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TECHNOLOGY & DIGITAL QUANTITY SURVEYING

The Future of the Quantity Surveying Profession in Africa

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Abstract

The quantity surveying profession stands at a defining moment in its long history, and nowhere is that moment more consequential than in Africa. Across the global construction sector, an interlocking set of digital technologies — building information modelling (BIM), artificial intelligence (AI), cloud computing, reality-capture devices, big-data analytics, blockchain and digital twins — is reshaping how built assets are conceived, measured, procured, delivered and maintained. Functions that once depended on manual take-offs, printed drawings and paper-based bills of quantities are increasingly executed on integrated digital platforms that promise greater speed, accuracy, transparency and value across the whole life of a project. For African quantity surveyors, working in economies with severe infrastructure deficits, constrained public finances and a young, rapidly urbanising population, these are not merely professional questions but developmental ones.

This paper examines the trajectory of technological change within quantity surveying, with particular attention to its implications for Africa and for the institutions that shape practice on the continent — among them the Association of African Quantity Surveyors (AAQS), the Association of South African Quantity Surveyors (ASAQS), the Nigerian Institute of Quantity Surveyors (NIQS), the Institute of Namibian Quantity Surveyors (INQS) and their sister bodies elsewhere. It traces the evolution of the profession from measurement and documentation toward strategic construction economics; analyses the principal technologies driving change and the evidence for their impact; and weighs the opportunities they create against the practical, ethical and structural barriers to adoption on the continent. Drawing on international standards (notably the ISO 19650 series), international industry research (including the McKinsey Global Institute and the World Economic Forum), the African Development Bank's assessment of the continental infrastructure gap, and the scholarly literature on BIM and quantity surveying, it argues that technology is not displacing the quantity surveyor but redefining the role. The future practitioner will be less a producer of documents and more a **digital construction economist for the African built environment** — integrating cost management, data analytics, sustainability and risk advisory within an increasingly model-based and data-rich environment, and doing so on a continent whose harmonisation of professional standards, driven by the AAQS and by regional protocols such as the SADC

Mutual Recognition Protocol, is itself now part of the digital agenda. The central question of the AAQS / INQS 2026 conference, "QS Quo Vadis?", is answered not by resisting change but by mastering it — and by leading it.

Keywords: quantity surveying; digital transformation; building information modelling; 5D BIM; artificial intelligence; construction economics; Africa; AAQS; ASAQS; NIQS; ISO 19650; sustainability; professional development.

1. Introduction

The construction industry is experiencing one of the most consequential periods of technological change in its history. Digital transformation is altering how projects are designed, quantified, procured, managed and operated, and it is doing so at a pace that few professions within the built environment have previously had to absorb. For quantity surveyors — whose authority has historically rested on the disciplined measurement of work and the management of construction cost — these shifts are both an opportunity and a test of relevance. For African quantity surveyors in particular they are a test of leadership: whether the profession, on this continent, will lead its industry into a digital era or be pulled along in the wake of decisions taken elsewhere.

Historically, the quantity surveyor relied on manual take-offs from printed drawings, spreadsheets and well-established but labour-intensive procurement routines. Value lay in the accuracy and impartiality of measurement and in the surveyor's command of contract and cost. Today, that foundation is being rebuilt on digital ground. Quantities can be extracted automatically from coordinated models; cost data can be updated in real time as a design changes; collaboration occurs continuously on shared cloud platforms rather than through periodic exchanges of paper.

The wider context is the so-called Fourth Industrial Revolution (4IR), in which physical, digital and biological systems converge. For construction, the practical expressions of 4IR include artificial intelligence, building information modelling, cloud collaboration, digital twins, drones and laser scanning, blockchain, automated estimating and predictive cost analytics. These are not isolated tools but a connected ecosystem; their value compounds when they are integrated. Importantly, the evidence does not suggest that they are replacing quantity surveyors. Rather, they are redefining the profession — stripping away repetitive manual effort and elevating the surveyor's analytical, advisory and strategic contribution. In an African context, that redefinition is being pursued in parallel to the broader continental digital agenda articulated in the African Union's Agenda 2063 and its Digital Transformation Strategy for Africa, both of which explicitly identify infrastructure delivery, transparency and productivity as pillars of the continent's development trajectory.

This redefinition is occurring against a backdrop of persistent underperformance in construction productivity. The McKinsey Global Institute has estimated that construction-sector labour productivity has grown at roughly a third of the rate seen in manufacturing over recent decades, and that closing the gap could add trillions of dollars in annual global value (McKinsey Global Institute, 2017). Digitalisation is widely regarded as one of the principal levers for closing that gap, which places the quantity surveyor — as the

profession most directly concerned with cost, value and productivity — at the centre of the transformation. The African picture is sharper still. The African Development Bank has estimated the continent's annual infrastructure financing gap in the order of tens of billions of US dollars a year (African Development Bank, 2018), a shortfall that makes every percentage point of avoidable waste, every improvement in tendering discipline and every gain in on-site productivity a matter of tangible public benefit.

The question animating this paper, and the AAQS / INQS 2026 conference, is therefore deceptively simple: **QS Quo Vadis?** — where is the quantity surveying profession heading? The answer matters acutely for Africa, where rapid urbanisation, large infrastructure deficits and constrained public finances make efficient, transparent and accurate construction delivery a development priority, not merely a professional concern. This paper sets out the technological landscape, evaluates its implications for African practice, and proposes a path by which the profession can not only survive disruption but lead it — through its universities, through firms of every size, through the regulators and through the collective vehicles of AAQS and its member institutes.

