QUANTITY SURVEYORS REGISTRATION BOARD OF NIGERIA

2023 ANNUAL ASSEMBLY ON

Going back to the future: Refocusing and Remodeling the Quantity Surveying Profession for Globalization

Technological Advancement: Opportunities & challenges for Professional Quantity Surveyors

1st February, 2023

At National Women Development Center (NWDC), Abuja

Technological Advancement in Construction & Opportunity for Quantity Surveyors

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Introduction

A new paradigm is unfolding in the global construction landscape as the industry continues to embrace digital information and technologies in unprecedented pace.

New developments in technology and construction materials are adding significant values in the today's construction processes, and changing the traditional methods of construction into methods synonymous with efficiency.

Coupled with the need for improved quality, cheaper costs, short delivery time and safe work environment, the construction industry is motivated to rely on these innovative technologies to advance the frontiers to meet the needs of today's client and environment.

The Concerns

Many experts have expressed concern on the future of professionals in the industry, fearing that technology will take away the traditional roles of professionals if the industry continues on this trajectory.

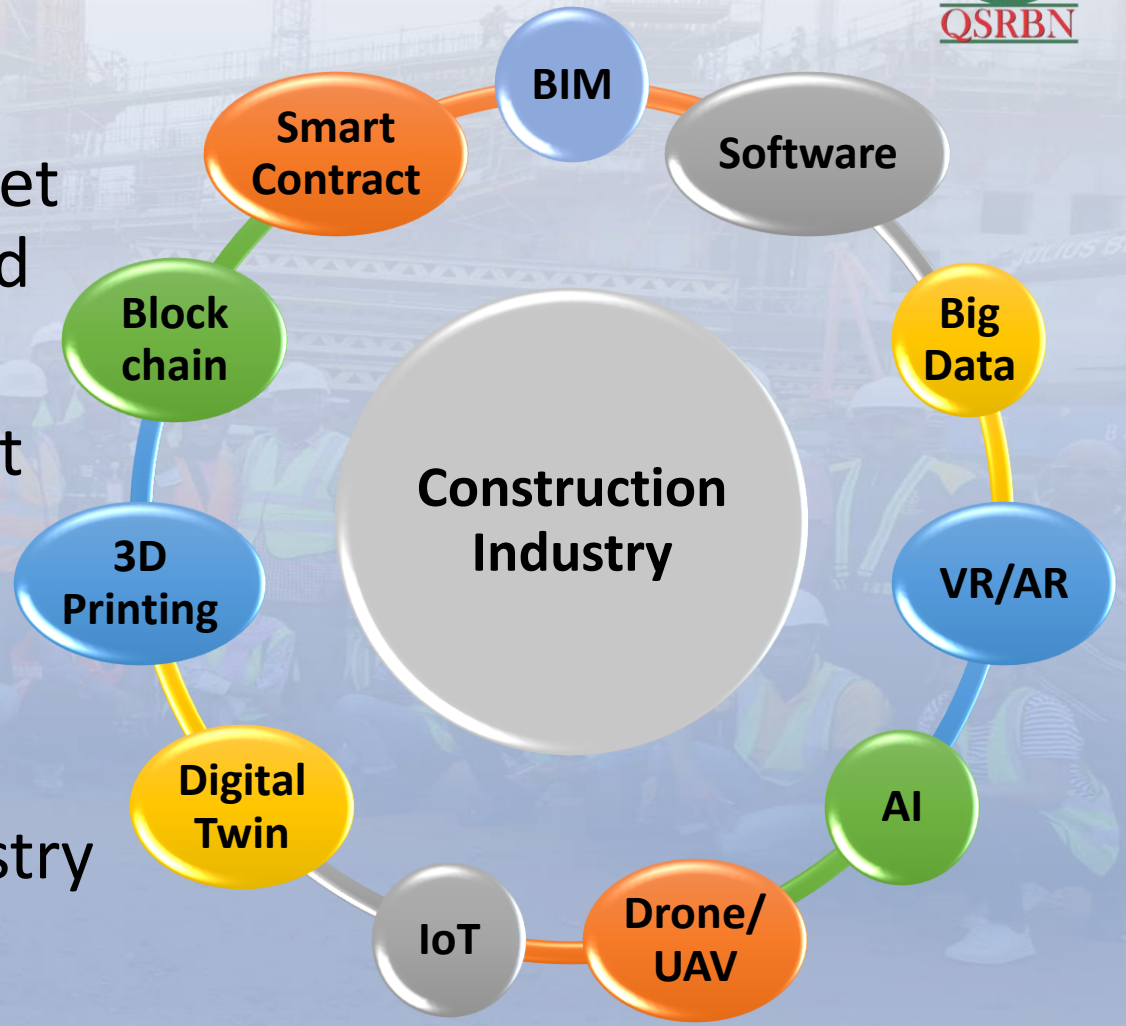
Others opinions however, argued that this development would rather reinforce the roles and services of professionals to evolve alongside with modern advancement in technology.

Whatever the case, it is certain and expected that a new crop of professionals, one birthed and bred in the knowledge and understanding of these trending revolutions is required.

Emerging Trends in Construction Industry

Several of these developments are interconnect and depends on internet infrastructure for its deployment and implementation

Ranging from BIM concepts, internet based computing, software development and material advancements, these cutting edge developments are defining the operations of the construction industry and how projects are delivered.

