AI for **Quantity Surveying** (AI4QS)Report

Exploring the Impact, Building Competence and Advancing Responsible Use

AI4QS

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Executive Summary

As Artificial Intelligence (AI) transforms how projects are costed, managed, and delivered, the Quantity Surveying (QS) profession stands at a critical turning point. The integration of data-driven tools, automation, and predictive analytics is creating opportunities for improved efficiency, sustainability, and decision-making. However, these advancements also raise challenges related to bias, transparency, accountability, and professional integrity. The *AI4QS* Report responds to these realities by investigating how Quantity Surveyors can adopt AI responsibly, ensuring that technology enhances, rather than replaces human expertise and ethical judgment.

Drawing on interviews with professionals, academics, and industry stakeholders, the report captures how AI is currently being used within QS workflows and how it is perceived across practice. Respondents highlighted both optimism and caution - recognising the value of AI for accuracy, cost intelligence, and sustainability, while warning against over-reliance and the erosion of critical thinking. These insights establish a real-world foundation for understanding how readiness, training, and culture must evolve alongside technology.

Looking ahead, a *Future Wheel* foresight workshop explores the short, medium, and long-term implications of AI adoption in Quantity Surveying. It visualises a range of plausible futures, some marked by innovation and opportunity, others by inequality and ethical tension. This forward-looking analysis underscores the need for proactive, responsible strategies to guide AI's integration into professional practice.

Complementing this evidence base, the report features thought-provoking contributions from leading experts and practitioners. Their articles address the core dimensions of responsible AI use in QS: from cost intelligence and education reform to leadership, sustainability and ethical governance. Together, they argue for a balance between digital progress and professional principles - one that embeds fairness, transparency, and inclusion into every aspect of AI adoption.

Central to the report is the introduction of BRIEF V1.0 – the Built Environment Responsible AI Competence Framework, a conceptual model defining the *knowledge, skills, and behaviours (KSBs)* required for ethical and effective AI engagement. BRIEF provides a structured guide for educators, firms, and policymakers to embed AI literacy and responsibility into curricula, training programmes, and professional standards. Its seven interconnected dimensions reflect a holistic vision, moving from understanding what AI is and how it works, to how it should be governed, communicated, and sustained across the built environment.

Ultimately, the AI4QS Report serves as both a reflection and a roadmap, capturing the present state of AI in QS practice and charting a responsible path forward. Through this work, AI4QS reaffirms its commitment to empowering professionals to lead confidently, think critically, and harness AI ethically for the future of the built environment.

Contributors

AI4QS is grateful to the following individuals who have contributed a section in this report in alphabetical order.

Dr Abdullahi Saka – University of Westminster (Project Team)

Dr Abdullahi Saka is a Reader in Sustainable Digital Construction and Enterprise at the University of Westminster, where he serves as the Research Lead for Property and Construction; and Co-Director for the Centre for the Study of the Production of the Built Environment (ProBE). He is a Project Lead for the AI4QS Initiative and Director of Research for BIM Africa. A Quantity Surveyor and Chartered Construction Manager with experience across three continents, his expertise spans applied AI, sustainable construction, digital enterprise, project management, and innovation diffusion. Dr Saka has published many academic and industry outputs and has delivered funded research projects worth more than £2.5 million from UKRI and international funders, addressing productivity, safety, and sustainability challenges in the built environment and adjacent sectors. He led the development of the Built Environment Responsible AI Competence Framework (BRIEF) v1.0 for the AI4QS initiative.

Alice Graham – Procore Technologies

Alice Graham is a Chartered Quantity Surveyor and Solutions Specialist at Procore Technologies, bringing a unique blend of consultancy experience and cutting-edge construction technology expertise. With a strong foundation in cost and commercial management across sectors including the public sector, life sciences, and infrastructure, she now works at the forefront of digital transformation, helping organisations optimise their cost management workflows through innovative technology. Alice's work at Procore focuses on empowering project teams to gain greater control of costs and budgets, streamline financial processes, and adopt digital tools with confidence. Her professional journey- from traditional QS practice to construction tech-gives her a powerful perspective on how AI and digital solutions are reshaping the QS profession and enabling smarter, data-driven decision-making across the project lifecycle. Widely recognised as a rising leader in the field, Alice has received several accolades, including: *We Are The City* Rising Star Award (2023); *Women in Construction & Engineering* Best Quantity Surveyor (2021); BPIC Rising Star (2021) and *RICS Matrics* Ambassador of the Year Finalist (2024).

Dr Anil Sawhney – RICS

Dr Anil Sawhney is the Head of Sustainability at the Royal Institution of Chartered Surveyors (RICS), where he leads global initiatives that advance the organisation's strategic mission to shape and influence sustainability across the built environment. His work spans the development of industry guidance, thought leadership, education, and training that support the sector's transition to a more resilient and sustainable future. Dr Sawhney holds extensive international experience across academia, research, industry, and consulting, having worked in the USA, India, Canada, the UK, and Australia. He is a Project Management Professional (PMP®), a Fellow of RICS (FRICS), and a Fellow of the Higher Education Academy (FHEA). He also serves as a visiting professor at Boston University, Liverpool John Moores University, and the University of Southern California. A prolific author, he co-authored *Construction 4.0* (2020) and the *Handbook of Construction Safety, Health, and Well-being in the Industry 4.0 Era* (2023). Dr Sawhney also contributes to several global advisory bodies, including UKCRIC and FAST-Infra, and chairs the ICMS Standard Setting Committee.

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Professor Franco Cheung is a Chartered Quantity Surveyor and Professor of Sustainable Built Environment at Birmingham City University. A globally recognised researcher and educator, he specialises in the intersection of quantity surveying, sustainability, and digital transformation. His work focuses on enhancing construction productivity while reducing environmental impacts, with significant contributions to embodied carbon reduction, low-impact building design, and advanced cost modelling. He has led and contributed to numerous Innovate UK, EPSRC, and EU-funded projects integrating AI, IoT, BIM, and Digital Twins to accelerate digital adoption across the built environment. His research continues to influence industry practice, particularly in areas of life cycle evaluation, offsite manufacturing, circularity, and data-driven decision-making. Professor Cheung also serves as Research, Innovation and Enterprise Lead for the College of Built Environment and leads the Digital and Sustainable Built Environment Group. He remains committed to shaping future QS professionals through his teaching and mentorship at undergraduate and postgraduate levels.

James Garner – Gleeds/Project Data Analytics Task Force

James Garner is a Chartered Quantity Surveyor and Fellow of the RICS with over 25 years of experience at Gleeds, where he currently serves as the Head of AI and Data. A pioneer in digital transformation within the built environment, James leads global initiatives at the intersection of construction, data analytics, and artificial intelligence. As Chair of the Project Data Analytics Task Force, James is at the forefront of advancing how data and AI are harnessed across the project lifecycle. He is passionate about democratising data use in construction and has authored RICS technical guidance on cashflow forecasting. His current work focuses on orchestrating AI agents, driving ethical AI adoption, and building practical, value-driven solutions for the QS profession. James is also a vocal advocate for responsible and inclusive AI, bridging the gap between technology and industry practice to ensure that data-driven innovation benefits professionals across firms of all sizes.

Dr Kudirat Ayinla – Loughborough University (Project Team)

Dr Kudirat Ayinla is a Chartered Quantity Surveyor (MRICS) and the Programme Leader for the BSc (Hons) Quantity Surveying and Commercial Management at Loughborough University. She is a Project Lead for the AI4QS initiative and an Academic Advisory Borad Member for Centre for Construction Best Practice (CCBP). Her research focuses on advancing process efficiency and performance in the Architecture, Engineering and Construction (AEC) industry through sustainable practices and digital technologies. She specialises in the application of Artificial Intelligence, Machine Learning, Digital Twins, Knowledge-Based Modelling Systems, and Building Information Modelling to support advanced construction methods such as offsite construction, lean manufacturing, and construction robotics. She is a Chartered Constriction Manager (MCIOB) and collaborates widely with industry on digital and offsite construction innovation. She led the AI in Quantity Surveying baseline study for the AI4QS initiative.

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Dr Saleeb is Associate Professor in Creative Digital Technologies & Construction at Middlesex University, and Programme Leader for the MSc Building Information Modelling Management programmes. Through her position at the university and on several professional body steering committees, she provides consultation for both industry projects and organisations in sustainable design, construction, digital transformation, BIM, Digital Twins, AI and onsite project management. Noha has led several industrial and council-funded grant projects, has more than 100 journal, conference, industry and book chapter publications, including co-authoring the CIOB Artificial Intelligence Playbook, NIBS Digital Twin Position Paper, co-directing the African BIM Report 2024-2025 and has achieved several national/international awards for her expert work in the areas of Sustainability, Digital Twins, Heritage, BIM and Construction Innovation, most recently the UK & Ireland Green Gown Sustainability Champion Award 2024.

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Dr Opeoluwa Akinradewo is a Senior Lecturer in Quantity Surveying and Construction at the University of the Free State, South Africa. He holds a PhD in Construction Management from the University of Johannesburg, where he developed a blockchain adoption framework for construction information management. With over 150 peer-reviewed publications, two published books and notable industry engagements, Dr Akinradewo's research spans the implementation of digital technologies and sustainability in the built environment, which has won him over 10 notable merit awards. He is currently serving as a research fellow at INTI International University, Malaysia and has contributed as a project manager on infrastructure projects both in South Africa and Nigeria. He is passionate about advancing construction efficiency through emerging technologies and collaborative innovation. He has earned a certification as a Blockchain Architect, currently a probationer member of NIQS and an associate member of the Association of South African Quantity Surveyors. He led the Impact of AI in Quantity Surveying research for the AI4QS Report.

Richard Golding – Gleeds

Richard Golding is a Chartered Surveyor and business leader with over 15 years of experience shaping strategic growth and innovation across commercial real estate and the wider built environment. His work is guided by a simple philosophy: do good, have fun, and stay creative; using construction as a force for positive change for clients, cities, and communities. With a background spanning real estate consultancy, digital transformation, and brand thinking, he brings a pragmatic yet imaginative lens to complex challenges, supporting clients through moments of significant change. Beyond his role at Gleeds, Richard is actively involved in shaping industry dialogue and standards. He contributes through his work with the City Architecture Forum, the Circular Do Tank, and the Royal Institution of Chartered Surveyors, championing resilience, sustainability, and long-term value in the built environment. He is particularly passionate about mentoring emerging talent and building meaningful relationships, believing that the most transformative projects are born where trust, curiosity, and collaboration meet.

Contents

Introduction

1.1. Artificial Intelligence and the Built Environment

In this report, we use the term Artificial Intelligence (AI) not to describe a single tool or application, but to refer to a broad class of technologies and systems capable of performing tasks traditionally associated with human intelligence. This including machine learning (including deep learning), natural language processing (including generative and conversational AI), optimisation, computer vision, reinforcement learning, and AI-enabled decision support systems, among others.

AI is redefining how buildings are conceived, delivered, and managed. From predictive design optimisation and digital twins to automated measurement and carbon modelling, AI is rapidly becoming an integral part of construction decision-making. We are witnessing AI's growing potential to improve productivity, cost efficiency, and sustainability across the built environment. However, alongside these opportunities come critical questions around ethics, accountability, transparency, and equity. The challenge facing the sector is ensuring that technology strengthens, rather than replaces, human judgment and professional integrity.

As reliance on data intensifies across the built environment, the need for appropriate governance, professional competence, and trust becomes increasingly urgent. The release of the RICS Responsible AI Professional Standard (2025)[1] , which comes into effect in March 2026, underscores this urgency. It establishes expectations for fairness, accountability, and transparency across all surveying disciplines, a timely development as firms and professionals accelerate their digital transformation journeys.

1.2. AI in Quantity Surveying: The Case for Responsibility and Competence

Within the built environment, Quantity Surveying (QS) occupies a distinctive position at the intersection of finance, data, and value management. We recognise QS professionals as custodians of cost intelligence and stewards of resources, balancing efficiency with equity, and precision with sustainability throughout the project lifecycle.

AI presents significant opportunities to transform QS practice. Through predictive analytics, natural language processing, and automation, AI can improve forecasting accuracy, streamline workflows, and support more informed decision-making. At the same time, these technologies introduce new risks, including algorithmic bias, data privacy challenges, and over-reliance on opaque systems that may undermine professional accountability.

To navigate this duality, we argue that QS professionals must go beyond adoption and develop the capability to understand, interrogate, and responsibly apply AI in practice. This recognition provided the foundation for the AI4QS initiative - a collaborative research and innovation effort aimed at shaping the future of QS in the age of intelligent systems.

[1]Royal Institution of Chartered Surveyors (RICS) (2025) *Responsible use of artificial intelligence in surveying practice – 1st Edition.* 02 September. London: RICS. Available at: https://www.rics.org/content/dam/ricsglobal/documents/standards/Responsible-use-of-artificial-intel... (Accessed: 20 September 2025).

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1.3 The AI4QS Initiative

AI4QS is a pioneering initiative led by researchers from the **University of Westminster** and **Loughborough University**. Our mission is to understand, shape, and advance the role of AI in Quantity Surveying practice and education. Through AI4QS, we seek to empower built environment & QS professionals to lead confidently in an increasingly digital and data-driven built environment, while maintaining the ethical foundations, professional judgment, and values that underpin the profession.

1.4. Project Aim and Phases

The overarching aim of AI4QS is to drive innovation in the Built Environment through Artificial Intelligence, while ensuring its responsible and ethical adoption. To achieve this, we structured the project around four interlinked phases that together provide a roadmap for systemic change:

- Phase I – Baseline Research: Mapping AI adoption in QS practice and education, identifying opportunities, barriers, and skill gaps through surveys, interviews, and focus groups.
- Phase II – Competence and Education Development: Defining what it means to be an AI-ready QS through the identification of key competencies and creation of training and CPD pathways.
- Phase III – Knowledge Exchange and Industry Engagement: Bridging the gap between academia and industry through webinars, workshops, and publications.
- Phase IV – System Development and Future Delivery: Establishing the Responsible AI in Built Environment Digital Hub as a central platform for research outputs, self-assessment tools, and professional learning resources.

1.5. About This Report

The AI4QS Report represents a milestone in the project's journey. Titled *"Exploring Impact, Building Competence, and Advancing Responsible Use"*, the report synthesises insights from professionals, academics, and industry leaders to provide a holistic view of AI's evolving role in Quantity Surveying.

It is structured around three overarching themes:

1. Exploring Impact – understanding how AI is currently influencing QS practice through interviews and foresight activities.
2. Building Competence – articulating the skills, values, and frameworks needed for AI-literate professionals.
3. Advancing Responsible Use – defining pathways to ensure that AI adoption remains ethical, inclusive, and sustainable.

1.6. Looking Ahead

The AI4QS initiative and this report mark only the beginning of a longer journey. As AI investment and adoption accelerate across the Built Environment, the need for responsible, transparent, and competency-based approaches has never been greater. Through continued collaboration with educators, professional bodies, firms, and researchers, we aim to sustain this conversation and action - building a Digital Hub for AI in Built Environment and supporting the development of future-ready professionals who can shape a fair, sustainable, and intelligent future for the built environment. By advancing understanding, promoting competence, and championing responsibility, we hope to ensure that AI strengthens, rather than replaces, the human judgment and values that define the Quantity Surveying profession and the Built Environment at large.

Artificial Intelligence in Quantity Surveying Practice

2.0 Baseline Research Findings

This section presents findings from baseline research conducted to explore the impact of Artificial Intelligence (AI) in the Quantity Surveying (QS) practice and workflows. The baseline research draws on interviews with professionals in quantity surveying, commercial management, academia, and other industry stakeholders. It investigates current AI usage, emerging opportunities, required skills, and challenges to its adoption.

2.1 Current Applications of AI in QS Practice

AI is increasingly influencing the QS profession, supporting various aspects of the workflow and skillset. Although the Royal Institution of Chartered Surveyors (RICS)[1] notes that AI adoption in QS remains slow, interview data from UK-based professionals reveals several areas where AI is already being applied or is considered ripe for integration into the practice.

2.1.1 Key Areas of AI Application:

Professionals identified seven key areas of AI application in their practices and suggested that these areas are ripe for integration into the profession. These themes are summarised in Table 2.1, which outlines specific tasks, and interpretations of AI's advantages and limitations.

Table 2.1 Areas of AI application in QS Workflow

Major QS Application Area	Example Usage	Advantages / Limitations
Quantification	Automated digital take-off using AI; generating BOQs directly from design data.	**Advantages:** Significant time savings, fewer manual errors, rapid feasibility and life-cycle costing. **Limitations:** Dependent on quality of input/ Building Information Modelling (BIM) data; struggles with complex geometries and bespoke details.
Contract Administration	AI tools for clause extraction, contract comparison, and automated payment validation.	**Advantages:** Streamlines administrative tasks, accelerates contract review and payment checks. **Limitations:** Data confidentiality and trust concerns; cannot interpret nuanced contractual clauses or exercise professional judgment.
Value Management	AI-driven cost modelling to compare design alternatives (e.g., steel vs. concrete frame).	**Advantages:** Enables quick scenario analysis and cost-benefit evaluation; supports evidence-based value engineering. **Limitations:** May overlook contextual or non-quantifiable value factors; reliant on accurate input data.
Project Financial Control	Predictive cost dashboards, automated CVR (Cost Value Reconciliation), and cashflow forecasting.	**Advantages:** Improves financial transparency and forecasting accuracy; enhances early warning of overruns. **Limitations:** Requires consistent project data; predictive reliability limited by data gaps or poor standardisation.
Data Management	AI harvesting as-built data, cost benchmarking, and structuring datasets for reuse.	**Advantages:** Creates institutional memory, enhances benchmarking, improves digital integration. **Limitations:** Weak data culture and inconsistent governance hinder scalability and reliability.
Sustainability	Whole-life cost and carbon impact modelling.	**Advantages:** Supports carbon–cost optimisation and sustainability-driven decision-making. **Limitations:** Requires validated carbon and lifecycle databases; focus often remains on upfront cost.
Risk Management	Predictive analytics for cost inflation, supply chain volatility, and contractual risk detection.	**Advantages:** Enables early risk detection and proactive mitigation strategies. **Limitations:** AI may miss emerging risks or lack contextual interpretation; still requires human oversight.

2.1.2 Summary of Key Insights:

1. Quantification
AI is most mature in supporting quantity take-off and automated cost estimation. Professionals interviewed highlighted significant time savings and reduced manual errors. However, AI's accuracy is highly dependent on the quality of input data, particularly BIM models and drawings. Complex interfaces and bespoke details still require human oversight.

Implication: AI can streamline repetitive measurement tasks, but professionals must ensure high-quality data inputs and retain human review for complex scenarios.

2. Contract Administration
Tasks such as contract clause extraction, change-log management, and payment processing are increasingly automated. Some interviewed professionals use generative AI tools to locate clauses and pre-populate assessment sheets. Despite efficiency gains, concerns remain around data privacy and the opacity of AI models.