It is worth being precise about why this matters now rather than at some indefinite future date. Three forces have converged. First, the underlying technologies — modelling, analytics, machine learning, cloud infrastructure and reality capture — have each crossed a threshold of practical usability and affordability, so that capabilities once confined to research or to the largest firms are now within reach of mainstream African practice. Second, clients and governments are beginning to expect digital delivery, and in some jurisdictions to mandate it, which turns adoption from a competitive choice into a condition of doing business; the momentum of BIM-enabled procurement in parts of Southern Africa and the growing appetite for digital public procurement across the continent are early expressions of this. Third, a generation of digitally fluent professionals — trained at institutions such as Wits, Pretoria, Cape Town, Nelson Mandela University, the University of Lagos, Obafemi Awolowo, Ahmadu Bello, Kwame Nkrumah University of Science and Technology (KNUST), the University of Nairobi and the Namibia University of Science and Technology — is entering the workforce with different expectations of how work should be done. When capability, demand and talent shift at once, professions that read the change correctly tend to advance, and those that do not tend to lose ground to better-adapted competitors — including, increasingly, competitors from adjacent disciplines who arrive equipped with data and software skills.

This paper is therefore offered not as a forecast of distant possibilities but as an argument about present choices. The structure that follows first revisits how the profession reached its current position, tracing both its British origins and its African maturation; then examines in turn the principal technologies reshaping it — building information modelling, artificial intelligence, cloud collaboration, reality capture, data analytics, blockchain, digital twins and the digital tools of sustainability — before turning in depth to the African context, to the competencies the future will demand, and to concrete recommendations for the institutions that must act.

2. The Evolution of the Quantity Surveying Profession

Long before modern construction economics, BIM models and AI-driven estimating, the principle of cost planning was already recognised. In Luke 14:28, the importance of calculating the cost before building was clearly articulated — a principle that remains central to the quantity surveying profession today.

"For which of you, intending to build a tower, sitteth not down first, and counteth the cost, whether he have sufficient to finish it?" — Luke 14:28

The discipline of counting the cost before building is, in truth, far older than the profession that bears its name. What the modern quantity surveyor formalised was not a new idea but an ancient prudence — the conviction that resources must be reckoned before commitments are made. The history of the profession is the story of how that prudence was professionalised, standardised and, today, digitised. And on the African continent, that story is now more than a century old.

As an organised profession, quantity surveying emerged in Britain in the nineteenth century from the practical need to measure building work and to settle the cost of construction fairly between client and contractor. It took root in Southern Africa almost as soon as it had become a recognised profession in London, and the twentieth century saw its steady spread and institutionalisation across the continent. The principal milestones — British and African — are summarised below.

Year	Development
Late 1700s	Bills of Quantities come into use in Britain (Henry Cooper & Sons of Reading, an early QS firm, established 1785)
1802	Scottish quantity surveyors meet and produce an early method of measurement
1836	The new Houses of Parliament (Sir Charles Barry) becomes the first major public contract fully measured and tendered on Bills of Quantities
1859	The term "Quantity Surveyor" comes into recorded use
1868	The Institution of Surveyors is founded in London — the forerunner of RICS
1881	The Institution receives its royal charter as "The Surveyors' Institution"
1908	The Association of South African Quantity Surveyors (ASAQS) is established — one of the oldest quantity surveying bodies in the world
1930	The London institution is renamed the Chartered Surveyors' Institution
1947	It becomes the Royal Institution of Chartered Surveyors (RICS)
1969	The Nigerian Institute of Quantity Surveyors (NIQS) is founded, giving the profession an organised voice in West Africa
1986	The Quantity Surveyors Registration Board of Nigeria (QSRBN) is established as the statutory regulator of the profession in Nigeria

Late 1990s	The Association of African Quantity Surveyors (AAQS) is formed as a continental umbrella body, giving the profession, for the first time, a pan-African institutional platform
2000s–present	National institutes mature across the continent — including the Institute of Namibian Quantity Surveyors (INQS), the Institute of Quantity Surveyors of Kenya (IQSK), the Ghana Institution of Surveyors (GhIS) QS Division, and their counterparts — and regional integration begins in earnest, notably through the SADC Mutual Recognition Protocol for quantity surveyors

Table 1. Key milestones in the development of the quantity surveying profession, in both its British origin and its African maturation. Sources: RICS, ASAQS, NIQS and AAQS historical records.

For more than a century after these foundations were laid, the profession's core services were remarkably stable: the measurement and quantification of works; the preparation of bills of quantities; cost estimating and cost planning; the production of tender documentation; contract administration; and financial control during construction. These services were document-driven and labour-intensive, and the credibility of the profession rested on the rigour and neutrality of its measurement. On the African continent that credibility was built patiently, project by project, and — in many jurisdictions — by very small numbers of practitioners serving very large territories.

Standardisation reinforced this role, and on our continent it has taken a distinctly African shape. Every mature African quantity surveying jurisdiction has, over time, produced its own measurement conventions. In South Africa, the Association of South African Quantity Surveyors (ASAQS) publishes the Standard System of Measuring Building Work, complemented by the guidance of the Construction Industry Development Board (cidb) and the Joint Building Contracts Committee (JBCC) suite of standard contracts. In Nigeria, the Nigerian Institute of Quantity Surveyors (NIQS) has developed the Building and Engineering Standard Method of Measurement (BESMM), which serves as the profession's technical anchor there. Elsewhere on the continent — from Kenya to Ghana, from Namibia to Zambia — national frameworks, sometimes home-grown and sometimes adapted from the RICS New Rules of Measurement (NRM) suite, which structures cost estimating, detailed measurement and whole-life cost planning (RICS, 2012), perform the same essential function. Together these frameworks have given each national profession a common technical language and a defensible basis for cost advice. But the continental picture remains fragmented, and it is precisely this fragmentation that the Association of African Quantity Surveyors (AAQS) has set out to address, working through vehicles such as the SADC Mutual Recognition Protocol and its wider programme of continental standard-setting toward a common African measurement and cost-management standard that respects local practice while enabling regional integration — a project of direct relevance to the African Continental Free Trade Area (AfCFTA) and to the cross-border projects that will define the coming decade. Through each of these frameworks the quantity surveyor has emerged as the trusted custodian of construction cost: independent, methodical and indispensable to orderly procurement.