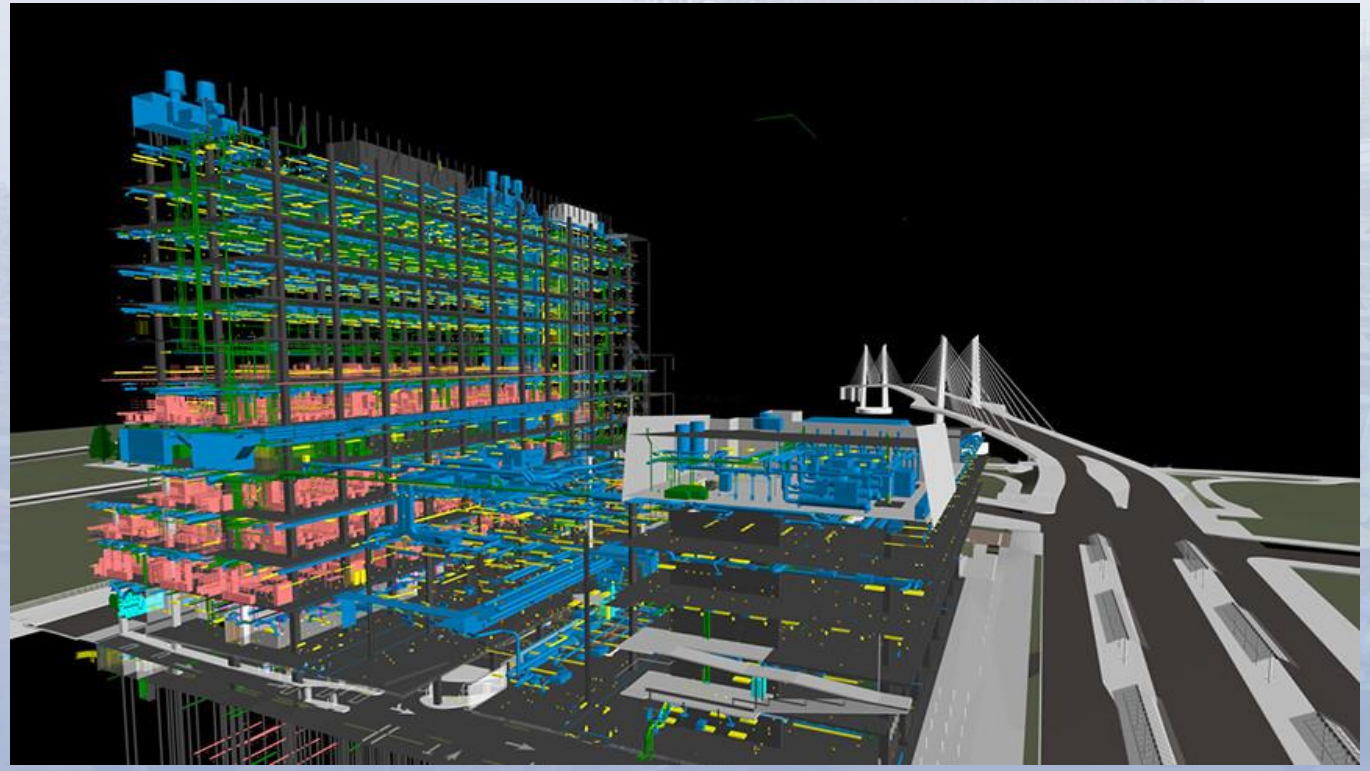


Advanced Construction software and programs

- **BENEFITS**
- Real-time collaboration and communication
- Efficient Document Management
- Easy Resource Management
- Improved Budgeting
- Rich Organization of Information
- Easy integration and customization
- Cloud based accessibility

Construction software are revolutionizing the construction industry, offering efficiency in design processes, construction and post construction phase of project lifecycle, as well as enhancing communication among project team members.

BIM and Cloud Based Collaborations

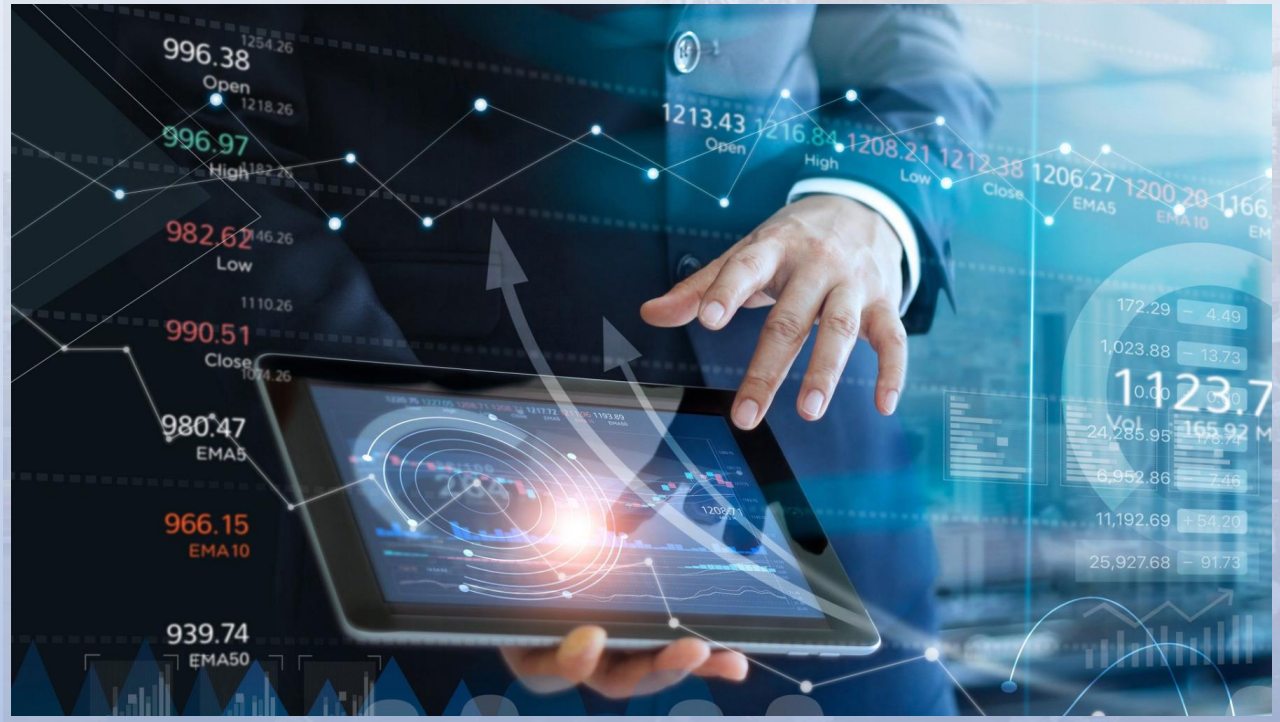


BENEFITS

- ❑ Better project collaboration
- ❑ Visualization of Design intents
- ❑ Accurate estimation & costing
- ❑ Efficient communication
- ❑ Improved scheduling/sequencing
- ❑ Improved fabrication/production
- ❑ Effective risk mitigation
- ❑ Safer construction sites
- ❑ Improved lifecycle management

