Smart Building Study
Focus on the Facts

Foreword

Dear readers,

Over the past few years, the concept of smart buildings has come more and more into the spotlight.

Every stakeholder, whether they are corporates (occupants, tenants), investors, owners, developers or facility management companies, has their own opinion on the topic. Smart buildings are THE future in real estate for some, while others dismiss them as a technical gadget, nothing more than a buzzword.

But what exactly makes a building "smart"? What are the key technologies involved? And are the upfront investments for smart buildings really worth it? At this point – almost seven years after the debut of "The EDGE" in Amsterdam and other lighthouse projects, after countless debates and panels – the industry has still not come up with a unified response to these essential questions.

Without a set of shared industry standards, it is particularly challenging to make evidence-based statements about the added value of smart buildings. Opinions vary widely on the exact definition of what makes a building smart. It is enough for some to offer a digital room or workplace booking system or an app for users, while others expect fully automated building services including an IoT infrastructure and cloud APIs.

That is why the publishers of this study decided to do a deep dive into this important topic, working with established subject matter experts and collecting the first major set of empirical data on smart building performance. The result is a study that helps create consensus on the definition of smart buildings and quantify their future potential.

Special thanks go to our development partners for bringing diverse perspectives to these very engaging discussions, to the companies in our case studies for their practical contributions and to our colleagues from Deloitte and the BAUAKADEMIE for the active role they played in the research. We hope that you enjoy reading this report and that you can use its ideas as a basis for further collaboration and discussion. We look forward to an open debate on our findings with stakeholders from across the real estate sector and to further investigating these ideas.

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Many thanks to the following partners for their support in the preparation of this study:

ART INVEST REAL ESTATE

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Executive Summary

What makes a building "smart"? And does smartness automatically add value? To answer these questions and more, we gathered insights from a variety of stakeholders, including corporates (occupants, tenants), investors, owners, developers and facility management companies, and collected quantitative as well as qualitative data on 20 smart buildings from different regions in Germany and Switzerland.

Key findings of the study

A shared industry standard for smart buildings similar to the levels of autonomous driving from the automotive sector

The new five-level model for smart buildings covers the essential technical and organizational aspects of buildings. Level 0 describes building services that are controlled mainly manually, Level 4 is a fully autonomous building, and Levels 1 to 3 represent the evolutionary steps in between.

These smart building levels are fit for purpose

We analyzed 20 buildings using the five-level model and assigned each to a particular level based on fixed criteria. Then, we independently confirmed the results with the survey participants.

Smart buildings are more cost-effective

The average operating costs of the smart buildings in our survey were lower than those of conventional buildings by as much as 26%.

Smart buildings are more energy efficient

On average, the smart buildings in our analysis consume 34% less energy than conventional buildings.

Smart buildings have a positive impact on user comfort and corporate image

Users say they find smart buildings more comfortable and believe that smart features enhance the corporate image of its occupants.

Communication between occupants and providers needs to improve

Occupants and providers have quite different perceptions and expectations, particularly when it comes to providing cybersecurity and reducing both operating costs and CO_2 emissions.

Users like to keep things simple and need support in managing change

A majority of the users we surveyed for this study are overwhelmed by the number and the complexity of the controls in user apps. We need to start a discussion about which applications users actually need, how to support them when things change as well as how to best provide more general technical support.

Background and objectives of the study

After The Edge was completed in Amsterdam as a lighthouse project in 2016, there was an obvious hype around smart buildings across the real estate sector. Several new office buildings with advanced digital features have been constructed since that time, from the CUBE Berlin (2020) and the Hammerbrooklyn.DigitalPavillon in Hamburg (2021) to the OWP 12 in Stuttgart (2021).

In a 2020 global study by Deloitte, 75% of C-suite real estate executives said they believed smart buildings would be the norm by 2025. 60% of the 750 global executives in the survey reported that they planned to significantly increase their own investments in smart buildings in the near term (< 18 months).[1]

Today, more than three years later, we can see initial signs of this trend on the German market, although we are still far away of smart buildings becoming the norm. So, what exactly is keeping smart buildings from become more mainstream in Germany?