Digitalisation is now transforming each of these traditional functions. Manual take-off is giving way to automated quantity extraction from models; static estimates are being replaced by real-time cost modelling; isolated spreadsheets are yielding to cloud-based, integrated

financial dashboards; and historical intuition is being supplemented by data-driven forecasting and whole-life cost management. The change is not simply that tasks are performed faster; it is that the nature of the surveyor's contribution shifts from producing information to interpreting it. And in Africa, where a great deal of routine measurement work is still performed in well-established local packages such as WinQS, QSPlus and their peers, that shift is beginning from a firm — and unusually widely diffused — practical base.

As a result, the modern quantity surveyor is increasingly described in expanded terms — as a data analyst, a digital construction advisor, a risk strategist, a sustainability consultant and a technology integrator. None of these displaces the discipline of cost management; rather, each builds upon it. The trajectory of the profession is therefore best understood not as a break with its past but as a widening of its remit: from measuring the building to managing the economics, risk and sustainability of the built asset across its life.

It is instructive to note that this is not the first time the profession has absorbed a technological shift. The move from hand-written dimension sheets to the electronic spreadsheet, and later to dedicated measurement and estimating software, each changed how the work was done without diminishing the need for the underlying judgement. On the contrary, every previous wave of automation tended to raise expectations of speed and accuracy while freeing surveyors to take on more analytical and advisory work. The current transformation is larger in scope and faster in pace, but the historical pattern is encouraging: the profession has repeatedly demonstrated that it can adopt new tools without losing the disciplinary core that gives its advice authority. The task now, especially in Africa, is to repeat that adaptation deliberately and at scale, rather than reactively and in isolated pockets — and to do so in a way that lifts the whole continent rather than a handful of leading firms.

3. Building Information Modelling and 5D Quantity Surveying

3.1 Understanding BIM and ISO 19650

Building information modelling is a digital representation of the physical and functional characteristics of a built asset, and a shared process for creating and managing the information associated with it. A BIM model is far more than three-dimensional geometry: it carries quantities, specifications, cost data, scheduling information and asset-lifecycle attributes, and it allows project stakeholders to work from a single, coordinated source of information (Eastman et al., 2011).

Internationally, the management of BIM information is now governed by the ISO 19650 series, which was published in 2018 and which absorbed and superseded the earlier British PAS 1192 framework (ISO, 2018a; ISO, 2018b). ISO 19650 establishes the concepts and principles of information management using BIM (Part 1) and the requirements for the delivery phase of assets (Part 2). It introduces disciplined ideas — the common data environment, information requirements, and a structured exchange of information between parties — that are directly relevant to quantity surveyors, because the reliability of model-based cost advice depends entirely on the quality, structure and governance of the underlying information.

South Africa has adopted ISO 19650 as a national standard through the South African Bureau of Standards (as SANS/ISO 19650), and BIM guidance issued or endorsed by bodies such as the cidb has begun to bring the standard into public-sector procurement practice. Nigeria, Kenya, Namibia and Ghana have all seen BIM initiatives emerge from their institutes, universities and progressive firms, though formal national mandates remain, at the time of writing, the exception rather than the rule. The direction of travel is clear: African adoption of ISO 19650 is uneven but increasingly deliberate, and the profession's institutes — AAQS, ASAQS, NIQS and their peers — are actively positioning quantity surveyors as informed participants in that adoption rather than as downstream recipients of decisions made without them.

3.2 5D BIM and the transformation of measurement

For the quantity surveyor, the most significant development is so-called 5D BIM — the linking of cost (the fifth dimension) and time (the fourth) to the three-dimensional model. In a mature 5D workflow, quantities are derived directly from model objects and associated with rates and cost data, so that an estimate is no longer a static document but a live model of project cost that responds to design change (Smith, 2014). When a designer alters a slab or a façade, the affected quantities — and their cost consequences — can be reflected almost immediately.

This represents a profound shift in the measurement process. The traditional, sequential routine of taking off quantities by hand and transcribing them into a bill is increasingly replaced by model-based quantification, in which the surveyor's effort moves upstream into defining how the model should be structured and classified, and downstream into interrogating, validating and advising on the cost information the model produces. The scholarly literature has long anticipated this: studies of BIM and quantity surveying practice emphasise that the value of automated measurement depends on the alignment between model classification and established measurement rules, and that surveyors must engage actively in shaping model standards rather than passively receiving outputs (Olatunji, Sher & Gu, 2010; Matipa, Cunningham & Naik, 2010). For African practice, this has a specific implication: as BIM classification schemas are adopted or adapted locally, the alignment between them and the ASAQS, NIQS and other national measurement standards will determine whether 5D can be trusted in practice. That alignment is a professional task, and it belongs on the desks of the institutes.

3.3 Benefits for cost management

Where it is implemented well, model-based quantification offers measurable benefits: a reduction in measurement error, faster estimating and re-estimating, improved transparency between project parties, tighter cost control through rapid scenario testing, and better coordination through clash detection that prevents costly rework. These benefits are mutually reinforcing — faster estimating, for example, allows more design options to be costed, which in turn supports better value decisions earlier in the project, when the capacity to influence cost is greatest.

