Association of Consulting Engineers of Ireland

Guidance Note

Ref: 2026-11/1

ACEI Artificial Intelligence Guidance Note for Member Firms

Message of thanks: This AI Guidance Note was created by members of the ACEI BIM & Digitalisation Committee

Contents

1. Glossary of Key Terms.
2. Introduction.
3. Risks and Rewards of AI.
4. How AI Can Be Used in Engineering and Construction.
5. Examples of AI in Action in Irish & Europe.
6. AI Transparency Requirements under the EU AI Act
7. First Steps: Exploring and Integrating AI.
8. Summary and Key Recommendations.
9. References.

1. Glossary of Key Terms

- **Artificial Intelligence (AI):** is defined by OECD as: a machine-based system that can, for a given set of human defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. AI systems are designed to operate with varying levels of autonomy.
- **Machine Learning (ML)**: A branch of AI where software improves its performance by analysing data.
- **Large Language Models (LLMs):** AI systems trained on large amounts of text, capable of producing human-like written content. This can be used for translation, text generation (e.g. emails, reports),summarising, question answering, code generation and reasoning or problem solving.
- **Generative AI (GenAI):** is a subset of machine learning and deep learning. It is AI that creates new content such as text, images, video, coding or designs.
- **Natural Language Processing (NLP):** The ability of computers to understand and process human language.
- **Automation:** Using technology to carry out repetitive or complex tasks more efficiently without constant human oversight.
- **Hallucination:** When an AI system generates information that sounds plausible and confident but is incorrect, misleading or not based on real data.
- **Algorithm:** A set of instructions a computer follows to solve a problem.
- **Bias:** When AI systems produce unfair or skewed outcomes due to poor quality or unbalanced training data.
- **Computer Vision:** a field of AI that enables computers to analyse, interpret and understand visual information such as videos or images.
- **Prompt Engineering:** the skill of crafting effective inputs to get useful outputs from AI tools.
- **The EU AI Act (2024):** A recent piece of European legislation regulating AI.

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2. Introduction

Artificial Intelligence (AI) is no longer a futuristic concept confined to research labs or tech giants, it is increasingly becoming a part of everyday life, shaping how businesses work and how decisions are made. For consulting engineers in Ireland and across Europe, AI can offer a range of opportunities to help improve efficiency, accuracy, and sustainability. Alongside these great opportunities, AI also presents risks that must be carefully managed.

The purpose of this note is to provide member firms with a straightforward introduction to AI. It introduces some common vocabulary, presents some of the most common risks and rewards, and sets out how AI can be
applied in engineering and construction. It also provides a series of practical first steps that companies can take
to begin exploring AI in a safe and responsible way.

This advice note is not about turning engineers into AI specialists, but rather about giving them the confidence to ask the right questions, trial small applications, and gradually build AI into everyday workflows.

3. Risks and Rewards of AI

AI has the potential to offer significant benefits for consulting engineering firms, but these should be carefully weighed against the potential risks.

On the rewards side, AI has the capability to automate time-consuming, mundane and repetitive tasks, from rewording reports to populating BIM models. This can free up engineers to focus on higher-value work. It can also improve speed, resulting in faster turnaround times for drafting documents, or preparing tender submissions. When used responsibly, it can enhance accuracy by spotting patterns or errors that humans might overlook.

There are also risks: Companies must ensure that sensitive project data or personal data are not uploaded into public AI tools where it could be exposed or misused. Also, AI is not fool-proof and can generate results that may look convincing but are technically incorrect, a phenomenon often referred to as “hallucination”. There is also the risk of over-reliance, where human judgement is sidelined in favour of AI suggestions. Crucially, companies must also consider compliance with new regulations such as the EU AI Act [8], as well as existing data protection requirements under GDPR. Consider the phrase ‘if the product is free, you are the product’. Be aware of who is controlling your data.

In addition, it is important to recognise that different AI providers have varying approaches to privacy, data handling, and sustainability. Potential users should carefully examine these aspects when selecting a service, ensuring that the provider’s policies align with their organisation’s values and regulatory obligations. This includes understanding how data is stored and processed, and whether the provider uses energy-efficient infrastructure or supports broader environmental goals.

