FUTUREquipped

Construction Sector

(Domestic) Building Management Systems (DBMS)

UNIT 2

Funded by:

Scottish Funding Council
Promoting further and higher education

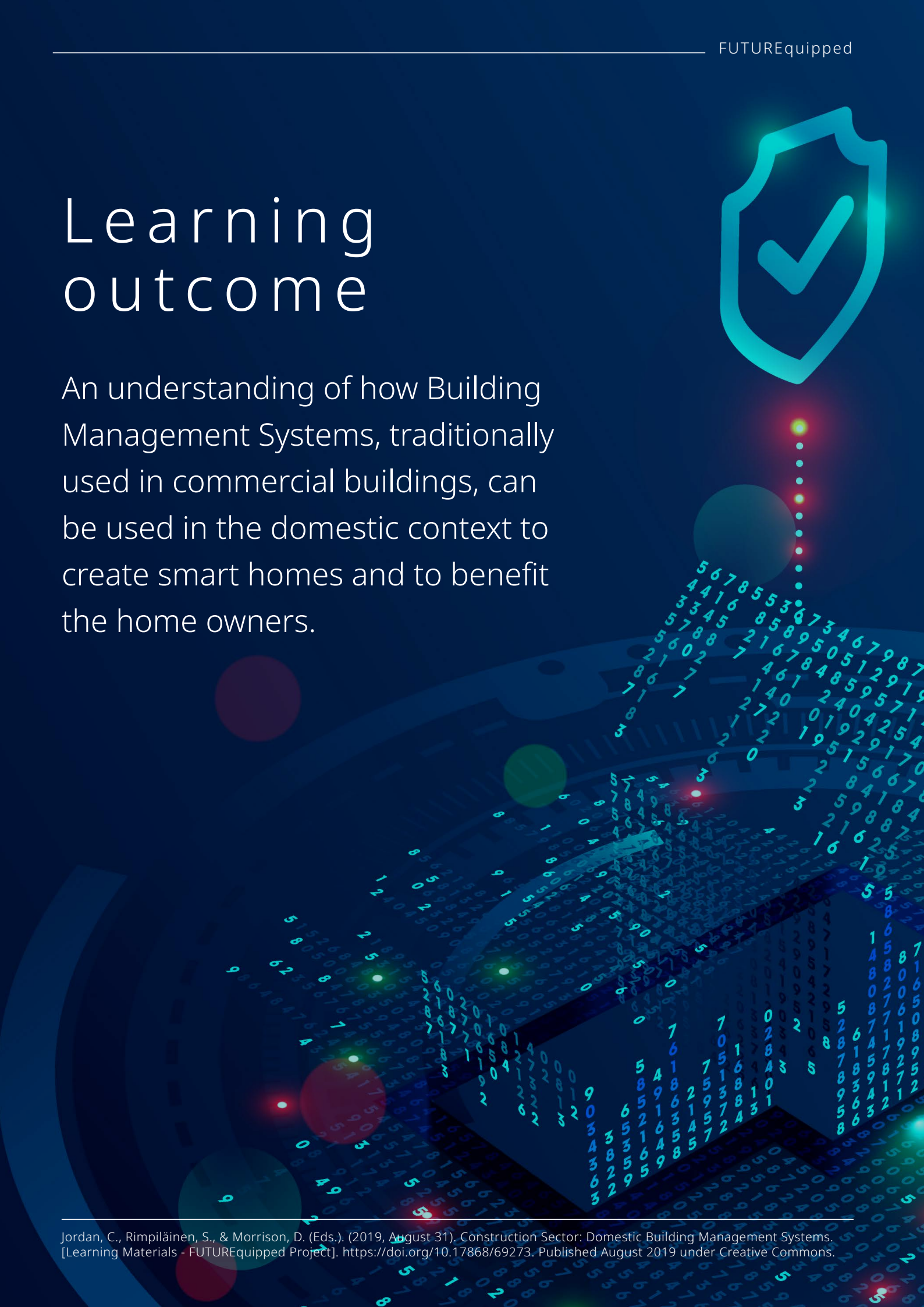
Designed and delivered in collaboration by:

Construction Scotland Innovation Centre

Digital Health & Care Institute

Learning outcome

An understanding of how Building Management Systems, traditionally used in commercial buildings, can be used in the domestic context to create smart homes and to benefit the home owners.



