Unlocking the Value of Built Environment Data

NLA Built Environment Technology Expert Panel

Part 1

Driving trust, value, and resilience through better data governance

THE OPPORTUNITY

- The built environment is 25% of the GDP of the UK economy
- Cities generate huge amounts of built environment data
- Most of it is incomplete, siloed, or underused
- Unlocking data = economic, social, and environmental value
- → It's time to treat data CORE as infrastructure

WE ARE NOT ALONE

Initiative / Project	What it aims to do	Kinds of data / standards involved	Status / Notes
Built Environment Carbon Database (BECD) (BCIS / RICS-led)	To be the main source of data for carbon estimating & benchmarking in UK construction (both buildings & infrastructure) architecturaltechnology.com+2Construction Management+2	Operational & embodied carbon, product-level emissions; harmonisation of how carbon data is submitted & quality-rated architecturaltechnology.com+2RICS+2	Live; free-access benchmarking tool; more "asset data" & "product data" modules are being built out. architecturaltechnology.com+1
OS "deeper & richer buildings data" for Great Britain	Enhancing the Ordnance Survey's building datasets with more attributes (e.g. building age, efficiency, access) to support various stakeholders. Ordnance Survey	Building-level metadata: age, energy efficiency, access, structural & other attributes. Ordnance Survey	Released enhancements (March 2024); available via OS Data Hub under Public Sector Geospatial Agreement (PSGA) for partners. Ordnance Survey
UCL's Building Stock / Energy Database Project	To get an accurate picture of the energy usage of all UK buildings — pulling together data to allow modelling, policy, etc. University College London	Energy consumption, building characteristics; data needed for modelling energy in buildings. University College London	In progress; UCL's Building Stock Lab working with government. University College London
NEBULA (Neighbourhood-level dataset for England & Wales)	A national-scale dataset for modelling domestic energy consumption in small neighbourhoods. arXiv	Combines building characteristics, climate, urbanisation, environment, socio-demographics. arXiv	Published recently / in prep; designed for researchers and planners for better energy modelling. arXiv
UK Net Zero Carbon Buildings Standard (NZCBS)	Developing a single agreed methodology and definition of what constitutes a "net zero carbon building" in the UK. RICS+1	Operational & embodied carbon; thresholds / limits; alignment with existing standards (e.g. whole life carbon accounting) RICS+2ww3.rics.org+2	The coalition is soliciting data (call for evidence), collecting baseline data from many building types. RICS+1
Building Passport Alignment Project	To standardise data / taxonomy for building passports and ESG reporting; aligning different schemes; produce a draft specification standard. Madaster UK	Data taxonomies for materials, carbon, environmental/social metrics; specification for building passports. Madaster UK	Draft taxonomy created; testing with providers; draft spec standard expected (around Q1 2025) for more formalisation. Madaster UK
Madaster / Materials Passports & Registry	Providing an online registry of materials used in buildings; materials passports for reuse / circular economy; transparency of material data. UKGBC	Material origin/quality/location, life cycle data, product data, tracking for reuse. UKGBC	Operational; some large-scale projects using it (e.g. 1 Broadgate) UKGBC
Colouring London (UCL CASA + OS + GLA + Historic England)	Collect, visualise, disseminate attribute data for every building in London; open-data platform for building stock. ww3.rics.org	Building attribute data (statistical / physical / historic etc.), spatial data; integration of fragmented data sources. ww3.rics.org	Live; code is open; intended as a go-to for London building stock data. ww3.rics.org
UK BIM Alliance — standardising product data	Working group to make sharing of product data easier; set up consistent data requirements, hosting, standards for product/manufacturer data. Construction Management	Product metadata / product data specs; interoperability with broader BIM / digital construction data. Construction Management	Ongoing; industry engagement. Construction Management
Innovate UK / BSI new standard for AI-readiness in built environment sector	Developing a guide / standard (PAS 1958) around data & information standards to support AI use, especially for SMEs. Innovate UK Business Connect	Data/information standards landscape; taxonomy; clarity about what standards exist and how to use them for data/AI readiness. Innovate UK Business Connect	Currently consulting (draft stage) and collecting feedback. Innovate UK Business Connect

THE PROBLEM

- Repeated, redundant data gathering.
- Incomplete/inaccurate design and construction data.
- No incentives or standards for data sharing.
- Trust gap: unclear how public data is used.
- Private companies monetising public data without creating value for the public sector.
- Locked-in data.