Implication: AI can assist with administrative tasks, but legal and valuation decisions should remain human-led. Closed AI models with governance frameworks are recommended for sensitive contract data.

3. Value Management & Project Financial Control
AI supports rapid option appraisal and dynamic cashflow forecasting. It can link pre-contract estimates with post-contract actuals and predict inflationary impacts using historical data. However, effectiveness depends on the completeness and consistency of datasets.

Implication: Trial AI tools for scenario costing and cashflow modelling, validating outputs against historical projects before wider adoption.

4. Project Financial Control
AI is increasingly being used to support financial oversight in QS practice, particularly in areas such as cashflow forecasting, cost-value reconciliation (CVR), and final account data harvesting. Respondents described how AI tools can augment cost reporting and automate aspects of financial analysis.

Implication:
AI can enhance financial control by linking real-time data with predictive models. However, its value depends on robust data collection practices. QS professionals should validate AI outputs against historical project data and ensure financial datasets are structured and complete before relying on AI for decision-making.

5. Data Management
AI applications in data management focus on structuring, analysing, and reusing project information, particularly through the automation of data capture from cost reports, final accounts, and BIM models. Professionals highlighted the untapped potential of AI to transform historical project data into actionable intelligence but noted that inconsistent data practices and fragmented BIM use currently limit this value.

Implication: Standardised data governance, structured templates, and consistent BIM integration are essential to maximise AI-driven insights and benchmarking accuracy across QS workflows.

6. Sustainability & Risk Management
AI is beginning to support sustainability efforts in QS through whole-life costing and carbon-cost linkage. Professionals noted that AI can assist in estimating the overall cost of construction across a building's lifecycle, enabling more informed decisions around materials and environmental impact.

Implication: AI can enhance sustainability analysis in QS, but its effectiveness depends on the availability of robust environmental data. Professionals should integrate AI tools with lifecycle databases and shift focus towards long-term value rather than upfront cost alone.

7. Risk Management
AI is also being used to support predictive analytics and early risk identification. Professionals described how AI can model inflation scenarios and flag contract clauses relevant to variation orders, helping QS professionals anticipate potential risks.

Implication: AI should be used as a decision-support tool to enhance risk awareness and forecasting. However, human judgment remains essential, especially in complex or unprecedented situations. Combining AI insights with professional experience ensures more reliable risk management.

2.2 Perception of Opportunities: The Transformative Potential of AI in Quantity Surveying

Although the use of Artificial Intelligence (AI) within Quantity Surveying (QS) workflows remains relatively limited, there is a growing recognition among professionals of its transformative potential across multiple dimensions of practice. Professionals interviewed acknowledged that AI is gradually extending its influence across key aspects of the QS role, from measurement and estimation to data management, and project financial control functions, and that these developments present significant opportunities for the profession (Table 2.2).

The collective view among professionals suggests that AI should not be regarded merely as a tool for automation, but rather as an enabler of innovation, strategic decision-making, and sustainable practice. The emerging opportunities are linked to eight key advantage dimensions (Figure 2.2 and Table 2.2) that describe where AI can generate the greatest value for the QS profession.

Figure 2.2 – Key Advantages of AI in QS Practice

Table 2.2: Advantages of AI application in QS Workflow

Advantage Dimension	Key Opportunities Identified	Advantages / Implications to the Profession
Accuracy	Enhancing precision in measurement and estimation; detecting cost anomalies; improving benchmarking consistency.	Strengthens data integrity and client confidence. QSs shift from manual input to assurance and validation of AI-driven outputs.
Sustainability	Enabling life-cycle cost and carbon modelling; integrating environmental and financial data.	Supports ESG-aligned decision-making and sustainable delivery strategies. Positions QSs as advisors in sustainability-led design.
Strategic Value	Data-driven commercial strategy, procurement and delivery optimisation.	Expands QS influence beyond cost reporting to proactive strategy formulation and business intelligence.
Risk Reduction	Forecasting cost overruns, inflation trends, and contractual risks; real-time risk monitoring.	Promotes early warning culture and evidence-based decision-making. AI augments professional judgment for risk interpretation.
Knowledge Enhancement	AI-enabled benchmarking and project data reuse; codifying tacit knowledge.	Transforms QS firms into learning organisations. Institutional knowledge is retained, improving forecasting and performance over time.
Professional Transformation	Emerging roles such as Digital Cost Analyst, Data Steward, AI Assurance Consultant.	Drives re-skilling and digital literacy. Enhances QS relevance as a data-informed, technology-enabled profession.
Collaboration	Linking BIM, cost, and schedule data; promoting interdisciplinary coordination.	Encourages holistic project delivery. QSs become integrators across design, engineering, and commercial functions.
Efficiency	Automating repetitive administrative tasks (take-off, invoicing, reporting); reducing data processing time; managing multiple projects simultaneously.	Major time savings and improved throughput. Enables QSs to focus on strategic and value-added tasks, making efficiency a competitive advantage.

2.2.2 AI-Enabled QS Transformation of the QS Profession

The findings indicate that AI presents multi-dimensional opportunities that extend far beyond automation. The perceived opportunities of AI in Quantity Surveying can be understood across three progressive stages of professional maturity (i) the short-term focusing on gains, (ii) medium-term focused on evolution of the profession, and (iii) long-term focused on transformation of the QS profession in adopting and leveraging AI technologies (Figure 2.3).

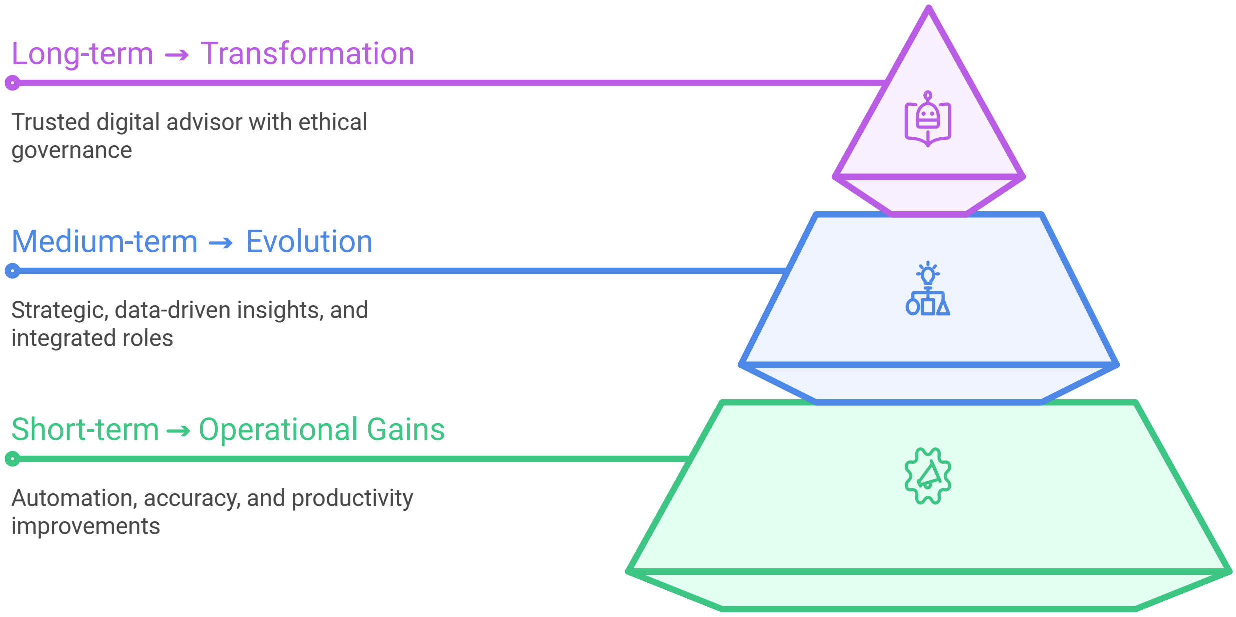


Figure 2.3: Stages of AI-Enabled QS Transformation

2.2.2 Short-term gains:
AI adoption in the immediate future is expected to deliver tangible improvements in automation, accuracy, and productivity. By automating repetitive and time-intensive tasks such as quantity take-off, invoicing, and cost reporting, QS professionals can reduce manual workload and increase output efficiency. Enhanced data processing and error detection also contribute to more precise estimation and forecasting, improving reliability and confidence in project cost outcomes.

2.2.3 Medium-term evolution:
In the medium term, AI will enable a shift toward strategic, data-driven, and integrated QS roles. As automation streamlines operational tasks, QS professionals can increasingly focus on interpreting AI outputs, advising on procurement strategies, and integrating financial intelligence with design and construction data. Collaboration across digital platforms such as BIM, digital twins, and off-site manufacturing will strengthen the QS's role within a connected project ecosystem, positioning them as key contributors to data-informed decision-making and value optimization.

2.2.4 Long-term transformation:
In the longer term, the profession is expected to evolve toward the role of the trusted digital advisor, a QS who combines deep cost expertise with ethical governance, analytical acumen, and cross-disciplinary insight. AI will underpin a new era of professional practice where QSs provide leadership in digital ethics, sustainability, and risk assurance. This transformation redefines the QS as a critical integrator of financial, technical, and ethical intelligence, guiding project decisions with both data-driven accuracy and human judgment.

In essence, AI is perceived not as a replacement for human expertise but as a complementary enabler that enhances professional judgment, efficiency, and foresight. Those QS professionals who invest in digital competencies, data literacy, and ethical governance will be best positioned to lead within the evolving digital construction ecosystem.

2.3 Concerns and Limitation of AI in QS

While AI presents significant opportunities for innovation and efficiency within the Quantity Surveying (QS) profession, the interviews with professionals revealed a range of concerns, limitations, and perceived barriers that currently constrain its adoption and practical application.

Professionals consistently noted that AI adoption in QS remains slow due to issues of trust, data governance, investment costs, ethical uncertainty, and cultural resistance. These concerns reflect both technological limitations and institutional or behavioural challenges, indicating that successful AI integration will require not only technical readiness but also cultural and regulatory alignment (Figure 2.4).

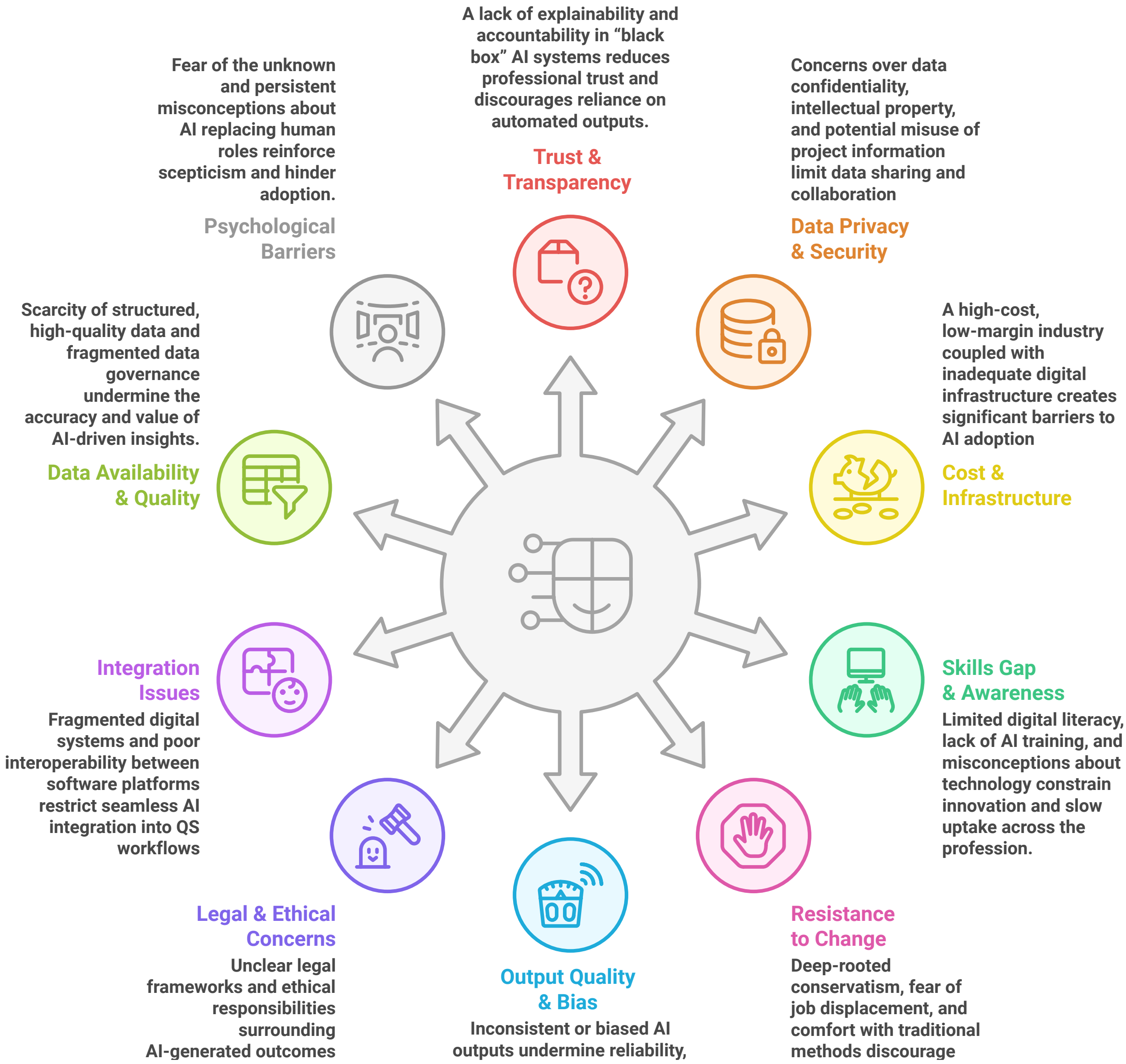


Figure 2.4: Concerns and Limitation of AI in QS

The thematic analysis highlights that the barriers to AI adoption in Quantity Surveying stem from a combination of technological, human, and institutional factors. It is deduced that barriers to AI integration in QS are multi-layered and systemic rather than purely technical. Ethical trust and data governance form the core constraints, amplified by limited investment capacity and cultural inertia within the profession.

Among these, several concerns were most frequently cited across participants:

- Cost and Investment Constraints: Many construction firms operate with narrow profit margins, making the high upfront cost of AI tools and training difficult to justify without immediate returns.
- Data Privacy and Ownership: Persistent fears over data leakage, intellectual property loss, and regulatory breaches inhibit the sharing of project information essential for AI development.
- Trust and Transparency Issues: The "black box" nature of AI and uncertainty over accountability for errors erode confidence in automated decision-making processes.
- Skills Gaps and Cultural Resistance: A lack of AI literacy, combined with traditional working cultures and fear of job displacement, slows adoption and experimentation.

Although technical challenges (such as data scarcity, interoperability, and algorithmic bias) were noted, participants placed greater emphasis on cultural, ethical, and structural barriers. This indicates that the successful adoption of AI in QS will depend less on technological readiness alone and more on institutional trust, ethical frameworks, and professional capability development.

Addressing these limitations requires a multi-pronged approach involving investment in digital skills, robust data governance policies, regulatory clarity, and the development of transparent AI systems that align with professional ethics. As such, the evolution of AI within the QS profession will rely on balancing technological advancement with the preservation of human judgment, accountability, and ethical responsibility.

Impact of Artificial Intelligence in Quantity Surveying

3.0 Introduction

This section synthesises findings from a knowledge-exchange workshop with Quantity Surveying (QS) professionals, where participants developed a Future Wheel exploring how Artificial Intelligence (AI) is expected to reshape the profession. The model reveals that AI's influence extends far beyond technical upgrades. It marks a socio-technical transformation - one that redefines competencies, workflows, regulations, and even the identity of the QS professional.

3.1 Future Wheel Model

The model comprises three layers: direct impacts, first-order effects, and longer-term second-order implications. Together, they illustrate the trajectory from rapid digital efficiency to deep organisational shifts and systemic societal consequences. What emerges is clear: AI is not just a tool; it is a catalyst for structural change within the built environment ecosystem.

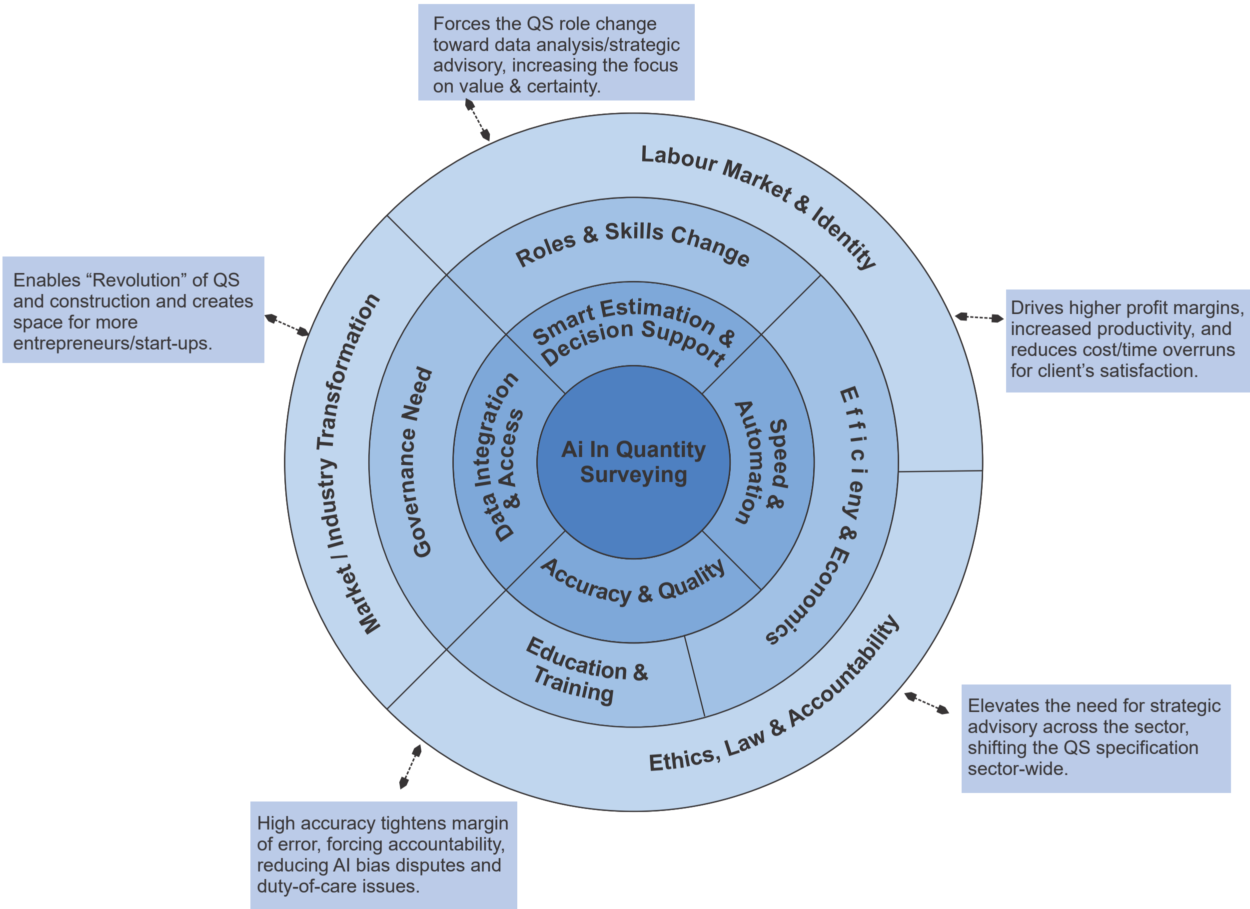


Figure 3.1: Future Wheel Model for AI in Quantity Surveying

3.1.1 Direct Impacts

AI is already accelerating core QS processes. Tasks such as measurement, cost take-offs, benchmarking, and contract analysis are increasingly automated, enabling near-instant retrieval, processing, and reporting. What previously required days of manual work may be achieved in minutes. This shift enhances efficiency, consistency, and transparency, significantly reducing administrative burden. Accuracy gains are equally substantial. Machine learning–assisted cost modelling and automatic cross-checking improve the reliability of outputs such as Cost Value Reconciliation (CVR) reports and cash-flow forecasts. Participants described AI systems that consolidate disparate project datasets, reducing human error and providing deeper analytical insight than traditional manual approaches could achieve. But speed and accuracy are only part of the story (Figure 3.2). AI centralises data in unprecedented ways - "open-source data," "centrally accessible data," "smart contracts," and even "AI integrated into BMS (Building Management System) for automatic FM (Facility Management)." QS practice begins to shift from document handling to data navigation. Professionals imagine being able to ask an AI agent to instantly retrieve project-specific procurement values, performance histories, or deviations in past projects. The QS's work becomes deeply entangled with information ecosystems rather than discrete tasks. These direct impacts generate a compelling promise: more efficient work means more profit. Firms anticipate "cost reductions," "increased profitability," "quicker working = more profit," and "improved predictive capacity."

