# Smart Building Design

**Smart technology for the professional environment**

Nowadays, everything seems to be called 'Smart'. At home we are surrounded by smart water kettles, smart thermostats, smart digital assistants and smart lighting. Going 'smart' is also a prominent trend in the professional environment. Technology is being used to improve the performance of buildings, organisations and people.

Businesses like to show off the possibilities of their futuristic gadgets. A Smart Building offers a lot of opportunities, as long as considerable time is put into thinking about and evaluating the possibilities and potential obstacles and restrictions. As Smart Buildings will evolve over time, the choices made in the beginning will have far reaching consequences.

**Business intelligence**

A Smart Building combines the conventional building automation systems with advanced business intelligence. An advanced infrastructure automatically controls the systems in the building based on the collected data, while using it for optimising the processes in line with the business' functions and services. The objectives can be operational, like reducing cost, improving efficiency, but it really becomes significant if they are strategic, like enabling new business models or improving customer experience.

Business intelligence combines all collected data via machine learning algorithms to create valuable information about business processes. More and a wider variety of sensors increases the sensor density, and enables a more accurate analysis.

A building filled with sensors will generate a lot of data. However, collected data is something different than information. Advanced software solutions and smart dashboards help owners, operators and facility managers to generate this information to improve asset reliability and performance, reduce energy use and optimize how space is used and minimizes the environmental impact of buildings.



| Externe input | Co2 | Humidity | Light | Presence | Temperature | Noise |

Various types of sensors in a Smart Building

**Ready for the future**

A Smart building has the potential to be continuously upgraded. It is capable of growing with tomorrow's demands. This will meet the demands of the client, but also to stay compliant with future building requirements. Furthermore, technology will evolve over time and can be enabled by over-the-air updates. This makes a Return on Investment (ROI) comparison with conventional technologies like apples and oranges.

**The basics of Internet of Things (IoT)**
The acronym IoT stands for 'Internet of Things'. It means that all devices are connected to the internet. Devices are divided in Sensors and Actuators.

Sensors measure (sense) the status of the environment. The accuracy of the measurements is important. This is easier said than done. Put 5 sensors next to each other and you will find 5 different values. More (high quality) sensors help in this case as data gets averaged.
External input can also be used for information. An online weather forecast can be a significant input for analysis and decisions.

Actuators are devices that execute an 'action'. For example, this could be switching on the lighting, but just as well increasing ventilation, lowering the blinds or switching off the air conditioning. Actuators introduce a change to the environment, mechanically or electronically.



