GIRI

Get It Right Initiative

ARTIFICIAL INTELLIGENCE AND ERROR REDUCTION THE OPPORTUNITIES AND CHALLENGES

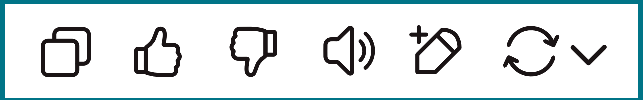
RESEARCH REPORT

July 2025

HEY CHATGPT, PLEASE SUMMARISE THIS REPORT IN 60 WORDS

HERE IS A 60-WORD SUMMARY OF YOUR GIRI AI AND ERROR REDUCTION REPORT:

This report explores how artificial intelligence can reduce errors in construction—while also highlighting the risks AI itself may introduce. It outlines practical use cases, best practice case studies, and guidance on safe deployment. GIRI calls on contractors, software providers and policymakers to adopt assured, human-in-the-loop AI strategies to improve quality, reduce waste, and enhance productivity across the industry.



ChatGPT can make mistakes. Check important info.

“THE AI REVOLUTION ISN’T OVERHYPED – IT’S UNDERHYPED. THIS IS THE MOST IMPORTANT DEVELOPMENT IN THE LAST 500-1,000 YEARS. WE’RE ENTERING A NEW ERA, IT’S COMING FAST, AND WE CAN’T SCREW IT UP.”

Eric Schmidt, Former CEO and Executive Chairman of Google speaking in a TED Talk, April 2025

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FOREWORD

FOREWORD BY CLIFF SMITH, EXECUTIVE DIRECTOR, GET IT RIGHT INITIATIVE

GIRI was established in 2015 to create a construction industry that gets it right first time – improving quality, productivity and safety while reducing waste and rework. Our mission has always focused on equipping people with the tools, knowledge and culture they need to eliminate error at source.

In 2016, our original research report identified 17 root causes of error. In 2023, our Technology Report explored how emerging digital tools could be deployed to tackle these causes directly.

At the same time, we re-established the GIRI Technology Working Group to bring together construction leaders and software providers in a collaborative forum to accelerate innovation that genuinely addresses industry challenges.

This new report builds on that foundation and turns its attention to artificial intelligence – one of the most transformative technologies of our time. AI holds huge potential to improve decision-making, automate routine tasks and reduce avoidable mistakes. But it also brings new risks, especially if used without sufficient care, context or assurance. In high-hazard sectors such as construction, we must tread carefully.

What emerges from this report is a balanced message of opportunity and responsibility. AI could become a powerful ally in the effort to reduce construction error – but only if we deploy it wisely, with the right safeguards in place. We hope this document offers useful insight, highlights practical applications and encourages further engagement from both construction professionals and technology developers.

Cliff Smith
July 2025

> “AI COULD BECOME A POWERFUL ALLY IN THE EFFORT TO REDUCE CONSTRUCTION ERROR – BUT ONLY IF WE DEPLOY IT WISELY, WITH THE RIGHT SAFEGUARDS IN PLACE.”

EXECUTIVE SUMMARY

The construction industry faces long-standing challenges around productivity, quality and workforce shortages. At the same time, avoidable errors continue to cost the UK sector an estimated £10–25 billion annually. Artificial Intelligence (AI) offers a compelling opportunity to address these issues – improving accuracy, reducing waste and supporting safer, more efficient delivery.

This report, produced by GIRI, explores how AI can be used to help reduce errors across the construction lifecycle, while also recognising that AI itself introduces new risks. Based on industry interviews, case studies and desk research, the report identifies how AI is currently being used, what barriers exist and what strategies will help maximise its benefits.

KEY FINDINGS:

- AI adoption in construction is growing but remains largely exploratory, with most firms trialling generative AI tools in low-risk use cases such as documentation or meeting notes.

- AI has significant potential to reduce error in areas such as design, scheduling, quality control and project management particularly when paired with structured data, clear workflows and human oversight. The main categories where AI could have greatest impact are:
  - Poor planning and design
  - Inadequate project management
  - Quality control and compliance
  - Human error

- AI tools themselves can introduce errors, especially through hallucinations or incorrect assumptions. This is a particular concern in high-hazard environments such as construction.

RECOMMENDATIONS:

For contractors and others working in construction:

- Focus AI investment on high-impact error sources.
- Conduct risk assessments before deploying AI tools.
- Embed assurance into AI workflows – using techniques such as chain-of-thought reasoning, human-in-the-loop validation and assurative AI.
- Establish internal policies and safeguards to prevent unauthorised or inappropriate use of AI.

For software providers:

- Prioritise error reduction as a use case in product roadmaps.
- Develop verification tools to assure outputs from generative AI.
- Integrate AI into lessons learned and quality management systems as early examples of how AI can support and improve existing tools.

GIRI itself will:

- Promote AI for error reduction across the sector.
- Expand the Best Practice Casebook it published in November 2024 to include AI examples.
- Be an advocate for safer, assured uses of AI, and champion ways of doing this for construction.

AI will not solve construction's problems alone – but used wisely, it could become a powerful force for good to help reduce error and improve outcomes across the industry.

INTRODUCTION

ABOUT GIRI AND THIS REPORT

The Get It Right Initiative (GIRI) is a not-for-profit membership organisation that has adopted a multi-disciplinary approach to tackling error. Its members include clients, consultants, contractors, regulators, educators, professional institutions and trade bodies who are working together to raise awareness about the challenges of error – and to eliminate it at source.

Its goals are to:

- Create a culture and working environment to get it right from the start.
- Change attitudes and harness leadership responsibility to reduce error and improve construction quality, productivity and safety.
- Engage all stakeholders in eliminating error from inception, through operation, to completion.
- Share knowledge about error reduction processes and systems.
- Improve skills across the sector, creating a positive approach to pre-empting error.

WHAT ARE ERRORS AND WHY DO THEY OCCUR?

GIRI's definition of an error is any action or inaction that results in a requirement for re-work, a requirement for extra work or produces a defect. (A defect is any failure to meet the project requirements at a handover.)

Errors can occur across the whole construction lifecycle: from upstream processes including raw materials processing and manufacturing, through to construction, commissioning and handover.

In 2016, GIRI produced a research report[1] on improving value by eliminating error. The research team used a 'Grounded Theory Method' to collect and analyse information on error in the UK construction industry. It identified the most financially significant causes of error and the most effective methods for avoiding or minimising the consequences of error. Figure 1 below, taken from the report, shows the 17 most prominent root causes of error, ranked by importance.