It is important, however, not to overstate the automation. A model produces quantities only as good as the objects and data within it; professional scrutiny remains essential. The quantity

surveyor's judgement — about measurement conventions, the treatment of items poorly represented in the model, allowances for risk and the realism of rates — becomes more, not less, important as raw measurement is automated. The discipline shifts from counting to checking, and from transcription to interpretation.

A simple example illustrates the change. Consider the cost planning of a multi-storey office building in Johannesburg, Lagos or Windhoek. In the traditional workflow, a change to the floor-to-floor height late in design would require the surveyor to re-measure affected elements — façade, internal partitions, vertical services, finishes — by hand, a process measured in hours or days and vulnerable to transcription error. In a mature 5D workflow, the same change propagates through the coordinated model, the affected quantities update automatically, and the surveyor's attention turns immediately to the questions that actually require professional skill: whether the revised design introduces buildability or risk issues, how the cost change should be communicated to the client, and what value-engineering options might offset it. The technology does not make the decision; it removes the drudgery that previously stood between the surveyor and the decision. This redistribution of effort — less time measuring, more time advising — is the recurring signature of digital transformation across every function examined in this paper.

3.4 Barriers to BIM adoption in Africa

Despite its advantages, BIM adoption across much of Africa remains uneven and faces well-documented obstacles: shortages of technical skills and trained personnel; the high cost of software licences and capable hardware, particularly for smaller firms; gaps in digital infrastructure and reliable connectivity, and in the electricity supply that underpins them; cultural resistance to changing established workflows; and the limited maturity of regulatory and contractual frameworks that mandate or support BIM. South Africa, through bodies such as the cidb and the Green Building Council of South Africa, has advanced furthest, and BIM adoption is rising in Nigeria, Kenya, Ghana and elsewhere on the back of institute-led continuing professional development and university curriculum reform. Yet the continent still lags behind the levels of mandated BIM use seen in parts of Europe and Asia.

These barriers are real, but they are not immutable. Each can be addressed directly through the professional, educational and governmental actions set out later in this paper — and each is being addressed, in different measures, by AAQS and its member institutes. The point is not that African BIM adoption is inevitable, but that its pace and shape are choices, and that the profession's institutes are among the actors best placed to shape them.

4. Artificial Intelligence and Machine Learning

Artificial intelligence is emerging as one of the most disruptive forces affecting professional services of every kind, and quantity surveying is no exception. Where BIM restructures how information is created and shared, AI changes what can be inferred from it. Machine-learning systems trained on large bodies of historical project data can identify patterns and relationships that would be impractical for a human to extract, and apply them to new problems at speed.

4.1 Applications across the quantity surveying workflow

The applications of AI in quantity surveying span much of the professional workflow. They include automated and parametric estimating, in which models trained on past projects generate early cost estimates within minutes; predictive cost modelling that anticipates the likely outturn cost of a project given its characteristics; risk forecasting that flags the conditions historically associated with overruns; the analysis and review of contracts using natural-language processing to surface unusual or onerous clauses; procurement optimisation; and the prediction of programme and schedule outcomes. In each case, AI compresses the time required to move from raw data to actionable insight. Every one of these applications is directly relevant to the volumes and pressures of African project delivery, where public and donor budgets are stretched, contracting environments can be complex, and the cost of overrun is measured not only in commercial terms but in delayed clinics, classrooms and kilometres of road.

4.2 Generative AI and large language models

The recent maturation of generative AI and large language models has widened these possibilities considerably. Such systems can draft and summarise documentation, interrogate contracts and specifications in natural language, assist in preparing tender and report narratives, and act as an analytical assistant across the surveyor's information. Used well, they reduce the time spent on routine drafting and document review, freeing professional capacity for analysis and advice. Used uncritically, they introduce new risks — of plausible but incorrect output, of confidentiality breaches and of an erosion of the professional habits that underpin sound judgement. The technology is powerful precisely because it is general; that same generality demands disciplined, professional control. That discipline is a natural fit for a profession already trained to weigh evidence, check assumptions and stand behind its numbers.

4.3 Opportunities

For practitioners, the opportunities are substantial. AI can accelerate decision-making, improve the consistency and reach of forecasting, reduce certain categories of human error, identify risks earlier, and lift overall productivity by removing repetitive analytical labour. The most credible reading of the evidence is that AI augments rather than replaces the professional: it enhances capability, allowing the surveyor to do more, to do it faster and to do it with a broader evidence base than unaided judgement permits. For an African profession that has always had to do more with less, this is an unusually direct and welcome force multiplier — provided its adoption is disciplined.

4.4 Risks, ethics and professional judgement

These opportunities carry corresponding risks that the profession must manage deliberately. They include the privacy and security of project and commercial data; over-reliance on automated outputs at the expense of independent verification; cybersecurity exposure as more value flows through digital systems; the gradual loss of foundational measurement and estimating skills if they are never practised; and the ethical questions raised when

consequential decisions are informed by opaque algorithms whose reasoning cannot easily be examined. The appropriate response is not to refuse the technology but to govern it — to retain professional judgement as the final authority, to insist on the explainability and auditability of AI-assisted advice, and to develop clear ethical guidelines for its use. Automation should inform the surveyor's judgement, not substitute for it. This is precisely the ground on which AAQS and its member institutes are best placed to lead, by developing continent-relevant ethical guidance for AI in cost and contract advice.

