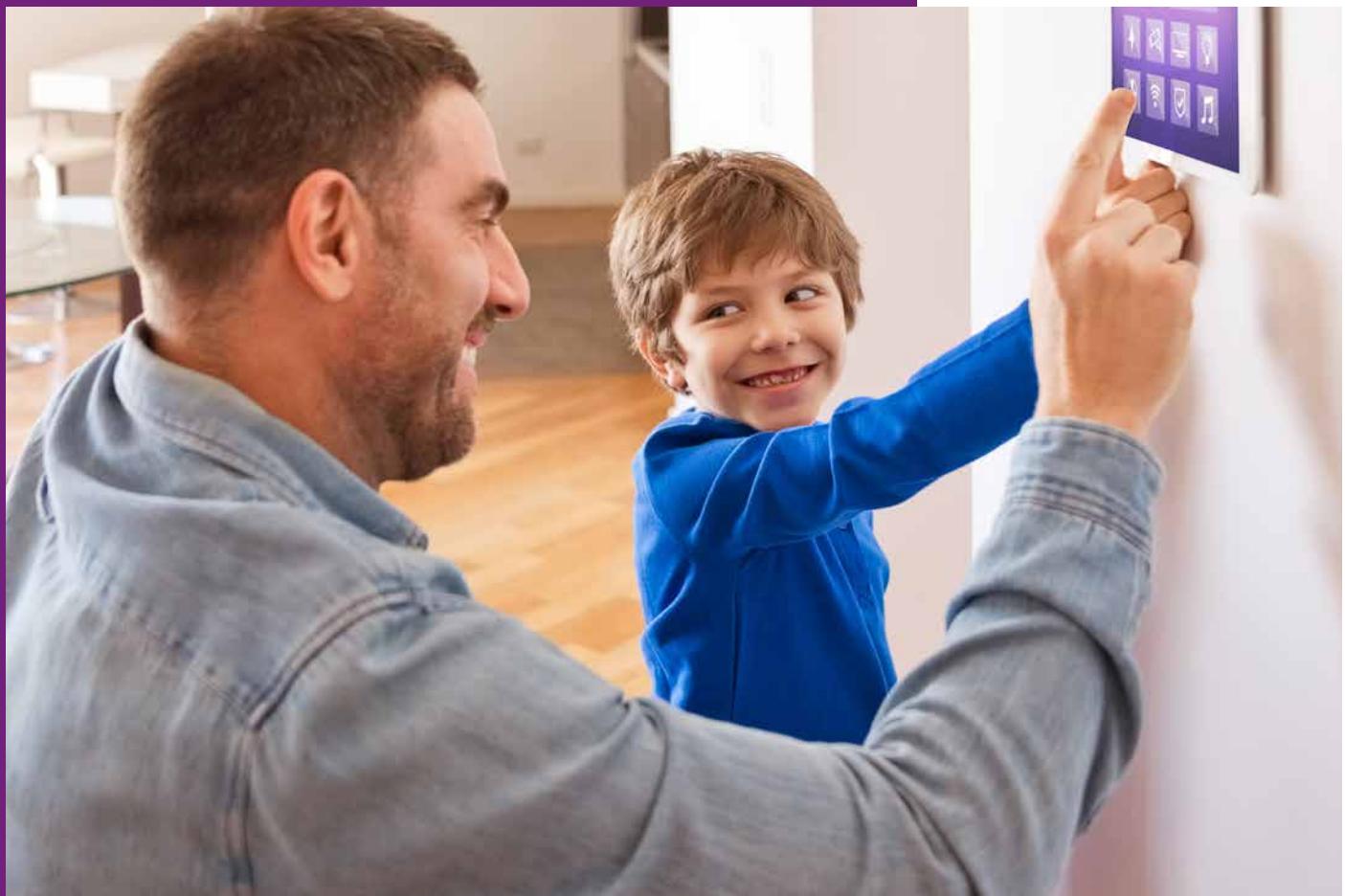
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Housing + Open Platforms

The variety of standards and systems for Smart Homes may continue to increase but also generate innovative use cases for commercial buildings



There is still no universal standard for all Smart Home devices in sight. Instead, many different protocols and systems compete. In the innovative Smart Home community, however, application examples can be found that can be transferred to the B2B sector.

The resource-saving, environmentally conscious, intelligent, networked and safe house is standard in future housing construction — it is called a Smart Home. But what exactly is a Smart Home? Which standards and systems exist? How does it work and which advantages and disadvantages come with a Smart Home? What might trends and developments look like in the future? What follows is an overview of some essential data for your consideration.

Smart Home use cases are diverse and serve as inspiration for professional applications

A Smart Home means that devices in a household are connected to each other and can send or receive information via the internet, smartphones or electronic voice assistants. Examples are the self-activation of a Wi-Fi-enabled washing machine when the electricity price is low or sending a push notification to the owner's smartphone as soon as a wash cycle is finished. Smart thermostats can help reduce operating costs and save energy. So-called smart locks make it possible to open the front door remotely for other people, such as the parcel delivery person or a cleaner. This means that manually executed technical processes can be digitized, automated and coordinated. In connection with both the Smart Home and the Smart Building, the term Internet of Things (IoT) is often used. IoT is decisive for the online connection of internet-enabled devices. In short, IoT takes a house or flat to the next level.

Numerous standards and systems complicate integration

Since the Smart Home is made up of many intelligent components that are addressed via a control center (also called a base station, gateway, hub or bridge), the choice of the control center is the first and also the biggest step into the world of the Smart Home. It determines which components can be integrated into the system. The systems are divided into open and closed. Open means that a control center can be connected to components that are not from the same manufacturer. With closed systems it is the other way around. Both systems have advantages and disadvantages. In an open system, components from different manufacturers can be combined and controlled via a harmonized platform. In this way,

communication between products from different companies can be simplified. Closed systems can only be combined with products from the same manufacturer; however, these are often more secure. The reason: the radio protocol is not open and the standards only lie with the manufacturer itself. This enables a smooth exchange of data between the products of the individual supplier.

The next step is to select sensors and actuators for a system. The sensors send data to the control center, such as the detection of movement. The actuators, on the other hand, react to signals from the control center and control the household appliances. Data transmission in Smart Home systems is either wired or wireless. This basic mode of operation not only applies in the Smart Home but is also the basis of building automation in the Smart Building. As it does not require any infrastructure, radio is the most common way of data transmission. Which radio standards are used depends on the manufacturer of the components and the control center. Alternatives to radio standards are wired systems with so-called buses. Wired systems are particularly suitable for new buildings. In existing buildings, however, retrofitting is costly and time-consuming because cables have to be laid to every existing component.

The great variety of standards is both a curse and a blessing, as many people interested in Smart Homes are faced with a confusing choice. The challenge of different standards and systems also arises at the Smart Building level, so that the requirements of the consumer sector can also be transferred to the business context. The basis in each case is IoT and network communication technologies.

Data protection and security offer potential points of attack

It is in the interest of industrial companies as well as the real estate industry, project developers, investors and those who hold properties in their portfolio to report a need for repair at an early stage and thus significantly reduce maintenance costs and increased electricity consumption. In addition, it is also important to collect data on an entire property portfolio in order to make housing management processes more effective. Among other things, the Smart Home contributes to climate protection through reduction in CO₂ and at the same time ensures cost savings. These in turn influence business success, both for existing properties and for new buildings. As promising as the advantages of the Smart Home sound, it is also important to take a look at the other side of the coin. Two of the biggest points of criticism are the increased (IT) security risk and data protection. Data protection and data security have been prominent topics in the real estate industry since the enforcement of the General Data Protection

Regulation (GDPR). A lot of data is produced and used in Smart Homes. Thus, hacking attacks that gain access to the data can quickly become an acute threat. Careful handling of the applications and observance of a few security rules during installation and use can prevent data mishaps.

Smart Home use cases can be scaled to Smart Building

Although both terms describe the digitalization of real estate of any kind, there is a significant difference. In comparison to the Smart Home, which envisions the use of intelligent technologies exclusively in privately used buildings, the Smart Building deals with the digital networking of commercial properties such as shopping centers, hotels, offices, and logistics buildings. As previously described, a large number of use cases are being tested on a small scale in the large Smart Home community. Can these use cases be transferred or scaled to the Smart Building? Is it possible — as of today — to link the Smart Home with the Smart Building? In contrast to the Smart Home, where data is collected voluntarily by household members, data collection in the Smart Building tends to happen without all persons involved being aware of it. Thus, legal aspects regarding data protection should be taken into account.

In addition, the multitude of different standards and systems makes it seem less sensible for technical reasons to link Smart Homes with Smart Buildings. It would probably be more effective to filter out those use cases from the large number of tested use cases in the B2C sector that can also be scaled or transferred to large commercial properties in the B2B sector. However, there are still some challenges to overcome before Smart Buildings can be realized and operated as a standard.