| Sensor | Network | Actuator |
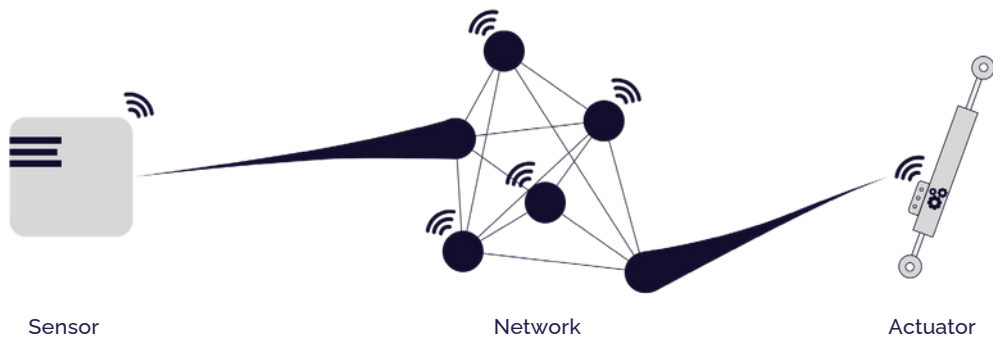
Sensors measure and actuators action. Both devices are connected with each other via a network, also called the infrastructure. This can be wired or wireless, local or connected via the internet. Selecting the right infrastructure is a fundamental choice when creating a Smart Building. It is the foundation for any future change, expansion or enhancement. The initial choice has a major impact on the future possibilities.
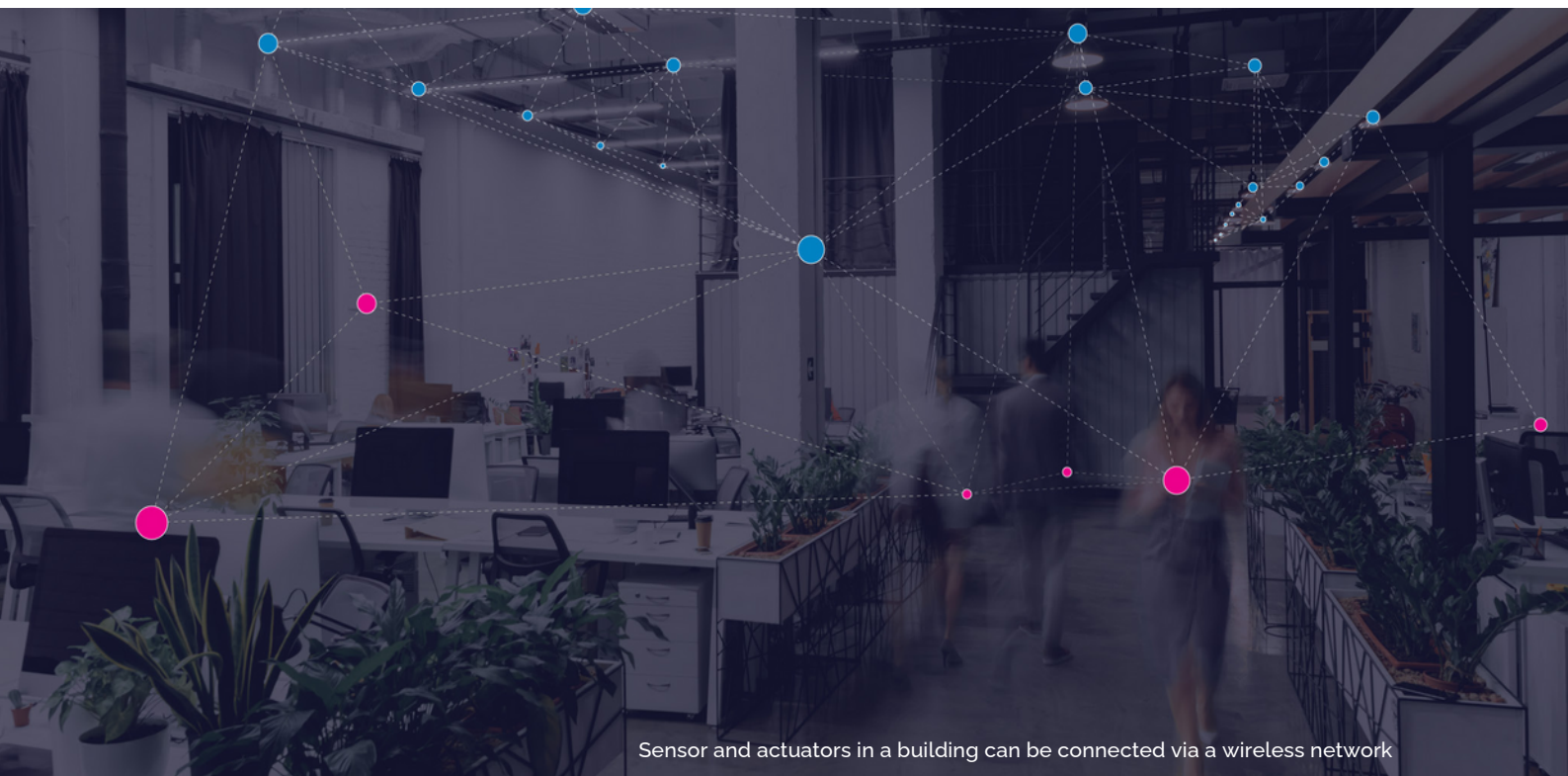


Sensor and actuators in a building can be connected via a wireless network

# Smart Building Design Model

A Smart Building is a sustainable development with the aim to use energy efficiently, to improve the wellbeing and productivity of employees and to reduce operational cost..
It is essential to gain insight in the processes in a Smart Building Therefore, Chess developed a model with the user as the centre point. The model enables us to correlate different layers of information and to detect the level of interaction.