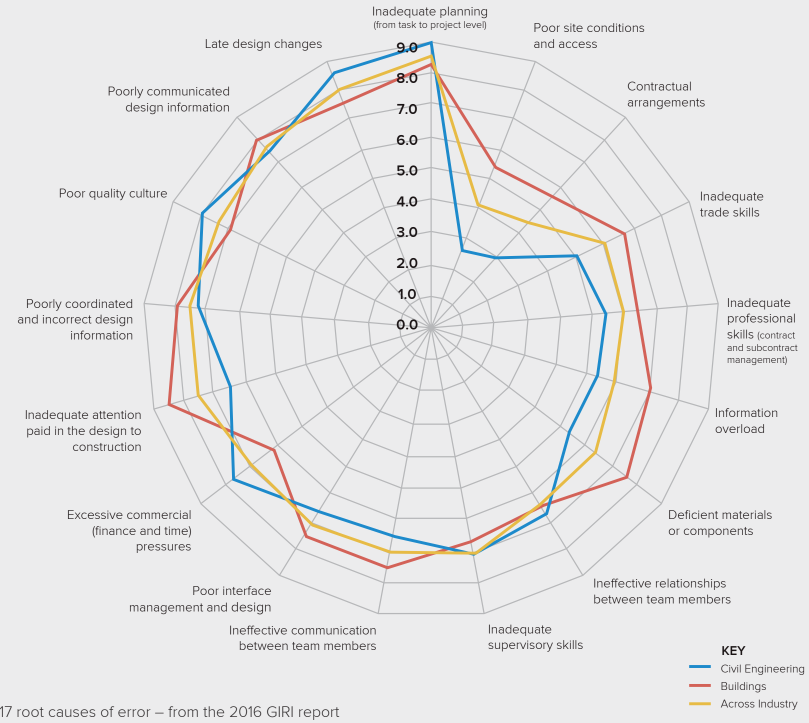


Figure 1 - 17 root causes of error – from the 2016 GIRI report

[1] Get It Right Initiative - Improving value by eliminating error. Research Report, April 2016. www.getitright.uk.com/live/files/reports/3-giri-research-report-revision-3-284.pdf

THE GIRI TECHNOLOGY WORKING GROUP

GIRI has established a Technology Working Group that brings together construction and design managers facing quality management challenges along with technology developers who are creating software and tools specifically designed to reduce errors. Meeting monthly, this collaborative forum facilitates the exchange of ideas and best practices, creating valuable connections between industry problems and technological solutions.

To date the Group has produced two reports about the use of technology to reduce errors. These are:

- ***The Use of Technology to Reduce Errors In Construction***[2] (October 2023), which suggested eight categories of construction technology that may best support error reduction.
- An error reduction ***Best Practice Casebook***[3] (November 2024), which builds on the eight categories and presents 18 case studies that show how technology solutions are actually being used on construction projects to reduce error and improve productivity.

ABOUT THIS REPORT

This report builds on the two previous ones and focuses specifically on the opportunities and challenges in using Artificial Intelligence (AI) to help reduce errors. It not only covers error reduction and quality management, but also the worry that AI may itself introduce a new potential for errors, through the probabilistic way in which it operates and mimics human-like intelligence.

AI should only be used in a high-hazard, highly-regulated environment such as construction if it is trusted, and where what it generates can be relied upon, substantiated and assured.

The report is structured around the following Sections:

- An explanation about AI – what it is and the different types (deep learning, generative (LLMs), computer vision and agentic etc). (**Section 2**).
- How AI is currently being used in construction and the way in which this is likely to develop. (**Section 3**).
- The particular challenges of error reduction and quality management – and what AI may be able to offer. This includes relevant examples of start-ups and technology providers who are exploring or using AI in this space. (**Section 4**).
- The concern that AI may introduce a new potential for errors, and how the risk of this can be managed and reduced. (**Section 5**).
- The implications of the analysis in this report for contractors (and others in construction), software providers and GIRI itself. (**Section 7**).

The report was based on desk research and semi-structured interviews with quality and construction managers, technology providers and AI professionals. The authors of this report are grateful to the following companies who have contributed: Cumulus, IBM, Inframatic, Lessons Learned Solutions, Mabey Hire, Qualomate, Mclaren Group, Sablono, Taylor Woodrow, Visibuild and Willmott Dixon.

[2] The Use of Technology to Reduce Errors in Construction – October 2023 – available at: https://getitright.uk.com/live/files/reports/11-giri-brochure-layout-d014-singlepages-212.pdf

[3] The Use of Technology to Reduce Errors in Construction Best Practice Casebook – November 2024 – available at: https://getitright.uk.com/live/files/reports/13-giri-technology-report-nov24-web-826.pdf

2. BACKGROUND ON AI

INTRODUCTION TO ARTIFICIAL INTELLIGENCE (AI)

AI is currently dominating headlines and public debate, with many commentators suggesting it will transform not only how we work but the very structure of society itself.

At its core, AI refers to computer systems designed to perform tasks typically requiring human intelligence. These systems analyse data, recognise patterns, make decisions and learn from experience without explicit programming for every scenario.

Modern AI spans a spectrum from narrow or 'weak' AI, which excels at specific tasks (such as image recognition or language translation), to more sophisticated systems capable of reasoning across domains and adapting to new situations. AI applications generally fall into two broad categories:

- **Predictive AI:** These systems analyse historical data to forecast future outcomes. They typically answer 'closed' questions such as "Is this transaction likely to be fraudulent?" or "Does this patient show indicators of a particular medical condition?" Predictive AI is excellent for identifying patterns and correlations within structured datasets.

- **Generative AI:** These systems create new content text, images, audio, or code – based on patterns learned from vast training datasets that can be trained on both structured and unstructured data. Tools like ChatGPT or image generators such as DALL-E are high-profile examples of generative AI. Rather than simply predicting outcomes, they produce novel outputs that statistically resemble their training examples.

Predictive AI can be seen as a sophisticated, multi-dimensional correlation system, far beyond the statistical techniques taught in schools. Generative AI functions like an extraordinarily advanced version of predictive text – offering outputs based on the most likely next word, phrase or image.

Neither system possesses 'intelligence' involving true comprehension; they follow algorithmic programming to deliver optimal responses, learning and improving with each iteration. This means that both approaches can make mistakes and the reason and rationale for their output may be hard to follow and substantiate (i.e. they may resemble a 'black box' solution.)

Nevertheless, the ability of both predictive and generative AI to perform complex tasks and produce meaningful outputs continues to advance at a remarkable pace, with enormous opportunities (and challenges) for construction, as for other sectors too.

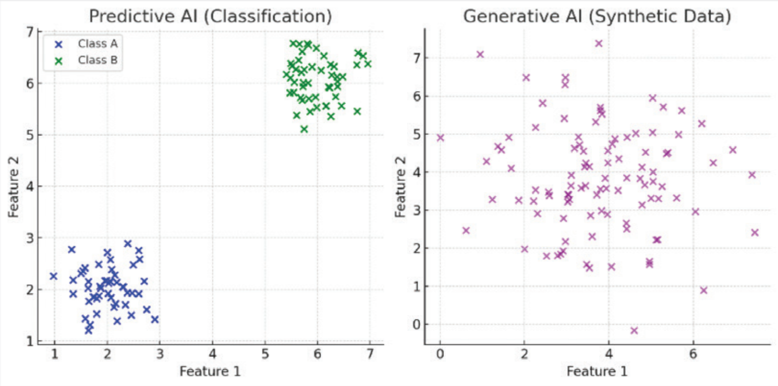


Figure 2 - Conceptual difference between Predictive and Generative AI from a clustering perspective

Left: Predictive AI uses historical, labelled data to classify new observations into known categories (e.g. Class A vs. Class B). The model identifies and reinforces boundaries between clusters to optimise classification accuracy. Right: Generative AI models the underlying distribution of the training data to create entirely new data points. Rather than assigning inputs to fixed labels, it generates outputs that plausibly belong to the same data space, reflecting the learned structure without explicit categorisation.

RECENT TRENDS AND DEVELOPMENTS IN AI

Recent advances in AI have led to the development of autonomous AI agents – systems that can independently pursue complex goals by planning, reasoning and adapting to changing conditions. Unlike traditional AI tools that respond to a single input with a single output, AI agents can perform multiple steps in sequence to solve problems. For example, instead of simply listing available flights like a standard booking website, an AI agent could plan and book an entire trip – researching options, comparing prices, managing logistics and completing reservations – without needing detailed human instructions. In a professional setting, tools like AutoGPT show how an AI agent can research a topic, draft a report, check for errors and revise the content – all autonomously.