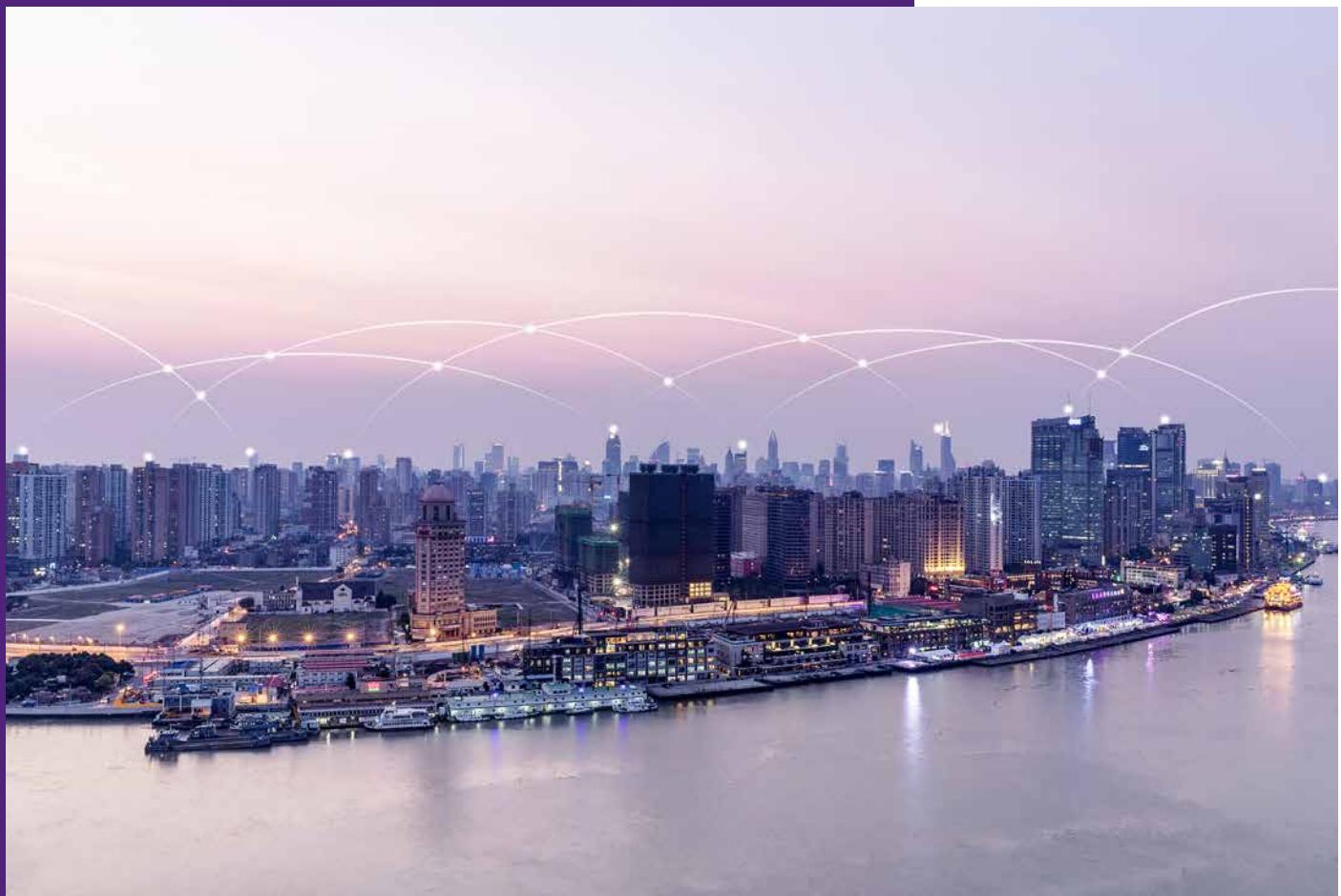
Smart Homes and Smart Buildings converge via industry-wide standards

Whether and to what extent the Smart Home will be accepted by industrial companies, project developers, private and commercial investors depends on many factors. Anyone who owns a house and rents out apartments will not be able to realize a Smart Building if each tenant wants to use their own Smart Home system. As a result, a Smart Building only makes sense as things stand today if the data is compatible with the tenants' back-end systems. In the future, it will be decisive how the smart infrastructure can be intelligently coupled with the needs of the people who use it. Universal standards can help to create acceptance here. Another factor is the compatibility of devices from different systems and different manufacturing companies with numerous control systems. The largest manufacturers of Smart Home systems are working together on the CHIP project (Connected Home over IP) to make the devices compatible with each other. Matter standard (previously known as CHIP) is developed and managed by the Connectivity Standards Alliance (CSA), which is made up of the above-mentioned manufacturers, among others. The use of Matter is intended to provide multiple generations of renters, both residential and commercial, with a user-friendly Smart Home environment. Through the CSA's collaboration with the World Economic Forum as well as the Council on the Connected World, the deployment of Matter is expected to go global. The communication of the devices is IP-based.



Infrastructure + Connectivity

High-performance infrastructures are a critical success factor for the marketability of buildings and the fulfilment of increasing usage requirements



Properties with a lack of digital infrastructure may no longer meet market requirements in the future and will likely suffer losses in attractiveness and value. Therefore, investments in the building infrastructure are important.

In real estate practice, the technologically advanced services of telecommunications providers can often only be used to a limited extent due to the network infrastructure in the properties. At the same time, the demand for corresponding digital technology is increasing, so that properties with insufficient equipment are losing a lot of their attractiveness. Digitalization trends such as Smart Homes, Smart Buildings and the IoT are in demand and have a significant influence on the future of the real estate industry. In addition to a good network connection, high-speed network infrastructures are needed within the buildings.

Digital infrastructure as the basis for Smart Buildings

Meeting core needs and adequately supporting digital business models through mobile workers for whom the use of cloud technology, for example, is here to stay, requires fast and reliable internet connections and solid mobile reception. When renting office or commercial property, this infrastructure is often more important than the amount of rent to be paid, so there is potential for rent increases here. But those who rent out real estate also need this infrastructure in order to provide cloud-based services to tenants and to be able to answer their enquiries digitally.

One way to meet the requirements for a fast internet connection is Fiber to the Building (FTTB). FTTB refers to fiber optic cables that are laid right into the basement of buildings. In order to avoid costly civil engineering work, modern connector technologies can be used, with the help of which the optical fibers can be routed into the building via existing gas or water connections. In the property itself, the signals are then routed to the residential or office rooms via existing copper lines and VDSL technology. The fast fiber optic lines can achieve high speeds of up to 1,000 Mbit per second for downloads.

The 5G mobile communications standard as the next evolutionary step in wireless technology

In Smart Buildings, the new mobile technology 5G will likely play a decisive role, as the network provides a uniform interface for many offerings. 5G promises more throughput, higher capacity and simultaneously decreasing operating costs. The amount of data in modern properties, for example, on water consumption or indoor temperatures measured by sensors, is growing continuously. At the same time, buildings can be controlled automatically with the help of IoT applications. 5G is seen as an enabler of the IoT, as greater network capacities allow more IoT devices to be connected. It is nothing less than a quantum leap in digitalization. With 5G, data can be transmitted at up to 10 gigabytes per second, twenty times faster than before. The delay time with which data may arrive at the other end of the world is also reduced to less than 5 milliseconds. If, for example, an excessively high temperature is reported in the building's internal communication, the heating can be automatically turned down. The network capacity required for this can be provided by 5G mobile technology, enabling efficient and environmentally friendly energy use. 5G also influences the interior design of office buildings and the associated work opportunities. Better quality video calls through real-time communications reduce the need for business travel. Higher speeds and greater bandwidths make completely wireless workplaces possible, helping lower costs.

Another essential aspect of 5G technology is network slicing. Within the framework of network slicing, individual programmable infrastructure layers are created. This ensures a sensible distribution of network resources and components. If a separate network is created for an individual building through network slicing, communication within the building can be secured and take place flexibly. For example, for Industry 4.0 production halls where machines communicate directly with each other, a 5G connection may be required to support the business model of these customers.

The higher speed of data transmission and the shorter reaction time of the network to requests (latency) shortens the wavelength of 5G. For this reason, the distance between masts must be reduced to a maximum of 500 metres, which means that new masters must be erected to achieve complete network coverage. In the increased need for radio masts, however, lies the opportunity — if real estate property is available — to rent the roof to mobile network providers for the installation of new masts and thus generating additional rental income.

One disadvantage of 5G is that, especially in energy-efficient buildings that consist of a solid building fabric with often specially coated window panes, 5G radio signals are blocked as effectively as heat losses are reduced. Here, ESG sustainability preempts digitalization and, for structural reasons, banishes the fast radio waves to the outside.

To compensate for the weak points of 5G, so-called repeaters can be installed in the building, which achieve an amplification of the mobile radio signal and spread the signals within the property. However, at the same time, some of the advantages of 5G are negated because the entire building has to be wired accordingly and space has to be created in the walls for the risers. However, far fewer cables are needed than with classic LAN connections for PCs, telephones or printers. It should be noted here, however, that many repeaters currently available on the market are not suitable for the new mobile network and must be retrofitted. It is advisable to use repeaters that can be upgraded.

Another option is Distributed Antenna Systems, i.e. numerous antennas distributed throughout the building that help to amplify the new radio technology. In addition, mobile radio signals can be converted into WLAN signals via gateways and telephoning can be switched to WLAN calls. To implement these solutions, long-term investments are necessary. Nevertheless, they are likely to be unavoidable, as the range of mobile applications is constantly growing and tenants are unlikely to put up with poor reception in buildings.

Fast infrastructures form the basis for the digitalization of the property and better user experience

In the future, fiber fibre optic lines and the new mobile technology 5G are positioned to dominate the digital infrastructure in real estate, despite the challenges mentioned. Real estate companies that want to meet the requirements of their customers and the market cannot avoid investing in these technologies. They should therefore see them as an opportunity to keep their finger on the pulse of the markets and attract new prospective tenants. It is essential to prepare the infrastructure of the buildings for the 5G transition because this future technology can fundamentally transform the real estate world.



Buildings + Data

Buildings equipped with IoT only become truly ‘smart’ through the use of on-site artificial intelligence and data analytics



The use of artificial intelligence (AI) enables in-depth and precise data processing on-site and allows for a more (energy) efficient building management of Smart Buildings.

