

The future of the profession

Engineering Leadership Group

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Executive summary:

The Engineering Leadership Group (ELG) has undertaken a review of the Institution's 2018 *Future of the Profession* outputs. The purpose was to reassess whether previous technical priorities remain valid and to identify the key technical and strategic focus areas needed for structural engineers and the Institution over the next five years.

Panel chairs, committee representatives and invited experts examined the major challenges shaping the future of structural engineering across six domains: **Artificial Intelligence and Data, Resilience and Systems Thinking, Materials and Modern Methods of Construction (MMC), Climate Action, Evolving Technical Competence, and Broader Influence & Horizons**. The attendees also explored broader societal expectations, including the UN Sustainable Development Goals (UNSDG), climate and biodiversity concerns, ethical leadership, and the profession's global responsibilities.



Key Findings across the six themes

1. Data and artificial intelligence

AI and software developments offer significant opportunities for efficiency, data processing and optimisation, but require careful, context-aware use. Structural engineers must retain critical judgement, understand AI and software limitations, and develop high-quality datasets. The Institution may need to guide members on evaluating digital tools and emerging technologies.

2. Resilience and systems thinking

Resilience, in considering hazards, recovery and long-term adaptability must be embedded in design practices. Structural engineers should adopt a systemic, holistic perspective that considers societal and environmental impact. It is clear that there is a widening global skills gap, particularly in regions most affected by climate change, highlighting the need for international collaboration and the adoption and better understanding of local resources.

3. Materials and modern methods of construction (MMC)

MMC requires engineers to begin with an understanding of how buildings will be manufactured and assembled, before developing design solutions. Early contractor involvement was recognised as improving outcomes and reducing later design challenges. New materials and MMC present opportunities for low-carbon, efficient construction but also require new competencies, risk models, and close collaboration with clients and contractors. Guidance is needed to support safe, sustainable adoption, manage legacy issues (e.g., RAAC, LPS and transfer slabs), and embed MMC effectively from project inception to enable us to meet societal needs.

4. Climate action

Climate change remains a defining global challenge. The Institution has made strong progress with embodied carbon guidance and tools but must ensure that members apply these consistently and effectively. Engineers need broader contextual awareness including social, economic, and ecological to influence sustainable outcomes and engage clients meaningfully.

5. Maintaining technical competence

Lifelong learning is essential. Engineers must maintain strong core skills while developing new capabilities in emerging fields such as AI, diagnostics, risk and resilience. There is increasing need for modular learning, revalidation, reflective practice, and business competence. Ensuring ongoing competence across careers will be central to maintaining public trust.

6. Broader influence & horizons

Structural engineers increasingly operate at the intersection of technical, societal and political issues. The profession must strengthen its voice, influence policy, engage with global challenges, and support ethical decision-making. Greater inclusivity, diversity and representation across the membership are essential to remain relevant and impactful.

Cross-cutting themes for future focus

- Reaffirming core engineering skills, judgement and critical thinking
- Embedding ethical behaviour and societal impact considerations
- Developing broad skillsets (T-shaped or key-shaped (deep expertise in one core skill plus broad general knowledge) engineers)
- Using technology appropriately, supported by competence and oversight
- Enhancing contextual understanding of social, environmental and global challenges
- Increasing diversity, inclusion and global reach for better outcomes
- Strengthening engagement, collaboration and knowledge sharing across the profession and international partners
- Gathering and sharing “good” data to inform projects and develop our understanding of our impacts is needed

Strategic considerations for IStructE

The Institution should take a strong leadership role in shaping policy, influencing education, supporting global resilience, collaborating on climate action, sharing data, and amplifying the profession's voice. Ensuring that the Institution reflects society, supports under-resourced regions, and continues to develop world-leading competency standards. The overarching aim is to maintain trust, relevance, and impact as structural engineers help shape a safe, sustainable and equitable built environment.

Data/Artificial Intelligence (AI):

AI is rapidly changing engineering practice through automation, optimisation and enhanced data analysis. Structural engineers must understand both its opportunities and limitations.

AI has existed in various forms since the 1950s. Today, its outputs can sometimes be difficult to distinguish from those produced by humans. To date AI has been used to imitate people in step-by-step reasoning to problem solve when looking at uncertain or incomplete data. There are numerous strands that AI can be used for such as deep learning, natural language processing, classification and clustering, translation, information extraction, multi-objective optimisation and anomaly detection.

