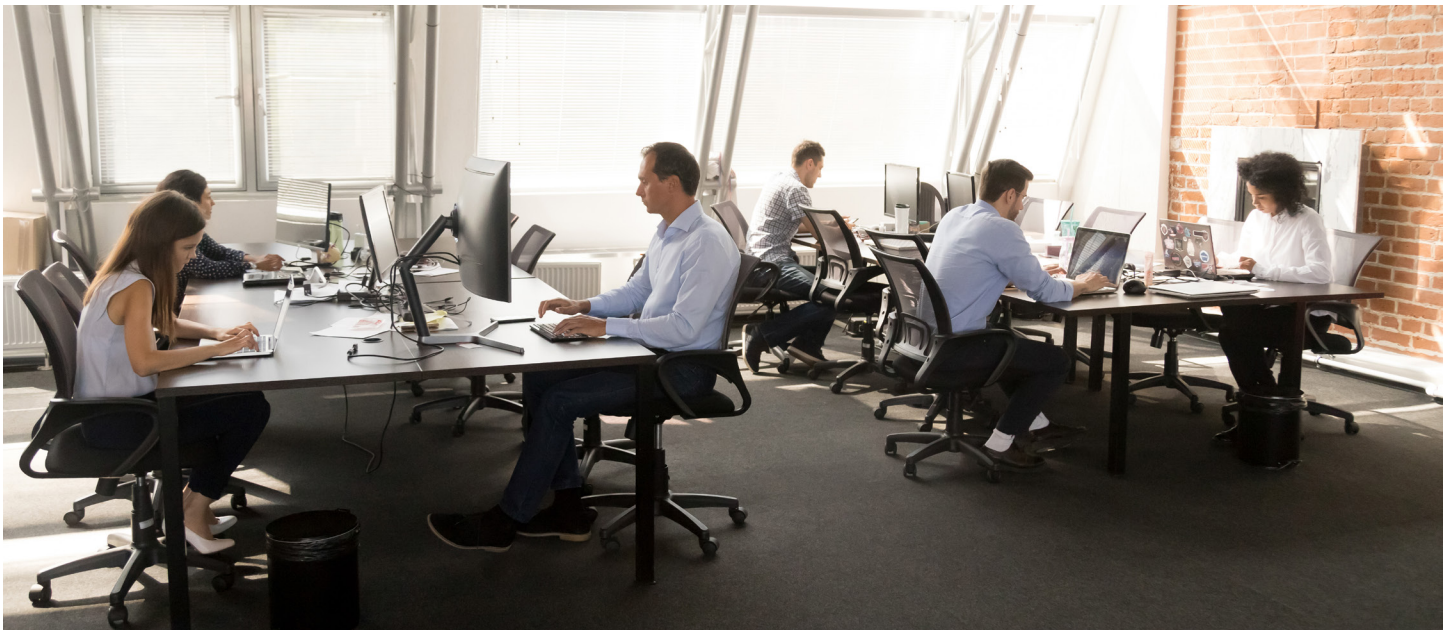
How to measure Workspace occupancy

Best practice guide



Essential smart building technology for the modern workplace

RAPID CHANGES TO A MODERN BUSINESS ENVIRONMENT

The business workplace has changed dramatically in the past decade. The traditional 8-hour workday with all employees sitting at their desks has evolved. Workplaces from large enterprises to small startups have become increasingly mobile and have rapidly transitioned into an "anytime, anywhere" work ethos. As a result, expensive office space is sitting unused.

Real estate is the second highest operating expense for employers, next to salaries. The annual cost per workstation continues to rise across the globe. According to a recent office space report sponsored by Cushman & Wakefield, Hong Kong and London are the most expensive office markets in which to accommodate staff, while New York and Silicon Valley experience a 6% increase in occupancy costs per year.

On-site employees require access to adequate workspaces, whether they work in an office every day or only come in for a few days a week to attend meetings and collaborate with colleagues. Companies struggle with the goal of condensing and contracting space efficiently, while at the same time creating enjoyable and productive work environments.