The automation and networking of private homes, office buildings or entire city districts continues to gain momentum and is possibly the current megatrend in the real estate world. Regardless of whether the private home or an entire office complex is to be automated, one central goal is always pursued: simple and fast operation of the building in order to be able to run it (more) efficiently in terms of energy.

Enormous amounts of data pose a challenge for efficient building operations

To make this possible, hardware components such as sensors forward data to software that transfers the data streams to the cloud. In reality, however, these data volumes often take on exorbitant proportions and make it difficult to operate the building efficiently. With the increasing networking of office buildings, the flood of data will only increase even more. AI should help to process it on-site and independently carry out initial optimizations in the building.

Firstly, all building data is collected, unqualified, before it is processed externally in the cloud or on the respective platforms of the equipment manufacturers. The structured data forms the basis on which building performance is analyzed and Smart Building services are improved. Tenant parties, owners and facility management can access real-time and historical building data at any time to make optimizations in the building and correct errors.

The external processing and storage of building data allows the responsible persons to intervene in the building management at any time, but also involves some risks. Since the collected data is initially transferred to the processing platforms in an unstructured way and transferred to the cloud, this process loses efficiency as the amount of data increases. AI should help to prevent the efficiency losses that arise from the distributed data storage. With the help of AI, data should already be fundamentally structured and analyzed on-site so that the sensor-generated data basis remains within the building. Instead of forwarding a flood of building data and processing it externally, the use of AI allows an initial independent optimization of the building on-site. The data is processed with the help of empirical values.

Errors and problems are detected and status reports are forwarded to applicable parties. The building stores sensor data on-site and only transmits forecasts and error messages to external bodies. It is therefore evolving from a smart to a cognitive building.

Deep data analysis through AI tools becomes the foundation for the success of Smart Buildings

More and more companies are investing in intelligent solutions to collect building data in order to derive actions that reduce the building's energy consumption. Often, the existing technical building equipment is equipped with additional sensors to obtain more precise data and optimize the user's interaction with the office complex. However, the supplementary sensor technology is often not sufficiently integrated into the processing components and data analysis remains inadequate. Data without in-depth analysis is worthless for operators as well as customers!

Especially for Smart Building services, the quality of data analysis determines the success or failure of the project. Advanced data processing solutions such as AI tools enable accurate processing and interpretation of sensor-generated data sets. For this, cognitive buildings must be equipped with IoT sensors that provide accurate information on the environment, the occupants and the energy demand. Only a versatile and precise data supply allows AI tools to produce complete and comprehensive analysis results and recommendations for action. In addition, AI solutions are characterized by the significantly lower time required to carry out problem analyses and error detections.

Automated optimizations through AI on-site enable energy-efficient operation of cognitive buildings

The potential of AI in Smart Buildings arises from the combination of extensive data collection and independent data evaluation. AI lays the foundation for innovative and use-oriented solutions that guarantee efficient building management. Cognitive buildings not only forward sensor-generated data but also analyze on-site information about the building and its use by the occupants. This allows misallocations to be detected at an early stage and building use to be optimized automatically. With the help of neural networks, AI tools recognize deviations from (previously defined) limit values and distinguish between different error cases. Thus, different areas such as ventilation, lift systems, maintenance and space utilization of the offices can be independently monitored and optimized via AI. However, there are also limitations to the use of neural networks. The current systems are only suitable for solving similar

tasks as in an upstream training phase. However, they cannot be applied to all areas of the building from the offset. Nevertheless, there are already office complexes that use AI in their control center, for example, to adapt ventilation and power consumption to the utilization of the respective part of the building. As a result, cognitive buildings can be run in a more energy-efficient way, reducing their operating costs.

In the future, AI platforms will likely lay the foundation for the introduction of intelligent learning processes in office complexes so that they can be operated in a more energy-efficient way. AI can improve the data processing of buildings. This will involve an interplay of automated routine checks by AI-powered systems and selective human interventions. Autonomous systems can monitor office complexes, detect problems and make suggestions for action. The sensor-generated data may not be forwarded externally but already processed in the cognitive building. A crucial factor for success is the interaction between sensors, software and humans, which depends on both precise automatic data acquisition and evaluation and harmonious communication and division of labour between humans and machines. In the future, those who operate a Smart Building may only take on monitoring and

problem-solving tasks. The future vision of office complexes includes an autonomous system that organizes appointments and room bookings in human language and independently adjusts the heating and cooling dynamics of rooms based on room occupancy and weather forecasts. Today, it is unclear when such operations will be feasible through the digital infrastructure of office complexes, but one thing is certain: AI will transform the data processing of Smart Buildings.



Cities + Connected Services

Smart cities will likely further automate the management of public infrastructure (utilities, traffic and transport) and offer an expanded range of e-services



Technologies such as the IoT or Internet of Services (IoS) have the potential to make public infrastructure more efficient and thus create significant benefits on the way to the Smart City.

Smart City! Similar to the buzzword 'digitalization', 'Smart City' stands for many things, but a clear definition or assessment of when or how a city is smart does not exist. The term 'Smart City' is an overarching collective term that bundles the dimensions of technology, efficiency, progress, ecology and social inclusion and transfers them to an urban perspective. One possible definition of the highly developed Smart City is, for example, a permanent interaction between the people who inhabit the city and the technology (Things) and services that surround them, based on the IoT and/or the IoS. But even with this approximation to a concretization, the scope for interpretation in definition and implementation remains very wide-ranging. There are almost infinite courses of action. We approach smart cities via the most essential component of a city — the inhabitants and their living spaces.

Unlimited technology potential, unlimited urban possibilities

The technological possibilities and the interactions between technology, services and the people who live in the Smart City are almost unlimited. In addition to existing solutions and their further development, there are ideas and visions that have enormous potential for all areas of life in the city. A major current challenge lies in the standardization and continuous linking of the individual technologies. Numerous factors play a role here that must be brought together or integrated to help enable a seamless user experience. This, in turn, is the most important aspect when it comes to the acceptance of technological innovations by the population of the city of tomorrow.

Is the provision of technical gadgets and their interaction with people in the city the decisive added value of the Smart City? Certainly, providing means and resources to implement possible ideas and visions is not the essential element. Rather, the fundamental question is where the use of technology can be helpful and what additional common benefits it generates. One perspective here is cost efficiency. As a rule, municipalities have to be economical with the available funds. This applies equally to resources such as land

and funding. The predominantly strained situation of municipalities increases the pressure to exploit efficiency potentials with modern technologies and at the same time to open up new scope for action. IoT and IoS can make a significant contribution here.

Demand-responsive lighting as an efficient approach to a Smart City

A simple but illustrative example of the use of technology in a Smart City is demand-responsive and demand-controlled public lighting. This use case is adapted from the Smart Home and the Smart Building, but it shows far-reaching possibilities with the multitude of light sources in the public infrastructure — along streets, in squares, at bus stops, in theatres and public authorities. If we consider the energy demand and maintenance costs for a city's lighting systems, we can imagine the enormous savings potential that can be achieved for the urban budget through adapted lighting control. By means of suitable sensors (e.g. motion detectors or light/sun-dependent control), the lighting can be controlled according to demand and thus cost-efficiently. In addition to switching to modern light sources, networking the systems with each other opens up further savings potential. Especially in less frequented areas, demand-controlled and usage-based lighting concepts are an option for municipalities.

In addition to these options, the municipal supply network in particular offers further potential. Some companies have already recognized this and developed smart application options. For example, modern, interconnected light poles whose energy demand is measured via smart metering offer the potential for charging stations and thus the expansion and increased acceptance of e-mobility in the city. Contract models that promote cooperation between municipalities and utilities (municipal or private) can open up additional sources of revenue, the proceeds of which can be invested in the further expansion of the Smart City, among other things.

The current climate protection and sustainability debate, the increasingly scarce space in the city and the congestion of urban traffic areas open up another field of action. In addition to the smart expansion of e-mobility, smart technologies can also help to manage traffic volumes more intelligently and reduce CO₂ pollution. The real-time recording of traffic flows and the analysis of past congestion values can be used to derive predictions for capacitive traffic control and thus reduce congestion. Parking options can also be actively identified and emissions reduced or avoided.

E-mobility as a driver of the ecological Smart City

In addition to the spatial and demand-related availability of charging stations, increasing e-mobility also requires forward-looking control of smart charging infrastructures by energy suppliers. They must be able to better control the electricity consumption in private households as well as in e-mobility. Smart controlled grids can provide support in bridging peak loads and balance them better so that an efficient and stable power supply can be ensured. Private or municipally operated photovoltaic systems (for example on public buildings) integrated into the public grid with corresponding storage options also support the coverage of a city's emerging energy needs in an environmentally friendly and climate-neutral way.

In times of home offices and always-on devices, a core need of economic productivity in the knowledge society can thus be better met. This is facilitated by the increased installation of sensors in Smart Buildings and Smart Homes. This provides a broadly diversified database at all levels (private and public), which — appropriately networked — can generate added value. This database can be complemented in a targeted manner by public sensoring, i.e. the creation of a sensor platform that can be accessed by the public administration. The data could then also be made available to the private sector or housing parties via open interface structures, for example, to enable small-scale optimizations outside the access of the public sector.

With the help of suitable technologies, numerous services can also be made more easily available to people in the Smart City. Smart public servicing, i.e. the real-time booking of public services on-site with IoT or QR codes, can be a start. So far, it is mainly used in the area of public transport, but also in museums or exhibitions. In addition, an application for general administrative services is desirable.

Direct benefits for the citizens of the city are offered by digital services of the administration. One possible, but controversial, tool to support this could be the blockchain. The greatest potential for this technology would arise if the federal, state and local governments worked with a united database or a common data budget, for example, a digitalized land register based on blockchain.

