INTEGRATING BUILDING PERFORMANCE STANDARDS WITH SMART TECHNOLOGIES

2026

BGIS Global Integrated Solutions LTD

www.bgis.com/uk

Foreword

It is with great enthusiasm that I present this article which explores the interconnected relationship between building performance and the adoption of smart technologies. Due to increasing regulatory frameworks focusing on decarbonisation and implementation of measurable building performance metrics, organisations are placing greater emphasis on achieving their carbon emissions goals. In pursuit of these objectives, many are turning to technological solutions to address challenges and unlock further value.

The document aims to define the facets of building performance and how smart technologies can empower product owners to realise full value proposition, thereby organisation can invest more time and resource around strategic planning and execution.

Our Professional Services team has spent over four years developing a technology ecosystem designed to enable continuous monitoring and optimisation of building efficiency through supervised machine learning models guided by subject matter experts in building physics. These combined efforts have allowed us to transform routine interventions into strategic opportunities, demonstrating that the true power of innovation lies not only in addressing urgent issues but also in inspiring broader market change.

I am confident that the insights shared in this paper will assist audiences at all levels of facilities management, particularly organisations embarking on their own smart technology initiatives will find guidance to help establish effective control measures for successful integration. The convergence of smart technology and their frameworks represents the future of building performance, and our team is privileged to contribute to this advancement.

Nick Spearman

MD & Senior Vice President
BGIS Global Integrated Solution LTD

Authors

Laxmi Vajravel BEng, MSc

Professional Services Director UK
BGIS Global Integrated Solution LTD

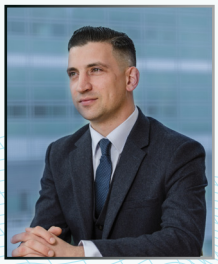
Christopher Howlett IEng*

Building Performance Director UK
BGIS Global Integrated Solution LTD

Benjamin Kelly AMEI

Building Performance Manager
BGIS Global Integrated Solution LTD

Contributors



Tom Cameron MSc, MBA, CMgr, FCMI

Commercial Director
BGIS Global Integrated Solution LTD

List of Content

Executive Summary

The UK PropTech market has undergone rapid transformation in recent years. Government mandates now require building owners to demonstrate measurable reductions in carbon emissions and to optimise building energy consumption. These regulatory pressures have spurred the development and adoption of technology solutions designed to ingest and analyse data from diverse sources, enabling a holistic assessment of building efficiency and performance.

Recent trends indicate strong uptake of cloud-based systems and artificial intelligence (AI) within Facilities Management (FM) over the past two years. This progress is promising for the sector; however, organisations continue to face significant challenges. These include the absence of a standardised framework for defining the minimum value proposition of smart technologies, persistent issues with data quality, and ongoing problems with interoperability. Furthermore, volatility in the UK labour market has extended the timeline for organisations seeking to realise the full benefits of smart building initiatives.

This paper aims to clarify terminology and standards by establishing clear definitions for both smart buildings and building performance. Additionally, it seeks to provide insight into how these two aspects can be effectively linked through technology, supporting organisations in their journey towards greater operational efficiency and sustainability.

Introduction

With UK real estate valued at US $23.2 trillion (~£17.4 trillion) at the end of 2024, providing significant opportunities across all layers of management namely, developers, managing agents and service partners to drive key priorities such as environmental and sustainability goals, enhancing customers experience and well-being and boosting productivity in the post COVID era.

A recent boom in the Proptech sector in the UK has witnessed over $20.36+ billion (~£15.1 billion),[1] investment over the last two years, ranging from design, manage and retrofit solutions. Increasing cost of asset ownership and governmental mandate to reduce the carbon emission, making organisations to focus towards energy consumption and wastage reduction, maintenance efficiency, customer well-being and optimising control strategy of their existing infrastructures.

As of 2023, research undertaken by Office for National Statistics (ONS) delve into the adoption rate of cloud-based solutions and Artificial Intelligence (AI) where the former indicated an increasing trend of 69% adoption and latter witnessing 9% with forecast that could increase up to 15%-22% in 2024/2025.[2]

Despite the recent positive trends, the fundamental challenges of integrating technology and building physics persist. The aim of this paper is to understand and establish the problem statement and provide industry insights and best practices of successful integration.