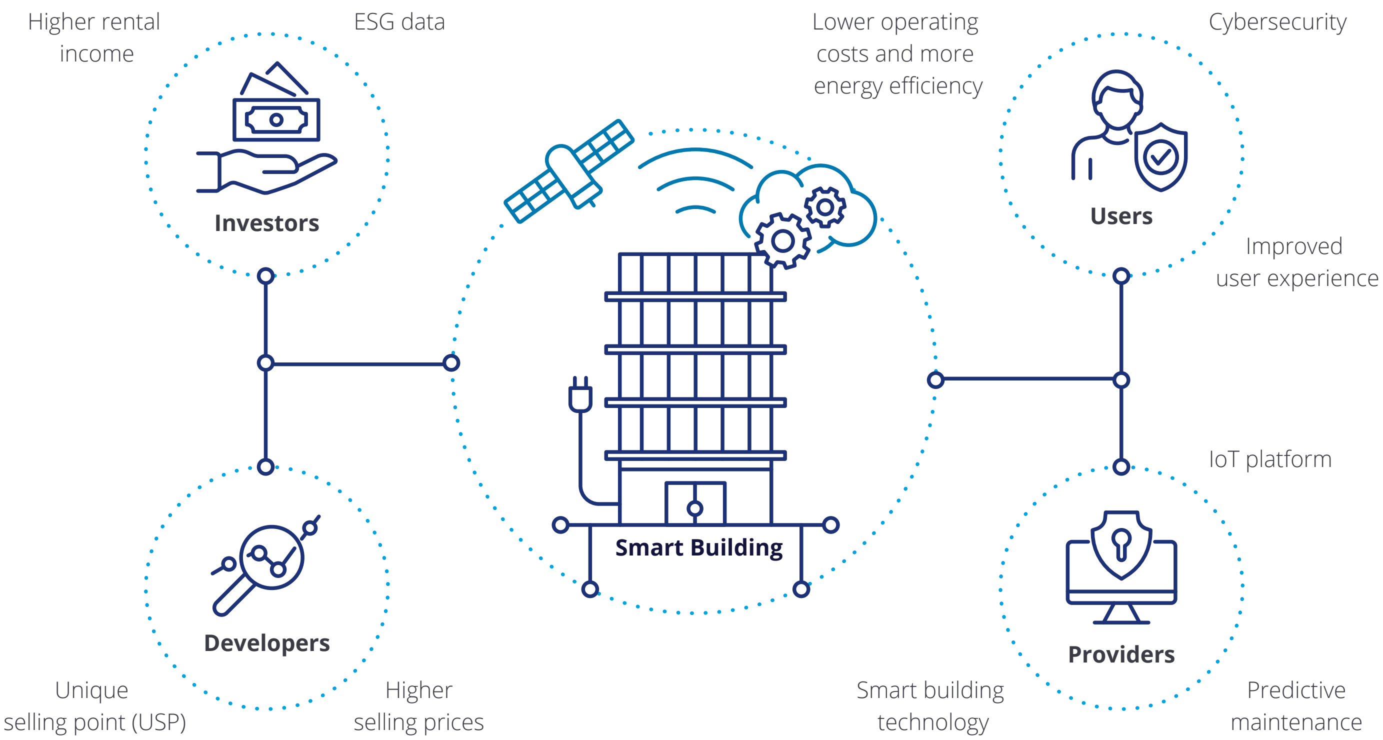
Given the rising energy costs, lower occupancy rates associated with remote working and looming ESG regulations, we have to take a more nuanced approach to this question, particulary in the context of existing buildings. Research into the added value of smart buildings often lacks clear data and evidence.[2] People make certain assumptions about smart buildings, from "Smart buildings reduce energy consumption and CO_2 footprint" to "Smart buildings lower operating costs by up to 15%",[3] but they do not have sufficient evidence for a business case.

[1] Deloitte, Commercial Real Estate Outlook, (Deloitte, 2020), https://www2.deloitte.com/content/dam/Deloitte/de/Documents/real-estate/Commercial-real-estate-outlook.pdf.

[2] BPIE, Smart Buildings Decoded – the concept beyond the buzzword, (BPIE, 2017), PAPER-Smart-buildings-decoded_05.pdf (bpie.eu); Dormakaba, Smart energy-saving buildings – Wie intelligente und automatisierte Gebäude zur Energiewende beitragen können ("The role intelligent and automated buildings can play in the energy transition"), (Dormakaba, 2020), 26074-wp-smartbuilding-de-200816.pdf (ctfassets.net).

[3] NYSERDA, The Value of Energy-Smart Buildings, (NYSERDA, 2019), The value of energy-smart buildings: Six benefits to consider - Albany Business Review (bizjournals.com), accessed in September 2023.

Fig. 1 – Different market perspectives on smart buildings based on different objectives



The debate is often doomed before it gets started because there is no shared definition of a smart building in the first place. Depending on their perspective (users, investors, facility management companies, developers, etc.), opinions vary widely on the kind of embedded technology that makes a building "smart", ranging from an app for booking rooms to a fully-integrated IoT platform. Stakeholders often define smart buildings differently because they have different expectations of what a smart building should offer (see Fig. 1).

In this study, we define standards for smart buildings based on a five-level model. This enables us to analyze common assumptions about smart buildings and to present the facts and evidence that show where vision and reality diverge.

The basis for a shared industry standard – a five-level model for smart buildings

What makes a building smart? To answer this question, we asked stakeholders with different perspectives (investors, occupants, developers, facility management companies) to come up with a multi-level model based on the concept for autonomous driving.[4] Level 0 buildings are controlled mainly manually, Level 4 buildings are fully autonomous, and Levels 1 to 3 represent the evolutionary steps in between.

Manual building (Level 0)
The building does not have a building management system; all controls and data collection processes are manual.

Asissted building (Level 1)
Some basic systems are connected to a central building management system and some remote control of these systems is possible. Data is partially automated and available on demand.

Partially automated building (Level 2)
The building has basic IoT infrastructure, and some of its building services and data collection is done automatically.

Fully automated building (Level 3)
Standardized cloud API in place, most of the building services are integrated into the IoT infrastructure, automated systems control all building services and real-time data is accessible at all times.

Autonomous building (Level 4)
All building services are fully integrated in the IoT infrastructure, and all controls operate based on an autonomous, AI-supported system.

We assign buildings to these levels based on objectively measurable technical criteria and the impact they have on the way the building services are organized. A simple set of yes/no questions is all that is required. The level where the responses correspond most closely determines how we classify each building. See Figure 2 for a detailed outline of each level.

[4] Zukunftsinstitut, Mobility Report 2021, (Zukunftsinstitut, 2021).

