

Northstream™



Smart Buildings: the way forward for landlords

White Paper
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Executive summary



Smart Buildings are the future of living and working spaces

Ever more people are seeking housing and employment within urban areas. At the same time, demographic and technology trends are reshaping our idea of living and working. This is posing substantial challenges to future buildings and their stakeholders, i.e. tenants, landlords, facility managers and solution providers. Making buildings smarter through sensor technology, connectivity, artificial intelligence and Building Management Systems (BMS) is the promising path to meeting those challenges, with Smart Buildings as the ultimate solution. Yet, the stakeholders have hardly taken substantial steps to make buildings smarter.

The needs of tenants and landlords are pushing for building smartification

Tenants' and landlords' expectations are shaping how we use and experience living and working spaces. Basic needs for shelter and workspace have advanced to the needs for cost savings, security, sustainability and convenience. Traditional BMS are not able to address advanced needs such that stakeholders are now reorienting towards smart BMS or Smart Buildings. Smart BMS advance traditional solutions (e.g. lighting or ventilation) through sensor technology and analytics. Smart Buildings advance all solutions by integrating them into one platform and benefit from system and data integration - enabling new services, solutions and revenue streams.

High costs, lacking capabilities and missing a digital strategy hinder Smart Buildings from happening

Although there is a clear need for building advancement, most implemented solutions are either traditional or smart BMS. Solution providers often struggle to integrate BMS with closed communication protocols. Corresponding technical capabilities are costly while most landlords either lack financing or the strategy to pursue Smart Building projects. The rare occurrence of Smart Buildings is therefore explained by high cost of implementation outweighing the benefits.

The right technology and business model will help overcome constraints to Smart Buildings

Trends in technology and consumer behavior will lead to an eventual convergence towards Smart Buildings. Consumers will expect increasing smartness of technology and its ability to serve them inside and outside of the home. Smart BMS will not suffice to satisfy those consumer demands. At the same time, the cost of implementation is going to decrease gradually - big players in the ecosystem are advancing their capabilities, solution providers are opening up their BMS.

The action plan for landlords to get ready for building (r)evolution

Landlords' strategy going forward is the key to a fundamentally changing Smart Building ecosystem. Smaller landlords should stick to turnkey solutions while actively advancing internal and external digitalization. Larger landlords in turn should be bold and holistic in their planning while initiating first impulses towards Smart Buildings. In driving these processes, small and large landlords should be pro-active and not wait for change to happen itself. Acquiring crucial capabilities through takeovers or joint-ventures will be the key to enable such advances. This is a major step for the real estate ownership of tomorrow to become more consumer-focused rather than asset-focused.

1. Introduction to Smart Buildings

1.1 Introduction to Smart Buildings

Smart Buildings are the foundation of smart cities. They fundamentally change our way of living and working by redesigning how we traditionally use buildings. In Sweden, today, Smart Buildings comprise more than 25% of the IoT market and are expected to exceed 2 billion EUR in 2019. This is the cumulative value of Smart Building solutions for all involved stakeholders including technology providers, landlords, etc. This market is projected to grow at a CAGR of more than 10% over the next 5 years.

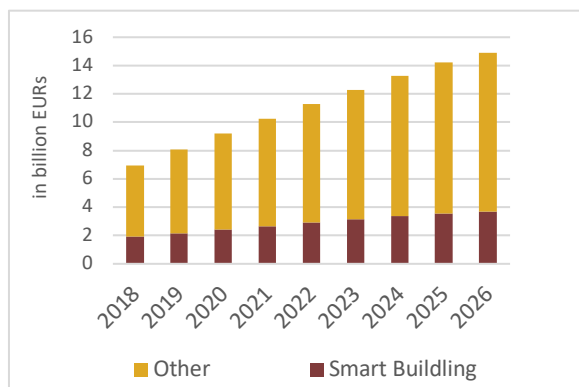


Figure 1 IoT market size in Sweden 2018-2026
(Source: Gartner)

The development of the Smart Building ecosystem is framed by a number of macro-level trends:

- **Demographic cohort:** The new generation of employees and tenants, the millennials, utilize technology to address needs such as convenience, flexibility and sustainability. This pattern will likely transcend into modern work- and living space. The subsequent Generation Z will reinforce those trends.
- **Economic impact:** Smart Buildings fuel investment and enhance sustainable as well as comfortable living. Revenue opportunities likely emerge from the collection and application of data. Smart Buildings provide various opportunities for developers and building managers to monetize the gathered data.
- **Sustainability:** Buildings and construction account for 36%¹ of global energy use while 82%² of the energy efficiency potential in Swedish buildings is not realized. The demand for technologies that optimize resource utilization (e.g. Smart Building technologies) is rising accordingly. The changing regulatory framework further promotes sustainability by increasing financial incentives for sustainable lifestyles.
- **Technological innovation:** Innovation in technology, such as IoT, Big Data, Machine Learning and Artificial Intelligence are increasing the benefits and lowering the cost of digitally transforming buildings.

¹ UN Global Status Report 2017

² Schneider Electric IoT-Rapport 2017

- **Urbanization:** Rising urbanization and population density necessitate higher living quality per m². Traditional buildings are reaching the limits of their capacity to accommodate needs of landlords and tenants.

