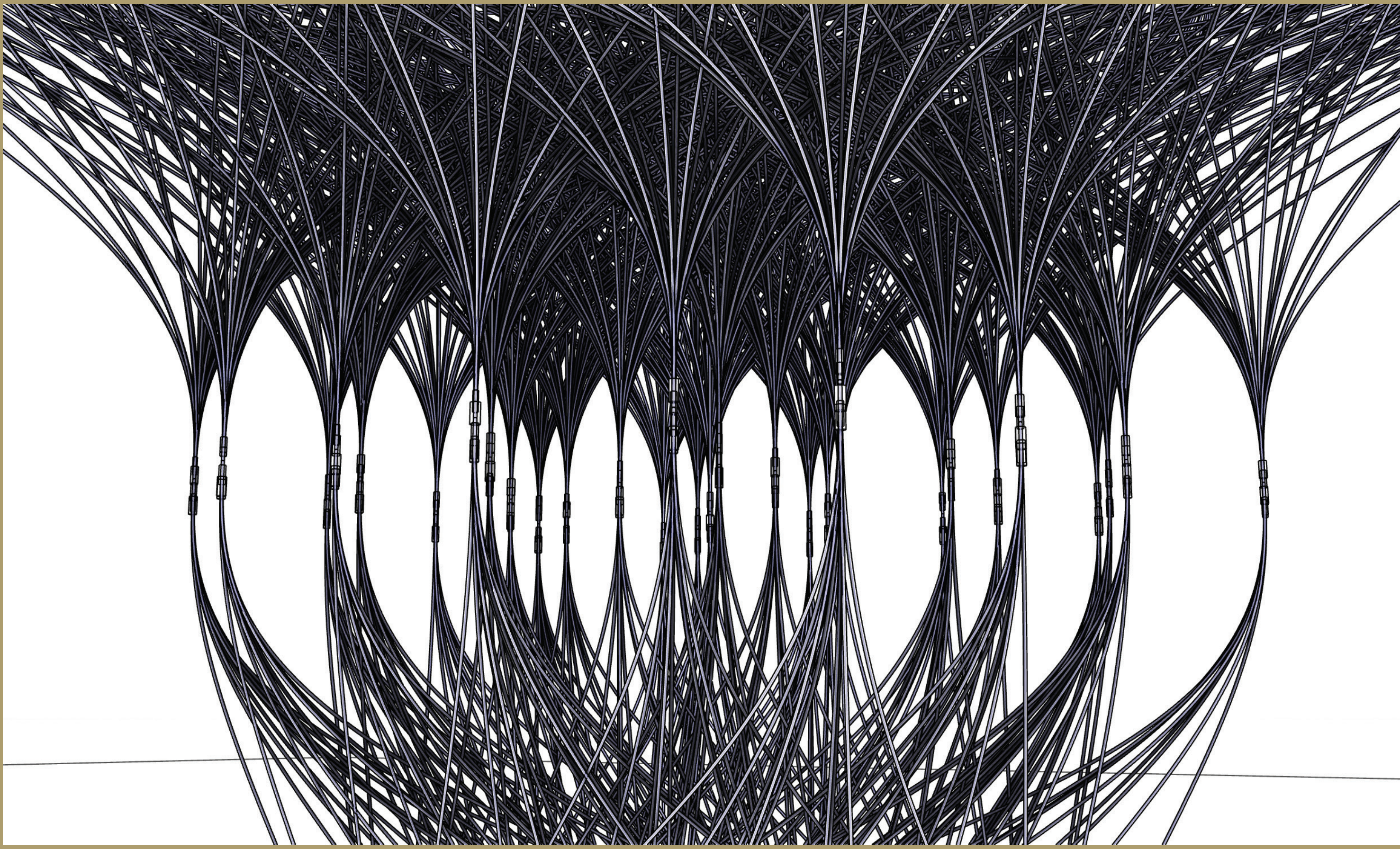
RIBA AI Report
2025



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Front Cover: Chris Fulton article; Neural network visualisation

Foreword

Muyiwa Oki

RIBA President 2023–2025

One year has sharpened the focus on the role of artificial intelligence (AI) in architecture. What began as speculation has become a range of usable tools that can be used to generate and optimise designs, but which challenge how we work and deliver services to our clients. The questions are no longer theoretical. They are practical and urgent, yet unresolved.

This report confronts the reality of AI's place in our profession. It is about recalibration.

Architecture has always been in the midst of society's most complex challenges, challenges which are rapidly growing in urgency and complexity. They include climate resilience, inequality, urban sustainability and material efficiency. With professional expertise and oversight, AI offers tools to dissect and address these challenges as never before.

AI will need to be used within an effective ethical framework. Where has the training data come from? Who controls the algorithm? Who owns the output? The answers to these questions are still being formed.

The 2024 survey revealed cautious adoption, finding that 41% of practices used AI. Our latest survey shows that figure is now nearer 60%. Using AI is increasingly part of normal practice.

But hesitations persist. Concerns about imitation, job displacement and data integrity remain and are valid. Yet the potential is undeniable: faster iterations, deeper analysis and quicker market adaptation. The balance lies in steering the technology, not being steered by it.

RIBA's role is clear. We need to make sure AI serves the profession, not the opposite. Therefore, we must set standards, demand transparency and equip architects to harness these tools without surrendering agency. The stakes extend beyond efficiency. They shape the future of buildings, cities, equity and the planet.

This report documents both our progress and the potential pitfalls. It is a snapshot of a profession in change, navigating a tool that could redefine creativity. The challenge is not whether to adopt AI, but how – and on whose terms.

The conversation continues.

RIBA AI, Generative Design and Data Expert Advisory Group

Nenpin Dimka, Architect at Unknown Architects Ltd and University Lecturer at London South Bank University

Unknown Architects Ltd

Nenpin is a chartered architect, educator, and academic researcher at the forefront of AI applications in architectural practice and education. As RIBA Co-chair of the Expert Advisory Group on AI, Computational Design, and Data, he contributes to developing professional frameworks and RIBA supporting its membership towards integrating emerging technologies

Nenpin's full bio is available in the article **AI and design thinking** on page 35

Phil Allsopp D.Arch., M.S. (Public Health), RIBA, Co-Chair, RIBA Expert Advisory Group on AI, Generative Design and Data

ORBIS Dynamics, Inc.

Phil is an RIBA Trustee and Council representative for the RIBA's Americas region. He is also CEO of Orbis Dynamics Inc., deploying advanced digital twin observatories for urban policy and design simulation to public and private sector clients globally. Phil is also a Senior Scientist with Arizona State University's Global Futures Laboratory, and an adjunct professor with Mohawk College's School of Climate Action in Ontario, Canada.

The RIBA's Expert Advisory Group (EAG) was formed in late 2023 to address the rapid advances occurring in AI technologies, generative design systems and data science; the latest phase of a decades-long development path in digital technologies and their application and refinement in several design and manufacturing sectors. The challenge for this EAG was to figure out: whether and how architects in practice should respond to these technologies; and whether these digital systems, if adopted, could enhance the effectiveness of architects in practice or might represent a threat to the profession itself. In a world where advances in these technologies, and the threats they pose, are accelerating, our work is ongoing and, we believe, we must provide frequent 'intelligence briefings' to the profession about our findings, which are informed by our research and the work and insights of the many contributors to our efforts.

As co-chairs, in close coordination with RIBA staff – Adrian Malleson and Alex Tait – we invited an initial group of contributors from professional practice, academia and industry to meet, discuss and establish priorities for the EAG's work in 2024 and beyond. Our goal was to establish a set of outcomes, rather than process steps, to guide the results of what the EAG was set up to do. Given the nature of the rate of change of digital technologies and their applications across the globe, we felt that the RIBA's should **establish an ongoing AI–Generative Design–Data Operational Intel unit within the RIBA** to deliver evidence-based insights which:

1. **Enhance** architects' core competencies in design, client management and creative thinking
2. Broaden **what** architects do, allowing design-stage optimisation of a building's socio-economic and environmental performance, so helping to create more economically viable, equitable and sustainable built environments that serve all in society
3. change **how** architects practise, integrating new working methods to augment, speed up, iterate and improve the design and build process, freeing architects to do what they do best – envision, design and create to make the future a better place
4. **improve** architects' compensation based on the quantifiable and significant economic, social and environmental value they deliver well beyond the building envelope itself.

The members of the RIBA EAG are:

Name	EAG Role	Organisation	Position
Phil Allsopp	Co-Chair	ORBIS Dynamics	CEO
Nenpin Dimka	Co-Chair	Unknown Architects Ltd and London South Bank University	Architect and Lecturer
Greta Jonsson	Member	Design Specifics Ltd	Architect and Passivhaus designer
Maryam al Irhayim	Member	AECOM	Architect and RIBA Student Representative
Des Fagan	Member	Lancaster University	Professor and Head of Architecture
Chris Fulton	Member	ADP	Digital Director
George Guida	Member	ArchiTAG and xFigura	Co-founder
Eva Magnisali	Member	DataForm Lab	Founder and CEO
Marek Suchocki	Member	Autodesk	Head of Industry Associations Strategy
Alex Tait	RIBA Staff	RIBA	Director of Practice
Adrian Malleson	RIBA Staff	RIBA	Head of Economic Research

Digital technologies are reshaping all professions

In the **medical profession,** technological advancements have revolutionised diagnostic imaging and surgical operations. Enhanced precision and minimally invasive procedures are enabled by robotic surgical systems, while the detection of abnormalities in medical images using AI has augmented radiologists' abilities. Such technologies serve to augment expertise and lead to increased efficiencies in healthcare delivery.

Similarly, the **manufacturing industry** has been transformed by automated production systems that utilise integrated product design tools. Combining digital twin technology and simulation enables engineers and designers to iterate and optimise products virtually, before physical production. This integration significantly reduces material waste, optimises development cycles and enables innovative and sustainable solutions.

In the **transportation industry,** technological transformation is exemplified in the evolution of propulsion systems. Vehicle design has been reimagined by advanced electrical powertrain technologies and advanced computational fluid dynamics. Beyond vehicle design, the transformation encompasses transportation networks that leverage intelligent systems to reduce emissions, optimise routes and enhance safety.

Digital technologies in architecture and the construction sector

In the **construction sector,** the widespread use of geographic information systems (GISs) with building information modelling (BIM) as a routine method for conducting planning, design and engineering services has developed more slowly. Computer-aided design (CAD) technologies (several leading applications of which were developed in the UK in the early 1970s) had many of the features of BIM and GISs today.[1]

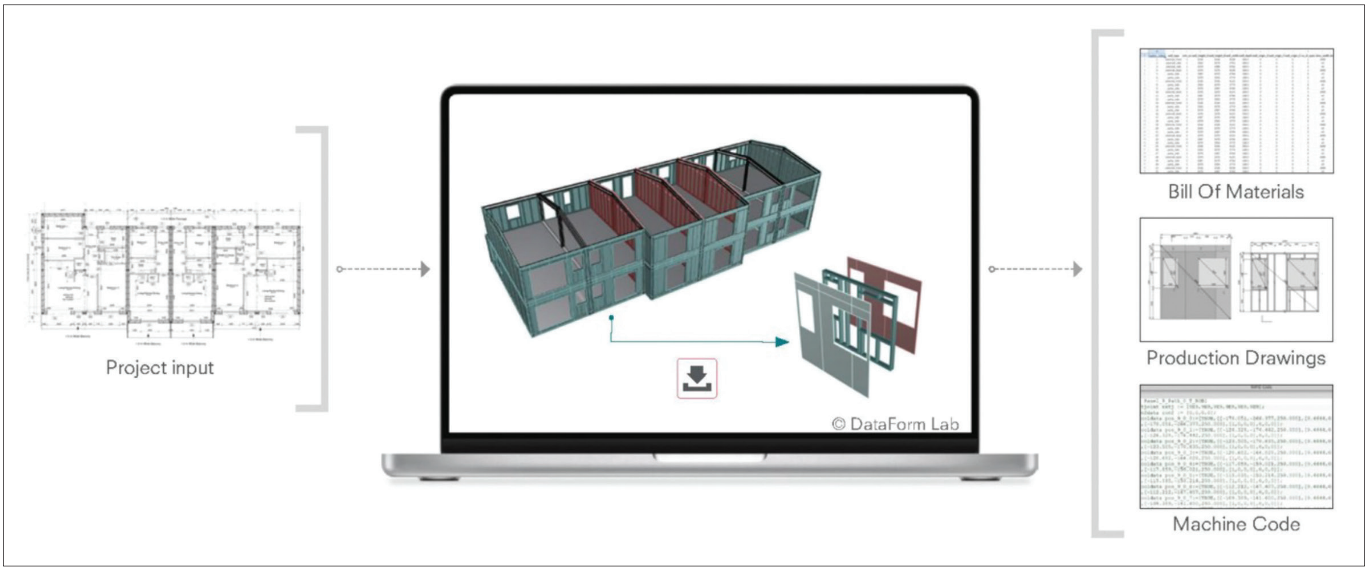
Since the early 2000s, the use of BIM systems, by both small and large practices, to create digital twins of built environments has increased significantly. This has been enabled by the arrival of much more mature BIM systems, such as Autodesk's Revit, Graphisoft's Archicad, Vectorworks and Allplan, and parametric modelling systems available via products such as Rhinocerus3D and Grasshopper, Unity, Unreal engine, QGIS and Blender, all of which can be connected to a variety of AI models.

Yet the construction sector itself – where the making of buildings takes place – remains by and large mired in a time warp, where egregious waste and inefficiencies abound and contribute directly to greenhouse gas (GHG) emissions and the housing affordability problems sweeping the world.[2] Characterised by fragmented supply chains, misaligned management processes and low productivity, the technological lag contributes to natural resource depletion and significant material and labour waste generation. Up to 30% of construction costs arise from inefficiencies in project delivery.

Further, the resistance to change holds back progress in our most pressing challenges: including climate change, rapid urbanisation and declining affordability of housing. The regulatory landscape and predominance of traditional construction approaches continue to impede innovation and improved productivity. Embracing technological innovation to tackle these challenges represents a critical opportunity for long-overdue change in the construction industry.

[1] For example OXSYS BDS and GDS, developed by UK National Health Service, Oxford Regional Health Authority, Research & Development, Headington, Oxford and Applied Research of Cambridge, Cambridge University, UK. See also RUCAPS (UK), developed by Dr John Davison and John Watts in the early 1970s and architects Gollins Melvin Ward (GMW Architects) in London in the late 1970s. In the USA, Skidmore Owings and Merrill's internally developed '2½D' CAD software system was used firmwide by the late 1970s and early 1980s.

[2] McKinsey Global Institute, Reinventing Construction: A Route to Higher productivity, February 2017. In collaboration with McKinsey's Capital Projects and Infrastructure Practice.



Structured workflow for intelligent manufacturing. Image courtesy of DataForm Lab

Mirroring best practices in other product production sectors

AI, generative design and data harmonisation skills and technologies provide ways for architects to play a decisive leadership role in reducing the construction sector's supply chain complexity, waste and GHG emissions while improving significantly the social, economic, energy, durability and environmental performance of the resulting built environments.

Linking design with manufacturing and precision assembly – designing buildings as production products – is not a new concept. This vertical integration was done on a very large scale in North America in the early years of the 20th century by several companies, including Aladdin[3] (Bay City, Michigan), Sears and Roebuck (Chicago, Illinois) and Montgomery-Ward (Chicago). Their extensive catalogues of prefabricated housing and other building types enabled entire townships to be mail-ordered, then assembled in a matter of a few weeks. Flat-packed 'kits' were transported to remote locations by rail freight cars, resulting in little or no waste on site.

AI, generative design and data systems connected with production line technologies and robotics enable such vertical integration to take place today. Design for Manufacturing and Assembly (DfMA) addresses not only the problem of waste (roughly 6.7m tons per annum for single family house building in the USA alone), but also the need for structures to be more affordable, better performing and more durable.

Architects who are involved with or who are leading enterprises engaged in DfMA approaches to built environments are thus able to exert far greater control over design quality (in all its dimensions) and end user safety than more arm's length designer roles. This reduces risk. In contrast, risks are higher where architects rely on developers, contractors, subcontractors and clients, not least the liability risks to architects due to performance compromises or errors in specification, as well as fit and finish.

Architects, including RIBA members, are actively engaged in developing (i.e. coding and software engineering) technologies and robust data storage and retrieval systems for automating the conversion of building designs produced with any type of BIM system into parametric and AI-enhanced manufacturing processes. This UK approach to the tight integration of design with manufacturing, fabrication and assembly (spearheaded by DataForm Lab) promises to revolutionise the making of buildings that never have to adhere to the one-size-fits-all 'modular' approaches that often appear in trade journal headlines. It has global relevance and application as almost every nation on the planet is struggling with affordability, durability, fitness for purpose and achieving carbon net zero goals for built environments of all types and sizes.

3 The Aladdin Company. The only US-made kit house neighbourhood in the UK is located at Austin Village, Longbridge, just north of the current BMW factory. In 1917, 200 'workforce housing' kits for munitions and aircraft manufacturing workers were shipped to Liverpool then transported by rail to Longbridge, where they were assembled by the future occupants. The City of Birmingham insisted that the 'temporary prefabs' be removed after the First World War, but they have remained in constant use and adaptation ever since. (From ongoing research by Dr Lauren Allsopp, Senior Global Futures Scientist, Arizona State University, Tempe , Arizona, 2024.)

Impacts of AI implementation in architecture

Opportunities for the profession

The **technology infrastructure** layer, featuring major platform players such as AWS, AZURE and Nvidia, presents opportunities for architects to use advanced computational tools and AI-generative systems. This technological foundation enables architects to develop sophisticated analysis and simulation capabilities, transforming how they approach both design and decision-making processes.

Most significantly, architectural services could fall into two distinct but complementary paths: **policy impact analytics** and **advanced architecture.** This suggests architects can expand their influence both upstream, into policy and planning, and downstream, into project delivery and management. Linking the two and directly supporting collaborative policy analysis is the broader field of reciprocal systems analytics and simulation – also known as **system dynamics,** created in the 1950s and early 1960s by Jay W. Forrester at MIT. Forrester's seminal publication Urban Dynamics[4] influenced city development policy across the USA but – as many regions are experiencing today – expediency, profits and commercial interests have driven built environment solutions rather than human well-being, prosperity or the health of the planet.

The progression from **traditional design services** to **facility management** and **change of use** considerations suggests architects can extend their value proposition across the entire building lifecycle. This comprehensive approach, enabled by technology, positions architects to address complex challenges in urban development, sustainability and social equity while maintaining their core expertise in building design and delivery.

The development of digital tools for professionals has been accelerating enormously and shows few signs of stopping. In response, the content of architectural education is also evolving globally to embrace and develop these digital technologies, providing new types of technology, manufacturing, business, policy and financial courses where analytic and simulation technologies are commonplace. For these reasons, we believe that new highly valued career paths for architects will open up as more light is shed on the quantifiably outsized role that architects play in creating and re-purposing built environments that propel and enable national prosperity and well-being.

