

TERMS OF REFRENCE

FOR

CONSULTANCY SERVICES FOR DEVELOPING AN ENTERPRISE ARCHITECTURE (EA) AND DIGITAL TRANSFORMATION ROADMAP FOR KENYA RAILWAYS CORPORATION (KR)

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1. Abbreviations

No.	Term	Meaning
1.	KR	Kenya Railways Corporation
2.	GoK	Government of Kenya
3.	KUMIP	Kenya Urban Mobility Improvement Project
	NMT	non-motorized traffic
	NCR	Nairobi Commuter Rail
	NMA	Nairobi Metropolitan Area
	EA	Enterprise Architecture
	IT	Information Technology
	ICT	Information & Communication Technology
	IP	Internet Protocol
	VHF	Very high frequency
	GSM	Global System for Mobile Communications
	MPLS	Multi-Protocol Label Switching
	ATW	Automated Train Warranty System
	ERP	Enterprise Resource Planning
	SAP	Systems Applications and Products in Data
		Processing
	TOR	Terms of Reference
	PDF	Portable Document Format
	SIEM	Security information and event management
	DAM	Database Activity Monitoring
	PAM	Privileged Access Management
	TOGAF	The Open Group Architectural Framework
	FEAF	Federal Enterprise Architecture Framework
	CONSULTANT	Firm with Qualification and staffing requirements
		to carry out the project

2. <u>Background</u>

KR is a State Corporation established in 1978 pursuant to the Kenya Railways Act, Cap 397 Laws of Kenya, to provide a coordinated and integrated system of Rail and Inland Waterways Transport Services and Inland Port Services. Part of this mandate includes the development and Operation of Commuter Railway Networks in Kenya.

The World Bank in partnership with the GoK intends to finance the implementation of the KUMIP. KUMIP, as proposed is expected to improve urban mobility and land use planning through policy reforms, institutional strengthening, mass rapid transit, passenger operations, NMT and traffic management. The NCR network is identified as the backbone for Mass Rapid Transit within the NMA and KR is dedicated to improving public service delivery, increasing transparency, and enhancing efficiency across all its operations. To achieve these objectives, there is a need among others designing and implementing a comprehensive EA that supports coordination, collaboration, and the integration of ICT resources at KR, resulting in principles, methods and models that are used in the design and realisation of information systems and infrastructure.

There are a number of systems that currently support KR operations and this is categorized into 6 main categories consisting of:

- (a) **Telecommunication Systems:** These systems provide communication between moving rolling stock, control centre, yards, crew, and operation teams. They operate as standalone with no integration. Currently the voice recording for the systems is not recorded apart from the IP Radio system. Currently the fiber optic infrastructure is provisioned by third party service providers under contractual obligations with KR. The Telecommunication systems include:
 - i. Radio System that is hybrid in nature having both VHF and IP based radios. The VHF radios are legacy radios that are still in use to support communication between the operation teams. The IP Radios are used for communication as well as location tracking through the GSM network.
 - ii. Cellular Mobile is used for communication by KR teams to support Operations and Administration functions.

- iii. On board Computers in rolling stock using GSM network to get track occupation license, communicate between rolling stock and Operation Control Centre/ Yards.
- iv. Fiber Optic Infrastructure The infrastructure supports data and IP voice communication across the network. The infrastructure is provided by third party Telco service providers on contractual basis, with the network being a MPLS network.
- (b) **Process Control Systems** Supports safe rail operation through centralized control & supervision of train operation, with safe crossing and stoppages. This includes:
 - i. Traffic control system the system currently supporting traffic control is a proprietary system called Automated Train Warranty System (ATW). This system is not integrated to the ERP, Ticketing and Passenger Information system, thereby not enabling required real time information relay across the systems.
 - ii. Interlocking system enables trains to be directed from one track to another and prevent conflicting movement, by ensuring a train stops, proceeds or is received in an open line. Currently KR has installed self normalizing switches that are operated by rolling stock wheels (hydraulic track components installed at the switches and operated by rolling stock wheels). The ATW system has a speed restriction module that communicates section speeds through onboard computers.
 - iii. Signalling system there exists no signalling system and currently in use are onboard computers installed in Locomotives and supported by ATW system. This uses GSM network for location tracking and communication with Control and Yards.
 - iv. Level crossing system The level crossings in KR network are not automated, with a few of the crossings having mechanically operated barriers. This system is critical for safe crossing of rolling stock at road intersections.
- (c) **Operational Systems**: Ensures efficient and effective rail operations through:

- i. Service scheduling system The ATW system has a planning module that manages the timetabling of train service. Crew planning is not automated and is manually carried out.
- ii. Fare collection system There exists 2 distinct fare collection systems that are not integrated and operate in silos. The system covers Commuter fare collection and Parking fee collection at designated stations through the use of point-ofsale computers. To compliment this, handheld devices are used for fare collection especially at halts where there are no formal stations and for on boarded passengers without tickets. The mode of payment for the fares are mainly cash and mobile money transactions.
- iii. Passenger Information system this offers static information display to rail service customers at various stations. The system is not integrated to the Traffic control system for seamless relay of train movement information.
- iv. Integrated Security Management System that enables monitoring of activities along rail corridor There is no automation.
- (d) *Management Systems:* Assists KR make informed decisions, with improved employee productivity and increased customer satisfaction.
 - i. KR has implemented SAP ERP that covers the Finance & Control, Material Management, Human Capital Management, Sales & Distribution, Project Systems, Production Planning & Quality Management functions. There are areas that are not covered by the ERP and is expected to be rolled out. This includes Real Estate, Customer Relationship Management, eProcurement modules.
 - ii. KR has rolled out a Contact Centre System that handles all queries from KR customers. The system is however not integrated to Operation and Process Control systems for seamless information exchange.
- (e) *Planning Systems:* Are used to plan/carry out maintenance, repairs and ensure material/service forecasting for rail assets.
 - i. Asset Management System there exists no automation of asset management and management of assets is recorded in

Microsoft excel and is not integrated to the Material Management Module for material availability.

- ii. Fuel Management System Fuel Management is currently recorded on manual sheets, with no automation for the same. There is no integration to assets management and Traffic Management system for information exchange and seamless verification
- iii. Track Management System There exists no track management system, and track management is done through manual inspection of the track and manual allocation of materials required thereof.
 - Incident Management System Incident Management is currently not automated, with incidences being captured in Microsoft excel. There is no integration to Asset Management system.
- (f) **Business Intelligence and Reporting Systems**: provide statistics from all systems named above. There exists several systems rolled out and most are not integrated, thereby having each system producing standalone reports, with no cross system information exchange for holistic reporting.

As part of the project preparation of the KUMIP, the KR intends to engage a consultant to develop roadmap and set of recommendations for an EA for KR. Implementation of roadmap is anticipated to be an activity under the KUMIP. The purpose of this assignment as outlined in the Term of Reference (TOR) is to outline the scope, responsibilities, and requirements for engaging a consultant to create and define an EA for KR. This EA will serve as the foundation for KR digital transformation journey, enabling improved service delivery, greater accountability, and more effective use of resources. The selected consultant will be expected to demonstrate in detail the existing experience and how they intend to accomplish the set objectives under defined scope for the following key areas, that are critical to KR operations:

- a) Fare Collection System
- b) Railway Specific Systems
- c) ICT Systems Security and Project Management

This should be detailed while focusing on *KR* current scenario that has:

a) Standalone Legacy systems

- b) Manual processes
- c) Lack of Interoperability and Integration
- d) Lack of standards
- e) Diverse stakeholders

3. Objectives

The objective of the assignment is to develop an Enterprise architecture (EA) for operations at KR with due attention to maturing the EA practice, attaining the right balance between efficiency and business innovation aligned with the overall KR strategy, international policies, standards, and best practices, as well as a clear roadmap for digital transformation which is expected to provide a digital transformation vision, a comprehensive analysis of existing and desired architecture, and identification of possible future digital solutions while serving as the foundation for KR transformation to build its digital capacity and capability as it ensures scalability, interoperability, data integration and high availability.

