

How artificial intelligence can unlock a new future for infrastructure

September 2024



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Foreword



Catherine Karakatsanis
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One of the greatest constants in the world is change. Sometimes, change is incremental, but at other times, it can be monumental, instrumental or even disruptive. The world is grappling with a number of truly global challenges, such as meeting net zero, achieving more for less and improving societal outcomes. The infrastructure sector is vital for driving such changes and improvements forward.

At the first Global Leadership Forum (GLF) summit, much of the focus was on net zero, and this challenge remains. Another reoccurring theme, however, continued to emerge: how we can use technology and AI to supercharge progress, reduce waste, and improve project delivery. This inevitably led to global leaders asking how such technologies were going to affect not only the wider sector but also their own operations.

FIDIC's collaboration with the EY organization remains strong, and this report continues to show the GLF's commitment to tackling the most significant challenges the infrastructure industry faces. Undoubtedly, artificial intelligence (AI) is here to stay, and our sector will not be immune to this change. It is, however, also important to note that there is no single version of AI and that there is a common misconception of the different models and tools that are being developed.

Only recently, the Financial Times reported that the next versions of large language models from ChatGPT and others will be capable of reasoning. Individuals such as Elon Musk in 2024 suggested we'll have AI that is smarter than any one human, probably around the end of next year, and that within the next five years, the capabilities of AI will probably exceed those of all humans.

This report demonstrates how transformative AI could be for the infrastructure sector, how the various sector players will need to interact in the future, and how business models may need to change. It also shows that there are grassroots and examples of AI utilisation occurring, but that traditional siloed thinking, among other things, is holding us back.

At the Global Leadership Forum Summit in 2024, world leaders had the opportunity to discuss a working version of this report and help shape its findings and outcomes. Some of the biggest challenges they identified in the sector such as labor skills shortages, asset use optimization and climate change all have the potential to benefit significantly from AI.

AI technologies offers potential when there is a global shortage of engineers to improve productivity, value add and drive better environmental and societal solutions. The implementation of AI in the infrastructure sector, however, is fragmented, and as such, the challenges we are trying to solve may not benefit fully from its advantages unless we collaborate and invest in a potentially quite different way of working in the future.

Finally, I would also like to thank EY, GLF members, and the FIDIC team for their continued support and commitment to driving progress across the sector for a better future.



Chris Lewis
EY UK Infrastructure Leader



Steve Lewis
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It is a great pleasure for the EY organization to have been a strategic advisor to FIDIC in the development of this report on the adoption of artificial intelligence (AI) in infrastructure. In recent years, AI has emerged as a transformative force, revolutionizing various industries and sectors. Now, we stand at the precipice of a profound shift in how we design, build, and manage our infrastructure.

AI offers immense potential to enhance our built environment's efficiency, safety, and sustainability. This report explores the key trends, challenges, and opportunities surrounding AI adoption in infrastructure. It explores how AI-powered technologies can optimize planning, design, construction and asset management, and enable smart decision-making. It also looks into the enablers needed from various stakeholders in the industry to generate a wider and faster adoption of AI, along with the new business models needed to make that adoption a reality.

As we navigate an increasingly interconnected world, harnessing the power of AI to overcome complex infrastructure challenges is crucial. However, it is equally important to address ethical considerations, data privacy, and cybersecurity concerns along this transformative journey.

The consideration of how AI can be adopted to help solve the macro challenges faced by society and, in turn, by infrastructure is at the heart of how we at EY think – we endeavor to build a better working world, and we believe AI will have a role in that. We hope this report goes some way to demystifying AI and its potential for us all in infrastructure and that it serves as a guide, empowering policymakers, industry leaders, and innovators to embrace the potential of AI and shape a future where our infrastructure is smarter, safer, and more sustainable. AI gives the construction and engineering industry the opportunity to embrace technology to drive productivity and innovation. Building information modeling (BIM) has been seen as too complex for many infrastructure organizations. Now AI offers the potential for universal adoption, expanded benefit realization, and the driving of leading practices across the industry.