UK PropTech Market

£15 Billion
Investment from 2023 to 2024

68% **Investment in retrofit solutions**

32% **Investment in build and design for performance**

Source: Global Proptech Trend 2024 - Barometer

Focus of the Paper

+ Establishing the definitions Building Performance Standards and Smart Building and identifying the common pitfalls to avoid.

+ Minimum viable architecture for system integration and interoperability.

+ Self-assessment methodology to ascertain organisational maturity and data readiness.

Key Statistics

13,000

Commercial rented properties still rated EPC F or G (England & Wales).

20%

Drop

Year-on-Year drop in upgrades to the top EPC bands (A*-B) in 2024.

Top Priority

Energy optimisation and reduction remains core objective.

According to research from property data and tech firm Search Acumen, rented commercial buildings are now expected to meet the Minimum Energy Efficiency Standards (MEES) — requiring an EPC rating of B or above — by 2040. This is two years later than predicted just last year, suggesting that progress across the built environment is slowing [3]

Source: The Energy Advice Club [Search Acumen]

38%

Digital Skills

Businesses reported that access to digital skills is preventing them from adopting AI.

59%

UK start-ups have adopted AI.

62%

Skills Shortage

Organisations are currently facing shortages in engineering.

Top 5 - Most frequently cites skills and roles (All responses)	
1	Engineers (mechanical, electrical,software,project)
2	Sales (general, technical, digital, customer service, business development)
3	Managers (general, supervisors, site,contracts)
4	Marketing (general,creative,digital,social media,PR)
5	Design (system design,electronics hardware designers, design engineers)

Source: The Open University - An analysis of the UK skills landscape

Defining “Smart Building” and “Smart System”

Over the last three decades, the term “Smart Building” or “Intelligent Building” has seen much evolution in its core definition and implementation, vastly due to the emergence of affordable sensory technologies, especially over the last decade. This paper cites the article “Smart and Sustainable Built Environment” [4]

“A building which totally controls its own environment” (Stubbings, 1988). This seems to imply that it is the technical control of heating and air conditioning, lighting, security, fire protection, telecommunication and data services, lifts and other similar building operations that is important – a control typically given to a management computer system.

Buildings Performance Institute Europe (BPIE) [5] have defined ‘smart’ as:

(i) stabilises and drives a faster de-carbonisation of the energy system through energy storage and demand-side flexibility;

(ii) empowers its users and occupants with control over the energy flows;

(iii) recognises and reacts to users’ and occupants’ needs in terms of comfort, health, indoor air quality, safety as well as operational requirements.

The above definitions are considered to be valid and warrant the integration of multiple data domains into a structured database, onto which performance analytics can be overlayed and a system that enables an infrastructure to control its environment with minimal manual intervention can be implied as a “Smart System”.

Building Performance Standards

The term “Building Performance” or “Building Efficiency” is a measure against its function in relation to designated criteria such as physical, social or environmental considerations.[6]

In simple terms, assessing building parameters such as heat dissipation or loss, energy usage, water use, water tightness, air quality, structural performance, asset performance and compare those metrics against the designed parameters and establish the deviations and remediate them.

The primary focus over recent years has been shifted towards reduction in energy consumption and wastage with other metrics such as structural and asset performance, customer satisfaction or comfort has taken somewhat of a back seat.

Smart building and building performance are intrinsically related, sharing an almost symbiotic relationship where the need for performance data is vital to ascertain the building’s efficiency and the means to collate, integrate and visualise is achieved through technology.

Building Performance Elements

A recent study undertaken in April 2025 by the energy advice hub pointed out that facilities managers and energy professionals face a steep challenge as the data eluded it is unlikely to meet key energy efficiency standards by 2030 and might delay progress by a whole decade. [3]

The findings point to a 20% year-on-year drop in upgrades to the top EPC bands (A*-B) in 2024. Meanwhile, more than 13,000 commercial rental properties in England and Wales are still rated F or G — well below the legal minimum of E introduced in April 2023.