A new survey of nearly 400 multinational companies by real estate company CBRE found that two-thirds plan to adopt a shared-desk workplace strategy by 2020. Their research also indicated that millennials consider the overall workplace experience as a determining factor in accepting a place of employment. Millennials view their office as not just a place of work, but also as a community where they can engage.

Contributing market factors driving an activity-based work environment:

- The rise of a mobile and/or remote workforce
- Flexible desk sharing to reduce operating expenses
- Increasing acceptance of the shared office space to enhance collaboration
- Millennial expectations for a modern and digital workplace

SOLVING THE SPACE UTILIZATION CHALLENGE WITH TECHNOLOGY

The task of ensuring available space by monitoring desk and meeting room utilization has been a logistical challenge for many facility and real estate teams. The advent of new low power wireless connectivity and unobtrusive GDPR-compliant occupancy sensors are replacing cumbersome manual tactics to solve this problem.

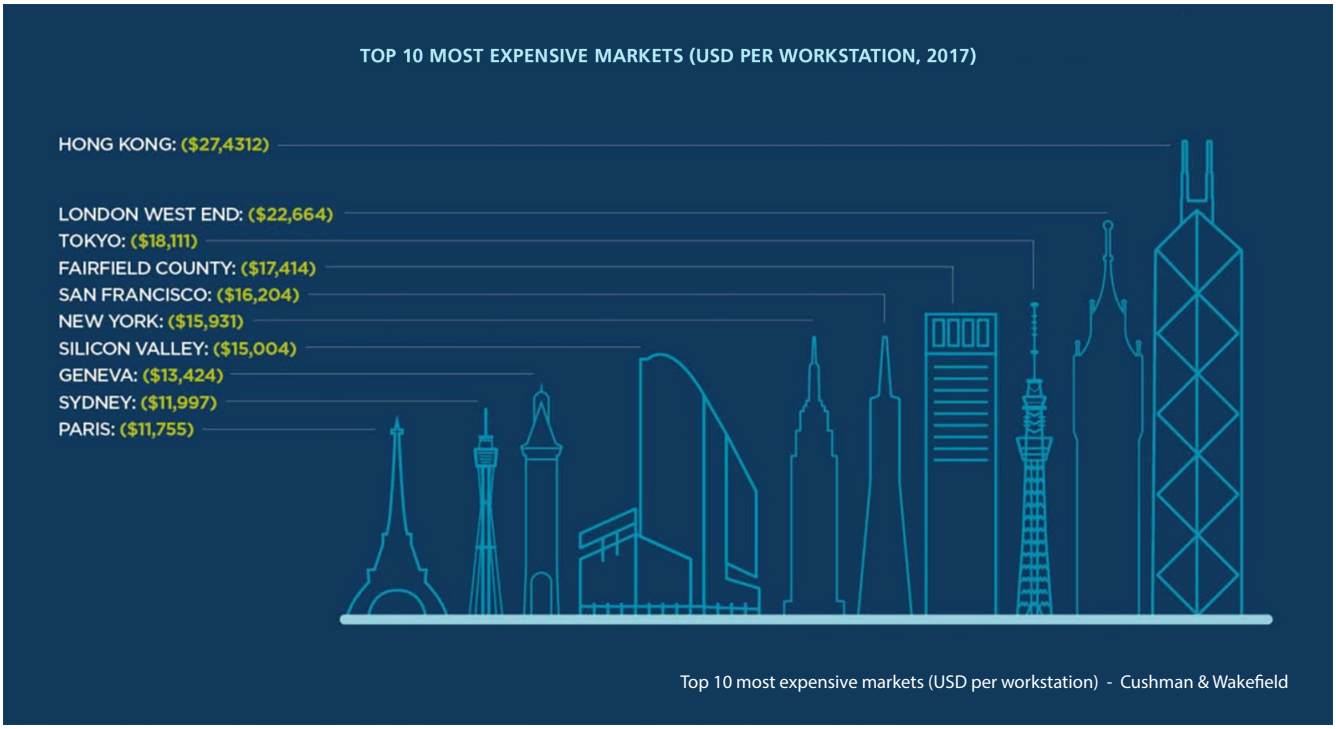
Semtech and OpenSensors have partnered to leverage the Internet of Things (IoT) and deliver an evidence-based space utilization management solution.