Jordan, C., Rimpiläinen, S., & Morrison, D. (Eds.). (2019, August 31). Construction Sector: Domestic Building Management Systems. [Learning Materials - FUTUREquipped Project]. https://doi.org/10.17868/69273. Published August 2019 under Creative Commons.

Introduction

Building Management Systems (BMS) (also known as Building Automation Systems BAS) are computer-based systems used for monitoring and controlling building services such as lighting, heating, ventilation, CCTV, smart meters etc. In addition to collating data and simplifying the control of building services, BMS can help with visualising data, automating reporting and creating alarms and alerts for faults and predictive and preventative maintenance.

In the context of SMART Homes, smart technologies such as Domestic Building Management Systems (DBMS), can, for example:

- Improve the performance of homes and the experiences of people living and working in them;
- Help reduce energy use, cut carbon emissions and support smarter and more flexible management of energy supply and demand;
- Help improve health and wellbeing of residents through better management of internal environments, safety and security;
- Help the elderly and those suffering from chronic diseases to live better and for longer at home through allowing control of their living environment through voice control and mobile apps as well as automation, ubiquitous monitoring and AI to support and predict people's changing needs.

Watch this short introduction to "What is a BMS-system":
https://www.youtube.com/watch?v=v-w9XT-uC40 (talks of it as "BAS")

Key drivers for the emergence of Domestic Building Management Systems

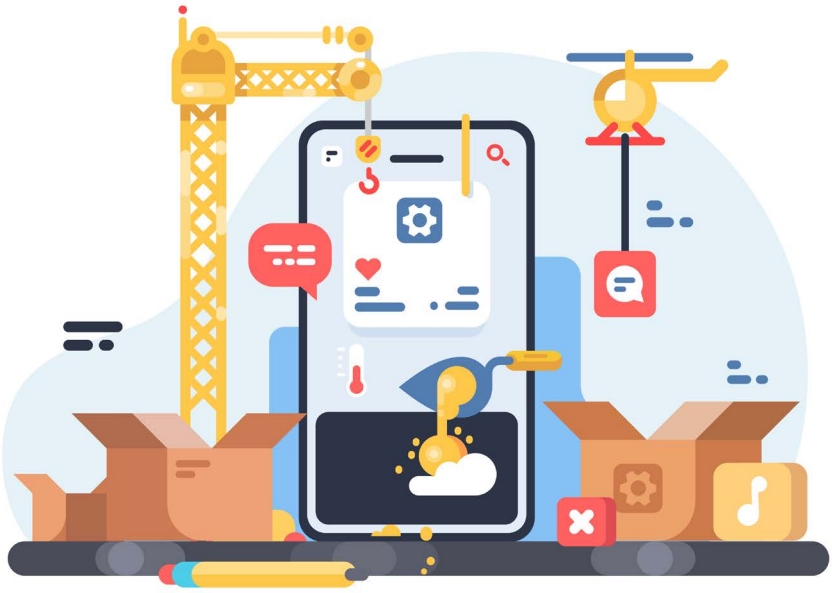
Historically, BMS have been associated with large commercial buildings. However, with the increased availability of wireless and mobile technologies, Internet of Things (IoT), equipment that is easier to control, and the decreasing cost of monitoring and detection, buildings of all sizes are installing increasingly complex and interconnected control systems. Because of this, home owners can now, for example, connect to their home and interact with devices such as lights and heating remotely using their smart phones.

Other drivers, besides developments in IoT, mobile and wireless technologies, include:

- Environmental concerns and strive for sustainable development;
- Building regulations driving safety, energy efficiency and sustainability of all buildings;
- Increasing ageing population and the need to find new solutions to helping people to live independently for longer in their own homes;
- Economy – consolidation of big companies, the emergence of innovative Start Ups, and the pace of technology development and innovation.

Who are the key players in Domestic Building Management Systems?