For structural engineers the key areas that have been suggested as possible areas that AI can support have been identified as:

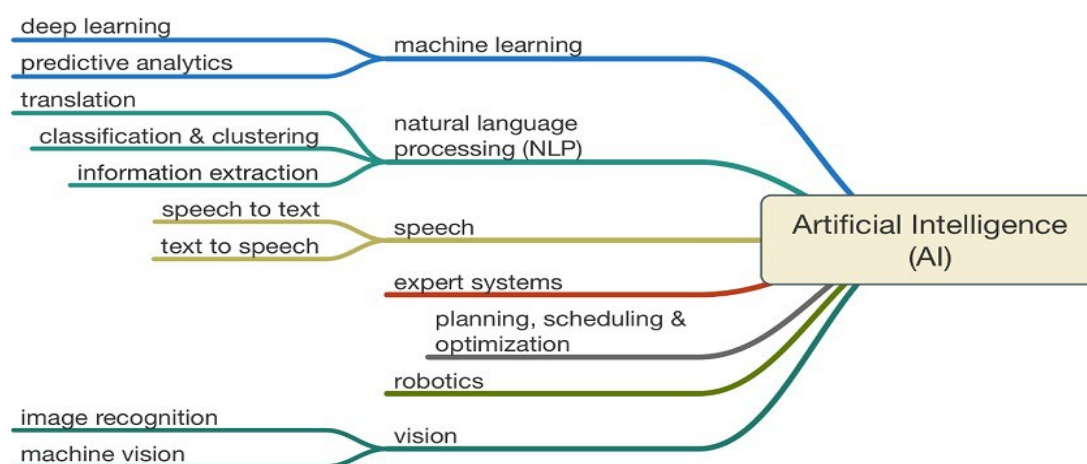
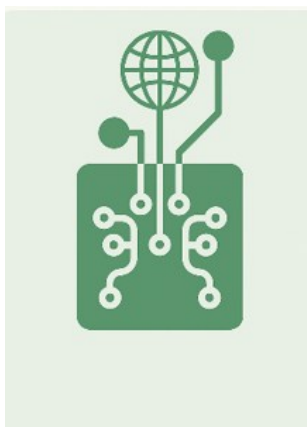


Figure 1: Potential areas AI can support

When used appropriately, AI can have significant benefits for the profession, such as, supporting the amount of data that is required to be managed or where complete accuracy is not as critical, such as data mining, real-time survey data, management systems, automated fabrication, collecting and analysing unstructured data, planning and optimisation. However, there does need to be a watchful eye to provide human intuition and judgement.

There are areas that the Institution needs to resolve, such as ensuring that the industry has good data sets, pushing the competence of structural engineers to ensure that the industry is able to maximise its use whilst still having oversight and understanding of the tool and the output.

Summary points from the discussions:



Key finding:

Digital tools are here to stay and when used correctly can elevate how structural engineers work. The industry will need to develop protocols to ensure that both input and outputs are accurate, consistent and promote a safe built environment.

Areas of focus:

- Better understanding of how to assess what tools are appropriate
- Better understanding of what requires greater or lesser scrutiny (QA), and the impact of such decisions
- What makes good data
- Better consistent sharing of data

Resilience and systems thinking

In essence resilience refers to the ability to “bounce back”, within the built environment reliance can be considered when mitigating the effects of a hazard occurring and to adapt to longer-term changes in use of the environment. Resilience is usually talked about in terms of city resilience, climate resilience, political resilience (this will include the development of procedural and policy decisions to respond to disasters) and natural incidents. All of these can and will affect the built environment both in terms of its development, management and in terms of the ability to “bounce back”.

There are several frameworks that Cities can use to analyse and identify their risk exposure and their ability to bounce back following natural incidents and potential hazards, such as earthquakes, high winds and flooding, drought – looking beyond life safety. More than this, structural engineers, need to look at the bigger picture to ensure that they are not causing undue harm to people, society, and the environment. Consider the ability of the environment to recover from our over-use of materials and resources, can structural engineers make better use of the resources already in the system?

Understanding the risk and the ability to respond to stress as a system is central to tackling wider problems such as safety and climate.

This information can inform structural engineers when engaging in initial phases of projects, it can inform the development of codes and practices. Structural engineers can and should have a role in helping to shape local, national and international policies and plans to mitigate the effects of disasters and hazards on current and future infrastructure and housing stock.

Summary points from the discussions:



Key finding

Structural engineers have a vital role in reducing risks, influencing planning and policy, and supporting communities.