Cloud Based BIM is improving project delivery through streamlining of project data exchange and project management to bring about efficient design, construction and operation process in the lifecycle of a project.

Big Data

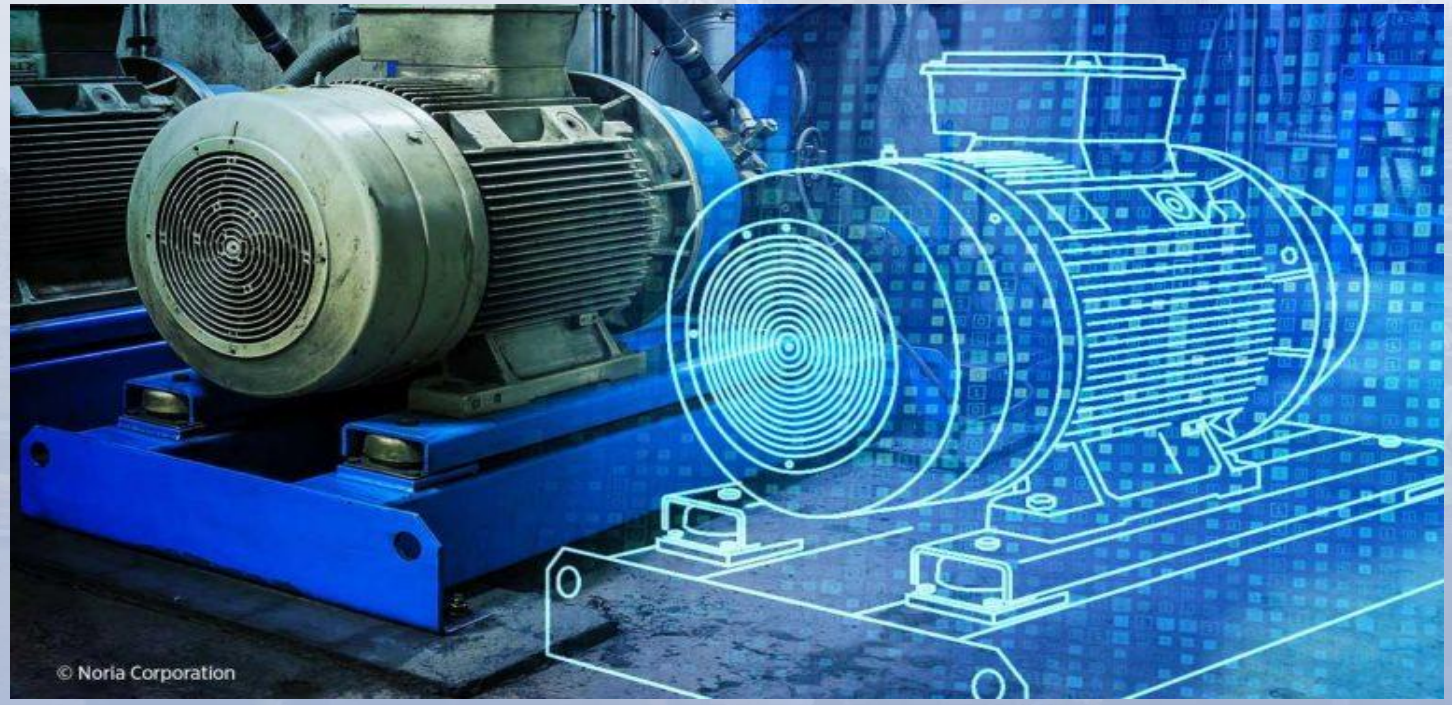


BENEFITS

- ❑ Improve efficiency
- ❑ Support decision making
- ❑ Better understanding of trends
- ❑ Easy detection of fraud & anomaly
- ❑ Increased situation Awareness
- ❑ Easy identification of Risks

Big Data is the aggregation and processing of both structured and unstructured data arising from activities of construction and other related industries so as to provide insight and better understanding to the general behaviour and pattern of events.

