IRONMONGERY AND THE IMPACT OF THE INTERNET OF THINGS

GAI SPECIFIER'S GUIDE

The specifier's guide to understanding the concept of the 'Internet of Things' and its effect on specifying ironmongery.

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IRONMONGERY AND THE IMPACT OF THE INTERNET OF THINGS

GAI SPECIFIER'S GUIDE

Based on the RIBA Approved CPD of the same name, the specifier's guide to Ironmongery and the Impact of the Internet of Things covers how to specify ironmongery products which embrace developments in communication technology.

To ensure that your project meets the latest standards, regulation, legislation and best practice, it is strongly recommended that the ironmongery should be specified by a GAI Registered Professional such as a Registered Architectural Ironmonger (RegAI). All RegAI's have successfully completed the GAI Diploma in Scheduling qualification, and continue to maintain and update their knowledge through the GAI continuing professional development (CPD) programme. RegAI status is a clear demonstration of professional competence in matters which are critical to building safety, accessibility and security. Visit www.gai.org.uk/RegAI.

If you would like to receive a presentation of the CPD, this is available through GAI member companies. Please visit the GAI website (www.gai.org.uk) for more details.

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CONTENTS

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1. THE INTERNET OF THINGS (IOT)

DEFINITION

The Internet of Things is a concept where not only people but objects and devices are able to network and communicate with each other.

It is a system of "things" or interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers (UIDs) and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

HISTORY

Kevin Ashton, co-founder of the Auto-ID Center at MIT, first mentioned the internet of things in a presentation he made to Procter & Gamble in 1999. Wanting to bring radio frequency ID (RFID) to the attention of senior management, Ashton called his presentation "Internet of Things" to incorporate the cool new trend of 1999: the internet.

Although Ashton's was the first mention of the internet of things, the idea of connected devices has been around since the 1970s, under the names "embedded internet" and "pervasive computing". The first internet appliance, for example, was a Coke machine at Carnegie Mellon University in the early 1980s. Using the web, programmers could check the status of the machine and determine whether there would be a cold drink awaiting them, should they decide to make the trip to the machine.

USES

Increasingly, organisations in a variety of industries are using IoT to operate more efficiently, better understand customers to deliver enhanced customer service, improve decision-making and increase the value of the business.

It will involve an increase in machine-to-machine (M2M) communication, with up to one trillion devices or "things" which could be connected to networks across industries.

The number of Internet of Things (IoT) devices worldwide is forecast to almost triple from 9.7 billion in 2020 to more than 29 billion IoT devices in 2030. In 2030, the highest number of IoT devices will be found in China with around 5 billion consumer devices.

IoT devices are used in all types of industry and consumer markets, with the consumer segment accounting for around 60 percent of all IoT connected devices in 2020. This share is projected to stay at this level over the next ten years.

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2. SMART HOMES

APPLICATIONS

The Smart Home also known as the Connected Home, uses modern automation systems to provide a practical way of controlling electronic devices in the home.

Smart Home technology can include all smart appliances (washers, dryers, refrigerators etc.), safety and security systems (internet-connected sensors, monitors, cameras, and alarm systems), and energy equipment like smart thermostats and smart lighting.

This advanced technology allows these vital home functions to be controlled remotely from anywhere in the world using an internet connected device. Every device involved is connected to a central hub often called a "gateway". The system is controlled through a user accessed wall-mounted terminal, mobile phone software, tablet, or a web interface of some kind. Another form of system control is through voice activation using devices such as Amazon Echo.

Here are some interesting statistics regarding the growth of connected home devices:

- Scheduled to continue growing steeply at an annual rate of 67%.
- This is scheduled to be much faster than smart phone or tablet device growth.
- It is scheduled to hit 1.8 billion units shipped in 2019, according to Business Insider Intelligence estimates.

ADVANTAGES

The following are some of the advantages of smart homes:

- **Energy Savings** - Some automated systems pay for themselves in energy efficiency eg. programmable thermostats.
- **Financial savings** - Smart devices can often save you money and also help show where you can save money by keeping track of energy use and expenditure.
- **Convenience** - home automation delivers ease of use. Most smart appliances, for example, allow for remote control via smart phone.
- **Digital Security** - Your smart appliance dashboard also allows you the security of checking in on your home, even when you're miles away. For some people, this peace of mind is the main appeal of home automation.
- **Installation** - Most systems are not that difficult or expensive to install, particularly if you are "tech aware".