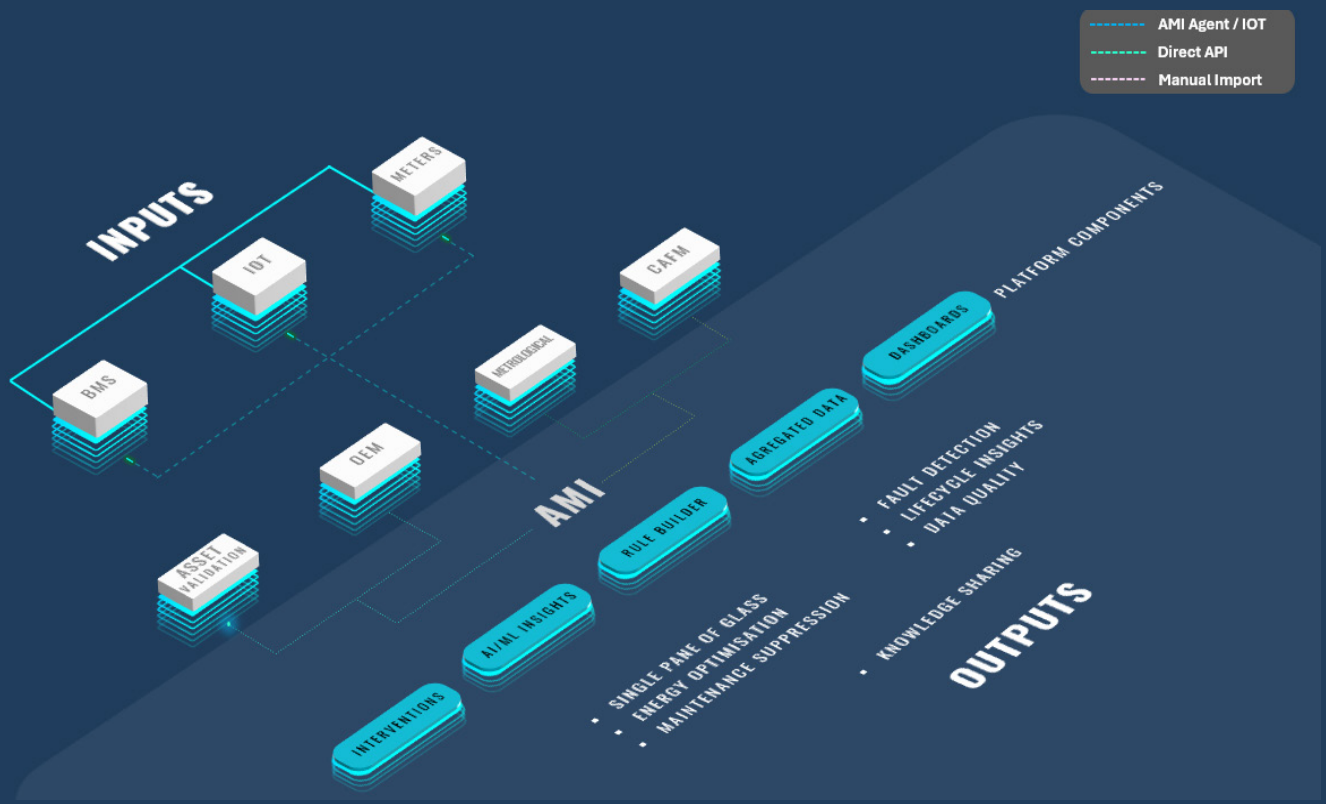
The statement above is not intended for the purpose of scaremongering, illustrates the point that the top priority in UK commercial real estate is to reduce energy consumption and eliminate potential cause of energy wastage whilst focusing on other key measures that has direct or indirect impact on the energy efficiency of the building.

The UK Green Building Council (UKGBC) illustrated in a peer review study that up to 26% reduction in EUI can be achieved through optimisation of the existing control infrastructure [8].