Technologies are available, networking is the goal

The technologies for all these topics already exist and could be applied. However, an essential prerequisite for the operation of the Smart City platforms and their components is an infrastructure with a data and fail-safe communication network. This infrastructure has so far been the Achilles' heel and stumbling block for the rapid realization of Smart City concepts. The smart infrastructure is technically highly complex to set up, maintain and operate and, like all information systems, is not only theoretically vulnerable to cyberattacks. The increasing importance and tightening of data protection also do not make it easier to generate and implement use cases.

For the development of the Smart City, this means analyzing and understanding the interdependencies of numerous everyday processes and generalizing them with the help of technologies. Technology must therefore learn to understand the how and where of the emergence of individual data sets and react to them in real time. Through the intelligent combination of data, correlations must be recognized, consequences calculated, and then corresponding information generated.

The main goal remains the liveable city

It therefore certainly makes sense to actively involve citizens in shaping the digital agenda for the city of the future and to include as wide a variety of opinions and ideas as possible. After all, in addition to all the technological achievements, a Smart City must also remain liveable, which means that the technical innovations at all levels of the real estate industry, starting with the Smart Home and ending with the modern city, must fit into everyday life and simplify it silently and, above all, for the benefit of all.



ERP + Digital Ecosystems

Modernized ERP systems form the backbone of company-wide data management and integrate the digital ecosystem of highly specialized real estate management solutions



Real estate as an unparalleled model for value creation needs future-proof solutions — more and more companies are modernizing their core business management systems and integrating their real estate management applications into the digital ecosystems.

Real estate management and digitalization have always belonged together — why companies still operate with paper archives in their basements is probably one of the biggest mysteries — at least since the boom of the property technology (PropTech) scene. Such relics from the 20th century are often simply the result of conservative corporate management.

Digitalization drives ERP systems ahead — a misconception?

Anyone who uses real estate — externally or internally — now has a decisive influence on the issues for which integrated and automated apps replace a trip to the customer center or a call to the property management office. All those involved in the value chain may now benefit from the new level of transparency, speed and sustainability offered by the apps and portal solutions — provided that the landlord has taken care of his data and processes comprehensively at an early stage. In addition, utilities, trades and other service providers in real estate management are approaching the rental and leasing side with extended digital services. As such, a fundamental conceptual rethink in the design of IT landscapes and the associated ERP and satellite systems is urgently needed.

As varied and imaginative as companies with a focus on real estate and property management may be in integrating their strategies, processes, applications and data in modern IT landscapes, what is needed is a robust, open and flexibly operable and usable ERP core. It must be possible to provide the data, processes and documents simply, conveniently and sustainably and support the associated detailed strategies in property and tenant management innovatively.

The search for a real estate data standard

Well-known system manufacturers and a network of over 600 PropTechs in Europe have nevertheless now proclaimed the digital revolution — admittedly after decades of persevering with the solutions established on the market. What is still missing, however, is a general real estate industry data and application standard. Although there have been numerous attempts to define and apply such a standard in the housing industry, corporate and institutional real estate, no consensus has yet been found.

Leading companies for integrated real estate ERP solutions initially implemented their software in real estate companies in the 1990s and 2000s. Today, the main focus is on sustainably realigning cloud-based applications and operations as a hybrid model.

No matter which approach a company uses, this decision always involves a choice between a new setup (Greenfield approach) and/or the migration of the existing database with master and transaction data (Brownfield approach) to a new platform environment. For this, early analyses are necessary to examine the migration capability of the existing application and data architecture as well as the implementation capability of any additional developments. Likewise, all interfaces for incoming and outgoing data and documents must be analyzed for portability to a new platform. The same applies to solutions from PropTechs and add-on solutions, for example in the area of asset and portfolio management or strategic and regulatory reporting.

Which ERP system fits best in perspective?

Software companies with real estate add-ons, especially in the housing industry segment, are in the process of raising their products and solutions to the latest standards in terms of functionality and technology. Long missed, but now in a clear upswing for ERP-specific solutions.

As a result, a heated discussion has broken out among C-level decision-makers in housing companies as well as in corporates, in facility management and among PropTechs about which ERP system and which technology should be trusted in the future and what concrete measures should be taken to counter the risk of a wrong ERP strategy. The companies concerned will not be able to avoid re-analyzing the market for real estate ERP systems and sounding out which products, apps and platform solutions come into question in the future.

At the core of real estate IT solution architecture is a robust, flexibly scalable ERP system that provides the desired information on the basis of clearly defined entities and value flows and, in interaction with specific apps, heralds a new quality of interaction with all parties involved. These parties include the tenants and others who use the property, supply companies and those interested in investing. The system is managed by an open and scalable integration platform, which needs to be aligned with current and future process requirements and structured in an expandable way with regard to changing market requirements. For example, the importance of external market data is continuously increasing. However, very few companies have yet developed concepts for how unstructured external mass data interact with the largely structured and redundancy-free ERP core. Portfolio management

systems take up this challenge; however, they require clear concepts for completely and comprehensibly structured internal and external data budgets. With regard to data integration of external parties, for example, in outsourced property management processes to corresponding service companies, the ERP core is of enormous importance as a source of truth (single source of truth) in the form of a real estate economic backbone. Data is considered the new oil and previous ERP-based data and application islands are merging into new integration platforms in mobile, app-based application environments.

ERP systems also define with their most important entities the thematic structure of integrated solutions for document management, for the data room as well as for the geographic information and computer-aided design (CAD) systems, so that in perspective, customer-, process- and project-specific information is held in complementary form both in the ERP and in the satellite applications.

A modern ERP system will continue to play an essential role in the digitalization of smart enterprises in the future

Based on this innovation boom, it is a matter of clearly deriving the ERP strategy from the corporate and IT strategy. In doing so, the regulatory requirements for at least 10 years of investment security must be taken into account, and the projects necessary for implementation must be prioritized and scheduled as well as their economic viability calculated — including the technological, operational and data-related bases required. Robotics, augmented reality, 3D-based CAD and building information modeling (BIM) solutions are creating new incentives for ERP environments to streamline long-established processes, replace manual or frequently recurring activities and sustainably enhance the customer and user experience.

New implementations are already taking place on the respective current platforms, while many of the companies are still stuck in traditional ERP approaches. When data and process redundancies continue to occur and the associated costly reporting is on the agenda, the time has come to redesign the ERP environment.



Sustainability + Blockchain

Sustainable business management requires verified data — this is driving blockchain usage PropTechs can be supported with combined data and platform services



Blockchain may revolutionize data exchange in the real estate industry through its decentralized, transparent and irrevocable functionality and can ensure the necessary governance of large-scale environmental and social data sets.

There is a sense of optimism in the real estate industry. Formerly called sustainability, now ESG presents the industry with perhaps its greatest challenge in history. Entire business models are being challenged. But are ESG requirements compatible with the real estate industry? ESG as a data-intensive, complex reflection of a cultural change is confronted with an industry that is certainly not a pioneer in terms of transparency, consistency, availability and authenticity of data in a world that is already, in many aspects, digitalized. Precisely for this reason, a transformation is inevitable, due to the Paris climate goals or the Building Energy Act. As a result, ESG intensively and extensively demands all kinds of environmental data (E) on climate protection, energy and water consumption, and recyclables management, social data sets (S) such as indoor comfort, user satisfaction and mobility, and thus inevitably serves as a catalyst for the digitalization of the real estate industry. In practice, thanks to PropTechs, solutions for measuring and transmitting E and S data already exist. With the help of intelligent measuring concepts (smart metering) and built-in sensor technology, data can be made available to the property's owners or tenants in good quality and in real time. As a result, data sets are created that require verification in terms of governance (G). As such, there is a definite need for confidential data sets with integrity to be made available. Could blockchain be a solution?

Opportunities and challenges of blockchain as a key to governance in the real estate industry

The blockchain is based on the basic principle of verifying data records of authenticated persons via the internet and then recording them as an unchangeable data block in a database. In the process, authentication and storage are decentralized via the computers of those involved in the network. A chain of blocks — the blockchain — is created by stringing together all transaction entries of an object and ensures the permanent availability and transparency of data. The blockchain has the potential to revolutionize all processes that require secure data transmission.

The connection to the network and the decentralized management of all transferred data can put all PropTechs on the map that have geared their business models towards measuring, processing and evaluating real estate-related data with combined data and IT services. The possible applications of blockchain along the entire life cycle of a property and the resulting opportunities for the real estate industry are manifold. Transactions carried out using blockchain technology will likely become more frequent in the near future. They may also be successively enriched by non-financial and ESG-relevant data packages. Land register entries can be replaced, as they are stored in the blocks in a secured manner. Prospective buyers can, for example, obtain complete documentation on the ownership of the property at the push of a button. Furthermore, it is realistic in the mid-term that electronic rental and purchase contracts, so-called smart contracts, which can monitor compliance with defined rules and automatically execute certain actions, will likely become the rule instead of the exception. Against the horizon of the set goal of achieving climate neutrality by 2045, it is foreseeable in the long term that the blockchain will provide inventory databases in a decentralized, transparent and secure manner. This not only includes databases on tenant data, but also inventory data on the materials used in the sense of the circular economy, which could, for example, be recorded by BIM models.

The potential advantages of the blockchain are obvious on this topic. Data can be transmitted at the push of a button. Intermediaries become superfluous so that transaction costs can be kept low. Sensitive data requiring protection is secure and verified. On the way to digitization, paper documents become obsolete. As a result, unprecedented transparency could be achieved vis-à-vis all who use or invest in the property, as well as vis-à-vis government bodies. Irrevocable documentation of processes along the entire value chain would also be guaranteed. Perfect conditions for the G in ESG.