[4] Jay Forrester, Urban Dynamics, MIT Press, Cambridge MA, 1969 and World Dynamics, Wright-Allen Press, Cambridge MA, 1971.

Avoiding AI risks and minefields to reap the rewards

May Winfield Global Director of Commercial, Legal and Digital Risks

BuroHappold

May Winfield is the Global Director of Commercial, Legal and Digital Risks at international engineering firm Buro Happold. May is a senior construction lawyer of over 19 years' experience and a leading global specialist in risk management and legal issues of digital and construction technology. She has a passion for innovation in the industry and has co-authored and contributed to various documents in this field, including legal guidance on ISO 19650, the ISO 19650-compliant standard information protocol, the Centre for Digital Built Britain's Digital Twins Roadmap and Digital Twins Toolkit Report, and version 2 of the UK Government's The Construction Playbook.

When you think of AI – whether generative AI ('genAI') or the newer agentic AI ('AI agents') – in architecture, what do you think of? Image generation, renderings, ideation, research? Or perhaps, automation of processes and analysis? Until now we've tended to think of AI as a catalyst for process, but will AI soon become an irreplaceable partner to co-design and co-create? Deloitte's State of AI in the Enterprise (5th Edition)[1] noted that while, on the one hand, the technology has significantly expanded the scope of human creativity, on the other it has ignited deep philosophical debates concerning truth, consciousness and humanity.

A McKinsey report[2] released in May 2024 noted that 65% of organisations surveyed had adopted genAI in at least one business function, yet only 33% of respondents said they were working to mitigate cybersecurity risks (cybersecurity being only one of the potential issues and risks in genAI use). So the question must be asked: When embracing this helpful and exciting technology, do you ever think about what could go wrong? Do you consider what you could lose, not just what you might gain?

AI offers efficiency and quality improvements, and so it is tempting to adopt it quickly to maximise its benefits and competitiveness. But let's consider for a moment the implications of such rapid adoption. It is a relatively new technology to most businesses. Everyone is still learning – even the AI 'experts'. So, given this knowledge gap, how do we best anticipate the corresponding new challenges and frontiers?

There has been a lot of media coverage on genAI court cases, but, in general, there is only minimal substantive guidance on risks. Even cautious adopters are lacking information on how to avoid potential problems. Solutions will inevitably evolve over time – with better understanding, contract terms and case law – but there are some practical mitigation steps that can be taken now, to avoid us laying traps for ourselves in the meantime.

I'd like to offer a practical summary of some of the key risks and potential legal issues in implementing genAI, along with suggestions for mitigating them.

[1] https://www.deloitte.com/uk/en/Industries/technology/research/state-of-aiin-the-enterprise-5th-edition.html

[2] https://www.mckinsey.com/~/media/mckinsey/business%20functions/quantumblack/our%20insights/the%20state%20of%20ai/2024/the-state-of-ai-in-early-2024-final.pdf

RIBA AI in Practice Summit - Jackie King Photography

Accuracy and reliance

There is a known phenomenon in AI called 'hallucination', where the genAI tool partially or entirely fabricates its responses. Some commentators suggest this could be to avoid disappointing the user – the tool fabricates an answer rather than providing an incomplete one or none at all. Who could have fathomed that AI may be eager to please! Or in some cases the AI agent might provide inaccurate results due to the nature of its training data or underlying genAI tool. There are serious consequences to hallucinations. Consider asking a genAI tool if a design is buildable and safe and it provides incorrect affirmation, or if an AI agent provides incorrect findings from a compiled set of survey data. The consequences could be catastrophic in terms of time, cost, liability and safety. It is therefore crucial to remember that until AI reaches general or human-equivalent intelligence, it remains a tool. It is unlikely to be a legitimate defence to claim the genAI tool is at fault; this being akin to blaming a calculator for a mathematical error. While genAI tools increasingly perform valuable functions to supplement and enhance our work, we remain responsible for our professional output.

Caution is sensible given the unknown impact on insurance. While professional indemnity insurance for architects (and other consultants) covers liability for negligence, it remains uncertain whether an architect would be deemed negligent when relying on AI output that they know could be erroneous or fabricated, or whether this falls outside the principles of negligence, and thus could be uninsured – with the architect bearing the losses and legal costs personally.

A separate risk specific to AI agents highlighted by some commentators is the unique threat of cyber-attack; for example, prompt injections that may manipulate the agent's behaviour or responses, or attacks designed to exploit vulnerabilities in the system. With the technology progressing so rapidly, it may simply not be possible to manage all potential cybersecurity issues and threats in this rapidly evolving space and therefore continuing vigilance and development of such systems is needed.

Confidentiality

At its simplest, inputting any data into a publicly available genAI is like throwing this data into a public forum. Once it has been entered, the data cannot be erased or removed, making it vulnerable to extraction by individuals through the use of targeted questions. There have been alarming examples showing how sensitive information can be retrieved in this manner. While generic data entry may not pose significant risks, the implications for confidential information – such as business secrets, client data and project specifics – are substantial and severe. For instance, some may recall a notable incident involving employees of a major technology company inputting proprietary code into ChatGPT for debugging purposes, thereby relinquishing control over that code. Such actions could not only expose company data to external entities, but also breach contractual obligations regarding client and project data, leading to friction with clients and internal management.

It is therefore prudent to closely review the user terms of any generative AI tools before integrating them into your organisation's operations. Key questions to consider include: Will the data be utilised to train the model? Will the data be accessible to third parties? Can the data be used to develop the tool or be presented to other clients? Where is the data stored? These questions are crucial in assessing the risks associated with confidentiality. Furthermore, given these risks, it is essential that you communicate any usage restrictions to employees within your organisation, provide training to raise awareness, and implement practical measures to ensure compliance.

RIBA AI in Practice Summit - Jackie King Photography

Copyright

There have been multiple court cases involving newspapers, authors and artists alleging breaches of copyright on the assertion that genAI tools have collected data from the internet and/or used material in training models without proper copyright licences. These issues have led to some publicised settlements or arrangements to sell or license content to AI providers. Cloudflare reportedly announced a marketplace where website owners can sell AI providers permission to scrape their content, and which provides tools that enable owners to see when and why models are crawling their sites. Such licensing and permission is obviously more complicated for consultants, whose content and data may be partly or wholly owned by clients or other parties. There have also been reported instances of genAI companies being found liable for copyright breaches due to their use of other parties' data without explicit permission. Courts appear not to be persuaded by claims of 'fair use' when companies assert their right to use data without consent.

Therefore, users of genAI tools face a risk that the output could potentially infringe on copyright. The existence of a copyright breach may only become evident if a party asserts a claim upon reviewing your output. This could be problematic – and uncomfortable – if the output is part of a client design or public-facing presentation. It is advisable that you consider carefully how you use genAI outputs, and that you focus on applications that avoid copyright complications.

Some software providers offer indemnities (sometimes for an additional fee) to protect users of their generative AI tools from claims of breach of copyright. While these indemnities are a responsible measure by such organisations, it is recommended that you review the terms thoroughly before paying extra or relying on them, as some may have limitations and potential loopholes. Crucially, these indemnities have yet to be tested in the courts, so it remains to be seen how jurisdictions will interpret and apply them (and any loopholes that may be found therein).

Additionally, there is an important aspect regarding the fundamentals of copyright and ownership. Case law in the USA suggests that AI-generated output that lacks sufficient human input/involvement does not qualify for copyright protection as AI cannot hold copyright, yet at the same time the human involved may not be considered the author. One can easily see how this might lead to disputes if you were to use such AI outputs for important project deliverables or public-facing materials.

Personal data and ethics

The General Data Protection Regulation (GDPR) in the UK and Europe protects personal data, restricting its use and storage. There are similar regulations in other jurisdictions. It is therefore wise to seek professional advice before using AI tools with any personal data.

It has been widely reported that genAI can be biased due to being trained on historical data. For example, a friend working in human resources recounted their experience of an AI agent recruitment tool that proposed only white male candidates for a role. However, this does not mean abandoning the technology. Instead, be aware of the potential bias and implement risk management and protective measures to address this as a 'known issue'.

A note on legislation

Several countries are either implementing or have already implemented legislation that covers some aspects of AI, with the EU AI Act being the most comprehensive piece in this area. The Act outlines varying restrictions and controls based on the levels of potential harm and risk posed by AI. It is interesting to note that the EU AI Act does not actually define AI, instead providing definitions for 'AI systems' and 'general-purpose AI models', leading some commentators to question whether the Act will need to be updated in its descriptions and certain content as the technology evolves. Looking at the USA, some states have enacted laws specifically addressing the personal data risks associated with AI, and there are multiple executive orders addressing various facets of AI.
In comparison, the UK has indicated an intention for a light touch, innovation-focused approach, although recently the UK Government issued an AI Playbook[3] and confirmed the intention to adopt 50 recommendations[4] related to the implementation of AI.

Conclusion

We now live in a world where every week appears to bring a new AI development, from AI that translates brain activity to self-learning robots. The benefits and popularity of the technology mean it should not and cannot be ignored. However, to prevent your business from laying a future legal minefield, it is important to actively consider two key questions. What realistically could go wrong? How do we avoid or mitigate that risk? An important part of mitigation will be the education of the various parts of the business – from commercial to technical to legal – on both the workings of the technology itself and the issues (many of which will be new and unprecedented) that may arise, so they can work together to create suitable processes, standard documentation and plans to ensure successful, risk-managed implementation.
Given the fast pace of the technology, this will be a continuing education, with risk mitigation needing to, at the very least, cover the big topics – including accuracy, confidentiality, personal data and copyright – mentioned in this article.

Some links for further reading on this topic:

CIOB Artificial Intelligence (AI) Playbook 2024:
https://www.ciob.org/industry/research/AI-Playbook

AI Opportunities Action Plan:
https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan

Deloitte, State of AI in the Enterprise, 5th Edition:
https://www.deloitte.com/uk/en/Industries/technology/research/state-of-aiin-the-enterprise-5th-edition.html

McKinsey: The state of AI in early 2024:
https://www.mckinsey.com/~/media/mckinsey/business%20functions/quantumblack/our%20insights/the%20state%20of%20ai/2024/the-state-of-ai-in-early-2024-final.pdf

Artificial Intelligence Playbook for the UK Government:
https://www.gov.uk/government/publications/ai-playbook-for-the-uk-government/artificial-intelligence-playbook-for-the-uk-government-html

AI Opportunities Action Plan:
https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan

Compilation of previous talks and presentations:
https://maywinfield.squarespace.com/

[3] https://www.gov.uk/government/publications/ai-playbook-for-the-uk-government/artificial-intelligence-playbook-for-the-uk-government-html

[4] https://www.gov.uk/government/publications/ai-opportunities-action-plan/ai-opportunities-action-plan

AI:Lab – artificial intelligence and low carbon building

Des Fagan Head and Professor of Computational Architecture

Lancaster University

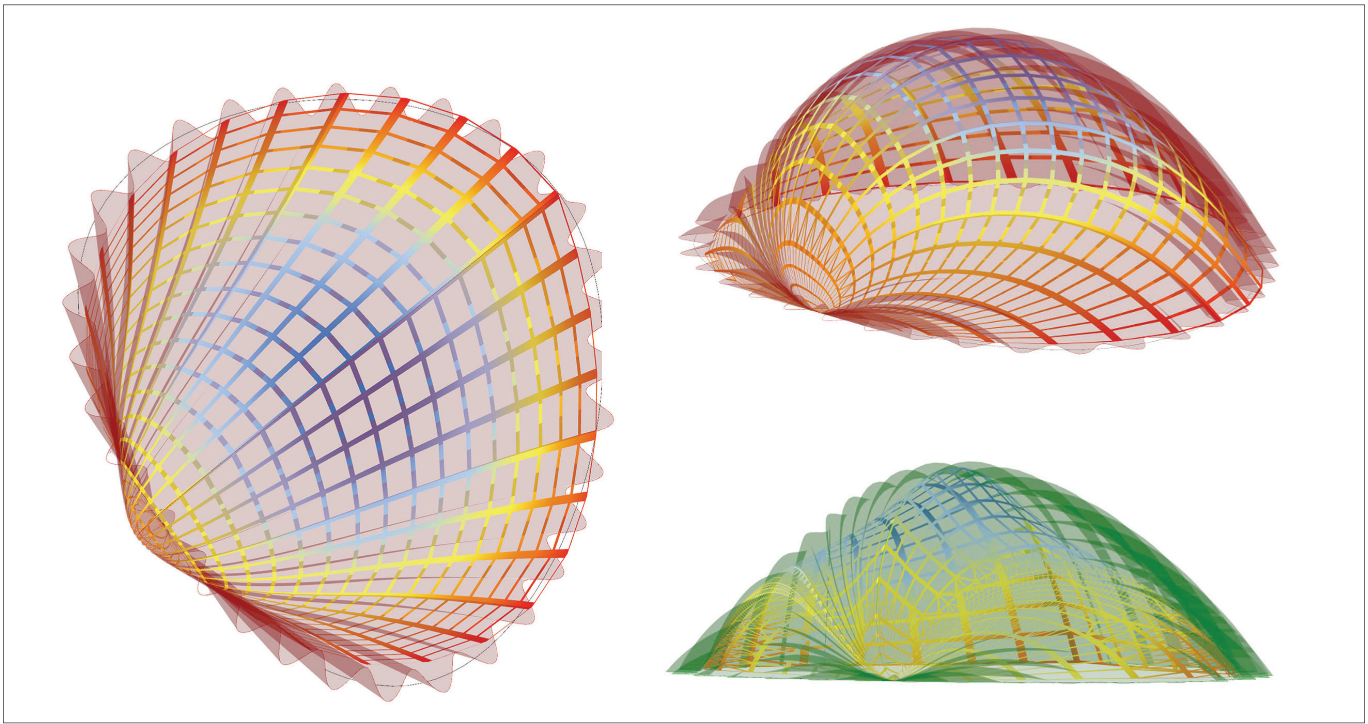
Head and Professor of Computational Architecture at Lancaster University, my field of research is in Optimisation and Deep Learning (Artificial Intelligence) for Decision Support Systems in design. I am particularly interested in the impact that Machine Learning will have on sustainable design processes and the regulatory and policy implications for the MHCLG, RIBA and ARB. In my current roles with the Practice and Policy Committee and the Data and AI Working groups at the RIBA, I oversee the development of a programme of policy activity around AI integration with practice. Other AI-focused roles include Deputy Chair of the QAA Subject Benchmark for Architecture in 2025 and Lead of the Working Group on AI in Architectural Education (SCOSA), where I help to guide the future integration of AI across UK Schools of Architecture.

The building industry is at an inflection point. With construction responsible for nearly 40% of global carbon emissions, the decarbonisation of the built environment is no longer optional. AI offers a useful lens through which we may begin to confront this challenge, not just by accelerating workflows, but also by transforming how we think, model and iterate in pursuit of a sustainable future.

AI:Lab (Artificial Intelligence for Low Carbon Buildings) – a UKRI-funded collaboration between Lancaster University and Grimshaw Architects – was the first funded project to embed AI directly into the live workflows of an architect's studio. Operating in residence within Grimshaw, the project tested how AI could influence sustainable architectural thinking across interrelated fronts for the practice's Eden Project Morecambe. The ambition was to integrate tools into four key decision-making processes:

- biomimicry through image parsing
- querying low carbon site strategies with large language models (LMMs)
- creating surrogate models for performance evaluation
- evaluating the carbon cost of the tools themselves.

Eden Project, Morecambe



Structural shell weight and deflection analysis

From shell to structure: biomimicry through computer vision

Inspired by the seashell forms of Grimshaw's Eden Project Morecambe, we explored how AI could translate the morphological intelligence of nature into carbon-conscious architectural forms. Specifically, we developed a pipeline to generate geometrically editable mesh-based structures from photographs of seashells, selected for their biophilic qualities and naturally optimised geometries. This would allow users to pick any seashells from any beach and to assemble and orient them to evaluate their structural and environmental performance, reimagined as buildings.

Machine learning tools were used to classify and parse photos of any found shell, using a computer vision model to extract dimensions such as curvature, golden spiral revolutions and cross-sectional depth. These features were then used to classify the shell and parameterise inputs into a mathematical shell volume function within a Rhino/Grasshopper environment. The resulting editable shell 'twin' remains anchored to the original shell's structural and mathematical morphologies, allowing for performance testing and design iteration.

Crucially, these forms were not abstract artefacts – each could be evaluated at various scales and with different materials to assess their potential for carbon expenditure and structural efficiency at the scale of a building. For example, increasing the scale of a shell while maintaining its curvature reduced material weight without compromising stiffness, directly affecting embodied carbon output. Early trials also indicated that rotationally symmetric shell forms offered the best surface area to volume ratio for reduced material use in enclosed systems.

This workflow produced a new design vocabulary – one rooted in biologically informed efficiency – positioning AI as a potential tool for translation between optimised patterns of nature and future building strategies.

