

Artificial Intelligence (AI) considerations for Information Managers in the built environment

Objective

This paper, produced by the GIIG,¹ aims to provide clear, relevant, objective guidance on the use of Artificial Intelligence (AI) in the built environment, to encourage appropriate habits and behaviours.

Scope

The use of Artificial Intelligence (AI) tools, of all types, to support information management and decision-making activities in the built environment.

Recommendations on the selection and implementation of technology is out of scope of this paper.

Intended audience

Information managers, asset managers, technologists and product specifiers in the built environment.

Technical perspective

The term Artificial Intelligence (AI) encompasses a large range of tools and technologies (such as generative AI/ Large Language Models, symbolic AI, artificial neural networks and automated pattern matching) which are developing and improving rapidly. There are many sources of information about such technologies,² how they work and how they are developing, which will not be covered in this paper.

Decision-making and information management processes

Effective decision-making is critical to all asset lifecycle stages in the built environment – from decisions about what to build, where and when, through to design activities, construction optimisation and operation/maintenance activities.

Key components of a decision are:

- understanding of the decision to be made;
- data and information whose provenance, quality and completeness are understood;

¹ Part of nima, the GIIG is a not-for-profit business focussed on practical ways to enable efficient information management for built and managed assets.

² Some further reading is included in this paper.

- tool(s) to extract, process and present the data based on the required decision – this could be an AI tool or other analytics tools; and
- the decision-making process and its support for organisational outcomes.

Above all, it is essential that suitable expert knowledge is involved to understand and define decision-making and information management processes.

Key factors

Some key factors to consider that are specific to the use of AI in the built environment:

- 1. Business case** – The use and development of AI tools may involve the use of considerable resources and funding; however, technology providers and AI evangelists often exaggerate benefits that may or may not be proven, resulting in AI for AI's sake. Therefore:
 - regularly review the forecast costs of development and use of AI tools against the anticipated benefit to review whether the business case is still viable;
 - carefully consider whether the AI use case is 'exploratory', a pilot of an existing process or a full-scale strategic AI replacement of such a process; and
 - agree whether the approach is relatively static, will be refined in clear stages, or will evolve/ adapt.
- 2. Information management approach** – For AI to provide suitable benefit to organisations, its use needs to be based on well-planned and defined information strategies and processes. Adding AI to chaotic, unpredictable situations is unlikely to provide stability.
- 3. Decision-making** – Decision-making can range from predictable pre-planned responses to a particular asset defect through to complex, multi-factor analysis, such as where to site a new airport. Where the levels of the following criteria are all 'low', then AI is probably suitable and potentially viable for automated decision-making; however, if one or more criteria are higher than 'low', then AI should be used to inform expert judgement. Decision-making criteria include:
 - complexity – assessment of the number of variables and the logic required to process the data;
 - uncertainty – assessment of the level of certainty in the data being used, the decision logic and any factors that cannot clearly be accounted for;
 - novelty – assessment of the amount of new / novel logic analysis in the decision-making process;
 - criticality – assessment of the potential impact of the decision, particularly if the outputs are undesirable e.g. safety, environmental, reputational, financial; and
 - ethical and security risks – assessment of whether the decision and outcomes may be difficult to defend from ethical and security perspectives.
- 4. Legislation, regulations and requirements** – There can be a complex and overlapping mix of legislation and regulations in the built environment and AI technology industries. Additionally, specific requirements for assets / projects may include a requirement for explainability of the decision-making process (see below), all of which add complexity.

Some of these may be conflicting and/or ambiguous, coupled with requirements that may be incomplete or implicit, which again highlights the criticality of suitable domain knowledge in the decision-making process. How certain is it that appropriate constraints and requirements have been embedded in the process? How might any guardrails in the AI tool constrain acceptable interactions and/or prevent unacceptable ones?