Digital Twin

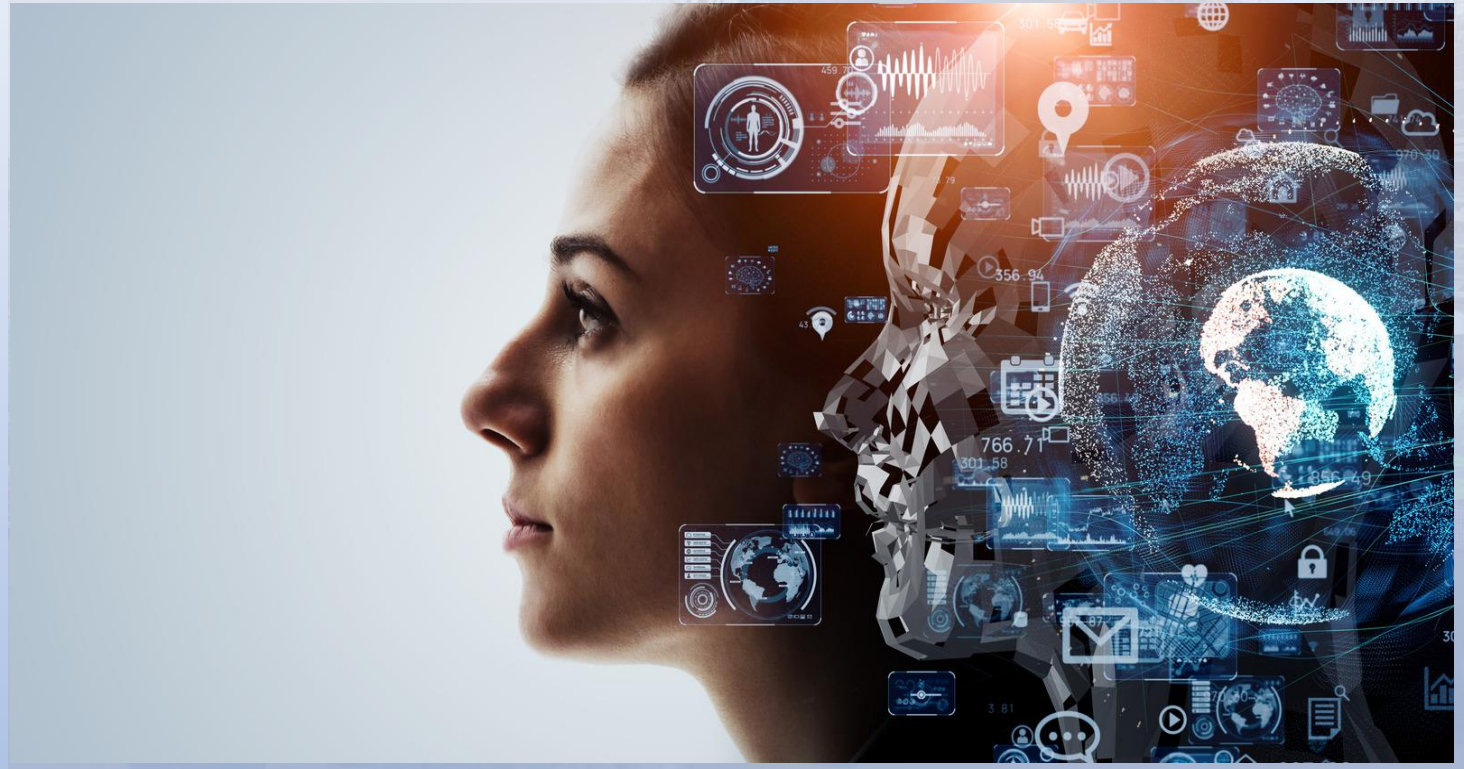


BENEFITS

- ❑ Accurate Performance Data
- ❑ Reliable Predictive Information
- ❑ Better Maintenance cycle
- ❑ Better equipment operation
- ❑ Energy demand projections
- ❑ Performance Analysis

Digital Twin offers virtual representation of a functional facility or component(s) connected via integrated sensors that collects real time data about performance of the component(s) to predict and provide valuable insight to the overall functionality, status and performance of the component or facility

AI & Machine Learning



BENEFITS

- ❑ Better Project Planning
- ❑ Risk Mitigation
- ❑ Reduced Labour cost
- ❑ Improved safety
- ❑ Reduce wastes
- ❑ Prevent Cost Overrun
- ❑ On-site Measurements

Machine learning and algorithm are giving rise to perfect imitation of human cognitive function to achieve greater speed, perfection and safety in construction industry.
AI is improving construction processes of design and execution seen in **"Digital Twin"**

Drones and UAVs

BENEFITS

- ❑ Accurate Site Surveying
- ❑ Safe inspection and Reviews
- ❑ Easy Progress monitoring
- ❑ On-site Measurements
- ❑ Reliable location data

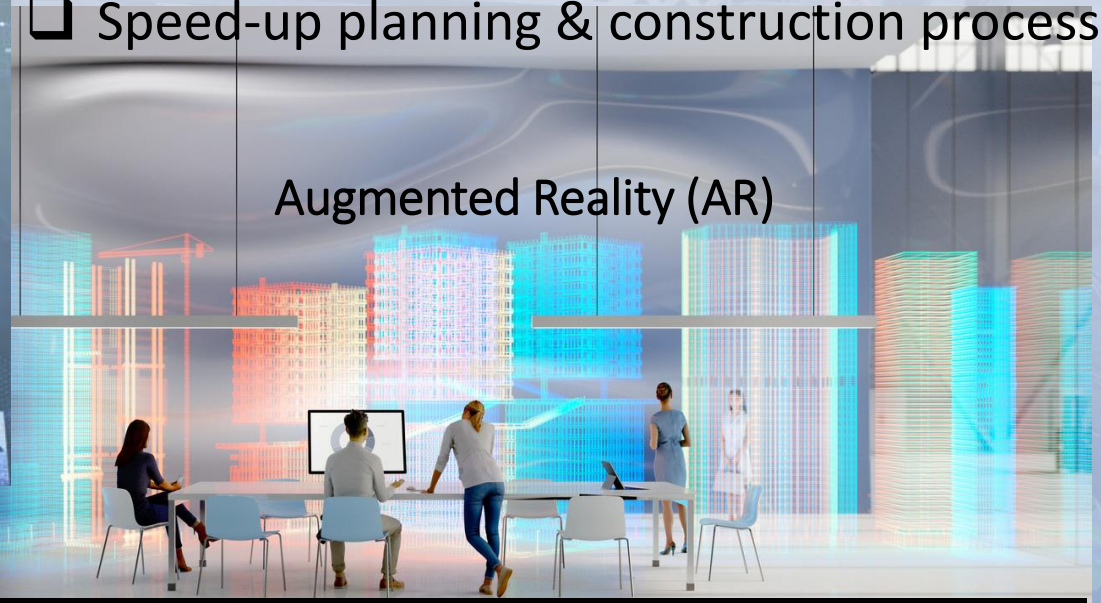
Drones & UAVs are providing quick and accurate way to obtain visual data on real-time developments and situations on project fields. Such data as survey, mapping or visual progress on site can be easily captured from safe and secured observatory.