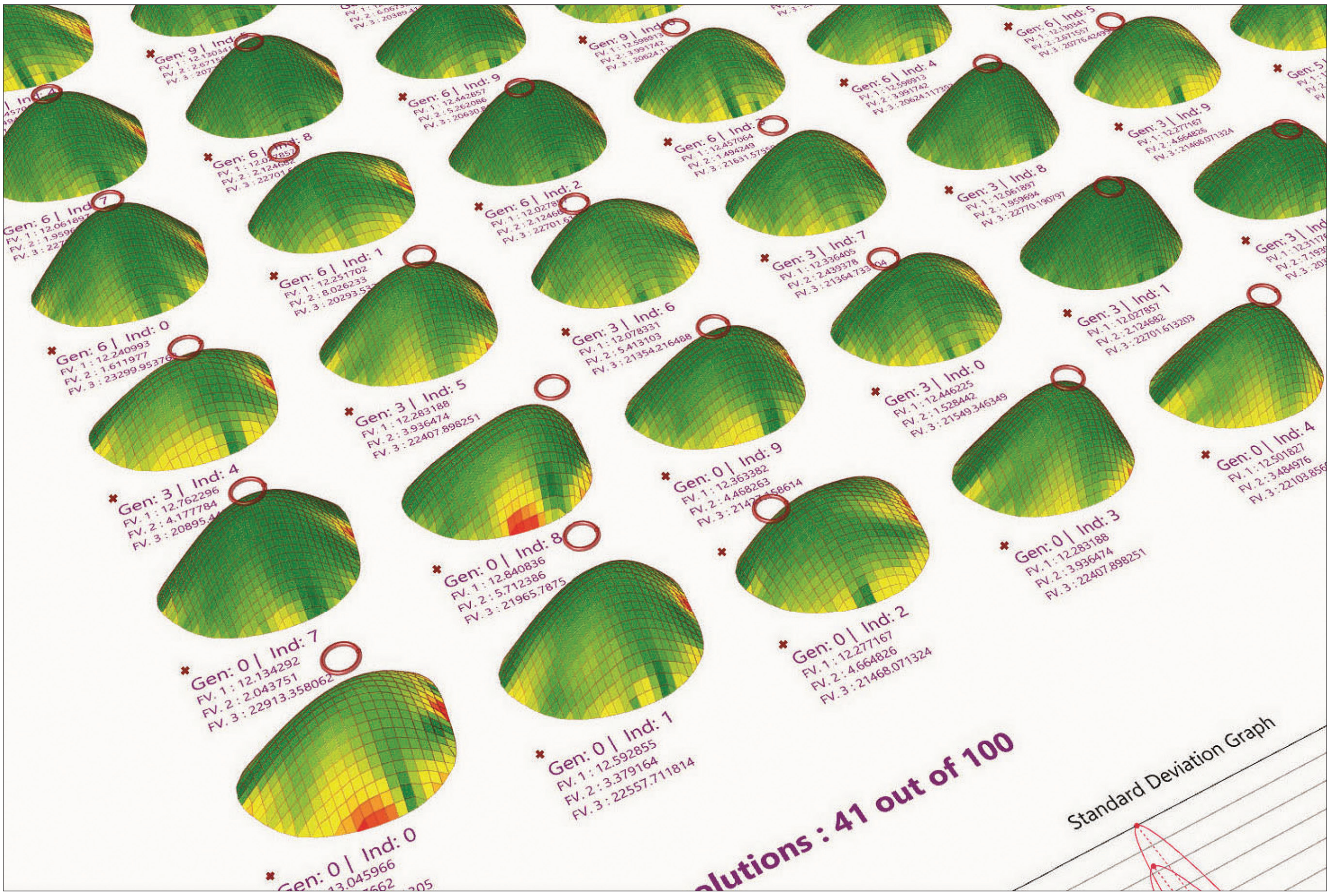
Conversations with sites: LLM for low carbon site strategies

LLMs offer emerging potential to support contextual conversational decision-making at the urban scale. This strand of research focused on how LLMs can interpret and synthesise vast publicly available datasets, including transport analytics, planning discourse and user behaviour, to inform sustainable site strategies.

A hybrid method integrated publicly available real-time traffic data, local bus network information, local news and planning documentation with natural language processing techniques. Through this framework, live and predictive congestion patterns were analysed to understand their influence on site accessibility and carbon emissions. The resulting insights informed adaptive site layouts, prioritising low carbon mobility options, reducing the embodied carbon associated with inefficient delivery routing to site and traffic-related delays.

To further examine planning complexity, an LLM-based 'virtual forum' was tested to simulate multi-stakeholder debate by drawing upon policy documents and public consultation information. The goal was not to forecast outcomes, but to assess how AI might be able to unlock divergent perspectives on city-making to promote low carbon strategies in the future. Synthetic dialogues were generated between archetypal stakeholders – developers, residents and environmental advocates – enabling scenario-based exploration of trade-offs in land use, ecology, density and infrastructure planning.

Rather than simplifying complexity, these approaches offered a means of navigating competing priorities to establish sustainable strategies. In doing so, the research highlighted a new role for AI within design workflows: acting as a potential computational 'mediator' to support responsive sustainable decision-making in urban environments.



Surrogate model deflection mapping

Predictive performance: surrogate models for form evaluation

High-fidelity simulation is essential to reduce carbon in buildings, but traditional finite element analysis for structural and material performance evaluation is slow and resource-intensive and is often inaccessible during early-stage design development.

Our research responded to this bottleneck by building a surrogate model – a fast approximation of a complex simulation or physical process, trained to replicate its outputs using machine learning but with significantly reduced computational cost. We trained our model using synthetic data generated from thousands of seashell form variations from work generated from our first project (on biomimicry through image parsing). These simulations were used to create a dataset of performance outcomes that mapped to the design 'problem' space of thousands of different shell sizes and shape variations that a user could create by changing form.

Built using convolutional neural networks (CNNs), the model delivered accurate approximations of traditional simulation outputs at a fraction of the computational cost and time. This allowed users to evaluate thousands of form variations, receiving both scalar and visual outputs instantaneously for rapid feedback. This allowed the team to quickly answer such questions as: What is the lowest structural weight or carbon total of the form variation that is closest to our preferred form? How does the total carbon of the structure change if we move the apex of the seashell form to position X,Y?'

Net zero: GPUs, water and the sustainability of AI

The training of AI models can require significant graphics processing unit (GPU) resources, often drawing substantial amounts of power and cooling water. To monitor this impact, the team implemented CodeCarbon, an open-source Python package that tracks the energy consumption and estimated emissions of code execution. Model training was logged for energy and carbon usage, with outputs being benchmarked against the ongoing monitoring of operational and embodied carbon savings that the tools intend to unlock by the conclusion of the project in 2027. Although it is still early in its lifecycle, the project recognises the importance of quantifying its own net carbon outcome. Scalability for any AI tool remains a key factor: when AI tools are deployable across thousands of projects, initial training cost will be readily repaid against wide-reaching impact, but responsible innovation means confronting these trade-offs transparently – and ensuring that projects maintain comprehensive records to evaluate carbon performance throughout their implementation.

AI Architecture Summit 2025: Sustainability, a national event hosted at the historic Morecambe Winter Gardens.

AI:Lab public engagement and knowledge exchange

A core objective of AI:Lab was to ensure its research reached into professional and public domains. To support this, the project convened the AI Architecture Summit 2025: Sustainability, a national event hosted at the historic Morecambe Winter Gardens. The summit brought together architects, engineers, educators, software developers and students to explore the implications of AI for decarbonisation in the built environment. As part of the event, the research was disseminated through a public exhibition, workshops and panel discussions. Over 300 residents and architects from across the UK attended over two days, gaining insight into AI-driven sustainability and its relevance to both future employment and community resilience.

Insights for future AI and sustainable practice

AI:Lab helped to demonstrate how AI can be used not only to optimise isolated workflows, but also to reimagine how we ask questions, validate assumptions and respond to design challenges on how we use carbon in architecture.

The key findings of the project include the following:

- Biophilic design can be systematically explored by parsing the geometries of nature and testing them at different scales and with different materials to evaluate performance.
- Data from social and environmental discourse, such as site-specific conversational or urban feedback, can be integrated into design workflows, opening new routes to establish sustainably responsive site strategies.
- Surrogate models can replace 'slow' simulation loops with rapid, reliable predictions of carbon expenditure to encourage low carbon approaches early in design ideation.
- The carbon cost of GPUs during training should be measured and monitored to ensure that AI tools do not undermine their own sustainability objectives. Tools such as CodeCarbon can be used to monitor emissions and to quantify net-zero claims at the end of a project cycle.

RIBA AI survey: findings

Adrian Malleson Head of Economic Research and Analysis, Royal Institute of British Architects

RIBA

Adrian is an economist and research analyst, with work focusing on sustainability, economics, and technological innovation. As Head of Economic Research and Analysis, he carries out a range of economic research, including RIBA Future Trends and the RIBA Business Benchmarking report. Adrian has recently co-led the RIBA's Horizons 2034 programme, providing a ten-year view of the significant global trends affecting the built environment.

From 2018 to 2023 he worked in partnership with UN-Habitat, leading a Global Capacity Development programme, as part of the UK Government's Global Future Cities initiative. He also leads the RIBA Economics Panel and is a regular contributor to the RIBA Journal and other professional publications.

Introduction

Last year, the first RIBA AI Report showed that AI had begun to change architectural practice. Through early adoption and application, the profession was again demonstrating its ability to innovate and to lead the digitisation of the construction sector.

This report looks at how the profession's views of AI have developed over the past year.

Broadly, the profession continues to see architecture and its practice as being enhanced by AI, with AI increasing productivity and creativity while enabling better buildings and better outcomes for clients.

Significant concerns remain, however, notably for future employment and fees.

Background

While the shock that followed the release of the first AI tools has faded, the pace of innovation has not let up. AI's effect on professional practice, society, the economy and the climate accelerates.

The months before the 2024 report saw rapid innovation in AI, as GPT-4 introduced AI capabilities to many. Tools such as Midjourney, Firefly and DALL·E allowed high-quality images and animation to be generated from simple text prompts for the first time. The ethical questions around AI were soon thrown into sharp focus, as early instances of AI output betrayed pre-existing biases and prejudices.

Over the past year, AI innovation has continued apace. Existing multimodal tools, such as GPT-4.1, increased in their breadth and sophistication. Tools such as Midjourney, Adobe's Firefly, and Autodesk Fusion continued to evolve rapidly. Video generation increased in power. Microsoft's Copilot, Google's Gemini and similar tools became embedded in everyday applications, including browsers, search engines and mobile phones, making AI available (indeed, difficult to avoid) for most businesses and people.

AI is not environmentally cost-free. Even though AI models have become more energy efficient, and AI is increasingly being used to enhance the sustainability of energy use, generation and distribution, the carbon costs of AI remain substantial and are growing.

The ethical questions around AI were soon thrown into sharp focus, as early instances of AI output betrayed pre-existing biases and prejudices.

Architecture and digital maturity

Digital maturity

An organisation's appetite to digitally innovate, to digitally mature, precedes the introduction of any specific digital tool. It is ongoing: AI belongs in a line of digital innovation in architectural practice, starting with computer-aided design (CAD), moving through building information modelling (BIM), and now to AI.

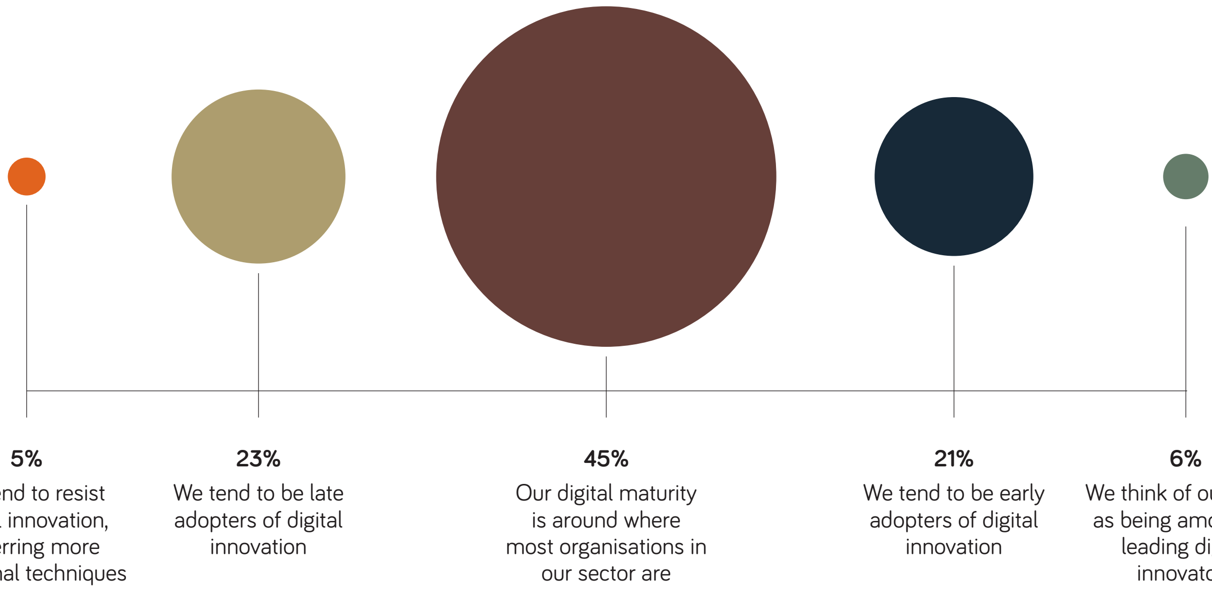
While the promise of digitisation isn't always realised, the AI-enabled digitisation of architecture promises rapid design innovation, better client outcomes, enhanced productivity and competitiveness, fewer errors and improved building safety and sustainability. It also may support design in becoming fully outcome-based, enabling architects to model and assess the effects of a building on its users, place and environment at increasingly early design stages.

The survey asked where respondents would put their organisation on a digital maturity scale.

Like last year, the responses suggest a well-distributed range.

Six per cent of respondents see themselves as leading digital innovators, 21% describe themselves as early adopters, 45% see their digital maturity as being around where most organisations in their sector are, while, among the remainder, 23% describe themselves as late adopters and 5% as tending to resist digital innovation, preferring more traditional techniques.

Overall, how would you assess your organisation's digital maturity?



While the promise of digitisation isn't always realised, the AI-enabled digitisation of architecture promises rapid design innovation, better client outcomes, enhanced productivity and competitiveness, fewer errors and improved building safety and sustainability.

During the work stages for which your practice is commissioned, do you create and maintain Building Models in accordance with ISO 19650?

Structured data

The profession's widespread adoption of BIM has highlighted the importance of well-structured data to digitisation: only through standardisation of data can information about buildings be systematically organised, read, shared and used among collaborating project parties. Creating and maintaining data in compliance with ISO 19650[1] standards ensures this.

Well-structured data also provides the bedrock for future AI applications in architecture because AI is most effectively trained and used with such data.

Most respondents report that their architectural practices follow ISO 19650 when creating and maintaining BIM models during their commissioned work stages, but not always, and some never do. Sixteen per cent always create models that conform to ISO 19650, 27% sometimes do, 19% only rarely do, while 38% never do.

At first sight, the 38% who never create compliant models may risk ineffective project information management. However, small practices are significantly less likely to make and maintain ISO-compliant models, and large practices are more likely to. This suggests that compliant models are more useful in larger projects, typical in the portfolio of large practices, and less useful in the small, often domestic, projects typical of smaller practices. Horses for courses.

[1] https://www.bsigroup.com/en-GB/products-and-services/standards/iso-19650-building-information-modelling-bim/

Knowledge and current use of AI

Knowledge of AI

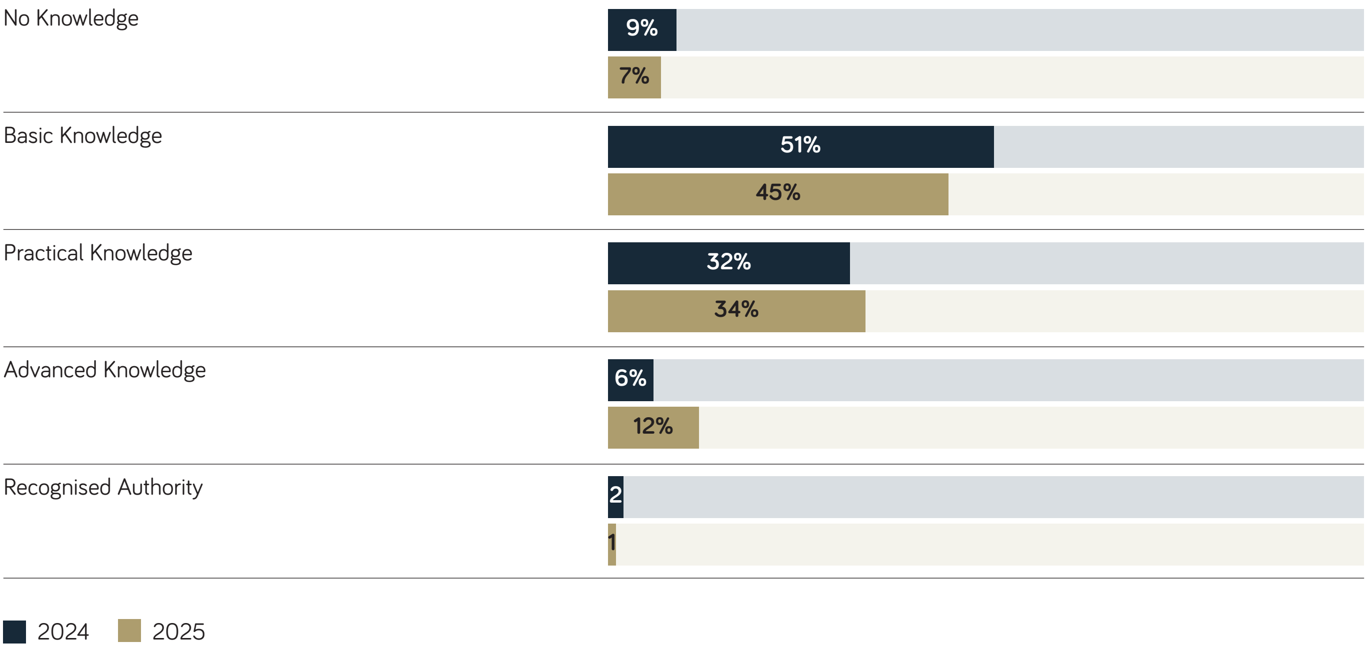
As the application of AI grows in scope, sophistication and complexity, staying knowledgeable about AI is an ongoing challenge.

Respondents' assessments of their knowledge about AI has seen a small but encouraging improvement over the past year. Overall, respondents are more likely to have practical or advanced knowledge of AI, and less likely to have no or only basic knowledge.

Comparing data from 2024 and 2025, there has been a gradual increase in knowledge:

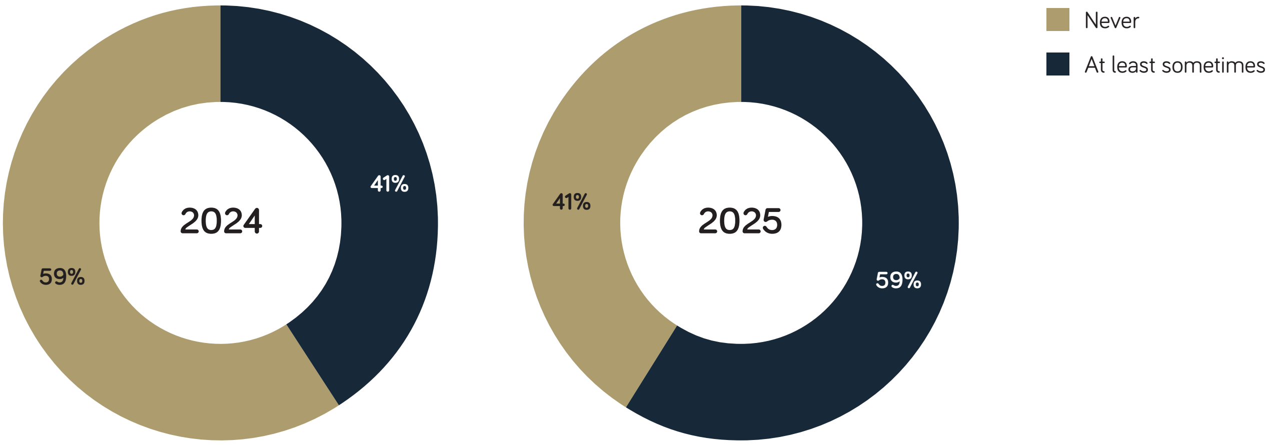
- few respondents think of themselves as a recognised authority: the proportion has fallen from 2% to 1%
- the proportion with advanced knowledge doubled from 6% to 12%
- the proportion with practical knowledge, likely the level needed by most, rose slightly, from 32% to 34%
- as the proportion with practical or advanced knowledge increased, the proportion with basic knowledge decreased, from 51% to 45%
- those with no knowledge of AI dropped from 9% to 7%.