Semtech's LoRa® devices and wireless radio frequency technology (LoRa devices and the LoRaWAN protocol) has emerged as the global standard for Low Power Wide Area Network (LPWAN) connectivity. A LoRaWAN®-based network, combined with LoRa-enabled sensors and gateways from OpenSensors, comprise the essential long-range, low power, flexible application to provide cost-effective, reliable communication and the ability to capture accurate data to understand how teams are working.

Technical advantages of LoRa devices and the LoRaWAN protocol for smart building use cases include:

- Delivering low-power, long range sensing capabilities
- Easy to install small 1.5 inch wireless sensors
- Extensive battery life
- Open standards, security and proven reliability

This guide details best practices to deploy smart building technology and explains key metrics to monitor, so companies can make data-driven decisions to efficiently optimize workspace.



Top 10 most expensive markets (USD per workstation) - Cushman & Wakefield

"Sustained growth in workplace-based employment, coupled with rising rents in central business districts (CBDs), has produced continued workplace densification. The Americas lost 5% of space per employee compared to the global 3.4% five-year average, Asia Pacific 4.2% and Europe 2.3%."

Cushman & Wakefield "Office Space Across the World" 2017

USING DATA TO DRIVE WORKPLACE OPTIMIZATION

A comprehensive space management strategy based on historical data enables businesses to make decisions about the current needs of a facility and forecast for the future. Before an organization considers making iterative, impactful changes to its work environment, there are key factors that must be benchmarked. Monitoring utilization rates and person-to-desk ratios provides an organization with the ability to make broad, informed decisions about their real estate portfolio.

Define Business Goals

Need to transition to an activity-based working environment, improve space capacity planning, or inform a workspace redesign project? With defined goals, the process will be much clearer in terms of the appropriate solution to integrate as well as the metrics that need to be measured.

Key Data Points To Measure

1. **Average and Peak Utilization**

   The first data point is an average utilization for desks and meeting rooms. Previously, this was accomplished by sending operations staff with clipboards to laboriously conduct manual audits of employee counts on each floor or business unit over a monthly or bi-annual snapshot of time. Leveraging the power of IoT, occupancy sensors are a much more efficient way of analyzing how building and office spaces are utilized and provide real-time data every day.

   Monitoring utilization will yield the average norms and peak usage of workspace. For most companies, the average utilization rate ranges from 45% - 50% for workstations and hovers around 40% for meeting rooms. Optimal utilization rates for each should fall between 60% to 80%.

   After obtaining at least one month of data, one can drill down to understand the trends and anomalies. Desk and meeting room occupancy tend to vary significantly depending upon day of the week and business unit.

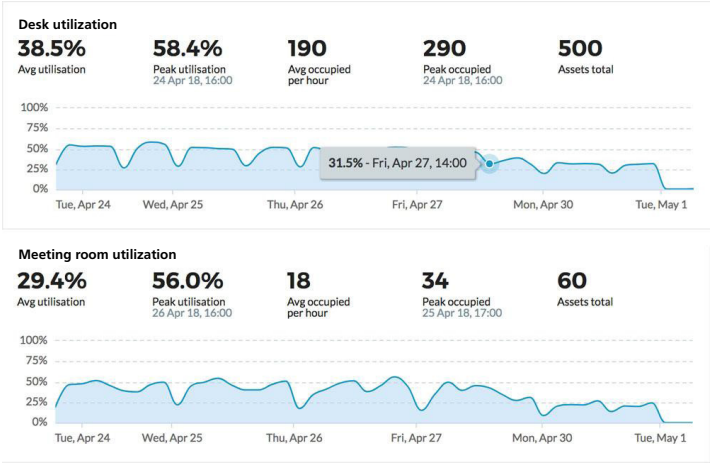
   This critical data identifies patterns in the workforce and the ability to optimize workspace and provide recommendations such as:

   - Encourage people to come in during off-peak times
   - Work from home during peak time
   - Suggest employees work at other locations where occupancy is lower during peak periods of time

2. **Person-to-Desk Ratio**

   A recent trend in space management has organizations moving to an agile working framework and converting units to a more flexible working environment. Businesses are moving from a one-to-one (one person, one desk) to a two-to-one ratio or even more. Finding the tipping point when density and the lack of collaborative space becomes a hindrance to people getting their work done is the art and science of workplace design. Sensor data helps determine the ideal ratio for each team, department or building.