Immersive Technology

Virtual Reality (VR)

BENEFITS

- ❑ Safety in worksites
- ❑ Automated measurement
- ❑ Enhance review and visualization
- ❑ Speed-up planning & construction process



Augmented Reality (AR)

Immersive technologies leveraging on the power of BIM are improving overall project visualization and reviews, offering unparalleled insight into project design element integration during pre or post construction phase.

3D Printing & DfMA

BENEFITS

- ❑ Accurate production of designs
- ❑ Faster production system
- ❑ Reduced material sourcing
- ❑ Reduced transportation cost
- ❑ Eliminated intermediaries

3D printing in construction is enhancing the production sequence in construction, eliminating challenges of material sourcing, middlemen, transportation and general time delays associated with traditional construction production methods.

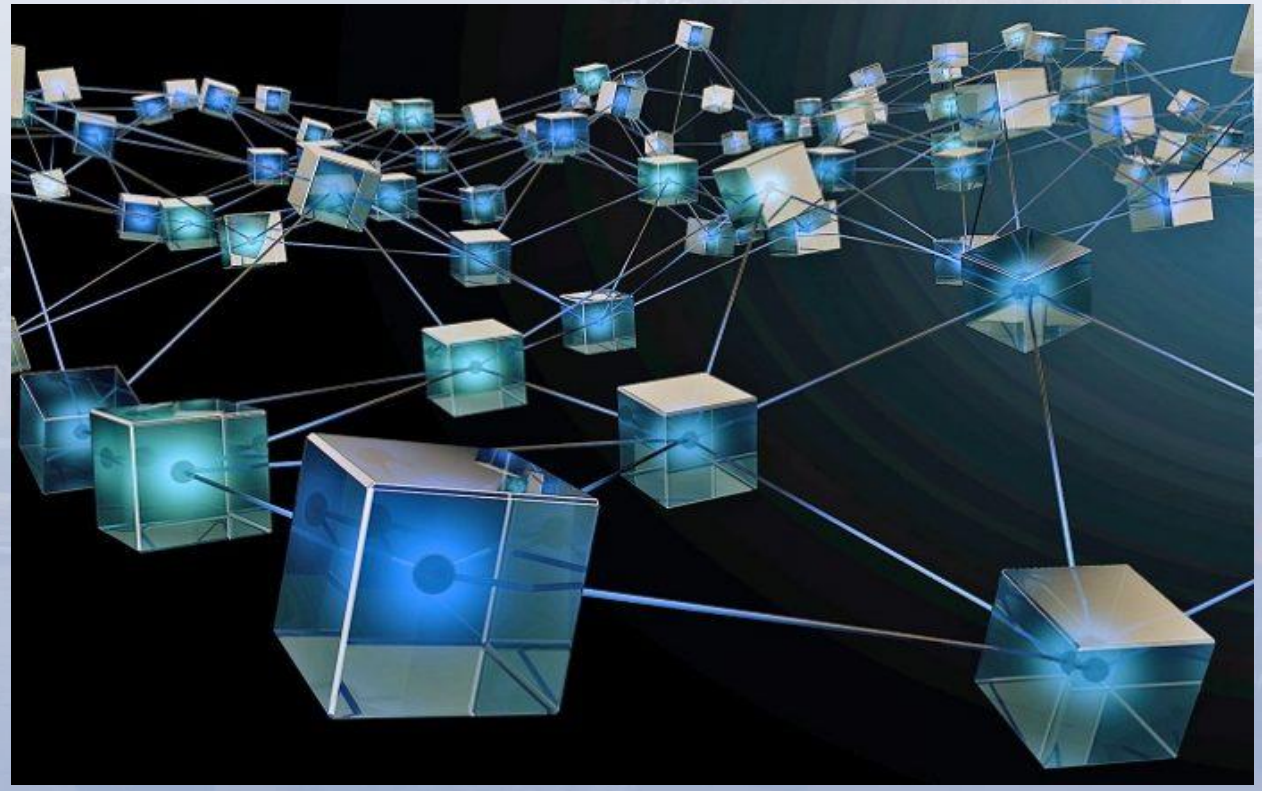
Internet of Things (IoT)

BENEFITS

- ❑ Smart control
- ❑ Assets tracking
- ❑ Advance Analytics
- ❑ Secured connection
- ❑ Ease of communication
- ❑ Efficient collection of data
- ❑ Applicable to various fields

Rapid development in technology and high speed internet is leading to a network integration of powerful electronic devices and vital control devices connected over the internet to create a continuous bridge between the physical and digital world.