5. **Explainability** – In some contexts, the basis of decisions will need to be explainable i.e. to explicitly demonstrate the justification for proposed approaches and to develop trust in the organisation and its processes. This is particularly relevant in tightly regulated/ legislated environments. Different kinds of AI support different approaches to explainability – has an AI tool been chosen that aligns with the explainability requirements? Will evidence of the reason for a particular course of action be retained in a format that supports later review?
6. **Accountability** – Regardless of the way that decisions are made, the asset owner/ service provider will remain accountable for the decisions made, the output of those decisions and the outcomes delivered. Use of AI tools does not remove this accountability.
7. **Data quality** – The input data required for decision-making may be of poor or unknown quality. For example, due to the nature/ legacy of existing assets, it is often not possible or too expensive to get high quality data.³ It is essential to understand the nature, characteristics, quality, completeness and provenance of the data being used and how this will impact the decision-making process. Has the AI been targeted to use appropriate data and information that is fit-for-purpose? How is unknown or missing data accounted for?
8. **Skills/ knowledge development** – Skills to use the tools and understand the problem being solved are essential, but over-reliance on AI tools will reduce and/or blunt the skills of staff. How to ensure that the use of AI helps develop and retain expert knowledge? It is important to provide career paths that allow people to develop and retain knowledge, skills and wisdom in both the underlying business problem, and the use of AI tools. If AI generates knowledge, do the human experts lose that knowledge? When AIs are trained by humans and other AIs, what is the appropriate training for the humans? Where experts are used to train AI tools, how will this be achieved if the expert knowledge is no longer available?
9. **Resilience** – Managers in the built environment typically need to think in the long term – assets can have lives of many decades. The resilience of tools and the organisational systems / processes to use them over such timescales will present challenges to manage; such as when suppliers withdraw or change a model or their pricing drastically changes. Similarly, due to such long timescales, organisations should plan for how they maintain the skills to use, develop and maintain such tools, and when / how to diversify from a single AI approach and how AI tools can be kept interoperable.
10. **Governance** – Suitable oversight is an essential ongoing requirement to ensure decisions made, outcomes and options considered are appropriate, ethical and legal, and are

³ In August 2024, nima published a draft position paper, [Quality data and artificial intelligence \(AI\)](#). It stated: “Organisations, before they deploy and use AI solutions, will need to ensure that their underlying source data has the quality characteristics necessary to meet its intended purposes.”

recorded for audit purposes. Again, this needs to consider the decision-making process in the light of the overall asset lifecycle and who is accountable for the use of the AI tools.

- 11. Change** – Change in technology and tools is inevitable and is accelerating. Not all these tools or developments will be in the best interest of the organisation. Therefore, the governance function should pro-actively review new and changing technologies before implementation. Depending on risk levels, it may be appropriate to undertake pilot studies and develop prototypes before wider scale adoption of new/ developing toolsets. The requirement to ensure that staff and end users understand how to use any new or changed approaches, should not be underestimated.
- 12. Emergent learning** – As AI tools develop and their use evolves, researchers are identifying emerging learning of AI across the board, that is the ability of AI models to demonstrate capability that goes beyond what they are trained to do. ‘Text to app’ generation is a good example, where an app is described in words, and software turns that description into an actual app; this was not expected and is a direct result of emergent learning phenomena. This creates both risk and opportunity in using AI, and is something to be aware of, as it can lead to unintended consequences.
- 13. Commercial risk** – AI vendors and suppliers may introduce technical or commercial changes that are not acceptable to the organisation, or the supplier may cease to exist, so the cost, effort and time to migrate to other platforms should be understood.
- 14. Security risk** – Assess the risks arising from where data, algorithms and logic may be stored, who may be able to obtain access it, and how to ensure it does not ‘leak’. Users should consider what information the AI tool is/was trained on and the extent to which it may contain security-sensitive information or enable the drawing of security-sensitive inferences from both training data and material uploaded by users.⁴
- 15. Be sceptical!** – Many of those developing, selling and implementing AI tools have unrealistically positive views of what their technology can achieve. In some cases, they could be accused of ‘magical thinking’. Before implementing AI tools, be sceptical about the claims being made about them, introduce suitable controls around their use and role in decision making and only relax these controls based on actual performance of these tools. Think critically about the data, analysis, outputs and decisions being made to reduce the risk of mistakes.

Conclusion

The development and use of AI in the built environment has the potential to deliver major benefits, and change ways of working. However, AI also presents many challenges that could lead to significant adverse impacts. Those implementing AI should aim to balance their enthusiasm for the way it will change how organisations work, with measured, sceptical, objective views of the costs, benefits, risks and potential adverse impacts.

⁴ See [NPSA advice on use of AI](#).

Further reading

- *Data Analytics and AI in Government Project Delivery* UK Government <https://www.gov.uk/government/publications/data-analytics-and-ai-in-government-project-delivery/data-analytics-and-ai-in-government-project-delivery>
- *Guidance on AI technologies, applications, and implementation in the built environment and engineering sectors, aligned with UK Government policy and best practices*. John Hall, <https://infeng.co.uk/library/artificial-intelligence/>
- *Decoding ISO 19650 Through Process Modelling for Information Management and Stakeholder Communication in BIM*, Fonbeyin Henry Abanda, Bharathi Balu, Selorm Emmanuel Adukpo and Adeyemi Akintola <https://www.mdpi.com/2075-5309/15/3/431>
- *The unseen Costs of AI* The RED Foundation <https://www.theredfoundation.org/post/report-the-unseen-costs-of-ai>

Update frequency

The field of Artificial Intelligence is developing rapidly. It is intended to review this paper regularly and update when new insights become available.