Areas of focus

- Reducing risks from hazards
- Considering broad societal and environmental impacts
- Supporting countries with fewer resources

Materials and modern methods of construction (MMC)

The successful adoption of MMC requires a different skillset from traditional design approaches from the start, including the importance of considering constructability and assembly from the earliest design stages. Structural engineers need to understand what elements should can be standardised and where bespoke engineering should be applied. This requires a behavioural change along with developing technical competence.

MMC is being seen as a positive option for the industry to address some of the issues and provide a more controlled industry. It is seen as a possible way to tackle increasing housing needs, whilst addressing sustainability within the supply chain and inconsistent quality assurance during the building process. However, this does not mean the MMC is not without its problems and that it will require a different approach from start to end as the risk/reward model for MMC systems is different. MMC requires new procurement models and supply-chain relationships. As a result, the role of the structural engineer is evolving, and will need structural engineers to adapt as the MMC practice evolves and matures.

Material section and its use is essential in ensuring that new and existing structures are safe, sustainable and provide longevity to the structures. Understanding material section and the impact of choices made particularly in the wider context is growing in importance, including our impact on the environment. There is a greater need to access relevant data on materials, (especially new materials) is key to enable to make decisions that will positively impact on the life and function of the structure.

Summary points from the discussions:



Key finding

New materials and manufacturing approaches are transforming building design and delivery. MMC uses factory-manufactured components to deliver projects more quickly, consistently and potentially more sustainably

Areas of focus

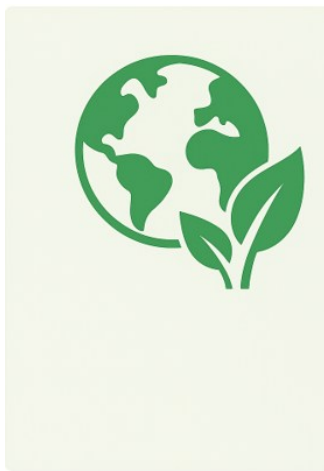
- Ensure safety and sustainability
- Ensure engineers are competent to work with new systems
- Influencing early on in the project

Climate action

Addressing the climate emergency remains one of the biggest challenges for structural engineers and the Institution. Over the last few years, the Institution has produced guidance and tools to enable members to develop a better understanding of embodied carbon, materials and collecting data to inform our projects. Structural engineers are being pushed to challenge the brief, to push clients and contractors to make sustainable, ethical choices.

Engineers must better understand how their decisions affect biodiversity and societal equity. Additionally, the Institution needs to better understand the commercial drivers for clients, to propose better sustainable outcomes based on information.

Summary points from the discussions:



Key finding

Structural engineers play a vital role in reducing embodied carbon, protecting biodiversity and supporting sustainable development.

Areas of focus

- Embed fundamentals around sustainability, including measuring and reducing embodied carbon.
- Consider wider impacts of decisions
- Engage with the wider community and supply chain

Maintaining competence

The Institution promotes the principle of lifelong learning and the sharing of knowledge, through the development of resources to ensure that members remain at the forefront of the industry. There is a greater necessity for structural engineers remain competent (technical and non-technical) to meet society's needs and expectations.

Structural engineers need to focus on embedding core engineering skills, whilst embracing emerging technologies and gaining an understanding of broader related fields. There are key skills that as a profession the profession needs to develop as core skills, such as better diagnostic skills and a greater appreciation and understanding of risk management. The need to adopt a growth mindset amongst structural engineers to continually develop their knowledge is key, along with promoting proactive leadership and responding to the pace of technological change

There is increasing emphasis for better recognition of organisational responsibility and personal accountability particularly relating to professional accountability, behavioural competencies and ethics.

Summary points from the discussion:



Key finding

Structural engineers must commit to lifelong learning covering both technical and broader skills

- Strengthening core structural skills
- Learning broader competencies
- Consider safety risk and ethics

Equity, diversity and inclusion

A commitment to equity, diversity and inclusion (EDI) is central to the long-term strength, credibility, and societal value of the structural engineering profession. As a global Institution, IStructE has a responsibility to ensure that its membership, leadership pathways, and professional outputs reflect the diversity of the communities its work serves. EDI is a fundamental pillar for improving outcomes, widening participation, and fostering an engineering profession that is fair, representative, and resilient.

Embedding equity

Equity ensures that every individual regardless of background, identity or circumstance has fair access to opportunities within the profession. This includes equitable entry routes, transparent progression pathways, and targeted support to address structural barriers. Embedding equity ensures that talent is recognised and nurtured based on merit, potential and contribution, not circumstance.