   As an example, take a highly mobile team, like a sales team, that is out in the field the majority of the time. Their needs will be significantly different from a finance group who is coming into the office every day and need fixed desks to do their jobs. The finance team would need a one-to-one desk-to-person ratio where as a sales team may easily operate on a one-to-five ratio. While there is no fixed industry benchmark, the average ratio for most modern companies is 1.2-to-2.



source OpenSensors

Increasing the person-to-desk ratio can:

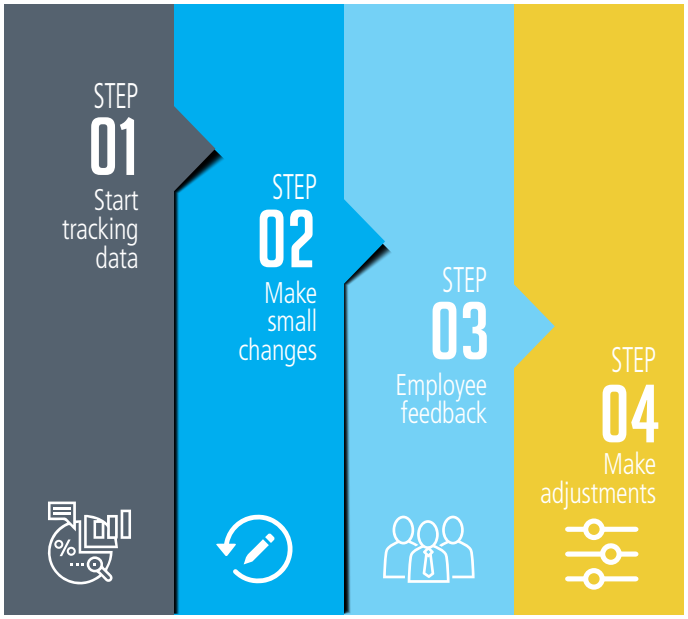
- Improve the utilization of workspaces (i.e. desk spaces are always in use)
- Reduce investment costs to build new office buildings as organization head count grows
- Accommodate more employees in a building or location without the need to rent more office space

Small Changes Can Produce Significant Cost Savings

Anonymized, GDPR-compliant information about occupants' presence, location, count, and activity can be used to optimize facility management. For instance, if a business has 100 employees with 100 desks and the average utilization is determined to be 50%, the business can make improvements to increase occupancy for the 50 desks that are not being used consistently. Improving the occupancy by even 10% would make a significant impact. At a cost of $15,000 per workstation such as in Silicon Valley, reallocating 10 fixed desks to a desk-sharing strategy with flexible desks or a hoteling policy would generate savings of $150,000 per year.

In addition to optimizing space, employers need to ensure the highest level of happiness and productivity for their staff by continuing to solicit feedback as changes are rolled out.

Four Small Changes Produce Results



source OpenSensors

"When I speak with companies, they often tell me they would like to hit an 80% occupancy rate. It's a great ambition to have, but I encourage them to move the needle by small amounts because a 10 - 20% change can actually make a massive difference."

- Yodit Stanton, CEO and founder, OpenSensors

HOW TO DEPLOY A SMART BUILDING SYSTEM

OpenSensors is an end-to-end managed solution service provider enabling organizations to understand the usage of their workspace. Based upon years of experience designing and managing logistics to provide fully operational sensor networks, the company provides the following 5-step "how to" guide for the deployment and maintenance of a smart building system:

1. **Site Survey**

   Assign a project manager to oversee a small internal team of IT staff and key stakeholders. Start by determining any mitigating risks and anticipate potential problems that may prevent a project from running smoothly. Review and select a solution provider responsible for solution design, hardware, logistics, and installation. It is imperative to establish a collaborative approach with the service vendor to ensure technical objectives align with the established goals and KPIs (key performance indicators) a business is trying to achieve.