1.2 Smart Building market and actors

The traditional real estate value chain and ecosystem is being reshaped by the complexity of Smart Building solutions. Tenants, landlords, facility managers and solution providers constitute the main actors in the ecosystem. Solution providers design Smart Building solutions working closely with landlords to tailor, build and integrate solutions into the buildings. Such range from the physical building infrastructure to sensors and hardware, connectivity, platform and software as well as services. Due to the complexity of merging several solutions into one platform, solution providers therefore now cover several steps of the “value chain”. Crucial competences are acquired through recruitment or close partnerships with other providers.

The designed solutions are then tailored to the needs of the main stakeholders, i.e. landlords, tenants and facility managers. Landlords function as the intermediary between needs (tenants’ or their own) and providers of solutions that address those needs. The needs of main stakeholders are as such the central force driving forward the ecosystem and we will specify them in more detail in the subsequent chapter.



Figure 2 The shaping “value network” for Smart Buildings

2. Why do we need Smart Buildings



2.1 How 'Needs' drive building smartification

Landlords have long perceived technology as an enabler to reduce operational costs. However, the emergence of modern and tech-savvy consumers has expanded landlords' view on the potential of technology. End-consumers are already using various technologies, especially consumer goods, to enhance their life quality. Their expectations of how technology will serve them is therefore slowly transcending and growing within their homes. Many landlords are therefore looking into options to translate those developing needs into new revenue sources.

Technology allows humans to manage and address their needs more effectively and it is up to us how we apply it. In order to understand where and how fast Smart Buildings are developing, we need to understand which needs are driving the application of technology in the buildings. Three main categories of needs can be distinguished: Asset-oriented, and residential tenants' and commercial tenants' needs.

2.2 Asset-oriented needs

Cost savings, sustainability and safety are landlords' overarching concerns. On a day-to-day basis landlord would like to see improvements in building maintenance and facility management. Many landlords are managing a variety of different systems from HVAC, lighting and surveillance to facility management that entail their own platforms³ and technology.

Landlords indicate that coordinating those platforms and maintaining the building absorbs the majority of their resources. Many landlords would therefore like to see an integration of different systems into one platform to ease management. Furthermore, the need for predictive maintenance is quite prominent. With the current technology many landlords are forced to react to building issues rather than preventatively replacing parts which would be substantially cheaper.

2.3 Tenant-oriented needs

2.3.1 Residential tenants

Sustainability and life quality are the two primary considerations of residential tenants. The potential of technology to achieve those objectives is constrained by tenants' willingness to share personal data as the mean to these ends.

End-consumers are becoming more concerned with their carbon footprint and are beginning to see energy efficient buildings as a way to save money through sustainable lifestyles. They seek electricity from sustainable sources and desire a home with greater energy efficiency – better insulation may reduce power utilization, while smart solutions for e.g. appliances optimize power needed (e.g. shave peaks).

With the digital and sharing economy gradually transcending into consumers' personal lives, in and outside of the home, quality of life can reach whole new dimensions. Quality of life for the modern

³ A digital platform is the environment that provides tools, services, knowledge and support, on which software can be

executed. It is also commonly used as the place to store the data and run intelligence logics.

consumer means convenience and experience through a smooth integration of fragmented digital identities.

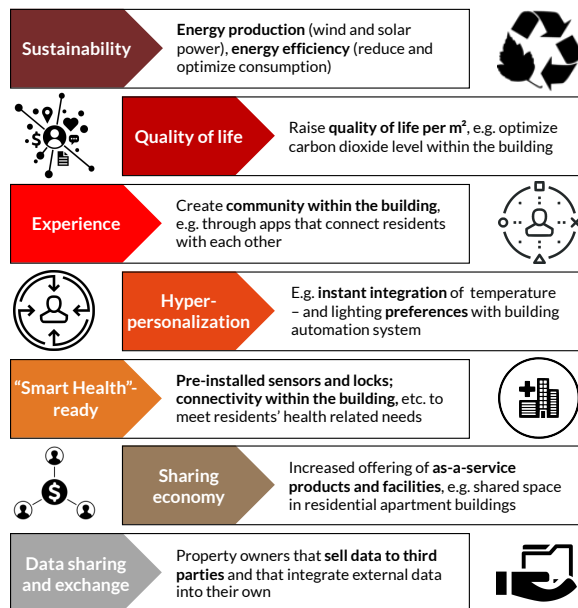


Figure 3 The most highlighted needs of **residential** tenants

Technology is then able to provide hyper-personalized services tailored to the specific needs of the individual. This includes smart solutions for e-commerce and delivery, applications that facilitate communication with neighbors, allow tenants to book building resources or to order maintenance work.

The end-consumers' susceptibility to such services varies however by the degree of personal digitalization, trust in technology and their willingness to share personal data. Young end-consumers are more connected and less concerned about sharing their data. Convenience and experience go hand in hand with tenant's expectation of a hyper-personalized environment.

Prior generations are more averse to sharing data for the sake of convenience. They expect stronger and more tangible compensation for compromising their privacy. Likely use cases lie in smart health where the impact of technology on life quality is more apparent.