The specific objectives of the EA will be to:

- a) Carry out a comprehensive analysis of existing systems and establish a target state EA.
- b) Identify possible future digital solutions across KR.
- c) Establish a clear and comprehensive framework for the integration of ICT systems and processes across KR.
- d) Promote interoperability, ensure scalability, data integration, standardization, and the sharing of resources to reduce duplication and improve efficiency with the required data security.
- e) Enable data-driven decision-making and enhance the Government's ability to deliver high-quality services to its citizens.

4. Scope of Work

The selected Consultant will be responsible for the following tasks:

4.1 Task 1: Conduct a comprehensive assessment of the current ICT landscape within KR, including current state assessment and gap analysis of existing systems, infrastructure, standards and policies.

The Consultant will focus on conducting assessment of the current ICT landscape through documentation, process, infrastructure review as well as interviews with key stakeholders. The assessment will cover the existing:

- 1. KR structure & governance, business strategy, processes, functions and goals and information needed to support the business.
- 2. The Software applications and services used at KR and the flow of data/information thereof.
- 3. The hardware, network and ICT infrastructure that support KR business.
- 4. The security policies and procedures that are used to protect the existing business and ICT landscape.

This will aid in the development of a contextual understanding of the business processes and level of automation thereof as well as aid in developing a fit/gap analysis of digitalization against the reviewed processes, applications, infrastructure etc. while ensuring a full organization-wide overview. The assessment will facilitate identification of key champions, their roles and responsibilities and key points and stages of engagement within the project.

Task 1 Output

An inception report shall be prepared within week three (3) from contract signing, outlining the status findings of the assessment, issues, challenges, risks identified, as well as highlighting opportunities within the existing landscape.

4.2 Task 2: Define EA governance, develop and map out the EA governance in alignment to KR's organization structure and decision-making process, KR' strategic objective and policies, and international standards and best practices.

Following the assessment, the Consultant shall define EA governance that outline the structure that will ensure success of the EA initiative at KR and

deliver business value. This will outline the teams to provide the vision and direction for the EA initiative, with alignment to KR organization structure and decision making process. The consultant will define the scope of the EA governance while aligning the same to KR Business Strategy and objectives. The consultant will review KR internal skills and give the skill requirement and talent required to facilitate successful EA function. The consultant will define and develop well defined processes for successful EA governance, while aligning the processes with KR business strategy and objectives.

Task 2 Outputs.

The Consultant shall provide to KRC the following:

- Detailed work plan towards developing digital Road Map and EA for KR, outlining constraints and assumptions within week six (6) from contract signing
- EA Governance structure
- Scope of EA governance
- Skills and talents required for successful EA function, while detailing the skill gap analysis at KR.
- Well defined processes for EA governance aligned to KR business strategy and objectives.

4.3 Task 3: Define the EA's components, including its principles and link the same to current KR status

The Consultant will define the EA's components and principles and having done the assessment link the same to current KR status. The Consultant will map this structure, model the business capabilities and identify opportunities for optimization. The Consultant will standardize ICT processes and make recommendations on ICT infrastructure reorganization to enable alignment with business objectives and goals. The Consultant will document the current IT assets and business processes that will transition to KR desired "future state" that supports KR business overarching goals.

Task 3 Output

First progress report within week nine (9) from contract signing, the Consultant will give a report detailing the following:

- Status of activities outlined in detailed work plan highlighting risks/items that require KR management attention, as well as a report detailing the existing;
- **Business Architecture:** outlining KR Business Strategy, processes, governance detailing how KR business operates and uses the business processes, and the interaction between the processes and the various business functions, while indicating the information needed to support the business.
- **Application Architecture**: outlining the software applications and services that support the business.
- Information/ Data Architecture: outlining the logical and physical data assets and the data management resources at KR.
- **Technology Architecture**: outlining the hardware farm, network and infrastructure of KR.
- **Security Architecture**: outlining the security policies, procedures and solutions used to protect the enterprise.
- Integration Architecture: outlining the relationships between the different architecture components, while giving the systems/ applications and their relationship to core business processes.