THE COST OF MISSING THE OPPORTUNITY

- Lower building valuations → reduced investment.
- Poor data = increased risk → lower insurability/ mortgageability.
- Lost tax revenue.
- Reduced public sector control and oversight.
- Wasted potential for healthy, safe, efficient buildings.

WHY NOW

Surge in smart city initiatives and digital twins.

New planning legislation and ESG reporting requirements.

Public awareness of building safety and sustainability is growing.

Early movers can shape the future data economy.

OUR VISION

A trusted, incentivised data-sharing framework.

Central or federated governance model.

Graded data quality scores.

Incentives for high-quality data contribution.

Regulation that embeds data into planning.

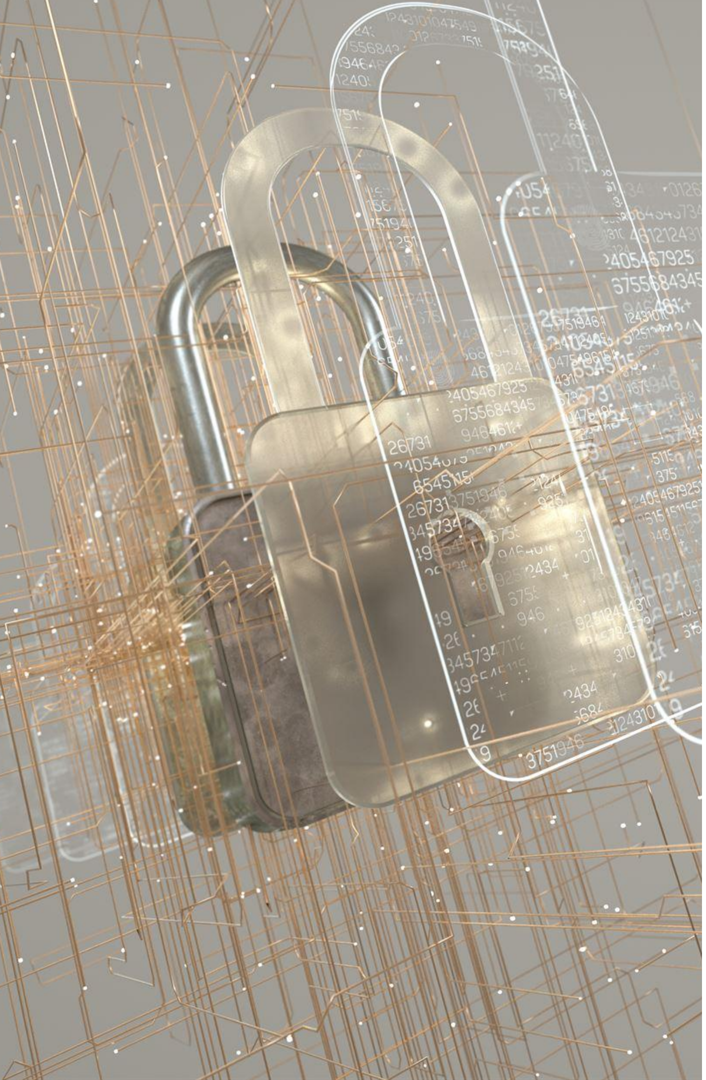
Transparent use for public good.