Blockchain Technologies

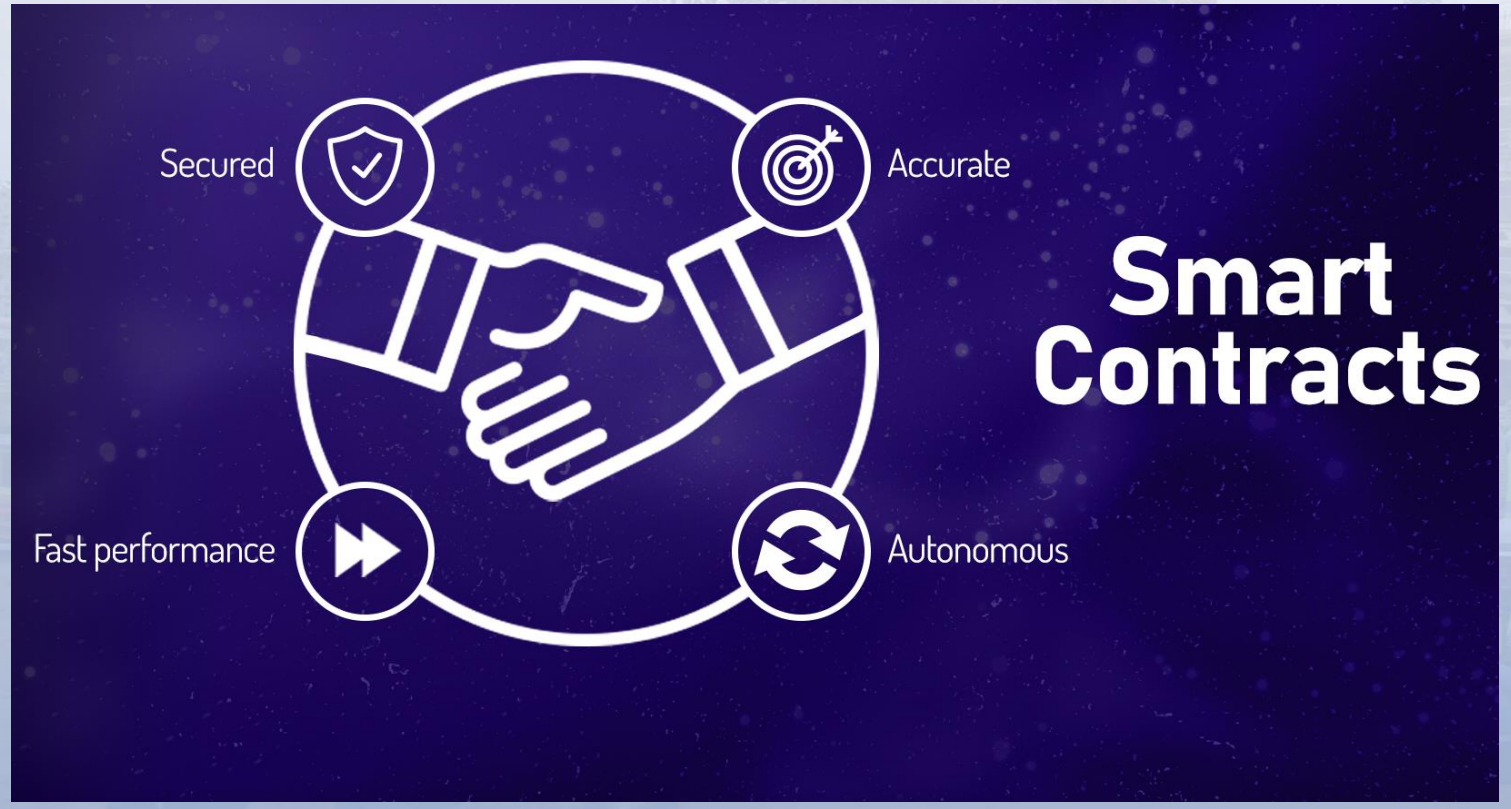


BENEFITS

- ❑ Predictive Asset maintenance
- ❑ Security of construction data
- ❑ Accelerated payment processing
- ❑ Decentralized information system
- ❑ Scalable to meet development needs

Blockchain technology is a linked series of “Blocks” of data connected to forms a distributed ledger that automatically balances itself and offers advantages of being secured, decentralized and scalable to match organization size.

Smart Contracts



BENEFITS

- ❑ Accuracy and Efficiency
- ❑ Transparency of process
- ❑ Speed of execution
- ❑ Security of transaction
- ❑ Trusted transactions

Smart Contract is a blockchain program that is self executing, and has all the terms and condition written in lines of code, acting without intermediaries between seller and buyer. A decentralized platform with capacity to execute events automatically.

Appreciations

for your wonderful patience and attention throughout this presentation.

Requirements for Technological Advancement

Outlines

- Client's Demand
- Education, Training and Learning (Structured & Organizational learning)
- Relevant Policy Tools
- Technological Competence
- Technological Capacities
- Skills
- Relevant Infrastructures

Technological Competence

Proficiency in:

- BIM enabled QS software
- Basic AutoCAD, Microsoft Office and other basic software
- 3D design software (Revit Photoshop, 3DMax, Sketchup).
- Simulation software (e-quest, Phoenix, Visio, ASHRAE etc.)
- Cost modelling & data Mgt.

Knowledge of:

- BIM,
- Big data,
- Artificial intelligence,
- Virtual reality,
- Cloud computing,
- Internet of Things,
- Blockchain

Skills

1. automation & robotics,
2. coding & programming,
3. communication,
4. design drafting & engineering,
5. digital literacy,
6. digitization & virtualization,
7. Modelling & simulation,
8. planning & estimation

- Computer programming techniques
- Machine learning
- Big data3D printing
- Automation based technologies
- Automation vehicles
- Digital fabrications
- Managing, coordination and collaboration
- Drones/UAVs
- Industrial manufacturing
- Robotics
- **IOT**
- Smart sensors
- IT/ICT/computer information systems

- Digital twin
- Revit
- Navisworks
- BIM
- AR & VR
- Basic computer literacy & application
- AutoCAD
- Revit Structs
- Smart Sensor