Percent that agree that AI will have a positive effect on productivity and collaboration.



Comparing data from 2024 and 2025, there has been a gradual increase in knowledge: The proportion with advanced knowledge doubled from 6% to 12%.

AI adoption: percentage of practices using AI for at least the occasional project



Use of AI

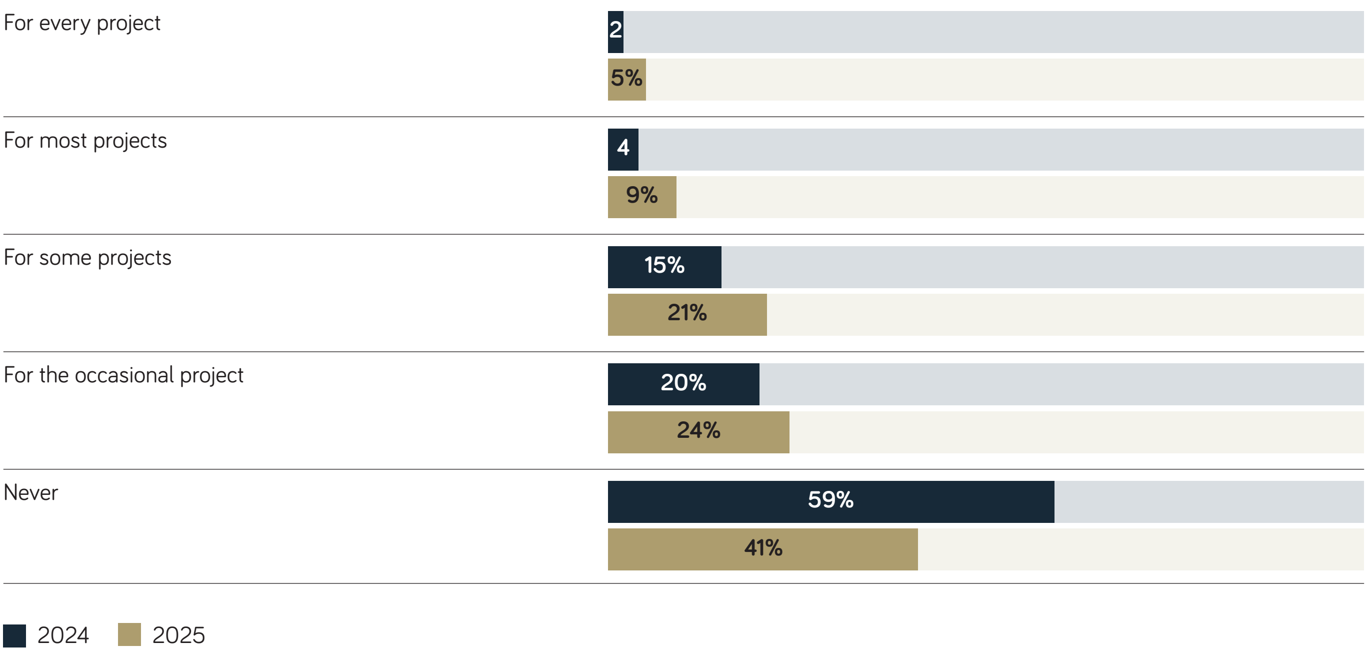
More respondents than last year reported their practices are using AI in the projects they are working on, and are using it more often and to do more things. In 2025, 59% of practices reported using AI for at least the occasional project, up from 41% in 2024. Most practices are now using AI. Conversely, the proportion of practices that never use AI has dropped, from 59% to 41%.

Reported AI adoption among respondents is more common among larger practices. Large practices (50 or more staff) have an adoption rate of 83%, while it is 64% among medium-sized practices (those with 10 to 50 staff) and 48% among small practices (those with fewer than 10 staff).

Looking at the data in more detail:

- 5% of practices now use AI on every project, more than twice the 2% of 2024
- the proportion of practices that use AI for most projects also more than doubled, from 4% to 9%
- the largest increase is among practices that use AI for some projects, up from 15% to 21%
- the proportion of those that use AI for the occasional project also grew, from 20% to 24%
- the proportion that never use AI fell from 59% to 41%.

For the projects you are currently working on, how often does your practice use AI in any way?



The profession’s views on AI

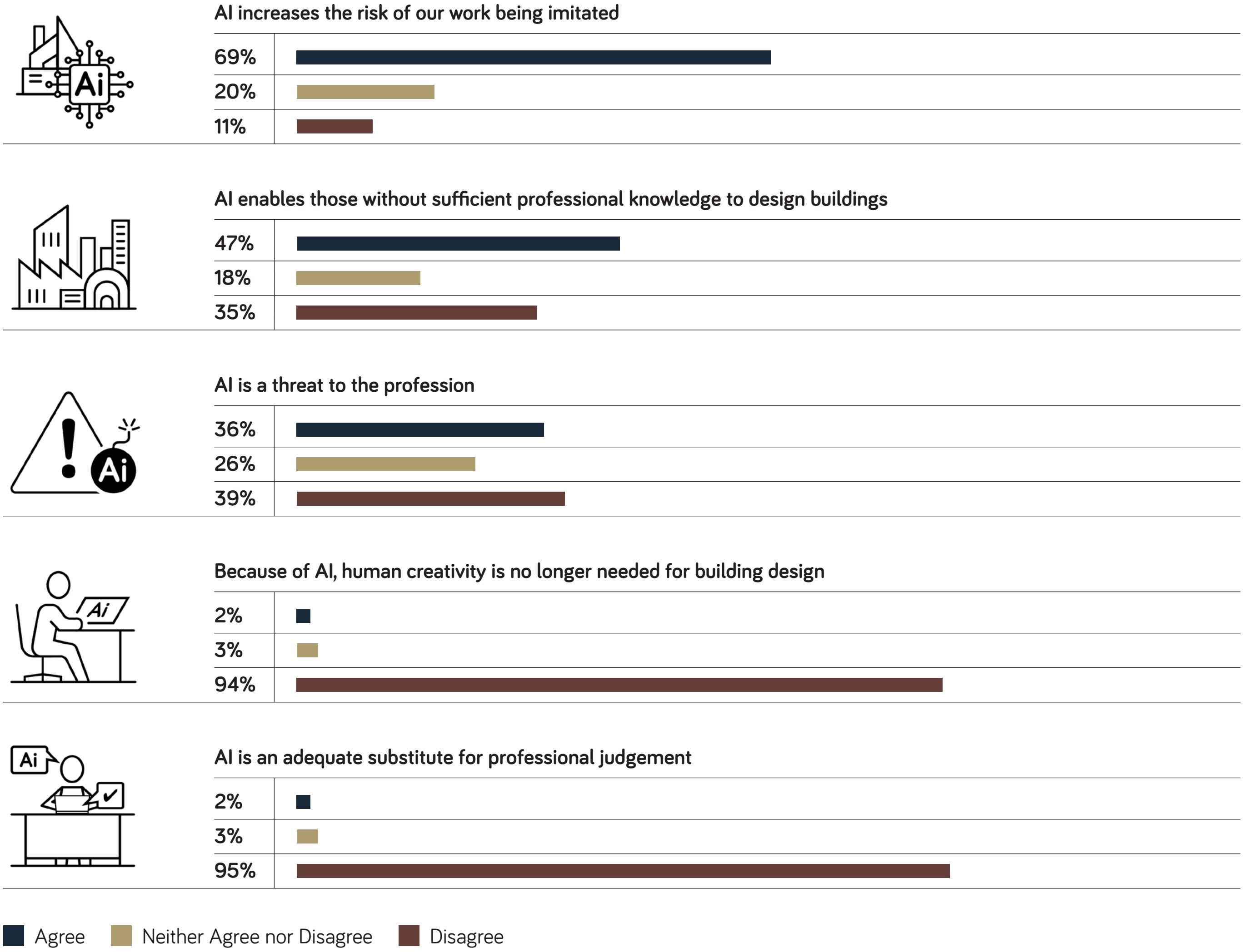
The survey asked all respondents about their views on AI; these were found to vary, with the opportunities offered by AI emphasised by some and the risks by others.

Risks arising from the use of AI include imitation of work, architectural design being carried out by those with insufficient knowledge and AI being a threat to the profession:

- 35% of respondents see AI as a threat to the profession, but 39% do not
- 69% believe that AI increases the risk of work being imitated
- 47% believe that AI allows those without sufficient professional knowledge to design buildings, so increasing the risk of buildings being unsafe, unsustainable or not meeting client needs.

Despite these concerns, there is firm agreement that AI cannot replace professional judgment and creativity, with 95% disagreeing that AI is an adequate substitute for professional judgment, and 94% disagreeing that, because of AI, human creativity is no longer needed for building design.

Agreement with statements

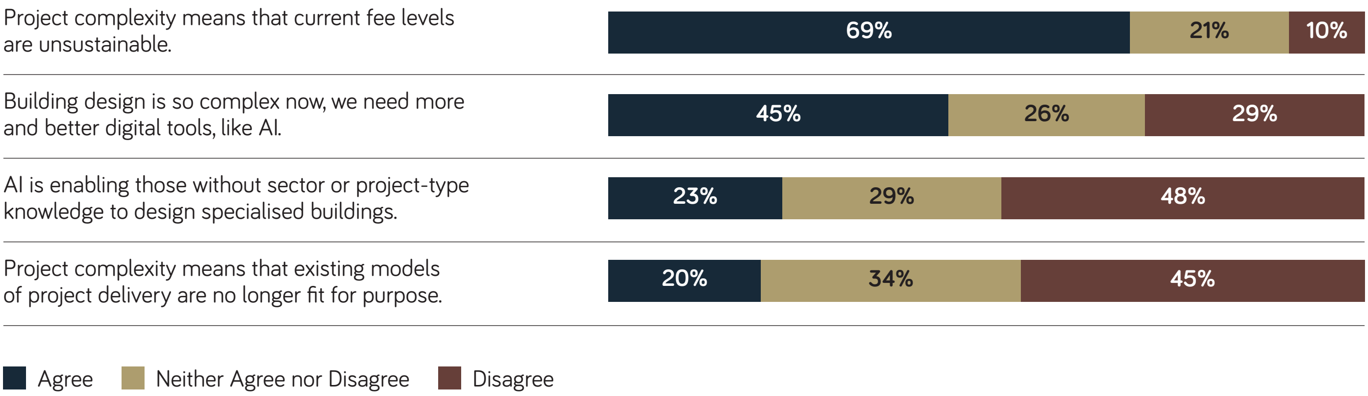


However, challenges remain. As projects become more complex, fees are under pressure. Sixty-nine per cent agree that current fee levels are unsustainable due to project complexity, and 45% agree that the current complexity of building design means more and better digital tools, such as AI, are needed.

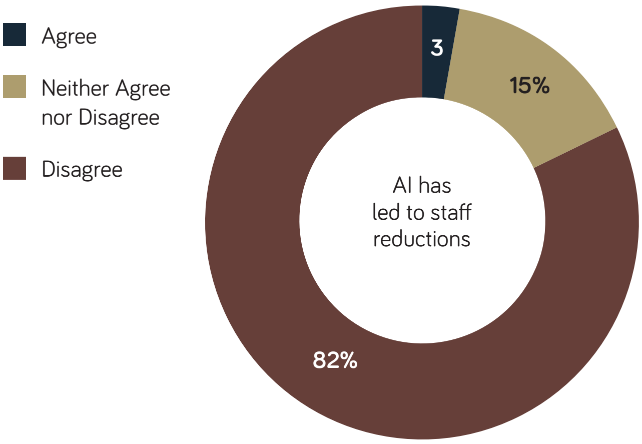
The range of skills, depth of education and complexity of thought necessary to create successful, sector-specific building design are reflected by the 48% disagreeing that AI enables those without sector knowledge to design specialised buildings.

Current project delivery models are not seen as outdated by a majority, as only 20% agree that they are no longer fit for purpose.

Agreement with Statements



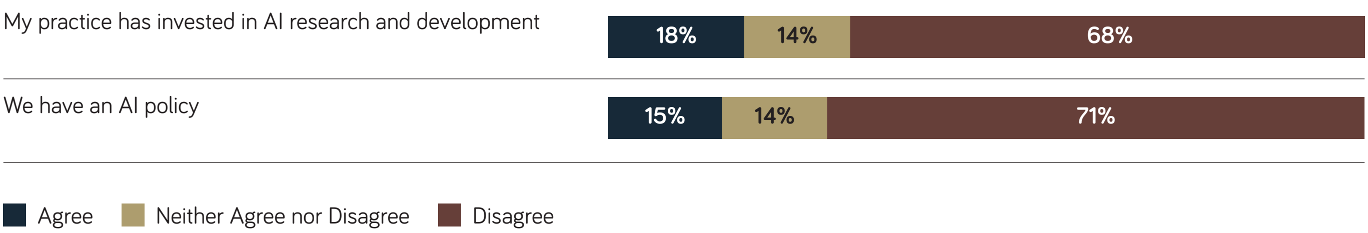
Agreement with statements



There is little evidence of AI currently displacing practice roles. Job losses are not being widely reported, with only 3% of respondents agreeing that AI has led to staff reductions.

Mitigating the risks and exploiting the opportunities of AI will rely on business preparedness. However, relatively few practices are systematically preparing for AI adoption and use, with fewer than one in five (18%) having invested in AI research and development and only 15% having an AI policy.

Agreement with Statements



Views of current AI users

Fifty-nine per cent of practices are currently using AI.

This section looks at the views of the 59% of respondents who reported that their practices currently use AI: what they are using AI for, how they think AI may change the profession, and what improvement AI can bring (or fail to bring) to practice.

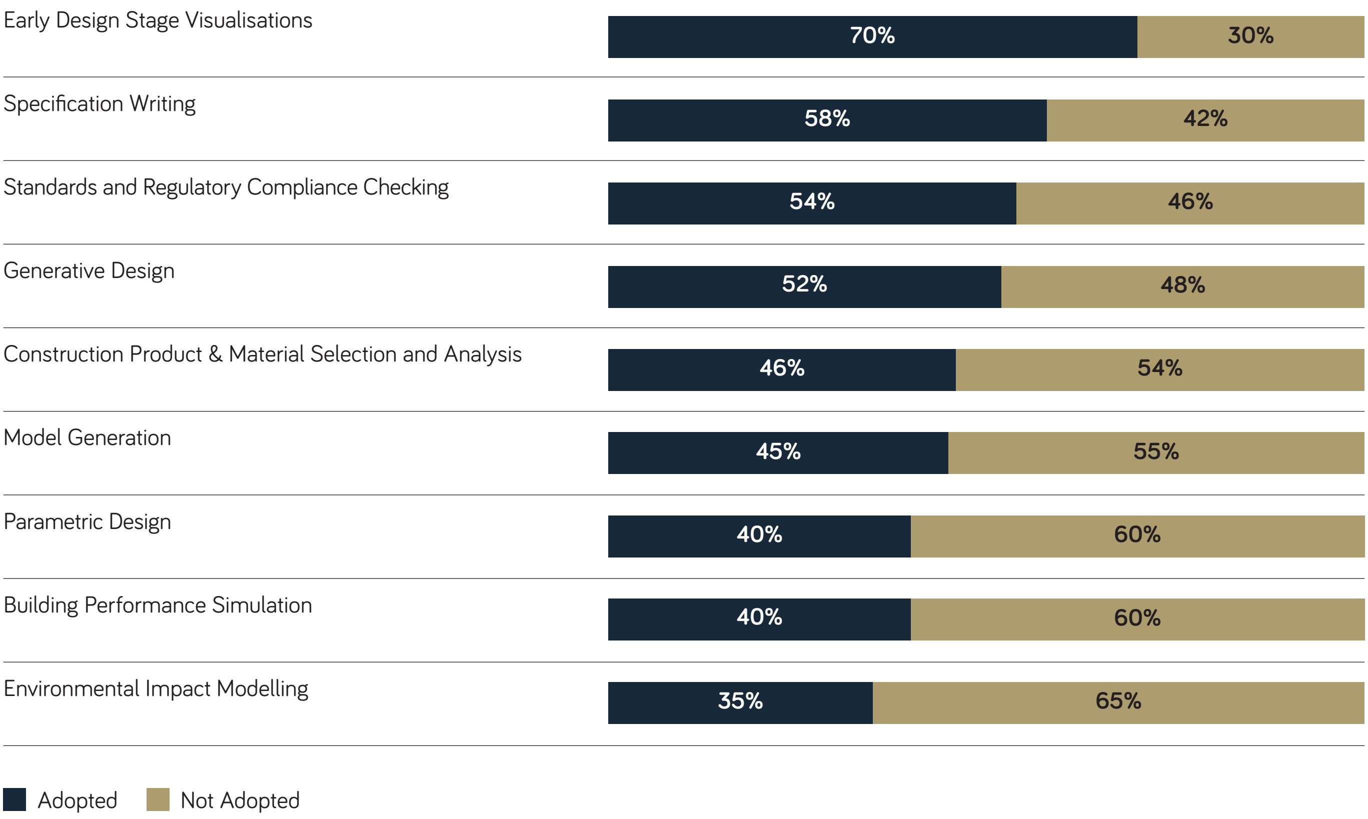
AI and the design process

AI is being used to assist with a range of design activities, though adoption varies by activity. It is most used among respondents for early design visualisations (70%) and specification writing (58%). AI is least commonly used by respondents for building performance simulation (40%) and environmental impact modelling (35%).

Looking in more detail at the top two activities we find the following:

- During the design stages, practices most often use AI for early design stage visualisations, just as they did last year. Here, 6% of practices always use AI, 13% use it often, 34% sometimes and 18% rarely. Less than a third (30%) never use AI for this purpose.
- More practices are using AI for specification writing, with 58% now using AI to assist, an increase of 19 percentage points: in 2024, 39% used AI for specification writing. Looking at the detail, 5% per cent of practices always use AI for specification writing, 9% use it often, 28% sometimes and 16% rarely. Forty-two per cent never use AI to assist with specifications.

Please indicate how far AI has been adopted* within your organisation in the following areas of the design process:



*The percentage described as having 'adopted' AI comprises those who use AI 'always, 'sometimes', 'occasionally' or 'rarely'.

AI and project management

AI is also being adopted for project management, albeit less prevalently than in the design process. Again, adoption varies by activity.