- Technology companies (large corporates and Start Ups) – implementing IoT, wearable and mobile tech solutions in domestic context.
- Energy Providers – pioneering /promoting affordable smart meters that can be easily integrated within a domestic BMS. Considerable influence on market and research.
- Scottish government – (NHS and Scottish Building Standards Authority) awareness of ageing population, greater requirement for home care and mounting costs associated with hospital care; responsibility to reduce energy costs and limit waste resources; considerable influence through legislative change.
- Building design teams – early integration of BMS within a domestic setting (same approach as commercial projects), within BIM practices and the benefit from project performance/feedback to inform future design. The design team are involved in the project at inception and can therefore promote benefits of BMS in the domestic context. A particular focus is afforded to the resultant reduction in life cycle costs.
- Home and building owners interested in improving the efficiency of the building win which they reside or operate, reducing energy use and associated costs and improving the ability to customise and optimise service utilisation.



Scottish Innovation Centres most closely linked to DBMS:

Construction Scotland Innovation Centre (CSIC) – Construction industry-led Innovation Centre for Scotland's construction industry. Since opening in October 2014, CSIC has been linking together businesses, university and college experts and public sector providers to deliver transformational change in construction along with the provision of appropriate innovation support in areas where industry demand is currently not being met. CSIC has an innovation factory that has specialist equipment which can be utilised for product development; CSIC also provide business support and networking opportunities for emerging market players.

CENSIS - the innovation centre for sensor and imaging systems (SIS) and Internet of Things (IoT) technologies and their applications. Sensor technology and IoT applications are crucial for enabling and realising Domestic Building Management Systems for SMART Homes.

What are the key challenges and opportunities for the development / adoption / progress of DBMS?

Challenges:

- Volume of isolated apps and smart technologies available for the home (apps operating on non-connected and/or non-compatible infrastructures);
- Creating middle software to talk to and collate performance data from consumer-focused smart tech;
- Reluctant consumers – “I like my thermostat with buttons I can push”.

Opportunities:

- Collaboration across multiple sectors;
- Custom building BMS systems for specific user groups/needs;
- Improvements in BIM through performance data analysis;
- One stop -shop for all your services/controls – having a single user interface;
- To learn from user data - particularly demographics/specific health issues;
- Reduce energy consumption;
- Reduce life-cycle costs.

Please, read a

Case study

on using DBMS with a SMART home:

Smart Home Lab, a house on the BRE site at Watford

It has been predicted there will be over 20bn IoT-enabled devices by 2020. A majority of these will be linked to usage in homes and buildings. (van der Meulen, 2017)

BRE (Building Research Established), a world-leading building science centre, has established a Centre for Smart Homes and Buildings (CSHB), which is a collaborative hub for industry, academia and government. As part of that, BRE launched a Smart Home Lab – essentially a house being used to trial and test smart tech in real settings. The lab is located in Watford, England.

Currently the Smart Home Lab is testing a range of devices that cover e.g. heating, energy use, safety and security, lighting and air quality.

Scientists at BRE are also working with RNIB (The Royal National Institute of Blind People) and others to look at how smart homes and buildings can best support independent living, helping older people and those with disability or chronic illness to live more independent lives both at home and work. The centre provides an opportunity to address issues that are common across construction industry, shaping policy, defining standards, supporting innovation and creating demonstrators.

The most popular features have proven to be those that save consumers money and energy, as well as enable them to have more convenient lifestyles. These include sensor-activated lighting, smartphone-controlled boilers and smart meters. Amazon Alexa and similar voice activated products are emerging as part of the IoT market, supporting e.g. those with mobility issues to remain in their own homes for longer.