Figure 3.2: Data on Direct Impact of AI in QS

3.1.2 First-Order Effects

The first-order consequences focus on how organisations and professionals adapt to AI-enabled workflows. The most significant shift highlighted by participants is the changing nature of QS work itself. As machines assume repetitive or calculation-heavy tasks, QS professionals are pushed upward into more strategic roles - interpretive, advisory, and evaluative.

This transition mirrors transformations seen in other data-intensive professions. However, it carries a paradox. While AI frees experienced QS practitioners to operate at a more strategic level, it could simultaneously constrain opportunities for early-career professionals to develop foundational skills. A graduate who does not learn from first principle may struggle to build the intuition required to challenge or validate AI outputs. In this sense, AI may both elevate and erode the profession simultaneously.

Organisations also anticipate financial shifts. Faster work cycles, improved accuracy, and reduced rework are likely to increase profitability. However, these savings come with new costs: software licences, data infrastructure, cybersecurity obligations, and training. Some firms expect that these will ultimately be passed on to clients, creating tension around fee structures in the short term.

Educational institutions face similar pressures. Curriculum reform is no longer optional. AI literacy, data analytics, digital ethics, and computational thinking are becoming essential components of QS training. But another tension emerges: if students rely too heavily on AI during training, will they become proficient analysts-or merely proficient system operators?

Governance concerns further intensify. Participants foresee the need for new industry-wide standards that clarify data ownership, model validation, professional accountability, and ethical obligations. Without such frameworks, liability risks and inconsistency will proliferate (Figure 3.3).

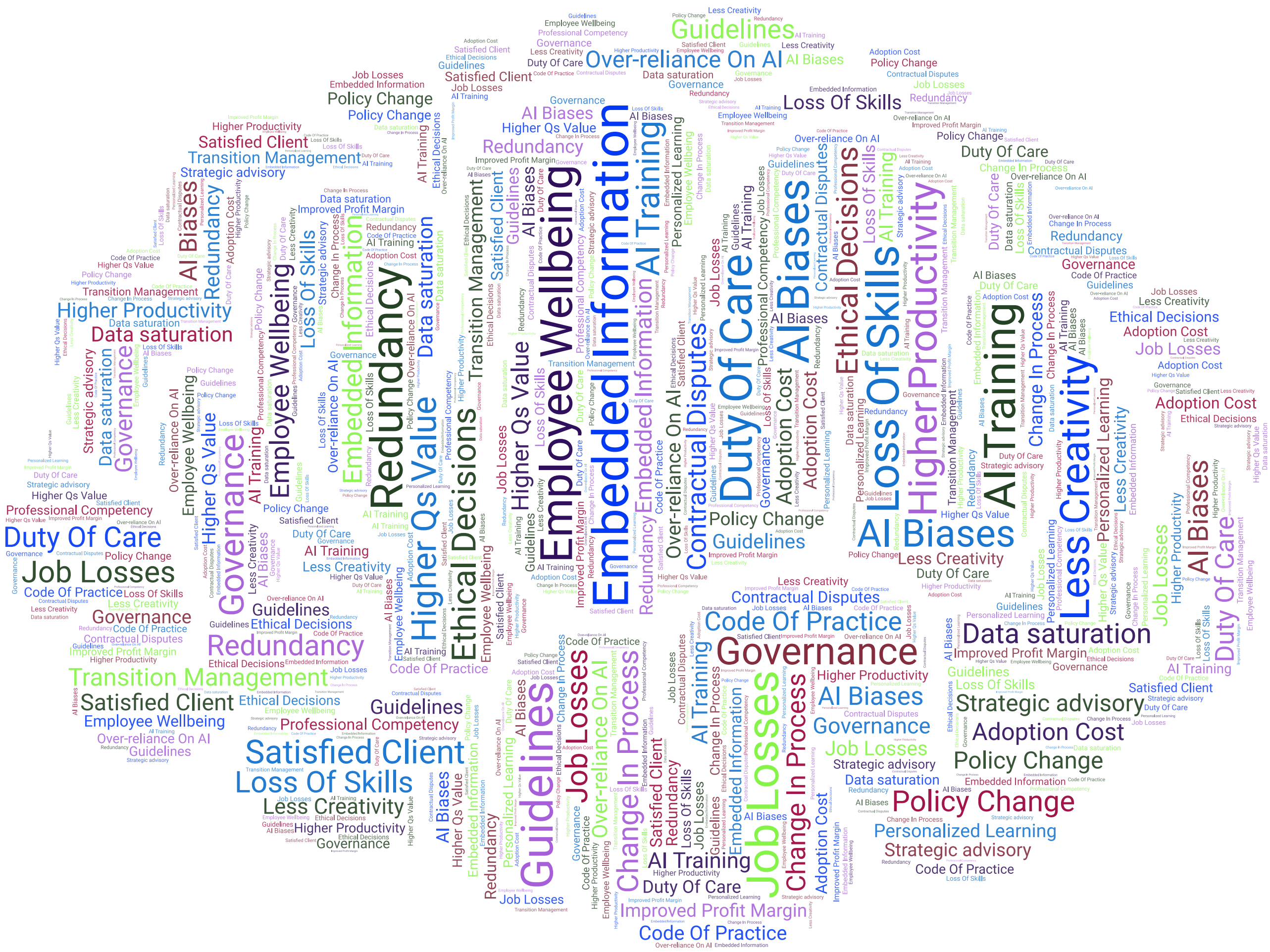


Figure 3.3: Data on First Order Impact of AI in QS

3.1.3 Second-Order Effects

The outer layer of the Future Wheel, which addresses second-order consequences, encompasses structural and societal implications that materialise over time. Central among these is the rise of concerns regarding ethical and legal accountability. As AI systems become decision partners rather than mere tools, questions of authorship, liability, and transparency intensify. Data privacy, algorithmic bias, and the traceability of automated decisions are no longer just technical issues but matters of professional ethics and governance. Experts envisaged scenarios in which disputes about biased cost forecasts or automated contract clauses could escalate to legal proceedings (taking "AI to court"). Such outcomes demand a re-examination of professional indemnity, duty of care, and evidence protocols.

A related tension arises from data ownership and intellectual property. Centralised cost databases and shared benchmarking platforms blur the boundaries between proprietary and public information. Clear legislative frameworks will be required to define ownership rights, access privileges, and the reuse of anonymised data for research or commercial purposes.

The labour-market implications are equally significant. While AI enhances productivity, it may also reduce the demand for entry-level QS positions that focus on measurement and documentation. This displacement risk must be weighed against the creation of new roles in data governance, AI model training, and strategic analytics. The profession is therefore likely to experience not absolute job loss, but rather role redistribution, where human expertise is concentrated in areas such as interpretation, negotiation, and client relations.

Long-term industrial transformation is another defining feature of the third-order effects. The boundaries of the QS profession are expected to blur as engineers, data scientists, and economists converge around integrated digital project platforms. This could yield both collaboration and competition, challenging existing regulatory and fee structures. Simultaneously, new entrepreneurial ventures are anticipated, such as AI-enabled consultancies, start-ups offering automated cost-benchmarking services, and cross-disciplinary data advisory firms. Such diversification represents a structural shift toward an ecosystem economy within the built environment.

Figure 3.4: Data on Second Order Impact of AI in QS

3.2 Implications

Speed Creates New Pressures

AI's most immediate impact is speed - faster outputs, faster reporting, faster decision cycles. But speed carries hidden burdens. When a task that once took a day is reduced to an hour, organisational expectations rise accordingly. Efficiency gains risk becoming productivity demands, intensifying cognitive pressure and potentially harming wellbeing. Faster workflows do not automatically mean healthier or more sustainable working conditions.

The Dual Future of QS: Strategic Elevation or Strategic Displacement

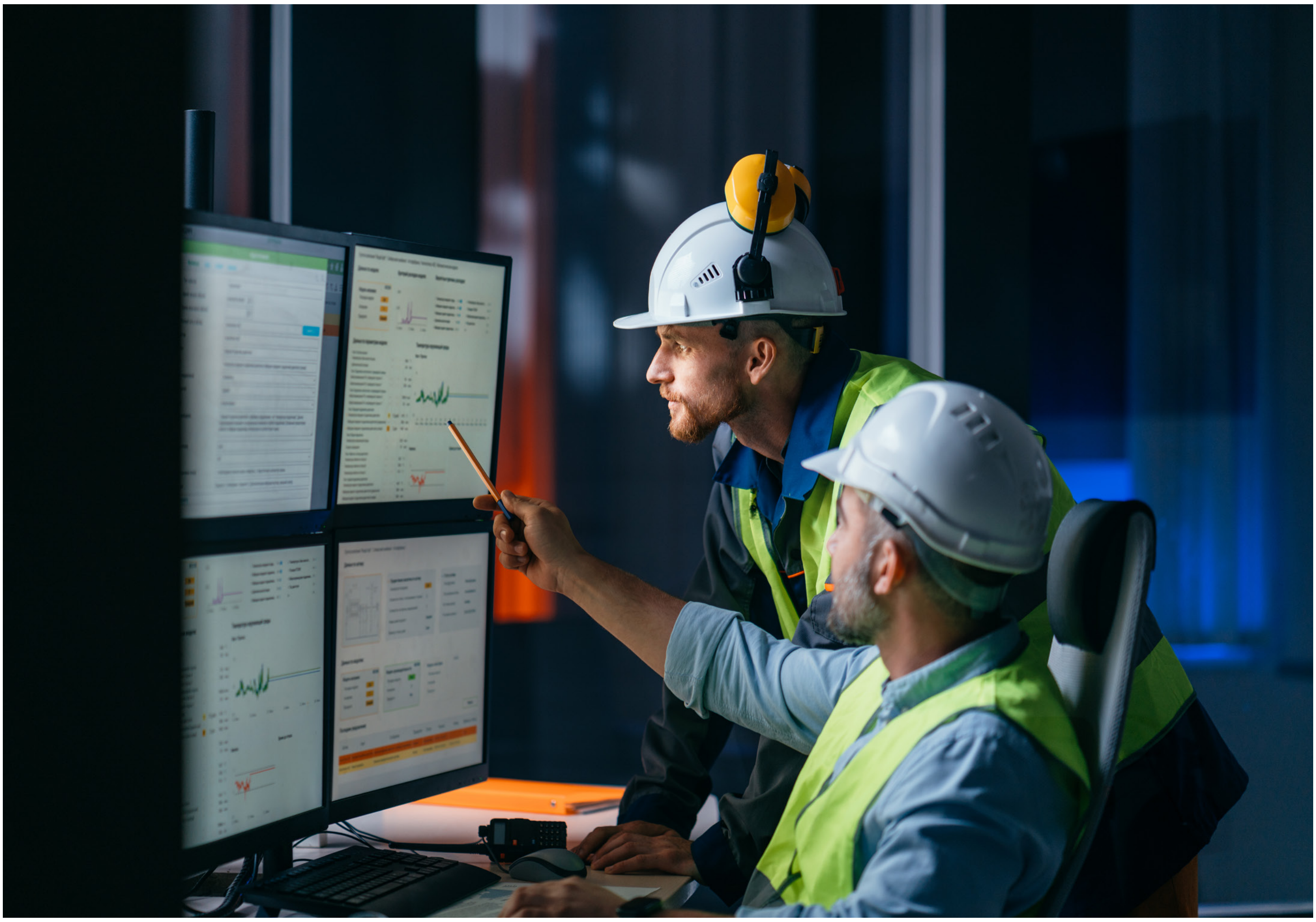
The workshop revealed two competing visions for the future:

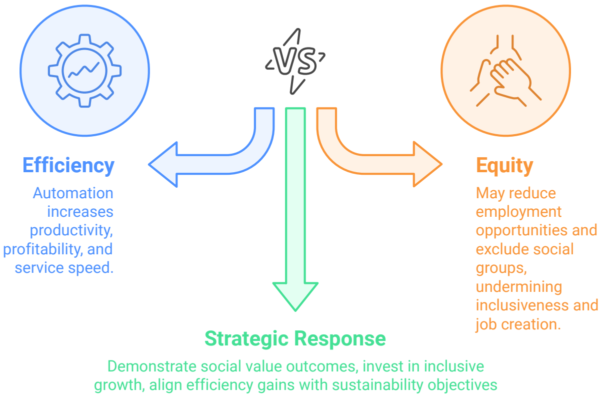
1. **Strategic Elevation**
   AI handles the mechanics. The QS becomes a strategic navigator - interpreting data, advising clients, and mediating risk.
2. **Strategic Displacement**
   AI systems become increasingly autonomous, potentially substituting aspects of QS advisory work. Clients may rely directly on AI-driven design–cost platforms, bypassing traditional expertise.

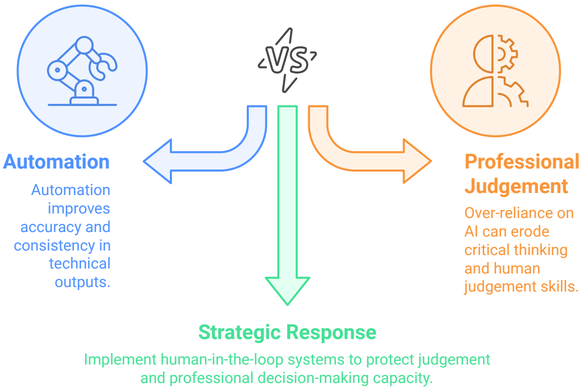
Which path prevails depends not on technology but on governance, education, and ethical stewardship.

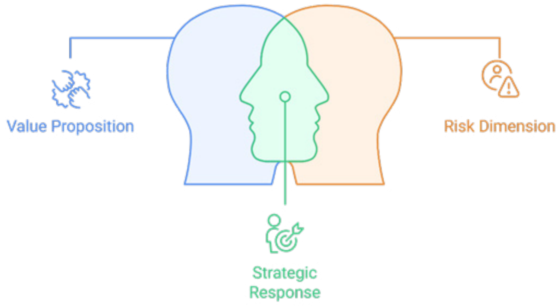
The Core Paradox: AI as Both Catalyst and Threat

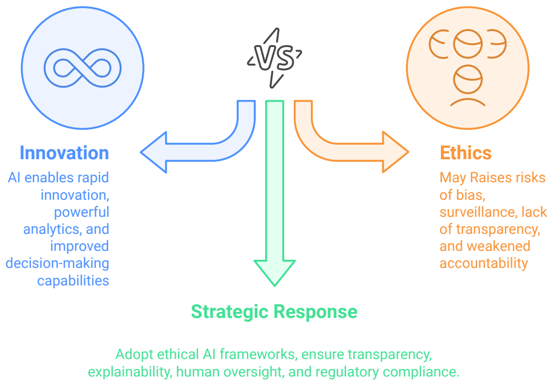
The overarching insight from the Future Wheel is that AI simultaneously strengthens and destabilises the profession. It enhances capability but threatens skill depth. It improves accuracy but complicates accountability. It increases profitability but risks workforce displacement. It advances sustainability goals but burdens digital infrastructure.