Fig. 2 – Five-level smart building model

		Level 0 (Manual)	**Level 1** (Assisted)	**Level 2** (Partially automated)	**Level 3** (Fully automated)	**Level 4** (Autonomous)
Technical criteria:						
Building management system (BMS)	Technical scale (building services) of the BMS	No BMS	Heating, Ventilation, Cooling	**Level 1 +** lighting (incl. occupancy sensors)	**Level 2 +** façade (access control, shading)	**Level 3 +** façade (access control, shading)
Remote control	Location independent control of building systems	✗	✓	✓	✓	✓
Network	Building network and relevant IT infrastructure	✗	✓	✓	✓	✓
Interconnectivity of systems	All relevant systems can be connected and integrated via an open interface	✗	✗	✓	✓	✓
IoT infrastructure	Technical IoT infrastructure such as sensors, gateways	✗	✗	✓ 50% systems integration	✓ 75% systems integration	✓ 100% systems integration
Central building database	Storage of all relevant building data in a centralized database	✗	✗	✗	✓	✓
Cloud API	An open API interface for all building data	✗	✗	✗	✓	✓
External data points	External data, e.g., traffic data, can be integrated	✗	✗	✗	✓	✓
Predictive analytics	Data is used to forecast future events (e.g., capacity)	✗	✗	✓	✓	✓
Predictive maintenance	Data is used to forecast future maintenance efforts	✗	✗	✓	✓	✓
"Smart City" integration	Building is integrated into a network of cities/other buildings	✗	✗	✗	✓	✓
Organizational impact:						
Techn. Building Management	Level of automation	Manual	Assisted	Partially automated	Fully automated	Autonomous
Data availability	Level of automation and availabiltiy of building data	Manual, data only on demand	Partially automated, data on demand	Partially automated, data on demand	Fully automated, real-time data	Fully automated, real-time data
Decision-making authority	Who has the authority to make decisions in building operations	Users[1]/ operator[2]	Users[1]/ operator[2]	Users[1]/ operator[2]	Users[1]/ operator[2]	Building
Operator responsibility	Who is responsible for operations	Owners	Owners	Owners	Owners	Manufacturer

[1] Users = Staff or tenants [2] Operator = Facility Management/CREM

For this study, we analyzed building data from 20 smart buildings, using a benchmark of 440 conventional buildings for comparison.

Classifying buildings according to these five smart building levels enables us to directly match data on the building operations with the respective smart building level. On this basis, we can determine whether and to what degree smart buildings at Levels 1 to 4 outperform Level 0 buildings. The 20 buildings in our study are classified as follows:

Tab. 1 – Classification of the buildings analyzed in the study

Level	Number of buildings	Total m² net floor area	Ø Construction year
Level 1	8	218,395	2019
Level 2	11	251,206	2019
Level 3	1	12,095	2020

We selected 440 Level 0 buildings from the NEO Office Impact Report, the largest report on operating costs of office buildings in Germany[5], to use as a benchmark for comparison. Given the comparatively limited number of buildings in Levels 1 to 3, we have consolidated them into a single group in order to provide a more meaningful comparison.

[5] NEO, Office Impact Report 2023, (NEO, 2023).

Smart buildings – down to the facts...

The qualitative and quantitative data collected in our questionnaires serve as a basis for our analysis of common market assumptions. In an effort to represent a variety of different perspectives, we interviewed developers, investors/owners, tenants and owner-occupiers about their experience with specific smart buildings. You can find a detailed overview of the process and the methodology used for the study in the appendix.

Common market assumptions about smart buildings

To date, it has been a challenge to compare smart buildings with their conventional counterparts, in part because we lack a shared standard for smart buildings, but also because we did not have enough reliable data on building performance. The lack of data on smart buildings is certainly also because many of them have only been in operation for a very short time.

Without any objective evidence to back them up, a number of assumptions about smart buildings started to make the rounds. The most common among them relate to return on investment, shared standards and terminology, and the role of smart buildings in sustainable/ESG-compliant building services.

For this study, we have compiled and analyzed the following assumptions on the basis of objective measurements and subjective experiences:

Assumptions that we can measure objectively

1. Smart buildings are cheaper to operate than conventional buildings.

2. Smart buildings are more energy efficient than conventional buildings.

Assumptions based on subjective experience

3. Smart buildings are more user-friendly than conventional buildings.

4. Smart buildings have certain embedded technologies that make it "smart", but it is not clear exactly which ones.

5. The degree of “smartness” varies among buildings.

6. Smart Buildings enable ESG compliant building operations

Do smart buildings reduce operating costs?

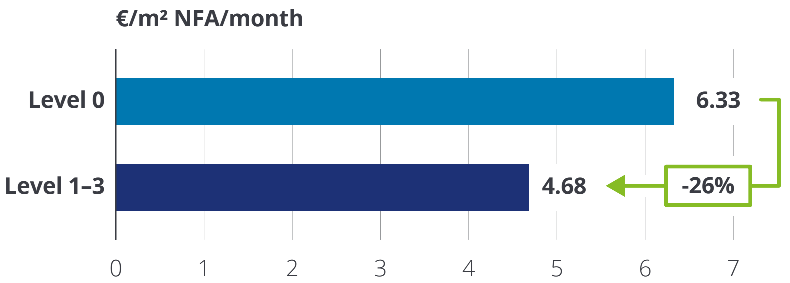
Buildings assigned Levels 1 to 3 in our model have, on average, 26% lower operating costs than Level 0 buildings. In euro terms, the average operating costs for Level 1 to 3 smart buildings are 4.68 EUR/m² NFA per month.[6] That means the cost of operating a smart building is 1.65 EUR/m² NFA per month less than a Level 0 building.

We can attribute this significant reduction to two main factors: 53% lower heating costs and 49% lower cleaning costs.