Elements	Measures	Purpose	Analytics Feasibility
Energy	EPC, EUI, SAP/ SBEM, U-values, airtightness.	Reduce energy use & emissions.	Highly Feasible with less manual intervention.
Carbon	DER/TER, BER/TER, $kgCO2/m^2/yr$.	Meet climate targets.	Highly Feasible with less manual intervention.
Indoor Environmental Quality (IEQ)	Ventilation, overheating, Indoor Air Quality (IAQ).	Healthy indoor environment.	Highly Feasible with less manual intervention.
Fabric	Ψ-values, insulation continuity.	Thermal efficiency and quality.	Physical assessment and SME support required.
Water	Litres/person/day.	Reduce water consumption.	Highly Feasible with less manual intervention.
Sustainability	BREEAM, embodied carbon.	Broader environmental impact.	Physical assessment and SME support required.
Asset Performance	Asset Health, maintenance optimisation.	Increased availability.	Highly Feasible with less manual intervention.

Technology Architecture

The core objective is to identify the data domains pertinent to provide a comprehensive view of the infrastructure and to ingest into a standard data lake with a key emphasis around data normalisation to convert the semi-structured data into a tactical information and insights. These must be treated as minimum requirements to provide encapsulated view of the building's efficiency and its metrics.



BGIS proprietary analytics and operational platform - Artificial Maintenance Intelligence

Data layers & Domains

Category	Data Domain	Data Types
Core Layer	Building Management System (BMS), Energy Management System (EMS), Document repository.	+MEP Telemetry. +Metering Data. +DESOPS information.
Enrichment Layer	IOT Sensory data	+Vibration. +Temperature. +Pressure. +Acoustics. +Indoor Air Quality.
Operational Layer	CAFM/CMMS Data	+Asset Registers. +PM Schedules. +Resource Matrix. +Life Cycle Data.
Enhancement Layer	Access Control, Lighting Control, Vertical Transport	+Lighting comfort. +Occupancy. +Lifts operational data. +Life Cycle Data.

Unlock smart system's potential

Routine monitoring of the building performance measures provides early alerts around performance deviations, operational risks and maintenance inefficiencies. Conventional methods include manual intervention and assessment to establish the baseline; However, the majority of these manual interventions can be transformed into near real time alerts via smart system through a functionality called "Fault Detection & Diagnostic (FDD)".

FDD is a rule engine allowing the product user to apply threshold rules against the aggregated sensory points and track its individual performance against its design. This can be on Energy Usage Intensity (EUI), high CO2 Levels, excessive water consumption or poor ventilation or HVAC performance so long as the respective data domains have been ingested.

It is imperative that the chosen technology has the capability to include multifaceted criteria that closely replicates a real-life scenario rather than being binary, which will result in high noise levels.

Upon identifying these performance gaps, ranging from plant operating outside normal operating hours to static pressure drop on an Air Handling Unit, alerts can be transformed into tactical interventions for remote investigation or resolution.

Establishing a normalised data aggregation layer is vital in providing the end users and building operators with the clear visibility around the performance metrics.

FDD Use Case

Fan Coil Units

1 

Identifying Fan Coil Units (FCUs) behaviour such as identifying heating and cooling valves operating simultaneously.

Energy Use

2 

Identifying abnormal energy consumption patterns during weekday and weekends and ascertaining the root cause.

Critical Event

3 

Identifying operational and capacity risks associated with critical assets such as chillers, generators and main electrical network.

Maintenance Optimisation

Within the FM industry, maintenance instructions are mandated by legislative elements and the remainder driven by British Standards (BS) and industry best practices / guidelines such as SFG20. Following the increase in cost of asset ownership due to inflation post COVID, building owners are seeking a hybrid model where some maintenance tasks are driven by condition, criticality and operational context of the installation through technology.

Step 1:Undertake maintenance strategy review and perform Failure Modes and Effects analysis.

Step 2: Identify the tasks that can be replaced with a Data Led Maintenance (DLM) rules that are offers more routine monitoring via FDD functionality.