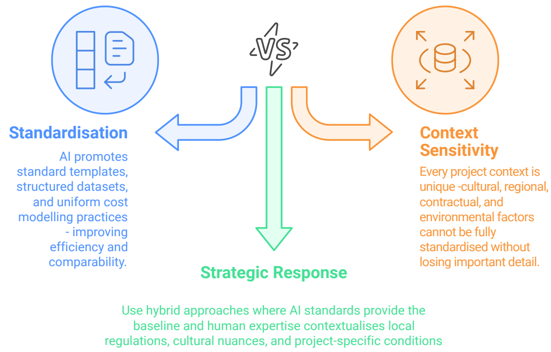


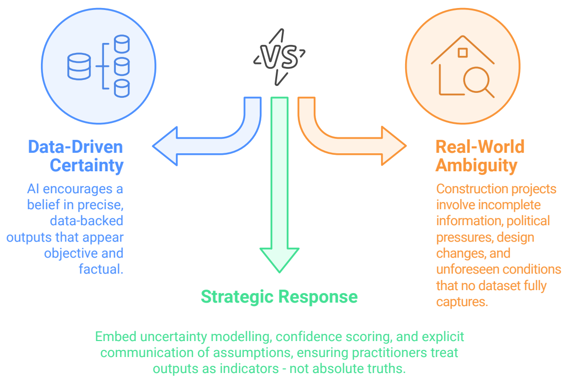












AI will not only change QS tools - but it will also challenge the very logic of what the QS profession is, what it values, and how it defines expertise. The critical question now facing the profession is: Will QS professionals actively shape the future of AI - or will AI reshape the QS profession in ways it is not prepared to manage?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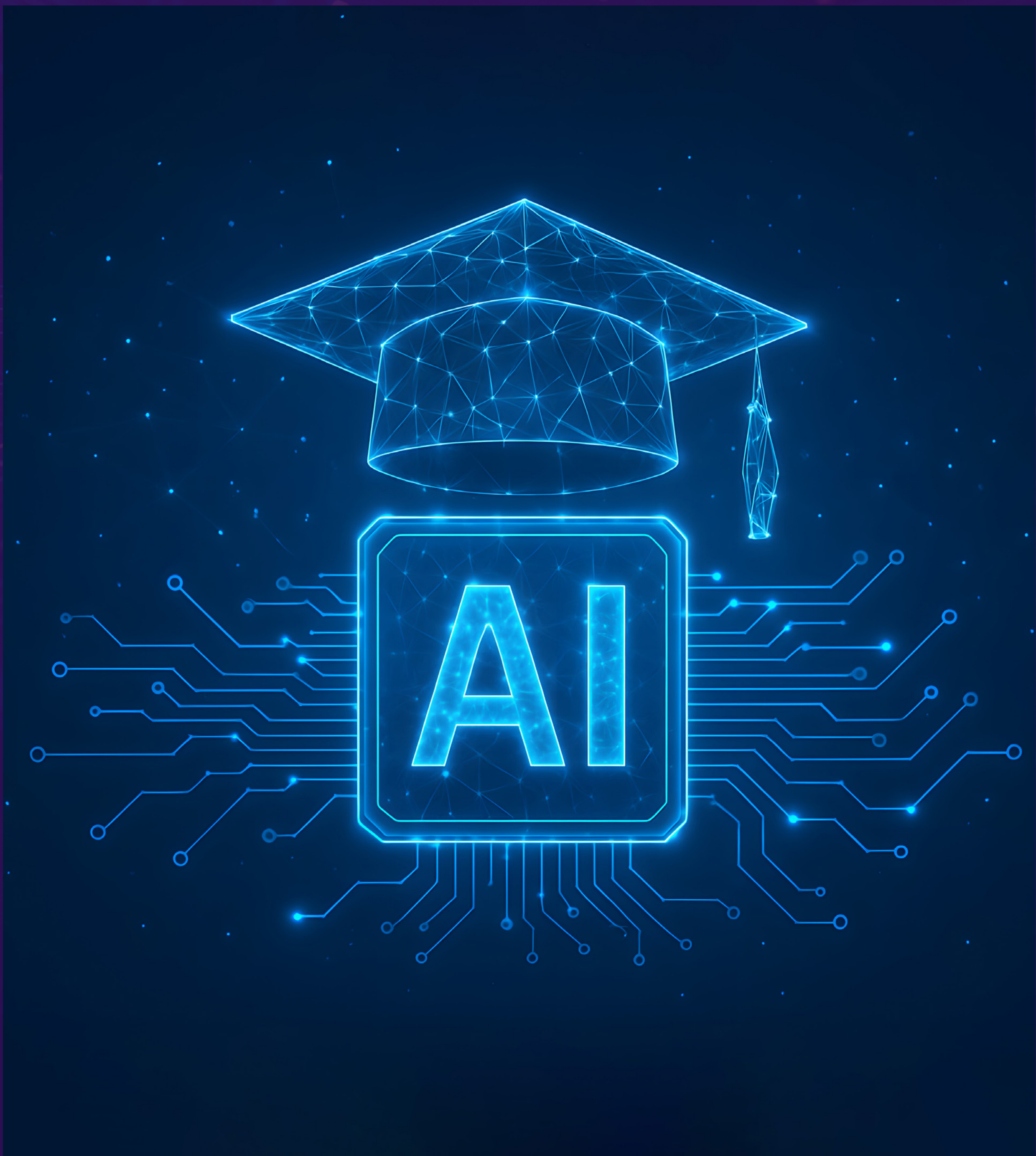
Educating for Integrity: Embedding Responsible AI in Construction Education

Dr Noha Saleeb
Associate Professor in Creative Technologies and Construction



4.0 Introduction: Why Integrity Matters in the Age of AI

Artificial Intelligence (AI) is rapidly proving to be a catalyst for transformation within the construction industry, including reshaping Quantity Surveying (QS) by automating cost estimation, risk analysis, project management and predictive analytics. These AI tools' benefits are significant, promising efficiency and speed, with machine learning and deep learning models achieving 75–90% accuracy in construction cost estimations. However, they also introduce critical challenges and risks which if left unconstrained, can erode professional judgment and compromise ethical standards. These risks include bias in datasets, algorithmic errors, opaque reasoning, data inaccuracies, and over-reliance on technology which risks diminishing professional judgment and oversight [2,3]. Hence Academia has a critical role in preparing future QS professionals not only in how to use AI, but to do so responsibly, ensuring transparency, fairness, and ethical integrity. This is by embedding responsible AI principles and standards into QS education, ensuring graduates are not just tech-savvy but ethically grounded in their professional judgement.

4.1 The Dual Challenge: Innovation & Integrity

AI systems can process vast datasets and generate insights faster than any human, influencing decisions worth millions. However, their outputs are only as reliable as the data and algorithms behind them. If these systems are biased or obscure, they can perpetuate inequities or lead to exorbitant mistakes. For example, **Algorithmic Bias in Cost Prediction Models:** if historical data reflects regional disparities, AI models trained on imbalanced datasets may cause regional or contractor-based injustices, affecting tender evaluations and fairness in certain regions o contractor types[2]. **Opaque Models:** black-box systems create accountability gaps by producing results without clear reasoning, undermining transparency and making it difficult for QS professionals to trace or explain decisions for accountability[4]. **Skill Erosion:** as AI takes over spreadsheets and calculations, over-reliance on AI could diminish core QS competencies, for instance critical QS skills such as negotiation, critical cost analysis and risk interpretation may decline[5]. Hence, the challenge is clear: how to harness AI's potential without sacrificing professional integrity.

4.2 Core Principles to Embed for Responsible AI in QS Education

Teaching and learning solutions to mitigate for the above challenges necessitate embedding the following principles in pedagogy / curricula for QS education, and also across the built environment educational programmes. First is **Transparency & Explainability**[4]. Students should understand how AI models work, what data they use, how outputs are generated and how to interpret outputs critically. Unpacking AI algorithms prevents blind trust in algorithms, and helps students articulate / trust decision logic, communicating reasoning clearly and ethically. Second is **Bias Awareness & Mitigation**[3]. Future QS professionals should learn to identify bias in datasets and algorithms, how it enters datasets and algorithms - for example, analysing unrepresentative datasets or skewed sampling, hence applying corrective measures. This includes understanding socio-economic and cultural factors influencing construction data. Teaching methods to detect and correct bias, such as counterfactual testing, raise ethical standards in QS practice. Third is **Human Oversight & Accountability**[2]. AI should augment, not replace, professional judgment. Future QS professionals should maintain core skills like cost analysis and negotiation, ensuring AI outputs are validated by human expertise to retain QS professionals' responsibility and accountability for decisions. Finally but very importantly **Ethical & Legal Compliance**[4]. QS curricula should cover emerging regulations on AI use in construction, data privacy laws, professional codes of conduct and intellectual property to ensure compliance and ethical practice. Incorporating frameworks like IEEE's ETHICS curriculum, and RICS standard on "Responsible use of Artificial Intelligence in Surveying Practice" helps QS students navigate data protection and professional codes.

4.3 Pedagogical Strategies for Achieving Responsible AI

There are numerous teaching and learning strategies that can be practically adopted to maintain integrity in AI outputs. Examples of these include the following. **Case-Based Learning** investigates real-world construction case studies functionalities where AI errors led to project overruns or disputes etc. This is through discussing root causes of what went wrong, how it could have been prevented, and mitigation strategies, e.g. AI cost model failures and remedial strategies. This can uncover why outputs were opaque and how transparency could have prevented errors. It can also examine projects where biased AI decisions impacted cost or tender fairness, fostering awareness of bias sources. **Simulation Exercises** use AI-powered QS tools in controlled environments, to generate cost outputs, then train students to scrutinise for anomalies, bias, errors or overconfidence, encouraging students to critique / evaluate outputs and identify risks. This improves understanding and transparency of algorithmic logic while enforcing ethical and legal compliance. **Interdisciplinary Modules** combine QS with courses on data ethics, GDPR, algorithmic fairness, digital governance, and accountability using case studies from e.g. STEM education or other engineering programmes[3]. **Student Curation & Peer Review** encourage critique and improvement of AI-generated outputs / reports, annotating risks and proposing improvements. This fosters critical thinking and collaborative learning, greater accountability in analysis and identifying bias in datasets or outputs, thus proposing corrective measures. As a summary, Figure 4.1 below highlights which pedagogical strategies can be used to achieve which core principles for responsible AI, to maintain educational integrity.

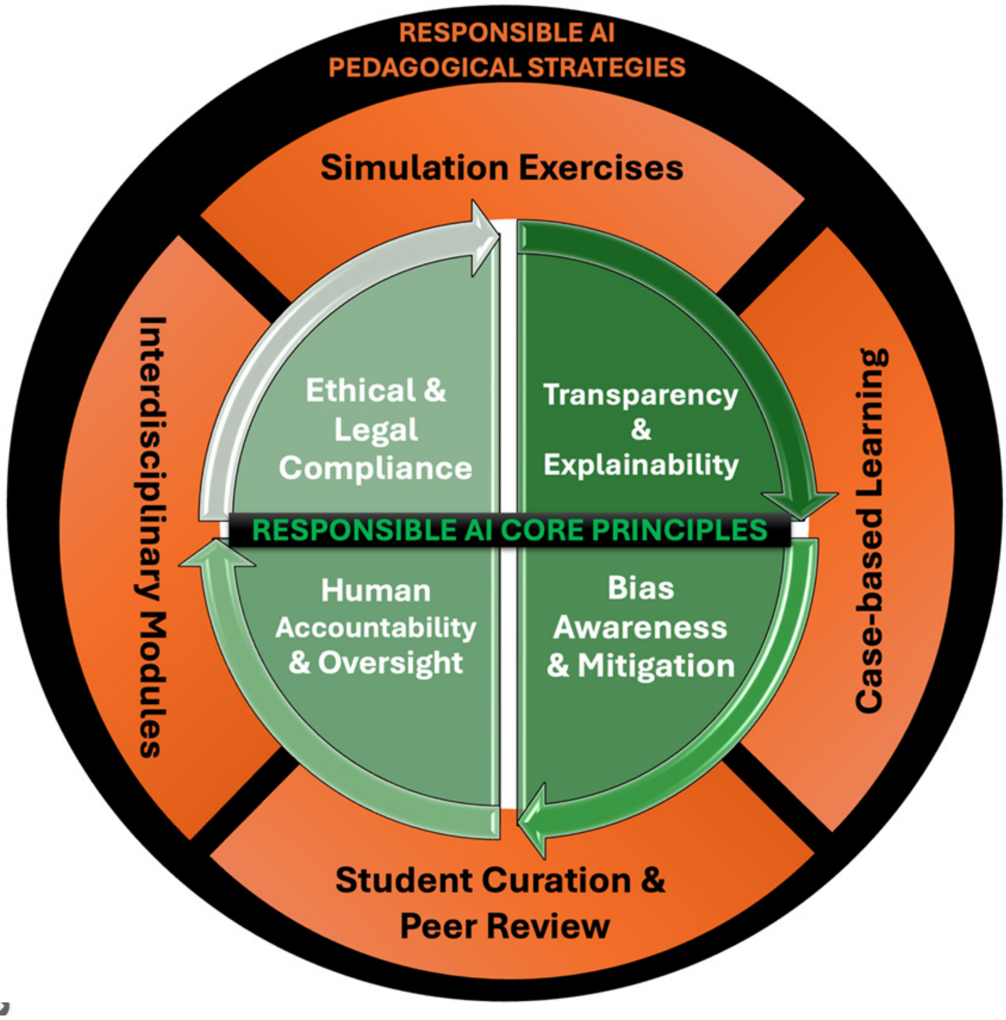


Figure 4.1 – Relationship between Core Principles and Pedagogical Strategies for Responsible AI

Three-Tier Framework for Relevancy

It is an undeniable challenge that AI evolves faster than academic curricula can adapt, which risks curricula outdating quickly. However this opens an opportunity for engagement with industry and professional organisations e.g. RICS, IEEE, and AI ethics conferences / events to ensure that teaching and learning content remains relevant[2,6]. As such academia can adopt a three-tier approach for continuous relevancy:

1. Curriculum Integration

Weave responsible AI principles into QS modules ranging from cost planning to contract administration.

2. Industry Collaboration

Partner with AI tool developers and technology providers to to ensure tools meet ethical standards, and pilot transparent and explainable, bias-aware systems in educational settings.

3. Continuous Professional Development and Lifelong Learning

Provide alumni with continuous training in AI ethics, bias auditing, and evolving regulations.

[2]Shehu, H., Ogunleye, E., Atilola, M. O., et al. (2025). *Ethical and Responsible AI in Engineering and Construction Projects: Governance, Trust, and HumanCentered Design. Scientific Journal of Engineering and Technology, 2*(2).
[3]Usher, M., & Barak, M. (2024). *Unpacking the Role of AI Ethics Online Education for Science and Engineering Students. International Journal of STEM Education, 11*, 35.
[4]Holmes, W., Porayska-Pomsta, K., Holstein, K., et al. (2021). *Ethics of AI in Education: Towards a CommunityWide Framework. International Journal of Artificial Intelligence in Education, 32*(4), 504–526
[5]Weerakkody, C. D. W., Jayasuriya, D. M. S., & Rupasinghe, A. R. (2024). *The Propriety and Limitations of Relying on Artificial Intelligence And Digitalization in the Field of Quantity Surveying.* [Conference paper]. General Sir John Kotelawala Defence University IR Repository
[6]IEEE Society on Social Implications of Technology (SSIT). (2025, June). IEEE ETHICS 2025: Emerging Technologies, Ethics, and Social Justice [Conference]. Northwestern University.

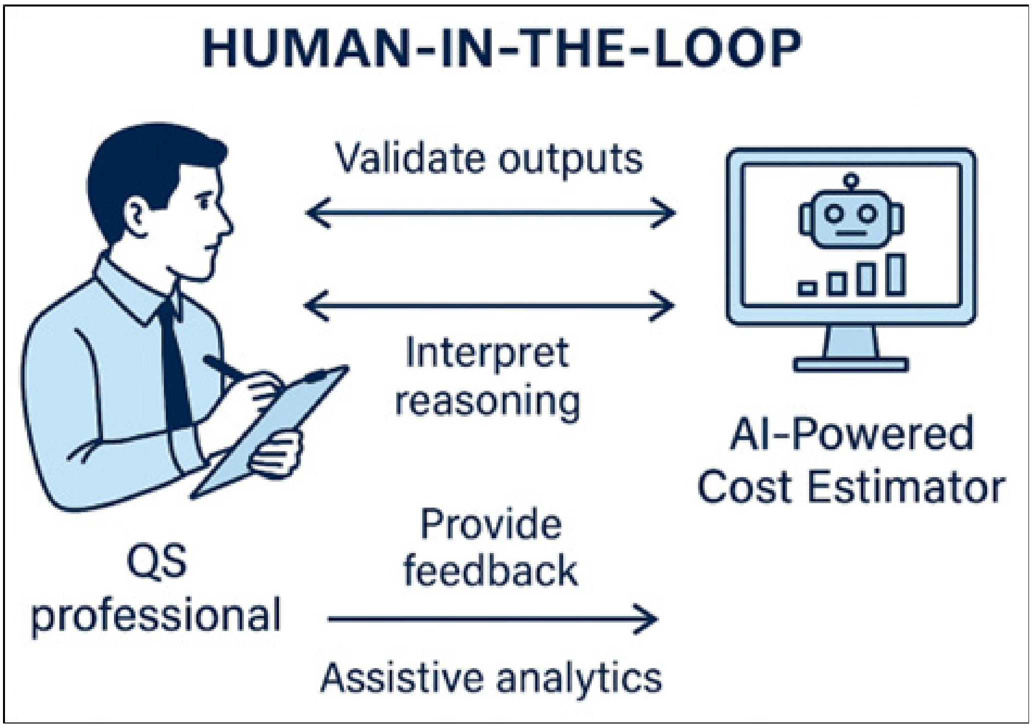


Figure 4.2 – QS Interaction with AI via Human in the Loop Concept

4.4 Conclusion: Building Trust in AI-Driven QS

Responsible AI education is not optional, it is essential for safeguarding integrity in QS practice. By embedding transparency, bias awareness, and ethical principles into curricula, academia can ensure that AI enhances learning and professional competence without eroding the judgment and accountability that define the QS profession.

The future of QS is digital, but it must also be ethical. Educating for integrity is the foundation for building trust in an AI-driven construction industry, ensuring future professionals can leverage AI responsibly. Properly trained, they can not only use technology effectively but also maintain the integrity and trust that define the QS profession in a data-driven world.

Artificial Intelligence, Leadership, and the Future of Quantity Surveying: Measured Instinct in a Digital Age

Richard Golding MRICS
Associate Director, Gleeds

5.0 Introduction

In the built environment, the language of value is being rewritten yet again. No longer measured solely in bricks, concrete, yield or margin, value is now encoded deep within data; layered and often messy. Though, construction (and more specifically, surveying) has always been data driven; only now, this data is digital and not just the by-product; but it is the source code. Within every dataset lies the potential to predict cost, inform design, benchmark progress, and even anticipate future reuse. In this shifting landscape, artificial intelligence (AI) is not simply a new tool; it is a new terrain.

As a consultant within a large global practice, I find myself somewhere between two worlds: one foot grounded in the tactile craft of traditional surveying, the other stepping into the algorithmic unknown. AI brings undeniable promise; it can automate measurements, extract insights from vast troves of information, optimise procurement, and model commercial scenarios at speeds once unimaginable. At Gleeds, we are already very advanced with machine learning tools to benchmark project costs and analyse construction market trends in real-time. The efficiency gains are tangible. The business case is compelling; though industry-wide governance and responsible use still requires some consideration.

5.1 Yet amid the buzz of brilliance, I carry a quiet caution

We must not mistake automation for understanding; nor should we allow speed to substitute for sense-making. AI excels at pattern recognition; but what it lacks (at the moment) is the capacity to wonder without precedent. It can tell us what, but rarely why; and in a profession built on nuance, on judgements shaped by site, supply chain, and stakeholder ambition, that distinction matters.

Therefore, leadership in this space is less about technical dominance and more about interpretive fluency. The future of surveying will not be won by those who build the biggest models, but by those who know when to trust them and most importantly, when not to.

This is not about resisting change. Far from it. I am, unapologetically, an advocate for digital innovation; but I believe innovation must be stewarded responsibly. We need professionals who understand AI not as a magic wand, but as a mirror; reflecting our assumptions, amplifying our biases, and accelerating whatever governance we build in.