Source: https://www.bregroup.com/press-releases/bre-launches-centre-for-smart-homes-and-buildings-to-demonstrate-internet-of-things-smart-products-and-services/


STUDY ROOM
LIVING ROOM
DINING ROOM
DEPOSIT
LAUNDRY ROOM
KITCHEN
HOUSEKEEPING ROOM
FA

Assessment 1

Multiple Choice Assessment (10 questions)

1. What does BMS stand for?
a. Building Management Software
b. Building Management System
c. Building Maintenance System
d. Building Maintenance Software

2. BMS can benefit the home owner by:
a. Informing them when maintenance is required to the central heating system
b. Monitoring energy usage
c. Alerting them to faults within the system
d. All of above

3. BMS can help the home owner control:
a. The central heating system
b. Ventilation
c. Lighting
d. All of the above

4. BMS can reduce:
a. Energy use
b. Household utility bills
c. Artificial light usage
d. All of the above

5. BMS can improve your home's:
a. Thermal efficiency
b. Energy efficiency
c. Value
d. All of the above

6. BMS store performance data that allows:
a. Designers to learn from their mistakes
b. Householders to assess energy waste
c. Householders to spot potential cost savings
d. All of the above

7. BMS can keep records of:

a. Repairs carried out to the boiler
b. Who visits the house and when
c. The homeowner's daily routine
d. All of the above

8. BMS allows the householder to control:

a. Internal conditions
b. External conditions
c. Both of the above

9. BMS can improve the home's security with:

a. Remote CCTV
b. motion detectors
c. remote alarm systems
d. All of the above

10. BMS can be controlled:

a. Remotely
b. By voice command
c. Via your smart phone
d. All of the above

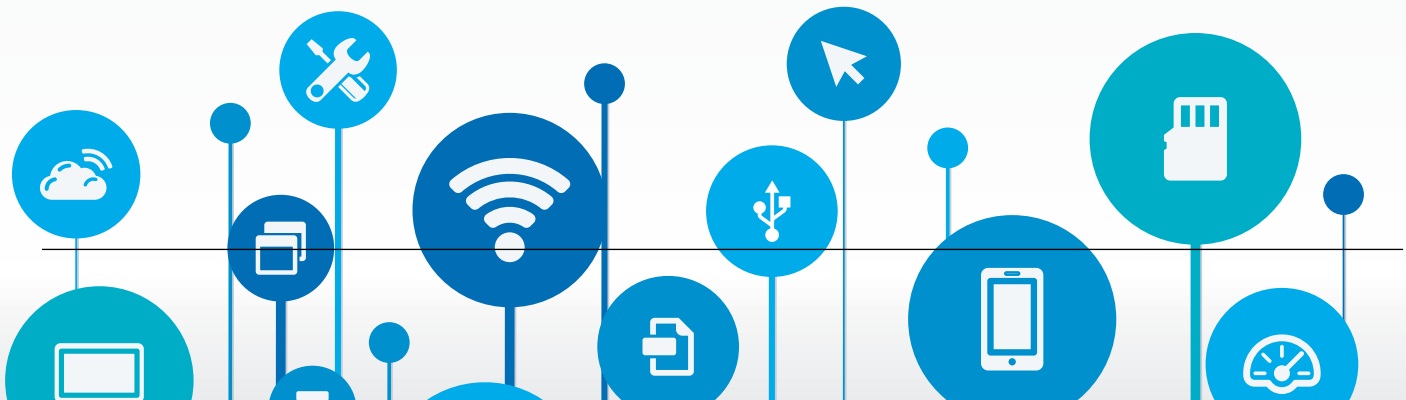
Answers on page 10

Assessment 2

Scenario / Project-based assessment

Do research on Domestic Building Management systems. Create a poster that illustrates how a domestic BMS could benefit an elderly home owner. The poster, which should contain max 200 words and illustrations, should cover:

- Short introduction to BMS
- Short explanation of IoT
- Short description of the elderly person's situation (type of housing; personal situation)
- Detail the types of benefits BMS would offer to the home owner.



Assessment 1 Answers

1. b - Building Management System
2. d - All of above
3. d - All of above
4. d - All of above
5. d - All of above
6. d - All of above
7. a - Repairs carried out to the boiler
8. a - Internal conditions
9. d - All of above
10. d - All of above

These materials were produced by college lecturers as part of the FUTUREquipped project in 2018. The project was funded by the Scottish Funding Council and designed and delivered in collaboration by the Digital Health and Care Institute and the Construction Scotland Innovation Centre.

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