Level 1 to 3 buildings pay less for heating because they have advanced heating systems with demand-driven controls. While heating in a Level 0 building is inefficient (e.g., open windows despite ongoing heating cycles), Level 1 to 3 buildings use a basic level of smart technology – for example sensors – to improve heating efficiency.

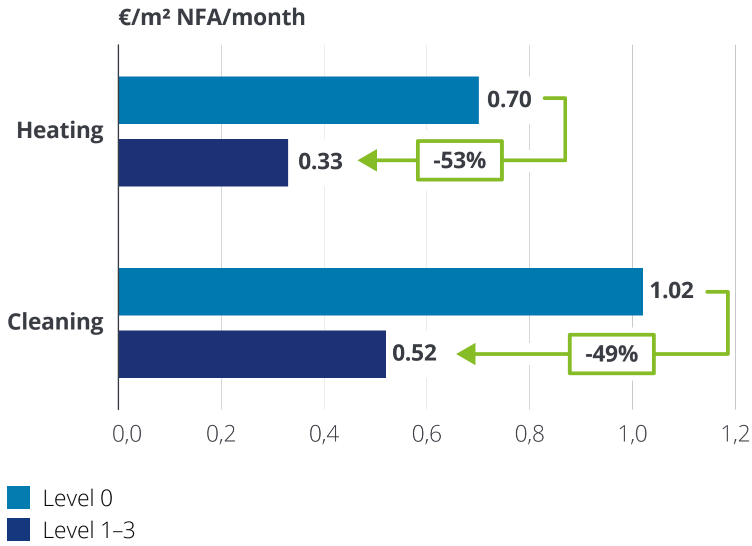
The lower cleaning costs for Level 1 to 3 buildings may be attributable to a more demand-oriented cleaning process. Based on our previous market experience, however, most of the buildings in these categories are still contracting conventional cleaning services, as the majority of commercial cleaners do not offer cleaning on demand. So, the question as to the significant difference in cleaning costs compared to Level 0 buildings remains largely unresolved.

Fig. 3 – Monthly operating costs of Level 0 buildings compared with Level 1 to 3 buildings



[*] Operating costs: taxes, fees, waste disposal, insurance, operations, inspection, maintenance, electricity, heating, water and wastewater, cleaning, security, administration (commercial + technical), caretakers, building repairs, technical repairs

Fig. 4 – Heating costs of Level 0 buildings compared with Level 1 to 3 buildings



[6] The data here represent the average value of all Level 1 to 3 buildings. Given the low volume of data in each level, we combined Levels 1 to 3

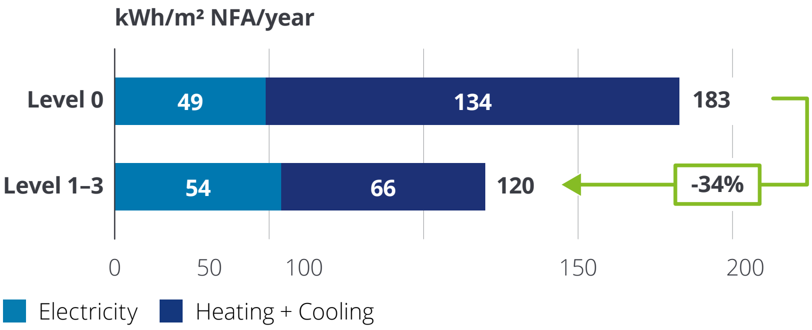
Are smart buildings more energy efficient?

The average energy consumption of Level 1 to 3 smart buildings is 34% lower than that of Level 0 buildings. This finding is based on the total electricity and energy costs for heating and cooling. It stands to reason that the advanced technology features of Level 1 to 3 buildings use slightly more electricity compared to Level 0 buildings. That makes the difference in heating and cooling costs all the more remarkable, with Level 1 to 3 buildings consuming 68 kWh/m² NFA per year less than their Level 0 counterparts.

Another significant finding was the proportion of energy consumed for electricity versus heating and cooling. Level 1 to 3 buildings report a ratio of roughly 50:50, while heating and cooling accounts for more than two-thirds of the overall energy used in Level 0 buildings.

In terms of the energy consumed for heating and cooling in particular, Level 1 "smartness" already offers significant efficiency gains compared to Level 0 buildings thanks to the use of simple controls. The addition of basic IoT infrastructure (e.g., sensor technology) starting from Level 2 is sure to make energy consumption even more efficient – as evidenced by the lower operating costs reported above, which are mainly driven by heating costs.

Fig. 5 – Consumption of electricity, heating and cooling of Level 0 buildings compared with Level 1 to 3 buildings



[1] End-use energy for electricity in the buildings in kWh/m² NFA
[2] End-use energy for heating and cooling in the buildings in kWh/m² NFA

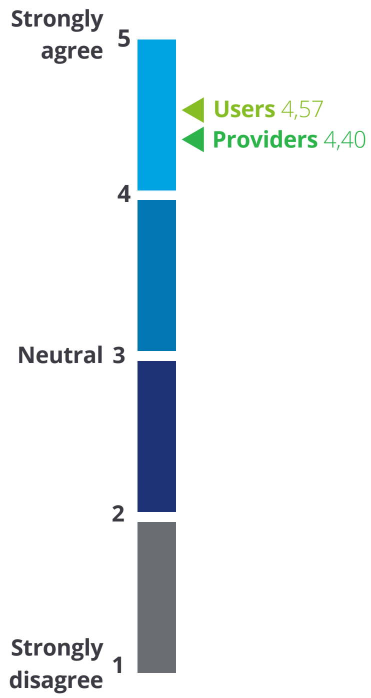
Perception and reality – the subjective market perceptions of users and providers