One major technical breakthrough is Retrieval-Augmented Generation (RAG), which significantly improves the factual accuracy and utility of AI systems. RAG enhances Large Language Models by allowing them to retrieve up-to-date information from external sources, such as databases or the internet, while they are computing the answer to the user's 'prompt'. This enables models to go beyond their static training data and provide responses that draw upon real-time information from a much wider set of sources, especially the internet.

Model Context Protocol (MCP) is another important development. It enables AI systems to simultaneously track and integrate information from multiple threads – such as ongoing conversations, documents or project histories. This contextual awareness greatly enhances coherence and responsiveness in complex, multi-source environments, allowing AI to provide more relevant and nuanced outputs. MCP also provides a consistent interface to connect AI to other software.

The AI landscape is being shaped by the rapid growth of major players such as OpenAI, Anthropic and others. These organisations have developed foundational models with wide-ranging capabilities, which are increasingly being adopted across industries. In construction, this trend means that firms are more likely to adapt these general-purpose models for industry use, rather than building bespoke, domain-specific AI tools from scratch. That said, high-hazard environments like construction present unique challenges. In such contexts, not only must the outputs be correct, but they must also be demonstrably compliant with standards, codes and the like. Section 5 of this report explores emerging techniques, such as assurative AI, chain-of-thought reasoning and human-in-the-loop approaches to improve the assurance and reliability of the output of generative AI.

THE FUTURE TRAJECTORY OF AI

The trajectory of AI development suggests that we are witnessing a technological revolution of historic proportions, not a passing trend. As early as 2018, Sundar Pichai, CEO of Google, stated:[4]

"AI is one of the most important things humanity is working on. It is more profound than electricity or fire."

Much more recently, in April 2025, former Google Chief Executive and Chairman, Eric Schmidt, restated[5] the level of impact that AI is set to have:

"The AI revolution isn't overhyped – it's underhyped. This is the most important development in the last 500-1,000 years. We're entering a new era, it's coming fast, and we can't screw it up."

4 - Canales, K. (2023). Google CEO Sundar Pichai says AI is more profound than fire or electricity. Business Insider. Retrieved from: Sundar Pichai Says AI Could Be More Profound Than Fire, Electricity - Business Insider

5 - 'The AI Revolution is Underhyped' – TED Talk with Eric Schmidt. 16th May 2025. Available here: https://www.youtube.com/watch?v=id4YRO7G0wE

Research by McKinsey & Company supports this perspective. Its 2023 report[6] states:

"Generative AI's impact on productivity could add trillions of dollars in value to the global economy. Our latest research estimates that generative AI could add the equivalent of $2.6 trillion to $4.4 trillion annually across the 63 use cases we analysed – by comparison, the United Kingdom's entire GDP in 2021 was $3.1 trillion."

Despite these bold forecasts, while AI excels at pattern recognition, data processing and even generating complex outputs, it continues to lack critical human attributes such as nuanced judgment, emotional intelligence, ethical reasoning and genuine creativity. These uniquely human capacities will remain indispensable for the foreseeable future.

Image courtesy of AUAR (UK)

6 - McKinsey & Company. (2023). The economic potential of generative AI: The next productivity frontier. Retrieved from: Economic potential of generative AI | McKinsey

GLOSSARY OF AI TERMS

Term	Definition
AI Agents	Autonomous systems that plan, reason and act to achieve complex goals with minimal human intervention.
Artificial Intelligence (AI)	The field of computer science focused on creating systems capable of tasks normally requiring human intelligence, such as reasoning and learning.
Computer Vision	A field of AI that enables machines to interpret and process visual information from the world, such as images and videos, in a way similar to human vision.
Data Science	An interdisciplinary field using algorithms, statistics and systems to extract insights and knowledge from data.
Deep Learning	A subset of machine learning where artificial neural networks with many layers learn from large volumes of data.
Fine-tuning	The process of taking a pre-trained AI model and training it further on a specific, often smaller, dataset to make it suitable for a specialised new task.
Generative AI	A type of AI designed to create new content such as text, images, code or music, based on patterns learned from training data.
Hallucination	When an AI system produces information that is plausible-sounding but factually incorrect or nonsensical.
Knowledge Graphs	A structured representation of knowledge where entities are linked by relationships, allowing AI systems to reason and infer new facts.

Term	Definition
Large Language Models (LLMs)	Advanced AI models trained on massive datasets that can understand and generate human-like text or other types of data.
Machine Learning (ML)	A field of AI focused on creating algorithms that enable computers to learn from and make decisions based on data.
Model Context Protocol (MCP)	An AI capability that allows simultaneous tracking of multiple information sources, threads or contexts to improve coherence and relevance.
Predictive AI	AI that uses historical data to forecast future outcomes, trends or classifications.
Retrieval -Augmented Generation (RAG)	A method that enables AI models to retrieve information from external sources at the point at which they run to improve their accuracy and relevance.
‘Strong’ AI	AI systems that have general reasoning abilities and can learn and perform tasks like a human across many domains.
Training Data	The dataset on which an AI model is trained, containing examples from which the model learns patterns and
‘Weak’ AI	AI systems designed to perform specific tasks; they are highly specialised and do not possess general reasoning abilities.

3. AI IN CONSTRUCTION

CURRENT USE OF AI IN CONSTRUCTION

The current use of AI in the construction sector remains relatively limited. While there are growing examples of predictive AI, computer vision, generative AI and AI agents, actual deployment and day-to-day use are still the exception rather than the norm. Much of the current activity is exploratory or confined to pilot projects, or the production of simple documents or meeting notes. However, this is set to change significantly, as the following sections explore.

Example of predictive AI

- **nPlan** (www.nplan.io) uses machine learning algorithms trained on extensive historical construction schedule data – tens of thousands of past projects – to forecast potential delays, risks and deviations before they occur. This use of historical patterns to predict future outcomes is a clear example of predictive AI in action.

Examples of computer vision AI

- **Buildots** (www.buildots.com) applies computer vision AI via 360° helmet-mounted cameras to automatically track on-site progress and compare it with BIM models. The system identifies built elements (e.g. walls, ceilings, ductwork) and flags delays, discrepancies or inefficiencies in real time.

- **Robok** (www.robok.ai) has developed SiteLens™, a tool that integrates with existing CCTV infrastructure to monitor construction sites. Using computer vision AI, it detects safety hazards such as missing Personal Protective Equipment (PPE), tracks worker and equipment movement and helps optimise site workflows to reduce delays and bottlenecks.

Examples of generative AI

- **Consigli** (www.consigli.no) has developed the 'Autonomous Engineer', a generative AI tool that produces mechanical and electrical (M&E) designs up to RIBA Stage C. Based on architectural models and specifications, the system can produce designs in days that would typically take human consultants months – while reducing material usage by around 20%.

- **Joist** (www.joist.ai) provides a generative AI platform to support bid and tender processes. It assists proposal teams by generating customised content for Requests for Proposals (RFPs) and Qualifications (RFQs), ensuring alignment with requirements, editing for consistency and improving overall quality and responsiveness.

Examples of AI agents

- **BuildPrompt** (www.buildprompt.ai) uses autonomous AI agents to manage and streamline the digital handover process. These agents extract and validate data from project documents, drawings and media using natural language processing and computer vision. They prompt users to fill gaps, generate structured outputs and ensure that complete, navigable digital records are delivered at project closeout.

- **Trunk Tools** (www.trunktools.com) has developed a suite of AI agents to address common operational and administrative tasks in construction. For example, TrunkText is an AI-powered assistant that allows site teams to query specifications, RFIs and change orders via natural language. The Schedule Agent links scheduled activities to project documentation, generates look-ahead schedules and flags potential delays – supporting more proactive decision-making.