For Irish consulting engineers, the balance lies in starting with relatively low-risk, non-confidential applications, learning through practice, and gradually expanding usage while putting safeguards in place.

A good starting point for companies may be to enrol in the Enterprise Ireland & EU Commission funded online course:
AI for you - Introduction to AI and the EU AI Act' [9] which is available here:
https://ceadar.ie/edih-news-blog/online-course-ai-for-you-introduction-to-ai-and-the-eu-ai-act/

This course aims to increase your awareness of AI, helps you become AI literate, demystifies the EU AI Act and the limited situations in which it applies, and supports adoption of AI in your organisation.

4 . How AI Can Be Used in Engineering and Construction

AI is already being applied in various ways across the European engineering and construction sector. As noted earlier, one of the simplest uses of AI is in initial document drafting and review, AI tools can help reword technical specifications, reports, or even client correspondence, reducing the administrative burden for engineers. To use these tools effectively, it is important that users develop strong prompt engineering skills. This is arguably the most practical and valuable capability for day-to-day use of AI.

Health and safety monitoring is another emerging application, whereby AI-powered vision systems scan site
cameras in real time to identify unsafe behaviours, such as workers not wearing hardhats or other PPE , or operating near potential hazards. Early trials in Europe suggest that such systems could significantly reduce site accidents [2].

Quality control in manufacturing and prefabrication is also benefiting from AI through the use of automated image recognition tools which are capable of identifying defects in materials or components that may be missed by manual human inspection, improving quality assurance [3].

Algorithms can be used to analyse project data to improve project scheduling, predicting likely delays and recommend rescheduling strategies, helping project managers to allocate resources more efficiently [4].

AI also supports sustainability goals, by analysing building designs, energy models, and material options, AI can
recommend changes that can reduce energy use and waste, supporting Ireland's commitments under the European Green Deal [5].

Taken together, these examples show that AI is not an abstract theory but a practical tool that can be applied in
everyday engineering contexts.

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The table below highlights a non exhaustive list of some potential low risk, medium risk, and high-risk use cases of AI.

Members are advised that the use of AI and the inherent risk of using AI should be risk profiled in each of their own environments and use cases. It is acknowledged that what is a low risk for some members may be a higher risk for others.

Low Risk	**Medium Risk**	**Higher Risk**
Grammar checking	Drafting reports	Design calculations
Meeting summaries	Tender submissions	Safety-critical decisions
Formatting	Technical specification drafting	Regulatory compliance assessments
Translation	Option appraisals	Automated design sign-off

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5. Examples of AI in Action in Ireland & Europe

While the examples highlighted in this document demonstrate some of the applications of AI, they represent only a small portion of how the technology is being adopted across the engineering and construction sectors.

There are already examples of AI being applied in ways that are relevant to consulting engineers.

In Ireland, the Department of Public Expenditure issued Guidelines for the Responsible Use of AI in the Public Service [7]. While aimed at government bodies, these provide a useful model for ACEI member firms on how to adopt AI responsibly. This document, along with other AI resources are available on the gov.ie website at https://www.gov.ie/en/department-of-public-expenditure-infrastructure-public-service-reform-anddigitalisation/publications/artificial-intelligence-resources/#resources.

Dún Laoghaire-Rathdown County Council has piloted the use of 360-degree cameras mounted on vehicles to capture detailed imagery of roads and footpaths. This technology uses high-definition imaging and AI analysis to deliver accurate condition ratings, identify worn markings early, and map key street assets. It also supports longterm investment planning, ensuring funding is targeted where it's needed most, showing how digital tools can support infrastructure management [6].

Across Europe, AI is being used in the construction sector to support human workers , particularly in predictive safety systems. In countries like Germany and the Netherlands, image recognition tools assist staff by monitoring construction sites in real time, helping to enhance safety and efficiency without replacing the critical role of engineers and site personnel [2].