Consumer expectations further vary with income. Convenience and experience (and even sustainability) may be primary to higher-income groups, while other considerations such as location or interior are taken as given. Such considerations may dominate for less affluent end-consumers and service expectations may as such be lower.

2.3.2 Commercial tenants

Commercial tenants are concerned with utilizing building data to improve building operations while adapting their organization and the work place to the digital economy. Modern work places seek to enhance employer attractiveness, employee satisfaction and work place agility.

Sustainability and energy efficiency inhibit immediate benefits to building cost and corporate branding. Employer attractiveness and employee satisfaction go hand in hand with productivity and operational efficiency. Attracting, satisfying and retaining the best talents is essential to competitiveness and work place satisfaction has been shown to increase productivity and employee retention.

The needs of individual employees are naturally similar to those of residential tenants – convenience and experience through hyper-personalization. Addressing those needs is therefore likely to increase work place satisfaction.

Lastly, work place agility facilitates a more systematic collaboration and knowledge sharing which enhances worker productivity. Work place agility furthermore allows organizations to quickly adapt to new technologies entering the work place.

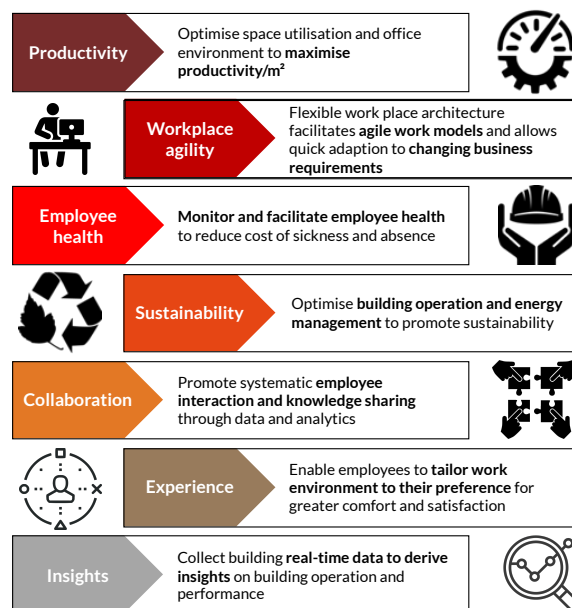


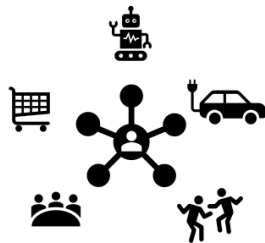
Figure 4 The most highlighted needs of **commercial** tenants

Insights:

User experience – Why should the real estate industry care about it!?

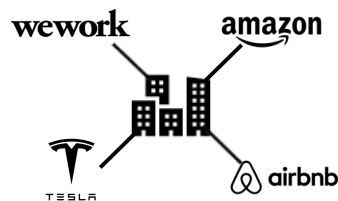
It is widely accepted that enhancing the user experience in different services and industries can serve as a tool to increase the returns on investment and create more revenue. In parallel, the real estate industry, in its traditional form, has not made much effort in this process. The buildings are still being designed with the main aim of accommodating people and serving their basic need that is creating a shelter, while adding little to no new features in some cases.

However, like in many other areas, the building tenants can and will also develop new needs and adopt new possible experiences that could be very well served by the buildings. Examples are retail deliveries to buildings, vehicle charging and sharing, co-working and co-living spaces and even over-the-night transforming of office spaces to over-the-night hotels in city centers. This highlights the notion of 'Experience economy' - a concept that has found little traction in the real estate industry.



What matters here is that if the real estate industry does not cater the experiences of the tenants, viable startups and companies from other industries may do that and reap the corresponding benefits. Airbnb is a good example of such an outsider. A startup that benefited from real estate industry's miss to foresee the possibility of sharing living spaces. Or WeWork, another startup that is now threatening the traditional business model of commercial landlords.

Given the extremely high valuation of new in-building services, the question is who will be the next Airbnb and WeWork? New startups, or already established companies who have disrupted other industries already?





3. Solutions to make buildings smart

3.1 Smart Building solutions

Legacy Building Management Systems (BMS) address the needs by operating building hardware through automated system control (Figure 5 – Phase 1). Each BMS entails its own control panel with corresponding platforms. Systems are pre-programmed to execute automation rules. Such rules can only be optimized by facility managers manually analyzing information and adjusting rules (e.g. turn lights on and off at certain times).

Furthermore, maintenance is conducted reactive, i.e. facility managers only become aware of hardware failure once malfunctioning occurred. Legacy BMS in itself are therefore siloed and not considered a smart technology.

Decreasing hardware cost and improved sensor and connectivity technology enabled the transition of legacy BMS to smart BMS in many buildings (Phase 2 in Figure 5). IoT sensors collect real-time building data which is then transmitted to an analytics platform – commonly provided by OEMs.

The provided platforms in smart BMS analyze real-time data to suggest improvements in building automation rules to facility managers. Smart BMS furthermore enable proactive and predictive building maintenance within each siloed BMS – sensors capture and transmit the state of building hardware, alert urgent need for repair and maintenance prior to malfunctioning and allow the identification of root causes.