Voice activated device

DISADVANTAGES

The following are some of the disadvantages of smart homes:

- **Upfront Cost** - Smart appliances may save you money in the long run, but the initial investment is still high. Home automation has become more affordable in the past few years, but it still has a long way to go.
- **Compatibility** - One of the most frustrating things for homeowners is that smart technology isn't all compatible.
- **Power disruption** - Affects most of these devices immediately, although some may have a backup source. In the event of a Wi-Fi outage almost all of them will be rendered completely useless.
- **Hacking** - It can be vulnerable to hacking. This is a particular concern for home security systems.

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3. SMART BUILDINGS AND CITIES

SMART BUILDINGS

Smart buildings are sometimes referred to as 'automated buildings', 'intelligent buildings' or buildings that incorporate smart technology.

At its most basic level Smart Buildings describe buildings that include a number of technologies which can all be integrated in to one building.

As with Smart Homes, they centre on the use of interconnected technologies but on this occasion use this to make buildings more intelligent and responsive, ultimately improving their performance.

Technologies used in Smart Buildings include:

- Automated systems.
- Intelligent building management systems.
- Energy efficiency measures.
- Wireless technologies.
- Digital infrastructure.
- Adaptive energy systems.
- Networked appliances.
- Data gathering devices.
- Information and communications networks.
- Assistive technologies.
- Remote monitoring.

SMART CITIES

A smart city is an urban area that uses different types of electronic data collection sensors to supply information which is used to manage assets and resources efficiently.

The term 'Smart cities' is defined in PAS 180: 2014 Smart Cities. Vocabulary as '...the effective integration of physical, digital and human systems in the built environment to deliver a sustainable, prosperous and inclusive future for its citizens.'

Smart Cities utilise data collected from citizens, devices, and assets which is then processed and analysed to monitor and manage:

- Traffic and transportation systems.
- Power plants, waste management and water supply networks.
- Law enforcement and information systems.
- Schools and libraries.
- Hospitals, and other community services.

The top five 'Smart Cities' in the world (ranked by Forbes):

1. **Barcelona** - environment & smart parking.
2. **New York City** - smart street lighting & smart traffic management.
3. **London** - technology & open data.
4. **Nice** - environment & agency cohesion.
5. **Singapore** - smart traffic management & creative use of technology.

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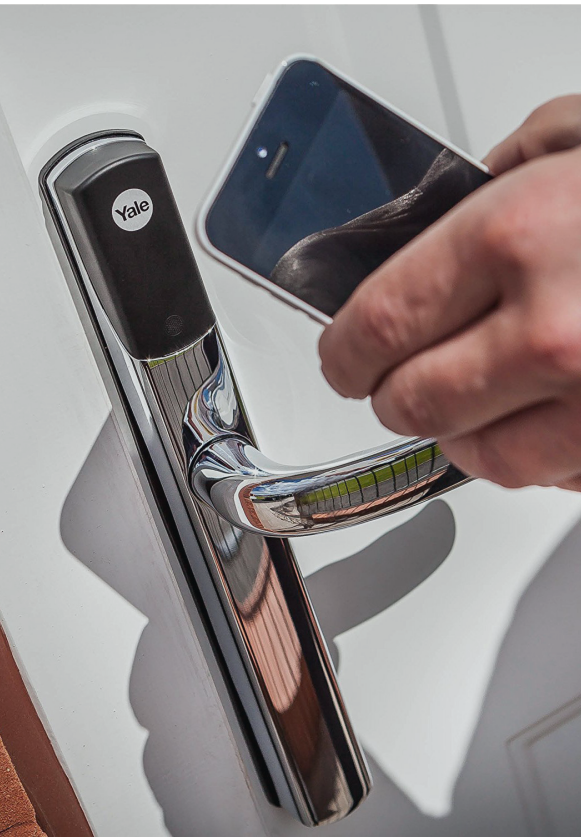
4. IMPACT ON THE IRONMONGERY INDUSTRY

A host of products have been developed that connect to the internet and can be controlled using a smart phone, tablet or PC. Here are some key examples from the ironmongery industry.



