WE ARE A LEADING FORCE OF
DIGITAL BUSINESS MODEL TRANSFORMATION.
WHAT ARE WE NOT? EVERYTHING ELSE.

WE FIND SOLUTIONS TO CREATE SOMETHING
OUT OF NOTHING. OR TURN YOUR
CURRENT ASSETS INTO A MIRACLE.

#ConstructiveDisruption
#DigitalOrDead

BUILDINGS AND BEYOND
Digitization and Artificial Intelligence in Building Automation, Construction and Real Estate

Expert study by ILI CONSULTING AG and Siemens Building Technologies
The business of firms in building automation, construction and real estate will experience substantial changes in the years to come. Digitization and artificial intelligence basically affect all industries to different degrees. Moreover, the timing of the changes varies considerably. Some industries, such as the automotive industry, have so far been affected significantly more than other industries like construction and real estate. Despite these differences in the degree and timing of the changes, nearly all firms face major challenges. In part, the nature of the digitization challenges may also differ across firms in the same industry, depending on their positions along the value chain and their business models.

Whatever the degree of change, the disruption is major for most firms. However, the willingness to change is too limited in many companies. There is excessive focus on planning and continuous implementation of minor adaptations – real changes receive insufficient attention. This limited impact of new initiatives often leads to frustrations. As a result, employees may focus on their operational day-to-day business. However, this comfort zone of well-known activities may quickly turn into an innovation coma, marked by inactivity for new ideas and concepts.

There are lions in the zoo, and lions in the wilderness. A lion in the wilderness continually hunts for prey. All his senses are always alert so he can act with the right strategy at the right opportunity. For this, he is awake, fit and agile. On the other hand, a lion in the zoo loses his vital hunting instinct due to the secure supply of food. He no longer continues to focus on picking up the scent of prey. Moral: instincts must be mobilized and institutionalized.

Today, many experts in Silicon Valley and beyond claim that artificial intelligence (AI) is the way to go in the building automation, construction and real estate sectors – as the next step of digitization exceeding minor change initiatives, such as strategies for reacting to more intense competition, because of revised concession practices for smoke alarm systems. Will human expertise lose its relevance in such a scenario? Not! Executives can build on their human intelligence, which enables their sense for opportunities even under highly uncertain conditions. Despite the hype about AI, this sense for opportunities offers a major advantage relative to decision-making algorithms.

Thus, executives should stay calm and analyze the impact of digitization on their firm from a business and financial perspective. In the building automation, construction and real estate sectors, firms are experimenting with a variety of digital solutions. While these are only initial steps, major opportunities for innovation and growth abound, through services beyond managing buildings more efficiently with digitization and AI.
Executive summary

There is no alternative to digital transformation for companies in the fields of building automation, construction and real estate. This does not refer to minor steps of digitizing and automating individual business activities. Instead, it refers to major shifts and transformations about generating and capturing value along the entire value chain. For example, in about 75% of all large building projects worldwide over the past three years, the date of completion was more than 10% behind schedule. In addition, buildings including infrastructure, consume roughly 40% of the energy consumed worldwide. These numbers illustrate the potential relevance of innovation in these sectors.

Of course, building automation, construction and real estate firms need to benefit from their current core businesses with their cash cows as long as possible, but they also need to find the right moment to shift at least some of their resources towards the future portfolio to entirely new products and services. Hence, there is no alternative to thinking beyond a firm’s current product portfolio. Many firms in these industries will increasingly be in the IT business – whether their executives want to or not. Traditional construction and service companies can hardly be successful without a strong focus on IT in the future. Thus, it is time to act by setting up digital transformation initiatives. Merely waiting and hoping that the digitization trend fades away is not a viable option.

Rather, the customers of firms from these industries view digitization as not just a vehicle that helps companies do the same things a bit better. They also expect that digital developments will result in completely new business opportunities and models based on smart evaluation and analysis of data that supports transparency and decision-making processes across the building lifecycle. With a digital building lifecycle ecosystem, it will be possible to drive value in the building construction and property industry by enabling fast, easy and seamless interaction of data and knowledge. With a clear understanding of possible business models, executives need to package digital products and services, to arrive at solutions for completely new markets and to transform their traditional markets.

Based on an opportunity space for successful digitization initiatives, this study has boiled down to the several key topics that currently need to be considered for strengthening digitization and innovation in established companies in building automation, construction and real estate. These are: shifting value propositions, value-adding services, AI driven analytics, safety & security applications, process-spanning platforms, multi-partner ecosystems, beyond-building concepts, new revenue models, data-based transparency, and one-stop solution providers. Considering these key topics will help optimize the management of digitization initiatives and innovation activities. On this basis, firms may capture the value of innovation and growth beyond simply more efficient management of buildings through digitization and AI.
1 Motivation for the study

The strategy guidelines in many companies impose limits, but existing standards are often too restrictive when looking to the future. This applies to numerous firms in the building automation, construction and real estate sectors. Many firms that were once successful have been marginalized by competitors, and such an evolution may potentially affect most large established firms. The underlying reason for this threat is the trend towards digitization and AI, along with related developments, such as the Internet of Things (IoT) and industry 4.0. For example, several studies suggest that in about 75% of all large building projects worldwide in the past three years, the date of completion was more than 10% behind schedule. In addition, buildings including infrastructure, consume roughly 40% of the energy consumed worldwide. These numbers illustrate the potential relevance of innovation in these sectors.

However, many construction and real estate firms have been relatively slow in responding to digitization, and many building automation companies now face new competitors. By now, most firms have acknowledged the relevance of digitization and AI for their core business, such as safety and security in future buildings. In fact, digital transformation will be a central determinant of sustainable corporate performance over the next few years in these industries. In contrast, a lack of innovation capability in terms of digital solutions may well be the reason for a dramatic decline in competitiveness. Low innovation performance will be the result, which would prevent firms from adapting to a changing environment marked by new technologies, competitors, and markets.

The consequence of insufficient digital transformation would likely be a downward spiral of falling revenues and shrinking market shares. Following the logic of digital Darwinism, new and more adaptive enterprises with a more pronounced digital expertise would win the upper hand, such that a firm that was successful not long ago would suddenly have to fight for its survival. Just one major evolutionary step in digital solutions can change the fortunes of a firm from being among the leaders to facing bankruptcy. These negative effects of limited attention to digital innovation may generally affect all companies from all countries. Firms with limited adaptive capability may suffer from low innovation performance. In contrast, firms with a high level of transformation may capture the major opportunities of successful innovation.

While the strength of some trends may differ, there is no doubt about the disruptive nature of digitization and AI in building automation, construction and real estate. The impact of these trends may vary in firms in these relatively mature industries. Maturity characterizes the peak of development and, at the same time, implies imminent decline. Most sectors try to counteract this phenomenon. Through incremental, clearly defined evolutionary processes, firms in these sectors achieve marginal product improvements every year and generate short-lived impulses for sales. However, the battle for the 5% improvement or 2% more content prevents companies from addressing the single most important point – creating a long-term, sustainable competitive advantage.