Sensor data is used to determine the effect of building automation systems on the business processes and the effect on the business results.



| Sensors | System | KPI's |
| --- | --- | --- |
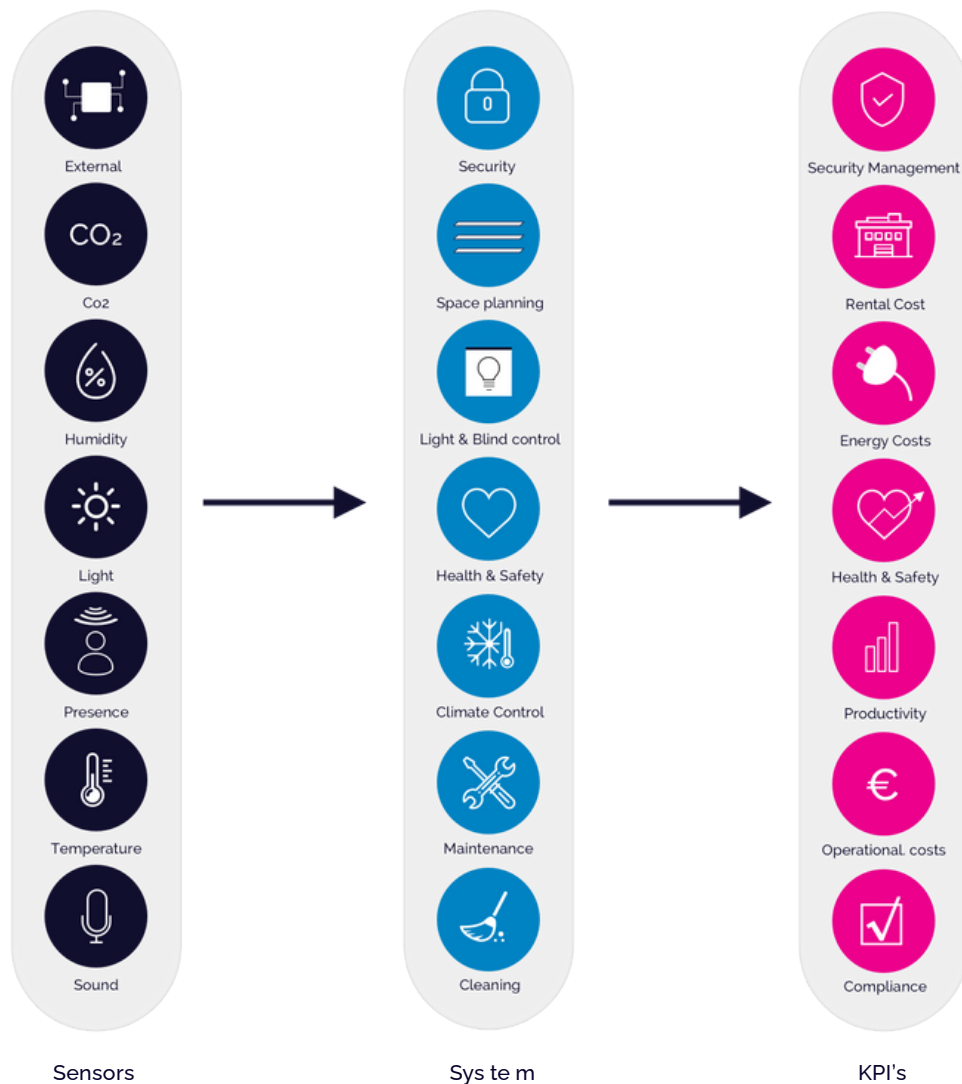
The sensors on the left measure the environment variables that influence the health, wellbeing and productivity of the user.

The activities in the middle are the technical systems and business processes. The sensor data is used for building automation and management applications in order to improve the operation of the building.

These activities allow us to control the system to improve the wellbeing and productivity of the user, reduce the operational cost, improve the security and reduce the energy cost. It enables us to quantify the sustainability of the building.his results in the KPI's (Key Performance Indicators) on the right. KPI's make the Smart Building performance visible.

# Possibilities

Why would you invest in a Smart Building? Does the return really justify the investment? The answer is yes. There is a multiple of possibilities that justify to seriously consider the investment.