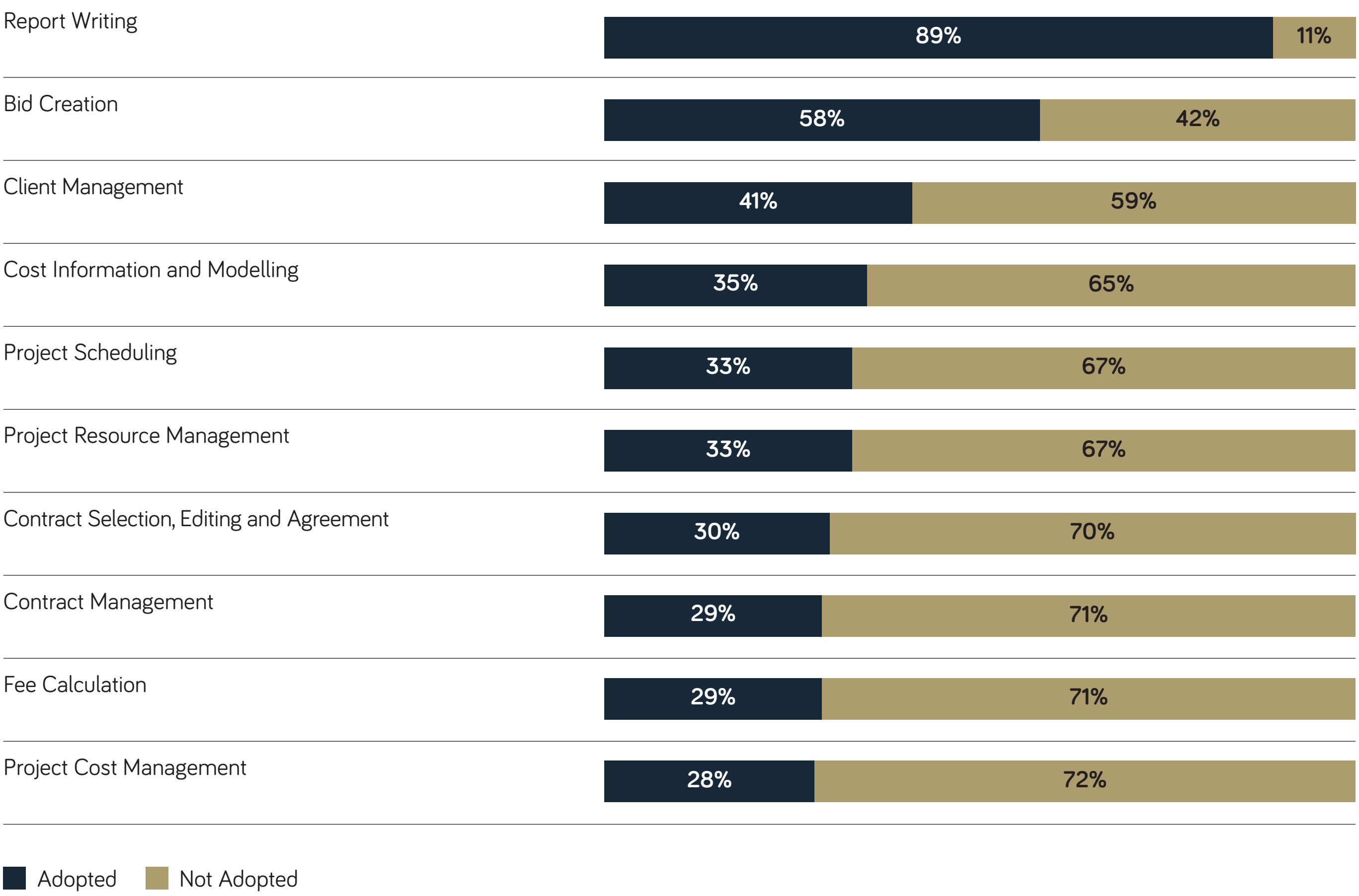
Most respondents use AI for report writing (89%) and bid creation (58%). Fewer use AI for contract management (29%), fee calculation (29%) or project cost management (28%).

The ease with which AI can generate plausible, if sometimes facile, text is reflected in its widespread use in report writing, with 8% of respondents always using AI for reports, 18% using AI often, 42% sometimes and 21% rarely. Just 11% never use AI for report writing.

AI for bid creation comes second, with 58% using AI to assist here: 6% always use AI for bid creation, 11% use it often, 26% sometimes and 16% rarely. A minority (42%) never use AI for bid creation.

Only a minority use AI to assist with more complex and risky tasks, such as contract management, fee setting or project cost management.

Please indicate how far AI has been adopted within your organisation in the following areas of project management:



Most respondents use AI for report writing (89%) and bid creation (58%). Fewer use AI for contract management (29%), fee calculation (29%) or project cost management (28%).

Benefits and limitations of AI

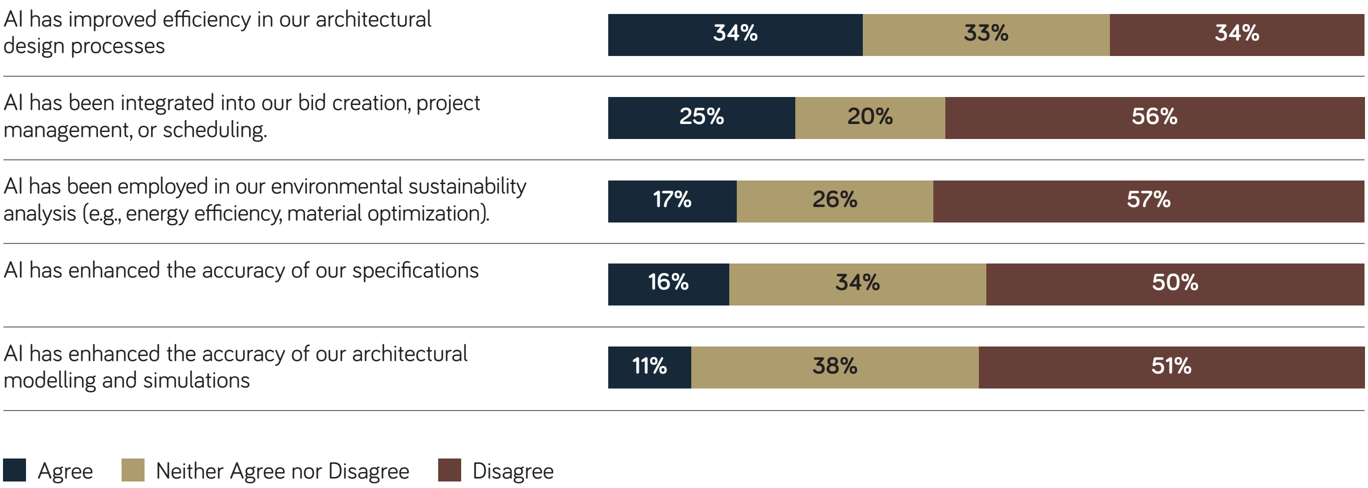
Current AI users diverge on whether AI brings efficiency gains to design. A third (34%) of practices agree it brings efficiency improvements, but an equal percentage disagree, and the remainder (33%) are neutral.

Only a minority have integrated AI into areas such as environmental sustainability analysis (17%) or bid creation, project management or scheduling (25%).

Although AI is increasingly used for preparing specifications, it is not yet enhancing their accuracy. Half of respondents (50%) disagree that AI has enhanced specification accuracy, and just 16% agree. Similarly, there is currently little agreement that the accuracy of modelling and simulations is improved by AI, with 51% disagreeing and only 11% agreeing.

There is no clear consensus on the benefits of AI, even among current users.

Agreement with statements



Although AI is increasingly used for preparing specifications, it is not yet enhancing their accuracy. Half of respondents (50%) disagree that AI has enhanced specification accuracy, and just 16% agree.

AI – the near-term future

Following the questions on AI users' assessment of AI, all survey participants, both those who have adopted AI and those who have not, were asked about expectations for AI over the next two years.

On balance, architects expect AI to be used in more areas than currently, improving efficiency and accuracy in the design process and becoming more integrated into project management. However, a significant proportion do not expect AI to improve their design accuracy or practice efficiency or to be integrated into their workflows.

There are future risks, including elevated risk of design imitation and fee levels becoming insufficient to compensate for increased project complexity.

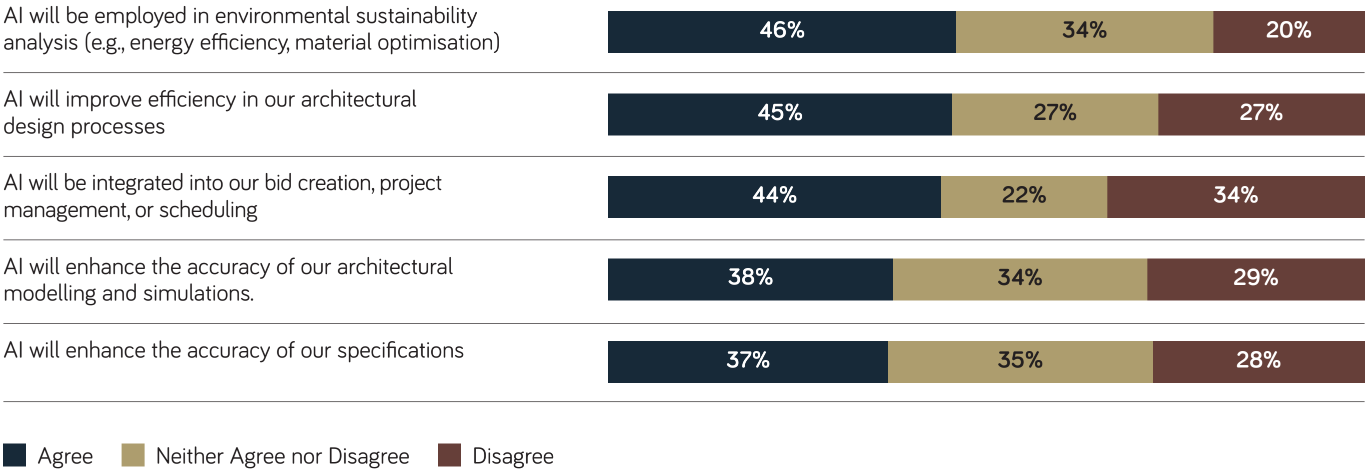
Job losses are a concern for all roles that rely on human intelligence. However, while some respondents are concerned about AI displacing roles, the overwhelming majority do not expect practice employment to be lost to AI.

Turning to the detail, 46% agree that AI will be employed in environmental sustainability analysis (although 20% disagree), and 45% believe AI will improve efficiency in their design processes (although 27% disagree).

AI may also improve design accuracy, with 38% agreeing that AI will enhance accuracy in modelling and simulations (although 29% disagree) and 37% agreeing that AI will improve accuracy in specifications (although 28% disagree).

Respondents are more likely than not to anticipate AI being integrated into their bid creation, project management or scheduling during the next two years, with 44% agreeing that it will, but 34% disagreeing.

Agreement with statements



There are future risks, including elevated risk of design imitation and fee levels becoming insufficient to compensate for increased project complexity.

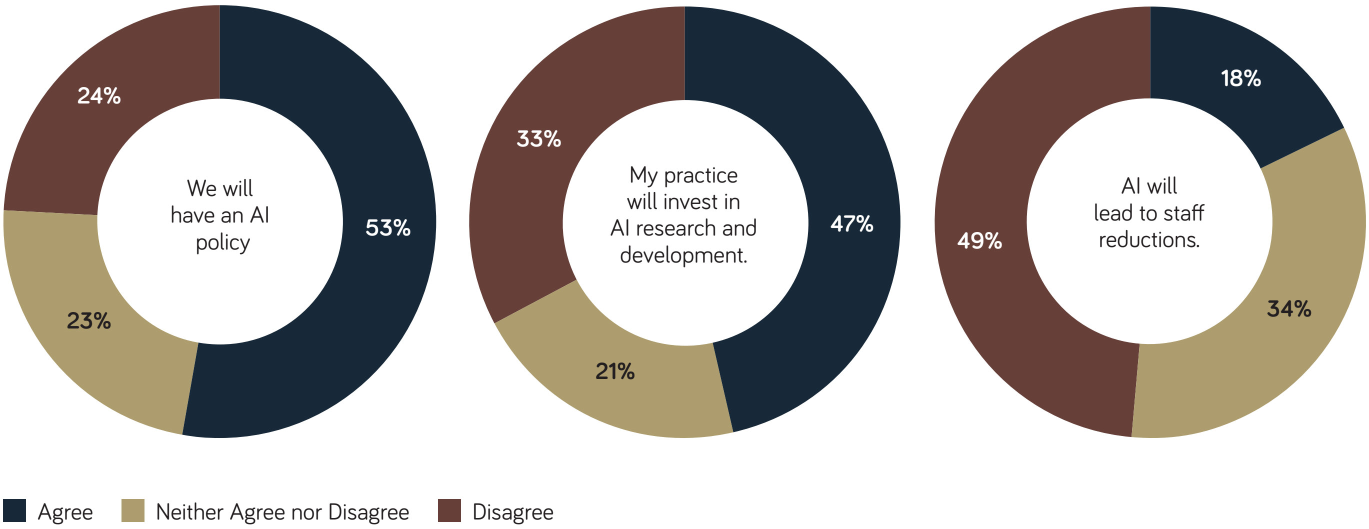
Policy, investment and job displacement

AI is expected to become more formally adopted into practice.

A majority of respondents (53%) expect their practice to have an AI policy within the next two years, and nearly as many (47%) anticipate their practice investing in AI research and development. If AI is set to transform the profession, early investment in research and development makes sense for many practices.

Despite concerns about AI displacing professional roles, only 18% believe that AI will lead to staff reductions, suggesting widespread confidence that AI will be a tool to augment, rather than replace, human expertise.

Agreement with statements



A majority of respondents (53%) expect their practice to have an AI policy within the next two years, and nearly as many (47%) anticipate their practice investing in AI research and development.

Complexity, fees and digital tools

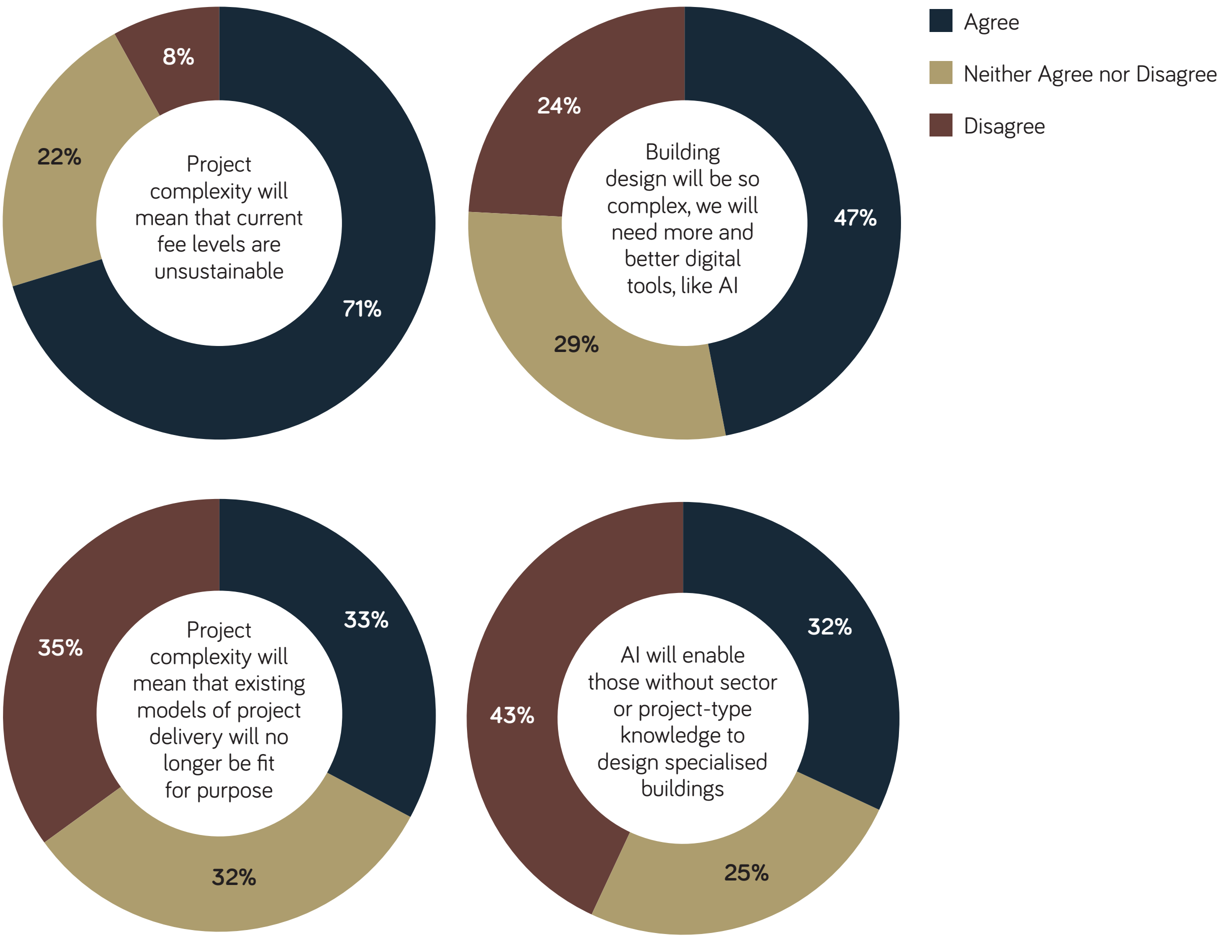
Building projects are becoming ever more complex, allowing innovation in building design, improved building performance and enhanced client outcomes. But this is also increasing the work needed to create designs and oversee their realisation.

Along with other factors, this growing complexity places pressure on fees: 71% of respondents agreeing that current fee levels are unsustainable. Relatedly, 47% agree that building design complexity will require more advanced digital tools, such as AI.

There is an even split on whether existing project delivery models will become obsolete due to complexity, with 33% agreeing they will and 35% disagreeing.

Almost a third (32%) agree that AI will enable those without sector-specific knowledge to design specialised buildings, although more (43%) disagree.

Agreement with statements



Almost a third (32%) agree that AI will enable those without sector-specific knowledge to design specialised buildings, although more (43%) disagree.

Opportunity and risk

Nearly half of respondents (49%) see AI as an opportunity for the profession to meet the growing demand for more and better buildings. However, the profession does not expect the risks of AI to dissipate over the next two years.