ATTITUDES TO AI IN CONSTRUCTION

As part of the research for this project, we carried out semi-structured interviews with quality and construction managers, technology providers and AI professionals to understand their attitude to AI – in terms of current use, potential future use and the barriers to achieving this. The three categories of questions were organised around the following:

1. To what extent are you currently using technology in construction to help reduce errors and improve quality?
2. To what extent and how are you currently using AI in construction, and what do you see as the barriers and challenges to its adoption (for error reduction and more generally)?
3. How do you see the potential for AI in construction (and in error reduction specifically)? Where might things be in five or ten years' time?

Findings specifically relevant to error-reduction and quality management are covered in the next section. What follows here is a summary of broader views on AI adoption and readiness in the sector. Interviewees from construction companies reported that they are already using AI, particularly general-purpose generative tools. For example:

- Many are using Microsoft Copilot, the generative AI assistant integrated into Word and other Office tools.
- More than half have created private GPT models for internal use. These are designed to answer staff queries and generate documents securely – without risking the exposure of company data to external AI platforms that may retain or learn from user input.
- Several are running pilot projects to assess whether AI can meaningfully improve operations and whether they have the organisational capability to adopt it. These pilots tend to be narrow in scope, such as generating meeting notes, drafting reports or summarising site diaries.
- A majority have introduced AI use policies, typically aligned with broader data protection and GDPR compliance frameworks, to limit unapproved or uncontrolled use of AI tools.

Many companies have appointed individuals to lead on AI initiatives, with some having job titles such as 'Head of AI' or 'AI Lead'.

However, none of the organisations interviewed reported undertaking fundamental changes to their business models or processes as a result of AI. There were no examples of large-scale restructuring, business process re-engineering or major efficiency drives based on AI. Similarly, there was no suggestion that AI was currently displacing human roles or leading to significant cost savings.

This relatively cautious approach reflects a widespread lack of trust in AI tools at present. Many interviewees expressed a view that AI is not yet reliable or robust enough to be widely deployed on site or in critical decision-making. As a result, the impact of AI on the construction sector today remains limited.

That said, when asked to look ahead five to ten years, most interviewees anticipated that AI would become highly influential – fundamentally changing roles, workflows and even the structure of the industry. Some noted broader societal impacts and the need for the sector to start preparing for that transition now.

In short, there is a shared belief that AI will be transformative, but that its full arrival – and its impact on construction – still feels some way off. It is tomorrow's challenge and problem, not today's.

The industry is in a holding pattern: interested, experimenting, but not yet fully committed.

THE POTENTIAL FOR AI IN CONSTRUCTION

So what might the potential be for AI in construction? We identify the following seven trends as indicative of the transformative impact the technology may offer.

1. Generative AI for design and documentation

Construction workflows involve extensive production of documents, drawings and schedules. By leveraging large language models and design algorithms, generative AI can automate much of this output. This is contingent, however, on ensuring accuracy and compliance with building codes and standards. (See **Section 5** for how such risks may be mitigated).

2. Verification tools

Closely linked to generative AI is the growing role of AI as a verifier – automatically checking whether designs, specifications and outputs meet relevant regulations, standards and client expectations. This is distinct from creating or predicting: it is about auditing. For example, AI could validate whether an M&E layout complies with fire regulations, whether as-built models match design intent or whether a digital handover includes all the required documentation. These tools align directly with efforts to reduce errors and are discussed further in **Section 4**.

3. Predictive AI for real-time risk management

Predictive AI can analyse vast datasets to identify patterns and forecast risks such as programme delays, cost overruns or safety hazards. When integrated into live site reporting systems, AI can act as a 'digital PMO' – monitoring activity in real time and flagging emerging issues within minutes rather than days. This enables earlier, data-informed intervention.

4. AI agents to streamline back-office workflows

AI agents – autonomous digital assistants – can support a range of administrative and commercial tasks, including tendering, document management and programme coordination. These tools reduce manual workload, increase consistency and offer greater responsiveness across internal construction operations.

5. AI agents to enable parametric 5D BIM

5D BIM links 3D design data with both time (4D) and cost (5D) dimensions, enabling project teams to see the knock-on effects of changes in real time. For it to be effective, the model must be parametric: a change in one element (e.g. increasing floor area) should automatically update quantities, schedules and cost estimates. AI agents – each dedicated to one of design, scheduling and costing – can work in tandem to maintain a dynamic, synchronised BIM environment. When connected with predictive reporting systems, 5D BIM could function as a project's 'controlling mind' – capturing what has happened, identifying what comes next and allocating actions accordingly.

6. A systems engineering approach

AI opens the door to a more integrated, systems-based view of complex projects, as proposed by Andrew McNaughton in his reviews[7] for the Institution of Civil Engineers. Similarly, Mark Enzer[8] has championed the role of connected systems in delivering smarter infrastructure. AI can help link fragmented workflows and disciplines into a coherent delivery framework – driving greater efficiency, coordination and control.

7 - 'Doing a better job: A systems approach to infrastructure delivery', December 2020, Institution of Civil Engineers. (Author: Andrew McNaughton).

8 - 'Connect to change - unlocking the value of systems thinking in the built environment'. Enzer, M., for the Built Environment Collective Under preparation. (Publication expected, July 2025).

7. Integration with robotics for physical delivery

Construction ultimately produces physical outcomes – be it a building a road or a power station. To fully realise productivity gains, AI must integrate with on-site systems that build, assemble and move materials. Advances in robotics – such as FBR's bricklaying robot or multi-functional humanoids like Boston Dynamics' Atlas and Tesla's Optimus – demonstrate the potential for machines to carry out complex site tasks. AI can orchestrate and adapt these efforts in real time, linking design and action.

Even if only some of these trends materialise, this would represent a paradigm shift greater than any seen in construction in the past two centuries. Roles will change – humans will focus on tasks requiring judgement, creativity and leadership, while machines take on routine or reactive functions.

The structure of the industry is also likely to change. Traditional contractors and consultancies may find it difficult to adapt to the speed and scale of AI-driven transformation. New, 'AI-native' firms may be better placed to capture the opportunities.

Ultimately, the integration of AI will depend on the vision and capability of project owners. In the language of Project 13, the role of the 'capable owner' must evolve into that of the 'AI-capable owner' – an organisation that can understand, adopt and lead with AI to achieve better project outcomes.

To misquote L.P. Hartley from *The Go-Between*:

"The future is a foreign country; they do things differently there."

Designing and building in an AI-first world will indeed be very different, and we are only barely out of the starting gate.

Image courtesy of Converge

4. AI AND ERROR REDUCTION

CURRENT USE OF AI FOR ERROR REDUCTION

As suggested in Section 3, discussions held during the development of this report, and wider industry conversations, suggest that while AI is already being used to support error reduction in construction, its application remains relatively limited and often experimental. However, there are notable examples where AI is beginning to show tangible value in the context of quality management and error reduction:

- **Buildprompt and EKFB – Learning from NCRs**
  Buildprompt is collaborating with EKFB (the Eiffage Kier Ferrovial BAM joint venture for HS2) to apply AI to non-conformance reports (NCRs) and inspection methodologies. By ingesting historical NCRs and related procedures, their system aims to:
  • Identify patterns in root cause data
  • Recommend effective repair strategies
  • Suggest changes to reduce recurrence of incidents

  This use of AI supports a move towards proactive mitigation – turning inspection data into actionable insights.