Infrastructures

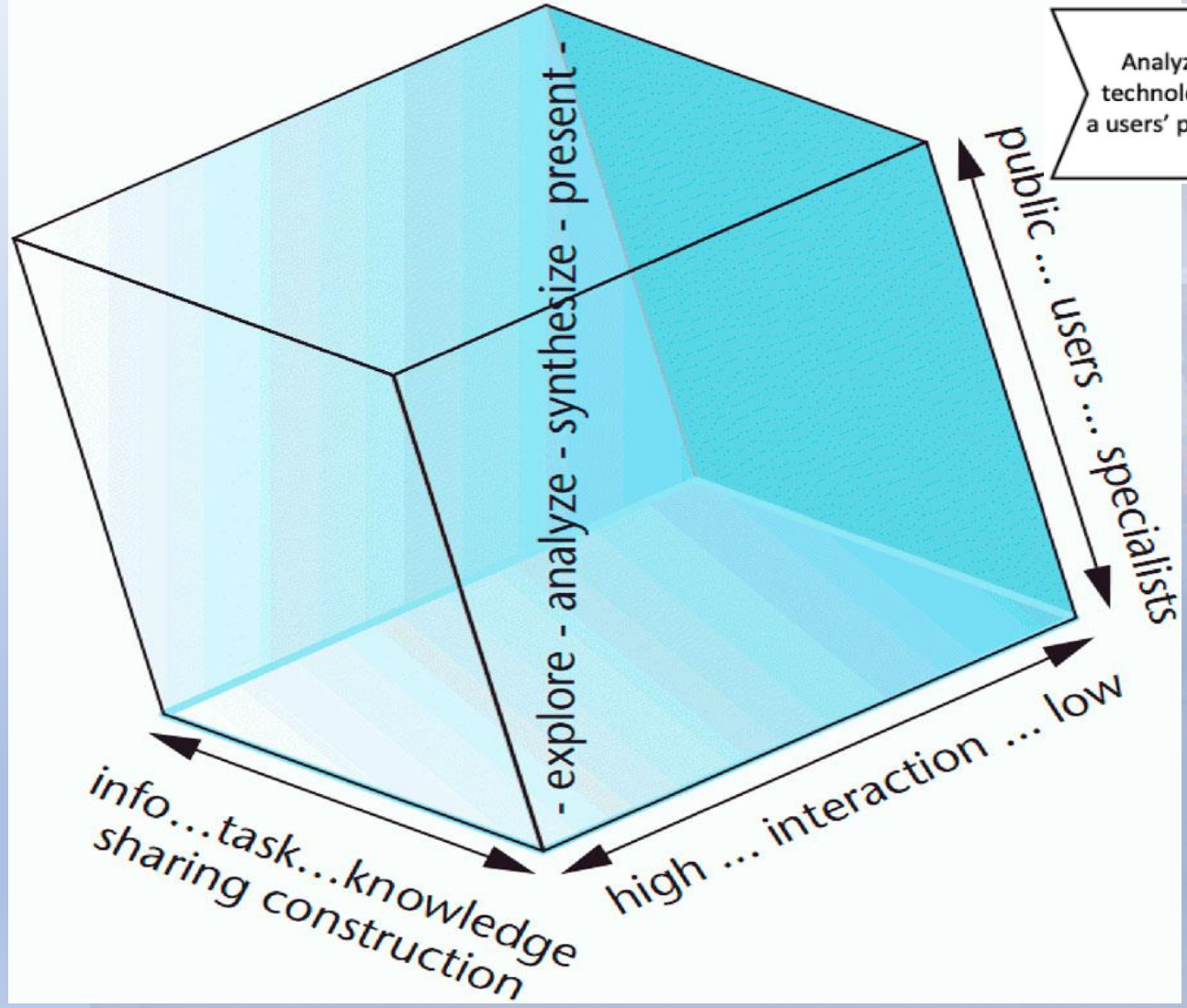
Soft infrastructures

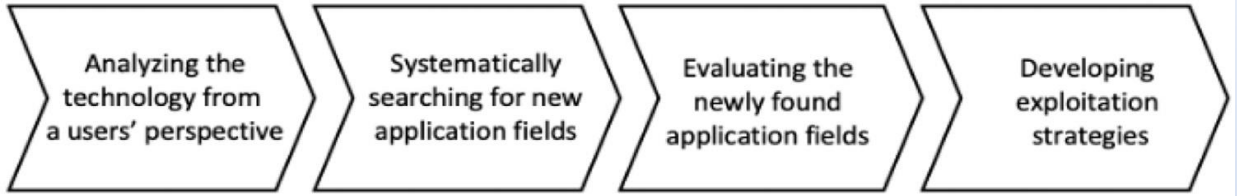
- QS software (CostX, MasterBills etc.)
- Basic AutoCAD, Microsoft Office and other basic software
- 3D design software (Revit Photoshop, 3DMax, Sketchup).
- Simulation software (e-quest, Phoenix, Visio, ASHRAE etc.

Hardware

- The computers
- Handheld devices
- Drones
- Exoskeletons and robotics

Specific Requirement Architecture





- Analyze the technology from a potential users' perspective to understand what type of problem the technology solves in the current target market
- systematic search for analogous application fields for the technology
- evaluate and rank applications for commercial viability to identify application to focus on
- develop an actionable strategy to enter the market.

Specific Requirements- BIM, Blockchain & AI

Blockchain

- BigchainDB,
- Ethereum,
- Hedera Hasgragh,
- IBM blockchain platform,
- Hyperledger Iroha,
- Monero,
- Multichain,
- Neo Blockchain,
- Openchain,
- R3 Corda,
- Ripple Stella

BIM

- BIM project execution plan
- Project information
- Key project contracts
- Project goal/BIM uses
- Organisational roles/Staffing
- BIM process design
- BIM information exchanges
- BIM & facility data requirements
- Collaborative procedures
- Quality control technological infrastructures (hard * softwares)
- Model structures
- Project deliverables
- Delivery strategy/contract

Artificial Intelligence

- Big data
- AI networking.
- Artificial intelligence workloads infrastructures (CPUs & GPUs)
- Preparing AI data (Data Scrubbing)
- AI data management and governance
- AI-IoT
- AI training

Challenges & Strategies to Improving Technological Advancement among QSs

CHALLENGES AND STRATEGIES TO IMPROVING TECHNOLOGICAL ADVANCEMENT AMONG QS

QUANTITY SURVEYORS REGISTRATION BOARD OF NIGERIA

QSRBN

E.T. Momoh (FNIQS, RQS)

- **SPEAKER**

INTRODUCTION

Today, the key professional competitive advantage lies in IT.