Pursuing such an advantage is particularly important under highly dynamic and uncertain conditions with many open questions. How will the building of the future look like? What new safety and security features will become a standard? How can the data that is collected by means of multiple sensors in buildings be integrated and monetized on a large scale? In the construction and real estate sectors, many firms have been quite slow in addressing these questions and in responding to digital disruption. However, firms may in fact leverage the uncertainty of these trends to experiment with novel solutions, to capture additional opportunities and outperform their competitors.

"Digitalization is about collecting data from buildings and using it. The amount of data available is constantly increasing, and so are our understanding of it and our capability to translate it into value. We can thus serve our customers better, and help them turn their buildings into perfect places.”
Simon Retailleau, Vice President, Global Head of Portfolio Management & Global Head of Service Portfolios, Siemens Building Technologies
2 Digital transformation and digital services

There is no alternative to digital transformation for companies in the fields of building automation, construction and real estate. Moreover, we are not referring to minor steps of digitizing and automating individual business activities. Instead, we refer to major shifts and transformations about generating and capturing value along the entire value chain. Many firms in these industries will increasingly be in the IT business – whether their executives want to or not. Traditional construction and service companies can hardly be successful without a strong focus on IT in the future. Thus, it is time to act by setting up digital transformation initiatives, for example by implementing Building Information Modeling (BIM) and developing digital twins. Merely waiting and hoping that the digitization trend fades away is not a viable option.

Nonetheless, establishing targeted digitization initiatives is a difficult task, and the same is true for many applications of AI. Unfortunately, there is neither an algorithm for economics-driven innovation theory nor for an engineering development methodology. What is the key reason for this? Humans are irreplaceable in the decision-making process. Thus, innovation, digitization and artificial intelligence experts need to join forces to ensure sufficient expertise. While most firms simply do not have a choice, they struggle with developing appropriate digitization strategies and managerial responses.

In terms of the strategic focus of digitization initiatives, four typical patterns may be observed. Many firms simply remain in their status quo of relatively limited innovation and digitization activities. In addition, many firms have tried to strengthen the success of their nondigital innovations by means of systematic innovation initiatives over the past years. For instance, such programs to enhance the proficiency of innovation management involved establishing systematic innovation processes. Besides these innovation management activities, many firms have recently started digitization initiatives, which often lead to efficiency gains only – for example, based on pursuing industry 4.0 solutions in internal optimization processes – rather than to entirely novel solutions.

In fact, digitization initiatives in many building automation, construction and real estate companies focus either on the status quo or on enhancing efficiency based on digital technologies. In most firms, therefore, a major proportion of the potential remains unrealized. These opportunities could be realized by combining digital and nondigital innovation into completely new solutions. Here, the focus would be on capturing new opportunities by providing completely novel products and services. However, most digitization initiatives at companies are directed at avoiding crises, to defend the status quo against the competition. Figure 1 illustrates this focus of most digitization initiatives on efficiency and optimization, rather than on innovation and growth.

A key strategic challenge of digitization is the transformational effect that it has on the product and service portfolios of established companies. In many firms, digitization leads to small changes only in the established product and service base. Instead, digital disruption calls for a major overhaul of a firm’s product and service base. This transformation may include significant changes to a firm’s bestselling products and services. Hence, there is no alternative to thinking beyond a firm’s current product portfolio. Companies need to fully exploit their base of established products. Simultaneously, they need to explore completely new product categories, which are enabled and enriched by means of digital solutions. This challenge demands a careful balancing act.

Of course, building automation, construction and real estate firms need to benefit from their current core businesses with their cash cows as long as possible, but they also need to find the right moment to shift a substantial part of their resources towards the future portfolio of entirely new products and services. Often, digitization will not only require new digital products, but also a broader selection of digital services. Thus, it is important to intelligently bundle digital products with further services. The services may include complimentary lock-in services directed at strengthening a firm’s product sales. Moreover, digitization often provides opportunities for invoiced add-on services complementing a firm’s products. With a clear understanding of the possible business models, executives need to package digital products and services, to arrive at solutions for completely new markets and to transform their traditional markets.
3. Interview with Dr. Serhan Ili

Dr. Serhan Ili, CEO, ILI CONSULTING AG

Are the digitization and AI trends similar or different across industries?
There are important technological and market developments jointly driving the trends towards digitization and AI. In every industry – and in fact in every company – specific challenges are associated with these overall trends. Nonetheless, there are some underlying patterns that lead to similar challenges for many companies. A threat for many firms is the potential change in the competitive rules of the game – based on new digital solutions, new competitors, new value chain partners, and possible substitute products.

Which specific similarities do you see between different industries in terms of digital transformation?
Above all, the underlying technologies that enable the trends towards digitization and AI are relatively similar across industries. Embedded sensors, mobile solutions, cloud computing, machine learning, and advanced data analytics are influential fields of technology that enable the major transformational potential of digitization across different industries. While the application of these technologies differs, many of the underlying technological enablers are related.

Will digitization and AI boost the efficiencies of companies?
Yes, efficiency gains due to optimization are one major benefit of digital technologies. However, there are other benefits of innovation and growth, which are at least as powerful as the efficiency increases. In fact, the efficiency-based mindset in many firms is insufficient, if a disruptive transformation occurs and the competitive rules of the game in an industry are changed. The evolution towards digitization, IoT, industry 4.0 and AI is so disruptive that it is currently affecting most sectors. When digitization and AI hit an industry, it is often shortighted to use current products and services as a yardstick for the future. Management approaches that are presently successful may become a risk, if they blind executives to the requirement of new products, processes, services, and business models.

Are new competencies in IT required to succeed with digital transformation?
This is a good question, and the answer is yes and no. In order to fully leverage digital solutions, companies need data funnels to connect multiple layers of IT systems. In particular, product IT is essential beyond production and office IT. On this basis, firms can develop and utilize integrated solutions for products, services and IT applications. However, many established companies in the construction and real estate sectors are ‘digital laggards’. As such, they have limited data funnels to enable digital innovations. To become ‘native digital innovators’, executives need to closely integrate the different layers of IT, especially regarding the new digital solutions embedded in products. Consequently, a part of the answer is ‘yes’.

Is this only a part of the story?
You are right, a part of the answer to the previous question is also ‘no’ – because IT challenges typically do not constitute the central hurdles in the digital transformation process. Before implementing IT systems, it is essential to thoroughly identify a compelling value proposition and then accordingly design the remaining parts of the business model for value creation and value capture. On this basis, clear requirements for selecting IT suppliers need to be defined. If these important initial activities are not considered carefully, a company may well end up with some unprofitable business model in the market. Therefore, executives should consider critical business models early in the process of addressing digitization, rather than immediately turning their attention to potential IT challenges.

What are current key topics in this regard?
Blockchain and artificial intelligence applications currently dominate the discussion. For example, the blockchain technology may enable every device with its sensors in a smart building to settle its service with other parts of the value chain, which may be enhanced by means of artificial intelligence. On this basis, new forms of energy management will be possible, and they may be implemented with a stepwise approach, following the logic of minimum viable products.