- **Lessons Learned Solutions – AI-Powered Capture**
  Lessons Learned Solutions is integrating a LLM interface into its LessonFlow platform, a digital tool designed to capture and apply lessons learned throughout a project lifecycle. In this setup, team members can provide a short written description of an issue, and the AI then writes it up in a structured format suitable for inclusion in the organisation's lessons learned database. In some cases, users may simply upload a photo and add a few notes, and the AI completes the record. This approach significantly lowers the barrier to capturing knowledge, reducing friction and time for frontline staff, while improving the quality and consistency of inputs into organisational learning systems.

- **SpecHelper by Qualomate - Human-AI specification processing**
  SpecHelper uses advanced AI algorithms to convert project specifications into a structured knowledge system that maps relationships between sections and learns to highlight critical paragraphs based on organizational usage patterns. This capability enables teams to create project plans faster while making the collective experience of senior staff accessible to everyone, ensuring field teams always have accurate information at their fingertips.

Yet despite the modest nature of these current examples, most of the companies we spoke to suggest that AI is going to take off rapidly, transforming the way in which workflows and tasks are planned, delivered and assured. The question is in what way and over what timeframe?

ANALYSING THE POTENTIAL FOR AI TO IMPROVE ERROR REDUCTION

As a starting point for an analysis of the potential for AI to improve error reduction, we note that the HS2 team recently reduced the 17 GIRI root causes from the 2016 GIRI report (see Figure 1) to nine. We prefer to work with this reduced list – see Figure 3 overleaf.

1 Poor planning and design

AI-driven tools will play a major role in improving design quality and project planning. They will be able to automatically analyse design models, specifications and schedules to detect clashes, sequencing issues or scope gaps that often go unnoticed in traditional reviews. Machine learning models trained on historical project data will help flag design decisions associated with past delays, cost overruns or rework. In scheduling, current rule-based checks – such as DCMA 14-point assessments – will likely be surpassed by AI models capable of deeper, pattern-based evaluations of schedule robustness, risk and float distribution.

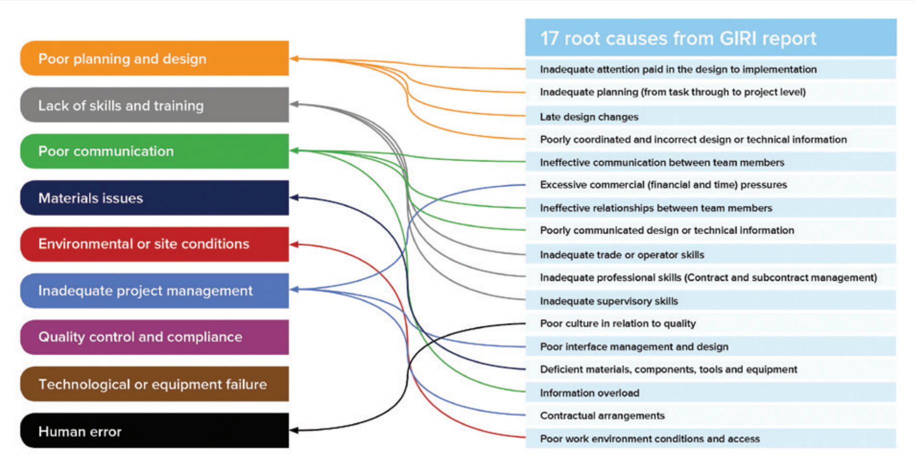


Figure 3 – reduced list of 9 causes of error – from analysis by HS2

Beyond isolated disciplines, the emergence of autonomous AI agents will enable assurance across 3D (design), 4D (time) and 5D (cost) – each agent specialising in its domain while collaboratively identifying issues at the interfaces between them. This integrated, agentic approach has the potential to transform planning and design assurance from a static checklist exercise into a dynamic, real-time diagnostic process.

Impact on error reduction = high
Progress to date = low-medium

2 Lack of skills and training

AI will be able to help reduce errors caused by a lack of skills and training by acting as an always-available, context-aware assistant that supports workers in real time. AI-powered tools will be able to offer step-by-step guidance for unfamiliar tasks, suggest corrective actions when issues arise and automatically flag deviations from standard procedures. For example, when a worker reads a standard or Risk Assessment Method Statement (RAMS) document, the AI can generate interactive questions to assess comprehension – improving both engagement and compliance.

AI can also enhance competence management by tracking who is suitably qualified or trained for specific tasks and surfacing that information when needed.

AI copilots embedded in quality or inspection apps will be able to help less experienced staff correctly complete checklists or interpret specifications without needing to escalate to senior staff. Over time, tasks currently carried out by people will increasingly be undertaken by machines – whether as software or robotics. However, it must remain the case that humans stay in charge (‘human in the loop’), accountable for what happens on site but empowered by a more connected, capable and automated support system.

Impact on error reduction = medium-high
Progress to date = low-medium

3 Poor communication

Natural language processing LLMs are already improving the clarity and accuracy of written communication in construction. Voice-recognition interfaces are becoming more common, enabling faster, real-time communication on site and in offices. LLMs can also structure and retrieve relevant information from vast datasets across projects, helping teams stay aligned and informed.

In the near future, LLMs are likely to serve as intelligent interfaces across communication platforms – such as email – where AI agents will autonomously handle routine or low-priority messages. Meeting transcripts are already being integrated into project logs; the next step will be the emergence of ‘project agents’ – AI tools that can participate in meetings, retrieve data on command and provide instant contextual support.

These tools will improve decision-making by ensuring access to accurate, timely information, thereby reducing the risk of errors and accelerating their resolution when they occur. However, while AI will enhance human-to-machine interaction, strong human-to-human communication will remain essential. Classic interpersonal skills – especially listening – will continue to be critical to the successful delivery of construction projects.

Impact on error reduction = medium-high
Progress to date = low-medium

4 Materials issues

AI will enhance forecasting, tracking and quality assurance for materials across the construction supply chain. AI systems will be able to check that materials specified in design models and bills of materials are appropriate for the task, assessing compatibility and performance against project conditions. They will help prevent specification errors and unsuitable substitutions, while also ensuring that the correct materials are ordered and delivered. AI agents will increasingly automate procurement workflows – managing orders, tracking deliveries and responding to delays or fulfilment issues in real time. Computer vision tools will support this by verifying deliveries against specifications and flagging incorrect or damaged items before they are used on site.

Impact on error reduction = medium
Progress to date = low

5 Environmental and site conditions

There is now far more data available to support environmental and site management – ranging from real-time sources such as sensors, drones and satellite imagery, to historic data from previous projects. This creates opportunities for AI to deliver valuable insights through advanced analytics, although its impact here may be more incremental than in some other areas. From this, AI tools can help reduce the risk of errors caused by incorrect assumptions about site conditions or slow responses to environmental changes, by enabling earlier detection of issues and more informed decision-making.

Impact on error reduction = medium-low
Progress to date = low

6 Inadequate project management

AI can help improve visibility, coordination and decision-making across the project lifecycle – reducing the risk of errors caused by inadequate project management. Generative scheduling tools can produce more accurate and coherent programmes from the outset, while AI-driven schedule analysis can go beyond standard DCMA checks to identify risks and inconsistencies. Predictive analytics can highlight warning signs by comparing live project data against patterns from past failures, such as cost overruns or missed milestones, enabling earlier and more effective intervention. An AI-enabled Programme Management Office (PMO) can support near real-time reporting, identifying problems, errors and non-conformities in hours rather than weeks.

Routine tasks such as reporting, risk register updates and compliance checks can be handled by AI assistants, freeing project managers to focus on strategy and decision-making. Perhaps most significantly, AI can help break down silos between disciplines and job functions – providing a unified view of project data that reduces miscommunication, gaps and fragmented decision-making.