We extend our gratitude to everyone at FIDIC and the Global Leadership Forum who contributed, challenged, and encouraged the development of this report. We are especially grateful to those who took the time to complete the survey and participated in the workshops at the summit, as their valuable input has helped us draw meaningful conclusions and insights. Particular thanks must be extended to Jim Johnson of Arup, Fidel Saenz de Ormijana Valdes of Ferrovial, Mike Haigh of Mott McDonald, Catherine Karakatsanis, Graham Pontin, and Sara Lipscombe of FIDIC, and Nelson Ogunshakin whose passionate leadership, commitment, and joviality were continuously employed for the compilation of this report and wider industry transformation. In addition, thank you to the EY teams across the globe who worked tirelessly.

Executive summary



Context and the need for a new approach

The infrastructure industry will face major challenges over the coming decades. These include climate change, urban expansion, economic uncertainty, labor shortages, and supply chain disruptions among others. To address these issues, we need new ways to deliver projects faster, more cost-effectively, and more sustainably. Artificial intelligence (AI) will certainly be a crucial tool in this effort, but while the industry is getting to grips with AI capabilities, its true potential is still to be fully unlocked.

To better understand the industry's current perspectives and AI adoption, we surveyed FIDIC Global Leadership Forum (GLF) members – representing the key players and leaders in the infrastructure industry – and ran a workshop at the FIDIC GLF meeting in April 2024, focusing on:

- ▶ Their current use of AI
- ▶ Barriers to AI adoption in infrastructure
- ▶ What is needed for wider AI adoption
- ▶ The potential benefits of AI

The survey results from 44 senior leaders and industry observations show a mixed picture. The respondents tell us they are investing in AI to varying degrees – in line with findings from other industry reports. Some organizations are investing conservatively (less than 2% of their revenue) while others are taking bolder steps (of up to 10%). In addition, startup funding for AI-driven businesses in the built environment is outstripping that of AI-enabled FinTech solutions. However, this investment is resulting in spot solutions, mainly focused on the early project stages.

This is understandable when AI solutions are trying to operate in the traditional, siloed delivery models that define infrastructure delivery today. Other barriers to AI adoption include unclear returns on investment, cultural resistance, skill gaps, and technological fragmentation.

With these barriers in place, it's unsurprising that AI adoption is low and that we are yet to realize its true value. To address this and to help move the industry to an informed sector that understands the benefits of AI and deploys it to the best effect, this report seeks to bring greater clarity of the different types of AI in the market, how they can be used in different stages of an asset lifecycle and the benefits and outcomes they deliver to the sector and society more broadly. It also explores how AI can unlock new opportunities and value across the infrastructure ecosystem and for the many stakeholders who work within it.

The sector has made a good start into the world of AI but to harness its potential to improve decision-making, build resilience, increase productivity, and enhance outcomes throughout an asset's life, the sector needs to accelerate its adoption of AI tools.

Unlocking value from the complex, interconnected system of infrastructure delivery

Traditionally, infrastructure planning, delivery, and operations have often occurred in isolated, linear ways. Infrastructure development is also inherently complex, involving many interconnected parts and dynamic interactions. To manage this complexity, the asset lifecycle has traditionally been broken down into a series of steps: planning, design, construction, and operation, each involving many stakeholders.

One way of thinking about the value and opportunities of AI is looking at it through the lens of a "systems thinking" approach to infrastructure development. With its immense processing power and advanced abilities in data analysis, relationship discovery, and outcome prediction, AI can handle complexities that traditional linear approaches cannot. AI can analyze vast amounts of data to uncover hidden patterns, predict potential issues, and best use resources across all project phases. This would break down barriers between stakeholders, reduce costs and expedite delivery.

Five guiding principles that frame the traditional asset lifecycle can support the 'systems thinking' approach and illuminate AI's potential. By building the connections of various factors across all five guiding principles, better decision-making can be achieved.