In addition to objectively measurable evidence, there are soft factors that usually include subjective opinions. Some of the assumptions about smart buildings, relating to comfort or image, for example, focus on exactly these soft factors. This was the motivation behind the qualitative questionnaire we developed for the study and sent specifically to stakeholders with direct experience with smart buildings, whether they were tenants, owner-occupiers, facility management companies, real estate developers or investors/owners. For simplicity's sake, we combined the respondents into two groups:

- Users (tenants, owner-occupiers, facility management companies)
- Providers (developers, owners, investors)

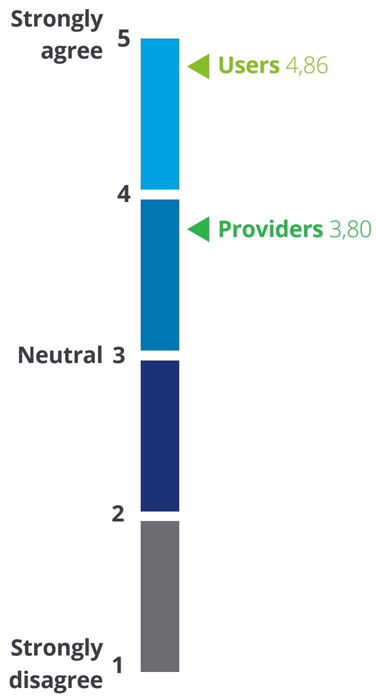
We asked users as well as providers the same questions about their perception of smart buildings; however, we asked the providers to answer the questions from a user's point of view. You can find a detailed overview of the process and the methodology used for the study in the appendix.

Fig. 6 – Smart buildings should positively impact user comfort and corporate image



The findings here show that both users and providers believe smart buildings enhance both comfort for the actual users and the corporate image of the tenants. The result for the user group was slightly higher than that of the providers, highlighting the broadly positive attitude users have toward smart buildings. The providers also clearly see major benefits for future users and rate the appeal of these properties accordingly.

Fig. 7 – Smart buildings should reduce operating costs and CO_2 emissions/ energy consumption



The users expect "significantly lower operating costs" and "significantly lower energy consumption/CO_2 emissions". The provider group, by contrast, does not believe that these factors will be as meaningful for future users. Given the developments on the real estate market[7] and the soaring energy costs, utility costs are increasingly becoming a burden for today's tenants. That makes it all the more surprising that providers have so far been unwilling to make user needs a higher priority.

[7] Bulwiengesa, BAUAKADEMIE Performance Management, Gesamtmietbetrachtung Büromarkt Deutschland ("Overview of the office real estate market in Germany"), (bulwiengesa, BAUAKADEMIE Unternehmensgruppe, 2023), Struktur_Nebenkosten_20230208, 00 Layout (bulwiengesa.de).

Fig. 8 – Smart buildings should provide better cybersecurity than conventional buildings

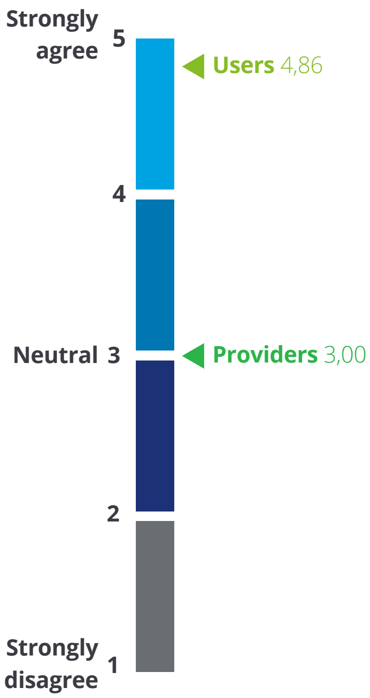
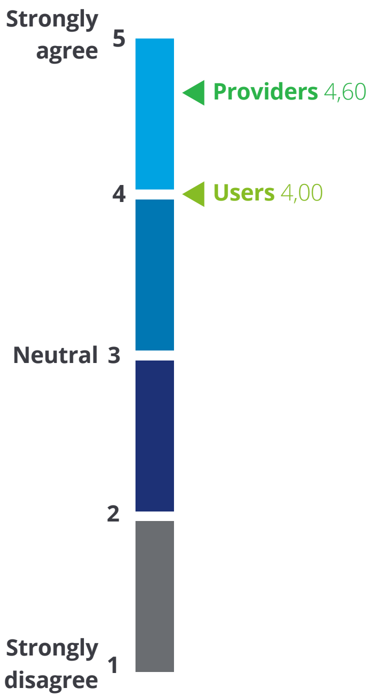


Fig. 9 – Smart buildings should help buildings become more ESG-compliant



The biggest difference in perception relates to "cybersecurity". While the users almost unanimously agree that added cybersecurity is important to them, the providers are much more reserved in their assessment. There appears to be a significant information and communication gap in this context. Providing open system interfaces (for users as well) means that smart buildings have to dedicate a lot more resources to cybersecurity. Users (large corporations in particular) have made the topic a core priority in their day-to-day business for several years now and therefore have a clearer understanding of the risks, at least relative to other stakeholders. Providers, on the other hand, have so far had little exposure to cybersecurity risks in the real estate context. This could be one reason why users and providers have such different assessments of the situation.

From the perspective of the users, smart buildings only provide limited support for ESG compliance. The general uncertainty regarding the specific impact of ESG regulation on the real estate industry is probably a factor here. Providers have a decidedly more optimistic view here. This may be because they have a better idea of the volume and quality of the automated data and of the kind of data required for regulatory reporting.