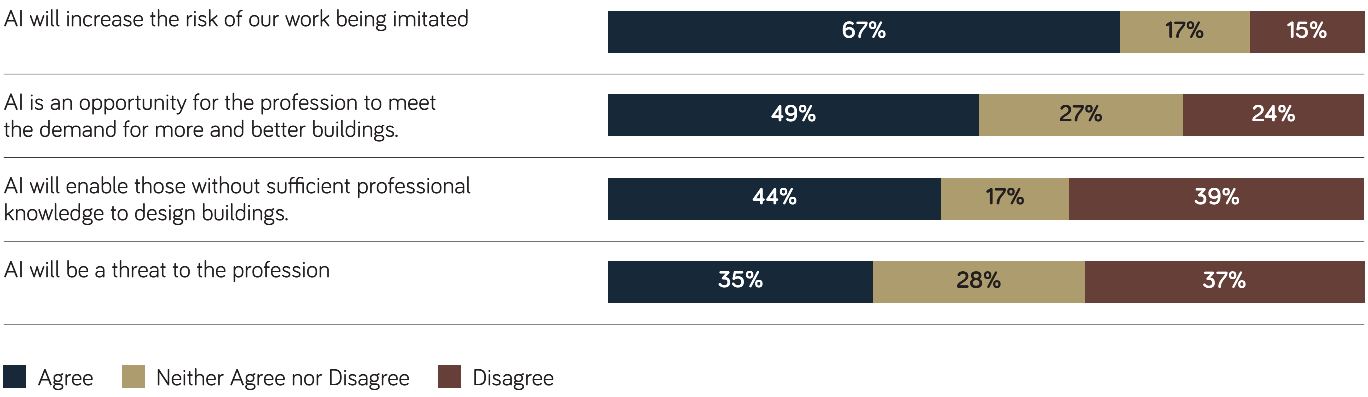
As in other creative industries, AI threatens the preservation of intellectual property (IP). Over two-thirds (67%) agree that AI will increase the risk of work being imitated. Just 15% disagree. Aligned to the risk of imitation, 44% believe AI will enable those without sufficient professional knowledge to design buildings.

The view that AI represents an existential risk to the profession is not held by a majority, with views closely split. Over a third (35%) agree that AI is a threat to the profession, although more (37%) disagree.

Professional judgment and creativity

Despite many respondents holding the view that AI is a risk to the profession, the majority believe that AI cannot replace the architect's professional judgment or human creativity. An overwhelming 91% disagree that AI will be an adequate substitute for professional judgment, and 89% disagree that human creativity will no longer be needed for building design because of AI. While AI may enhance and transform workflows, architectural practice looks set to remain human.

Agreement with Statements



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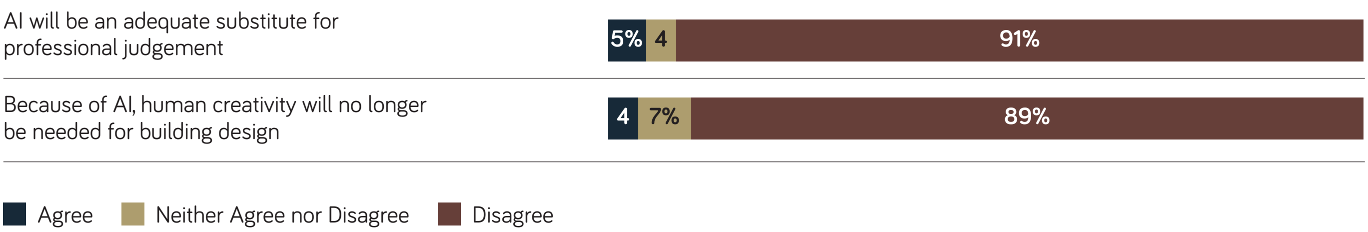


As in other creative industries, AI threatens the preservation of intellectual property (IP). Over two-thirds (67%) agree that AI will increase the risk of work being imitated. Just 15% disagree.

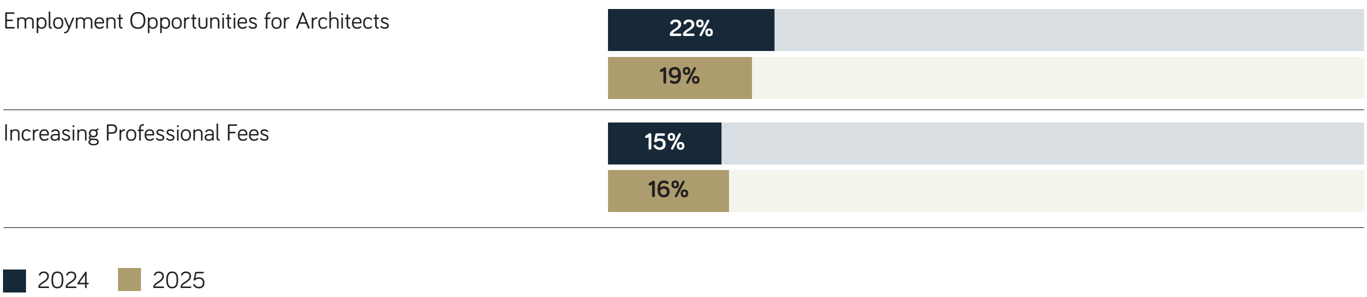
Evaluation of AI

Survey participants shared their views about whether the overall effects of AI would be positive or negative in some important areas. Views tended to be less positive when compared with those from last year, but only slightly. Concerns around employment and fees were most prominent, but many see opportunities for AI-facilitated innovation, creativity and collaboration.

Fees and employment

The profession has significant concerns about the effect of AI on already challenged fee levels and employment opportunities. Just 19% believe AI will improve employment opportunities, down from 22% in 2024, and 49% expect it to have a negative effect. Views are even more pessimistic around fees: only 16% expect AI to have a positive effect, similar to last year's 15%, and half expect a negative effect.

Percent that agree that AI will have a positive effect on employment opportunities and fees

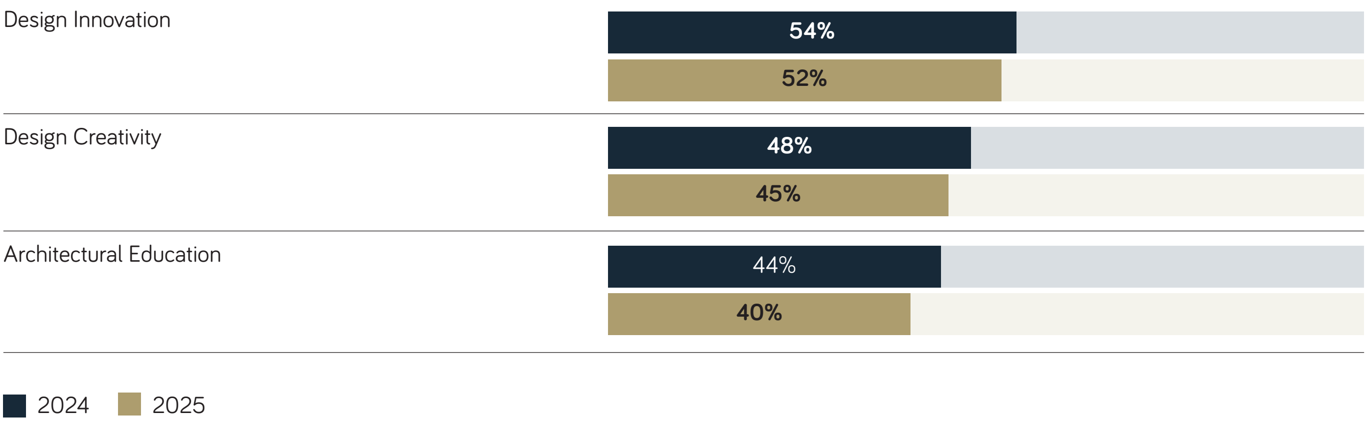


Innovation and creativity

Despite these concerns, many respondents see AI as a route to innovation. A small majority (52%) feel AI will be positive for design innovation (down from 54% in 2024), while 22% feel it will be negative. Views tend to be positive about design creativity as well: 45% are positive (down from 48% last year), although 31% are negative.

The foreseen effects of AI on architectural education are more mixed. While 40% expect AI to have a positive effect (compared with 44% last year), 41% expect the effect to be negative, while 19% foresee it making no difference.

Percent that agree that AI will have a positive effect on Architectural Education, Design Innovation and Design Creativity



Productivity and collaboration

The construction sector has consistently failed to make the productivity gains seen in other sectors. Better collaboration between parties has long been identified as part of the solution to poor productivity.

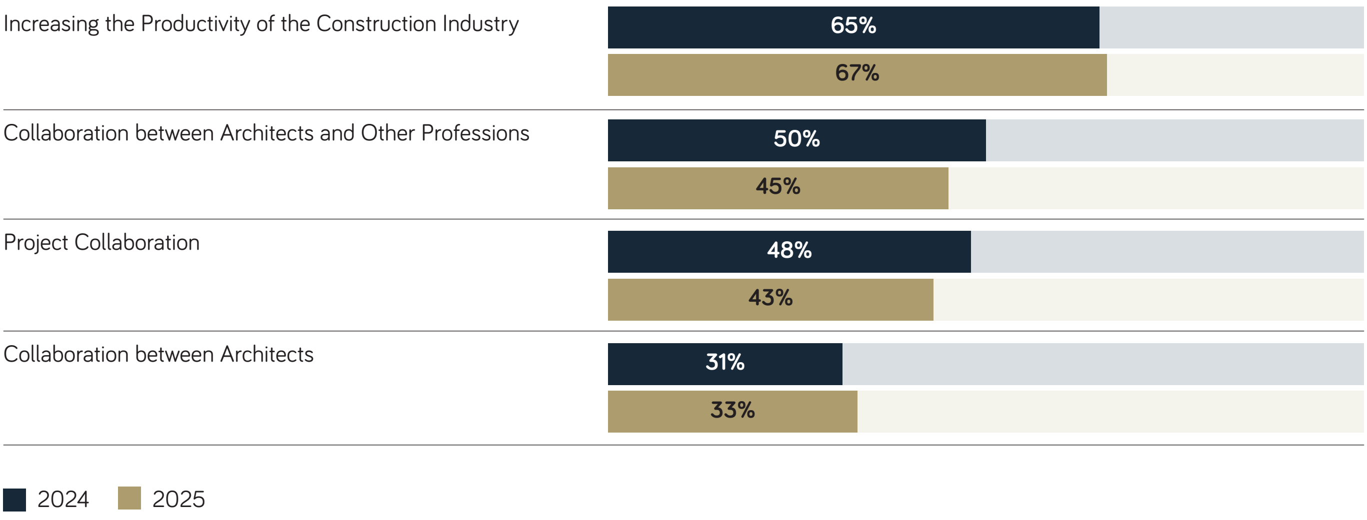
This year, 67% of respondents believe AI will increase construction industry productivity (up from 65% last year), with only 10% expecting a negative effect.

On balance, respondents expect AI to be positive for collaboration. This year, 45% expect it to be positive for collaboration between architects and other professions, while 17% expect it to be negative. For project collaboration, 43% are positive and 14% negative. Thirty-three per cent expect AI to be positive for collaboration between architects, though 22% expect it to have a negative effect.

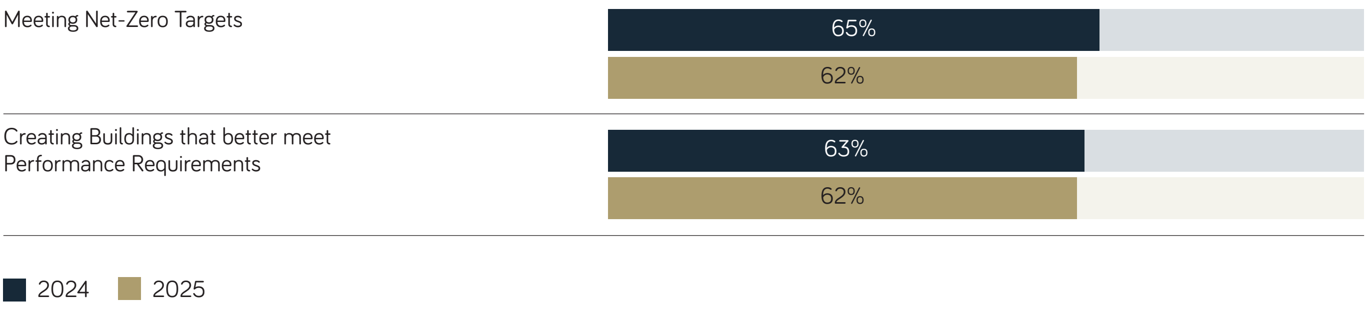
Net-zero and performance

Most respondents believe AI can help the profession meet the urgent and burgeoning need for better-performing, low-carbon buildings. The 2025 results are very similar to 2024's. Sixty-two per cent see AI as positive for meeting net-zero targets (and just 10% negative). Similarly, 62% believe AI will be positive in creating buildings that better meet performance requirements, while only 13% believe it will be negative.

Percent that agree that AI will have a positive effect on productivity and collaboration.



Percent that agree that AI will have a positive effect on building performance and meeting net-zero targets



Final word – ethical considerations

Ethics and AI in architecture

Professions are defined not only by specialist knowledge, developed skills and extensive education, but also by shared ethical standards. For RIBA members, this is the **RIBA Code of Professional Conduct.**[2]

AI, in contrast, is not a profession. While AI models and tools may have ethical constraints coded in, an ethical framework is not a defining feature of AI.

As architects begin to use AI, ethical considerations are coming to the fore. These include large-scale plagiarism in training data, unclear IP rights and ownership, and questions around compensation for contributors whose work underpins AI systems, outputs and profits. Indeed, AI may display the biases, values and assumptions of creators and training data, which may not be shared by the designer or the client.

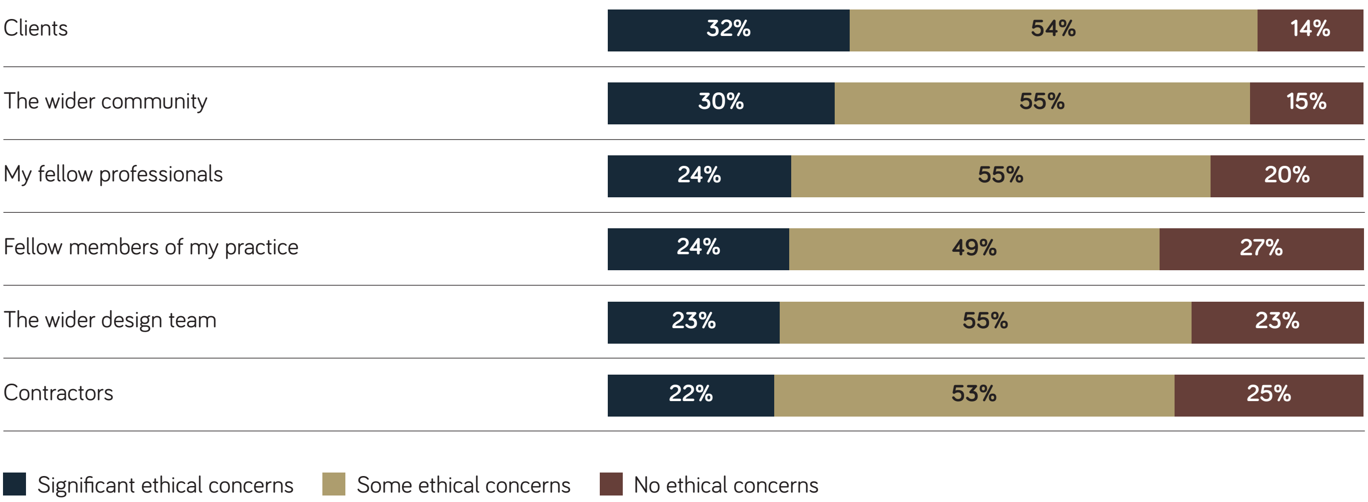
Respondents tend to agree that AI brings new ethical concerns into project relationships. These concerns have become more pronounced this year.

When comparing this year's results with those of 2024, there has been an increase across the board in the proportion of respondents who see either 'significant' or 'some' ethical concerns in their professional responsibilities towards other project parties. For each of the project parties identified, the percentage of respondents who felt there were ethical concerns increased as follows:

- Clients: from 84% in 2024 to 86% in 2025
- The wider community: from 82% in 2024 to 85% in 2025
- My fellow professionals: from 75% in 2024 to 80% in 2025
- Fellow members of my practice: from 65% in 2024 to 73% in 2025
- The wider design team: from 69% in 2024 to 77% in 2025
- Contractors: from 64% in 2024 to 75% in 2025.

While much of the focus on AI has been on technological innovation and digital transformation, as big a challenge is the ethical use of AI. Getting this right is fundamental to the continued professional integrity and standing of architects.

Do you foresee ethical concerns arising out of the adoption of AI, in professional responsibilities towards:



About the survey

The survey ran from January to April 2025, with RIBA members asked to share their views on AI. Just under 500 people responded – our sincere thanks to all who took part. As in 2024, not everyone responded to every question (in part because not every question was relevant to every respondent).

The respondents were self-selecting, so these results are best read as a very good indication of AI in the profession but not as definitive. The RIBA will continue to monitor this fast-developing area, which has the potential to transform the practice of architecture.

[2] https://www.architecture.com/knowledge-and-resources/resources-landing-page/code-of-professional-conduct

AI and design thinking

Nenpin Dimka, Architect at Unknown Architects Ltd and University Lecturer at London South Bank University

Unknown Architects Ltd

Nenpin is a chartered architect, educator, and academic researcher at the forefront of AI applications in architectural practice and education. As RIBA Co-chair of the Expert Advisory Group on AI, Computational Design, and Data, he contributes to developing professional frameworks and RIBA supporting its membership towards integrating emerging technologies.

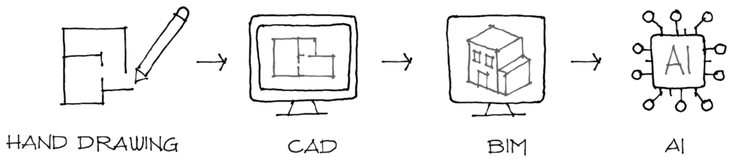
Nenpin's ongoing research into AI applications in architectural pedagogy demonstrates his commitment to advancing educational methodologies and professional practice standards. He also explores how AI can enable addressing systemic challenges in architectural education and practice. Nenpin advocates for inclusive technological advancements in architecture, ensuring AI enhances rather than replaces human creativity and cultural sensitivity.

Introduction

Over the years, architectural design has evolved dramatically as the profession has had to address increasingly complex challenges, ranging from meeting societal needs to addressing environmental sustainability and driving technological advancement. This evolution reflects architects' expanding responsibilities to create innovative, inclusive and resilient designs that respond effectively to contemporary demands.

Throughout its evolution, the architectural design process has leveraged tools that have undergone significant technological transformation in the education and practice stages. These advancements have enhanced architects' capabilities in terms of precision, efficiency and collaboration, but the process remains firmly anchored in fundamental design thinking principles.