Despite the many advantages, but precisely because of its disruptive nature, blockchain faces challenges that need to be overcome for successful integration in the real estate industry. Even though initial approaches to a more energy-efficient blockchain exist, the question of how to reduce the very intensive computing power that has been necessary until now remains unanswered. So how are reliability and data security to be guaranteed? There still is no clear legal standing regarding data protection. In addition, integration must be done in lockstep with the authorities and requires balanced regulation that allows the technological advantages to come to the foreground yet prevents abuse.

ESG needs blockchain and blockchain needs**ESG – two players on the same team**

Blockchain is not magic. Nevertheless, as a very complex but promising technology, it has enormous potential as a solution for the verified transfer of ESG data. It offers the real estate industry a chance to provide a governance structure to the multiple services that arise besides the mere sale of space. After all, fueled by increasing regulation, ESG itself can become a catalyst for digitalization and the integration of blockchain technology. ESG demands more and more data, and it is the environmental and social data sets that require strong governance. In this context, blockchain can fulfil precisely the requirements that ESG demands. With this, both players on the same team can benefit from each other. The simplified and secure connection through blockchain offers PropTechs the ideal technological basis to expand their own product portfolio through combined data and IT services. Those who can generate reliable benchmarks and create the transparency that is important for the real estate industry will likely gain a clear competitive advantage by offering a target-oriented connection between technology and data procurement.



Business Development + Automation

The deep integration of robotic process automation, AI and process mining technologies is becoming a key efficiency driver



In response to accelerated decision-making processes, digital information overload and flexible working models, combined technologies are emerging that automatically analyze and execute processes. Their use creates the right conditions for data-driven business development.

There is high competition for customers and resources in all areas of the real estate industry, which often requires management decisions to be made under time pressure. In a project development for the repositioning of an existing property, for example, it might be that alternative courses of action are not always investigated, quantitative requirements are not made transparent when outsourcing measures are carried out for the first time or possible consequential effects are not considered in the budget allocation. The common cause of these deficits is the failure to consider information before and during the decision. This omission can often be traced back to an incomplete process in the analysis. The information, in turn, must be obtained from the available master and transactional data. If it is possible to elicit the information value from the data basis, conclusions can consequently also be drawn about a seamless design of the process and consistent decision-making.

Decision quality as a management risk in the real estate industry

In addition to insufficient knowledge about the informational value of existing data, the data quality — in particular in regards to it being complete, correct and up-to-date — is regularly not actively managed. This results in a high manual effort for procurement, verification and analysis before the essential information for the management decision is found in the data chaos. This makes data management a core requirement for every organization. Efficiency and quality, as the overall goals of data management, are being jeopardized by the growing volume and variety of data. Thus, automation and digital transformation generate significant advantages here. Two basic technologies of digitalization come into question for this: process mining and robotic process automation (RPA).

Existing data as a starting point for improvement

Process mining refers to machine monitoring and analysis of data flows (i.e. movement data between different entities already recorded in the systems) as well as associated metadata that provide information about the nature of these data flows. The record structure is examined for relevant data and this data is then collected across all similar records in the data stream. In the case of a project developer, for example, this could be the individual sub-project measures of all his developments: start and end dates, number and role of participants, G/L accounts posted to, etc. So, this enables the technology to immediately recognize certain information from a large amount of raw data. Because the raw data is tapped in the system without further data transformation, process mining conserves system resources and offers a dynamic, changeable and fully cloud-capable analysis approach. At the same time, the results of the mining show both gaps in the target process and deviations in the lived practice. Approaches to process definition and optimization can be derived from this reproducible, objectively justified basis for argumentation. For example, if sub-steps of a process repeatedly run through previously undefined roles, this is automatically recognized in mining. With this knowledge, an individual process can now be defined, standardized and transferred into a monitorable system workflow — a foundation for higher process efficiency as well as for the identification of digitalization potential. The technology can also be applied in the search for potential and thus opens up paths to data-driven self-optimization for the organization.

Efficient robots create acceptance for digital transformation

An important component of process optimization is the minimization of manual process steps. These often occur during the provision and transfer of data between systems. RPA solutions take over these usually simple, recurring manual steps by having bots follow all the activities of the individual process according to a script that is easy to create and then imitate them. In addition to increasing efficiency through automation, RPA similarly opens up the option of extending the processes with routines for transforming, enriching, quality controlling and analyzing the errors in data. This enhanced data processing is valuable because a great deal of business-relevant information is already created digitally and distributed in machine-readable formats. With the challenge of connecting more and more external data sources to one's own data structures (and as long as programming interfaces or other integration technologies are missing), RPA can grow into a bridge application for data transfers.

With process mining, RPA and lead to AI to a self-optimizing organization

While process mining continuously identifies approaches for organizational improvements, the use of RPA implements them in a cost-efficient, scalable and time-saving manner. Resources freed up by this should be used in addressing more advanced technologies, especially AI. In addition to being used as a tool for extracting data fields from complex data structures (for example, from leases), it enhances their positive effects in the interaction with process mining and RPA.

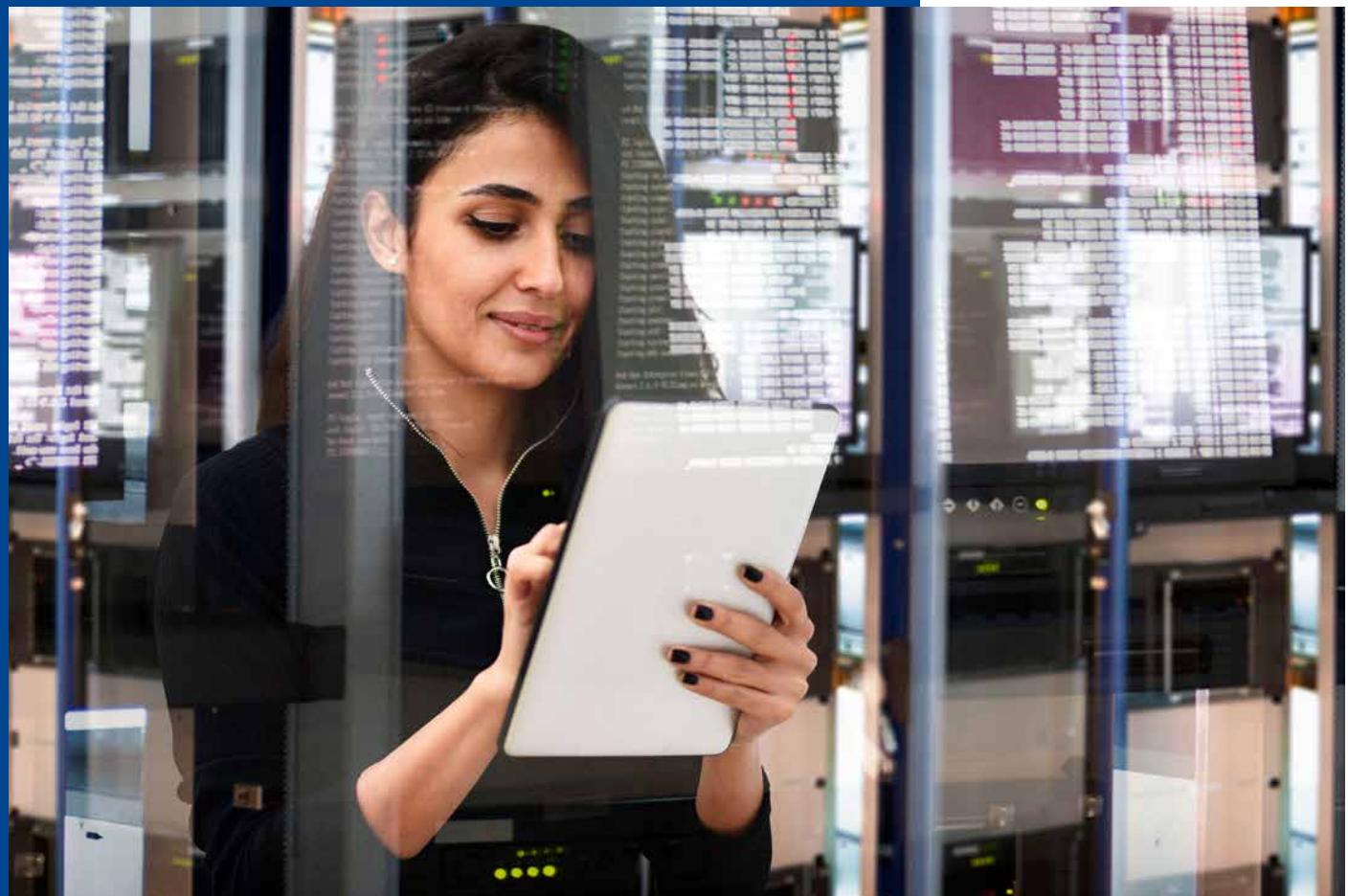
- AI benefits from the dense data population and data timeliness generated by RPA. It indicates quality deficiencies in the data records and identifies possible causes for the occurrence of errors by comparing the data source and destination. Measures derived from the findings deal with, for example, the inclusion of new data fields, the extension of mapping tables or the adaptation of source paths. The performance of the bots used is thus increased in a targeted and effective manner without rendering the previous development effort worthless.
- Freely configurable search algorithms of the AI run through the results from the mining process and highlight inconsistencies and correlations in them. If interpretation approaches are missing in the subsequent processing, further data could be obtained and integrated into the analysis. This results in well-founded action strategies for the use of complex data structures and previously unused sources, which increases the scope of mining and the informative value of its results. This, in turn, provides more consistent improvement approaches that can be quickly implemented through process mining and RPA.