About the interviewee
Dr. Serhan Ili is CEO of ILI CONSULTING AG. He works with leading companies from all industries in the fields of innovation and digitization. He regularly publishes articles, for example in the Harvard Business Manager, and books about various topics, such as Digital or Dead. He is a renowned expert for innovation as well as digital transformation, and he is often contacted for press interviews, for example by manager magazin, DIE ZEIT and Wirtschaftswoche. Dr. Ili studied Industrial Engineering at the Karlsruhe Institute of Technology (KIT), Germany. He went on to receive a doctoral degree in Engineering at the Dr. Ing. h.c. F. Porsche AG in the development center in Weissach and at the Institute of Product Engineering at the Karlsruhe Institute of Technology (KIT).
4 Digital services in building automation, construction and real estate

Digitization and AI affect nearly all sectors, including the building automation, construction and real estate industries. The latter two must catch up to avoid missing the boat on forward-looking technologies. Surprisingly, two of the largest industrial sectors worldwide – the construction as well as the real estate industry – show a very hesitant attitude towards adopting digital technologies to change business models, provide new revenue and value-creating opportunities, and to capture competitive advantages. Several studies suggest that less than 10% of construction companies in Germany make full use of digital planning tools, whereas over 90% of building material firms are convinced that they have not yet exhausted their digital potential. Another study of the Association of German Chambers of Commerce and Industry (DIHK) found that 93% of building construction companies are convinced that digitization will influence every single one of their business processes. The situation is similar in the real estate industry, a market with net fixed assets of 7.4 trillion Euros in Germany (57% residential and 43% commercial), 2.8 million employees, and a transaction volume of 170 billion Euros per year.

According to a study by the real estate company Drees & Sommer, even though most of the respondents (investors, bankers, project developers and real estate experts) see the influence of digitization as very strong (33%) or strong (68%), analysts observe a significant lack of implementation of digitization initiatives or a forward-looking strategy to go digital. For the time being, “gut feelings” have dominated entrepreneurial decisions (60%) among many real estate managers, and only 24% of them rely on a set of real data. Standardized data acquisition methods, central storage of data on submarkets, or drill-downs to asset classes are available at only approximately 20% of all real estate companies. This is quite astonishing, since most industry representatives perceive data transparency as vital for easy and structured assessment of properties, without data gaps and inconsistencies, to come to a quick agreement or consensus on price expectations upon significantly shortening the transaction process. Notwithstanding that digitization is not at the top of the agenda in both sectors. For example, the construction industry ranks among the last ones with respect to digitization and the digital maturity of the real estate industry is also limited. Also, both sectors have recognized that the economic value of data is increasing and that digitization will become a key driver of innovation in the building construction and property industry. Moreover, business partners of both industries view digitization as a vehicle that not only helps firms do the same things a bit better. They also expect digital developments to result in completely new business opportunities and models based on smart evaluation and analysis of data that supports transparency and decision-making processes across the building lifecycle. With a digital building lifecycle ecosystem, it will be possible to drive value in the building construction and property industry by enabling fast, easy and seamless interaction of data and knowledge.

Turning data into business value

The nature of modern buildings is changing dramatically. Buildings once simply provided a space for people to live, learn and work. Now they need to become digital and, in the future, they will be an integral part of the IoT and the internet of energy. With a digitized infrastructure, buildings become dynamic assets that improve occupant comfort and efficiency, lower energy costs, and communicate incidents. In addition, smart buildings are expected to work with elements outside their four walls by interacting with electrical grids, environmental conditions, and the mission of their organizations – beyond just the buildings. The recent rush of new technology has accelerated changes in how buildings operate and, in the future, AI will enable buildings to become smarter and communicate with occupants and assets. However, with a multitude of technology options, new challenges for all stakeholders will arise.

Based on advanced technologies, there is a massive increase in data availability and volume from the proliferation of intelligent sensors, smart devices and the IoT. Building data from all disciplines in the building (power management, heating, ventilation and air conditioning equipment and controls, access and security systems), different types of energy (renewable, oil, gas, electric), the various stakeholders (planners, general contractors, facility managers, owners, users) as well as hardware and software components (energy, infrastructure and ERP systems) are still a hidden resource that offers great potential for enhancing the current business or even creating new opportunities. For example, the number of connected data points in the market is expected to increase from 618 million in 2016 to 2.6 billion in 2021, indicating an expected rise in the amount of data being generated by buildings (Figure 2).

Buildings are talking... we are listening...

<table>
<thead>
<tr>
<th>Market</th>
<th>2021</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected data points</td>
<td>46 million</td>
<td>1.5 million</td>
</tr>
<tr>
<td>Connected buildings</td>
<td>~ 150,000</td>
<td>~ 80,000</td>
</tr>
<tr>
<td>Siemens</td>
<td>2021</td>
<td>2016</td>
</tr>
<tr>
<td>Data values analyzed per day</td>
<td>550 million</td>
<td>400 million</td>
</tr>
<tr>
<td>165 quadrillion</td>
<td>30 quadrillion</td>
<td>2.6 billion</td>
</tr>
</tbody>
</table>

Figure 2: Buildings and connectivity (Source: Siemens customer survey 2015).
Beyond merely collecting data, users want to get more out of their data, as revealed in surveys conducted by Siemens AG Germany in 2015. For example, 80% of the respondents in these surveys indicated that visualization of data is the most important aspect of digitization, resulting in more transparency and fact-based, cost-driven decision-making. Of the respondents, 69% expect improved services, 65% demand access to their data, irrespective of their location, and 50% expect new digital services and business models (Figure 3). If building owners can leverage all the monitoring and reporting data, they can improve their own offerings, provide better and more individual support to their customers – through the knowledge on how to make better decisions, stimulate business innovation with new data-driven value propositions, and improve their cost position.

Although the volume of available data is growing rapidly, bringing data-driven offerings to market successfully, and generating profitable business from data, often remains nothing but a good idea. The key question of ‘how to turn data into business value’ often cannot be answered satisfactorily. It leads directly to the current gaps between customer demand, business requirements, and technology, and gives rise to key challenges such as the following: how to access the required data for analytics? What is the actual value generated for customers across the building lifecycle? How to earn money from data and what are successful business models? What are the options to successfully collaborate in new business ecosystems with partners and suppliers?

For the time being, the drivers of digitization in the construction and real estate industries can be viewed from both an internal and external perspective. Internally, it is primarily the improvement of processes that acts as the key trigger for digitization, and the expectation of cost structure improvements. Organizational changes, new market players, or an increase in data volume, on the other hand, play a more minor role. One of the primarily external drivers of digitization is the customer, one whose expectation and communication profile has changed and will continue to change. New market expectations, as well as expected future or currently recognizable policy obligations, are also recognized as drivers of digitization in the building automation, construction and real estate sectors, leading to new business offerings based on data analytics combined with domain know-how. These new offerings will enable participants to collaborate with ecosystem partners, and to offer their customers new services that optimize their businesses and create attractive new business models and applications. Such opportunities include proactive maintenance, a reduction in energy consumption, and higher efficiencies in the engineering and building lifecycle. On this basis, gains in quality, cost and time will follow.