Smart BMS are however still siloed as solutions are provided by different vendors with proprietary systems. This prevents the transition from smart BMS to a Smart Building.

In Phase 3 smart BMS are integrated into one platform – the brain of a Smart Building. All smart BMS are now conveniently managed through a single platform. Integration of generated data from different BMS substantially advances data analytics as well as predictive maintenance activities. Security and fire protection systems for instance are integrated with HVAC and lighting such that the latter systems automatically respond to emergency situations.

With further development of current automation solutions Smart Building platforms will be able to automatically manage and operate buildings without need of human intervention.

3.2 State of the ecosystem in Sweden

Cost reductions, sustainability and safety measures are driving current BMS implementations in Sweden. The vast majority has installed HVAC, fire safety, burglary alarm or energy monitoring solutions - in parts or in all of their buildings. Lighting and surveillance technologies are almost as common. Current systems are mainly deployed in the traditional, vertical fashion; i.e. these systems are not integrated with each other.

Looking beyond legacy solutions we note a transition to Phase 2. Sensor technologies are applied to capture utilities, weather, occupancy or the wear of different building parts. Collected data can then be integrated with individual vertical solutions to benefit tenants as well as facility managers and landlords.

Occupancy sensors in conference rooms are for instance integrated with the HVAC system such that room climate is automatically synched to the number and preferences of individuals in the room.

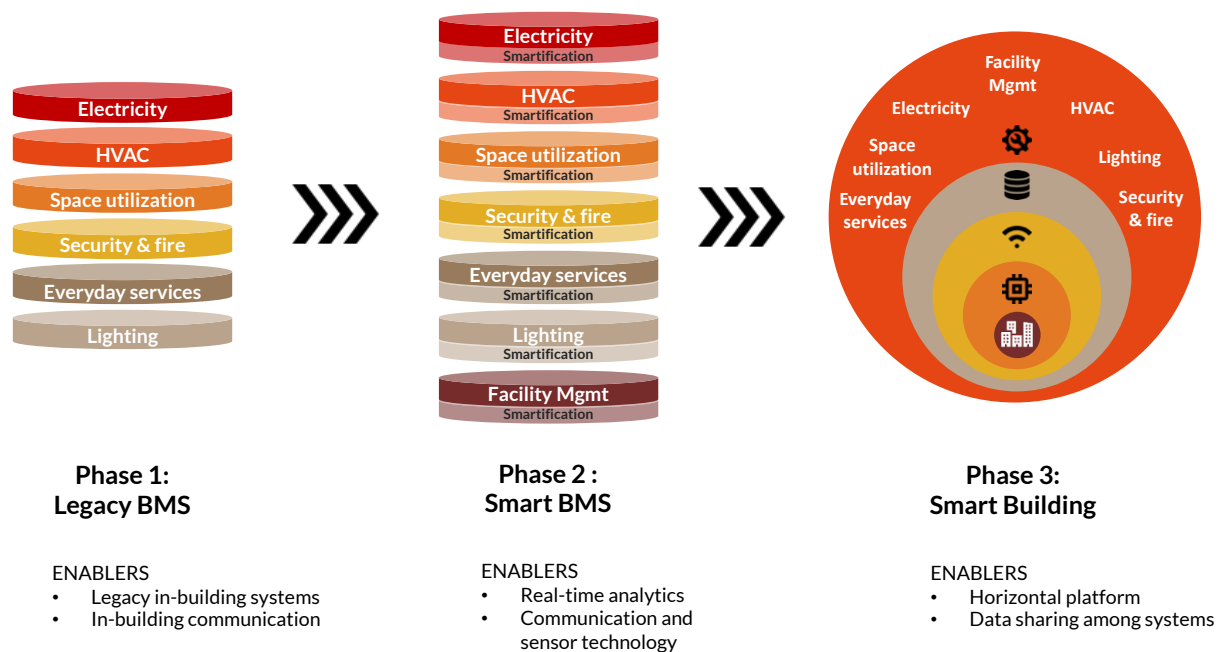


Figure 5 Transition from legacy BMS to Smart Buildings

This can even be done in advance if connected to the room booking systems. Energy savings are achieved by reducing heating and ventilation in idle space.

The majority of Swedish building infrastructure has technology equivalent to Phase 1 or Phase 2. Upgrading to smart BMS entails a number of immediate apparent benefits while being easy and cost-effective in implementation.

Few companies have therefore initiated first impulses directed at reaching Phase 3. For instance, a number of larger real estate companies in Sweden are developing an open protocol that enables the communication of different BMS (see mini case study). At the same time, a number of larger OEMs are conducting pilot projects where one or two BMS are integrated. However, none of these projects have yet managed to develop a solution to integrate all BMS in one platform.

3.3 Challenges of implementation

A certain maturity of the ecosystem is necessary for Smart Building solutions to develop and establish. A mature ecosystem is characterized by an aligning mindset of central actors, available resources and technical capabilities. Here we have listed the main challenges hindering Smart Buildings from happening.

3.3.1 Infrastructure

The majority of installed BMS allow for integration but not necessarily for connectivity. Systems are often proprietary and entail their own support network, subset of controllers, supervisor panels, applications and communication protocol. OEMs sometimes falsely claim to provide systems with open protocol.