Mobile-operated smart digital lock

SMART DIGITAL LOCKING

Smart Door Locks means a home can be secured without the need to carry keys. The door can be opened in a variety of ways, including a PIN code, remote fob, or even a smart phone when connected to a smart home system.

- Digital locks had previously been seen as an elementary form of access control, but all that has now changed.
- It is now possible to generate time-sensitive codes which can allow temporary access through locks.
- Short, medium or long-term codes for a specific date, time and duration can be set and generated via an app or online.
- Codes can be sent via email or SMS.
- Using an audit trail, it is possible to view a lock's history including which codes were used at what time.

SMART LOCKING AND ACCESS CONTROL

There is an intelligent combination of electronics, mechanics and wireless access control available which uses smart phone application.

- This technology for the locking industry provides unique identification for every opening through encrypted communication.
- The Battery inside the key provides wireless function of time and calendar with complete audit trail.
- Specialist keys can be updated with a smart phone application and allows the ability to update access rights in the field.
- A Cloud-based Web Manager allows the ability to change access rights anytime anywhere required.

BUILDING AUTOMATION SYSTEMS

This management system intelligently integrates door, window and safety technology into building management systems.

- The interface module allows integration of emergency exit systems, smoke and heat extraction systems, hold open door systems and automatic doors.
- Automatic doors can assist the users of a building with increased accessibility.
- It can be used as an independent building automation system (stand-alone solution) or integrated into a higher-ranking building management system.
- The applications for this are browser-based and can therefore be operated on every IP competent terminal; No matter whether you use a PC, tablet, or smart phone.

VIRTUAL REALITY 360 DEGREE CITY

New Virtual Reality technologies are being exploited to engage with customers.

- Through the 360 degree City it allows the customer to digitally experience the usability of products.
- This virtual world will illustrate where and how a range of products can be used with their solutions displayed in a 3D environment from a user's perspective.
- This is all accessible via an app.

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5. BUILDING INFORMATION MODELLING (BIM)

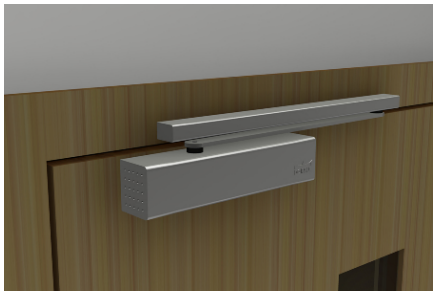
As the 'internet of things' continues to affect almost every aspect of human existence - the built environment is no exception. From building design and construction projects to infrastructure development and ongoing asset management, the industry continues to be transformed by these new and evolving digital solutions.

Building information modelling (BIM) is an important aspect of this technological change and for those organisations that wish to perform more efficiently and sustainably, and compete in the vast global construction market, it must be embraced.

- Building information modelling (BIM) is highly reliant upon the Internet of Things.
- Using BIM it is possible to create a fully integrated digital model of a building thus assisting with clash detection, life-cycle costs and facilities management post completion.
- In addition to this, the correct usage of BIM can assist with management of on-site Health and Safety as the BIM model can be programmed to show up build-ability issues. Health and safety files being produced as an intelligent 3D model.

In order to support the built environment with this challenge, BSI has developed a Kitemark in collaboration with industry stakeholders to ensure that it adds value and addresses the key issues on BIM implementation. This is based on compliance with BS/PAS 1192 Standards.

BIM models of products can be downloaded directly in to the Software and used on the project. Many GAI member Companies have already created BIM models on BIMstore or National BIM Library for ironmongery, washroom components or Doorsets.



BIM model of door closer

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6. FUTURE TRENDS

With developments in technological capabilities changing so quickly, we take a look at what predicted trends we can expect to see in the near future.