Leveraging new opportunities

New opportunities in the building automation, construction and real estate sectors have been recognized by many traditional and new players. Like Siemens, many traditional players in the building technologies industry have jumped on the data and analytics bandwagon. Some have made significant efforts in recent years to increase and communicate their analytics capabilities, or have made major acquisitions in the analytics market to strengthen their abilities to analyze all data for actionable insights. Others try to define new industry standards for the IoT or set up global software headquarters in Silicon Valley. In addition, several IT players are trying to replace domain know-how with ‘knowledge from data’ and seeking to penetrate the building technology markets and position themselves as a key enabler for the IoT. In the field of smart homes, for instance, Google is striving for leadership. After acquiring Nest in 2014, a startup making smart thermostats and smoke detectors, Google also bought Dropcam, a company focusing on connected home-monitoring cameras and sensors like Somfy. In addition, spinoffs from former Google employees such as EnergyDeck are on their way. These are just some snapshots of the current market activities of IT players. It is assumed that IT providers might gain even more momentum in the future, if standard IP communication becomes the norm for the IoT where, until now, proprietary communication proved to be a barrier to entry.

Figure 3: Customer expectations (Source: Siemens customer survey 2015)
“Efficiency in all businesses cannot be increased endlessly – at least not as long as processes or systems are optimized in isolation. The only means of achieving genuine efficiency advances is to adopt a comprehensive approach across the board. This requires a high level of interaction and automated analysis of the information that is obtained. The key to all this is digitalization.”

Peter Löffler, Head of Innovation & Industry Affairs, Siemens Switzerland

Specialized players offer promising tools, especially for commercial real estate, in important areas such as highly flexible and high-performance data collectors, providers of internet portals or services around the business of real estate agents, or for people looking for an apartment or house. New startups emerge every week in the context of the IoT and AI. According to the “Gewerbequadrat” blog, the number of startups in the real estate digitization environment – the so-called PropTechs – providing services to the real estate industry in Germany is increasing rapidly. However, 9 out of 10 companies end up failing. As a result, experts believe that it is impossible to predict which firms will be the dominant players in five years. On the one hand, this means that close monitoring is essential to identify potential partners for mergers and acquisitions. On the other hand, the moves of traditional competitors or horizontal IT players, together with those specialized players, are a major threat to which a company should pay close attention.

In addition, classic real estate companies need to keep an eye on the PropTech scene, because many of these companies do not see themselves as an extended workbench of established real estate companies, but as serious competitors with new business models. Right now, most of the PropTech solutions are quick fixes targeted at the everyday processes of a commercial real estate agent. They do not answer the key questions of how to run and manage performance of the entire building, and they do not offer value-added services over the entire lifecycle of a building. In contrast, the most important goal for the building technology industry is to create an ecosystem of connected devices, systems, and buildings designed to maximize the potential of the environment. The objective is to allow customers to be even more effective at what they do, and to empower them to turn data into business value.

Joining forces across industry boundaries

An integrated building management system constitutes the basis of a smart solution for building performance. It should use a smart, robust and open platform to connect disparate building systems such as heating, ventilation, air conditioning, mechanical, electrical, fire, security, lighting, etc. Implementing an integrated building management system results in smart building command, control and communication. It also allows connecting to third-party systems and provides the foundation for an intelligent building infrastructure.

Further core components of a smart solution for building performance are advanced analytics and advisory services, which provide the opportunity to use software apps, such as fault detection and diagnostics delivered through a cloud-based platform that enables data-driven optimization. These services help to monitor energy consumption, system performance, energy supply, and many other components for optimizing overall building performance. An additional leap in building performance can be achieved by means of complete integration of procurement, operations and sustainability functions, with a focus on reducing total energy costs and increasing operational building efficiency. A sustainable energy strategy provides a risk-oriented view of a company’s energy expenditures. It also delivers a plan for investing in energy efficiency confidently and consistently to reduce a company’s energy costs over the long-term. A sustainable energy strategy also eliminates the risk that efficiency gains would be offset by market price increases, and provides a sustainability benefit rooted in cost savings. However, until now this knowledge remains embedded in the minds of energy engineers and cannot be replaced by software.

Customer expectations must be at the heart of digital transformation.

The third component is enabled by the convergence of integrated building management systems, on the one hand, and advanced analytics and advisory services, on the other, combined with partners, especially those providing commercial data. This allows customers to realize maximum value from data-driven and new digital services, ranging from optimized reactive services (such as alarm monitoring and management, addressing and fixing an issue remotely without rolling a truck), to proactive services (system health reports), predictive services (such as identifying a problem before it occurs), energy optimization (such as energy reduction based on data collection and analysis, while maintaining the level of comfort of occupants) to digital transparency with proven outcomes and performance reporting (based on key performance indicators established jointly with customers and aligned with customers’ key business goals). Smart algorithms based on AI applications can easily evaluate trends and recognize patterns in user behavior or consumption, and capture and visualize these data in a meaningful way to create information-rich dashboards for fast cognitive observation. This results in informed decisions, predictive strategies and continuous optimization.

For the real estate industry, these consistent and complete data sets and analyses can provide complete digital documentation of the portfolio, transparent portfolio management with individual indicators, structured asset valuation and, ultimately, shortened transaction processes. Moreover, this approach prepares the ground for cloud-based software, digitally enhanced automation or, at its highest level, a systems-balanced approach that will result in autonomous buildings that control and optimize themselves based on AI. These smart buildings will communicate with occupants, and are also expected to work with elements outside their four walls to interact with electrical grids, environmental conditions, and the mission of their organizations – beyond the building itself.

It is commonly accepted that these transformation processes will lead to opportunities that can only flourish if the building automation, construction and real estate sectors join forces. New business models have already begun to change the rules of the game and have the potential to shift the balance of power in the marketplace. As a result, classic competitive situations will give way to more complex constellations where, through a network of partnerships and alliances, firms are interconnected in ecosystems, but at the same time act as competitors in the market. It also means that partnerships between traditional facility enterprises, large IT players, and rising stars in the PropTech environment will play a much more important role.

Connecting the entire lifecycle

Especially in the field of building design, planning and construction, digitization in the form of Building Information Modeling (BIM) is at the very top of the agenda. As a new digital approach, BIM is revolutionizing the entire planning and construction process. The BIM approach accelerates
The construction process of a building and, if done right, maintains its performance across the entire lifecycle. BIM is used to virtually simulate a physical building – called the ‘digital twin’. This digital twin may also analyze the building’s dynamic response to changes in occupancy or energy supply, and it also indicates the need for building maintenance or upgrades. Among other things, this planning leads to optimal energy efficiency, cost savings and higher sustainability. It also accommodates the comprehensible desire of owners and operators to use once-generated data during the utilization phases of the building.

Correctly applied, the BIM value chain ranges from basic analysis, preliminary and design planning, to analysis and documentation. In addition, it covers the manufacturing process, quantity determination/scheduling, as well as everything from site management, to operation and facility management, and post-processing, including demolition or rehabilitation of the object. Ideally, the digital twin follows all modifications of the real building, and dynamically readjusts itself in case of recorded performance differences. However, no matter which terms are used in the building automation, construction and real estate industries to describe the latest technological and analytical advances, customer expectations must be at the heart of digital transformation. From the point of view of the building automation, construction and real estate industries, four basic value pillars drive the key outcomes for all stakeholders involved. This applies to both existing and new buildings, as indicated in Figure 5.