Step 3:Integrate CAFM system to enable workflow for DLM rules which can be raised as corrective workorder only when the set threshold against a control measure is breached.

AI Adoption - Where do we Stand?

Albeit the adoption rate on AI was 9% in 2023 and forecasted to 22% in 2024 by ONS [2], the study conducted by strand partners on behalf of Amazon Web Service (AWS) [7], indicated the adoption rate for AI across all business was found to be 15% in 2024/25 and the general perception around AI has been positive within the FM sector but the concerns around security and accuracy of the AI model persist.

The biggest barrier in adoption and implementation of any sub-sets of AI is around data quality and structure, This challenge exists in core data domains; whether be it the lack of haystack structure on the Building Management System (BMS), in-accurate metering schema on the energy management system or the basic taxonomy of the infrastructure asset registers in the Computerised Facilities Management System (CAFM).

AI is here to stay; this paper supports the implementation of the AI models into the day-to-day management of the building but warrants the need for robust data quality & governance and change management processes on all key data domains.

Implementation of supervised machine learning models such as Long Short-Term Memory (LSTM) models and Novelty Detection models to detect abnormal and outlier on asset health can be used to ascertain performance deviation of the building's infrastructure.

UK AI Adoption Rate

2023

9%
Adoption across all business

2024/25

15%
Adoption across all business

55 -68%
Adoption in large enterprise businesses

59%
Adoption in Startups

Source: Unlocking AI Potential 2025 - AWS/Stand Partners

Typical Applications of AI in Smart Systems

Energy spikes

Deviation from the normalised consumption pattern factoring occupancy and meteorological data.

Performance Deviation

Sensory bounds deviations of supply and extract flow on Air Handling units.

Weighted Asset health score

Aggregated view on the asset health based on sensory data, CAFM and FDD alerts.

Maintenance Optimisation

Suppression of repetitive maintenance tasks which can be superseded by data led maintenance rules.

Business Readiness

An organisation embarking on the technology integration initiatives often feel the pressure during deployment phase predominantly due to the unknowns or lack of understanding around the existing tech stack.

Whether the decision is to build the system from scratch or buy a product from the market, it is recommended for businesses to perform a self-assessment around technology, strategy, value and data integrity. This will enable businesses to ascertain areas of improvement and allow them to implement control measures and adopt a measured and quasi state approach throughout the programme thus avoiding scope creep, data & connectivity challenges and increase start-up cost.

Technology Guardrails

+ Establish long term technology strategy with explicit benefit tracking goals (operational and financial targets).

+ Early engagement with the key stakeholders, internal and external and communicate clearly around roles and responsibilities.

+ Build vs Buy - based on the business strategy,ascertain the appropriate procurement and deployment tactics to avoid incurring heavy start up and support model costs.

+ Assess IT infrastructure and estate connectivity to identify mitigation plan to harden connection profile of the portfolio.

+ Identify all core data layers and agree data integration strategy and overlay with robust data quality and governance framework.

Barriers and Challenges

Data Quality

+ Most organisations are receptive to the fundamental principles of implementing smart systems to aid their energy and sustainability priorities, more often that not, this journey is impended by the data quality of the core domains such as BMS, EMS and CAFM systems. This results in fragmented system implementation with poor accuracy of the prediction along with the inability to convert unstructured data into tactical information enabling proactive decision making.

Resources and competency

+ British Chamber of Commerce highlighted 62% of UK businesses agreed there is skill shortage, especially in the field of manufacturing and engineering. This has a financial impact during design and build of technology as most often these activities are outsourced. It must be noted that the current engineering knowledge gap prevents organisation to use smart technologies to its full potential to drive building performance goals.

Siloed technology

+ Legacy systems or systems operating in siloes currently acts as a deterrent to organisations due to cost of integration coupled with support obsolescence. Requirement for organisations to risk assess existing technology stack and endeavour to bring them under a single ecosystem to improve interoperability of the information.

Clear scope and engagement

+ Integration building performance standards requires explicit requirements on objectives to achieve with clear milestones along with measurable outcomes which enable businesses to perform benefit tracking. It is recommended for the organisations to communicate and engage with internal and external stakeholders around the standards and incorporates the requirements with a clear communication plan.