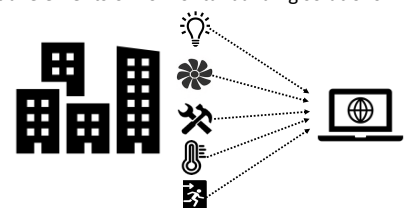
Furthermore, sensors will need to be installed across the property.

In the ideal case, horizontal Smart Building solutions are incorporated early in the construction process. This allows the utilization of open systems architecture with open protocols and IP compliance for data transfers. Interoperability of different BMS within one building is fundamental to horizontal Smart Building solutions and most landlords identify this as a main hurdle to horizontal solutions.

Mini case study:

Different communication protocols for different BMS constitute a main challenge in integrating gathered data from different systems. In order to overcome this, the big real estate companies Vasakronan, Akademiska Hus, Klipsk and Willhem have collaboratively developed a new protocol named **RealEstateCore**.

This new protocol enables building control and the development of new services that collectively work together. It is an open source language that property owners can use to describe building structures, ownership, inhabitants, technical systems, sensors and events. The three main domains of **RealEstateCore** are the digital representation of building elements, control and operation of the building and IoT technologies, all of which are essential elements of horizontal building solutions.



3.3.2 Capabilities

Integrating BMS from different vendors therefore necessitates capabilities ranging from connectivity, sensor technology, building, energy and security management systems to the digital economy.

Connectivity providers, system integrators and OEMs have initiated impulses tapping into the Smart Building market, but no single player has developed a holistic product offering. OEMs generally do not have a serious ambition of opening up their systems to enable horizontal solutions – they are primarily focused on customer retention and acquisition for their vertical solutions.

No external solution provider can therefore offer turnkey end-to-end solutions. Furthermore, qualified workers are scarce – this concerns installation technicians as much as building engineers specialized on Smart Buildings. Landlords themselves hardly have the expertise to conduct the integration of vertical systems.

3.3.3 Resources

Landlords consider the lack of time and financial resources as primary hurdles to realizing Smart Building solutions. Landlords invest significant human resources and time into managing and operating their buildings. Most of their time and concerns are therefore focused on sustaining smooth day-to-day operations which often leaves little room to seek long-term improvements.

Furthermore, Smart Building solutions generate long-term gains. At the same time, many investors and landlords still do not associate Smart Buildings with a tangible business model that has a steady ROI. As such, landlords are struggling to motivate the generation of new capital, or the allocation of existing capital to Smart Building projects.

3.3.4 Mindset & strategy

We have noted few impulses from landlords to upgrade from smart BMS to Smart Buildings. While part of the reason may lie in the difficulty of implementation and lacking resources, we have also noted that many landlords are skeptical with regards to the benefits of more connected solutions.

Smart BMS are easier and cheaper to implement yielding apparent benefits. Many landlords prefer those solutions given the current high cost of Smart Buildings. Few landlords apply the long-term view on technologies necessary to address the needs of tomorrow's buildings and tenants. Most of today's tenants do not have an urgent need for Smart Building solutions while most of today's landlords do not think of the requirements for the buildings of tomorrow.

Case study 1: Transition from legacy BMS to Smart Building

Location: Bangalore, India

Area: 10-story building, 59,000 m²

Intel coordinated the smartification of its own facilities in Bangalore, India, in 2016. In this solution, the building is equipped with more than 9000 sensors and has integrated various BMS from different vendors. The implemented Smart Building solution integrates all formerly siloed BMS. Each siloed solution initially provided its own platform and hardware through respective OEMs.

Intel has enhanced all BMS with a horizontal platform and multiple IoT gateways. Intel's IoT gateways ingest and process various communication protocols used by the different BMS. Data is processed to Intel's cloud server where third party software analyzes data further and reacts by executing corresponding automation rules. All BMS therefore process their data through the IoT Gateways and are centrally managed on one platform.

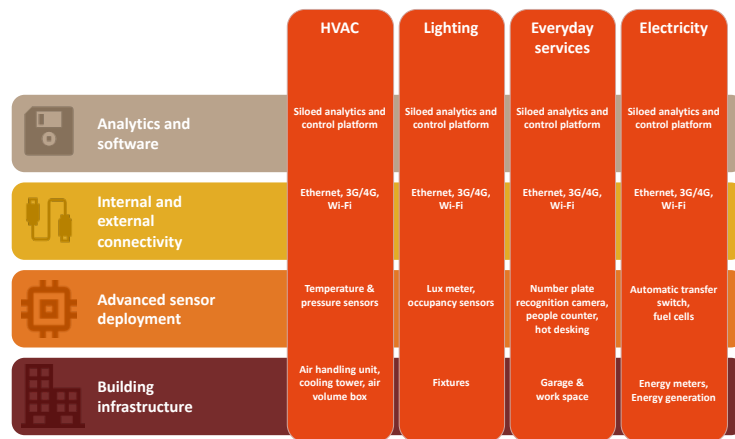


Figure 6 Siloed BMS offered by different OEMs to be implemented in Intel's facility

Some obtained impact:

- Energy/water savings of \$645,000 per year with a ROI of less than four years
- Increased employee capacity by ca. 30%
- Socially driven temperature control potentially increases worker satisfaction by 83%

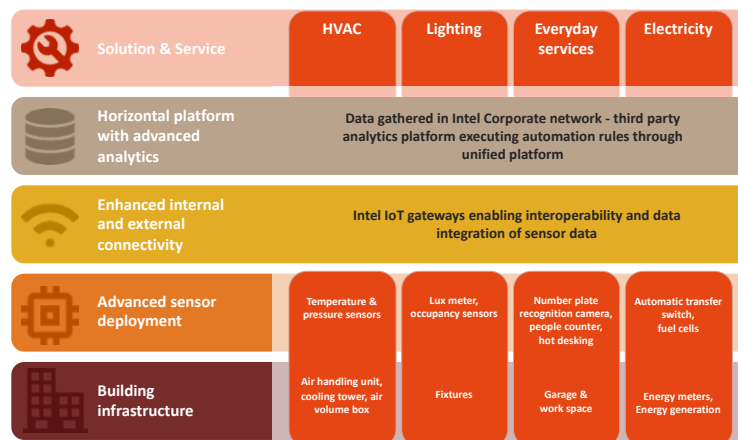


Figure 7 Horizontal Smart Building solution deployed in Intel's facility

4. Smart Buildings, now and the future



4.1 Needs – present not urgent

We earlier outlined the needs of current stakeholders in the ecosystem. Such needs indicate how Smart Building solutions will and should be designed. Understanding the urgency and development of those needs is essential to assessing the future of Smart Building trends.

Sustainability and convenience are present concerns of modern consumers. Modern technology is able to address those needs in exchange for tenant data – inside and outside the tenant's home/building. Personal data is exchanged for a more convenient and sustainable life. We recognize however that needs are heterogeneous, and that convenience may be secondary to individual demand for cost savings and sustainability.

Fierce competition for employer attractiveness and employee retention fuels the need of commercial tenants for Smart Building solutions. The digital work place is often shaped by characteristics that do not entail apparent quantifiable benefits. Horizontal solutions are required to address such intangible needs, which makes it easier to motivate and justify corresponding capital-intensive investments.

Landlords lack capabilities, time and resources to implement Smart Building solutions. Their engagement with daily operational issues hinders more proactiveness in realizing Smart Building solutions. Energy and cost efficiency are the prioritized needs of most landlords. Vertical turnkey solutions by large OEMs allow an easy implementation and entail apparent quantifiable benefits. Many landlords furthermore do not have concrete plans for implementing connected solutions and most entities are lacking digitalization strategies.

4.2 Smart Building enablers

The demand for Smart Building solutions derives from the outlined needs of tenants and landlords. Whether providers are able to develop such solutions depends on three enablers. These enablers are the development of technologies and capabilities, the development of a win-win business model and lastly the strategy of individual players to advance themselves and the ecosystem.

Technology and capabilities determine the cost of implementation of Smart Building solutions. Business models decide whether landlords are able to utilize existing technology to earn a return on costly Smart Building projects. And strategy determines whether and how landlords are able to find their place in that ecosystem.

4.2.1 Technology drivers – cautious initiatives advance the ecosystem

Advances in the collection, processing, analyzing and storage of data will affect the development of Smart Building solutions. If more data can be collected, stored and analyzed at lower cost, higher levels of building smartness are reached. Improvements in data storage, sensors, connectivity at higher bandwidth will furthermore advance data communication and security. Big data and analytics based on AI will improve the insights retrieved from that data.

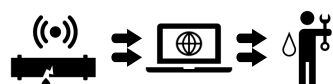
Lacking interoperability (i.e. different standards, protocols and APIs) is the main technical issue hindering the integration of different BMS. This is still driven by most OEMs' focusing on sustaining their market share through vendor-locking customers while expanding and upgrading currently established systems.

However, OEMs are looking out for new revenue opportunities given declining margins for their traditional hardware products such as light bulbs, boilers and cameras. They are preparing for advances in the Smart Building market by slowly shifting from closed to open architecture and by conducting first explorations into the new market.

On the property side are larger landlords developing their own platforms for horizontal building solutions while proptech startups are likely to enhance innovative forces in the Smart Building sector. Innovating and questioning the status quo is the way for start-ups to gain market share and we have seen some recent, innovative applications emerging from companies such as iioote AB.

Mini case study:

iioote AB works with companies and municipalities to plan and execute system integration strategies. iioote is specialized in integrating sensor technology, LPWAN, cloud platform and data analysis from various vendors. In a recent project together with the Research institute of Sweden iioote installed sensor technology to detect moisture and water damage. Damages and their spreading are detected and reported to the central management platform such that more severe damage is prevented.



4.2.2 Business model – how to solve the challenge of financing

Financing is one of the main challenges for landlords to realize Smart Building projects. Identifying and emphasizing tangible returns of such projects is therefore essential to motivating financial investments. At the same time, once horizontal solutions are being developed, it should be implemented in a way that it benefits all involved stakeholders; including the solution providers that previously have been monetizing their vertical solutions (i.e. legacy vertical BMS providers).