However, no matter which terms are used in the building automation, construction and real estate industries to describe the latest technological and analytical advances, customer expectations must be at the heart of digital transformation. From the point of view of the building automation, construction and real estate industries, four basic value pillars drive the key outcomes for all stakeholders involved. This applies to both existing and new buildings, as indicated in Figure 5.

“Digitalization is key to achieve efficiency and sustainability in building automation, construction and real estate industries.”
Christian G. Frey, Senior Manager Innovation & Patent Coordination, Siemens Building Technologies

The three digital twins together build the digital lifecycle ecosystem.

DIGITAL PRODUCT TWIN
Product specific data (e.g. size, wiring, color...)

DIGITAL CONSTRUCTION TWIN
3D CAD data, floor plan, sensors located, rules/values, KPIs...

DIGITAL PERFORMANCE TWIN
Maintenance costs, KPI status, monitoring, operation concepts, infrastructure status, time series data...

Figure 4: Overview of digital twins.
<table>
<thead>
<tr>
<th>Value Pillar</th>
<th>New Construction</th>
<th>Existing Buildings</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reduced Costs</strong></td>
<td>• Reduces overall project costs/budget through an integration plan defined early in the planning process. Before specifications are written and equipment is purchased, dramatically reducing change orders.</td>
<td>• Reduces capital costs and operational expenses by utilizing an open system that incorporates core components of existing systems and detects and analyzes faults.</td>
</tr>
<tr>
<td></td>
<td>• Reduces upfront investments by defining how systems can work together, reducing system infrastructure needs and allowing best-in-class systems in specifications.</td>
<td>• Reduces overall costs by creating an open environment to integrate disparate new and existing systems, allowing them to maximize their full potential for optimized efficiency.</td>
</tr>
<tr>
<td></td>
<td>• Reduces overall costs by creating a long-term integration plan for systems and networks, while reducing future redundancies.</td>
<td>• Reduces future operational costs by ensuring the facility can acquire the best future technology that may not be on the market at the time planning and construction begin.</td>
</tr>
<tr>
<td></td>
<td>• Significantly cuts capital expenditures during the construction process by reducing change orders and associated costs associated.</td>
<td>• Analyzes energy supply invoices to identify over-billing, redundant charges, and lower-cost energy sources.</td>
</tr>
<tr>
<td></td>
<td>• Lowers future operational costs by ensuring that the facility acquires the best future-proof technologies.</td>
<td>• Resolves faults efficiently with trained service personnel, who know how best to respond to fault detection and interpret system reports and analyses.</td>
</tr>
<tr>
<td><strong>Enhanced Productivity</strong></td>
<td>• Supports a lean construction strategy for equipment acquisition throughout the construction process.</td>
<td>• Provides an integrated building management system that extends the capability of individual systems.</td>
</tr>
<tr>
<td></td>
<td>• Provides clear definitions of roles and responsibilities of each member of the building technology team.</td>
<td>• Provides more efficient allocation of resources using an integrated building management system.</td>
</tr>
<tr>
<td></td>
<td>• Reduces and optimizes construction schedules by integrating technology requirements using the critical path method.</td>
<td>• Improves operations by identifying and analyzing faults, allowing facility managers to pinpoint system malfunctions, prioritize repairs, and resolve critical issues immediately.</td>
</tr>
<tr>
<td><strong>Elevated Performance</strong></td>
<td>• Anticipates the future by incorporating new technologies into the planning process.</td>
<td>• Collects and analyzes building data for increased transparency, faster response, and better-informed decision-making.</td>
</tr>
<tr>
<td></td>
<td>• Supports new generations of sustainable construction.</td>
<td>• Allows service teams to be less reactive and more proactive.</td>
</tr>
<tr>
<td></td>
<td>• Improves project execution and mitigates risk by leveraging integrated technologies.</td>
<td>• Applies remote services wherever possible.</td>
</tr>
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<td></td>
<td>• Ensures efficient deployment and operation of building technology based on a technology roadmap.</td>
<td>• Provides the flexibility of open technology and gives technology scalability to best meet future needs.</td>
</tr>
<tr>
<td></td>
<td>• Provides an integrated building management system that extends the capability of individual systems.</td>
<td>• Increases the value of past investments by allowing integration with new and future solutions.</td>
</tr>
<tr>
<td></td>
<td>• Allows specifying best-in-class systems that reduce redundancies and increase overall building performance.</td>
<td>• Lays the foundation for incorporating new technology as it appears on the market.</td>
</tr>
<tr>
<td></td>
<td>• Establishes a technology plan to avoid costly change orders.</td>
<td>• Allows best-in-class applications to be plugged in and made interoperable so the building can continuously evolve and improve itself.</td>
</tr>
<tr>
<td><strong>Future Adaptability</strong></td>
<td>• Provides a technology roadmap to ensure that the most flexible and open building technology is specified.</td>
<td>• Creates extensibility to new applications, leveraging initial investments and open-platform concepts.</td>
</tr>
<tr>
<td></td>
<td>• Provides plans for an open network that accepts and adapts new technologies and new systems.</td>
<td>• Provides the flexibility of open technology and gives technology scalability to best meet future needs.</td>
</tr>
<tr>
<td></td>
<td>• Ensures future viability and adaptability of buildings long after construction is complete.</td>
<td>• Increases the value of past investments by allowing integration with new and future solutions.</td>
</tr>
<tr>
<td></td>
<td>• Provides seamless transition to facility management with thorough construction documents based on building information modeling.</td>
<td>• Lays the foundation for incorporating new technology as it appears on the market.</td>
</tr>
<tr>
<td></td>
<td>• Minimizes changes and/or disruptions during initial facility startup, and commissioning with functional performance tests.</td>
<td>• Allows best-in-class applications to be plugged in and made interoperable so the building can continuously evolve and improve itself.</td>
</tr>
</tbody>
</table>

Figure 5: Overview of customer expectations.
5 Interview with Stefan Kögl
Stefan Kögl, Head of Building Solutions, Siemens Real Estate

How does digitization change the world of construction? Fundamentally! Or to expand a little building and the construction sector have been resistant to change over the last century. This comes down to the fact that in many instances it is still a matter of laying a stone on a stone, and that a construction site is logistically organized along relatively simple lines, i.e., material is delivered and processed by one individual. Digitization is a revolution in its purest form. Basically, it influences every building phase: planning, logistics, materials, and the construction process itself. This serves to optimize the entire value creation chain, so that building as an activity is industrialized to some extent. What this means is that the building as a product is so perfectly planned and organized in advance that effectively it only needs to be assembled.

So how will the planning and construction process look like in the future? The future planning process will take place on an exclusively digital and fully networked basis. The key phrase here is Building Information Modeling (BIM). In contrast to the customary planning activities that today accompany the construction process, the idealized BIM method sees the whole building planned in advance, in parallel with all the associated trades, and simulated, tested and corrected as required in a virtual model. Faults and discrepancies can thus be identified and corrected before the building process starts. We can identify and deal with potential errors and conflicts in advance, resulting in a faster construction process with fewer glitches. Another advantage is that by using the digital twin of a building, it is also possible to simulate variants aimed at optimizing that building. Two questions that arise are: 1) What effects will the particular type of façade have on building and investment costs, and later on maintenance and cleaning? And 2) What impact will an extra door have on future evacuation scenarios, comfort levels, or heating costs? We can come up with precise answers to such questions before breaking ground. Ideally, the building would be fully planned right through to completion. This would not only enable faster, simpler and more cost-effective planning and construction, but also allow optimization of the building’s operation.