1. Determine purpose – AI improves asset planning and selection.
2. Plan end-to-end delivery – AI enables more comprehensive insights for robust business cases.
3. Confirm operating model – data-centric digital twins facilitate AI adoption.
4. Integrate ways of working – AI enhances controls and performance oversight.
5. Operate responsive assets – AI improves operations and sustainability.

To accomplish the systematic change, however, requires targeted cross-stakeholder collaboration across eight key groups – asset owners, operators, consultants, contractors, government, academia, technology providers and capital investors. They must all align on shared 'ambitions' to use AI to improve infrastructure.

Three innovative models provide blueprints for overcoming challenges

To aid a move to a 'systems thinking' approach, we have outlined three innovative models that provide blueprints that address core barriers within the industry – each one uses AI to connect all parts of the infrastructure system:

1. Integrated data and AI platforms: These allow everyone to see and share information, making it easier to work together.
2. Data-as-a-Service: This lets different groups share and make money from their own data.
3. New contract types: These encourage companies to use AI and invest in innovation.

These models help us see AI not just as a separate technology but as providing enormous potential to improve how all parts of infrastructure work together. They show how we can move from thinking only about individual projects to considering how infrastructure serves society as a whole.

To reap this level of AI potential requires consistent adoption of AI technology throughout the sector. Through incremental use of AI in all project phases, the infrastructure sector will naturally find greater opportunities to connect with other stakeholders and find symbiotic uses of AI that benefit more than one set of stakeholders.

To reach this position faster, it is crucial for industry professionals who want to adopt AI to foster an innovative mindset, be equipped with the necessary skills and have the right tools.

FIDIC aims to lead the way in integrating AI effectively and ethically into infrastructure projects through:

- ▶ **Mindset:** Cultivating an open and collaborative environment is essential for the successful adoption of AI. This involves raising awareness, fostering discussions, and addressing legal and ethical considerations to build trust and encourage the sharing of data and insights.
- ▶ **Skillset:** It is crucial to develop the competencies required to leverage AI in infrastructure. This includes providing training, certifications, and workshops that equip professionals with the knowledge and expertise needed to integrate AI technologies effectively and keep the infrastructure industry attractive to future generations.

- ▶ **Toolset:** Offering the right tools and frameworks is vital for practical implementation. This involves developing standardized data collection methods, secure data-sharing protocols, and AI-specific contract provisions that support innovation and collaboration.

How FIDIC can support in unlocking of value by AI

FIDIC believe that this research led by the GLF has shown there are five clear areas where FIDIC can represent the sector and aid the sharing of knowledge to drive continuous innovation and realize the benefits of AI as the industry aims for dramatic improvement in delivering and operating assets:

1. FIDIC will identify methods and opportunities, where appropriate, to make its extensive repository of content, accessible in a structured and usable format to enhance their utility in AI applications.
2. FIDIC will organize targeted events to highlight the latest developments, use cases, and benefits of AI in infrastructure, driving greater understanding and collaboration among stakeholders.
3. FIDIC will investigate methods and opportunities to develop training and certification on the use of AI in infrastructure to ensure that industry professionals are equipped with the necessary skills and knowledge to effectively integrate AI into their projects.
4. FIDIC will act as a repository to collect and share value stories and lessons learned from real-life implementation of AI in infrastructure to enhance collective knowledge and drive innovation.
5. FIDIC will explore the possibility that future contracts holistically address the dynamic nature of AI and include provisions to support AI integration effectively, maximizing the benefits of AI technologies while managing associated risks.

Through the above, FIDIC will help bridge the knowledge gap, promote the adoption of AI, and support a transition to infrastructure projects that can fully leverage AI technologies effectively and ethically. This holistic approach will be a major step toward fostering an innovative mindset, equipping professionals with the necessary skills, and providing the right tools. These foundational changes will allow the unlocking of value in the infrastructure by AI.

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