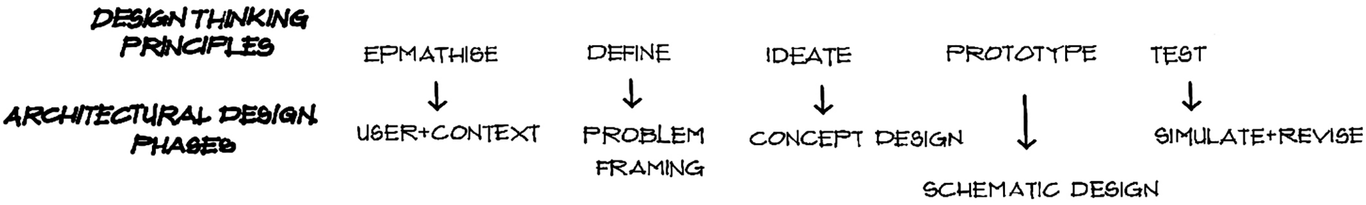
AI is one such development in the historical sequence, representing the latest advancement in architectural tools. AI tools can potentially address significant gaps in producing industry-ready graduates, restoring professional value and addressing the increasingly complex problems architects face.



Mapping design thinking and architectural design

Architects adopting new tools to enhance aspects of design and delivery is not novel. However, the opportunities offered by AI technologies are different, in that the new tools are capable of enhancing each design thinking phase while addressing the complex, data-rich problems of contemporary practice. Design thinking principles – empathy, definition, ideation, prototyping, testing and evaluation – offer a human-centred conceptual framework to problem solving and shape how architects collect data, frame problems, generate concepts, refine proposals and assess outcomes.

To give an understanding of the applicability of AI in architectural design, this article presents an analysis of design workflows through the lens of the tools employed at each stage, from pre-design analysis to final design. This perspective enables us to identify opportunities for integrating specific AI capabilities, so that AI is a supportive tool that aligns with and enhances professional values, helping architects to addresses current challenges.



AI tools in architectural design

The various types of AI tool offer distinct capabilities that align with design thinking principles and enhance architectural design at different phases:

1. At the predesign **(empathise)** stage, large language models (LLMs), such as GPT and Claude, assist architects in developing comprehensive design briefs by simulating diverse stakeholder perspectives and uncovering latent user needs. These AI systems also excel at analysing building codes and regulations, saving time on compliance research. When combined with data analytics and computer vision capabilities, AI tools can process numerous datasets, including environmental, demographic and infrastructure data, to create better-informed and context-sensitive site analysis and design strategies.

2. In the problem framing **(define)** phase, AI tools have revolutionary potential. Generative design platforms, such as Autodesk's Forma and Spacemaker, help architects to define constraints and objectives while also rapidly exploring various data-driven spatial layouts. This rapid iteration supports evidence-based decision-making and enhances early-stage analysis of design options. Meanwhile, AI image generators, such as Midjourney, DALL·E and Stable Diffusion, create high-quality visuals by translating textual prompts, facilitating design narrative development, client communication and aesthetics exploration.

3. The accelerated generation and refinement of the design alternatives at the concept and scheme design stage (**ideation** and **prototyping**) demonstrates the capabilities of AI tools. Parametric and generative design algorithms can automatically explore configurations to meet design goals, such as daylighting, spatial efficiency or energy performance. When integrated with building information modelling (BIM) applications, such as Revit with Dynamo and ArchiCAD, AI tools analyse performance data and predictive analytics to optimise schematic designs through structural, environmental and cost metrics.

4. As design progresses, AI-powered tools enhance prototype testing and design development through performance simulation and optimisation. AI-integrated BIM applications assess thermal, acoustic and energy performance by modelling real-life scenarios. They provide data-driven visual and numerical feedback that flags inefficiencies and suggests improvements. These feedback loops enable data-informed decisions, promoting sustainable solutions while enhancing efficiency and creativity.

5. In the final (**testing**) stage, AI tools enhance design evaluation, validation and communication. AI-driven digital twin environments provide real-time performance feedback, allowing stakeholders to interact with models and understand projected scenario-based outcomes. Tools such as BrainBox AI simulate occupancy patterns, energy use and comfort, enabling teams to validate assumptions with quantitative evidence. This AI-supported process fosters collaborative decision-making, reduces the risk of costly changes, and ensures compliance with user needs and regulations.

Implementation challenges

Despite their potential benefits to the design process, the implementation of AI tools presents significant challenges. Interoperability remains a primary challenge when introducing new AI systems into existing software ecosystems. Naturally, advanced AI applications have digital infrastructure requirements, which present a technical hurdle. For small and medium-sized practices, subscription-based AI tools may present additional investment risks, with the possibility of tools becoming obsolete before their full value is realised. The quality of datasets poses a fundamental limitation; existing data are poorly structured for AI integration, which requires purpose-built, well-structured datasets specifically prepared for LLM ingestion. This data preparation challenge is compounded by significant gaps in the regulatory landscape, as the establishment of standards is still at an early stage. Additional challenges focus on human factors, such as a lack of confidence in generative design software among experienced designers, as well as gaps in training requirements and digital literacy among project design team members.

The integration of AI into architectural practice also raises important ethical considerations that the profession must address proactively. Data privacy concerns may emerge when AI systems collect and analyse sensitive information for design decision-making. Bias in AI training datasets represents another significant challenge, potentially perpetuating discriminatory patterns or exclusionary spatial arrangements. Similarly, uncertainties around authorship and creativity arise when AI influences design decisions. Does liability rest with the designer (architect) or the tool (AI developer) or a combination of the two? Perhaps, the most fundamental consideration should be that the core architectural competencies of critical thinking and human-centred design must remain central to the profession. As such, AI augments rather than replaces the architect's judgment and creative vision.

Academia and practice: closing critical gaps

When approached strategically, AI offers transformative opportunities at the educational, practice and client levels.

Architecture graduates often go into practice with theoretical knowledge but lacking practical competencies in areas such as fire safety compliance, business development and client communication, in which skills are typically acquired through years of experience. AI-enhanced datasets offer a solution to this: educational institutions can develop shared repositories of case-based learning materials covering real-world regulatory scenarios, performance analytics and client interactions. By curating these datasets for AI tools, students can engage with real practice challenges – such as assessing designs against regulations, exploring the financial implications of design choices and developing evidence-based value propositions. This creates a rapid learning environment that compresses years of professional exposure.

At the practice level, AI-facilitated knowledge exchange transforms architecture's traditionally siloed, geographically constrained knowledge base. Practices can document successful project approaches into structured datasets that educational institutions can integrate into studio environments. This establishes a two-way dialogue, where students learn from real-world scenarios while firms benefit from academic research on emerging methodologies. AI tools make this knowledge transfer immediate and interactive rather than delayed and passive.

In conclusion, the collaboration between academia and practice through AI-enabled platforms represents a transformative solution to architecture's historical challenge of quantifiably demonstrating value to its clients. AI-enabled data visualisation creates a shared learning platform where students and practitioners collaboratively develop evidence-based communication approaches. Academia contributes analytical frameworks for assessing design impact, while practices contribute real client interaction scenarios and feedback. Together, AI-powered tools translate complex design decisions into clear narratives about a building's performance, costs and user experiences. This approach equips students with critical communication skills while giving practitioners new methodologies to articulate value, addressing a fundamental industry challenge that neither could solve independently but which AI facilitates through structured knowledge sharing.

Future outlook: from knowledge silos to knowledge systems

Although AI integration into architecture is still in its infancy, with several emerging trends likely to reshape the future of the sector, multimodal AI systems represent a promising frontier, integrating textual, visual and spatial understanding within unified platforms. Cross-disciplinary integration is accelerating as AI bridges boundaries between architecture and adjacent fields. Another significant trend is the democratisation of AI tools, which may help address the current digital divide between large and small firms. Regulatory developments will inevitably shape AI's architectural implementation as standards for AI use become established.

The integration of AI represents an opportunity for the profession to reimagine how architectural knowledge is created, shared and applied. AI tools, when properly integrated with design thinking principles, can augment human creativity rather than replace it. To achieve this vision and establish frameworks at the heart of innovation and core architectural values, industry–academia–professional body collaboration must be encouraged. Further, the profession must embrace AI with enthusiasm for its potential but with a critical awareness of its limitations.

In conclusion, the collaboration between academia and practice through AI-enabled platforms represents a transformative solution to architecture's historical challenge of quantifiably demonstrating value to its clients.

Creating a practice AI policy

Chris Fulton Digital Director

ADP

Chris Fulton is the Digital Director at ADP Architecture, leading their Digital Excellence Group and steering ADP's digital strategy. Through work in both practice and academia, he leads research and development in computational design, automation and artificial intelligence, as well as overseeing digital and BIM delivery. Prior to an established career as an architect, he also has a varied background as a physicist and educator, as well as developing machine learning and software applications in financial and healthcare sectors.

Chris leads the Ethics & Practice workstream for the RIBA's Expert Advisory Group on Data, Computation and AI.

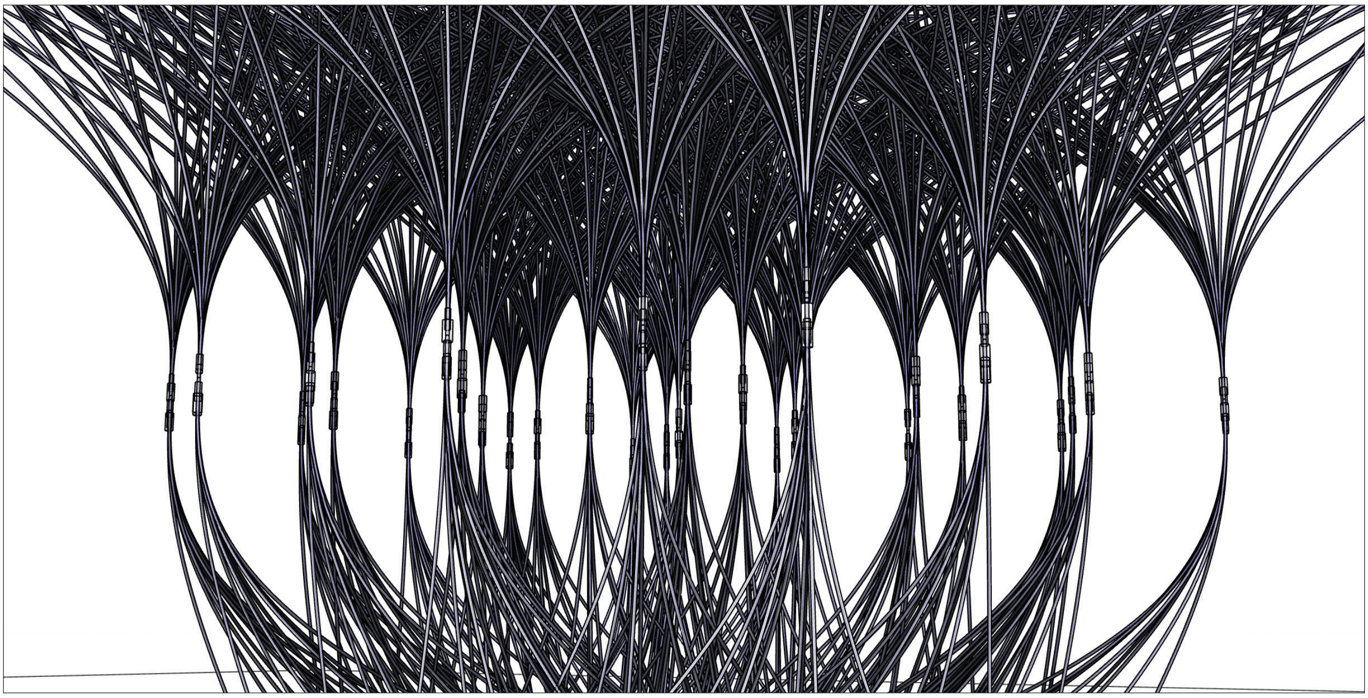
This article outlines what one practice has learned from supporting a critical and considered engagement with AI, through the development and implementation of a policy on the use of new AI tools.

In 2023, during a video call between RIBA corporate members about the possibilities of AI in architectural practice, a key question became apparent: 'Has anyone actually written … an AI policy?'

It was clear that creating a policy on AI (or even defining AI itself) was not a priority for practices. Like practice leaders across the UK, we were all discussing ways in which generative AI models and tools might somehow revolutionise, amplify or disrupt ways of working. But it seemed like we were all considering embarking on a mysterious and exciting voyage of discovery without anything resembling a map.

Of course, this should not really be surprising. Architectural leaders live for the dynamic world of spatial and visual design, of winning projects and seeing them built; not for creating and updating policy documents. Furthermore, the idea of an AI 'policy' seemed laughable – things are changing so fast that a policy would be out of date before it is even finished,

However, the question stuck with me. What our practice needed was a guide to keep us headed in the right direction, regardless of what developments might occur. We needed a good AI policy; one that gives us a framework for informed decision-making, rather than a set of ready-made decisions, and is not a static document that just ends up gathering dust.



Neural network visualisation - Chris Fulton

Team and leadership

One of the most important elements for developing a workable policy is to have the right team. We already had a loosely coordinated group of people with digital expertise, helping with everyday issues thrown up by our technology stack, and onboarding new practice members. They became central to our first policy priority – **to properly evaluate these 'evolving technologies'.** Generative AI text and image generation tools, new iterations of mathematical optimisers and parametric solvers, automated connected application programming interfaces (APIs) and data processing, and workflows that might introduce efficiencies to the design process all featured – this was a chance to unify our wider digital strategy with our approach to AI. Unsurprisingly, a small, committed and digitally savvy group enjoyed and embraced the chance to 'play with new stuff' in a safe and supported way.

The other element to creating a policy is to have the **right leadership**. My own background, prior to becoming a qualified architect, was as a software engineer developing machine learning and big-data systems in healthcare and finance. Being both technically skilled enough to understand the processes underlying AI models and able to lead this team and educate the wider practice was a distinct advantage.

Of course, not every practice has an in-house team ready and willing to be guinea pigs for unknown generative AI tools (which, some may worry, could even end up taking their jobs). And it is rare to be able to appoint someone with expertise in both the technical details of machine learning and architectural leadership. However, it highlights some important questions to ask when establishing a digital/AI policy for your practice: **Who is going to lead?** and **What people, skills and understanding do you already have?** Working within your existing capabilities – instead of trusting digital transformation entirely to an outside party – can lead to long-term sustainable and transformative change.

Goals first

In articulating an AI strategy or policy, it is very easy to fall into one of two extreme positions: see no use for something that's difficult to understand, or to ascribe over-ambitious capabilities and usefulness to new technology.

This problem of extremes is amplified when the conversation is entirely centred on the technology itself. Recall the recent hype around blockchain and smart contracts, when many were beguiled by the new digital tech, but only later asked seriously what they might actually be able to do with it.

This problem is easily overcome, however, by asking the single most important question when forming an AI policy: **What are your goals?** By defining, as specifically as possible, what success would look like for your practice, you can sidestep the distracting conversations about how the technology works (or does not work), and instead articulate and then critically evaluate measurable outcomes.

For example, it is easy to be convinced that image generation models offer huge time-savings; beautiful, fully formed jpegs appear on the screen in no time, prompted from a few words typed into a box. However, when we did an end-to-end evaluation on a small real-world project, we actually found that an experienced architect, using a pen and rudimentary Photoshop commands, was able to produce compelling concept visuals in far less time, and with a great deal more control, than it took one of our testing team to generate and assemble suitable imagery from prompts. The constraints of a real brief made the task very different from generating context-free images in isolation.

For each of your specific AI policy goals, you should write down how you will measure success, and how you can safely test and evaluate the end-to-end impact that a specific technology might have. This approach is technology and platform agnostic, and the idea is to build a learning and critical approach to AI, not to adopt static procedures or standards.

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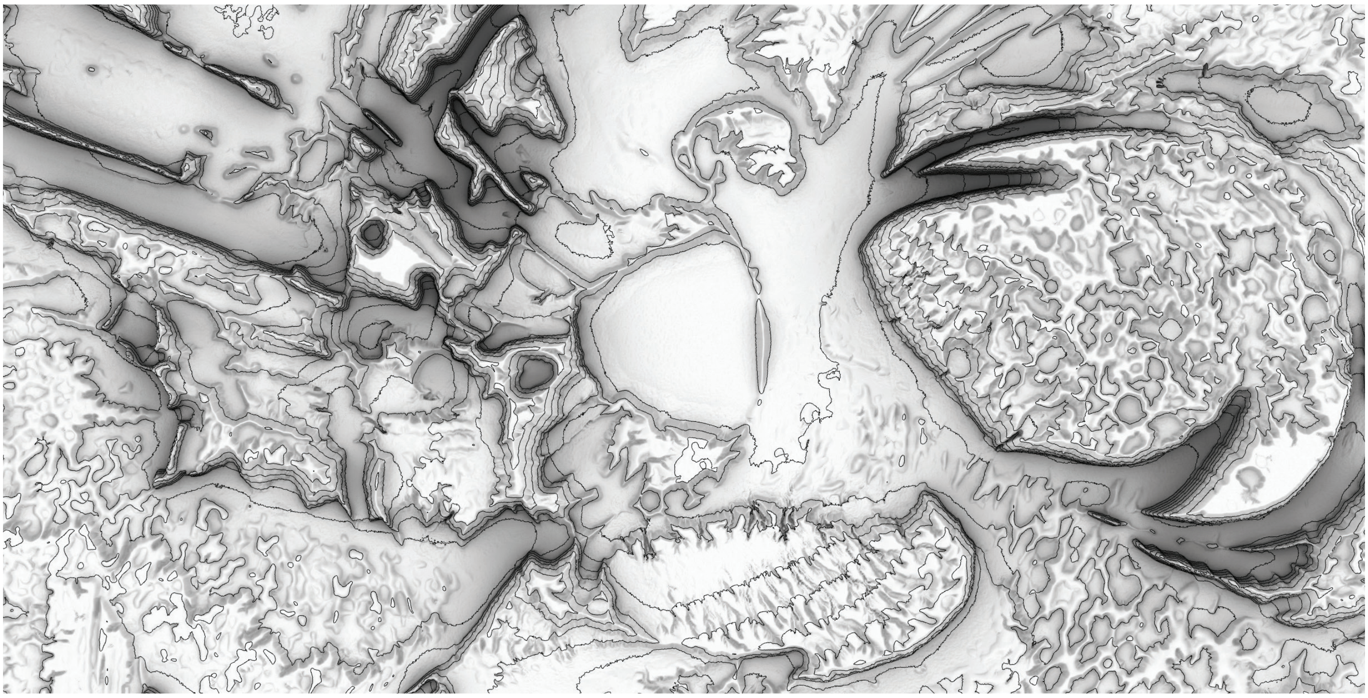

The jagged frontier - Chris Fulton

Trusted information and connected policy frameworks

The AI market is developing rapidly, and it is easy to be swayed by impressive-looking demos or to fall prey to the oft-repeated sales pitch: 'If you aren't quickly adopting AI, you're falling behind'. My advice, from experience, is to ignore the hard sell.

Having AI policy goals and being able to stick to them is incredibly powerful, especially if skills and understanding are limited within your practice. The process of articulating a policy gives you the chance to think critically about your needs, rather than be driven by fear of missing out.

Two types of connection will be key to successful policy implementation:

- alignment with existing policies and procedures within your own practice
- connection with other firms and groups exploring similar issues.