Where do you see the greatest challenge in pushing forward with BIM? From my perspective, the greatest challenge will be to implement an integrated, end-to-end BIM process, with all stakeholders on an equal footing. Within the sector, the situation is still that only the planner has the planning data, the construction company has the building data, and everyone draws up his or her own BIM model. Each party does its own optimization and few of those involved see the bigger picture. So, we then have precisely the situation that we want to avoid, in that the expertise already in place does not get shared. To put it in graphic terms, everyone is only interested in his/her slice of the cake. Digitization, however, interlinks all topics and the requirements of individual project phases. Another issue is the question of who owns the data from BIM, something that comes up especially during the operating phase. In the future, sensors will deliver a large volume of dynamic data from running the property:

- often a room is used or cleaned, how it is heated, and so on. Hence, over the course of time a wealth of dynamic data accrues – but who owns it? The user, the facility manager, or the owner? There are many technical and legal questions that will have to be clarified.

How can this be achieved? By developing a standard and trying to drive and influence the market! And this is precisely what we are currently doing. In recent months, at Siemens we developed a holistic BIM standard, which looks at all phases of a real estate property’s lifecycle and provides associated data. To date, this is unique in the marketplace. We have now published the BIM@SRE standard and are making it available to the market, of course hoping that planning specialists and construction companies will make use of this knowledge.

We have now talked a great deal about the planning and building process. What other developments will affect the construction sector? A wide variety of developments! 3D printing, for example, will play a significant role. Today, it is already possible to manufacture components based on 3D design engineering data. Recently, Dubai saw the opening of the first office block erected using only parts produced with 3D techniques. This development will continue and increasingly become the standard. And the more parts that can be produced on site, the greater will be the changes to building as an activity. It is essential, though, for all elements to be 100% pre-dimensional and to fit accurately to the millimeter, so that everything can be assembled properly. Moreover, visualization is another trend that will create a high degree of transparency within planning and construction. By means of virtual reality, I can sit at a table with my partners and examine this or that component much more effectively (for example, this one is too large, too thick or too thin), using a methodology that didn’t exist earlier. Such visualization brings better results and improves the quality. If in the future everyone works on one model, each can immediately see the results of her/his actions and input.

You also mentioned materials... Correct. The importance of intelligent materials and composites is growing continuously. This means materials that react like living organisms to influences such as moisture, temperature, pressure or wind, and solve technical issues autonomously without external intervention. The development of these smart materials has advanced at a dramatic pace over recent years, and has led to genuine innovation leaps in a wide variety of different fields. For the construction sector too, we now have highly interesting approaches, such as load-bearing structures that self-optimize under stress, or surfaces that repair minor damage themselves. Or, there are other examples such as light-reflecting concrete for intelligent guidance systems, or thin film solar cells for textile architecture. We can give pretty much free rein to our imagination here.

How will digitization change architecture, and what will tomorrow’s buildings look like? If only there were a simple answer to this question. Fundamentally, the immutable architects’ rule “form follows function” applies here too. If the functions in the building and the requirements placed on these remain the same, the characteristics of buildings will still be similar. The changes in architecture will come with the function and altered materials, though it is not yet possible to state definitively what form they will take. However, what we can already
say today is that the buildings we procure must be capable of greater flexibility in adapting to the ever-greater pace of change. Thus, they must be suitable for manufacturing product A today, for making product B tomorrow, and yet capable of serving as office space or a laboratory the day after that. Modularity is another requirement for tomorrow’s buildings, and this too is a response to address the need for adaptability to changes in use.

Perhaps the most important development is that buildings will really become more sustainable. In Germany, for example, by 2050 the demand for primary energy in buildings is supposed to fall by 80%. To achieve this, buildings must be planned, and operated more intelligently than today. If the appropriate technologies are incorporated into planning from day one, it is possible to cut heating, electricity or lighting costs by more than would be possible using conventional methods. And this applies not just to the planning of power supplies, but also to scoping the project with a view to efficient space utilization, optimum exploitation of natural light, and the use of sustainable materials. Without seeking to peer at the crystal ball, my view is that Siemens is well set to cope with all the disruptions ahead. And here at Siemens Real Estate, we have all the possibilities at our disposal, and should thus deal with them with the right motivation.

In this regard, I would like to touch on another important aspect of digitization, specifically the topic of change management, and changes regarding management behavior. Today, we are faced with the constant assertion ‘tomorrow it will be like this or that’ without anyone knowing precisely how things will pan out. Tasks are becoming ever more complex, because digital technology facilitates wide-ranging interlinks. Additionally, those involved are at very different stages of the transformation, including experts whose knowledge we need to utilize as effectively as possible. In such an environment, an open leadership culture is more vital than ever. Everyone’s view counts, because only collectively will we be able to arrive at the correct decisions as to ‘When do we do what, how forcefully should we drive which innovations, and how should we develop our teams?’

About the interviewee
Stefan Kögl, born in 1965, studied architecture at the Technical University in Braunschweig, Germany, and graduated in 1994. He gained his first professional experience as a planner in various architectural firms before joining Metro AG in 2004, where he worked as the head of planning. After working in a management capacity in international project development at LBBW Real Estate, he joined Siemens in 2010 and has since headed GS SRE’s Building Solutions department. Stefan Kögl is married and has a son.
6 Digital services at the crossroads of industries

The construction and real estate sectors have barely been at the forefront of digital transformation, but the transformation process has recently intensified, because digital technologies and applications provide major advantages for relevant players, such as investors and owners of new buildings. The added possibilities to reuse data help to link multiple players along the value chain. Above all, Building Information Modeling (BIM) helps integrate data from the design, planning and construction phases of a building. Therefore, some costs will shift from construction to the previous planning phase. As such, BIM also significantly affects the scope and focus of architects’ tasks and activities.

Future applications will further link BIM to the subsequent phase of operating new buildings. Based on digital product twins, digital construction twins and digital performance twins, major efficiency gains will be possible in the different steps along the value chain from designing, constructing and operating buildings. Condition-based monitoring is only one example of such enhancements. On this basis, digital technologies also allow for further transformation of capital expenditures to operational expenditures. Beyond efficiency gains, however, digital transformation enables completely new services, such as corrective, preventive, condition-based, or predictive maintenance. In general, fault detection and software-as-a-service applications will play a central role, along with digitally enhanced automation, open systems and proactive power management.

Many of these new services cannot be offered by one company alone. Instead, the development and accomplishment of these services calls for business ecosystems with multiple partners across various industries. Consequently, new interfaces with external partners need to be managed successfully. In the case of sensor-enabled new services, for instance, the interface of building automation, IT and financial services becomes particularly important. On this basis, several critical questions need to be addressed. What role do IT suppliers play in developing a platform for collecting, utilizing and leveraging the value of data from sensors in buildings? How can a multitude of micro-financial transactions be efficiently and reliably managed together with financial services providers? What role would a building automation company have in this respect?