With the use of the basic technologies of process mining and RPA, as well as the addition of AI capabilities, a highly automated optimization cycle for the organization, data management and process efficiency of the company is created. In the close interdependency of these fields of action, positive changes in one field give rise to further potential in the other fields, which can dynamize the optimization measures. Companies in the real estate industry should therefore implement the mastery of the three comparatively easy-to-use technologies as a fundamental competence in all sub-fields in order to specifically improve their competitive position. In this way, the company as a whole develops into a sustainable organization that continuously optimizes its capabilities in a system-supported manner.



Data + Cloud Computing

**On-premise data lakes are replaced by
multi-cloud environments and fully
mobile IT landscapes**



In contrast to data warehouses, data lakes are better able to cope with the data volumes and especially the data structure of IoT and sensor-based data. Orchestrated multi-cloud solutions as the basis for mobile-enabled IT landscapes will likely prevail over on-premises solutions.

Digitalization in general, and in the real estate industry in particular, is accompanied by an explosion of data volumes. The industry already operates a very data-intensive business, likely for historical reasons. The arrival of digitalization in the everyday life of real estate management will multiply the flood of data many times over. As we have already explained in previous articles, this development is driven by various factors.

Smart Buildings and IoT generate data volumes that are difficult to manage

The data volumes resulting from the developments towards private Smart Homes, commercial Smart Buildings and public smart cities are almost beyond imagination. They are caused in particular by the use of smart metering, IoT sensors and IoS; further drivers are the demands placed on the industry not by property management or the tenants themselves, but rather by external influences such as legislation, the Paris climate targets and associated ESG. The scale of this data can no longer be described in terms of terabytes, but rather in the spheres of petabytes and exabytes.

The challenge starts with the management and storage of the sheer volume of data but increases with its utilization. The question of how the data can be used intelligently to gain information for the operation and control of properties and to make informed decisions is not easy to answer.

Data lake versus data warehouse – the technological way to turn data into information

To approach the topic fundamentally, IT distinguishes between data warehouses and data lakes when recording data. Data warehouses can store large amounts of data and then make it available to various stakeholders for further use. In this process, the data is stored in a structured way according to a specific ordering concept that enables later access. The intelligence here lies in the filling of the data warehouse. In contrast, data lakes do not start with the storage logic — they develop their intelligence during data retrieval. The data can be stored in data lakes largely unstructured, in simple file formats. Only when data is requested from the data lake does it have to be decided which data is needed and how it should be prepared.

The compelling reasons for opting for data lake structures are: the sheer mass of data, the effort required to structure large amounts of data that are still completely unstructured at the time of creation/collection and, in particular, the flexibility to process data only once the goal of its use has been determined.

On-premises as a discontinued model – multi-cloud environments are the future

For the IT architecture of the data lakes, a distinction can be made between the on-premises version — the classic installation on hardware on-site in the company — or the installation in the cloud. In order to evaluate the different approaches, the structure of the data, its volume, the data generation rate (sensors produce data 24/7, 365 days a year) and its most flexible possible subsequent use must in particular be considered. When mapping in the cloud, a further distinction is made between the use of one or more clouds of the same type (public or private), the multi-cloud, and the simultaneous use of different cloud types, the hybrid cloud. The use of multiple cloud providers requires orchestration, i.e. the management and integration of the different clouds. This leads to additional challenges, but also offers opportunities for optimized data management.

The strengths and weaknesses of the architectures need to be weighed up against each other

The following topics can be used to categorize and evaluate the approaches.

— Flexibility, scalability, costs

In contrast to an on-premises solution, the use of multi-cloud solutions makes it possible to react flexibly and at short notice if the requirements for a solution change in terms of type and scope. In the cloud, virtual resources are used on third-party servers rather than physical hardware in the company's data center. Storage capacities can therefore be scaled, expanded or reduced at short notice in consultation with the cloud providers without having to change the capacities in the company's own data center. Scalability not only applies to the hardware, but also to the necessary personnel resources for data and server management, which in the case of an on-premises solution in the company tend to have to be mapped with fixed costs, i.e. are far less flexible. Once hardware and personnel resources have been built up on-site, they cannot be adapted or even removed at short notice and may cause permanent idle costs. Logging off/renting cloud capacities creates far greater flexibility, avoids idle costs and ensures investment security.

— Availability

The cloud is available almost without interruption, 24 hours a day, seven days a week. Regardless of whether hardware needs to be updated or fails, the cloud is still available. Pre-defined service level agreements with the provider enable calculable downtimes.

— Technological evolution

By relying on external cloud providers, companies participate in the evolution of technologies, while on-premises investments in hardware and staff development, once made, quickly become obsolete as technology advances. Cloud services are offered under market pressure, and contracts can be concluded for a limited period of time and renegotiated on a regular basis.

— Application management and multi-cloud orchestration

One challenge in the parallel operation of different clouds is to combine them into a functioning overall system. The added value of multi-cloud solutions only comes from the coordinated and optimized use of all cloud systems. Various solutions and products are available for orchestration, including Amazon Web Services, Cisco CloudCenter, IBM Cloud Orchestrator, Microsoft Azure Automation or Cycle Computing, to name but a few. A multi-cloud solution makes certain demands on management but can be flexibly adapted to the respective needs.

— Data security

Physical protection against the loss of data goes hand in hand with higher investments in personnel and hardware for back-up capacities in an on-premises solution rather than in cloud-based storage, for which the cloud operator is responsible for the back-up concepts. An important factor in the multi-cloud solution is the location of the server farms and their security concepts. Access to the data and its path from the place of origin to the storage location is a challenge for on-premises and multi-cloud solutions alike. Economies of scale at the cloud service provider enable the protection of data against professional cyberattacks better than small, local, on-site data centers.

— Integration into the mobile IT landscapes

The type of storage affects how data enters the storage media and how it is subsequently accessed. If the data is on-premises behind the company's specific firewalls, access design is far more complex and demanding than if it is stored in a multi-cloud solution. Data access via mobile devices is a decisive factor for flexible on-site availability in a property. The potential can only be leveraged if data can be used daily. In this way, various stakeholders who own or operate properties or provide corresponding services can benefit from, for example, web services that can be integrated into mobile apps. This is a decisive advantage of multi-cloud solutions.

Orchestrated multi-cloud data lakes as a solution for mobile Smart Building data streams

Only when the data streams, which are generated in particular by the multiple sensor technology of the IoT, flow together in a data lake based on orchestrated multi-cloud solutions, will the volume of data become manageable and usable within a mobile IT landscape. This forms the basis of data use and data evaluation within the company but gains even greater importance when external parties and tenants themselves can be integrated. They are beneficiaries of data-based services and will also be directly or indirectly involved in the data collection in the future. To manage mass data with adequate technical solutions, data will be usable and readily available: these factors will be a pillar for success for the real estate industry. The challenge is to turn raw data into usable information that can be precisely tailored to the various use cases of the real estate industry.



Digital Transformation + Employees

Digital enablement and guided cultural change are crucial for the speed of digitalization and the realization of unique selling propositions



The degree of digitalization of a company stands and falls with the company and its employees' ability to adapt to new technologies and create added value through their networking.

Numerous KPMG studies, such as KPMG in Germany's Digitalization of the Housing Industry in 2020 or KPMG in France's 2021 study, Digital Marketing Leadership, have already pointed out a central problem of digital transformation — the lack of digital enablement. This is because the company's employees remain a key factor that determines the success of the implementation. They are often forgotten during the transformation and therefore do not have the necessary skills to integrate the technologies profitably into their daily work.

The role of digital enablement in digital transformation

This is where digital enablement comes into play. It is about empowering companies and their employees for digital transformation. To be more precise: Digital enablement should put employees in a position to deal with the new technologies, adapt their work accordingly and be able to fully exploit the potential of the technologies. This is the only way to successfully introduce technologies and increase the speed of digitalization needed in a company. In the context of digital enablement, the following three factors must be taken into account in order to sustainably anchor the new way of thinking and working in the corporate culture, to increase the speed of digitalization and to ensure the realization of the unique selling propositions (USPs). These factors are: the individual consideration of employees, the introduction of active change management and the adaptation of organizational structures.

The individual consideration of employees as a central factor in digital enablement

For a successful introduction of digital enablement, it is necessary that employees recognize the added value of the new technologies and perceive the digital transformation as an opportunity and not as a threat. Since there are a variety of people in companies, all with differing skills and attitudes towards digitalization, the employees must be addressed individually. For example, there are so-called digital natives who have grown up with technologies and are therefore familiar with them, and there are other employees who have had no contact with technology or digital applications in their private or professional lives. In addition, it can be assumed that employees not only have different levels of knowledge, but also fundamentally different

attitudes towards digitalization. While some have already recognized the opportunities of new technologies, others see them as a danger and are rather skeptical about them. It is therefore important to recognize the given differences at an early stage and to respond individually to each person, their skills and prior knowledge. Through an individual approach, knowledge gaps and training potentials can be identified, and the mindsets of employees can be changed so that in the future they see digitalization as an opportunity, not as a threat but as a way to acquire knowledge, expand their competencies and prepare for the labor market of the future.

Proactive change management ensures long-term success

Accompanying the transformation process with proactive change management is just as important as looking at employees individually. People do not change overnight — they go through a process that takes time. Digital enablement is therefore also a time-intensive process that requires active support through change management. This can ensure that all company employees are actively supported through regular training and development measures to expand their knowledge and skills in dealing with new technologies and to sustainably change their ways of thinking and working. This includes, among other things, promoting an understanding of digitalization and digital transformation. This enables employees to adapt to the changes and actively shape the transformation. Furthermore, change management ensures a holistic view of the process.