> A good professional, equipped with quality data, tools, AI, and digital skills, is a powerful proposition for the future of our industry, but blindly applying AI to bad business models with unskilled resources will only deliver bad results faster.
>
> Ben Huskisson,
> Chief Digital Officer, Gleeds

5.2 New blood must look to old blood to enrich digital thinking

As someone who has worked closely with young professionals through the Royal Institution of Chartered Surveyors (RICS), I see first-hand the generational divide. Many new entrants are digitally native; comfortable with cloud platforms, collaborative tools, even a bit of Python. But native does not equate to mastery. Where in a sector now racing towards digital augmentation, we risk creating a future where surveyors know how to use the tools, but not how to question them. Understanding the importance of the cost plan, but not necessarily the importance of the site visit.

That is why I encourage emerging professionals to cultivate a dual fluency: technical and human; or perhaps New School blended with Old School. We need people who can read a data model as well as a room. Who can code a script, but also spot when the logic behind it is flawed. Data literacy, systems thinking, and computational modelling will be critical, but so too will be curiosity, creativity, and emotional intelligence (EQ).

5.3 We need creativity, inclusivity, and ground-up collaboration

As more of our tasks become digital: automated space utilisation, Bills of Quantities generated in seconds, site inspections by drone, we must be careful not to lose our physical intuition. The profession of surveying is not abstract; it is grounded, and it is embodied. We read buildings not just through spreadsheets, but through conversations in meeting rooms and walk-throughs of voided slabs.

I am fiercely protective of that physicality. I encourage our surveyors to get on site, take real measurements, speak with subcontractors, and understand the build from the ground up. Not as throwbacks to a bygone age, but as formative rites of passage. It is only by combining that hands-on knowledge with AI-enabled tools that true insight can emerge.

Our own journey with AI at Gleeds reflects that balance. Led by brilliant colleagues such as James Garner, our in-house Data and AI teams are developing toolkits and training to support consultants at every level. We're creating automated benchmarking systems, natural language processing tools for tender review, and predictive models for risk analysis. But none of these tools operate in a vacuum, they are embedded into live projects, shaped by human feedback, and constantly reviewed for relevance. An agile Human/Machine call and response. Still, even with these systems in place, I often return to a single guiding principle: AI must augment our abilities, not atrophy them.

AI is not arriving into the built environment in isolation, it is part of a broader wave in the emerging TechStack. Quantum computing promises leaps in power to transform cost modelling and programme scheduling. Robotics is already present on-site, from Smart Building systems to inspection drones and 360° cameras; which will only become more integrated into mainstream delivery. Digital twins are evolving from static handover assets into live, predictive models; which inform embodied and operational cost, performance, and carbon into a single decision-making tool. Meanwhile, blockchain offers new models of trust and traceability in procurement, potentially redefining how value is recorded and transferred.

Leadership, in this new landscape, is not about being the smartest in the room, it is about being the most curious, the most responsible, the most willing to ask difficult questions. How do we ensure transparency in AI decision-making? Who audits the algorithms? How do we protect against model drift in long-term projects? These are not theoretical dilemmas; they are very real and very present professional imperatives.

One emerging practice which is already in place at Gleeds is 'Decision Provenance Tracking'. It is no longer enough to record what AI provides; we must also capture the specific data points, assumptions, and human interventions that shaped the recommendation, via record-keeping. By logging not only the answer but the journey to it, we create an audit trail that strengthens accountability, protects professional liability, and provides invaluable feedback which makes way for continuous improvement. A digital trail which turns decision-making into a constructive dialogue, and ensures that AI learning compounds rather than dissipates project by project.

Within in our own processes, we have found that a tiered validation approach (combining automated reviews, AI/EQ CompChecks, and client validation for critical elements) offers the most comprehensive assurance. These checkpoints not only reduce the risk of model drift, but builds trust with internal and external stakeholders by making the validation process explicit, transparent, and repeatable.

Table 5.1: AI in Project Lifecycle

RIBA Stage	Human Led	AI Elevation	Validation (Tiered Quality Assurance)
00 _ Strategic Definition	Establish business case and budget intent. Engage with stakeholders.	Benchmark similar schemes. Rapid feasibility modelling using generative AI.	• Automated plausibility checks • AI/EQ CompCheck of feasibility outputs • Client validation against strategic objectives
01 _ Preparation and Brief	Define initial cost plan, procurement strategy, and value drivers.	NRM x NLP synthesis of briefing docs. Geospatial analysis for site-related cost influences.	• Automated feasibility validation • AI/EQ competency review of derived briefs • Client validation to confirm alignment
02 _ Concept Design	Update cost plan. Lead early cost/design alignment workshops.	Instant quantity take-off using 3-point cost planning. Parametric design costing and scenario comparison.	• Automated range/outlier detection • AI/EQ CompCheck of parametric assumptions • Client validation of feasibility and value drivers
03 _ Spatial Coordination	Refine elemental cost plans. Lead value engineering focused on lifecycle cost.	Detect inefficiencies and overlaps in coordinated models. Auto-validate evolving estimates.	• Automated clash/duplication checks • AI/EQ CompCheck of flagged inefficiencies • Client validation of VE outcomes
04 _ Technical Design	Prepare pre-tender estimates and tender docs. Align to procurement strategy and approach.	Refine Bill of Quantities (BoQ). AI-led tender package optimisation and supplier cost comparison.	• Automated quantity reconciliation • AI/EQ CompCheck of BOQ integrity and procurement strategy alignment • Client validation of tender documentation
05 _ Manufacturing and Construction	Manage contract admin, valuations, variations, and reporting.	Predict cost/programme risks. Automate claims reviews and progress analytics. Streamline Change Orders.	• Automated progress/risk checks • AI/EQ CompCheck of claims assessments • Client validation of valuations and major decisions
06 _ Handover	Agree final accounts. Advise on value handover and soft landings.	Reconcile and finalise accounts. Compare lifecycle assumptions with delivery data. Prepare for data transfer to client.	• Automated reconciliation checks • AI/EQ CompCheck of lifecycle assumptions • Client validation of final accounts and digital twin outputs
07 _ Use	Capture learning. Support facilities in operational cost management.	Evaluate cost-in-use vs prediction. AI dashboards for real-time performance and benchmarking.	• Automated performance variance detection • AI/EQ competency review of insights • Client validation and translation into future cost guidance

5.4 A look ahead

As we move towards Phase Two of AI4QS' journey, there are several key areas which will demand deeper exploration.

Sector-specific AI ethics frameworks

Generic AI principles, while useful as a baseline, do not fully address the intricacies of the built environment. Our sector wrestles with decisions that affect safety, value, and community wellbeing; it deserves tailored guidance that reflects these responsibilities. A more tailored ethical doctrine for construction related operations would not only protect professional integrity but it would also help clients navigate this terrain with greater confidence.

The evolution of professional liability

If an AI tool produces a recommendation that shapes procurement or cost certainty, where does the accountability lie? With the consultant who deployed the query, the developer who coded the system, or the system itself? These are not abstract legal puzzles; they are live challenges for contracts, insurance, and ultimately for trust in our profession.

Data sovereignty and stewardship

The lake of project data is increasingly the lifeblood of AI training, but ownership and consent remain blurred. Clients rightly demand confidentiality, yet collective (or even open-source) data can generate industry-wide insights that benefit everyone. Balancing these competing priorities of privacy and progress will be a defining debate for our field; and perhaps spearheaded by the Public Sector.

A generational opportunity

Perhaps the most exciting prospect is not technological at all, but human. We are standing at a rare intersection: digital-native graduates entering practice just as seasoned professionals carry forward deep institutional knowledge. This overlap is almost fleeting, but it is fertile ground for hybrid skill development; and a chance to integrate computational fluency with instinctive judgement before the pendulum swings too far either way.

5.5 The future is ours to forge

Institutions like RICS are responding. The development of a Professional Standard for responsible AI use in the built environment is a good first step. It is foundational not prescriptive, and that is appropriate. We cannot predict every twist in the technology's path, but we can define its ethical perimeter.

I would go further. I believe education must evolve. AI should not be confined to optional modules or digital electives. It should run through the curriculum, informing how we teach measurement, procurement, programme control, and client care. Students must learn to see AI not just as a tool, but as a collaborator; something to engage with creatively.

Beyond education, the pipeline itself must widen. If we are to build AI tools that are fair, ethical, and genuinely useful, we need diversity at the table. That means more walks of life in data science, more neurodiverse professionals in project modelling, more voices from across the globe shaping the AI systems that will influence how capital is spent and space is shaped.

This is the real opportunity. Not just to digitise Surveying, but to reimagine it. To move from transactional to strategic; reactive to predictive; isolated consultants to interdisciplinary collaborators. AI gives us the means to see further but it is still up to us to choose where to look; and in that, I remain deeply optimistic.

Because if there is one truth to carry forward, it is this: the future of our profession will not be secured by algorithms alone, nor by tradition in isolation, but by the thoughtful integration and dual fluency of both. If we get this right, AI will not diminish the role of the Surveyor, it will elevate it.

At its heart, Surveying has always been about more than numbers. It is about trust, interpretation, and good judgement. Those are human strengths; and if we nurture them (if we lead with them), then the future will not be artificial. It will be brilliantly, rigorously, gloriously human.

Cost Intelligence and Education for the AI-Ready Quantity Surveyor

Professor Franco Cheung
Professor in Sustainable Built Environment, Birmingham City University

6.0 Introduction

The Quantity Surveying (QS) profession stands at a crossroads as Artificial Intelligence (AI) reshapes how professional services are delivered. QS services are no exception. To remain competitive, QS practices and the educational institutions must embrace bold reforms. The real transformation lies in integrating the use of data intelligently, automating routine workflows, and repositioning QS services to support value-driven, lifecycle-focused decision-making, underpinning by responsible learning, governance, and ethics

6.1 Reimagining QS Practice Through Cost Intelligence and AI

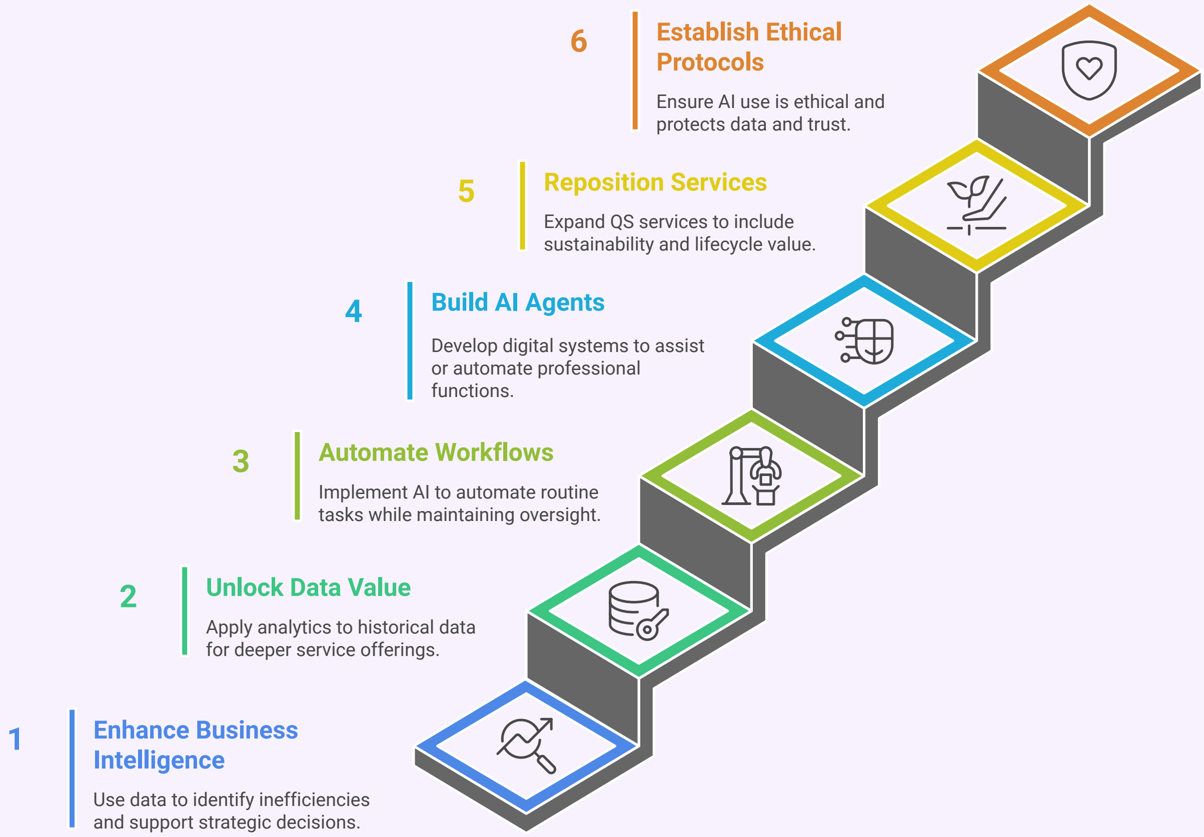


Figure 6.1 - AI in Quantity Surveying

6.1.1 Enhancing Business Intelligence for Internal Performance

While QS has typically focused on delivering client services, firms now need to use business intelligence (BI) internally to identify inefficiencies, assess performance, and support strategic decisions. Metrics derived from resource data, project duration, team productivity, and supply chain responsiveness can help firms move from procedural, transactional services (e.g., monthly valuations) toward offering insight-driven, value-added consultancy.

Some leading QS firms have begun to use tools like Power BI to benchmark performance and visualise project health. However, such initiatives are mostly limited to large consultancies. Many small to mid-sized practices remain at a low level of digital maturity, limiting their ability to capitalise on these efficiencies. As observed in McKinsey's 2025 AI report[8], the firms seeing the greatest value from AI are those actively redesigning their workflows and rethinking management practices to capture value at scale.

6.1.2 Unlocking Value through Data Analytics

QS practices have vast knowledge assets in the form of historical costs, procurement choices, and delivery performance. These assets are arguably underutilised. By applying data analytics and modelling ranging from descriptive dashboards to predictive models, QSs can provide deeper value-added services such as forecasting project risks, optimising lifecycle costs, and supporting design and procurement decisions early on. Yet most firms still lack the capabilities, or the willingness, to share and structure their data in ways that enable such insights. Blanco, et al. (2018)[7] found that while AI offers high potential ROI, few engineering and construction (E&C) firms have the maturity or systems in place to implement it effectively. There has not been significant development in the UK since the report was published 7 years ago. This gap is particularly important as QS firms are typically operating within confined boundaries, instead of seeking opportunities for value creation.

6.1.3 Automating Workflows While Preserving Professional Oversight

A substantial portion of QS work remains labour-intensive - particularly in measurement, valuation, and report production. AI technologies such as Natural Language Processing (NLP), Large Language Models (LLMs), and parametric cost modelling can automate routine tasks, linking cost data with BIM models or producing draft reports instantly. It is now widely recognised that report writing from AI can achieve very high standard. However, automation introduces new risks. Firms are understandably cautious about using tools that require exposure of proprietary databases. Furthermore, AI outputs must remain explainable and verifiable. Human oversight is non-negotiable, especially given legal and ethical implications. In the AI4QS event held in RICS headquarter, one practitioner suggested that he would never give away the authority to approve to AI. McKinsey's latest AI survey highlights that only 27% of organisations review all AI-generated content before use, and nearly as many check less than 20%. For QSs, ensuring outputs are justified by measurable logic and cross-checked by trained professionals is essential.

6.1.4 Building Knowledge into AI Agents

QS firms traditionally rely on expert knowledge residing within experts in costing, procurement and contract, etc. To remain competitive, this tacit knowledge must be transformed into structured data systems and ultimately into AI agents, i.e. digital systems that assist or automate specific professional functions. These might include an AI assistant that can benchmark new tenders, assess market volatility and risks in contract or model design-to-cost options, etc. McKinsey's 2025[8] survey showed that organisations seeing bottom-line benefits from AI are increasingly "rewiring" their business processes to embed generative AI in core functions, supported by defined roadmaps and senior leadership engagement.

6.1.5 Repositioning QS Services Around Lifecycle Value

AI can expand the potential scope of QS services. Rather than being restricted to capital cost related services, QSs can increasingly offer advisory services on sustainability, lifecycle performance, and embodied carbon. These services align with shifts in procurement models from transactional to relational, where clients seek long-term value, not just short-term price. Using AI-enhanced tools, QSs can integrate cost, carbon, and performance data to support value assessments.

6.1.6 Establishing Ethical Protocols for AI Deployment

The use of AI in QS also raises ethical and governance issues. For instance, how can AI-generated results that are hallucinated be avoided? How are client and in-house data protected? What happens when AI insights deviate from traditional judgement?

According to McKinsey's findings, larger firms are more likely to centralise risk management and compliance around AI, but many have not yet developed comprehensive strategies for explainability, fairness, and privacy. Without sector-wide protocols, the QS profession risks undermining the trust it has built over decades.

6.2 Educational Reform: Building the AI-Ready Quantity Surveyor

To support the evolution of practice, QS education must undergo parallel transformation. This is not simply about teaching students to use new tools but preparing them for new roles and responsibilities.

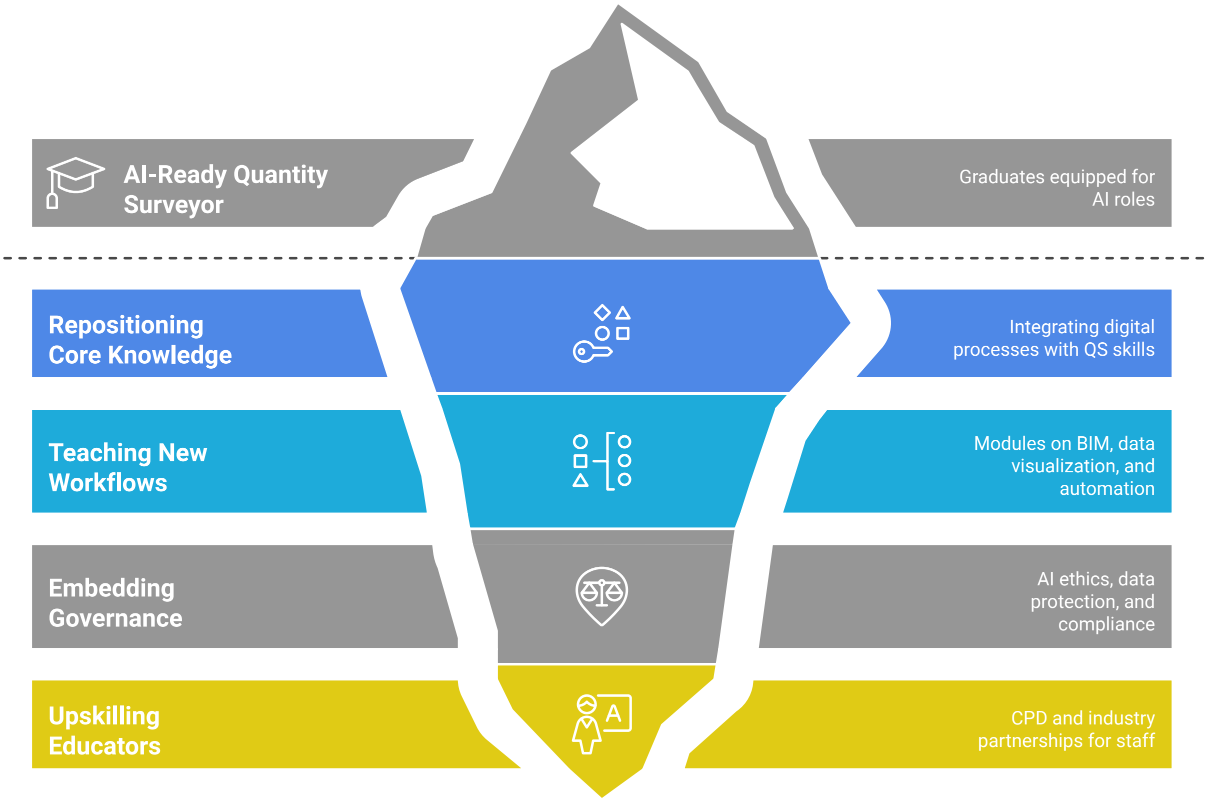


Figure 6.2 – Towards AI Proliferation in Quantity Surveying

6.2.1 Repositioning Core Knowledge in Digital Contexts

Measurement, contract administration, and cost planning remain essential QS skills. But these must now be taught alongside digital processes. For example, students must learn to automate quantification, understand parametric models, the use of relational database and assess the assumptions embedded in cost automation tools.