   A service provider will start its process by developing a detailed site survey. The provider will review Computer Aided Design (CAD) drawings for every floor within the office space. They will assess the best locations to position the sensors and gateways for maximum signal strength. OpenSensors uses a star configuration with a gateway placed on each floor (or two floors) to serve hundreds of sensors. To complete the planning phase, the project manager should approve pre-installation requirements including planned gateway and sensor locations.

2. Choosing Sensors

Next, the service provider will procure the appropriate battery-powered sensors to match the defined goals and data a company wants to measure. Since the LoRaWAN® protocol is an open standard, OpenSensors has access to hundreds of interoperable sensors and gateways from different specialty manufacturers, such as those with membership in the LoRa Alliance®.

The three types of utilization sensors most commonly used in work areas are:

- **Desk Passive Infrared (PIR) sensors** installed under desks and triggered by both motion and heat. They provide data on whether someone is present at a desk or conference room for more than 10 minutes.
- **Meeting Room PIR sensors** measure occupancy and are triggered by motion and heat. They have a wide field of focus which provides higher accuracy.
- **Meeting Room Counting sensors** are suitable for smaller meeting rooms and capture counts of people going in and out of rooms.
- **Foot Fall sensors** have a wider area field of focus and count people going in different directions. Data captured helps building managers understand the usage of open areas such as entryways and shared spaces.

A variety of sensors to track environmental factors such as noise, brightness, temperature, and air quality can also be incorporated into a smart building system.

3. Connectivity

One of the main considerations for a smart building system is how to reliably transmit signals from sensors to gateways and then onto a Cloud-based platform. Technologies such as Bluetooth or Wi-Fi have a troubled history of propagation and frequency issues inside buildings.

OpenSensors selected LoRaWAN as the ideal network protocol for smart buildings. The technology provides exceptional range and seamless interoperability between different manufacturers' devices. A LoRaWAN-based network combined with LoRa-enabled sensors and gateways provide the essential long-range, low power connectivity for cost-effective and reliable data communication.

LoRaWAN can be leveraged in either a public or private network. OpenSensors always creates a private LoRaWAN-based network to give building owners full control of data from sensors, through gateways, onto the Internet or separate on-premises server.

The data is delivered into OpenSensors' platform and presented in real-time on a dashboard. The network is completely segregated from corporate Internet and IT resources. To further ensure authenticated end-to-end device security, OpenSensors only deploys gateways with TLS security and sensors using AES encryption.

4. Staging & Implementation

OpenSensors stages hardware kits and runs tests with each configuration that will be implemented in the building prior to arrival at a site. This preparation stage eliminates potential challenges and ensures the system meets quality standards. With proper planning and preparation, an installation can usually be accomplished during off-hours. For instance, a deployment of a system for a financial services customer with over 2,000 sensors was completed by OpenSensors during the course of a weekend.

The sensors are GDPR-compliant and do not collect any personal data. They only measure occupancy at a desk or meeting room and do not link to a particular person.

It is important for employees to be notified about the space utilization management system before and immediately following installation. OpenSensors often provides webinars or town hall meetings to explain project objectives, detail privacy protection and help alleviate any employee concerns.

5. Handover

After deployment, OpenSensors delivers a customized dashboard displaying real-time metrics for each of the KPIs with visual graphs and blueprints. An asset management feature is built into the solution to easily manage and track where each sensor is located and syncs with floor plan maps when changes are made.

OpenSensors also analyzes the data to provide unbiased suggestions. Monthly or quarterly check-in meetings are established to monitor progress and make any necessary adjustments to strategy. Ongoing training on how to manage the analytics platform and assess monitoring reports is also provided throughout the life of the project.