Enhancing diversity

Diversity in the engineering workforce strengthens problem-solving, innovation and decision-making. A profession enriched by varied backgrounds, cultures, experiences and perspectives is better equipped to address global challenges. IStructE will continue working to widen participation across all demographics, including gender, ethnicity, disability, socioeconomic background, age and global region.

Building an inclusive culture

Inclusion is essential to ensuring that all members feel valued, respected and empowered to contribute. An inclusive culture supports ethical conduct, encourages open dialogue and fosters belonging. It enables individuals to speak confidently and share experiences that inform better engineering practice. Training, awareness and leadership accountability are key to embedding inclusive behaviours across the Institution and profession.

Inclusive engineering practice

EDI is not only about representation it is also central to engineering outcomes. Inclusive engineering means designing structures, processes and systems that meet the needs of diverse communities, respond to societal inequalities, and enhance safety and wellbeing for all. IStructE will continue to promote guidelines, tools and educational resources that help engineers embed inclusivity into design and decision-making.

Global inclusivity

As a global Institution, IStructE recognises its responsibility to support equitable access to knowledge, professional networks and capacity-building across regions. Building strong international partnerships and supporting practitioners in areas with limited resources is essential to advancing structural resilience worldwide. The Institution is committed to setting and maintaining professional competence providing a “passport” for members to demonstrate their professional capability.

Equity, Diversity and Inclusion

The Institution of Structural Engineers

A commitment to equity, diversity and inclusion (EDI) is central to the long-term strength, credibility, and societal value that the **structural** engineering profession. As a global institution, IStructE has a responsibility to improve outcomes, widening participation, and fostering an engineering profession that is fair, representative, and resilient.

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Embedding Equity Fair access to opportunities
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Enhancing Diversity Strengthening problem-solving, innovation and
- 
Building an Inclusive Culture Valuing, respected, and empowering all
- 
Inclusive Engineering Practice Promoting outcomes that benefit diverse communities
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Global Inclusivity Supporting equitable access to knowledge across regions

Broader Horizons & Influence

Structural engineers increasingly operate at the intersection of major societal challenges, including climate policy, regulatory reform, and the safety of the built environment. This section highlights the profession's expanding role in public discourse and the need for engineers to develop broader competencies beyond technical expertise. It emphasises the importance of proactive engagement with policy, improved ethical awareness, and stronger communication with the public to ensure that engineering decisions reflect societal needs. It also raises critical questions about how the profession can better influence agendas, build public trust, and position itself as a leading voice on pressing global issues such as resilience, sustainability and technological change.

Structural engineers are finding themselves more often in the middle of bigger issues and, as such, are required to play a broader role. This gives the Institution the opportunity to make a broader impact and support the development of skills for structural engineers to excel in this arena.

Conclusions

Cross-cutting themes for focus:

Cross-cutting themes essential for strengthening the future impact of both the Institution and the profession, include reinforcing core engineering skills, embedding ethical behaviour, and developing broader, T-shaped competencies that blend technical knowledge with contextual understanding. There is a need for responsible use of digital tools, heightened awareness of global challenges, and deliberate efforts to enhance diversity, equity and inclusion. Additionally, the need for better and meaningful engagement with societal issues, improved member support, and a commitment to innovation and reflective practice.

- Focus on the core engineering skills, including the ability to assess outputs.
- Consider ethical behaviour and the implementation of our skills.
- Develop a broadening skill set.
- The appropriate use of tools and technology.
- Contextual awareness and solutions.
- Boosting diversity and inclusion (including global reach) to achieve better outcomes.
- Create and foster better engagement on topics such as equity, diversity, and inclusion.

Considerations for IStructE:

Priorities required to maintain relevance and leadership will need the Institution to adopt a more confident public voice, to influence key agendas such as higher education curricula, and to expand its global reach and impact.

The continued development of competency standards strengthened international collaboration, and enhanced sharing of best practice across the industry are seen as essential. The section advocates for a more active role in shaping policy, supporting professional communities, and ensuring that the Institution remains a respected, forward-looking authority in structural engineering.

Reflections for IStructE to consider:

- How the Institution engages with the community to ensure that the Institution reflects the wider society, and that their voices and experiences are considered
- The Institution needs to be a place to share knowledge and good data
- Better consideration for what information the Institution makes available (and affordable) to the wider industry globally.
- Consider the role of Institution in embedding (structural) resilience considerations in practice, policy, regulations, scope of work? In UK and globally through strategic collaborations
- What the role of the Institution is in supporting other professional bodies and practitioners in regions with fewer resources and greater need/urgency to develop capacity to increase structural resilience of built infrastructure?