6.2.2 Teaching New Workflows

Educational programmes must include modules on:

- BIM-based quantity extraction
- Power BI and data visualisation
- Parametric modelling and automation
- Report generation via AI tools
- Workflow validation and exception handling

Exposure to these tools will ensure students are confident in both collaborating with and supervising AI systems.

6.3 Embedding Governance, Ethics, and Data Responsibility

Students must understand not just how to use AI, but how to use it responsibly. Curricula should include:

- AI ethics and bias mitigation
- Data protection and IP awareness
- Explainability and human oversight
- Compliance with professional standards

6.4 Upskilling the Educators and Aligning with Industry

For change to be effective, academic staff must also be supported in upskilling through CPD, industry placements, or knowledge transfer partnerships. Universities should collaborate with industry to co-develop curricula, provide students with access to real-world data, and test new educational methods through projects and studios.

6.5 Conclusion

AI will not replace QSs in the near future but those that can use it strategically, effectively and legitimately will replace those who are not. There will be unavoidable consolidation. Firms must move from procedural roles to strategic enablers, and education must pivot from teaching tools to building capabilities and readiness.

[7] Blanco, J. L., Fuch, S., Parsons, M. & Ribeirnho M. J. (2018). *Artificial Intelligence: Construction Technology's Next Frontier.* McKinsey & Company.
[8] Singla, A., Sukharevsky, A., Yee, L., Chui, M. & Hall, B. (2025). *The State of AI: How Organizations Are Rewiring to Capture Value.* Quantum Black AI by McKinsey & Company.

Building Competence and Trust: Preparing QS Professionals for Responsible AI

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7.0 Background

Have you ever felt so close to a breakthrough, so tantalisingly near a solution, that you could almost taste it, only to have it slip through your fingers? This is the feeling many of us in the construction industry have today as we stand on the precipice of the AI revolution. The promise is immense, but so is the responsibility. As we navigate this new landscape, a critical question emerges: how do we prepare Quantity Surveying (QS) professionals to confidently and responsibly use AI, ensuring human judgment remains central to our profession?

7.1 Two Futures, One Choice

Professor Richard Susskind[9] , in his seminal work on the future of professions, outlines two possible futures. The first is a reassuringly familiar, more efficient version of what we have today. The second is a transformational future, where professionals are gradually replaced by increasingly capable systems. For the QS profession, this is not a binary choice, but a two-track journey. In the immediate term, AI is a powerful augmentation tool, an evolution of our toolkit from the scale rule to digital drawings, and now to intelligent systems. But to ignore the long-term transformational potential would be to risk our own "BlackBerry moment" - a rapid obsolescence that saw a market leader reduced to virtually zero in just a few short years.

The question is not whether AI will change our profession, but how we prepare for it. AI breakthroughs used to come every 5-10 years. Now they arrive every 6-12 months. This reality demands that we act with urgency, not panic, but with deliberate and strategic intent.

7.2 Building the Competencies We Need

To navigate this dual future, we must focus on building new competencies that go far beyond simply learning to use new software. It requires a fundamental shift in how we think about our skills and our role.

First, data and AI literacy must evolve beyond a basic understanding of Excel. We need to become experts in data provenance, structure, and analysis. For a quantity surveyor, whose advice can make or break a multi-million-pound project, the provenance of data is everything. Construction is a data-rich industry, yet we remain information-poor. We capture data with little forethought about how it will be used, resulting in siloed spreadsheets that no AI system can effectively leverage.

Second, we must develop digital ethics as a cornerstone of professional practice. This means understanding when to disclose AI use to clients, how to ensure privacy and data protection, and how to attribute outputs appropriately. The RICS's recent consultation on a professional standard for responsible AI use is a vital step. Disclosure must become the norm, not the exception.

Third, we need interpretive and curation skills. The role of the QS is evolving from execution to curation and judgment. This means developing the ability to design the systems that do the measuring, to ask the right questions of our AI tools, and to critically evaluate the outputs they produce. What if a quantity surveyor could actually spend all their time adding value to clients, rather than being bogged down in manual data processing? This is not fantasy; it is the promise of AI done right.

7.3 Rebuilding Trust in an AI Era

The "grand bargain" that underpins our profession, our expertise, ethical conduct, and commitment to the public good in exchange for societal trust, is facing unprecedented challenges. To maintain this trust, we must be transparent about our use of AI and discerning in our choice of tools. There is a crucial distinction between generalist AI models, which learn from the vast and often unreliable expanse of the public internet, and custom-built, curated AI systems trained on a firm's own expertise. For professional services, where accuracy and reliability are paramount, this distinction matters enormously.

Trust is also built through professional standards that evolve with the times. The RICS's work on responsible AI is not just about compliance; it is about maintaining the integrity of our profession and ensuring that our advice meets rigorous standards, whether produced with AI or not.

7.4 The Urgency of Leadership and Culture

The construction industry, notoriously conservative and prone to "working harder, not smarter," is at a critical juncture. As we heard in our conversation with Dr. Bola Abisogun on the Project Flux podcast[10] , the skills gap is widening, and a change in attitude towards innovation is essential. What we often call a "skills shortage" is, in reality, a misuse of skilled professionals' time.

This is not just a technological problem; it is a systems-thinking problem that requires strong and enlightened leadership. Leaders must create the psychological safety for teams to experiment, to fail, and to try again. Without this cultural shift, we risk falling into the "wait and see" trap, delaying progress by years we may not have.

Intergenerational collaboration is also key. Younger professionals bring digital fluency, whilst senior professionals have the judgment and commercial acumen that AI cannot replicate. Bridging this gap through mentorship and collaborative learning is essential.

7.5 A Call to Action

Ultimately, this is not about being faster or cheaper. It is about being smarter. And smarter starts with structure, skills, and leadership. By embracing the complexity of this new era, by fostering a culture of continuous learning, and by remaining steadfast in our commitment to professional ethics, we can ensure that AI serves to augment our profession.

The greatest risk is not in trying and failing, but in standing still. True progress is born from a willingness to embrace complexity, to learn from our mistakes, and to maintain an unwavering belief in the potential for a better way of doing things. The future of quantity surveying will be defined by our ability to navigate this journey together, ensuring that human judgment remains the cornerstone of our profession, even as our tools become ever more powerful. This is our defining moment. Let's make it count.

Susskind, D., & Susskind, R. (2018). The future of the professions. *Proceedings of the American Philosophical Society, 162*(2), 125-138.

Dr. Bola Abisogun on the Project Flux podcast - https://www.buzzsprout.com/2346327/episodes/16823275

Bridging Technology and Practice: Overcoming AI Adoption Barriers in Quantity Surveying

Alice Graham MRICS
Solution Specialist, Procore Technologies

8.0 Introduction

In construction, transformation does not happen when a new tool appears. It happens when that tool is *adopted* - embedded into the everyday practices of the professionals doing the work.

But in quantity surveying, adoption of technology generally, and AI tools in particular has been slow, not due to lack of tools, but because the necessary groundwork has not been laid. Adoption of AI is not the beginning of change. It is the final stage of a longer process, dependent on four critical conditions:

1. Viable use cases based on real pain points
2. A strong business case that speaks to decision-makers
3. Change management that addresses both behaviour and incentives
4. Education that builds confidence and capability

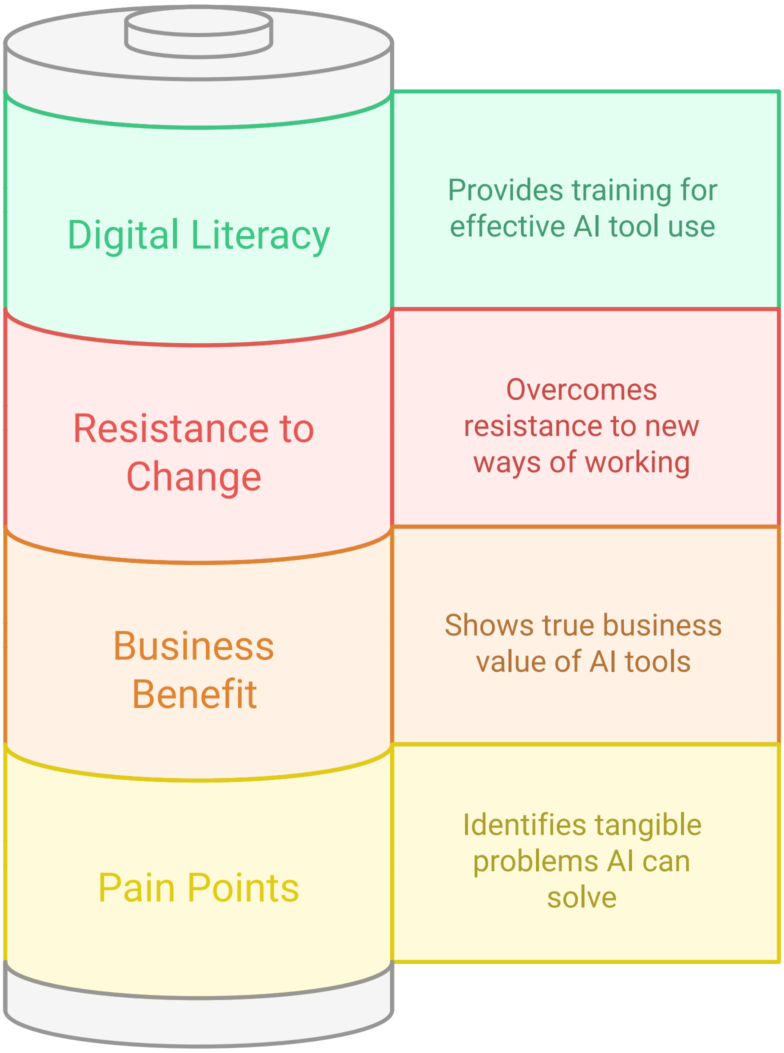

Figure 8.1 – Bridging Technology and Practice

These identified areas represent barriers for why adoption of AI has been so low in the quantity surveying profession. Until these barriers are dealt with, AI adoption will remain low.

8.1 Viable Use Cases & Pain Points

The first barrier is identifying and defining tangible pain points that can be solved with AI technology solutions. All technology starts with a pain point that includes improving or transforming existing practices. Quantity surveyors are always under pressure to be accurate and efficient and they need tools to genuinely relieve friction in their work for a positive impact working lives.

To achieve this, the pain points have to be identified to produce viable use cases. For a business, these must be mapped, prioritised, and clearly articulated - not just at an operational level, but in financial terms. Adoption happens when the purse-holders see the cost of not adopting.

Many of the early AI tools that have been built for construction are point solutions - focused on a single, narrow task. That is a good start, but adoption suffers when those tools do not connect into broader workflows. The goal is not to automate isolated tasks. It is to improve the flow of work -from estimating to completing the final account, from one department to another. AI Tools must align with core business processes. Adoption would not happen unless a use case fits neatly into the workflow - and the value is felt by more than one user.

Role of the QS: Do not just ask what could be automated. Ask what should be automated. Identify the parts of your workflow that are high-friction, repetitive, and business-critical - and focus your efforts for AI tools there.

The diagram below is an illustration of how a team can work towards identifying real life pain points that could be solved with an AI solution for quantity surveyors to use on a day to day basis.

Table 8.1: Examples of AI Use Cases

RIBA Stage	Use Case	Current State	Future State	Type of AI	How AI Works
Stage 0	Feasibility Cost Advisor	Manual estimation using past projects or rules of thumb	AI predicts costs from thousands of project datasets	Predictive Analytics	Learns from past project features to estimate new ones
Stage 1	Risk-Adjusted Budget Planning	Contingency based on flat percentage or intuition	AI quantifies risks from past data for tailored contingencies	Predictive Analytics	Uses historical risk data and probabilities
Stage 1	Procurement Strategy Advisor	Subjective decision by consultants	AI recommends based on outcomes of similar projects	Recommendation Engine	Matches project goals to best-performing past routes
Stage 2	Conceptual Design Cost Estimation	Manual take-offs and spreadsheets	AI extracts from drawings and applies unit costs	Computer Vision + Predictive Analytics	Reads geometry and applies historical rates
Stage 2	Design Cost Optimisation	Reactive value engineering	AI suggests cheaper alternatives during design	Rule-based + Machine Learning	Shows cheaper options with cost-saving forecasts
Stage 3	Real-Time Cost Monitoring	Periodic cost plan updates	AI live-tracks cost impact of design changes	BIM Analysis + Predictive Analytics	Detects design changes and updates cost instantly
Stage 3	Design Change Detection	Manual comparison of drawings	AI highlights additions/deletions automatically	Computer Vision / NLP	Compares drawings or models for all changes
Stage 4	Automated Quantity Take-Off & BoQ	Manual measurement and BoQ creation	AI auto-generates BoQ from BIM or 2D drawings	Computer Vision + NLP	Reads models, classifies items and outputs structured BoQ
Stage 4	Document Consistency Checker	Manual review of specs, BoQs, drawings	AI checks for scope gaps or mismatches	NLP + Computer Vision	Cross-checks project documents for completeness
Stage 4	Tender/Bid Analysis	Manual bid comparison	AI highlights anomalies, exclusions, outliers	NLP + Analytics	Reads pricing & clarifications to detect risks
Stage 4	Contract Risk Review	Manual legal read-through	AI flags risky or unusual contract terms	NLP	Flags deviations from standard clauses

8.2 Business Impact

The second barrier is not being able to show a true business benefit for using AI tools to the key decision makers who sign off on the investment. One of the traps in tech adoption is mistaking feasibility for value. Just because a task *can* be automated does not mean it is worth automating.

The key is understanding *what* pain matters, and *to whom*. While a junior QS might find manual data work in Excel slow and tedious, their director may see it as acceptable - even expected - because that junior is a relatively cheap resource. But when that same inefficiency is happening at the commercial director level, where salaries run into six figures, it is a different story. Now, the pain becomes a bottom-line issue.

For example, if that inefficiency is happening while a competitor is using tech to deliver faster, cheaper and more accurate work - the pain becomes existential. This is not about annoying admin. It is about competitive risk that has to be addressed.

Role of the QS: To support a business case for a solution, you have to describe the pain and quantify it in terms of business impact. Translate inefficiency into lost hours, delayed invoices, or project risks. Build a case that connects individual frustrations to business outcomes.

8.3 Change Management

The third barrier of adoption of AI is resistance to change. Once a viable use case is identified, along with its business case, the next challenge unfolds: Getting people to use AI tools and change their ways of working. This is where most adoption efforts stumble.

Change requires behaviour shifts - and quantity surveyors, rightly cautious by profession, are often resistant to changing the way they work. They have been trained to value consistency, risk mitigation, and process. That does not mean they are anti-tech - it means they're sceptical of disruption and very resistant to change.

Complicating this further is the issue of incentives. In consultancy quantity surveying practices for example, where services are billed by the hour, AI tools that increase efficiency by reducing time spent on a task can inadvertently reduce revenue. In this context, adoption of AI tools would entail significant changes to the longstanding business model for providing quantity surveying services.

If a QS is rewarded for spending time, why would they adopt a tool that helps them do the same job in half the time? Until the incentive structures change, adoption will remain patchy at best.

Adoption is a human process. Tools do not change culture - people do. And they need to see what's in it for them.

Role of the QS: Be a champion for smart change. If you are pushing for adoption, understand the behavioural and commercial obstacles in your organisation. Speak to both - not just how the tech works, but why it is worth it.

8.4 Training and Education

The final barrier is training and knowledge about using AI tools. This has the most impact on individual quantity surveyors in their day to day life. Even the best tools, solving the most painful problems, supported by great change management, will fail without basic digital literacy.

Many quantity surveyors have not had the opportunity - formally or informally - to learn how AI works, let alone how to use it in their day-to-day. Training offered by institutions like RICS, universities, and employers is only just beginning to catch up.

Meanwhile, surveyors are trying to keep up with projects, clients, reports and admin. They do not need theory-heavy modules on machine learning. They need simple, digestible ways to understand how this affects *their* workflow, today.

The digital divide is also a real concern. Larger organisations with enterprise solutions and internal support teams are already several steps ahead. Smaller practices often lack the resources to invest in new tech or the training needed to implement it - creating a gap in both access and capability.

Confidence in digital skills drives curiosity. If people do not understand AI technology and have digital skills, they would not explore it, and adoption stalls. Employers and institutions have a key role to pay in digital skills and upskilling the workforce. Individuals can also take matters into their own hands by learning things outside of the formal requirements of their role.

Role of the QS: Take learning into your own hands. You do not need to be a data scientist. But you do need to understand what the tool does, what problem it solves, and how to use it in your work. Seek out CPD, webinars, tutorials, or simply ask a colleague to show you.

8.5 Conclusion

AI adoption in quantity surveying is not just about technology. It is about trust, strategy, and design. And that starts with asking the right questions:

- What real pain is this solving?
- Is there a business case for investment?
- Will it be accepted, or resisted?
- Do people know how to use it?

Adoption is a result, not an event. And the pathway to breaking down the barriers of using AI in quantity surveying will take efforts from QS professionals, technology providers, business leaders, educators and professional bodies.

AI, Sustainability, and Global Standards: Guiding Quantity Surveying Towards a Responsible Future

Anil Sawhney FRICS
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9.1 Introduction

AI is being promoted as a transformative technology which is beginning to reshape entire sectors of the economy, from finance to healthcare. While AI is starting to show some benefits, the reality may be more nuanced than the hype suggests. In construction, most AI applications are currently focused on improving existing workflows rather than addressing the industry's broader systemic challenges. The sweeping gains implied in public discourse have yet to materialise for construction. Recent findings from the RICS Artificial Intelligence in Construction Report 2025[11] validate this current gap. The findings show that while interest is high, deployment is often limited to pilot programs and narrowly scoped use-cases (see Figure 9.1). For quantity surveyors (QSs), this gap presents an opportunity to use AI efficiently (completing tasks more quickly, with fewer resources, and in fewer steps) and effectively (doing the right things in the right way to deliver value).