Recommended actions

Based on the findings of our study, what are the most urgent action items for individual stakeholder groups with regard to smart buildings?

Providers (owners/investors/developers)
Providers need to expand communication with future users to get a better idea of their needs and the smart building technologies that are most relevant for them. The striking difference of opinion between providers and users regarding cybersecurity and energy savings is a prime example of this (see Fig. 7 and 8). Getting users involved early on in the development process is crucial for the acceptance and the success of smart building projects. It is also the best way to make sure providers adequately address the users' actual needs.

Our study shows that smart buildings use an average of 34% less energy than conventional buildings. At the same time, they provide digital data at the click of a mouse from Level 2 upwards, offering clear added value when it comes to complying with EU taxonomy regulations. We are calling on developers to include as standard the digital features of new builds in all future tendering processes (service specifications) and to develop a robust strategy for upgrading existing buildings.

Users (tenants/owner-occupiers/facility management companies)
Given the difference in opinion between users and providers, it is incumbent upon tenants (users) to speak up. They should be more specific about what technology and features they want future smart buildings to offer and demand these services from providers. Far too often, large-scale corporations in particular are unclear about their own vision for the future and the best smart features for their buildings. It is vital for companies to acquire smart building expertise and to raise awareness among decision-makers for the qualitative and quantitative benefits of smart buildings.

Facility managers need to develop their skill sets to meet the demands of digital building operations. As a matter of urgency, they must acquire knowledge and skills relating to digital technology, data analysis and cybersecurity. That means owners will have to update the specifications in their facility management tenders, demanding as well as incentivizing the requisite skills.

Conclusion

Smart buildings have lower operating costs, are more energy efficient and promise a better user experience.

As the first of its kind, this study was able to confirm widespread assumptions about smart buildings on the basis of the verifiable data. Defining smart building standards based on our five level model has, for the first time, made it possible to define what makes a building "smart" and to distinguish objectively between (smart) buildings. The fact that stakeholders with varying perspectives – from developers, investors and owner-occupiers to tenants and facility management companies – collaborated on this model was the key to its success.

We hope that future studies will continue to evaluate our findings, especially in terms of the extensive data we collected on the 20 buildings classified as Level 1 to 3. One particularly exciting area for future research is to study how the performance varies between new and existing buildings. Overall, these results reinforce a positive trend towards smarter buildings – in a nuanced, collaborative, results-oriented way.

Appendix

Methodology

We used a two-step process to investigate the common assumptions. In the first step, we assigned the participating buildings to the respective level based on the following questionnaire and the extent to which those responses lined up with the model's different levels:

1. Which building systems are connected to the building management system (BMS)?
2. Can you control the respective building systems (e.g., heating, lighting) remotely (e.g., on a central management dashboard)?
3. Do you have a building-wide IT network including the necessary infrastructure?
4. Can all relevant building systems be connected via an open interface that is not restricted to specific providers?
5. Do you have an IoT infrastructure (technical infrastructure such as sensors, gateways)?
6. Do you have a central building database (to store all relevant building data)?
7. Do you have a cloud API (an open interface for all building data)?
8. Can you integrate external data (e.g., traffic data) into the building's smart controls?
9. Do you actively use data for (predictive) analytics (e.g., data used to forecast future events such as capacity)?
10. Do you actively use data for (predictive) maintenance (data used to forecast future maintenance rotations)?
11. Can you integrate the building into "smart city" infrastructure (e.g., networks of cities/other buildings)?

We then conducted a qualitative survey in a second step, taking account of the perspectives of four stakeholder groups: tenants/owner-occupiers, facility management companies, developers and owners/investors. There was an additional section where we asked tenants/owner-occupiers and facility management companies to report building data such as operating costs[8] and energy consumption.[9] In the following quantitative analysis, we analyzed data from the 2021 benchmark year and from the NEO Office Impact Report.[10]

[8] For our purposes, "operating costs" include: taxes, fees, waste disposal, insurance, operations, inspection, maintenance, electricity, heating, water and wastewater, cleaning, security, administration (commercial and technical), caretakers, building repair, technical repairs (in euros/month).

[9] Energy consumption comprises electricity, heating and cooling (in kWh/year).

[10] NEO, Office Impact Report 2023, (NEO, 2023).