Budgetary constraints

+ Turbulence witnessed in the UK economy, FM organisations on all layers witnessing constrains around capital and operational spending due to increase cost in total ownership. In the pursuit of stabilisation; service charge, investment in greener solution, capital replacement and technology has taken a back seat, even solutions with higher potential often do not get implemented due to high start-up costs and longer Return on Investment (ROI).

Conclusion

[1] UK PropTech: Growth and Market Trend

The UK PropTech sector has experienced notable growth, with a strong emphasis on optimising building infrastructure, enhancing customer experience, reducing carbon emissions, and advancing Net Zero objectives. The market for smart systems in commercial buildings has surpassed expectations, offering a broad range of applications for end users. While this growth is encouraging, there remains a pressing need to standardise both the delivery and integration of performance metrics within the available technologies, particularly at the service provider level.

[2] Need for Cross-Organisational Collaboration

Currently, most service providers deliver their own version of smart systems designed to address specific challenges. However, the lack of universally accepted minimum standards for technology value propositions and the absence of clear success measures risk undermining the realisation of these systems' full value.

To address these challenges, cross-organisational collaboration is essential. Establishing an industry recognised or approved framework will help tackle common issues across all layers of facilities management, particularly those related to technology procurement, data quality, adoption, organisational readiness, and the definition of minimum viable targets.

[3] Establishing Measurable Goals and Stakeholder Engagement

There is clear, industry-wide momentum regarding building performance, signalling a promising direction for the sector. However, building owners frequently struggle to realise the full value of these advancements. This difficulty often stems from the absence of measurable and realistic objectives, which are not sufficiently broken down into the distinct components of building performance. Without precise targets for each facet, it becomes challenging to assess progress and demonstrate tangible benefits.

[4] Importance of Early Stakeholder Engagement

Facilities management is fundamentally centred around people. Engaging stakeholders at an early stage is crucial for the successful implementation of new initiatives. This approach ensures that roles and responsibilities of all stakeholders are explicitly agreed upon, and appropriate training is provided for all involved. Such engagement not only facilitates the adoption of new frameworks but, more importantly, empowers the management team.

[5] Skills Shortage and Workforce Development

The ongoing adoption of smart technologies and artificial intelligence highlights their staying power in the sector. Nonetheless, the sector often faces poor execution due to a shortage of subject matter experts, especially in engineering and digital disciplines such as data engineering and architecture. To overcome this barrier, businesses must increase investment in up-skilling or, where necessary, re-skilling their existing workforce.

References

[1] ESCP Business School

Proptech Global Trends 2024 - Annual Barometer.

2024. [Online]

[2] Office for National Statistics

Management practices and the adoption of technology and artificial intelligence in UK firms: 2023.

Mar 2025 [Online]

[3] The Energy Advice Hub

Commercial Real Estate sector set to miss major decarbonisation target by a decade [Search Acumen].

Apr 2025 [Online]

[4] Emerald Insights

Smart and Sustainable Built Environment, A.H. Buckman M. Mayfield Stephen B.M. Beck, Stubbings, 1988, Powell 1990.

Sep 2014 [Online]

[5] Buildings Performance Institute Europe (BPIE)

Finally – a concrete definition of a "smart building" to be placed at the heart of EU policy making as negotiations heat up - Press release

Jun 2017 [Online]

[6] Designing Buildings - Construction Wiki

Building Performance - Definition and performance evaluation.

Feb 2022 [Online]

[7] Amazon Web Service & Strand Partners

Unlocking UK's AI Potential.

2025 [Online]

[8] The UK Green Building Council

Building The Case For Net Zero: Retrofitting Office Buildings.

Jan 2024 [Online]

[9] The Open University

Business Barometer - An analysis of the UK skills landscape.

Jan 2024 [Online]

BGIS

BGIS Global Integrated Solutions LTD
8th Floor, 140 Aldersgate St,
Barbican, London, EC1A 4HY

T: 020 3867 9310
E: clientsolutions@bgis.com