For example, a building automation firm could rely on ultra-low power wireless sensor networks to collect a variety of data. Further technologies that may help to offer new services are virtual reality, augmented reality applications, and 3D printing. Moreover, in the medium-term voice recognition will likely become a feature increasingly expected by the customers of building automation companies, because people will want to steer and control some functions by voice recognition, not only in their private homes, but also in more complex buildings like offices and shopping malls.

Beyond these roles of building automation companies, IT service providers may play an important role in future ecosystems. The compatibility and interoperability of multiple systems will require seamless integration of different solutions. Moreover, advanced analytics functionalities based on AI applications will further boost functionalities that building automation already offers today. In the long run, quantum computing could offer new possibilities for managing data from networks of sensors distributed across buildings. In this respect, IT service providers will have another major role in future ecosystems.

If new services are enabled by data collected from sensors in buildings, which is potentially transferred to third parties, the billing for these data transfers needs to be managed efficiently and reliably. Here, financial services companies may play a major role. For example, these firms may implement the distributed ledger technology, such as blockchain, to enable every device with its sensors to settle its service with other parts of the value chain. Consequently, new forms of energy management will be possible. For example, remuneration for the multitude of data transactions that are required can be provided by financial services companies in an ecosystem. In this regard, another critical issue is advanced cybersecurity solutions for these settings. As such, financial services companies can contribute to aggregating and analyzing the data to optimize the value chain.

In sum, these examples underscore the relevance of business ecosystems, which will continue to increase in the building automation, construction and real estate sectors. Thus, a company will compete with not only its own product or smart solution, but also with a system of smart connected solutions. As a result, it is insufficient to optimize a firm’s own products and solutions. Even if a firm offers a solution that is superior to a competitor’s solution, it may not succeed in the market, because of problems in the business ecosystem. For instance, a company’s building automation solution may be inappropriately integrated into the business ecosystem – negatively affecting the final user experience. Moreover, a firm’s solution may be well integrated in the ecosystem, but if the entire ecosystem is inferior to competing ecosystems, the superiority of a firm’s solution will not pay off.

“Digitalization is opening up completely new opportunities to make real estate business smarter and spark a new level of competitive advantages.”

Volker Dragon, Senior Manager Industry Affairs, Siemens Building Technologies
If building automation, construction and real estate companies aim to systematically address the opportunities associated with digitization and AI, they have already taken an important first step, beyond merely searching for efficiency enhancements and protecting the status quo. While there are many ways to identify innovation and growth opportunities in the context of digitization, it is often helpful to consider two essential dimensions: the extended value chain activities and the variety of players in a business ecosystem.

Regarding value chain activities, executives need to map how their firm’s products, services and solutions get on the market – from the production of single product components to after-sales services. These different activities will often go beyond the activities that a firm is conducting internally, so that this analysis provides a broader picture. With respect to buildings, it is helpful to distinguish at least the following activities: design, planning, simulation, construction, operation & control, analytics, and refurbishment (and potentially demolition and recycling). These activities provide the first dimension of the opportunity space, and they extend the traditional value chain of each individual player in the building automation, construction and real estate industry.

Concerning the business ecosystem, executives should map the different players that are relevant in the context of a firm’s business. This set of players goes beyond direct suppliers and customers, and it includes partners from other industries and players at different stages of the value chain. In terms of the construction, real estate and building automation sectors, relevant stakeholders comprise at least the following players: building automation company, architect, planner & installer, construction company, owner, operator, investor, bank, insurance, regulatory bodies, IT service providers and PropTech startups – new companies in the field of property technology. These stakeholders constitute the second dimension of the opportunity space, and they go beyond the players that are typically considered at present by most firms in these sectors.

Developing a broader picture by aligning the value chain activities and the variety of players in the ecosystem will typically lead to several areas where a firm is already active, but it also brings up numerous opportunities where a firm is not yet active. These fields provide blue oceans of relatively uncontested markets with excellent opportunities for innovation and growth. Figure 6 illustrates an example of such an opportunity space, which needs to be tailored to the situation of each specific firm. If this opportunity space is opened from a digitization perspective, it offers a helpful starting point for how a firm may profit from digitization by growing its business, rather than facing shrinking margins in the core business.

In particular, the opportunity space contributes to identifying specific value propositions that help to optimize existing ideas or that provide the basis for completely new strategic initiatives. Here, it is helpful to think in terms of the following four categories: what you are good at, what you love, what you can be paid for and what the world needs. On this basis, firms may renew their digital intelligence to be able to adopt critical patterns for future success: the power of being digital, the power of exponential and the power of experience. As such, these success patterns enable digital lock-in experiences, product upselling and add-on services.
The opportunity space is key to provide a holistic perspective, to increase the sense for opportunities and to orchestrate ideas. It helps with developing knowledge and expertise and stops jumping from unconnected idea to unconnected idea.
8 Key topics for your business

Based on the opportunity space for successful digitization initiatives, the importance of innovation beyond mere efficiency increases can hardly be overrated. Digital innovation is the key to sustaining superior financial performance over time. Nonetheless, most companies consider efficiency gains as the most essential factor in their digitization initiatives. Starting a digitization initiative is an important initial step, but focusing purely on efficiency drastically limits the potential benefits of such initiatives. In nearly all companies, there are major opportunities to strengthen digitization, especially by developing completely new solutions based on innovation activities.

Often, these new solutions require new business models. Thus, the business model logic is essential to digital transformation in the building automation, construction and real estate sectors. A business model includes a firm’s value proposition, value creation and value capture. The value proposition part of the business model describes the value delivered by satisfying customer needs and solving customer problems. As such, it is the central starting point for the business model design. The value creation part of the business model addresses key activities, key resources, key partners and the cost structure of the company. Thus, it illustrates how a firm can profit from its solutions by capturing some of the value that it has created – potentially together with external partners.

Our analyses have boiled down to current key topics that need to be considered for strengthening digitization and innovation in established companies involved in building automation, construction and real estate. These key topics do not comprise basic measures, which many medium-sized and large firms in these sectors have already implemented anyway. Examples of these are strategic analyses on the impact of digitization, as well as a systematic innovation process from the initial idea to the final launch of a new solution on the market. Beyond such basic measures, we have summarized the following key topics that need to be considered in the present situation at many firms. Drawing on the business model logic, key topics 1–4 below primarily refer to the value proposition, key topics 5–7 to the value creation part, and key topics 8–10 to the value capture part of the business model.

1. Shifting value propositions
   Digitization and AI will substantially affect the core business of most firms by shifting their value propositions – at least in the medium-term. Executives need to conduct game change analyses and place the challenges on the top of their agendas.

2. Value-adding services
   Digitization initiatives at many firms put strong emphasis on increasing efficiency based on industry 4.0 technologies. Thus, the firms forego growth opportunities associated with new value-adding services based on digital and non-digital innovation.

3. AI-driven analytics
   The importance of advanced analytics based on AI will dramatically increase in the future, with great opportunities for building automation, construction and real estate companies. Firms need to develop sufficient internal expertise to proficiently collaborate with external service providers.