Impact on error reduction = high
Progress to date = low-medium

7 Quality control and compliance

Quality control and compliance represent one of the most significant areas for the use of AI to reduce errors. Computer vision tools will be able to inspect works on site in real time, comparing them against design models or predefined quality benchmarks to detect deviations, defects or non-conformities at an early stage.

Natural language processing can already scan documentation – such as inspection reports, method statements and certifications – to identify errors, inconsistencies or omissions that might otherwise go unnoticed, and the sophistication of these capabilities will only increase. AI systems will also be able to cross-reference project data against regulatory and contractual requirements, helping to ensure that compliance checks are thorough and correctly applied. As these tools continue to develop, they will enable a shift from periodic, manual inspections to continuous, data-driven quality assurance – making it easier to identify and resolve issues before they escalate into costly errors or rework.

Impact on error reduction = high
Progress to date = low-medium

8 Technological or equipment failure

The potential here is for AI to reduce errors caused by technological or equipment failure through more advanced forms of planned predictive maintenance. That is, by analysing data from plant and equipment telematics – such as usage patterns, temperature, vibration and load – AI systems will be able to detect early warning signs of wear, degradation or malfunction. This will enable failures to be anticipated and addressed before they occur, reducing the risk of unexpected breakdowns that can disrupt work, compromise safety or lead to costly rework.

AI will also support better decision-making around equipment deployment and utilisation, helping to ensure that the right machinery is used for the right task under the right conditions.

Impact on error reduction = medium
Progress to date = low-medium

9 Human error

Arguably, one of the ways AI will help reduce human error is by taking over certain tasks currently performed by people – but, as explored in **Section 5**, AI is not infallible and can also make errors. This reinforces the need for a ‘human-in-the-loop’ approach, where AI supports rather than replaces human decision-making. AI tools can act as real-time assistants, providing prompts, guidance and automated checks to help workers avoid omissions or misjudgements.

For example, augmented reality combined with AI can guide installation tasks step by step, reducing the likelihood of incorrect assembly or positioning. AI can also identify behavioural patterns that lead to mistakes – such as fatigue-related errors or repeated procedural oversights enabling targeted interventions like retraining or task reallocation. In some cases, AI may even monitor an individual’s wellbeing and recommend breaks to prevent lapses in concentration. By automating repetitive or cognitively demanding tasks, AI can reduce the mental load on site staff. While human skill and judgement will remain essential, AI will increasingly act as a safety net – supporting better decisions, catching potential errors early and improving overall workforce reliability.

Impact on error reduction = high
Progress to date = low-medium

An easier-to-read summary of the ways in which AI will be able to make a difference to error reduction, across the nine categories, is set out in Figure 4. In essence, the future potential of AI for error reduction can be grouped around the following five key benefit areas:

- **Insight & Prediction**
  AI identifies problems before they happen, using past data and real-time inputs to predict and prevent.
- **Automation & Assistance**
  AI takes on repetitive, time-consuming tasks and assists humans with smart automation.
- **Monitoring & Verification**
  AI constantly checks for deviations, defects or issues – on site, in systems and in people.
- **Communication & Collaboration**
  AI improves both human-to-machine and human-to-human communication, ensuring everyone is aligned.
- **Decision-making & Control**
  AI supports stronger, faster and more reliable decisions – without replacing human judgement.

CATEGORIES WITH THE GREATEST POTENTIAL FOR REDUCING ERRORS

Figure 4 plots the 9 categories set out in the previous Section on a two-by-two matrix to identify the ones with the greatest potential for error reduction and the level of progress made with each. There are three principal conclusions that emerge from this:

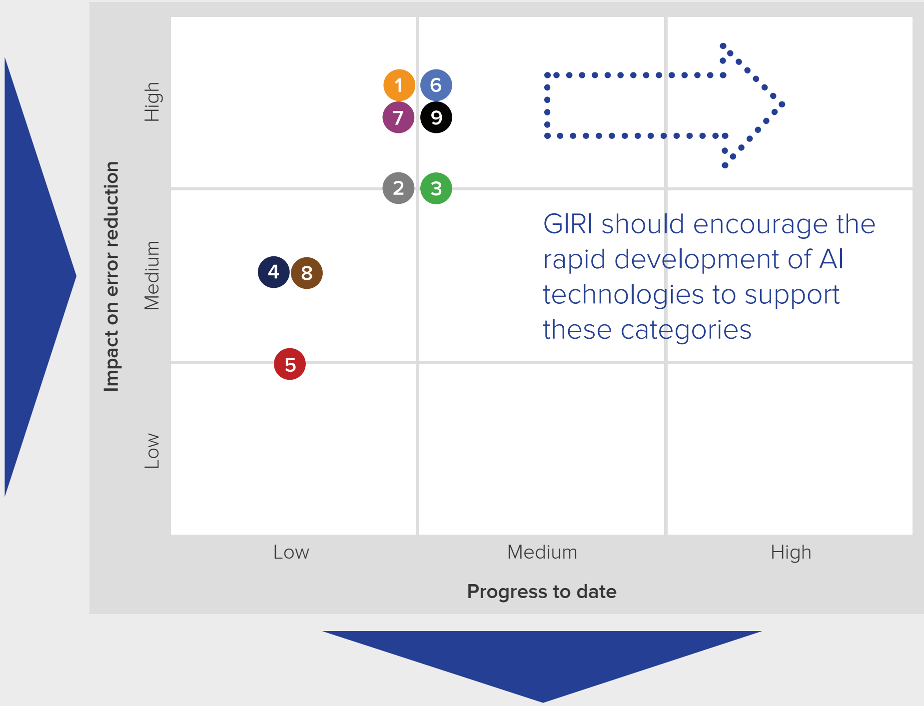
1. None of the nine categories has progressed to a significant extent. Therefore, there is much to be done to realise the potential from AI for error reduction that the analysis in the previous section suggests is possible.

2. All nine of the categories have reasonably significant impact on error reduction. While some have more of an impact than others, this demonstrates the apparent universal relevance and contribution that AI can make in this area, as in many other areas too.

3. The categories with the greatest potential for reducing errors are:
   - Poor planning and design
   - Inadequate project management
   - Quality control and compliance
   - Human error

1. **Poor planning and design**	**Clash-detection** – AI-driven identification of design conflicts **Diagnostics** – a shift from checklists to real-time issue detection **Prediction** – use of machine learning to forecast risks based on past data **Scheduling** – deeper AI evaluation of programme structure and resilience **Integration** – collaboration across 3D/4D/5D via specialised AI agents
2. **Lack of skills and training**	**Guidance** – AI provides real-time, task-specific support **Assessment** – interactive comprehension checks and learning reinforcement **Competence** – tracking qualifications and analysing skills data **Assistance** – copilots help with inspections, checklists and specifications
3. **Poor communication**	**Clarity** – improving written and verbal communication **Retrieval** – structuring and accessing relevant project information **Automation** – AI agents managing routine messages and tasks **Assistance** – project agents offering live, contextual support **Accuracy** – improving proof-reading and avoiding language errors
4. **Materials issues**	**Forecasting** – predicting material needs from project data **Verification** – checking deliveries with AI and computer vision **Compatibility** – ensuring materials match design and site conditions **Procurement** – automating orders and managing supply chain flows **Prevention** – avoiding specification errors and substitutions
5. **Environmental or site conditions**	**Sensing** – using real-time data from drones, sensors and satellites **History** – learning from past project data and trends **Response** – enabling earlier detection and quicker decision-making
6. **Inadequate project management**	**Scheduling** – generative tools and deeper programme analysis **Prediction** – identifying early risks through data patterns **Reporting** – real-time updates and error detection via AI PMO **Assistance** – automating routine tasks to support managers **Integration** – breaking down silos for unified project visibility
7. **Quality control and compliance**	**Inspection** – real-time site checks using computer vision **Detection** – early identification of defects and deviations **Scanning** – analysing documentation with natural language processing **Compliance** – verifying adherence to regulatory and contractual standards **Assurance** – moving from periodic to continuous quality monitoring
8. **Technological or equipment failure**	**Monitoring** – using telematics to track equipment condition **Prediction** – identifying early signs of wear or malfunction **Prevention** – avoiding breakdowns through proactive maintenance **Deployment** – improving how and when machinery is used
9. **Human error**	**Support** – AI as a real-time assistant aiding decision-making **Guidance** – step-by-step help through Augmented Reality (AR) **Automation** – standardising and streamlining repetitive tasks **Monitoring** – identifying behavioural patterns and wellbeing risks **Relief** – reducing cognitive load by handling repetitive tasks