- Many Africa Countries, particularly Nigeria, were slow in the uptake of IT in construction industries.
- However, in the recent time, there has been an upsurge in the deployment of IT utilization and development in the industry. But this are not without Challenges.

INADEQUATE TRAINING AND EDUCATION ON THE USE OF IT

- There is a knowledge-gap in terms of handling and utilization of IT tools among Quantity Surveyor.
- There is need for mandatory and continuous IT training for practitioners and students alike.

HIGH COST OF HARDWARE AND SOFTWARE.

- The high costs of procurement of both the hardware and software necessary for practice constitute a major challenge for IT deployment in QS practice in Nigeria.
- Encouraging the local production of software and hardware can help lessen the cost burden

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LIMITED LIST OF AVAILABLE SOFTWARE TO HANDLE SPECIFIC QS TASK

There is a need for continuous engagement between software developers and Quantity Surveyors in developing softwares that can handle more specific professional tasks.

RESISTANCE TO RE-ENGINEERING AND ORGANIZATIONAL CHANGE

There should be training programs geared towards educating QS professionals on new IT innovations and seamless integration to existing workspaces.

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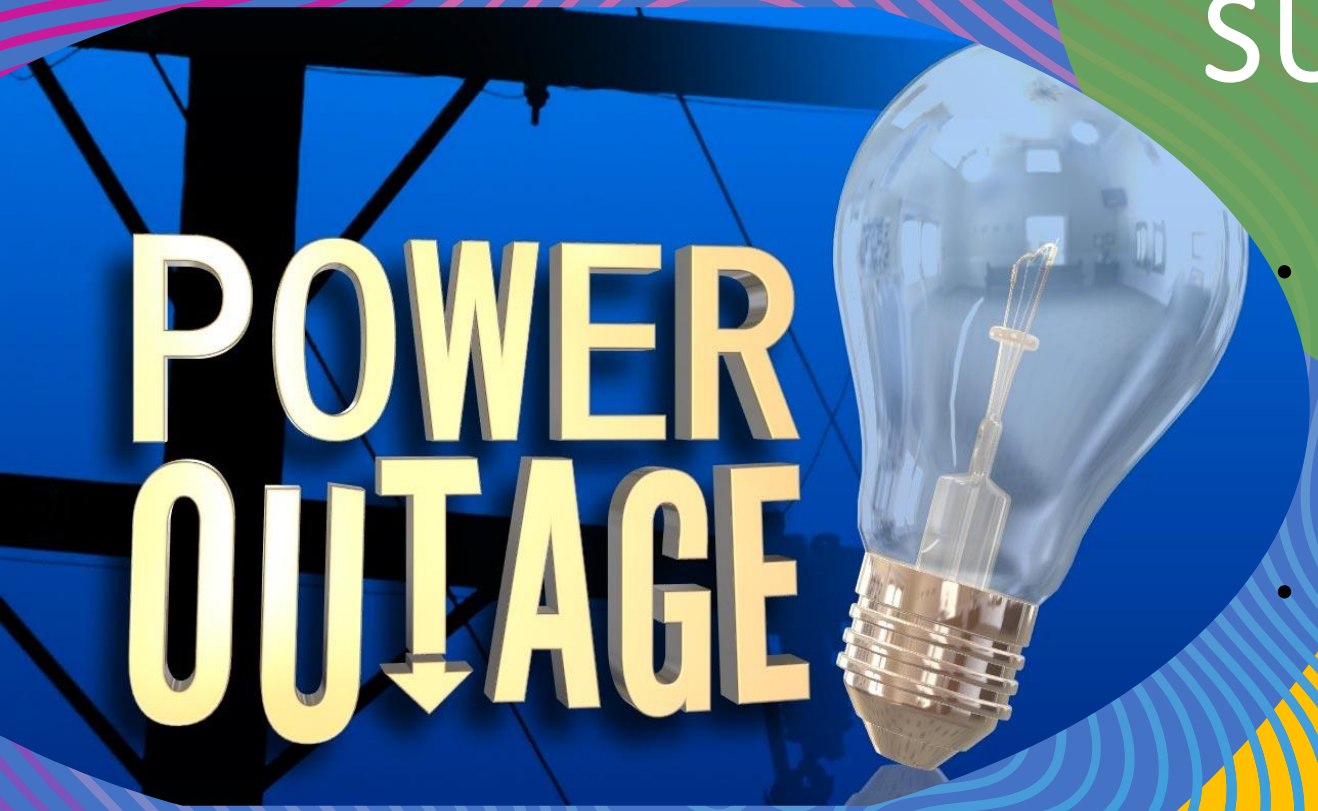
SECURITY AND PRIVACY OF DATA NOT GUARANTEED

Private data are prone to exposure because of threats from hackers, virus attacks, data theft etc. This can be mitigated through the adoption of the more secured blockchain technology.

POOR INFRASTRUCTURE AND ERRATIC POWER SUPPLY



- Erratic Power supply has made the adoption of IT innovations in professional practice less attractive among practitioners because of the unreliability of power supplies and consequently hampering their delivery efficiencies.
- Governments need to do more in terms of providing electricity and other infrastructures that could aid professional practices.

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LACK SYNERGY AMONG CONSTRUCTION PROFESSIONALS.

- Poor synergy among practitioners breeds lots of bottlenecks in the deployment of IT for providing professional solutions.
- There's need for more integration among construction professionals and in developing construction aided softwares.

•CONCLUSION

IT has widely been acknowledged as a potent tool for accelerating economic growth and thus bridging the gap between developed and developing economies. Most importantly, because of the indispensable contributions of construction industry to the development of economies, the usage of ICT in the industry is more important than ever. In a quantity surveying firm that is striving to achieve accuracy, IT usage is very imperative


Thanks
for Listening