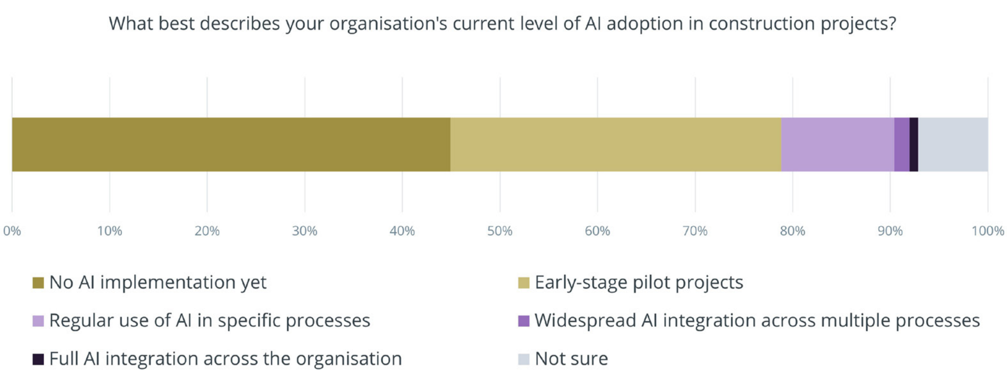

Figure 9.1: Adoption of AI in construction (source: RICS Artificial Intelligence in Construction Report 2025)

Therefore, this section of the report frames the conversation through the lens of "wicked problems", challenges characterised by their complexity, interconnectedness, and resistance to straightforward solutions. Specifically, three wicked problems stand out where AI could make a significant impact:

1. **Reducing environmental impacts**: this process is complex, requiring collaboration among specialists in the project team, management of limited and uncertain datasets, and far-reaching analysis across the whole-of-life of the asset.
2. **Addressing safety and skills shortages**: addressing safety requires real-time tracking of site data and predictive insights that manual observation cannot provide. Linking these risks to skills shortages adds a layer of complexity that human analysis alone struggles to manage.
3. **Improving construction productivity**: compared with other industries that have seen substantial advancements in digitalisation and automation, the construction industry's productivity has been trailing behind[12]. Construction productivity is constrained by interlinked workflows, resource limitations, demand fluctuations, limited digitalisation, and varied contracting models.

While AI offers potential solutions for safety and productivity, this article focuses specifically on the first challenge, namely, environmental sustainability. The focus is warranted because the built environment sector consumes 32% of global energy and contributes 34% of global carbon dioxide emissions[13], making it a significant driver of climate change.

According to the RICS artificial intelligence in construction report, over the next five years, 40% of respondents expect AI to have the most significant impact on project design and execution through **Design Optioneering,** which is the systematic analysis and evaluation of multiple design alternatives to optimise outcomes across competing objectives such as cost, carbon emissions, performance, and constructability (see Figure 9.2). Through **Design Optioneering**, AI can be used to improve the environmental sustainability of projects and assets. In particular, AI's ability to analyse thousands of design choices at speed provides a practical route to embedding sustainability in the initial stages of the project, where it has the most significant influence. Each design choice may affect several project objectives and requirements, including the construction program, cost plan, insurance requirements, and carbon budget, requiring a QS to assess and quantify their impacts. This shows that QSs can play a crucial role in using AI to improve environmental sustainability, requiring them to understand the intersection of AI and sustainability.

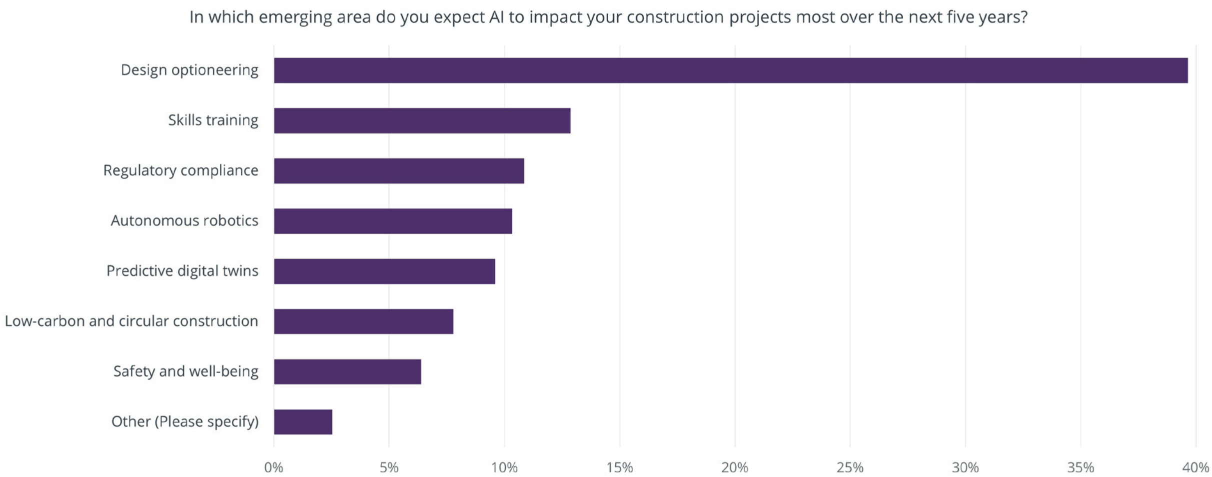

Figure 9.2: Areas of significant impact over the next five years (source: RICS Artificial Intelligence in Construction Report 2025)

9.2 Intersections between AI and sustainability

Sustainability is critical across all sectors of the economy, but it plays a particularly crucial role in the built and natural environments. In this context, environmental sustainability, in general, and the decarbonisation of the built environment, in particular, are becoming critical. As the industry grapples with decarbonisation, AI is emerging as a tool to reduce carbon emissions from assets. But at the same time, surging demand for AI, which is driving an unprecedented boom in digital infrastructure construction and ballooning energy requirements, is further compounding the problem. For QSs, understanding this nexus between AI and sustainability is essential to responsible practice, as this relationship operates across three distinct dimensions:

1. **AI as an enabler of sustainability**: On one hand, AI can help deliver sustainable outcomes by managing the complexity of design choices, materials selection, emissions factors, and whole-life carbon calculations. Integrating sustainability analysis into standard pre-construction, construction, and post-construction workflows is not straightforward, and AI can provide the augmentation capacity required to manage this scale of information and complexity. By processing vast datasets rapidly, AI enables QSs to explore scenarios that would be impractical to analyse manually. However, this enabling role is only one dimension of the relationship.
2. **Sustainability of AI infrastructure**: At the same time, the surge in demand for AI infrastructure creates sustainability challenges of its own. This infrastructure has significant embodied and operational carbon impacts. QSs can help use design economics and value management to reduce upfront embodied emissions, promote effective procurement routes, provide cost-effective ways to mitigate whole-life carbon emissions, and carefully manage the carbon budget. This includes advising on material choices, construction strategies, supply chain considerations, risks and their mitigation, and operational considerations that minimise long-term impacts. Yet both intersections also rest on a shared foundation.
3. **Data and standards as the foundation**: Underlying both is a third, foundational intersection of data and standards. The effectiveness of both AI and sustainability efforts depends on the availability of (a) robust, transparent, and consistent data; and (b) consistent and comprehensive practice standards, such as the Whole Life Carbon Assessments (WLCA)[14].

Recognising these intersections helps QSs use AI effectively in their activities, including sustainability efforts, and support their project teams. However, AI-enabled technology alone cannot navigate the nuances of sustainability. As this discussion of AI and sustainability takes shape, the debate must shift to the importance of advanced skills and the value of human judgment.

9.3 Skills and value of human judgement

QSs have always excelled in measurement, data analysis, and trend evaluation, and in providing advice and guidance to project teams. They offer contractual and commercial advice, as well as effective procurement and financial management, to clients. QSs also play a crucial role in sustainability efforts, including decarbonisation. As AI becomes more accessible and affordable, the profession must address issues related to skills and upskilling, as well as the role and value of human judgment.

This focus is vital, especially as AI models become more powerful and efficient. These powerful models can reduce the effort a QS expends on tedious tasks of searching, collating, and summarising large amounts of data and insights. This means QSs can focus on analysis, synthesis, and advice, meaning value-adding tasks. This would require QSs to acquire advanced data analytics and AI skills, enabling them to spend more time on value-added tasks and making their judgment and expertise stand out.

The profession is already prioritising this shift. According to the RICS Skills Report[15], when surveyors were asked which emerging skills will be most important over the next 5–10 years, **59% of respondents** prioritised "Advanced digital tools," followed closely by "Sustainability/ decarbonisation expertise" (41%) and "Data analytics" (40%) (see Figure 9.3).

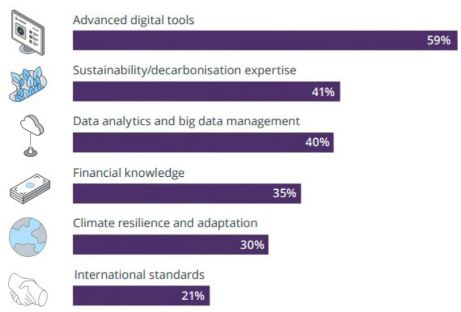

Figure 9.3: Emerging surveying skills (source: RICS Skills report)

The RICS Responsible use of artificial intelligence in surveying practice[1] also highlights this issue by setting requirements for upskilling the profession. However, technical fluency alone is not enough, since irresponsible use of AI risks undermining and corroding the profession's reputation. The use of some AI-enabled tools introduces bias, data reliability, and accountability-related risks. To manage this, professionals must adhere to the

RICS Standard on the responsible use of AI, which will take effect on March 9, 2026. This standard applies to the outputs of AI systems that have a material impact on the delivery of the surveying service.

At its core, this standard emphasises the surveyor's vital role. It does not view AI as a replacement but as a tool that requires human supervision. It explicitly mandates a "human-in-the-loop" approach, requiring firms to document precisely how human control interacts with AI systems they develop or use. Crucially, the standard defines professional judgement as a specific synthesis of "knowledge, skills, experience, and professional scepticism", that safeguards against the inherent risks of AI error or bias.
To operationalise this judgment, the standard provides a framework based on three core pillars:

1. **Transparency**: The standard requires surveyors to inform clients, in writing and in advance, if AI will be used to deliver a professional service.
2. **Accountability**: Firms must maintain a risk register updated at least quarterly and conduct detailed due diligence on third-party AI suppliers. This ensures that even when tools are automated, the firm retains full accountability for the results.
3. **Verification and reliability**: Professionals are required to apply professional judgement to record a written decision on the "reliability" of AI outputs. For high-volume automated tasks, this requires regular, randomised "dip samples" to assure quality and mitigate the risk of error or bias.

QSs can combine upskilling in data analytics and AI with the ethical guardrails needed for responsible AI use to ensure that the "intelligent use of AI[1]" solves specific, high-value problems rather than indiscriminately applying AI-driven automation. Proper governance and leadership will help build the trust required to tackle the sector's wicked problems.

9.4 A responsible future

The convergence of AI and sustainability creates both opportunity and obligation for quantity surveyors. As AI tools become readily available, professional judgment becomes the key differentiator, something that the firms must invest in and leverage. In the near future, AI-enabled sustainability efforts will require a human expert to navigate the process, mitigate biases and other risks, and deliver high-quality outcomes. As technology moves from chat-based AI tools to AI agents[16] capable of executing complex workflows, the stakes for oversight and human judgment would only increase.

The profession's response will determine whether AI enhances or undermines decision-making quality and the value of human judgment in the built environment. This requires moving beyond pilot projects to systematic capability-building: developing AI literacy, deepening sustainability expertise, ensuring data availability, and strengthening governance frameworks. Those who invest in these capabilities now will not simply adapt to change; they will define the standards of practice for environmental, social, and economic sustainability in the built environment sector.

New AI models and tools will continue to emerge, and work practices will continue to adapt and adopt. As these rapid changes unfold, it is professional leadership that will enable the sector to deploy AI responsibly. AI provides us with abundant intelligence, yet wisdom remains a scarce, uniquely human trait. As professionals, we must intentionally weave human experience and judgment into the standards and ethical frameworks that govern emerging AI tools, including specialised AI agents.

[11]RICS (2025) *Wicked problems in construction: the main problems that AI can help solve.* Available at: https://www.rics.org/news-insights/wbef/wicked-problems-in-construction-the-main-problems-that-ai-can-help-solve (Accessed: 30 November 2025).
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Built Environment Responsible AI Competence Framework (BRIEF v1.0)

10.0 Rationale

AI is transforming how the built environment is conceived, delivered, and managed. From automated design optioneering and predictive maintenance to digital twins and carbon modelling, AI has begun to influence almost every dimension of the construction lifecycle. Despite this growing potential, the sector remains in a state of uneven readiness. According to the RICS AI in Construction Report (2025)[17] , nearly 45% of organisations report no AI use at all, while only 1% have scaled AI across their projects. At the same time, optimism is rising - 70% of project managers and quantity surveyors believe AI will enhance value delivery - even as fundamental barriers persist, including skills shortages (46%), data quality issues (30%), and system integration challenges (37%).

This paradox - high optimism alongside low readiness - underscores a widening capability gap. Many organisations are preparing to invest in AI but lack the competence, governance structures, and ethical foundations required to implement it responsibly. Without a clear understanding of how to evaluate, govern, and ethically apply AI tools, there is a risk that technological enthusiasm will outpace professional accountability, leading to misuse, bias, or erosion of public trust. The built environment, in particular, faces distinctive challenges. Unlike sectors where AI systems operate in purely digital domains, construction and infrastructure projects are inherently physical, multidisciplinary, and risk intensive. Decisions made or influenced by AI - from cost predictions to design adjustments or environmental assessments - can have real-world safety, financial, and social implications. As such, the ability of professionals to engage critically and responsibly with AI is not optional; it is a new form of professional competence[18] .

Beyond technical literacy, professionals must develop ethical literacy - understanding how bias, explainability, privacy, and accountability intersect with their domain expertise. The emerging landscape of regulations and standards reinforces this imperative. However, existing professional training and accreditation systems in the built environment have not yet embedded these competencies systematically.

10.1 What Is BRIEF?

The Built Environment Responsible AI Framework (BRIEF) was developed by the AI4QS Initiative, based on consultation and input from stakeholders across academia and industry between July 2024 and September 2025, as an initial response to this gap. The development also draws insights from AI Skills for Business Competency Framework v2 by the Alan Turing Institute[19], Digital Competence Framework for Construction from CITB[20] and CIOB's AI Skills & Data Literacy framework[15]. BRIEF recognises that responsible AI use is not simply about compliance or technical proficiency, it is about cultivating judgment, integrity, and critical awareness across all levels of professional practice.

> Competence is the ability to integrate and apply contextually-appropriate knowledge, skills and psychosocial factors (e.g., beliefs, attitudes, values and motivations) to consistently perform successfully within a specified domain. - Vitello et al., (2021)

Definition of Competence Vitello et al., (2021)[22] was adopted in this research.

As such, the framework defines the knowledge, skills, and behaviours (KSBs) that underpin responsible AI engagement for built environment professionals. It provides a structured approach for educators, employers, and policymakers to design curricula, training, and assurance processes that strengthen both technical capacity and ethical maturity.

At its core, BRIEF is structured around seven interrelated dimensions, each representing a critical domain of responsible AI practice within the built environment. These dimensions form a holistic continuum - moving from understanding *what AI is* and *how it works*, to *how it should be governed, communicated, and sustained responsibly.* Each dimension contains detailed KSB statements that articulate *what professionals must know, what they must be able to do,* and *how they should act* when engaging with AI systems. Most importantly, BRIEF highlight context's impact on competence (Figure 10.1). Consequently, BRIEF aligns with Skills, Knowledge, Experience and Behaviours (SKEB) competence definition by the Industry Competence Committee (built environment).