UTILIZE SPACE TO ITS FULL POTENTIAL

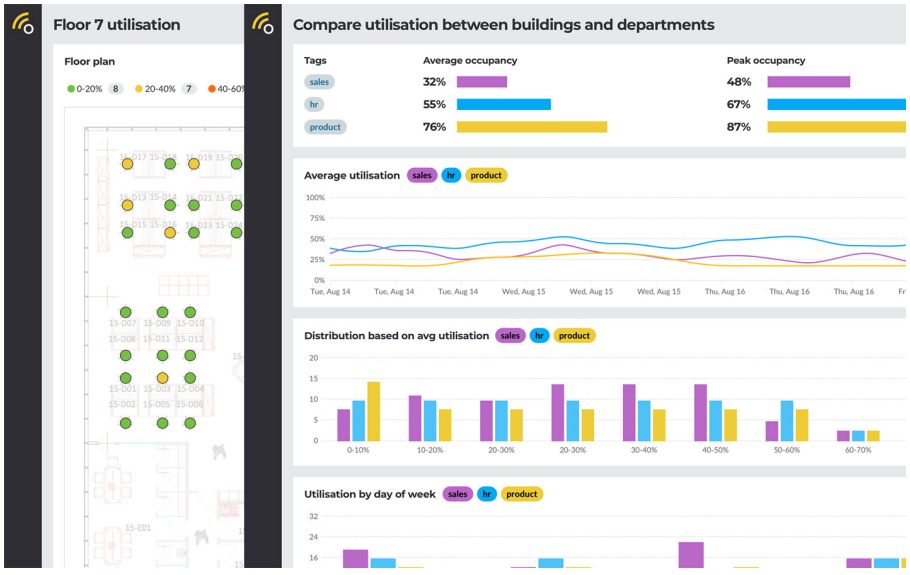
Modern workplaces dramatically reduce operating costs by incorporating principles of activity-based working into workspace design. Companies that monitor the work styles of their employees are able to craft environments that enhance employee experience.

The digital transformation in commercial buildings has already started and is gaining momentum. Businesses of all sizes can benefit from the IoT revolution that is bringing new efficiencies to facility management. Most workplace management systems generate a return on investment within months after deployment.

Evidence-based occupancy data from smart sensors takes away guesswork and equips teams with actionable intelligence to improve workplace practices, inform future designs to accommodate a growing workforce and ultimately boost employee productivity.

"There are a number of reasons why we use Semtech's LoRa devices and the LoRaWAN protocol. In terms of a building environment, LoRaWAN provides exceptional network coverage, low implementation and operating costs for battery-operated sensors, and built-in security features."

- Lawrence Griffiths, Solutions Architect, OpenSensors



source OpenSensors

"Through OpenSensors, we have been able to track occupancy levels in our offices and increase efficiency in our space management approach. Their support is crucial in order to achieve the excellence in occupancy management that all companies need."

Senior Facilities Manager, global fragrance company, Spain

ABOUT SEMTECH

Semtech Corporation is a leading supplier of high performance analog and mixed-signal semiconductors and advanced algorithms for high-end consumer, enterprise computing, communications, and industrial equipment. Products are designed to benefit the engineering community as well as the global community. The Company is dedicated to reducing the impact it, and its products, have on the environment. Internal green programs seek to reduce waste through material and manufacturing control, use of green technology and designing for resource reduction. Publicly traded since 1967, Semtech is listed on the Nasdaq Global Select Market under the symbol SMTC. For more information, visit **www.semtech.com**.

ABOUT OPENSENSORS

OpenSensors provides the next generation of Smart Building Management Systems. The company enables organizations with the ability to understand data usage of building space, desks, meeting rooms, shared workspaces and environmental conditions in order to design and manage complex office environments. OpenSensors provides customers with solutions to optimize and manage their workplace strategies by giving them a complete picture of space occupancy to make important operational change decisions. Organizations are equipped to make smarter decisions about their real estate costs and plan capacity by combining sensor technology with data to accurately measure space utilization in real time. Headquartered in London since 2014, OpenSensors has a growing footprint across Europe and North America. For more information, visit **www.opensensors.com**.

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