A particular caution concerns the quality and representativeness of the data on which AI systems are trained, and it is a caution African quantity surveyors must take especially seriously. A model that learns from historical project data will reproduce the patterns — and the biases and errors — present in that data. An estimating model trained predominantly on projects from Europe, North America or East Asia may give confident but misleading results when applied to Lagos, Nairobi or Windhoek, and it has no inherent awareness of the limits of its own competence. Africa's own historical project data — in the ASAQS, NIQS and other institute archives, in donor and development-bank records, and in the working files of the continent's larger firms — is therefore a strategic asset. The professional obligation is to understand what a tool was built to do, to interrogate its outputs against independent reasoning grounded in African cost realities, and to treat an AI estimate as a structured input to professional judgement rather than as an answer. This is not a reason to avoid the technology; it is the very reason a qualified African professional remains indispensable. The combination of machine speed and human accountability is more powerful, and far safer, than either alone.

4.5 A productivity caution

A final caution deserves emphasis, because it is so widely misunderstood. Artificial intelligence does not automatically make an organisation more productive — it merely makes it faster. True productivity gains arise only when automation is combined with the redesign of underlying processes and a firm focus on client and customer outcomes. Without that redesign, an organisation simply automates its existing, and often flawed, assumptions and then executes them at greater speed. The real differentiating factor is therefore not the technology itself, but the ability to translate a genuine understanding of client needs into organisational change.

For African quantity surveying practices, this has a direct implication. The temptation will be to bolt AI and automation onto existing workflows and to expect productivity to follow. It rarely does. The more valuable, if harder, question is what the workflow itself should become once the constraints that shaped it — manual measurement, sequential document exchange, periodic reporting — have fallen away. This observation returns us to the productivity imperative with which this paper began: technology is the lever, but professional judgement and the deliberate redesign of how work is done are the hand that pulls it. African firms that grasp this will pull decisively ahead of those that merely buy software — and, over time, will begin to close the productivity gap that constrains the continent's built-environment sector as a whole.

5. Cloud Computing and the Common Data Environment

Cloud technology has transformed the way construction projects collaborate. Rather than exchanging files periodically, project teams increasingly work continuously from centralised, cloud-hosted information accessible from any location. For quantity surveyors, this changes both the tempo and the transparency of cost management: cost information can be shared, reviewed and approved in something close to real time, and the surveyor can draw directly on the live project record rather than on a snapshot that may already be out of date.

A range of platforms now support this way of working, including Autodesk Construction Cloud and BIM 360, Procore, Bluebeam, dedicated estimating environments such as CostX, and general collaboration tools such as Microsoft Teams. Within the ISO 19650 framework, the organising concept is the common data environment (CDE) — a single, governed source of project information through which data is shared in a controlled and auditable way. The benefits include genuine real-time collaboration, secure remote access, centralised and version-controlled project information, faster approval cycles and clearer communication between parties.

In the African — and especially the Southern African — context, it is important to recognise the quantity surveying applications that already underpin everyday practice. Measurement, bills of quantities and cost estimating across the region are very widely produced using well-established, locally entrenched packages such as WinQS and QSPlus, which generations of African quantity surveyors have relied upon as their core production tools. As these and similar applications increasingly add cloud, collaboration and data-exchange capability — and as they begin to connect with model-based and common-data-environment workflows — the practical distance between the profession's existing toolset and the digital future described in this paper grows considerably shorter. The direction is already visible in the newest releases. QSPlus 5, for example, has folded the on-screen take-off capability once delivered by its separate DimensionX plug-in directly into its core (with vendor-stated productivity gains of up to eighty per cent), added a fully integrated cost-estimate module, and moved the whole workflow to the browser through Qsplus Cloud — with a library that supports the ASAQS Standard System of Measuring Building Work, NRM 2 and their international peers side by side. For many African firms, building incrementally on this kind of familiar and trusted software is a more realistic route to digital maturity than wholesale replacement, and recognising it offers a pragmatic and affordable on-ramp to the wider transformation.

The COVID-19 pandemic accelerated this transition decisively. When site visits and office attendance were curtailed, cloud collaboration moved from a convenience to a necessity, and many African firms that had been cautious adopted remote, digital ways of working within weeks. The experience demonstrated both the resilience that cloud working can provide and the importance of robust data governance and cybersecurity once a project's commercial information lives online — a discipline that African firms, working across multiple jurisdictions and increasingly connecting to international clients and funders, cannot treat lightly. The wider environment is also improving: expanding submarine-cable capacity around the continent, growing terrestrial fibre networks, and the arrival of low-earth-orbit satellite services are

steadily removing the connectivity constraint that once slowed cloud adoption in remoter regions.

6. Reality Capture: Drones, Laser Scanning and Digital Site Measurement

Technological change has also transformed the measurement and monitoring of physical work on site. A family of reality-capture technologies — unmanned aerial vehicles (drones), terrestrial and aerial laser scanning, photogrammetry, GPS-based surveying and digital terrain modelling — now allows the physical world to be captured digitally with speed and precision that manual methods cannot match.

For the quantity surveyor, the applications are direct and valuable. Drones and photogrammetry enable rapid, accurate measurement of earthworks and stockpile volumes; laser scanning produces dense point clouds from which existing conditions can be measured and, where required, converted into models ("scan-to-BIM"); aerial imagery supports objective progress tracking and the assessment of work in place for interim valuation; and digital terrain models underpin volumetric analysis and topographical mapping. These methods improve accuracy and speed, enhance safety by reducing the need for personnel to access hazardous or difficult locations, and produce a richer, time-stamped evidential record for reporting, valuation and dispute avoidance.