PILOT: LONDON BUILDING DATA INITIATIVE

- Aggregate and score building data across selected boroughs
- Fire risk assessments, “as-built” verification, retrofitting data
- Predictive insights using historical BoQs
- Test value uplift through data enhancement
- Showcase economic + safety returns

BUSINESS MODELS

1. Public-Private Partnership – shared investment and returns
2. Nonprofit Data Trust – open and neutral data governance
3. Government-Led Platform – aligned to public sector priorities
4. Data Marketplace – incentivised sharing and monetisation



DATA RESILIENCE IN BUILT ENVIRONMENT

Timely Data for Resilience

Accurate, timely data enables buildings and infrastructure to withstand, adapt, and recover from disruptions effectively.

Emergency Response Effectiveness

Critical information ensures immediate and effective response to emergencies within built environments.

Data Confidentiality and Security

Protecting sensitive data is crucial for commercial advantage, national security, and safeguarding operations from malicious threats.

IMPACT METRICS

% INCREASE IN BUILDING VALUATION

REDUCTION IN INSURANCE AND LENDING RISK

PUBLIC TRUST SCORE

COST SAVINGS FROM REDUCED DUPLICATION

ESG AND SUSTAINABILITY KPIS

DATA CREATES MEASURABLE RETURNS

CALL TO ACTION

We are seeking:

- Strategic partners (tech, property, local gov)
- Funders and investors to support the initiative
- Policymakers and regulators to align frameworks

Part 2

Bridging the data gap in practice

Fragmented built environment data

The built environment is increasingly shaped by data.
From digital twins and smart meters to BIM models and planning deliverables, information about buildings is being generated at every stage of the lifecycle.

Yet this data is often fragmented, incomplete, or locked in silos and, in many cases, archived or discarded once a project is completed.
As a result, the industry loses valuable intelligence that could inform retrofits, benchmarking, and continuous improvement.

Data as a long-term asset

Treating project data as a long-term asset rather than a temporary by-product would allow the sector to unlock insights that accelerate innovation, support evidence-based decision-making, and deliver wider benefits for the economy, environment, and society.

Recent regulatory measures, such as the UK Building Safety Act's requirement for a continuous "golden thread" of building information, illustrate how structured data is becoming essential to meet safety and compliance obligations.

Challenges and opportunities

Collecting and sharing structured building data at scale therefore offers the potential to improve safety, support net-zero goals, and enable new services. At the same time, it raises complex challenges around governance, privacy, interoperability, and market design.

This proposal seeks to establish clear ownership and long-term purpose for the data generated by the industry, while addressing the challenges and opportunities that such an approach entails.

Risks of data collection at acale

Legal and governance risks

- The legal landscape around building data remains fragmented, with uncertainties over ownership, privacy, and liability slowing adoption.
- While regulation can provide clarity, it also imposes new obligations. Establishing robust governance frameworks is essential for trust and compliance.

1. Data ownership and IP:
   - Combined datasets often involve multiple rights-holders. Without clear contracts and licensing, disputes may arise.
2. Regulatory compliance:
   - New mandates such as the UK Building Safety Act's "golden thread" create enforceable duties but add costs for compliance.
3. Privacy and consent:
   - When occupancy or IoT data reveal personal information, strict GDPR safeguards and anonymisation are required.
4. Liability:
   - Errors or omissions in shared data can cause harm. Assigning responsibility through audit trails, standards, and quality assurance reduces risk.

Technical challenges

- The technical risks of building data revolve around interoperability, quality, and security.
- While open standards are improving, inconsistent adoption, cybersecurity threats, and the sheer scale of urban data remain barriers.

1. Interoperability:
   - Multiple file formats and platforms risk siloed data. Standards such as ISO 19650 and IFC provide solutions but uptake is uneven.
2. Data quality:
   - Incomplete or inaccurate records undermine decision-making. Stewardship roles and validation processes are needed.
3. Security:
   - Detailed models may expose vulnerabilities to physical or cyberattacks. Strong access controls, encryption, and monitoring are vital.
4. Scalability:
   - Citywide digital twins and IoT data streams require significant infrastructure, raising governance and cost issues.

