Quick Guide to Sensors

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EXECUTIVE SUMMARY

The pace of technology is fast and unrelenting. Ideas identified as 'the future' of FM are now here and operational, such as machines that can tell they are not performing at peak efficiency, and employees being able to control everything in the office using a smartphone.

As such, there is a growing expectancy that the workplace features at least some of this technology. Recent reports have shown that using sensors can increase operational efficiency, improve employee satisfaction and reduce costs.

This Quick Guide is an introduction to the basics, exploring what sensors are, what they are used for, and why they are becoming so popular in FM and across every industry in the world.

QUICK GUIDE TO SENSORS

Service Works Global

1. What Are Sensors?

A sensor is a small electronic device that can detect, measure and record changes in its immediate physical environment. Different types of sensor can track different features, such as motion, pressure, temperature, flow, sound, humidity, light and presence.

Sensors have been used for years in technology such as intruder alarms and vehicle airbags, but a raft of innovation in development over the last decade has led to the use of sensors greatly expanding across more industry verticals, especially in consumer products.

In 2013 the Samsung Galaxy S4 became the first smartphone to integrate temperature, pressure and humidity sensors into one device, beginning the race to increasingly more sophisticated handheld technology. As more data has become available – and more easily interpretable – sensors have exploded in popularity. The element of control that can be gained from knowledge has led to wearables like step counters and heart rate monitors becoming highly fashionable. Users can keep track of their activity via an app and use this information to make informed choices in order to reach their fitness goals more easily.

Home sensors have also provided examples of how this technology could be transitioned into FM. Applications like the British Gas Hive and Google Home allow consumers to control elements of their home life from a mobile app, from anywhere. Users can make savings on their energy bills, for example, by banishing static heating schedules, which no longer suit fast-paced, flexible lifestyles. Heating can be controlled according to requirement, rather than wasting energy heating an unoccupied home when plans change. This technology is now being recognised in facilities management, where energy savings are a key priority for most organisations, both in terms of cost and environmental sustainability.

2. The Rise of Sensors in FM

Facilities management is largely viewed as resource-heavy, low profit margin industry. Investment in new technology is slower than in other sectors and traditionally, FM has employed a 'wait and see' approach to new innovation, preferring to defer investment until potential returns are deemed more reliable.

However, following the success in the consumer and healthcare sectors, and strongly influenced by the falling costs of sensors, data storage and increasing speed of connectivity, FM is gradually embracing sensors.

Where an object isn't already 'smart', sensors can be placed on or next to it to allow it to gather data. For example, a sensor placed on a boiler can monitor temperature or measure vibrations. As more data is collected, anomalies can be identified and preventative maintenance scheduled in order to resolve minor issues before they become a problem and affect the running of the asset.

While a BMS (Building Management System) can be used to manage HVAC or lighting equipment, for example, it can be expensive to implement. According to global technology company Intel, an IoT-based approach using wireless sensors can reduce deployment cost by around 30% when compared to a traditional BMS.[1]

Furthermore, a sensor can be used on anything, such as in:

- Soap dispensers in public washrooms to monitor levels

- Parking spaces to show availability

- Engines to detect anomalies

- Personal safety equipment to alert team members of falls or lack of movement.

Oral B has even produced a smart electric toothbrush that shows the user how long, how hard and where they are (or are not) brushing via an app.

This proliferaton of sensors has allowed consumers to become comfortable with the technology, removing the fear of the unknown and providing inspiration for implementation into new industries like FM.

[1] https://www.rcrwireless.com/20160808/internet-of-things/building-management-system-tag31-tag99