ARTIFICIAL INTELLIGENCE WILL INCREASE

- Smart home hubs, and equipment collect data on your habits and patterns of usage. When you set up voice-controlled devices, you allow them to record what you say to them and store those recordings in the cloud. In most cases, the data is collected to help facilitate what is called machine learning.
- Machine learning is a type of artificial intelligence that helps computers "learn" without someone having to program them. The computers are programmed in a way that focuses on data that they receive. This new data can then help the machine "learn" what your preferences are and adjust itself accordingly. For instance, when a video website suggests a movie you might like, it's likely learned your preferences based on your past choices.

INCREASED USE OF VIRTUAL REALITY

- Employee training in real life scenarios such as fire safety.
- Educational purposes – immersive and simulation based learning such as training for medical procedures.
- Business meetings and collaboration in areas such as design, engineering, construction, and architecture are taking advantage of VR. All participants can view the model.
- E-commerce - Online VR Shopping is a different experience. Sitting at home users can virtually try and buy the new items. Amazon or eBay are pioneering VR in this arena.

PRIVACY LAWS

- Security and privacy concerns will drive legislation and regulatory activity in privacy laws.
- The increase in Internet of Things devices is one reason security and privacy concerns are rising.
- In mid-2018, the European Union implemented the General Data Protection Regulation. GDPR has led to similar security and privacy initiatives in several nations around the world.
- In the United States, California recently passed a tougher privacy law.

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7. RELEVANT STANDARDS

BSI KITEMARK SCHEME

BSI launched a new Kitemark Scheme for Internet of Things Devices in May 2018.

The BSI Kitemark has been developed in response to the growth of internet connected products, and is designed to help consumers confidently and easily identify the IoT devices they can trust to be safe, secure and functional.

There are three different types of BSI Kitemark for IoT Devices, which will be awarded following assessment according to the device's intended use: residential, commercial, and enhanced, for use in residential or commercial high value and high risk applications.

Before being awarded the Kitemark the manufacturer is assessed against ISO 9001, and the product is required to pass both an assessment of functionality and interoperability, as well as penetration testing scanning for vulnerabilities and security flaws. Once the BSI Kitemark is achieved the product will undergo regular monitoring and assessment.

THE PRODUCT SECURITY AND TELECOMMUNICATIONS ACT 2022

The Product Security and Telecommunications Act 2022 has now been enacted in to UK law and applies to all consumer IoT products. The UK Government has mandated that businesses will need to be compliant with the new security requirements relating to consumer connectable products such as smart door locks, connected home automation and alarm systems and home assistants.

The Act is based on the ETSI standard ETSI EN 303 645 for consumer IoT security. This standard is designed to prevent large-scale, prevalent attacks against smart devices that cybersecurity experts see every day, by establishing a security baseline for connected consumer products and provides a basis for future IoT certification schemes. It describes building security into IoT products from their design, rather than awkwardly bolting security measures on at the end.

The Secure Connected Device accreditation is the only way for companies to obtain police recognition for the security of their Internet of Things products in the UK.

OTHER STANDARDS

The following is a list of standards which are applicable to this field:

- **BS EN 14846** - Electro-mechanically operated locks.
- **BS EN 15684** - Mechatronic cylinders.
- **BS EN 16867** - Mechatronic door furniture.
- **BS EN 16864** - Mechatronic padlocks.
- **PAS 24** - Security performance requirement for doorsets and windows.
- **BS EN ISO 19650-1** - New BIM standard - Concepts and principles.
- **BS EN ISO 19650-2** - New BIM standard - Delivery phase of assets.
- **PAS/BS 1192** - Series of BIM Standards.
- **PAS 180** - Smart Cities. Vocabulary.
- **PAS 181** - Smart City Framework.
- **PAS 185** - Smart Cities Security.

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The Guild of Architectural Ironmongers (GAI) is the only trade body in the UK that represents the interests of the whole architectural ironmongery industry - architectural ironmongers, wholesalers and manufacturers.

Formed in 1961, the GAI is internationally recognised and respected as the authority on architectural hardware, building its reputation on three key pillars; education, technical support and community.

Its technical information service is the only specialist service of its kind, providing comprehensive advice on issues relating to the legislation, regulations and standards governing the use of architectural ironmongery and related hardware.

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