Social and privacy concerns

- Building data initiatives will only succeed with public trust.
- Transparency, inclusion, and clear benefits for occupants and citizens are critical to avoid perceptions of surveillance or exclusion.

1. Trust and transparency:
   - Without clear communication, tenants and employees may resist data collection. Involving stakeholders helps build legitimacy.
2. Equity:
   - Smaller firms and communities risk being left behind if only well-resourced actors can participate. Public-good datasets may help balance access.
3. Public acceptance:
   - Drawing on lessons from healthcare and social care, embedding rights-based frameworks and clear consent practices can reduce resistance.

Commercial and economic factors

- The commercial case for structured data is strong, offering efficiency gains and new markets.
- Yet risks remain around costs, data silos, and competitive tensions.
- Policymakers and industry leaders will need to strike a balance between openness and commercial incentives.

1. Opportunities:
   - Shared data reduces project costs, enables predictive maintenance, and supports new proptech and energy services.
2. Risks:
   - Proprietary platforms may create lock-in, while small firms may face prohibitive costs. Competitive concerns can limit data sharing.
   - Making data public could expose proprietary intellectual property and potentially slow down development by encouraging litigation.
3. Market development:
   - Incentives such as certification, insurance benefits, or public procurement requirements can help align commercial interests with collective goals.

Key opportunities and benefits

Structured data provides the strongest rationale for overcoming adoption barriers.

1. Innovation & New Services:
    - Enables new markets like proptech, AI-driven services, and could unlock entrepreneurial activity (like Open Banking).
2. Better Decision-Making:
    - Helps policymakers, owners, and investors make evidence-based choices on retrofit, policy, and risk assessment.
3. Sustainability & Resilience:
    - Supports net-zero strategies, targeted retrofits, and material passports by providing energy and material data.
4. Economic Efficiency:
    - Reduces duplication, streamlines project delivery, and improves access to green finance and insurance.

Pathways to widespread adoption

Adoption pathways

The transition from isolated experiments to mainstream use of structured building data will depend on clear adoption pathways.

1. Bottom-up Professional Alignment:
   - Industry bodies (RIBA, ICE) embed structured data in professional standards, encouraging voluntary adoption.
2. Top-down Regulatory Mandates:
   - Public authorities mandate data capture at key lifecycle moments (e.g., BSA "golden thread" or Digital Building Logbook).
3. Recommended Route: A Phased Hybrid:
   - Professional consensus and voluntary pilots.
   - Codify successful practices into regulation.
   - Prioritize use cases with immediate benefits (safety, energy performance) and let others mature gradually

Enablers for widespread adoption

Regardless of route, several enablers will be critical.

1. Standards and Interoperability:
   - Use frameworks (ISO 19650, IFC) to reduce friction.
2. Trusted Governance Models:
   - Establish data trusts or stewardship councils to manage liability and consent.
3. Incentives:
   - Provide financial (reduced insurance) and reputational recognition schemes.
4. Capacity-Building:
   - Offer training, toolkits, and demonstration projects.
5. Citizen Engagement:
   - Ensure public trust through transparency and rights frameworks, following models from smart cities.

Cross-sector lessons

Experiences from other sectors show that data sharing is possible when governance, consent, and standards are clear.

Failed initiatives illustrate the risks of neglecting public trust, while successful ones highlight the value of mandated interoperability and cultural change.

1. Healthcare:
   - Trust, built through clear governance and consent frameworks, is vital.
2. Transport & Finance:
   - Mandated open standards (e.g., TfL open data, Open Banking) show that regulation can stimulate innovation.
3. Open Science:
   - Principles like FAIR (Findable, Accessible, Interoperable, Reusable) encourage broad participation through clear rules.

Use-cases enabled by structured building data

Government & local authority uses

Governments and local councils can use building data to design and monitor policy more effectively.