The potential impact and progress to date of the nine categories can be plotted as below:



With the high-level areas for AI to have an impact on error reduction being as follows:

Figure 4 – analysis of the categories with the greatest potential for reducing errors

5. HOW TO PREVENT AI FROM MAKING ERRORS

THE PROBLEM WITH 'HALLUCINATIONS'

AI systems – especially LLMs and neural networks – are fundamentally probabilistic tools that operate through pattern recognition rather than true comprehension. This means they can produce outputs that are confidently incorrect, from factual mistakes and internal contradictions to more troubling phenomena known as 'hallucinations': the generation of information that appears plausible but is entirely fabricated.

These errors often stem from biases, gaps or inaccuracies in the AI's training data, and from the way in which language models generate responses by predicting statistically likely word sequences rather than relying on verified knowledge. In high-hazard industries such as construction, such mistakes can lead to significant risks if unchecked. More than that, concerns about the possibility of 'hallucinations' significantly erodes trust in AI among construction professionals, which was one of the key themes of the interviews that we conducted for this report.

'Hallucinations' are common and significant:

- A study published in the Journal of Legal Analysis[9] found that LLMs, including OpenAI's ChatGPT-4, hallucinated in at least 58% of legal tasks. These hallucinations often involved the creation of fictitious legal cases or misinterpretation of legal principles.
- Research highlighted in Nature[10] reported that when LLMs were used to generate scientific references, 47% of the citations were fabricated, and an additional 46% were inaccurately represented. Only 7% of the references were both accurate and correctly cited.
- In a clinical documentation study also published in Nature[11], researchers observed a 1.47% hallucination rate and a 3.45% omission rate. It is worth noting, though, that by refining prompts and workflows, they successfully reduced major errors to levels below human note-taking error rates – a point that we return to later in this Section.

Not all LLMs are equal in terms of their propensity to hallucinate, and the developers are keen for their models to perform as reliably as possible. Vectara has produced a leaderboard[12] of benchmark scores for LLMs on the frequency and severity of hallucinations when answering questions based on a provided context (e.g. summarising a document or answering factual questions from a passage). It specifically tests faithfulness, meaning: does the model's output accurately reflect the source material?

At the time of writing this report, the Leaderboard scores suggest that that OpenAI's GPT-4 continues to perform well with impressively low hallucination rates, followed by models like Orca-2, Intel Neural-chat, Snowflake, Phi-3 and Llama-3.1-405B. Conversely, poorly performing models include: MPT-7B-Instruct, Falcon-7B and some earlier versions of LLaMA.

To reduce hallucinations, developers are combining improvements in training, architecture and post-processing. Techniques such as reinforcement learning from human feedback (RLHF) and instruction tuning help models better align with factual content and user intent. Factual consistency is increasingly being assessed before results are returned.

9 - Dahl, M., Magesh, V., Suzgyn, M. & Ho, D. (2024). 'Large Legal Fictions: Profiling Legal Hallucinations in Large Language Models'. Journal of Legal Analysis, Volume 16, Issue 1, 2024, Pages 64–93. Available here: https://doi.org/10.1093/jla/laae003

10 - Else, H. (2023). 'Abstracts written by ChatGPT fool scientists'. Nature. Nature. 613 (7944): 423. Available here: https://www.nature.com/articles/d41586-023-00056-7

11 - Asgari, E., Montana-Brown, N., Dubois, M., Khalil, S., Balloch, J., Au Yeung, J., & Pimenta, D. (2025). 'A framework to assess clinical safety and hallucination rates of LLMs for medical text summarisation'. npj Digital Medicine volume 8, Article number: 274 (2025). Available here: https://www.nature.com/articles/s41746-025-01670-7

12 - Source: HHEM Leaderboard - a Hugging Face Space by Vectara.

Developers are also using retrieval-augmented generation (RAG), confidence calibration and citation tools to ground responses in verifiable sources and enhance transparency.

However, users cannot rely on the developers to produce error-free LLMs. It is a case of 'user beware': people need to consider the appropriateness, in terms of risk and reward, for the use of a particular AI for a particular task. Given that, as we have shown, the potential benefits in terms of error reduction in construction are considerable, the question is then what additional steps can users take to make the use of AI a safer and more assured way of working?

REDUCING AI MISTAKES IN HIGH-HAZARD INDUSTRIES

Clearly in high-hazard and highly-regulated industries such as construction, mistakes made by AI systems can have serious safety, legal or financial consequences. The challenge to avoid (or mitigate as far as possible) the risk of such mistakes is not only a technical one, but is also organisational in nature. That is, it requires users to assess critically the role of AI, implement robust assurance frameworks and design AI workflows that prioritise transparency, auditability and human oversight.

The four steps below are good examples of ways to reduce the risk of AI making mistakes in construction:

1. **Risk assessment before using AI**
   Clearly there are some tasks that are more appropriate for support from AI than others. Before deploying AI on a given task, it is sensible to consider the criticality of the task, the consequences of an error and the maturity of the AI model for that specific application. Tasks involving health and safety, complex engineering issues or regulatory compliance will need particularly careful consideration as to whether AI can be used. Where it is used, it is likely to be in combination with other more established approaches and include significant human intervention (see point 4 below).

2. **Assurative AI (post-processing and validation checks)**
   Assurative AI is a secondary system designed as a way of assuring the output of a generative model. Such systems are likely to use knowledge graphs or rule-based engines. (A knowledge graph is a structured network that represents information with context, enabling reasoning and validation.) These tools can ingest industry standards, building codes and engineering best practice, then check AI outputs against them to detect violations, inconsistencies or omissions before the information is used on-site or included in design documentation. While they may not be the only check one would use on the output of a generative model, they go a long way to provide confidence that the design or document is compliant.

3. **Chain-of-Thought Reasoning**
   Encouraging AI systems to show their working – step-by-step reasoning known as chain-of-thought – helps make outputs more transparent and easier to verify. It allows human users to follow how a conclusion was reached and to identify any flaws or faulty assumptions in the logic, which is particularly valuable in high-risk tasks such as sequencing, coordination and schedule planning.

   For example, an AI system might propose: "The concrete pour for Level 3 is scheduled for Tuesday. Preceding tasks on Level 2 appear complete. Therefore, proceed as planned." However, the chain-of-thought reasoning reveals that the AI inferred task completion from a mislabelled status update in the project management system. A human, reviewing the step-by-step logic, spots this discrepancy and flags that the rebar inspection has not been signed off. The pour is delayed, preventing a serious sequencing error that could have led to rework or safety risks.

By surfacing intermediate steps in its reasoning, the AI allows planners to detect and correct hidden errors – ultimately reducing the chance of costly mistakes.