### Energy cost

Energy saving is the first thing that springs to mind. For example, presence and lux detection is used to control the lighting and climate control installations. Every sensor has its specific role in optimising the building automation systems.

### Rental cost

Knowledge of the use of the building will help to optimise the occupancy rate. If you rent or rent out, it's efficient to know how much a building is used. Smart Building services also increase greatly increase the value perception for the end-user.

### Operational cost

Automatic monitoring of building automation systems ensures that deviations and/or disruptions are noticed earlier. This enables a more efficient and planned response and prevents ad-hoc maintenance

### Health & Safety

The purpose of the building is to facilitate its occupants and visitors with their activities and ensure a secure and healthy environment. Examples are security systems such as fire detection and emergency lighting, but also the monitoring of the interior climate parameters, such as temperature, $CO_2$, particulate matter, is vital to prevent health issues. A Smart Building can assist or even manage the full process. There are many examples of buildings that enact automatically upon air quality measurements.

### Productiviteit

Studies show that It takes an employee on average upto 23 minutes to refocus after an interruption. Modern work life has enough distractions as it is from email, social media, colleagues. You don't want to add to this with unnecessary distractions like temperature, sunlight or other environmental conditions. Certainly not if you consider that this is extrapolated to hundreds of people working together in a space like and office or a school.

### Security

A Smart Building is full of sensors that are used to manage the building. However, these sensors will also monitor 'abnormalities'. Sensors for movement and noise are able to detect activities when they should not be there. This can be used as additional triggers to monitor the security of the space.

### Compliance

Norms and regulations change constantly, just like technology, There are norms like BS5266-1 for emergency lighting that need to be adhered to, and are likely to tighten in the near future. Also, environmental regulations and energy certification, like ISO 50001, is more and more important and requires detailed reporting on energy management. The technology in Smart Buildings delivers both on the reporting and management requirements. Emergency lighting can be tested automatically and detailed energy reporting enables the user to stay compliant with the latest requirements.

# Road blocks

Installation of sensors, switches, actuators and lighting is just the start of creating the 2020 Smart Building. The complete transition is complex. The process needs to be defined together with many partners and stakeholders, and this will inevitably lead to concerns around security, interoperability and risk in general.

### Different types of specialist means many partners in the chain

A Smart Building is often portrayed as simply making some setting via a smartphone. This normally works at home, however, it is not feasible in a professional environment. In large scale buildings like offices, hospitals or schools, many specialised systems interact. The in-depth knowledge of these processes is never with one player. To make the Smart Building a success, many players in this complex environment will need to operate with and next to each other.

### Interoperability

The required specific expertise about the different processes results in different systems that need to work together. This requires the systems to connect. Many systems work with proprietary protocols and dont have the capability to securely integrate third-party hard- and software. The other challenge is the hierarchy; who is in charge?

### Cyberecurity

In the Smart world, more and more processes are digital and happen online. This brings great advantages, but also risks. It is reported regularly that a significant number of Smart Buildings are vulnerable to cyber attacks. The National Cyber Security Centre warns for security issues when implementing Smart technology and has issued guidance how to deal with it in its " Secure by Design Code of Practice ". Compromised security in Smart Buildings has far reaching consequences.

### Risk Averse

The construction and installation industry is conservative and dogmatic in its approach. Some companies embrace new technology, however, many players will not or barely adopt innovations. Large projects are tendered as Design & Build with fixed cost and companies tend to use established, but aged technology to deliver. New, innovative systems will struggle to penetrate in this business model, as there is too much focus on eliminating risk. At the moment, we see that Smart Buildings are driven by state-of-the-art developments and forward thinking end-clients..

Mymesh Management System

# Mymesh Management System

The Mymesh Management System is an online application for the remote management, monitoring and control of your Mymesh network. In addition, multiple brand-independent building management systems can be integrated into a single platform with a wide range of building applications.

The Mymesh Management system is based on the IX.Web integration platform of Beveco Building Automation (www.beveco.nl). The management system can be fully compiled to your wishes and requirements. In the image below, various disciplines are included, such as fire protection, camera observation and climate installations, in addition to the wireless applications lighting, emergency lighting and sun blinds.