As a result, in order to create future win-win business models for Smart Building developments, we recommend two complementary approaches; utilizing the monetary value of data generated by buildings for all involved actors, and a new payment model for tenants.

- **Data-driven business model:** Smart Buildings generate plenty of data that is potentially convertible into substantial cost savings and revenue potential. Firstly, gathered tenant data

may be of significant interest to third parties such as furniture and design companies. Secondly, optimized power utilization in response to tenant preferences and occupancy (e.g. minimize heating and lighting of idle space) improves energy efficiency substantially. Thirdly, increasing amounts of collected tenant data further sophisticate predictive analytics since machine learning algorithms improve relative to the amount of data collected.

- **Payment model:** Creating new services may be a promising path for landlords to increase revenues and tenant satisfaction. However, a transparent pricing is key as increasing rent for the extra-service may upset tenants. The **pay as you grow** model for instance allows tenants to book, use and pay for services through their rental agreement. Tenants interested in certain Smart Building solutions, such as smart locks or charging electric vehicles pay for the additional service/electricity used while other tenants have the flexibility to opt against additional services.

4.2.3 The right strategy

Asset-and tenant-oriented needs of tomorrow will shape the buildings of tomorrow. Commercial and residential tenant needs will become increasingly demanding. And addressing those needs has potential to fuel landlords' topline while being pivotal to market leadership. Players with the agility to tailor building architecture to tenants' needs will claim market leadership and Smart Building solutions are the only way to gain sustainable competitive edge. Landlords will have to undergo a shift from an asset to a consumer company.

Given proprietary systems and a lack of skilled labor, Smart Building capabilities will be the main enabler of creating such solutions. There is a number of upcoming players in the Smart Building ecosystem from established OEMs to Start-ups. There are therefore different paths to acquiring Smart Building capabilities – through recruitment, takeovers or partnerships.

Simply establishing Smart Building solutions is however not sufficient to generate meaningful pay-offs. Landlords need to have a strategy in place of how to increase revenues and tenant-satisfaction with the amassed data. As the feasibility of Smart Building solutions is a matter of scale, specific strategies of how to engage in the ecosystem vary with size of the landlords.

Insights:

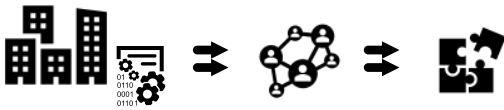
Smart Building data – is it the new oil?

With the introduction of new technologies in the buildings, such as sensors and connectivity, as well as IoT, buildings now generate large volumes of diverse data. This happens in an era of vivid discussions on the value of data, and its great monetary potential. However, due to absence of proper models for data monetization data owners are mainly sitting on growing datasets without realizing its benefits; very much like crude oil, which in turn needs to be processed and turned into something more valuable.



The full potential of the data is achieved when, in the first place, it is used in decision making processes. Next, the data can and should be shared and even traded among various stakeholders. This is where we will reach the full potential and benefit from co-existence of diverse datasets. It should not be forgotten that with recent developed techniques for anonymizing data, the concerns of jeopardizing the privacy of the end users are almost nullified.

This is where new models such as data-trading platforms and data-exchange come into play. Such schemes open up new opportunities for different Smart Building actors to benefit from the data they generate and/or own.



Case study 2

Future use case: electric cars and smart parking

The lack of charging stations is one of the present inconveniences of owning an electric car. 2 million electric cars were sold in 2018 while the number of charging stations is far inadequate to meet the demand for car charging. Consumers are often hesitant to opt for electric cars due to concerns over not being able to charge. In order to promote electric cars, parties of interest ought to make sure that sufficient and convenient stations are available.

Chargestorm, a leading charging solution company based in Sweden, provides a wide range of high-quality charging station solutions in various contexts, i.e. residential building, commercial office and parking. Chargestorm integrates the solution for instance into housing association's property system. This allows several electric vehicles to charge at the same time while helping the property owner to monitor the cost of charging per vehicle and tenant. Landlords can furthermore use load balancing solutions to prioritize electricity to different parts of the building. Tenants in turn gain full control of how and when the car is to be charged via APP.

(<https://chargestorm.se/>)

Another example of an electric car solution integrated into Smart Building architecture is the P+R concept by Hyundai and Kia. Drivers struggling to find parking space can use the Hyundai or Kia app to let the car autonomously cruise to a vacant spot with access to wireless charging stations. The car will then be moved to a vacant spot once it is fully charged. When needed, the driver requests the car via app and it will autonomously be driven to the driver's location. This conceptual solution requires communication between EV, parking facility, charging station and driver. The concept is set to be commercialized in 2025 upon release of level 4 autonomous vehicle.

(<https://cleantechnica.com/2019/01/28/hyundai-unveils-its-automated-parking-charging-valet-system/>)

5. Action plan for landlords



5.1 Strategies for large and small

Competitiveness means implementing tomorrow's solutions today; solutions that tenants often do not actively demand but are receptive to once experienced. At the same time, competitiveness is a relative outcome – relative to the company's and competitor's resources. Strategies to sustain or gain market share therefore differ for smaller and larger landlords.