The RIBA convening its AI, Generative Design and Data Expert Advisory Group has been another important step in advancing and supporting best practice. Planning where to obtain the information you rely on to make informed decisions, and making this part of your policy, is a wise move in an uncertain market.

Some questions to ask here may be:

- What is our existing digital and business strategy?
- What are clients looking for in the market?
- Are we set up to be an 'early adopter' firm with a high risk appetite, or are we more likely to benefit from tried-and-trusted technology?
- Who will we turn to for trusted advice?

The Boston Consulting Group[1], in its research on impacts of AI tools in companies, coined the term 'the jagged frontier'. There are arenas where algorithmic models far outstrip human ability – playing chess, for example. There are others where machine learning models are nowhere near as good as a qualified human expert, especially tasks requiring wide contextual and domain knowledge. Delegating the wrong kind of task to an AI model might be like replacing your most experienced architect with a student. An AI policy that provides a route to exploring this 'frontier' is going to bring more protection than one that just focuses on legal or compliance issues.

By seeing practice policies as holistic, you may also find that working on the fundamentals of good project and building information modelling (BIM) management, for example, not only pays dividends in realised efficiencies today, but also gives you the benefit of having the right data foundations for continued machine learning developments in the future. Expanding digital capabilities and taking advantage of AI is a long-term venture, so spending time on the fundamentals could give better returns than you would get from buying into a specific AI platform or tool.

An under-emphasised corollary to this is that you shouldn't limit AI use to architectural tasks, which you are already expert in. It may be more useful to have a good grasp of what you don't know, rather than what you do, and to make best use of these tools in areas where you are not already an expert. Making large language models (LLMs) available for practice members who work on business strategy, management, IT or operational infrastructure, for example, might greatly benefit those who were never taught such things in architecture school!

[1] https://www.bcg.com/capabilities/artificial-intelligence/insights

Permitted use

Ultimately, a policy will need to outline some simple rules on AI use in the practice. The approach that we opted for was 'permitted use', which tries to list specific tools for specific purposes. Given the changing nature of the landscape, we committed to reviewing the list every six months.

For an AI tool to be permitted for use, it must not only have demonstrable value, but also be acceptable in terms of legal alignment, compliance, liability, financial and environmental factors. Having an AI policy can help in addressing these issues.

The following issues might be deal breakers when applied to generative AI:

- Where is your data stored or processed?
- Will future models be trained on interactions with your company?
- Who 'owns' the output of this model?
- Will your professional indemnity insurance cover this kind of use of AI?
- How might deploying this kind of tool affect your net-zero ambitions – might your Scope 3 emissions be impacted?

We were particularly interested in expanding the practice's sustainability capabilities. As part of this effort, we applied predictive models to specific site analyses and environmental simulations, thereby speeding up the process from hours to seconds. However, as we needed to ensure compliance and remain within the limits to our professional liability, the use of these accelerated approaches had to be limited to indicative examples, rather than for generating fully calculated outputs.

In communicating with the practice more widely, we found it helpful not just to list the permitted tools, but also to give narratives based on use cases, explaining why a certain use case is more restrictive, and perhaps giving examples (often surprisingly entertaining) of how generative models can get things very wrong.

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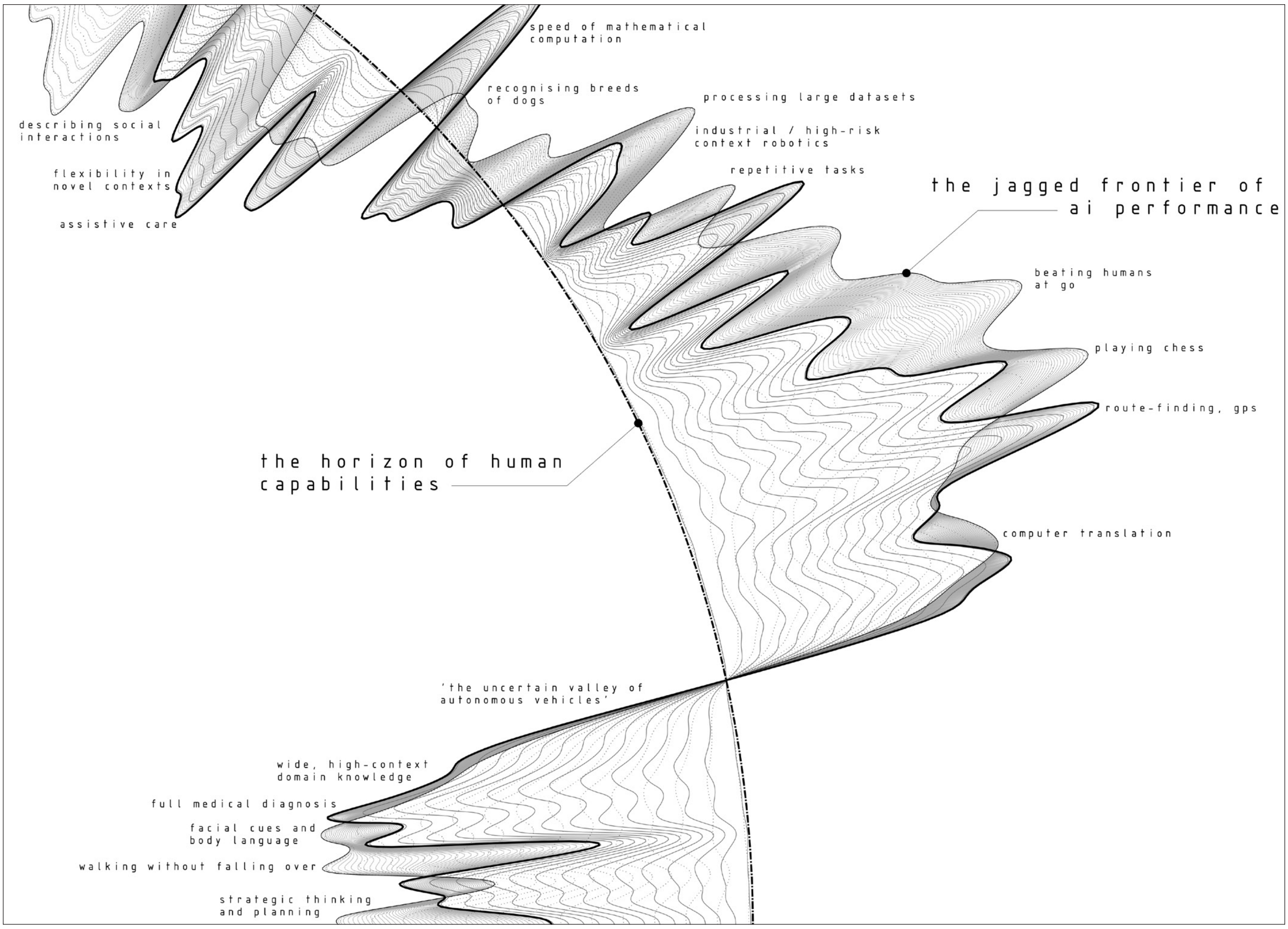

The jagged frontier - diagram - Chris Fulton

Launching and reinforcing

Communicating a new policy or change in practice can take time. It requires **building awareness, explaining the benefits** to everyone, and laying out **clear explanations and memorable storytelling** to help **embed a culture,** rather than a set of rules. Again, relying on leadership and team for driving digital change is key.

It has been interesting to reflect on the varied responses to the permitted use policy we launched in late 2023 and to compare it with normal practice today. People across the practice have become familiar with the limitations of existing tools, as they have engaged with, and found the limits of, the jagged frontier. Our permitted use list has settled into a steadier state, focusing on those tools with real value. Most people are aware of the legal, compliance and financial risks associated with overreliance on hallucination-prone output. And, of course, a number have simply stuck to tried and tested ways of working, as everyday pressure dampens enthusiasm for risking new approaches.

Adoption has been most successful where there is no obvious change for an end-user. For example, linked with a digital strategy around early-stage design tools, we have introduced Autodesk's FORMA as a standard workflow. Machine learning-powered environmental tools built into this platform make it possible to consider sustainability metrics much earlier in a project, but no-one is particularly aware of a large piece of 'AI' branding on the tool.

Like previous machine learning breakthroughs in, for example, route finding, chess playing, voice and character recognition, translation, industrial robotics and virtual assistants, successful algorithmic technology has become commonplace and accepted, to the level that it isn't really seen as 'AI' anymore. Perhaps this will provide a helpful perspective for the next stage of this particular voyage; transformative and valuable technologies may emerge and become embedded more slowly than some may like, but groups of architects with good guidance and support have proven to be more than able to engage with new AI technology on the basis of real-world performance rather than loud marketing.

AI, digitisation and the future of offsite manufacturing

Eva Magnisali Founder and CEO

DataForm Lab

Eva Magnisali is the founder and CEO of DataForm Lab, a construction tech company accelerating the adoption of automation in offsite construction. DataForm Lab's software platform seamlessly links design and manufacturing: it enables manufacturers to automatically configure projects, instantly translate designs into production drawings and machine code, and simulate and optimise factory operations through dynamic scheduling.

The construction industry faces intensifying pressure to deliver projects faster, more affordably and with greater sustainability. Offsite manufacturing – the prefabrication of building components in controlled factory settings – is often presented as the solution to these demands. While its advantages are well documented, offsite manufacturing also introduces new complexities: intricate workflows, design variability, supply chain vulnerabilities and production bottlenecks.

As offsite methods mature, it is becoming increasingly evident that digitisation alone is not sufficient. Without structured data, integrated workflows and a strategic application of AI, the sector risks merely digitising inefficiencies instead of resolving them.

This article explores why the future of offsite construction hinges not just on digitising information, but on intelligently structuring it – and how AI, when built on the right digital foundations, can transform the way the industry designs, manufactures and delivers projects.

Beyond digitisation: why offsite manufacturing needs AI

The first wave of construction digitisation replaced paper drawings, schedules and reports with digital files and 3D models. However, digitising documents is not the same as digitising processes. Offsite manufacturing demands the coordination of dynamic variables: different design options, fluctuating factory capacities, variable material availability and shifting project timelines.

Traditional, linear workflows struggle under this complexity. They often fail to respond quickly to change, resulting in production delays, resource wastage and lost opportunities for optimisation.

AI offers a way to overcome these challenges. When properly implemented, AI can help offsite manufacturers predict factory performance, prescribe optimal production strategies, and simulate 'what if' scenarios to anticipate disruptions. Yet AI is not a magic wand. Its effectiveness depends on the quality and consistency of the data it operates on. Fragmented or siloed information limits AI's potential to generate actionable insights.

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Structured data: the foundation for intelligent manufacturing

One common mistake in construction is to treat AI as something that can simply be layered onto existing digital systems. Without structured data – consistent, connected information that links design rules, production constraints and scheduling logic – AI tools end up working with incomplete or inconsistent inputs.

The manufacturers who achieve real and scalable improvements are those who structure their data from the outset. In a structured environment, design models are directly linked to manufacturing rules, bills of materials (BOMs) are synchronised with live inventory levels, and production schedules adjust dynamically based on real-time factory conditions.

At DataForm Lab, we focus on building these structured digital foundations. Our Project Configuration Tool, for example, embeds manufacturing logic directly into the algorithm that automatically configures products. As a result, production drawings, BOMs and even machine code are not only generated and updated automatically when design parameters change, but also optimised for manufacturing performance. Structured workflows do not restrict design freedom – they enable controlled variation, allowing manufacturers to adapt products flexibly while maintaining manufacturing efficiency.

How AI unlocks new possibilities in offsite construction

With structured digital workflows in place, AI can be deployed far more effectively across the offsite manufacturing process.

AI-driven predictive analytics allow manufacturers to forecast production lead times, identify potential bottlenecks based on specific design scenarios, and assess risks such as supply chain disruptions. Rather than reacting to problems after they occur, manufacturers can plan proactively, minimising downtime and waste.

Prescriptive analytics, meanwhile, move beyond forecasting to suggest optimal courses of action. Simulation modelling can recommend how best to sequence production, balance workloads across stations, or allocate materials and labour to maximise throughput. Tools such as the DataForm Lab Platform integrate these capabilities, dynamically adapting production plans as conditions evolve.

Perhaps most powerfully, AI supports simulation and 'what if' analysis. Manufacturers can test different strategies virtually – adjusting product design parameters, changing factory layouts or modelling demand spikes – and immediately see the impact on factory performance. Tools that embed this capability – such as DataForm Lab's Factory Automation Tool – give manufacturers the ability to stress-test decisions before making capital investments.

Simulation modelling can recommend how best to sequence production, balance workloads across stations, or allocate materials and labour to maximise throughput.

AI as an afterthought versus AI built on structured foundations

The difference between applying AI after digitisation and embedding AI into structured digital processes cannot be overstated.

When AI is treated as an afterthought – a layer added onto fragmented systems – its results are inconsistent, its responsiveness is limited and its impact is incremental. In contrast, when AI is built on structured foundations, it becomes a dynamic, real-time optimisation engine, capable of scaling performance across an entire manufacturing operation.

Manufacturers who understand this difference and invest in structuring their digital environments will be the ones who lead the next phase of industrialisation in construction.

Conclusion: from digital to intelligent

The future of offsite construction will not be defined by who digitises the most documents, but by who builds the most intelligent systems.

Structured data and AI are not standalone solutions. Together, they allow offsite manufacturers to design, produce and deliver better projects – with greater flexibility, higher quality, lower costs and reduced environmental impact. By embedding configurability, dynamic scheduling and simulation into their workflows, manufacturers move beyond digitisation and into true operational intelligence.

At DataForm Lab, we are committed to supporting this transformation. Our platform seamlessly connects design automation, production scheduling and factory automation, helping offsite manufacturers to scale sustainably and meet the complex challenges of modern construction.

The next phase of innovation in construction will be led by those who structure their data, connect their processes and leverage AI not as a tool of convenience, but as a core enabler of operational excellence.

About DataForm Lab

DataForm Lab is a technology company specialising in digital process automation for offsite construction. Our platform links design and manufacturing through automatic project configuration, dynamic production scheduling and factory automation simulation, helping manufacturers build scalable, sustainable operations.

www.dataformlab.com

AI as catalyst: how I formed my ethos, built my brand and founded my practice

STF

Tim Fu Founder and Director

Studio Tim Fu

Tim Fu is a renowned designer recognised for his pioneering use of AI in architecture. Emerging from the research team at Zaha Hadid Architects, he founded Studio Tim Fu, a high-tech architectural practice pioneering in the integration of AI into visionary designs. As a prominent voice in the field, his work has been showcased at conferences and exhibitions worldwide. Leading a specialised team of architects and technologists, he undertakes projects around the globe. Through his design and technological insights, Tim has amassed a significant online following, establishing his influence as a thought leader in the industry.

A personal view.

My first encounter with AI wasn't part of a grand vision. It was simply an experiment. I began exploring by prompting chair designs using Midjourney, as I was curious to see what machine creativity can yield. The results were rather unrefined, but the variation was staggering. In minutes, I had dozens of iterations. That moment sparked a realisation: AI could completely reframe how we approach design exploration.

As I delved deeper, I began to learn how to control AI outputs with my own design intuition. I prompted models using reference projects that inspired me, images of my previous work, and words that describe ideas preconceived in my mind. This wasn't about handing design over to a machine, it was about creating a feedback loop between human and AI. The process became collaborative, and out of that emerged a new design workflow, one where I could rapidly communicate with clients, publications and peers.

This process didn't just accelerate my design thinking, it became the foundation of a personal brand. I started sharing this work online, using platforms such as Instagram and LinkedIn not only as portfolios, but as test ground for new ideas to the public. The response was immediate. People weren't just interested in the visuals, they were drawn to the ideas behind them. AI helped me communicate design thinking with clarity and frequency and, in doing so, I quickly established a reputation beyond the shadow of my former role.

At the time, I was still working at Zaha Hadid Architects (ZHA), where I was part of the computational research team. My role focused on rationalising complex geometries into feasible construction. This specialisation worked well in conjunction with AI design, where every prompted design possibility is evaluated against the realities of material, structure and delivery. At this point I began investigating further possibilities of integrating AI into the architectural process.

Studio Tim Fu: Concrete Timber Symphony

Studio Tim Fu: Concrete Timber Symphony

Eventually, I felt it was time to take those principles further, into the field of practice. In mid-2023, I left ZHA to pursue an independent path. What started as a solo venture quickly picked up momentum. The visibility I had built online through AI-driven design exploration helped attract initial freelance opportunities. These early projects – though modest – proved critical. From interior design to film sets, they allowed me to test AI workflows with real clients, refining how to use generative models, optimisation tools and large language models (LLMs) in fast-paced, professional settings.

By the start of 2024, I formally launched Studio Tim Fu. Within a year, the practice had grown from one person to ten, assembling a team of architects, designers, technologists and coders. Together, we built a hybrid creative–engineering pipeline powered by AI – accelerating concept design, streamlining communication, and making advanced visualisation and optimisation part of the everyday process.

That momentum led to our commission for the Lake Bled Estates – a milestone project for the studio. Set beside Slovenia's most protected natural landmark, the project challenged us to deliver a luxury residential concept that also respected strict heritage constraints. AI helped us explore contextually responsive massing, simulate environmental performance and navigate regulatory codes in record time. It was a rare case where technology enabled design ambition and heritage sensitivity to coexist, a perfect opportunity to showcase how AI can address strict requirements.

The project has since garnered global attention, but what matters most to us is what it represents: AI is not just a novelty – it is a viable, responsible and future-facing tool for architecture. Used thoughtfully, it frees designers to focus on the parts of architecture that matter most – culture, emotion and experience.

As the studio matured, we deepened our investment in R&D. We partnered with Nvidia and Microsoft to develop a real-time AI rendering prototype, later exhibited at Autodesk University 2024. Our custom workflows now span from early ideation to construction documentation, with ongoing experiments in LLM-based building information modelling (BIM) and automated specification writing.

London has played a key role in this journey. As both a global hub for architecture and a growing centre for AI innovation, it offers a unique environment in which to prototype the future of our profession. Here, we have had the opportunity to attend various conferences, such as NXTBLD, CogX and London AI Summit, which provide platforms for exchanging ideas and building collaborations with tech leaders. This confluence of creative and technical culture made London an ideal launch pad for a new type of architectural practice, one that is accelerated by AI technologies.

Looking ahead, we see AI as an amplifier. It allowed a small studio like ours to scale up rapidly while competing with industry giants. It empowers designers to focus less on production and more on human-centric design. And it creates space in which to experiment, iterate and push boundaries faster than ever before.

If I could offer one message to the profession, it's this: don't wait. AI is here, and it's evolving rapidly. Just as computer-aided design (CAD) redefined our standard of practice a generation ago, AI will inevitably be the next default tool. As more work will be automated, we must identify our values as humans. We will no longer be valued as producers of form and drawings, but as curators of meaning. I believe the sooner we embrace this shift, the more agency we will have in shaping what comes next.

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