Within the Mymesh Management System it is possible to integrate systems from many suppliers. This allows the various sensors, systems and applications to work together within a Smart Building. The possibilities that arise from this are endless.
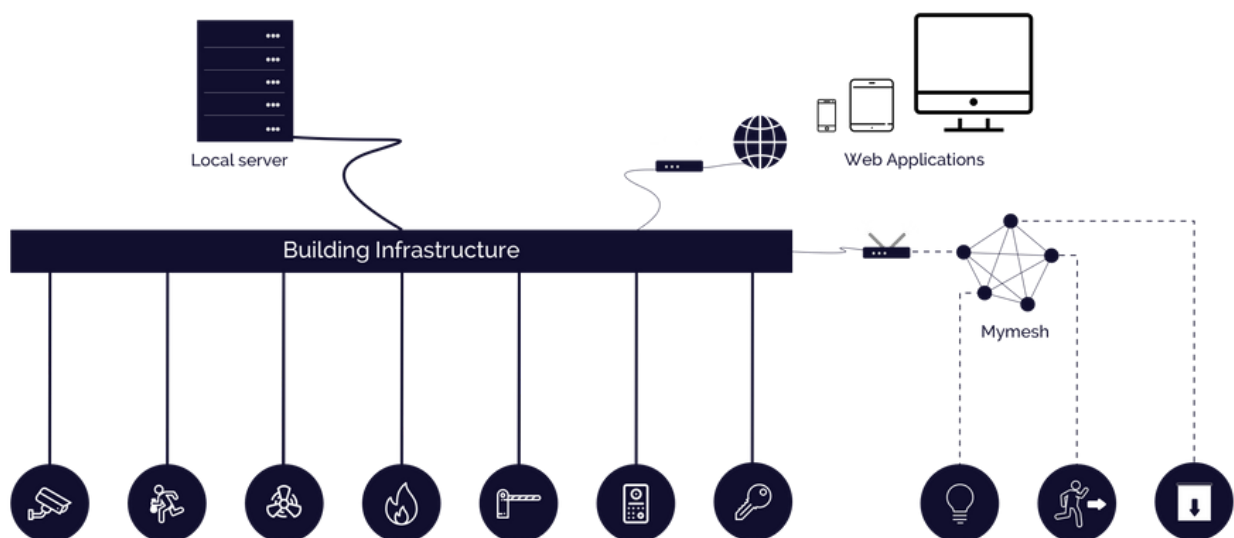
# A unique infrastructure

The potential of the wireless technology of Mymesh has evolved from the experience of decenia of development for multinationals and government departments. Chess decided in 2003 to develop together with the international scientific community, a network protocol to wirelessly connect thousands of devices.

The specific target application of the protocol was large professional environments. Therefore, security and scalability were paramount. To achieve this, a practice was adopted to learn from nature and mimic its strategies to solve human design challenges: Biomimicry .

Like with a large flock of birds or a shoal of fish, where thousands of 'members' rally, the protocol swiftly spreads signals throughout the network, no matter how large. The analogy is striking.

Distribution of the network

To ensure the system is able to manage systems throughout the Smart Building, you need an infrastructure that reaches every corner. The answer is lighting. Where there are people, there is lighting, and that makes it ideal to create a large, scalable and fine-mazed network to distribute data..