4. Safety & security applications
   The field of safety and security in future buildings is particularly attractive for developing new-digital applications. Thus, executives may want to identify promising solutions for their firms in these fields. Potential long-term offerings need to closely reflect the firm’s digital business models.

5. Process-spanning platforms
   The boundaries between the construction process and real estate management will become porous, because of process-spanning platforms, which will integrate the process from the initial design phase to final refurbishment. This integration will transform the entire value creation process beyond current BIM tools.

6. Multi-partner ecosystems
   Digital transformation requires new capabilities, and it often includes active collaboration with multiple partners. These collaborations extend traditional industry boundaries, and include diverse partners in ecosystems to enable completely new digital solutions.

7. Beyond building concepts
   By means of offering new digital services, firms from the building automation, construction and real estate sectors can offer solutions that go beyond the building itself, to offer indoor positioning systems or interfaces for city planning systems and the mobility infrastructure.

8. New revenue models
   New services and digital solutions will typically come along with new revenue models. Service-based payments, licensing models, or micro-financial transactions as a compensation for sensor-based data transfers, will lead to substantial shifts in the revenue streams of many companies.

9. Data-based transparency
   The availability of more detailed data in terms of breadth and depth will strongly enhance the transparency of costs and prices for products, services and solutions along the entire process from initial design to final refurbishment. This will lead to cost pressures and further impulses for innovation to achieve a price premium.

10. One-stop solution providers
    A central danger for established building automation, construction and real estate companies in terms of digitization is the emergence of new one-stop solution providers, who are at the interface to the customer. Providing integrated solutions with services may help to reduce this threat.

Considering these key topics on value proposition, value creation and value capture, based on the opportunity space, will contribute to optimizing management of digitization initiatives. The potential benefits will be even higher when several of these key points are combined. For instance, using AI driven data analytics in multi-partner ecosystems will contribute to the development of new revenue models. Besides these general topics, further firm-specific action items can be identified with a digital innovation check-up. Achieving excellence in managing digital innovation requires the implementation of various firm-specific measures, in alignment with corporate strategy. In this regard, proven expertise in managing digitization, innovation, and growth is needed.

“Smart applications based on artificial intelligence open up completely new revenue models.”

Dr. Ulrich Lichtenthaler, Senior Consultant, IlI CONSULTING AG
Digital transformation is a disruptive evolution for the building automation, construction, and real estate sectors, and many such firms have difficulties in successfully responding to this evolution. This limited capability to adapt to a disruptive change can be observed, despite some successful innovations in the history of many companies. In fact, innovation in the context of transformation processes is what helped many established firms to rise into the league of influential corporations in their industries. However, many firms then tend to focus more and more on efficiency as the main strategic goal, whereas the implementation of novel innovation projects receives insufficient attention – especially in the construction and real estate sectors.

Besides major threats for incumbent firms, there are important growth opportunities based on new services in the context of digital transformation and AI. Established companies basically have two options – wait for somebody else to disrupt their established business, or self-disrupt their business. While the first option is purely passive, the second option involves an active move towards digitization – potentially with negative effects on the established business.

Looking back, it may often appear easy to estimate the degree to which a company should have disrupted its own business – or at least should have tried to do so. When faced with a forward-looking decision, however, this is much more complicated. It will be difficult to convince all relevant stakeholders to focus fully on the future digital business at the expense of today’s business – especially if a firm’s competitive position and financial performance are still favorable, and a deterioration of these conditions is not yet fully discernible. Nonetheless, companies will often have to disrupt themselves, if they want to survive and prosper in the long run.

A clearer understanding of the opportunities and limitations of digital technologies and AI will emerge down the road. In the face of the uncertainty that is typical for disruptive trends like digitization and AI, it is still too early to shape an integrated and holistic agenda for digitization and AI in many construction and real estate firms. Nonetheless, complete inactivity is not a solution either. Firms need to react or – even better – should try to actively shape the impact of digitization now with respect to smart buildings of the future. Considering the substantial transformations ahead, firms have major opportunities to actively influence the environment in their favor.

In fact, fortune will favor the prepared firm – and this is particularly true under the present conditions in the building automation, construction, and real estate industries. Therefore, it is time to act now by starting well-designed digitization initiatives. Executives should consider the uncertainty that still accompanies digital transformation and AI deployed as resources. By actively shaping the environment, the uncertainty can be molded into favorable outcomes aligned with a firm’s strategy and business models.
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Volker Dragon is an industry veteran with over 25 years of experience in piloting industry marketing along the entire energy conversion chain. Currently serving as Senior Manager Industry Affairs at Siemens Building Technologies Volker oversees and analyses economic and political trends related to the Energy Efficiency Business. In addition to his current function he serves as Chairman of eu.esco, the European Association of Energy Service Companies. During his career Dragon has held management positions in the Power, Steel, Engineering and Building Automation Business. Dragon received a Master Degree in business administration from the university of applied sciences in Mainz and a second degree in communications from the European Business School (EBS) in Oestrich-Winkel.
DIGITAL OR DEAD
How digital transformation opens up blue oceans for survival in the future

Digital initiatives need to fit into the corporate environment in three ways. First, a digital initiative needs to work on paper. Second, it needs to work in the market. Third, it needs to work by growing a firm’s bank balance.

To fully profit from digitization, firms need to develop digital intelligence. This is the central capability needed to gain digital momentum and to facilitate a game change.

The book shows in a practice-oriented way how leading firms manage innovation, digital transformation, and disruptive business models. It includes contributions by renowned experts at innovative firms, such as Allianz SE, Cisco Systems, comdirect bank AG, Deutsche Lufthansa AG, Evonik Industries AG, Oracle, Terex Corporation, TRUMPF GmbH + Co. KG, Turkish Airlines, and Volvo Car Group.

“The digital tsunami is going to deeply affect every industry.”
Doç. Dr. Temel Kotil, CEO, Turkish Airlines

“And the aviation sector, too, will simply not survive if it clings to its ‘old’ business models.”
Doris Krüger, Senior Director Future Innovation Strategy and Member of Group Supervisory Board, Deutsche Lufthansa AG

“Digitization is enabling exponential innovation.”
Andreas Mai, Director Smart Connected Vehicles, Cisco Systems

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FAQ Digital Transformation and Artificial Intelligence
101 Questions – 101 Answers

Many firms that were once successful have been marginalized by competitors, and such an evolution may potentially affect the majority of large established companies in many sectors. The underlying reasons for this threat are the trends towards digitization, the Internet of Things, Industry 4.0, and artificial intelligence. Consequently, most firms simply do not have a choice. They need to respond by means of digital transformation. By now, most firms are aware of the challenges, but they struggle with developing appropriate strategies and managerial responses.

This practice-oriented book provides actionable recommendations, by answering the most critical and fundamental questions about successfully implementing digital transformation and artificial intelligence. As such, it illustrates how large and medium-sized firms may capture the opportunities, while avoiding the threats of digital transformation. The book considers not only potential efficiency gains, but also addresses the opportunities for innovation and growth in detail. So as to fully profit from digitization, firms need to develop digital intelligence. This is the central capability needed to gain digital momentum and facilitate a game change with disruptive business models.

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