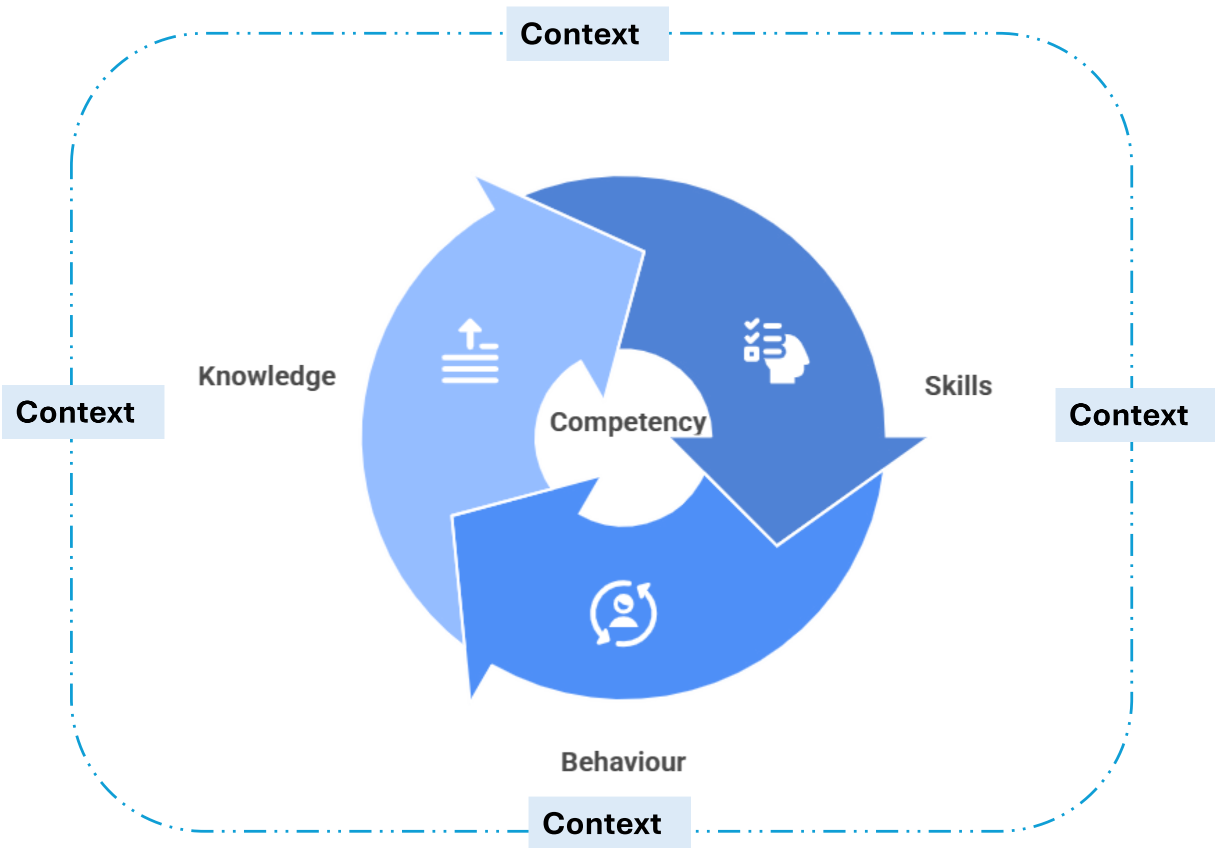

Figure 10.1 – Competence Contextualization

Table 10.1 - BRIEF

Dimension	Knowledge	Skills	Behavior
Dimension 1: AI Fundamentals and Data Literacy – Building understanding of AI systems, their data foundations, and the role of human interpretation	K1.1 Types and Functions of AI - *Understands key AI categories (ML, NLP, Computer Vision, Generative AI) and their applications in the built environment*	S1.1 Critical Interpretation of AI Outputs – *Evaluates AI results against professional standards, benchmarks, and contextual evidence.*	B1.1 Professional Skepticism – *Maintains a questioning mindset; does not accept AI results without critical evaluation.*
	K1.2 AI Failure Modes and Limitations – *Recognises common issues such as hallucination, data bias, overfitting, and concept drift.*	S1.2 Data Exploration and Validation – *Reviews input datasets for completeness, accuracy, relevance, and potential bias.*	B1.2 Intellectual Integrity – *Communicates uncertainty, assumptions, and limitations of AI-generated outputs honestly.*
	K1.3 Analytical and Visualisation Concepts – *Understands AI-generated metrics, confidence scores, and dashboard interfaces.*	S1.3 Result Communication – *Translates technical AI outputs into clear, actionable, and accessible insights for diverse audiences.*	B1.3 Critical Curiosity – *Proactively seeks to understand how and why AI produces particular results.*
	K1.4 Emerging AI Architectures and Trends– *Understands the evolving forms of AI systems (e.g., multimodal models combining visual and text data, autonomous and coordinated AI systems), and their potential implications for design, construction, and project delivery workflows*	S1.4 Multimodal Data Coordination – *Integrates and validates outputs from AI systems processing multiple data types (imagery, text, sensor data, CAD files) simultaneously.*	B1.4 Technological Agility – *Maintains awareness of rapidly evolving AI capabilities and adapts practice accordingly.*
	K1.5 AI Integration Ecosystems – *Understands how AI tools connect and interact with broader digital systems such as BIM platforms, digital twins, IoT sensors, and real-time project data streams, and recognises the implications for workflow efficiency, data governance, and decision-making.*		
Dimension 2: Data Governance, Ethics and Security . Purpose: Ensures that data used in AI systems is handled securely, ethically, reinforcing professional and public trust	K2.1 Data Protection Principles – *Understands legal frameworks, confidentiality, consent, and anonymisation techniques.*	S2.1 Secure Data Handling – *Applies encryption, access controls, and maintains audit trails for project data.*	B2.1 Integrity and Ethical Responsibility– *Upholds fairness, privacy, and transparency in all AI-related activities, declaring and documenting AI use, assumptions, and limitations clearly.*
	K2.2 Data Curation and Stewardship – *Knows principles for documenting, labelling, versioning, and storing datasets to ensure integrity, reproducibility, and accountability*	S2.2 Ethical Data Review – *Ensures that data collection, sharing, and usage respect privacy, rights, and professional regulations*	B2.2 Equity and Inclusion Advocacy – *Promotes the use of diverse and representative datasets to achieve equitable outcomes.*
	K2.3 Bias and Fairness – *Understands sources of bias (e.g., in training data or algorithms) and strategies for mitigation.*	S2.3 Bias Monitoring – *Conducts bias checks on datasets and AI outputs, documenting findings and mitigation actions.*	B2.3 Stewardship Mindset – *Treats data as a valuable shared asset to be managed responsibly.*

Dimension	Knowledge	Skills	Behavior
Dimension 3 – AI Governance and Risk Management. Purpose: Embeds transparency, risk awareness, and accountability into organisational AI use and decision-making	K3.1 AI Governance Structures – *Understands the structures and processes that ensure accountability for AI use, such as AI registers, risk registers, and decision logs*	S3.1 Governance Documentation – *Maintains accurate records of AI use, risks, and decisions.*	B3.1 Accountability – *Takes ownership of AI-assisted outputs and decisions.*
	K3.2 Regulation and Standards – *Is familiar with relevant AI regulations, standards and frameworks*	S3.2 Comprehensive Risk Assessment and Mitigation – *Identifies, evaluates, and mitigates AI risks across technical, social, and environmental dimensions, including bias, model decay, security vulnerabilities, misuse, and systemic impacts.*	B3.2 Transparency – *Discloses assumptions, data sources, and methodologies openly.*
	K3.3 Human Oversight and Shared Decision-Making– *Understands when and how human validation and shared control are required in AI workflows to ensure ethical, legal, and accountable decision-making.*	S3.3 Audit and Compliance Support – *Contributes to internal reviews and prepares evidence for external audits.*	B3.3 Ethical Foresight – *Anticipates and reflects on the human and societal consequences of automated decisions.*
Dimension 4 – Communication, Collaboration and Transparency. Purpose: Builds the capacity to communicate AI use openly and collaborate effectively across human–AI and cross-disciplinary teams	K4.1 Client Communication Requirements – *Understands professional obligations for disclosing AI use and ensuring explainability.*	S4.1 Transparent Communication – *Produces clear, plain-language statements on AI use for clients and stakeholders.*	B4.1 Openness – *Shares processes, data, and reasoning to build trust*
	K4.2 Cross-Disciplinary Collaboration Models – *Recognises interdependencies between disciplines (e.g., design, engineering, cost management) in AI-enabled projects.*	S4.2 Cross-Disciplinary Collaboration – *Works effectively with technical and non-technical colleagues to integrate AI solutions.*	B4.2 Collaborative Mindset – *Seeks and values diverse expertise to address complex challenges.*
	K4.3 Human-AI Collaboration and Augmentation– *Understands how AI augments human capabilities in design, analysis, and decision-making, including principles of interpretability, appropriate trust, creative problem-solving support, and contextual judgment enhancement.*	S4.3 Stakeholder Engagement – *Communicates AI capabilities and limitations to diverse audiences.*	B4.3 Empathic Communication – *Builds confidence and reduces apprehension about AI among stakeholders.*
		S4.4 Human-AI Collaboration and System Supervision – *Effectively interfaces with AI systems using appropriate prompts and configurations, oversees autonomous AI operations with clear human oversight points, and collaborates with AI tools to enhance human decision-making.*	B4.4 Augmentation Mindset – *Views AI as a capability multiplier that enhances human expertise rather than a replacement for professional judgment*

Dimension	Knowledge	Skills	Behavior
Dimension 5 – Responsible Innovation and Continuous Learning. Purpose: Fosters a culture of adaptability, reflection, and lifelong learning to embed responsible innovation within a continuously evolving AI landscape	K5.1 Responsible Innovation Principles – *Balances innovation with ethical and societal considerations.*	S5.1 Reflective Practice – *Analyses and documents lessons learned from AI use in projects.*	B5.1 Curiosity and Adaptability – *Actively seeks new knowledge and embraces technological change.*
	K5.2 Learning Ecosystems – *Understands pathways for continuous AI upskilling through formal and informal learning.*	S5.2 Impact Assessment – *Evaluates the social, environmental, and ethical implications of AI adoption.*	B5.2 Knowledge Sharing – *Mentors peers and contributes to a collective culture of learning.*
	K5.3 Adaptive Thinking – *Recognises the need to refine human judgment and processes in response to AI insights.*	S5.3 Continuous Learning Application – *Integrates emerging AI standards and knowledge into professional practice.*	B5.3 Resilient Mindset – *Learns from challenges and adapts to disruptive innovations.*
	K5.4 Organizational Change Dynamics – *Understands how organisational culture, structures, and change dynamics influence the adoption of AI, including common resistance patterns and strategies to build digital capability.*	S5.4 Adaptive Problem-Solving – *Combines AI insights with professional expertise to address uncertainty.*	B5.4 Ethical Change Leadership– *Demonstrates courageous leadership in advancing responsible AI adoption, building stakeholder buy-in, addressing resistance, and advocating for governance and ethics under organizational pressures.*
	K5.5 Innovation-Ethics Balance in Organizations – *Recognizes tensions between efficiency pressures and ethical AI use, and frameworks for navigating conflicting priorities.*	S5.5 Strategic AI Leadership and Ethical Navigation – *Contributes to organizational AI strategy development while articulating and defending ethical positions when business pressures conflict with responsible AI principles*	
Dimension 6 – Ethics, Accountability and Professional Judgment Purpose: Upholds integrity, duty of care, and ethical responsibility in AI-enabled professional practice	K6.1 Professional Codes of Conduct – *Applies ethical obligations from relevant professional bodies to AI contexts.*	S6.1 Quality Assurance and Validation – *Designs and implements verification processes for AI-generated outputs.*	B6.1 Public Interest Orientation – *Prioritises safety, wellbeing, and sustainability above convenience or cost.*
	K6.2 Liability and Duty of Care – *Understands legal and professional accountability when using AI tools.*	S6.2 Ethical Decision-Making and Challenge – *Balances efficiency with ethical considerations while identifying and challenging inappropriate, unsafe, or unethical AI uses.*	B6.2 Moral Courage – *Raises concerns and challenges irresponsible AI practices, even under pressure.*
	K6.3 Ultimate Human Responsibility – *Recognises that ultimate accountability and ethical responsibility always rest with the professional, not the algorithm or system*		

Dimension	Knowledge	Skills	Behavior
Dimension 7 – Procurement, Due Diligence and System Lifecycle. Purpose: Guides the responsible acquisition, deployment, and management of AI systems throughout their lifecycle.	K7.1 AI Procurement Processes – *Understands all stages of AI acquisition, from vendor assessment to contracting and compliance.*	S7.1 Vendor Evaluation – *Critically assesses vendor claims, data provenance, bias audits, and liability terms.*	B7.1 Innovation with Integrity – *Promotes ethical experimentation under clear governance.*
	K7.2 Lifecycle Management – *Understands the lifecycle of AI systems - from design, procurement, and training to deployment, monitoring, updating, and decommissioning*	S7.2 System Testing and Acceptance – *Conducts technical, functional, and ethical validation prior to deployment.*	B7.2 Sustainability Mindset – *Considers environmental and social impacts in AI procurement and operation.*
	K7.3 Environmental Impact Awareness – *Understands the carbon and resource demands of AI infrastructure.*	S7.3 Lifecycle Monitoring – *Tracks model performance, identifies drift, and manages version control.*	B7.3 Co-evolution Perspective – *Values the parallel growth of human and technological capability across the AI lifecycle.*
	K7.4 Feedback Loops – *Recognises how user interaction and new data influence model evolution and bias drift.*	S7.4 Participatory Evaluation – *Involves end-users and stakeholders in the continuous assessment and improvement of AI systems.*	
	K7.5 Integrated and Interoperable AI Ecosystems– *Understands how AI tools interoperate within wider digital systems, including data-exchange standards, interoperability protocols, and orchestration frameworks, and recognises the implications for procurement and lifecycle governance.*	S7.5 Multi-System Integration Testing – *Validates performance of interconnected AI systems, including digital twin-AI integration and coordinated multi-agent AI workflows.*	
		S7.6 Ecosystem Risk Assessment – *Evaluates and manages risks arising from interconnected AI systems, including dependency failures, data inconsistencies, and emergent behaviours*	

10.2 Competence Relevance And Depth Model (CRDM)

To ensure flexibility across roles and professional contexts, each Knowledge, Skill, and Behaviour (KSB) within BRIEF is categorised using two complementary models – Competency Relevance Depth Model:

1. Depth Model

This is Skill Levels (Adapted from the UK Government's Government Digital and Data Profession Capability Framework [23]). These levels define how capable a professional should be in a particular KSB to engage with AI responsibly.

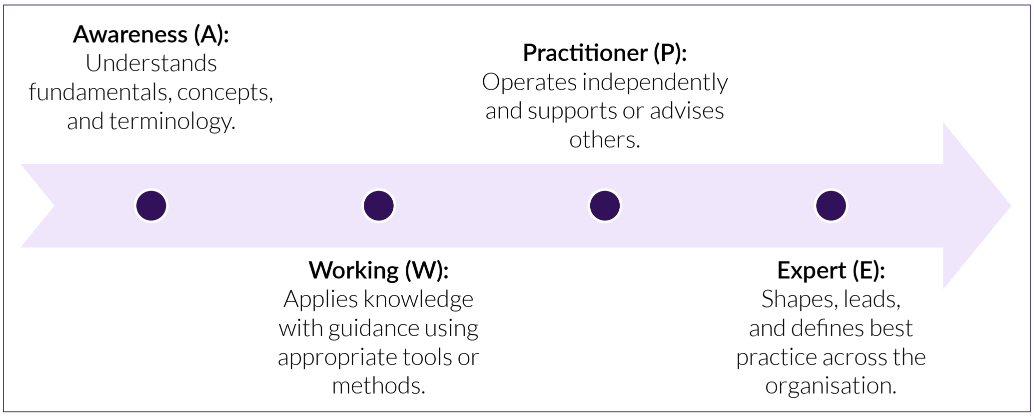

Figure 10.2 – Skills Depth

2. Competence Relevance (CR)

This model clarifies *which competencies* are most relevant to a person's professional role or learning context. It prevents "competence overload," acknowledging that not every KSB applies equally to all professionals.

- **Core (C):** Foundational competencies essential for professionals to use AI responsibly within their discipline.
- **Contextual (X):** Role- or task-specific competencies that become relevant due to the professional's operational context - such as responsibilities for AI use, management, procurement, or interpretation.
- **Not Applicable (O):** Competencies that are currently out of scope for a given role, learning stage, or professional pathway.

While the skill levels define the *depth of capability*, the Competence Relevance model ensures *contextual appropriateness*. Together, they create a two-dimensional matrix (Figure 10.3) that adapts BRIEF to diverse professional pathways. This dual-structured approach makes BRIEF adaptive rather than prescriptive, supporting role-specific curriculum and training design, meaningful competency assessment, and strategic workforce planning across built environment organisations.

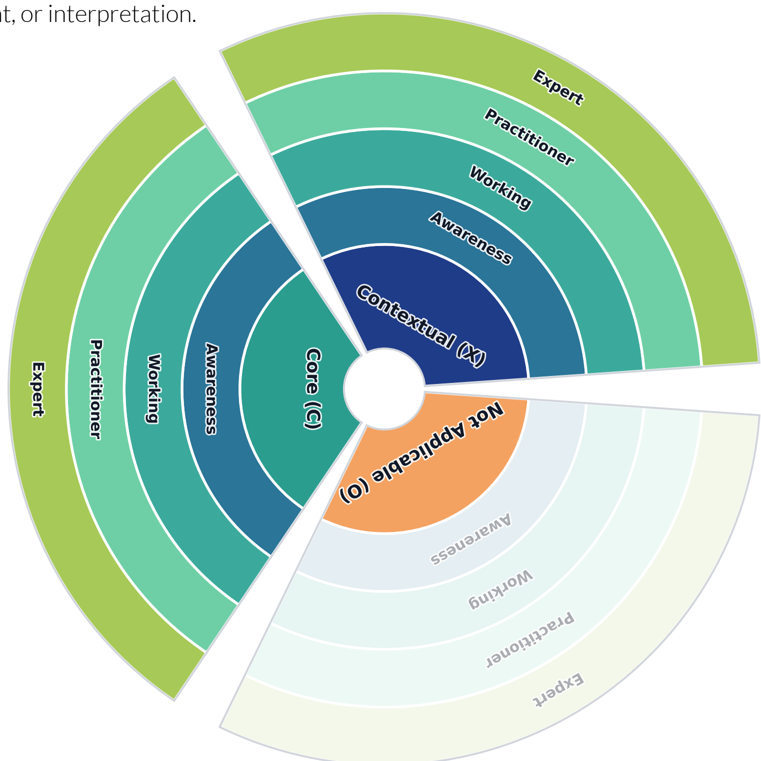

Figure 10.3 – Competence Relevance Depth Model (CRDM)

10.3 Application of BRIEF

The strength of BRIEF lies in its versatility across domains of education, professional practice, and policy. It functions as both a pedagogical tool and a governance framework, supporting the responsible and scalable integration of AI competence within the built environment.

Education

In education, BRIEF could provide a curriculum design framework for embedding responsible AI literacy within professional and technical programmes. It enables universities, training providers, and professional bodies to:

- Map course content and learning outcomes to relevant KSBs and CRDM.
- Integrate ethical, governance, and sustainability dimensions of AI into built environment disciplines
- Assess learner progression from awareness to expert level, ensuring that graduates are not only AI-literate but ethically grounded and industry-ready.

Industry

For industry, BRIEF could serve as a capability assessment and workforce development tool. Organisations can use it to:

- Define role-specific training pathways, identifying which KSBs are *core* or *contextual* for different professional functions
- Benchmark staff competence against recognised skill levels to inform upskilling decisions and capacity development
- Integrate BRIEF into AI adoption and governance strategies, ensuring that technological innovation aligns with professional accountability and organisational ethics.

10.4 What Is Next?

The Built Environment Responsible AI Education Framework (BRIEF) represents Version 1.0 - an initial foundation developed through consultation with stakeholders across academia, industry, and professional practice. While this version provides a structured starting point, the framework is intentionally evolutionary, designed to mature through evidence, dialogue, and iterative testing.

Over the coming months, the AI4QS team and partners will host a series of validation workshops, cross-disciplinary consultations, and stakeholder feedback sessions to refine and strengthen BRIEF. These engagements will ensure that the framework remains realistic, inclusive, and aligned with the evolving AI and regulatory landscape.

Piloting the BRIEF Digital Platform

As part of the next consultation phase, BRIEF will be piloted as an interactive digital platform that enables professionals to explore their AI competence profile while contributing feedback to refine the framework. Through the platform, users will be able to:

- Complete a BRIEF Competence Evaluation, tailored to their profession and context.
- Receive a personalised dashboard visualising their KSB profile and CRDM relevance map.
- Provide structured feedback on their experience and results, informing future refinements to BRIEF.

Contextualisation for Professional Pathways

The next phase will also involve the contextualisation of BRIEF for specific professions within the built environment - including quantity surveying, architecture, construction management, and civil engineering. Each professional pathway will have a tailored CRDM mapping, showing which competencies are *core*, *contextual*, or *out of scope* for that role, and at what Skills depth they should be demonstrated. This will allow professional bodies and employers to adopt BRIEF in a way that directly reflects their operational realities.

Supporting Materials and Learning Resources

To drive adoption and usability, supporting learning materials, guidance documents, and practical toolkits will be developed. These will help educators and organisations design training programmes, evaluate competence, and embed responsible AI principles within day-to-day professional practice.

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