For African practice in particular, reality capture is unusually well suited to the shape of the work. The continent's construction pipeline is dominated by linear infrastructure — roads, railways, transmission lines, pipelines — by earthworks-heavy resource, mining and dam projects, and by rapidly expanding urban footprints in cities such as Lagos, Nairobi, Kigali, Dar es Salaam and Cairo. Drone survey establishes volumes and progress on a corridor project in a fraction of the time, and at a fraction of the risk, of sending survey teams along a route hundreds of kilometres long, while producing a dated, photographic record that materially strengthens the surveyor's position in any subsequent dispute over what was built and when. The relatively low cost of entry for basic drone and photogrammetry capability also makes this one of the more immediately accessible digital technologies for African firms beginning their digital journey — and one where regulatory environments (drone permitting and airspace rules) are steadily maturing across the continent.

7. Big Data, Benchmarking and Predictive Analytics

Construction projects generate enormous quantities of data — on cost, quantities, productivity, programme, procurement and performance — yet historically much of this information has been under-exploited, locked in project files and rarely fed back into future decisions. The maturing discipline of data analytics is changing this, and the quantity surveyor, as the profession most concerned with cost and value data, is well placed to lead its application.

Modern practice increasingly draws on structured historical cost databases, market-intelligence systems, benchmarking tools and predictive analytics. Together these allow professionals to anticipate market fluctuations and price movements, to improve the realism of budgets and cost plans, to analyse risk trends across portfolios of projects, and to

make better-informed procurement decisions. Benchmarking against a robust evidence base also strengthens the credibility of cost advice, replacing assertion with demonstrable comparison.

Africa's specific challenge, and opportunity, is the relative scarcity of authoritative, standardised cost data at continental and even at national scale. Where firms work with fragmented private databases, and where public bodies rarely publish structured cost information, the profession has an unusually strong collective interest in coordinated action. AAQS and its member institutes are the natural custodians of a continental cost-data effort: contributing anonymised benchmarks, agreeing measurement-consistent categories, and building the shared evidence base that African quantity surveyors will need to advise on cross-border projects, on infrastructure programmes financed by the African Development Bank and by donor institutions, and on the AfCFTA-enabled market that is now emerging. The strategic implication is significant: data is becoming one of the most valuable assets in the construction industry, and the organisations — and professions — that capture, curate and interpret it will hold a growing advantage. For African quantity surveyors in particular, the disciplined collection and analysis of cost and project data is not a peripheral activity but a core source of future professional value, and one whose realisation will depend on collective, institutional action as much as on individual firm effort.

8. Blockchain, Smart Contracts and Procurement Integrity

Among the technologies reshaping construction, blockchain is at an earlier stage of adoption than BIM or cloud computing, but its potential relevance to quantity surveying — and to Africa in particular — is considerable. A blockchain is a distributed, tamper-resistant digital ledger in which transactions are recorded in a way that is transparent to permitted parties and extremely difficult to alter retrospectively. Built upon it, smart contracts are self-executing agreements in which contractual terms are encoded so that defined actions, such as a payment, occur automatically when agreed conditions are met and verified.

In a construction setting these ideas point toward greater integrity and efficiency in commercial processes. Payment milestones could be released automatically upon verified completion of work, shortening payment cycles and reducing the disputes and cash-flow problems that beset construction supply chains. A shared, auditable record of transactions, variations and approvals could improve transparency, simplify the assembly of the final account, and provide a trustworthy evidential trail. For the quantity surveyor, whose role centres on the fair measurement and certification of value and on the administration of payment, these are directly pertinent capabilities.

The relevance to Africa deserves emphasis, and is arguably greater than for any other region. Where procurement integrity and the timely, honest flow of payment are persistent and well-documented challenges — and where public bodies from the African Union to national anti-corruption commissions have made construction sector transparency a policy priority — technologies that make transactions transparent and resistant to manipulation could materially reduce the opportunities for corruption and strengthen public confidence in how construction funds are spent. Kenya, Nigeria and Rwanda, among others, have piloted blockchain and

distributed-ledger applications in various public-sector settings; the extension of such thinking to construction procurement is a natural next step. Realising this potential will require legal recognition of digital contracts and records under national law, appropriate standards, and the development of professional competence — but the alignment between blockchain's strengths and the continent's governance needs makes it a technology the profession should watch, pilot and, where appropriate, champion.

9. Digital Twins, the Internet of Things and Whole-Life Asset Management

As built assets are instrumented with sensors and connected devices — the Internet of Things (IoT) — it becomes possible to maintain a digital twin: a dynamic, data-rich digital replica of a physical asset that is continuously updated from its real-world counterpart. Where a BIM model typically represents the asset as designed and built, a digital twin represents the asset as it operates, integrating live data on performance, condition and use throughout the asset's life.

For quantity surveying, the significance of the digital twin lies in its extension of the cost conversation beyond construction into operation. The majority of the whole-life cost of a built asset is incurred not in its construction but in its operation, maintenance and eventual renewal. A digital twin, fed by operational data, allows whole-life and lifecycle costs to be modelled, monitored and optimised with a precision that has not previously been possible — informing maintenance planning, renewal decisions, energy and carbon management, and the financial stewardship of asset portfolios.

For African infrastructure, where much of what will exist in 2050 is yet to be built, and where the maintenance funding of existing assets is often the binding constraint on service delivery, the twin is not a peripheral technology. Applied to a hospital, a university campus, a water treatment plant, a highway or an urban district, it enables the surveyor to advise on operational economics across decades, on the sequencing of renewal expenditure to keep an asset serviceable within tight recurrent budgets, and on the trade-offs between capital cost and lifetime running cost that are so often mispriced at design stage. The professional who can advise not only on the capital cost of construction but on the operational economics of an asset over decades occupies a more strategic and durable position than one whose involvement ends at practical completion — and, for the African context specifically, offers a form of value that public clients under fiscal pressure will increasingly seek out.