Possible methods that can be used in change management are, for example, world cafés, breakout sessions, action learning and the concept of train the trainer. When conducting a world café, ideas can be exchanged through several rounds of talks with different participants, new perspectives can be developed and the teamwork within the company can be strengthened. Breakout sessions integrated into conferences can also be used for idea generation and interaction. In action learning, learning content is directly linked to practice through cases, creating an optimal transfer of information. The concept of train the trainer has a slightly different approach. Certain employees are trained by external personnel and pass on their newly acquired knowledge to their colleagues in internal company trainings.

Adapted organizational structures create space for change and new ideas

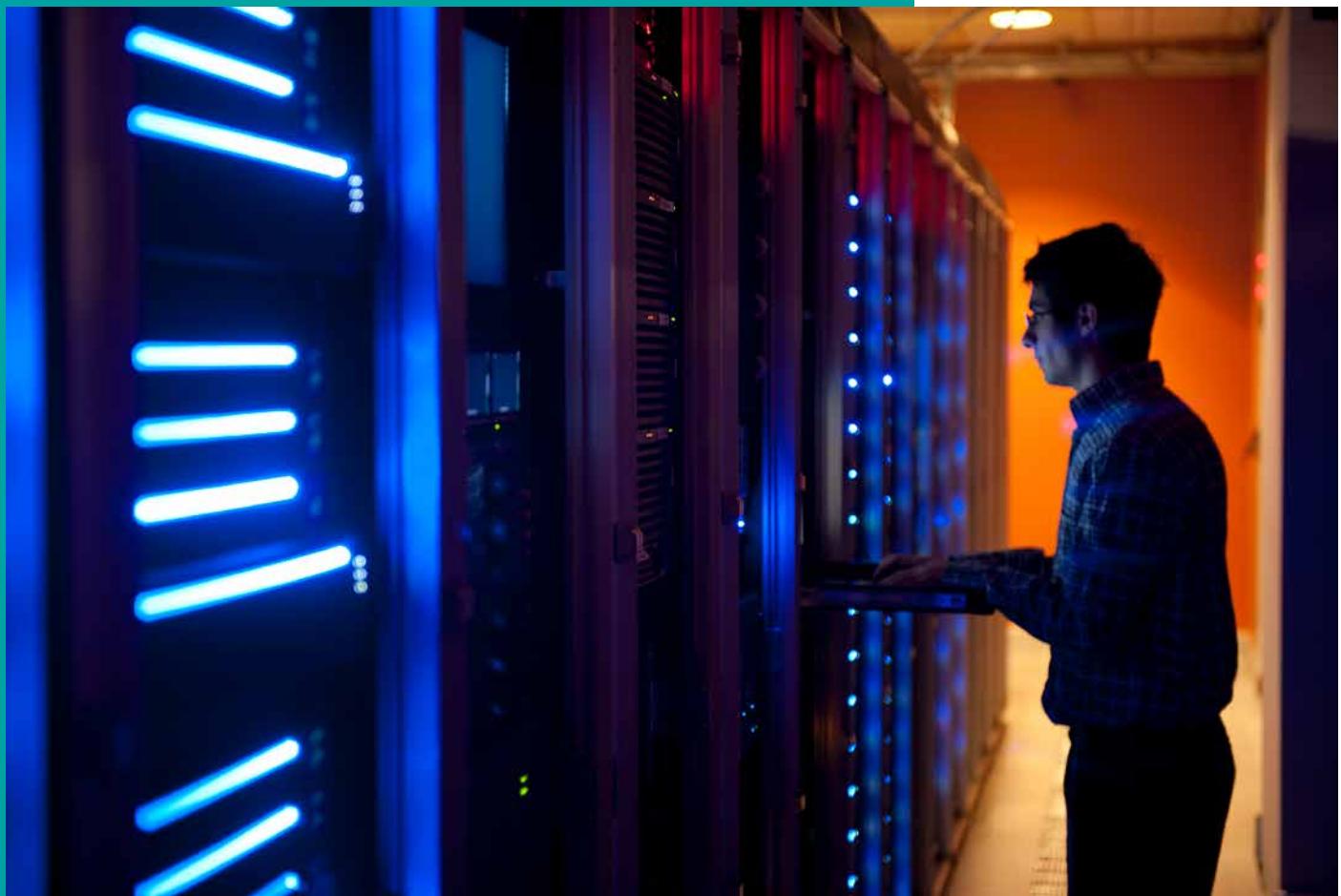
Organizational structures also play a central role in digital enablement. They must be adapted in such a way that they offer room for change and the implementation of new ideas. This can be helped above all by flat hierarchies and short, agile decision-making paths. Changing the organizational structure also includes creating clear responsibilities to make reporting more efficient, building a digital mindset both in the workforce and at the management level, and anchoring digital enablement in the corporate culture. If the measures introduced within the framework of digital enablement are not lived in the corporate culture, they cannot be sustained in the company in the long term.

In the future, digital enablement can enable the employees of a company to apply new technologies more quickly and to generate added value through the networking of different technologies. This helps enable the company to better and faster react to changes and new requirements and to increase the speed of digitalization. For these reasons, when it comes to digital transformations, companies should first focus on the digital enablement of employees and the adaptation of the organizational structure before deciding on new technologies and their implementation. This is because the success of the introduction of new technologies and the speed of digitalization and the realization of USPs stands and falls with the empowerment of company employees.



Cybersecurity + Data Protection

**The increasing relevance of cybersecurity
and data protection leads to new, more
professional management roles**



Data that can no longer be accessed or that has been stolen due to a cyberattack can also pose a significant risk to the continued existence of the company, in addition to the public reputational damage.

Due to the digital slumber of the real estate industry in recent years, the stark awakening in topics such as cybersecurity and data protection is now less than fairy tale-like. In recent times, the first companies have had to experience cyberattacks and their far-reaching consequences for business operations. The real effects ranged from minor restrictions in peripheral systems to the almost complete standstill of IT systems.

Professionalization around cybersecurity is taking place on both sides

In contrast to the defense efforts of the real estate industry, the attacks have become much more professional. Whereas in the past it was rather hobby hackers who showed more of a technical interest in changing the internet presence or spreading viruses in sporadic attacks, it is now professional structures that use centrally controlled attacks to carry out targeted identity theft or industrial espionage, not to mention simple data theft. They not only use modern hacking tools, but also increasingly employ AI in their attacks.

Many real estate companies make it very easy for hackers again and again. Outdated IT systems with often very weak user authorization, combined with a lack of technical and professional understanding of cybersecurity requirements in the IT departments, force the floodgates wide open. In addition, newer software systems have a broader attack surface due to hosting in the cloud or opening up to the outside world — on the building side through IoT connections, for users through mobile business applications.

Unfortunately, the situation is often no better when it comes to data protection. Although the GDPR has been in force for several years, many real estate companies have not yet taken sufficient technical and organizational measures to manage their large amount of personal data in compliance with the law. In many cases, even the data protection mandate has been outsourced and installed rather pro forma.

Furthermore, the fragmented, outdated systems and the predominant use of office programs are often an obstacle to implementing consistent deletion/anonymization concepts throughout the company.

The professionals in the sector also like to take advantage of this circumstance and help themselves to the data records. This often remains undetected at the beginning, as modern cyberattacks are not carried out with brute force, as in a traditional bank robbery, but are rather long-term and below the attention threshold. While larger corporations operate professional cybersecurity centers, smaller real estate companies find themselves defenseless against this threat because often the budget is limited, if it exists at all. In addition, a certain fear of the associated technical complexity and the possible negative impact on productivity can be felt among employees. The biggest influence, however, is the responsibility factor. The greatest need to catch up on is in the design of responsibility in the company and the associated establishment of a management role for the protection of company data.

Responsibility for cybersecurity and data protection must be anchored in management

All sizes of real estate companies have to react to the increased threat. Cybersecurity and data protection will no longer be the responsibility of IT department heads in the future, instead, they will be an important part of the responsibility of Chief Information Security Officers (CISOs), who are still newly being implemented in many companies. The role of the CISO will have to evolve from traditional gatekeeping to being the trusted bodyguard for the Chief Information Officer and the Chief Operating Officer. This requires setting new paradigms and challenging traditional thinking, because, ultimately, the other side is also constantly evolving.

The new executive board area may then also be responsible for the creation of company-wide — as well as cross-company — security concepts. Especially due to the strong networking of the real estate ecosystems, this comprehensive thinking of risk situations is necessary.

The role of in-house managers, which in many cases is yet to be created, enables regular IT/data risk assessments to be carried out in the company. While nowadays the focus is often on operational risks from real estate operations, the technical risk must come more into focus. A further step here can be the application and establishment of procedures according to the international standard ISO/IEC 27001 for information security. This guidance helps enable the rapid adaptation of common procedures and serves as an initial guideline for action.