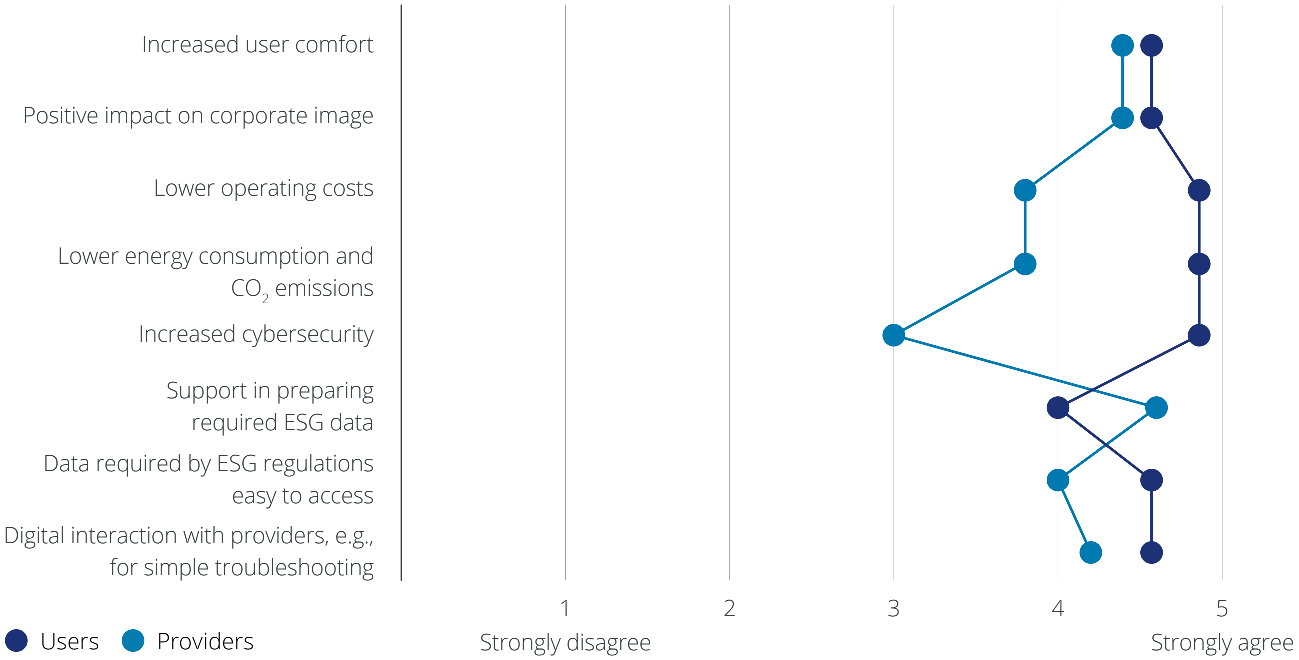
Key observations from the qualitative analysis
In order to assess the different opinions on smart buildings, we structured the survey in a target group-specific way. We combined the responses of tenants/owner-occupiers and facility management companies as "users" and grouped the responses of the other two groups investors/owners and developers together as "providers". The content of the questions for both groups was exactly the same, but we asked providers to respond from a user's perspective. This allowed us to compare the expectations of the users with those of the providers. The survey covered the following issues:

- Increased user comfort
- Significantly lower operating costs
- Significantly lower energy consumption and CO_2 emissions
- Data required by ESG regulations easy to access
- Digital interaction with providers, e.g., for simple troubleshooting
- Better cybersecurity
- Positive impact on corporate image
- Support for ESG reporting requirements

Respondents rated each issue on a Likert scale from 1 (strongly disagree) to 5 (strongly agree), with 3 as neutral, i.e., neither agree nor disagree.

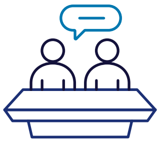
We then analyzed the responses by taking the total sum of the points provided by the respondents and the total sum of the respective questions and dividing both by the number of the responses to get the arithmetic mean (responses received 1 to 5 points depending on the response given). The following graph shows the overall points calculated for each issue in the survey, making it easy to quickly identify where the opinions of users and providers differed.

Fig. 10 – Responses from survey participants to the question "Smart buildings should have an impact on these issues."



Case Studies

Project/building
Handelsblatt Media Group,
Düsseldorf



Company
Waldmann –
Engineers of Light

Which problems/challenges have been resolved?
For the facility managers at Handelsblatt, one thing was clear: With such drastic changes in the use of office space, a hot desking system was the only thing that made financial sense in a work environment split between remote working and office days. It was vital to take a systematic approach in order to make staff feel more secure during ongoing change. Handelsblatt decided to partner with Waldmann on the LTX smart office solution, including a workstation booking system from the Waldmann start-up LIZ.

What was the solution you chose in the end?
Staff can book workstations or specific offices via the app. All workstations and offices were fitted with sensors to allow the facility managers to compare bookings with real-time occupancy data from the sensors. On site, i.e., without the app, sensors also indicate whether a workstation/office is currently free or already booked.

What were the key success factors?
Thanks to the sensors and the workspace manager, facility managers can keep a close eye on occupancy in various zones: Where is it crowded? Where is occupancy typically low? All of these insights indicate which areas of the work environment need adjustment. The staff can book workstations via the app and see where their co-workers are located, etc.

About

Waldmann W

The mission of the medium-sized family company Waldmann is to provide the light and data that optimizes the workplace for people. With the newly-founded start-up LIZ, digitalizing office lighting now goes hand-in-hand with smart software for state-of-the-art workplaces.

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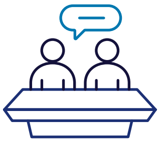
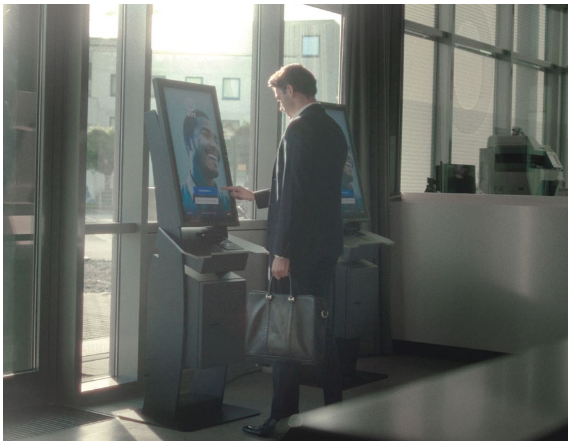
Project/building
Automated digital access management in smart buildings



Company
e-shelter security technologies GmbH
essentry GmbH



Which problems/challenges have been resolved?
Finding an access solution that is secure but also user-friendly is a challenge for companies that need extra security, from professional service providers to critical infrastructure. For visitors, external technicians and service providers in particular, processes ranging from registering and verifying identity to creating visitors' badges is generally handled manually, which requires a lot of time and effort. Companies with multiple locations may also have a different access process at each site due to the different systems in place. This may, even in the most modern buildings, result in a suboptimal user experience. Add to that the waiting time, which can generate extra costs for service providers in particular, and the lack of transparency as well as digital data for analytics. The company installed a digital access management system from e-shelter security and linked it with the other building services to standardize and fully automate the access process at 22 sites of the international data center provider NTT Global Data Centers in EMEA.