4. **Human-in-the-loop**
   As discussed previously, the high-hazard, highly regulated nature of construction means AI should support – not replace – human decision-making. A 'human-in-the-loop' approach places skilled professionals at the centre of critical decisions, using AI to assist rather than to take over.

   For example, an AI system might generate a construction sequence suggesting that partition walls can be installed immediately after the structural slab has cured. However, a human planner identifies a clash: ceiling services must be installed first. The AI, working from incomplete coordination data, missed this. The planner adjusts the sequence, avoiding rework, delay and potential damage.

   While reliance on AI may grow over time, a suitably qualified and experienced person (SQEP) must still make the final decisions. This is essential not only for safety but to meet legal obligations, including those under the Construction (Design and Management) Regulations (CDM). AI can serve as an expert advisory system embedded within workflows – but it must remain subordinate to human oversight, rather than operating as a fully autonomous system.

It is likely that organisations will deploy a blend of all four of these methodologies and, potentially, over time additional strategies for avoiding errors from generative AI systems may emerge. They should design their workflows in such a way as to both reduce the risk of error and still maximise the benefit of AI.

It is also important that they have strategies and procedures to prevent their staff and teams from working outside these safeguards: the unauthorised use of AI should not be permitted.

6. IMPLICATIONS FOR CONTRACTORS, SOFTWARE PROVIDERS AND GIRI

The previous five sections reveal that AI is a technology with huge potential – for construction as much as the rest of society – but whose application is limited at present. The opportunities for its deployment to help reduce errors are considerable, but this will take vision, care and effort on the part of contractors (and others in construction), software providers and GIRI itself. In this section we offer a few thoughts as to what each can do to maximise the upside potential of AI for error reduction, as well as reduce the risks.

WHAT SHOULD CONTRACTORS (AND OTHERS IN CONSTRUCTION) DO?

To fully realise the benefits of AI in reducing construction errors – while also managing the associated risks – contractors (and others working in construction) need to take a structured and disciplined approach, potentially including the following:

- Target high-impact error sources: focus AI efforts on the main drivers of error, such as poor planning and design, inadequate project management, quality control and human mistakes (see **Figure 4**).
- Ensure high-quality, structured data: AI systems are only as good as the data they receive. Structured, consistent and accurate data is essential for reliable outcomes.
- Design workflows carefully: AI should be integrated thoughtfully – either by embedding it into existing workflows or designing entirely new ones where appropriate.
- Set clear AI usage policies: introduce AI strategies and protocols so that staff understand which tools are permitted and which are not. Use of unauthorised AI systems should be explicitly prohibited.
- Conduct risk assessments before use: assess whether the benefits of AI outweigh the risks for each task. In higher-hazard or safety-critical activities, the threshold for AI use should be higher.
- Build in error-mitigation features to the use of AI itself: design workflows to include safeguards against AI errors – such as hallucinations – through mechanisms like assurative AI, chain-of-thought reasoning and human-in-the-loop validation.
- Start with verifiable use cases: trial AI in areas where its outputs can be checked independently (e.g. design validation and compliance checking). Track performance over time to identify errors and refine usage.
- Treat AI as part of wider business improvement: AI deployment should sit within a broader strategy for performance improvement and innovation. While error reduction is one goal, the change management required to embed AI – especially cultural and behavioural change – must not be underestimated.
- Balance urgency with caution: moving too fast may lead to poor implementation; moving too slowly risks competitive disadvantage and the lost opportunities to realise the benefits of AI. Judgements about pace should be informed by the growing consensus that AI will transform the sector profoundly.

WHAT ARE THE OPPORTUNITIES FOR SOFTWARE PROVIDERS?

The opportunities for software providers around AI and error reduction are threefold:

1. To produce software products that use generative AI to produce designs, schedules and construction documents that are more accurate than current human-based approaches or that rule-based software systems (configurators) can currently achieve.

2. To create software – such as assurative AI systems – that can verify the outputs of generative AI. This makes errors such as hallucinations or omissions less likely and enhances trust in the use of AI within high-risk, compliance-heavy environments such as construction.

3. To integrate AI into quality management and error-tracking software. For instance, generative AI can simplify how users enter and retrieve information in lessons learned databases, making insights from past mistakes more actionable and accessible.

Error reduction is just one of many possible AI use cases in construction – but it is unusually compelling: no one argues in favour of more errors! It is also linked to measurable financial impact, meaning that there is a strong economic case for software solutions in this space. As GIRI's research shows, direct and indirect avoidable errors in design and construction are estimated to cost the UK industry £10–25 billion annually.

We encourage software vendors to engage early with contractors and other industry stakeholders to better understand the root causes of error and how digital tools incorporating AI might prevent them. We hope to see error-reduction functionality prioritised early in product development roadmaps for the use of AI in construction.

WHAT CAN GIRI DO TO HELP?

GIRI has an unrivalled role within the construction industry as an advocate for higher-quality, error-free working practices. Through the Technology Working Group (TWG), we provide a forum where quality managers and other professionals responsible for error reduction can engage directly with technology and software providers.

This exchange of ideas around challenges and potential solutions is already proving a productive way to share best practices and highlight unmet needs. GIRI will continue to promote and grow this group. However, we believe we can and should go further.

In particular, GIRI will:

1. **Promote error reduction as a priority use case for AI**
   We will actively engage with software providers and AI firms to highlight the importance – and commercial opportunity to them – of prioritising error reduction in their product roadmaps.

2. **Showcase best practice**
   We will identify and share leading examples of how AI is being used effectively to reduce errors in construction. As part of this, we will update our Best Practice Casebook[3] (originally published in November 2024) to include new case studies focused on AI.

3. **Champion AI assurance for high-hazard environments**
   We will promote the need for safeguards that reduce the risk of errors in AI systems themselves – particularly in high-hazard sectors like construction. This includes encouraging techniques such as assurative AI, chain-of-thought reasoning and human-in-the-loop oversight. We will also publish and share practical strategies and policies that help reduce AI-related errors, such as conducting risk assessments before deployment and setting clear rules to prevent unauthorised AI use.

Image courtesy of asBuilt

FINAL WORD

Whether or not Eric Schmidt is right in calling AI the most important development of the last 500–1,000 years, there is little doubt that its impact on our world will be profound. In a sector like construction – grappling with long-standing challenges around productivity, skills shortages and quality – the potential for AI to deliver real benefits is substantial.

Among those benefits is AI's ability to help reduce error. At the same time, we must remain vigilant to ensure that AI does not itself become a new source of error or risk within the construction process.

GIRI will continue to champion best practice in quality management and error reduction – and that now includes best practice in the responsible use of AI. We look forward to working with members and other industry partners to ensure AI becomes a trusted tool in delivering better outcomes.

WE MUST REMAIN VIGILANT TO ENSURE THAT AI DOES NOT ITSELF BECOME A NEW SOURCE OF ERROR OR RISK WITHIN THE CONSTRUCTION PROCESS.


AI

GIRI research has shown that errors in design and construction contribute to between 10 and 25% of project cost, depending on size and complexity, amounting to roughly £10-25 billion annually in the UK construction sector. Artificial Intelligence presents unprecedented opportunities to reduce these costly mistakes through automated quality control, predictive analytics and real-time error detection. However, AI systems themselves can introduce new types of errors – for example, hallucinations, omissions or misunderstandings. This report, produced by GIRI, examines both the transformative potential of AI in construction quality management and the critical strategies needed to mitigate AI-related risks. Based on interviews with quality and construction managers, technology providers and AI professionals, it provides essential guidance on how best to navigate the AI revolution in construction.

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GIRI
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Working together to eliminate error in construction

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