10. Sustainability, Carbon and the Digital Quantity Surveyor

Technology is also a principal enabler of sustainable construction, and here too the quantity surveyor has a natural and growing role. The skills that define the profession — measurement, costing and the disciplined analysis of resource use — are precisely those required to measure and manage the environmental performance of built assets, and digital tools are making this practical at scale.

Digital tools now assist surveyors in lifecycle costing, in carbon cost analysis and the measurement of embodied and operational carbon, in energy modelling, in sustainability benchmarking, and in the preparation of environmental, social and governance (ESG)

reporting. Just as the profession measures and manages financial cost, it is increasingly being called upon to measure and manage carbon — a role for which the discipline of quantity surveying is unusually well suited. The notion of the surveyor as a manager of carbon as well as cost is rapidly moving from aspiration to expectation, and, on the African continent, the emergence of the Green Building Council of South Africa (GBCSA) and its counterparts in Kenya, Nigeria, Ghana, Namibia and elsewhere provides a supportive institutional context.

Looking ahead, African quantity surveyors will play an expanding part in green construction, in circular-economy planning that designs out waste and retains the value of materials, in the delivery of net-zero developments, and in climate-responsive infrastructure. For Africa, where the consequences of climate change are acute — from Sahel drought to Mozambique cyclones to Cape Town's water stress — and where much of the built environment of the coming decades is yet to be constructed, the opportunity to embed sustainability and carbon discipline into projects from the outset, supported by digital measurement, is especially significant. It is also aligned with the AU's Agenda 2063 aspirations for a climate-resilient continent and with the practical concerns of the multilateral funders on whom much African infrastructure investment will depend.

11. The Continental Imperative

The technologies discussed in this paper take on their sharpest meaning when the continental picture is drawn together. What follows is not a special case appended to a global argument; it is the whole argument, viewed from this continent. Four things bind it together — the scale of the delivery challenge, the leapfrog opportunity that scale creates, the honest barriers standing between us and it, and the collective work of the institutions that must lead. Each in turn.

11.1 The scale of the delivery challenge

Africa faces a development and infrastructure challenge that gives the digital transformation of construction particular urgency. Rapid urbanisation is concentrating populations in cities that must expand their housing, transport, water and energy infrastructure at speed; acute housing shortages persist across much of the continent; infrastructure deficits constrain economic growth; and public funding is limited relative to need. The African Development Bank has estimated the continent's infrastructure financing gap in the order of tens of billions of US dollars each year, underlining the scale of what must be delivered and the premium on delivering it efficiently and without waste (African Development Bank, 2018). The Programme for Infrastructure Development in Africa (PIDA), the flagship African Union — African Development Bank vehicle for continental infrastructure, embodies the ambition; the quantity surveying profession is one of the disciplines on whose accuracy and probity its delivery will depend.

11.2 Leapfrogging and a mobile-first context

These challenges are also an opportunity. Just as parts of Africa moved directly to mobile telephony and mobile money without first building extensive fixed-line infrastructure, the construction sector has the opportunity to leapfrog outdated, paper-based systems and adopt

digital methods directly. Technology can improve the predictability and quality of project delivery, reduce the opportunities for corruption through greater transparency, increase procurement efficiency, and stretch scarce public funds further. A mobile-first, cloud-based approach is well matched to contexts where connectivity is increasingly delivered through mobile networks and, more recently, through low-earth-orbit satellite services, rather than through legacy fixed infrastructure.

11.3 Barriers that must be addressed

The barriers, however, are real and must be confronted honestly. They include shortages of digital skills and of professionals trained in BIM, data analytics and related disciplines; limited investment in digital tools and systems, particularly among smaller firms; connectivity and power-reliability challenges in some regions; and institutional resistance to changing long-established ways of working. None of these is unique to Africa, but their combination can slow adoption and widen the gap between leading and lagging firms. Left unaddressed, they risk a two-tier profession in which a digitally capable minority captures the most valuable work — a division that would run precisely counter to the continental integration agenda the profession is otherwise helping to advance.

11.4 Harmonising standards and enabling regional integration

A distinctively African task — and one which the profession must own — is the harmonisation of measurement, cost management and professional standards across national borders. National measurement conventions such as the ASAQS Standard System of Measuring Building Work in South Africa and the NIQS Building and Engineering Standard Method of Measurement in Nigeria are mature and defensible bases for national practice, but they diverge in ways that make cross-border project delivery unnecessarily costly and slow. The Association of African Quantity Surveyors (AAQS) has, over the past two decades, made harmonisation one of its central purposes, working through initiatives such as the SADC Mutual Recognition Protocol for the quantity surveying profession and through parallel efforts to develop and disseminate common African measurement standards. This is technical work with strategic consequence: as the AfCFTA is progressively implemented and as continental infrastructure programmes such as PIDA move from planning into delivery, a common technical language of cost will be a practical enabler of both.

11.5 The role of professional bodies, universities and AAQS

Closing the digital, data and standards gaps is a shared responsibility. African universities and professional bodies must prioritise digital education and the training of the next generation of practitioners — embedding BIM, data analytics and AI literacy in curricula and continuing professional development, supporting BIM certification, and forging innovation partnerships with industry. Regional and national institutions, including AAQS and bodies such as South Africa's cidb, Nigeria's QSRBN, and the various national institutes across the continent, have a particular part to play in setting digital competency standards, sharing knowledge across borders, and giving the continent's quantity surveyors a collective voice in shaping how digital construction develops in Africa. A conference such as AAQS / INQS 2026 is itself an instrument of that effort — as much a working forum as a professional gathering.