1. Housing and Retrofit Policy:
   - Subsidy targeting, priority retrofit areas, track progress toward net-zero.
2. Urban planning and monitoring:
   - Track new developments, assess cumulative impacts, ensure compliance.
3. Sustainability and Climate Planning:
   - City-scale energy planning, flood modelling, and climate adaptation strategies.
4. Building safety and regulation:
   - Align with the “golden thread”, improve oversight of fire safety and structural integrity.
5. Infrastructure and investment planning:
   - Align infrastructure funding with real need.

Private sector applications

Businesses can leverage building data for efficiency, risk reduction, and new product development.

1. Real estate analytics and development:
   - Improving valuation models, investment decisions, and market transparency.
2. Energy performance services:
   - Performance-based contracting, demand-response markets, and tenant-facing energy dashboards.
3. Insurance and risk assessment:
   - Reducing uncertainty of risk assessments (e.g., lower premiums for verified safety).
4. Facilities and asset management:
   - Anticipate equipment failure, optimize space use, reduce operational costs, predictive maintenance.
5. Innovation frontier (“blue-sky”):
   - Materials trading platforms, dynamic pricing, optimization of energy demand.

Civil society and citizen-facing uses

Structured building data has public value when shared responsibly with communities.

1. Housing advocacy and rights:
   - Public data on energy efficiency, safety compliance, or rental conditions can empower tenants and NGOs to demand improvements.
2. Neighbourhood improvements:
   - Community groups can use open datasets to identify vacant properties, track air quality, or propose local retrofit projects.
3. Participatory planning and transparency:
   - Making planning and building data accessible allows residents to engage meaningfully in development proposals, strengthening legitimacy and trust.

Academic and research institutions

For researchers, structured datasets offer a foundation for longitudinal analysis and innovation.

1. Long-term urban studies:
   - Tracking of housing stock changes, migration patterns, infrastructure resilience.
2. Housing and social equity research:
   - Links between building quality, affordability, and social outcomes, evidence-based policy.
3. Environmental and climate science:
   - Model energy demand, carbon emissions, and local climate adaptation scenarios.
4. AI and machine learning innovation:
   - Large, standardised datasets are critical for training models that optimise design, predict failures, or generate adaptive planning scenarios.

Schema design and progressive data collection

Schema design

A common schema is the foundation for structured data; without it, information remains fragmented.

Re-Use is Key: Build on established standards (IFC, CityGML, EPC registries) rather than creating new frameworks

Principles for Design

1. Interoperability:
   - Align with international standards (ISO 19650, IFC, CityGML), ease cross-platform exchange.
2. Modularity:
   - Use a layered schema (core dataset + optional extensions).
3. Transparency and metadata:
   - Rich metadata (source, accuracy, update date) improves trust and usability.
4. Open & Extensible:
   - Open licensing and governance to avoid vendor lock-in.