4.4 Task 4: Develop KR EA model (framework) that aligns with international best practices, Rail industry standards, KR's Strategic Objective, Kenya Digital Master Plan and Commuter Master Plan.

The Consultant will review KR Strategic Plan, Kenya Digital Master Plan and Commuter Master Plan and define the EA components and structure that will cover KR business, information and technology and how each component will work together to support the other components and the overall architecture of the enterprise to achieve the overall desired goal. The framework will document the recommended architecture that will transition to KR desired "future state" that supports KR business overarching goals.

Task 4 Output

Second progress report within week twelve (12) from contract signing, the Consultant will give a report detailing the following:

• Status of activities outlined in detailed work plan highlighting risks/items that require KR management attention,

- Report detailing the desired "future state" and how all the EA components will work together, while making critical interdependencies visible for;
 - Business Architecture
 - Application Architecture
 - Information/ Data Architecture
 - Technology Architecture
 - Security Architecture
 - Integration Architecture

4.5 Task 5: Develop a roadmap and blueprint for the implementation of the EA, identifying key milestones, potential challenges and investment interventions required to achieve the digital intervention envisaged while giving reference architectures and design patterns

The Consultant will give a report detailing KR digitization position focusing on process optimization, business efficiency, improved customer experience and employee empowerment. The report is to detail proposed system architecture and give reference architectures and design patterns. The Consultant will develop a roadmap and blueprint for implementation of EA.

Task 5 Output

Within week sixteen (16) from contract signing the Consultant will give;

- Road Map and Blue print for implementing EA
- Report on Digitalization position of KR in relation to process optimization, business efficiency, improved customer experience and employee empowerment
- Report on proposed system architecture.
- Governance framework and Capacity building plan.

4.6 Task 6: Develop/Create guidelines and templates for the EA, enabling KR to adopt and implement the architecture effectively.

The Consultant will develop/create guidelines and templates for the EA implementation, that will be used to roll out and implement the EA

Task 6 Output

Within week sixteen (16) from contract signing the Consultant will submit;

• Initial Draft report of EA and digital transformation roadmap for KR.

4.7 Task 7: Organize and hold Stakeholder workshop for all key stakeholders to review and give input to EA and digital transformation draft report.

The Consultant will organize and spearhead a stakeholder workshop, that will review the initial Draft report of EA and digital transformation roadmap for KR. This will shape plans collaboratively and get the stakeholder input to the same. The Stakeholder workshop will ensure participation of all spheres required to ensure the success of the EA.

Task 7 Output

Within week eighteen (18) from contract signing the Consultant will submit;

- Report detailing the findings from the Stakeholder workshop, that will include stakeholder feedback and comment on the draft report of EA.
- Matrix with gaps, improvement and new areas gathered from the stakeholders and the consultant feedback on each and how the same will be plugged within the draft report.

4.8 Task 8: Carry out capacity building of KR staff to ensure continuity and future modification of the EA to align with scalability and technology change requirements in the future.

The Consultant shall prepare and implement a robust capacity building and Change Management program from onset of the project. This will include sensitization workshops for relevant stakeholders that will ensure understanding and smooth transition with complete adoption to the new EA and Digital Transformation Road Map. The Consultant will be required build capacity, train and transfer technology program to KR teams. Key function for capacity building on EA include but not limited to;

- Six (6) KR ICT officers to enable application of the proposed EA Blueprint, reference Architecture and design patterns by the team.
- Four (4) Staff in Passenger Operations Function
- Six (6) Staff in Train Operations Function
- Twelve (12) Staff in Engineering Function (Civil, Mechanical, Electrical & Signaling)

• Two (2) Staff in the Business process re-engineering function

Task 8 Output

- Robust Capacity building and Change Management program
- Within week twenty (20) from contract signing the Consultant will carry out training for key identified functions.
- 4.9 Task 9: Develop an implementation transition Plan for EA in line with EA findings and a roadmap to achieve the future state digital transformation, while detailing tools to be used to monitor and adjust the same.