12. The Future Quantity Surveyor: A New Competency Framework

If technology is redefining rather than replacing the profession, then the central practical question is what competencies tomorrow's quantity surveyor will require — and, in the African context, what a coordinated continental competency framework should insist upon.

The future practitioner must evolve beyond traditional measurement to combine enduring professional foundations with a set of new digital and analytical capabilities. The competencies most clearly implied by the trends discussed in this paper include fluency with digital systems and model-based information; data analytics and the ability to turn data into insight; an understanding of how to apply and govern AI; expertise in sustainability and carbon management; strategic and advisory capability; and the management of technology itself within a practice or project. To these should be added, for African practitioners, a working familiarity with the cross-border regulatory and standards landscape — including the SADC Mutual Recognition Protocol and the emerging continental instruments — that increasingly frames practice.

These capabilities do not stand alone. They sit on top of — and depend upon — the profession's traditional command of measurement, cost and contract. The most valuable practitioner is therefore a T-shaped professional: deep in the discipline of construction economics, and broad across the digital, analytical, sustainability and cross-border regulatory domains that increasingly surround it. In this light, the various descriptions of the future role — construction economist, digital project advisor, infrastructure strategist, financial risk manager — are not competing visions but facets of a single, expanded professional identity.

The defining attribute of that identity is adaptability. The specific tools will continue to change, and any competency defined too narrowly around a particular software package will date quickly. What will endure is the capacity to learn, to integrate new technologies into sound professional practice, and to keep the surveyor's judgement at the centre of an increasingly automated process. Adaptability, more than mastery of any one tool, will determine which practitioners and which firms thrive — and, taken collectively, which national professions on the continent lead and which fall behind.

13. Recommendations

If the profession is to lead the digital transformation of construction in Africa rather than be overtaken by it, action is required across four constituencies. The following recommendations are addressed to each, and are framed with the continental context — AAQS, its member institutes, African universities, African governments and African firms — deliberately in view.

Professional bodies (AAQS, ASAQS, NIQS, INQS and their peers)

Promote and, over time, formalise digital competency standards for quantity surveyors, so that digital capability becomes part of the recognised definition of professional competence in every African jurisdiction.

Encourage and support BIM certification and structured continuing professional development in digital methods, delivered through the institutes and, where possible, mutually recognised across borders.

Develop clear, continent-relevant ethical guidelines for the use of AI and automated decision-support in cost and contract advice.

Advance the harmonisation of measurement standards across Africa, building on the ASAQS SSMBW, the NIQS BESMM and their sister frameworks, and taking forward the SADC Mutual Recognition Protocol and the wider AAQS standard-setting programme.

Modernise professional training and assessment to reflect a model-based, data-rich practice environment.

Universities and educators

Integrate digital construction — BIM, data analytics and AI — into core quantity surveying curricula rather than treating it as an optional extension.

Introduce dedicated modules in BIM and applied AI, taught with current tools and real project data, and where possible with African cost data.

Encourage interdisciplinary training that exposes surveyors to design, engineering, computing, sustainability and the regulatory dimensions of cross-border practice.

Partner with AAQS and with member institutes to align academic training with the digital competency standards those institutes are developing.

Governments and regulators

Promote digital and transparent public procurement systems, using technology to strengthen integrity and value for money, and align with the transparency ambitions of the AU's continental infrastructure agenda.

Support smart-infrastructure development and, where appropriate, encourage or mandate BIM on public projects to build market capability — as has begun to occur in Southern Africa under cidb leadership.

Foster construction innovation through enabling regulation and investment in digital, energy and connectivity infrastructure, without which the productivity gains that digitalisation makes possible will not be realised.

Quantity surveying firms

Invest in technology and in the data foundations — structured cost databases and benchmarking — that underpin future competitive advantage, and contribute anonymised data to institute-led continental initiatives.

Upskill employees continuously, treating digital capability as a core investment rather than a discretionary cost.

Embrace digital transformation as a strategic priority and develop an explicit innovation strategy rather than adopting tools piecemeal.

14. Conclusion

Technology is no longer optional within the quantity surveying profession. The digital transformation of construction is accelerating globally, and the evidence considered in this paper indicates that quantity surveyors — on this continent as everywhere else — must adapt to it or risk being left behind. The manual, document-centred practice of the past is being steadily replaced by a model-based, data-rich and increasingly automated way of working.

Yet technology should not be regarded as a threat to the profession. Properly understood and properly governed, it is an opportunity — to increase the value the profession delivers, to improve efficiency and accuracy, to expand the range of services on offer, and to strengthen the strategic relevance of the quantity surveyor within the built environment. The repetitive labour that once consumed so much professional effort can be automated; the analytical, advisory and strategic contribution that only a skilled professional can make becomes correspondingly more valuable. For Africa, where infrastructure need is vast, where public resources are constrained and where the built environment of the next generation is largely still to be commissioned, that expanded contribution is a matter of continental significance.

The future African quantity surveyor will combine technical expertise, financial knowledge, digital capability and strategic thinking — a construction economist for the digital age, working within a profession whose national institutes are increasingly integrated under the umbrella of AAQS, and whose collective voice is increasingly capable of shaping how digital construction develops on this continent. The profession stands at a defining crossroads, and the question posed by this conference, **QS Quo Vadis?**, has a clear answer. The way forward lies in embracing technology, transformation and tomorrow — not as forces to be resisted, but as the means by which the African quantity surveying profession will renew its relevance and lead the construction industry of Africa into its digital future.

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