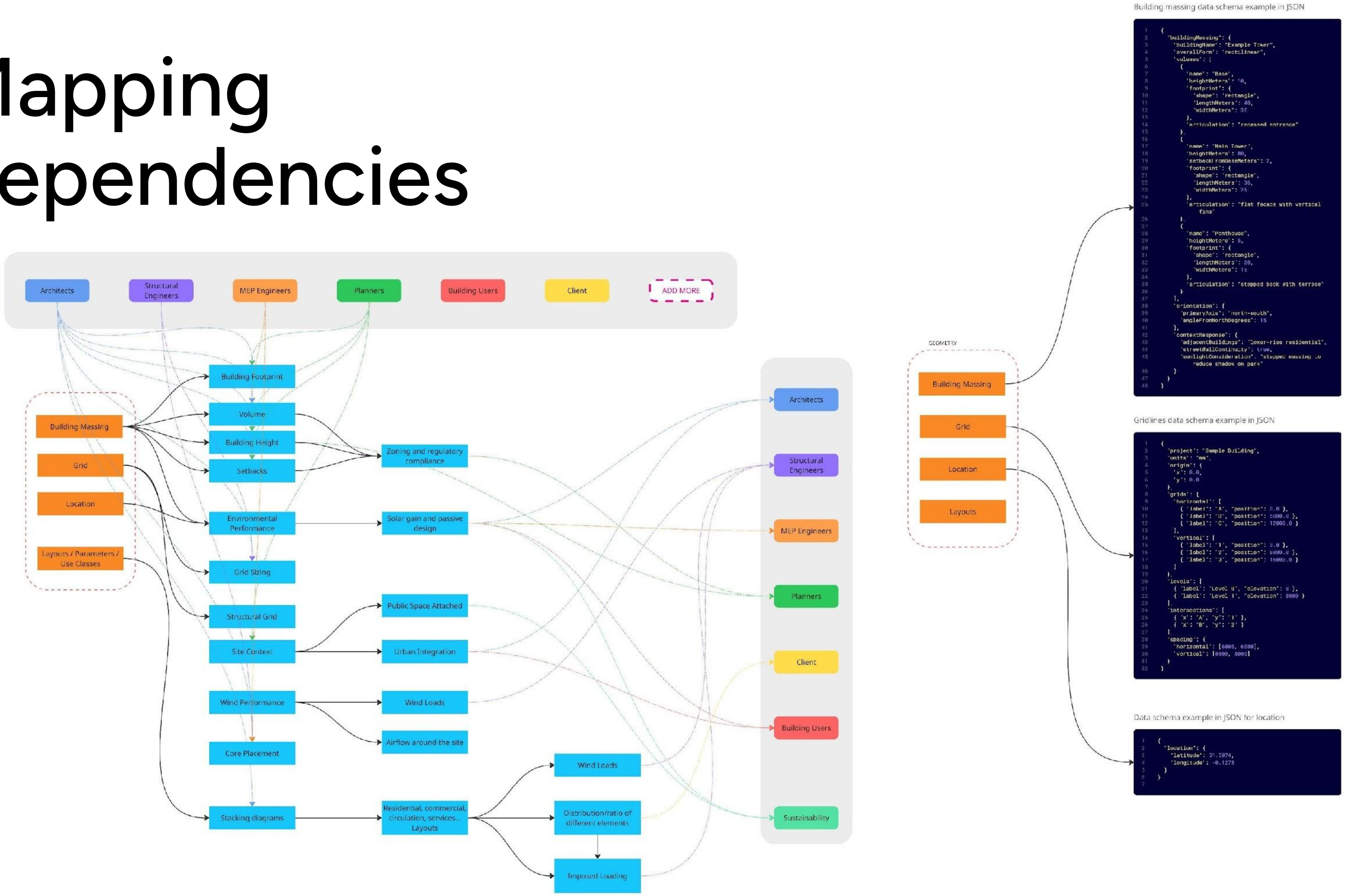
The core dataset

A minimal but mandatory dataset ensures comparability across all buildings.

Progressive Data Collection: Design the schema in tiers, starting with the baseline core and adding advanced layers (e.g., IoT feeds, material passports) over time.

1. Identity:
   - Unique building identifier, location, ownership status.
2. Physical characteristics:
   - Age (date of when it was completed and when additional works were carried out), typology, floor area, volume, construction type, use class, grid sizes, materials.
3. Safety and compliance:
   - Fire safety features, structural systems, regulatory certificates, MEP strategy.
4. Energy performance:
   - EPC ratings, consumption data, renewable systems.
5. Lifecycle data:
   - Renovation history, key material, and system components

Mapping dependencies



Governance and stewardship

To ensure quality and longevity, schema deployment requires active governance.

1. Custodianship:
   - Assigning responsibility for schema updates and validation (e.g. a national standards body or data trust).
2. Validation pipelines:
   - Automated tools to check completeness, accuracy, and format compliance.
3. Stakeholder input:
   - Continuous consultation with industry, academia, and civil society to refine schema fields and priorities.

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