Smart Building solutions are resource intensive and therefore necessitate a certain scale to reach profitability. Smaller landlords should advance their services and operations with available, turnkey solutions while getting digital strategies in place. Larger landlords have the scale and resources to change the game and gain competitive edge ahead of the rest – this means thinking bold and acting calculated while initiating major steps to advance the ecosystem. In this section we present a roadmap for small and large landlords on how to develop Smart Buildings:

5.1.1 Smaller landlords

1. Wait, see and upgrade.

Horizontal solutions require substantial investments that are more suitable for larger scales. Therefore, focus on standard turnkey solutions that enhance the smartness of your buildings. Cost and benefits are apparent, and OEMs may offer financing options as well. However, make sure to install solutions with open APIs and communication protocols so that you are ready to integrate once horizontal platforms have been developed. Renovations may be a good timing to conduct those upgrades.

2. Pick the low-hanging fruits.

There is a variety of tenant-oriented turnkey solutions. Digital locks, electric vehicle charging and booking apps for laundry facilities or repair services are likely to generate extra revenue while increasing tenant satisfaction. Know your tenants and make sure you offer the right services to the right tenants. Premium-tenants may expect different services than economy-tenants.

3. Digitalize operations.

Managing more buildings with the same work force increases profitability. Digitalization of your operations is a promising path. Shift your tenants towards digital platforms and streamline your operations through smart applications (e.g. plan schedule of janitors according to route and priority of maintenance issues). This will also require you to develop the IT capabilities in your company

4. Digitalize your strategy.

Digitalizing operations and services does not equate to having a digital strategy. When market, needs and capabilities have matured, your strategy should enable your company to be ready for change to reap the benefits of the early bird. Make sure you develop the strategy yourself, because you know your tenants, your motivations and your limitations – developing strategies means comprehending strategies.

5. Lead pro-actively.

As the company leadership you should pro-actively drive forward digitalization pro-actively. Don't wait for digitalization to happen and don't simply delegate it. Being passive means risking to either

miss the train or to take the wrong track. And if you reach a dead end you can always consult others for specific assistance on an issue.

5.1.2 Larger landlords

1. Think big, smart and horizontal.

As a market leader with the ambition to sustain your edge you ought to think beyond existing standard solutions. Needs and technology are inevitably trending towards Smart Buildings as the ultimate way of living.

Smart Building solutions need early planning and a holistic view on system architecture. This avoids post-construction add-ons (energy efficiency is a tangible, but not the only savings potential). Smartness in the future will extend beyond your building. Future smart buildings will communicate with each other and with the smart city. Plan gateway locations, power sources and data connections accordingly.

2. Acquire capabilities & test calculated.

Given the state of the ecosystem, taking market leadership means developing your own solutions. Capable talents are scarce but exist. Acquire gifted minds and drive the Smart Building revolution forward by testing grounds one step at a time. It will clarify crucial capabilities, suitable business models and tenant receptiveness.

3. Form partnerships.

Some of the Smart Building know-how can be acquired through human capital. Complement those resources with partnerships. Smart Building architecture requires substantial IT capabilities. Sharing risk, reward and competence is the sensible path to competitiveness.

4. Digitalize services.

Just like smaller actors in the ecosystem, you should not hesitate to reap the benefits of turnkey solutions with applicable use cases. Investments will likely pay off quickly and should not distract you from the bigger picture.

5. Put leadership in charge.

Many players in the ecosystem believe that IT departments should be in charge of digitalizing operations and implementing Smart Building solutions. However, IT should simply implement the technical side while leadership coordinates implementation. Company leadership has a holistic view on all stakeholders affected. Working closely with IT means maximizing your internal resources while ensuring that efforts are heading where they benefit all parties involved.



ABOUT THIS PAPER

This white paper was written by Northstream, sponsored by Tele2, with the aim to provide an objective and independent view on Smart Building developments in Sweden. While Tele2 commissioned the white paper, all opinions expressed in the text are entirely Northstream's and do not necessarily represent the opinions of Tele2.

APPROACH

This whitepaper was written during the period of May and June 2019. For this, Northstream has conducted interviews with subject matter experts in the real estate and proptech industry. Additionally, desktop research was used to verify and complement the information gathered through the interviews, which also supported performed analyses. In order to conduct the analyses and gather more complementary input, several internal Northstream and Tele2 workshops have also been held.

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Northstream, part of Accenture, is a boutique consulting firm dedicated to serve domestic and international clients. We have put our competence, passion and efforts at the intersection of business and mobile technologies, providing strategies handcrafted for each client's unique business and competitive dynamics. We are proud to say that we come highly recommended by many of the most successful players in the ecosystem of a connected world. We typically work with:

- Business strategy development and planning
- Technology and product assessment
- Strategic sourcing of systems and services
- Reorganization and transformation
- Market analysis and due diligence

Northstream was founded in 1998 - as of August 2019, we are part of Accenture.

As Communication Services Providers (CSPs) seek to capture the promise of the Pervasive Network, Accenture is helping CSPs accelerate their network transformation. By taking advantage of the opportunities made possible by new technologies including 5G, Software Defined Networking (SDN), Network Function Virtualization (NFV), artificial intelligence, robotics process automation and blockchain, Accenture is working with CSPs to accelerate their current business sustainability while unlocking new growth and competitiveness.