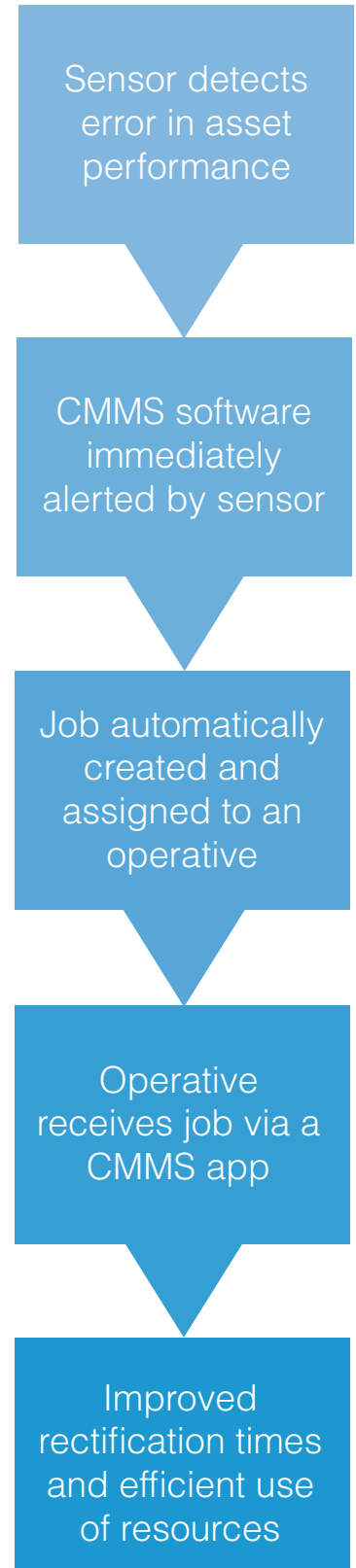# 3. Translating Data into Action

Integrated devices

Many facilities management teams are integrating sensors with their CMMS (computerised maintenance management system) software, however, the volume of data accumulated by each sensor is meaningless without someone to translate it. CMMS software can simultaneously manage the data streams from every device deployed, and respond to any alerts created by the sensors. For example, if a venue is holding an event and the soap has run out well before the next scheduled inspection, the CMMS can alert a member of the cleaning team to fill it. By analysing the data, patterns can be identified to increase efficiency. In this case, as the cleaning team doesn't need to check the soap, cleanliness or toilet paper (depending on where sensors are used), visits can be spaced further apart and alerts sent if the facility is unusually busy and requires extra attention. And, because all this information is flowing through a CMMS, all activities are recorded, budgeted, fully auditable and available to inform future decision-making.

Integrating sensors with CMMS also drives responsiveness: usually if a problem is identified it must be reported to the help desk, entered into the system, prioritised then assigned to an operative to carry out the work. However, using sensors, this process can be automated as the need for human intervention is removed until the operative attends the site, having received the job via their computer, tablet or smartphone.

The Internet of Things

A group of connected sensors forms part of the Internet of Things, or IoT. This essentially means that objects transmit information to the cloud, and can communicate with each other. In addition to improving asset management and maintenance, IoT has the potential to transform a workplace environment.

For organisations looking to create a fully-fledged smart building, an IoT platform is required to manage both data and processes. While CMMS integration allows alerts to be acted on by engineers, the IoT platform will be able to make decisions based on the data available. For example, it can determine from moisture sensors that it has just rained and therefore the sprinkler system is not needed to water the grounds yet. Furthermore, the IoT platform provides an interface to allow users to control different parts of the smart building – like increasing the heating or dimming the lighting using a mobile app or computer dashboard. Revolutionary office building, The Edge in Amsterdam has pioneered large scale, user-controlled work environments in order to create highly sustainable, adaptable workspaces.

Sensor detects error in asset performance

CMMS software immediately alerted by sensor

Job automatically created and assigned to an operative

Operative receives job via a CMMS app

Improved rectification times and efficient use of resources

4. Case Study - The Edge

The Edge in Amsterdam is hailed as the greenest, most intelligent building in the world. It has been awarded 98.4% the highest sustainability score by the BREEAM (Building Research Establishment Environmental Assessment Methodology) green building certification scheme, and uses technology to maximise user comfort and energy efficiency.[2]

Packed with 28,000 sensors within its connected lighting system developed by Philips, the building can monitor motion, light, temperature, humidity and infrared. Using Power-Over-Ethernet (PoE) cables, each luminaire is directly connected to the building's IT network and becomes a point of intelligence which can share data on occupancy and activity patterns as well as environmental data. Lighting and heating can therefore be reduced in empty areas, and resources (like cleaning) can be allocated according to occupancy. The connected lighting can even provide information on the availability of nearby facilities such as meeting rooms or hot desks, accessible via an app, which can also be used to customize the location's temperature or brightness according to the user's preference.

The system also provides a means of way-finding inside the building. The lights transmit encoded data to the device to enable identification of each light fixture within the building. Users can find out where they are within the building through the mobile app, and then follow directions on a map to their requested location.

Not only has the use of technology generated massive energy and cost savings, employees have flocked to this new building to work, in order to experience the 'future office' for themselves.[3]

[2] https://www.bloomberg.com/features/2015-the-edge-the-worlds-greenest-building/
[3] https://www2.deloitte.com/global/en/pages/about-deloitte/articles/gx-the-edge-of-tomorrow.html

4. Conclusion - Is FM Ready?

While sensors and the Internet of Things are increasingly being reported in the FM press and wider media globally, it's not yet actively on the radar of many organisations.

A recent poll held at the UK's FM industry body (the British Institute of Facilities Management) revealed that although smart buildings / smart occupancy were on the agenda for around two thirds within the next five years, only 30% were actively working on the adoption of this into their company philosophy. The remaining 10% claimed that smart technology would not be in their interests.[4]

However, at the current rate of change, those not embracing technology risk getting left behind. This not only means becoming less competitive compared to those able to increase their operational effectiveness in order to reduce costs, but also in terms of employee retention as the talent pool may choose to work in more employee-focused organisations.

Sensors and IoT are becoming increasingly commonplace, and are already being expected by FM customers, whether or not the industry as a whole is ready.

" At the current rate of change, those not embracing technology risk getting left behind "

[4] https://www.swg.com/blog/is-facility-management-ready-for-iot/

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