What was the solution you chose in the end?
The solution linked the essentry cloud platform with the access management system C-CURE 9000 and Salesforce, which is also used as the portal to register visitors and service providers at NTT-GDC in the EMEA region. Thanks to the essentry self-service kiosk, the check-in process including identity verification is fully automated. The system compares the ID provided with a 3D image of the visitor in real time. Once the visitor's identity has been verified, the kiosk issues a personalized RFID card, which they can return upon leaving the premises in an automated check-out process. Visitors can also sign NDAs, receive security briefings and provide other documentation digitally at the kiosk.

What were the key success factors?
The connected, digital access management system with identity verification at border control level allows NTT-GDC sites across EMEA to improve security and comply with growing customer and regulatory demands. At the same time, users have a more positive experience thanks to the standardized access process across all sites and the ability to complete the digitalized check-in including visitor badges in under one minute. Having a fully automated system cuts costs and improves efficiency. The configuration and the integration methods are tailored in full to the client's individual needs.

About

e–shelter security

e-shelter security offers end-to-end building security and digitalization solutions. With innovative security technology and IoT systems, e-shelter gives clients centralized control as well as an efficient, largely automated security and smart building management system. Additional services include the operation of the installed system, including alarm management, from e-shelter's own certified control centers. With 330 experts for systems integration, security and IoT, e-shelter security has not only provided security in office buildings and critical infrastructure for more than 20 years; the company also collaborates on smart building projects with large corporations and property developers.

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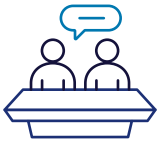
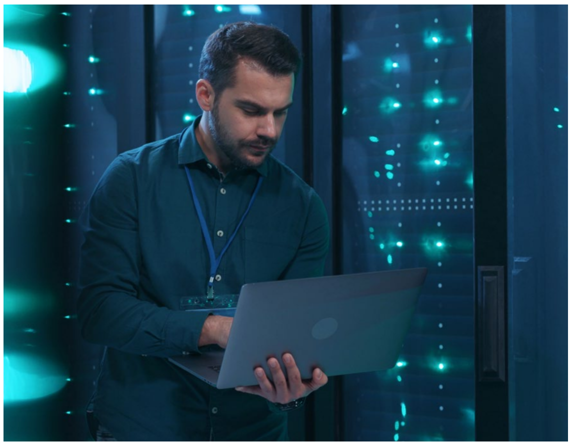
Project/building
Siemens Smart Infrastructure HQ in Zug, Switzerland – new network and security portfolio



Company
Fortinet GmbH



Which problems/challenges have been resolved?
Siemens Switzerland set up a Fortinet-based IoT core network for its new headquarters. The new system relies on digital cameras, instead of the earlier analog models, and uses an IP-based network with switches and other network components for data transmission. The previous system required each department to procure the relevant components on their own, based on their own survey of available manufacturers. There was no standard and no centralized management. The objective here was to standardize the IT components used in Siemens Switzerland's client projects. At the same time, the focus of projects in the area of Industrial IoT (IIoT) is shifting more and more to security.

What was the solution you chose in the end?
The core element of all building-related projects is the segmentation of the IIoT network using VLANs. The pilot project is now based on FortiSwitches and FortiGates configured as failover clusters.

What were the key success factors?
The idea was that the system should be as simple as possible to set up, to manage centrally and to implement with products that are compatible with IIoT projects, both in terms of the technology and price point. The key technological advantage was the availability of small ASIC-based firewalls that support up to 16 switches. It is possible to manage this very small system centrally the same way you manage a larger system (similar appearance), but it costs much less than a mid to high-performance firewall cluster.

About

FORTINET

Fortinet ranks number one in the most security appliances shipped worldwide, with more than 635,000 customers who trust Fortinet to protect their businesses. And the Fortinet NSE Training Institute, an initiative of the Fortinet Training Advancement Agenda (TAA), offers one of the largest and most comprehensive training programs in the industry in their effort to make cybersecurity training and new career opportunities available to everyone.

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About Deloitte
As a leading audit and consulting firm, Deloitte is a one-stop shop in the four areas of auditing, tax consulting, consulting and corporate finance for real estate services, offering a broad range of expertise. Deloitte provides conceptual services, business appraisals, process management and solutions involving IT-based analysis and assessment for clients ranging from property management and real estate companies to institutional investors as well as the public sector and corporations.

About BAUAKADEMIE
Founded in 1990, the BAUAKADEMIE group supports its clients with interdisciplinary expertise in the areas of engineering and law, construction and real estate, economics and information technology. The core values of this practice-oriented research institute at the Berlin University of Applied Sciences (BHT) are independence, neutrality and innovation.

About CoreNet
CoreNet Global is a dynamic, international network of corporate real estate (CRE) executives from multinational companies focused on adding strategic value to their organizations. The mission of the organization is to advance the practice of corporate real estate through professional development opportunities, publications, research, conferences, appointments and networking in 46 local chapters and networking groups worldwide.

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