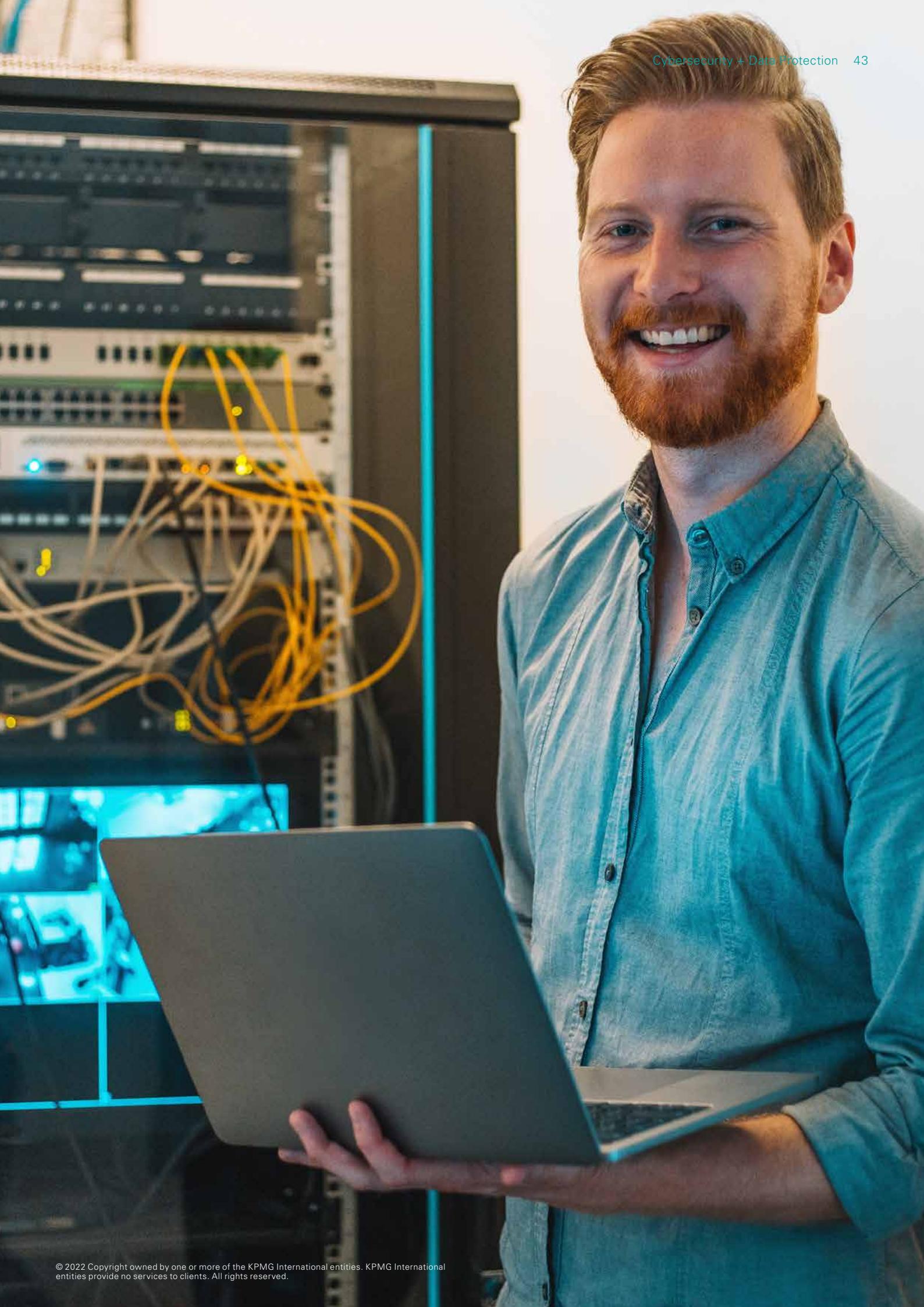
The increasing threat can only be countered in partnership with specialized professionals and employees

If an emergency does occur, the emergency plans drawn up in advance and the cooperation with professional service providers will help. It is advisable to establish or contract them in advance. Smaller real estate companies in particular have neither the capacities nor the technical equipment to counter an around-the-clock threat situation. Global service providers offer cybersecurity centers with permanent operations and have the ability to react agilely to ever-changing attack tactics and targets. The CISO is the professional link between the internal IT department and external service providers.

The service providers can then introduce corresponding logging and monitoring mechanisms for important networks and systems and also operate them in a scalable manner for smaller real estate companies. The coordination and implementation of so-called penetration tests in the form of Capture the Flag events by good IT experts is also a method that will be increasingly used in the future. The real estate CISO is also responsible for the implementation of protective mechanisms and the sensitization and training of company employees with regard to cyber risks. The danger is not only lurking outside the business premises. In many cases, the perpetrators and victims of cyber crimes and data leaks are the company's own employees. Whether it is because they open emails

with serious-sounding but damaging content under the daily work pressure, or because they deliberately take company-critical data home as dissatisfied team members. An attentive and informed workforce can help to reduce these risks. Building the foundations for this will be the CISO's task in the future. Employees are an important contributing factor to shaping the company's values and culture.

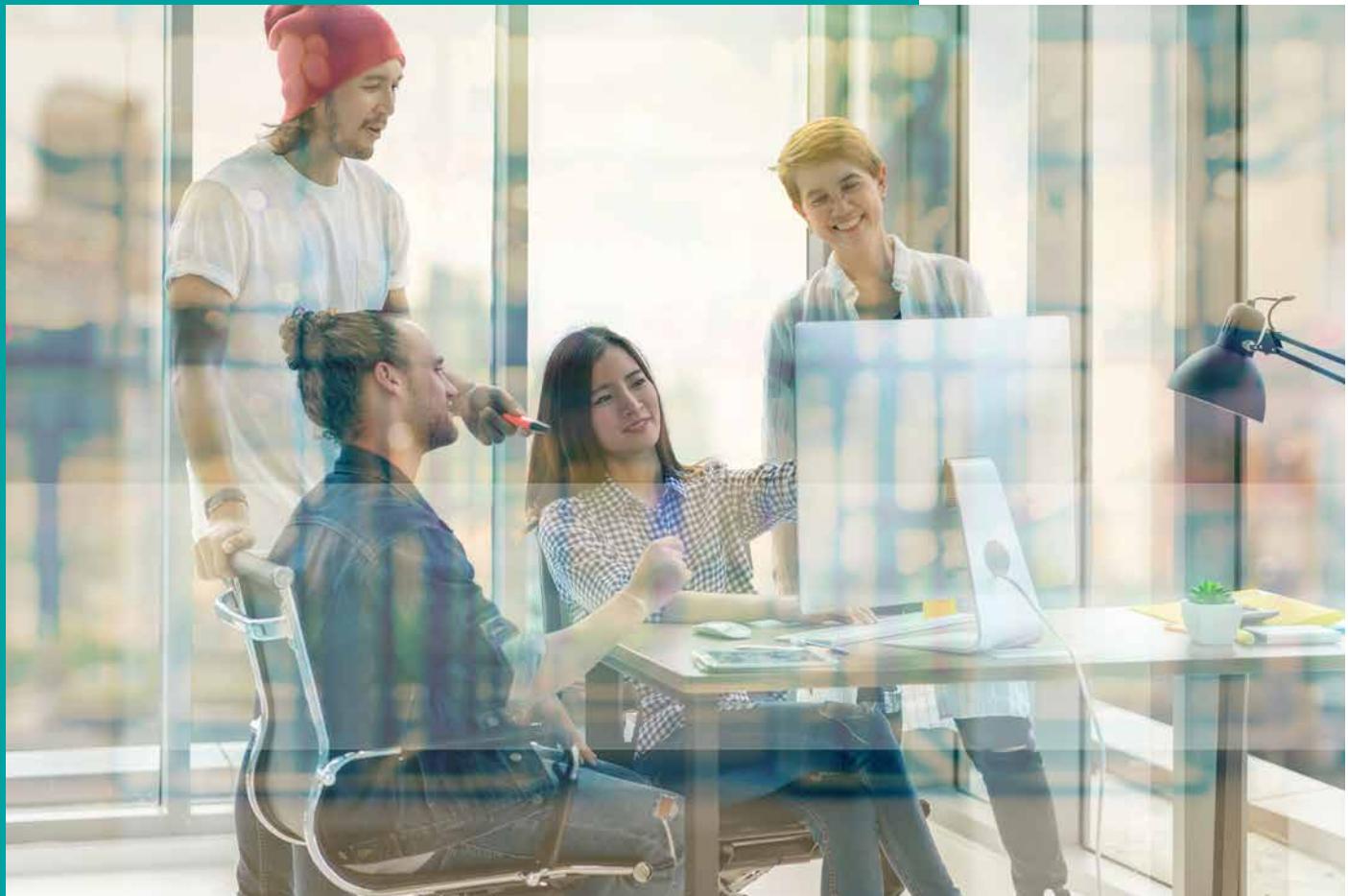
Through digitalization, companies can enjoy many conveniences: for example, processes become leaner and faster. This also increases the responsibility for the collected data and its processing. For many real estate companies, it is now the time to accept this responsibility — from those who steer the company's fortunes.



Conclusion

Real estate + real innovation — the real estate industry also has enormous opportunities and potential at all levels of digitalization in the near future.

Digitalization enables new IT architectures that connect the employees in the company via data and derived information with the users of the real estate and their demands.



Real estate + real innovation — the real estate industry also has wide-ranging opportunities and potential at all levels of digitalization in the near future. Digitalization helps enable new IT architectures that connect the employees in the company via data and derived information with the users of the real estate and their demands.

- Due to the increasing improvement of the digital infrastructure, Smart Homes, Smart Buildings and Smart Cities are moving ever closer together technically. An on-site data analysis of the diverse sensor data creates processed information for optimized management and user-specific interaction.
- In a smart company, decision-relevant information from real estate, markets and internal processes can be processed in a targeted manner. The ongoing intelligent automation can potentially handle not only process components, but also their structure in a self-optimizing way.
- More than ever, employees are the cornerstone of a modern corporate culture. Their thoughtful participation in the digital transformation anchors the awareness that opportunities are associated with the digital transformation into their daily actions. At the same time, this can also reduce the implementation and cyber risks.

The real estate industry is well equipped digitally for the challenges outlined in the introduction and all those still to come, because the corresponding technologies are already available. The leaders of this industry should have the courage to use them innovatively and to initiate the digital transformation.

We hope that our outlook on the topics, trends and technologies for the digital real estate industry has inspired you a little. We therefore look forward to your feedback and are happy to offer you a personal exchange.

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