# 'Entirely local, scalable and ultra-secure'

**Data infrastructure**

Connect a Mymesh device with our lighting and before you know it the building turns Smart. This might sound simplistic, but it is valid to a large extent. Mymesh not only delivers a wireless lighting control system, but is mainly a wireless data infrastructure that can be expanded and adapted indefinitely. Information about the lighting, but more importantly about the building travels instantly to the Management System.
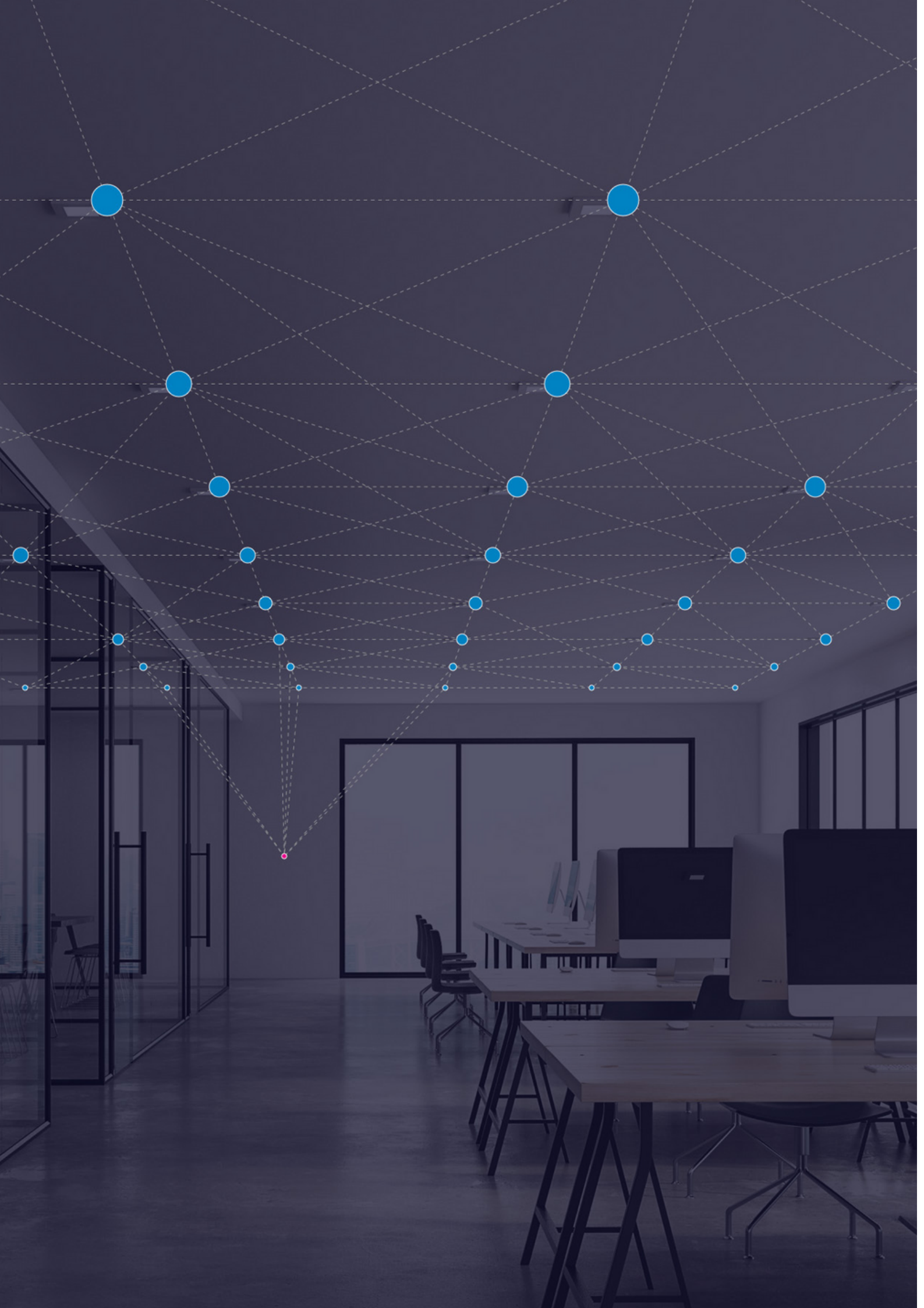
**Mymesh Management System**

The Mymesh Management System (MMS) is a Cloud based application to remotely manage, monitor and control the Mymesh network. Furthermore, it is able to integrate with third-party Building Management Applications to create one platform with a wide range of Building Automation Systems. The MMS is based on the IXWeb platform from Beveco Building Automation (www.beveco.nl). The MMS can be customised to individual requirements. Building Automation Systems like fire security, camera surveillance and climate control can be integrated next to the wireless applications for lighting,
emergency light and blinds.

It is possible to integrate third party systems directly into the MMS. This makes it possible to integrate all sensors, actuators and systems into one platform and manage it as one system. The possibilities are unlimited.

**The right choice**

The data infrastructure is the backbone of a Smart Building. Mymesh delivers a wireless network that is secure, scalable, robust and adaptable. These characteristics are the perfect foundation for any professional environment.

# Switch