Local authorities in Ireland are also beginning to experiment with AI chatbots to answer public queries more efficiently. This approach could be adapted by consulting engineering firms to enhance project team communication and reduce the workload on staff. [10]

Finally, the European Federation of Engineering Consultancy Associations (EFCA) has identified AI as one of the key enablers for future sustainable infrastructure in its 2024 Future Trends Report [1]. This highlights that firms of all sizes will need to engage with AI if they want to remain competitive within European markets.

6. AI Transparency Requirements under the EU AI Act

AI transparency is also becoming an important consideration under the EU AI Act. Organisations may be required to inform users when they are interacting with certain AI systems and, in some cases, disclose when content has been generated or substantially modified using AI.

While routine uses such as drafting assistance, spelling correction and document improvement generally remain subject to normal human review and approval processes, firms should be aware of transparency obligations relating to AI-generated content, chatbots and synthetic media. Member firms should ensure they understand when disclosure may be required and establish appropriate internal guidance as AI adoption increases.

In Ireland, oversight and implementation of the EU AI Act are being supported through the establishment of the AI Office of Ireland, which is responsible for coordinating AI governance and supporting compliance within the Irish regulatory framework. [11][12]

Key transparency considerations under the EU AI Act may include [11]:

- Informing users when they are interacting with an AI system, where this may not be obvious.
- Appropriate disclosure of AI-generated or AI-manipulated content where required.
- Ensuring human oversight and accountability remain in place for engineering outputs and professional advice.
- Maintaining awareness of evolving legal and regulatory requirements relating to AI transparency and governance.

7. First Steps: Exploring and Integrating AI

Firms may find it useful to begin on a small scale, concentrating on practical and low-risk applications. This can help teams build familiarity, experiment safely, and gradually prepare the foundations for further integration over time.

Step 1
The first step is awareness and AI literacy. Interested firms could arrange short internal sessions to introduce staff to AI, explaining the benefits and the limitations. This could include enrolling staff in courses like the Enterprise Ireland & EU Commission funded online course mentioned above in section 3 [9].

Free or low-cost tools such as generative AI language models can be trialled for simple tasks like rewording text,
summarising standards, or translating or formatting documents.

Step 2
Once AI literacy is gained, an AI strategy should be drafted to record company rules and requirements around AI use and IT security policies. This document can evolve over time as AI literacy grows.

Next, firms could experiment with administrative tasks. Drafting reports, minutes, or tender clarifications could be delegated to AI systems, of course ensuring that sensitive information is not shared and human reviews always happen at the end. This reduces workload without exposing sensitive technical data.

It can be useful to pilot one technical application relevant to the firm's core work. For example, an SME specialising in site inspections might test an AI tool for classifying or sorting inspection photos. A firm involved in road or rail projects could experiment with AI-based scheduling software. The aim is to learn what works and what does not, without committing large investment.

At the same time, firms must review how they handle data. Confidential or client-sensitive material should not be uploaded into public AI systems. Internal guidelines should be drafted to ensure compliance with GDPR and readiness for the EU AI Act [8]

Step 3
Firms could plan for learning and sharing information. Early adopters within the organisation can act as "AI champions", documenting lessons learned and sharing experiences with colleagues.

After these steps the firm will be better positioned to decide whether to expand its use of AI, invest in tailored solutions, or explore partnerships with technology providers.

8. Summary and Key Recommendations

For many consulting engineering firms, the greatest immediate value may come not from complex technical applications but from improving everyday knowledge work such as drafting reports, preparing tenders, reviewing documents, managing correspondence, carrying out research and sharing organisational knowledge. For ACEI members, the key is not to wait until large firms dominate the space but to start small, practical and safe, building confidence and experience while maintaining appropriate safeguards and professional oversight.

The following recommendations are made:

- Begin with awareness and simple administrative uses to build confidence.
- Pilot one technical application relevant to the firm's work. Limit access to approved solutions only.
- Put safeguards in place for data protection (GDPR) and compliance with the EU AI Act and any other relevant regulatory and/or organisational requirements.
- Provide training for staff, preferably specific to your business needs, and encourage staff to share
- learning and information to build internal knowledge.
- Treat AI as a supportive tool, human oversight and engineering judgement must always remain central.

By taking these steps, member firms can gain real experience with AI and prepare to scale up in a responsible
and effective way.

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