The Consultant is expected to give a final report on EA and Digital Transformation Road Map for KR. The report will detail *KR* digitalization roadmap that will focus on process optimization, improved customer experience, employee empowerment and provide detailed Architecture components, Blueprints, Reference Architectures and Design Patterns; Governance Framework and Structure and Capacity building / change management plans. Technical standards that will guide Design and Specification documents with a focus on "future state" desired.

Task 9 Output

- Final Report on EA and Digital Transformation Road Map for KR.
- Road Map for future state digital transformation and recommendations to changes and updates to business processes and technology.

5. Contract Administration and Management

The Consultant will work with *KR* ICT Manager who shall be the key contact person for this assignment.

5.1 Facilities and support to be provided by KR

KR will provide liaison with KR Functional Business Leads, and other key stakeholders (both internal & external).

The client will make available the documents at KR relevant to the assignment where necessary and may facilitate obtaining documents outside KR.

KR will provide a Project Office that will accommodate the Consultants and provision for a meeting room that has internet and network connectivity.

5.2 Facilities to be provided by the Consultant

The Consultant shall be responsible for arranging all necessary living accommodation and transportation for its staff and operations. The Consultant shall be responsible for arranging all necessary office equipment and relevant software and any other technical requirements for the assignment.

6. <u>Reporting requirements, timelines for deliverables, and payment</u> <u>schedule</u>

6.1 The selected Consultant is expected to deliver the following outputs:

- a) An inception report is expected to be submitted three (3) weeks after commencement of work. The report to outline findings detailing opportunities, issues and challenges identified in the ICT landscape.
- b) A detailed work plan is expected to be submitted six (6) weeks after commencement of work. This will be a detailed work plan towards developing a Digital roadmap and Enterprise Architecture for *KR* and clearly outline constraints and assumptions
- c) Progress reports two (2) to be submitted nine (9) weeks and twelve (12) weeks after commencement of work. The Progress reports are to report on the status of activities outlined in the detailed work plan and highlight any items/risks that require attention of *KR* management.
- d) Submit initial draft report of the *KR* EA structure and Digital Roadmap to management of *KR*, sixteen (16) weeks after commencement of work. The EA blueprint should cover Architecture domains (business, data, application, and Technology Domains).

The EA blueprint will include the following:

- i. Guidelines for defining, designing, developing, and utilizing ICT EA Framework.
- ii. Business Architecture

- iii. Integration Architecture
- iv. Information/ Data Architecture
- v. Infrastructure Architecture
- vi. Technology Architecture
- vii. Security Architecture
- viii. Creation of Enterprise Meta-model
- e) The initial draft report to be subjected to stakeholder's review through a stakeholder workshop eighteen week (18) after commencement of the project,
- f) A detailed assessment report of the current ICT landscape within KR.
- g) Submit final *KR* EA structure (detailed) and Digital Roadmap report, twenty-four (24) weeks after commencement of work.
- h) A comprehensive EA framework, including principles, governance structure, and technical architecture.
- i) A roadmap for the implementation of the EA, with clearly defined milestones and potential challenges.
- j) Guidelines and templates for the EA, enabling KR to adopt and implement the architecture effectively. While ensuring interoperability with other agencies.
- k) Build KR's institutional capacity in EA outcomes. Specifically, the consultant will conduct the following to ensure KR internal capacity is adequate by;
 - i. Develop draft work descriptions of key *KR* ICT personnel for coordination, design, development, introduction, and operations of new ICT systems.
 - ii. Propose an ICT leadership training program for at least two (2) ICT Officers that will support the implementation of the proposed solutions.
 - iii. Knowledge transfer and training to ICT leadership to ensure future adjustment and review of the proposed EA can be handled internally.
 - iv. Training and capacity building on EA of
 - Six (6) KR ICT officers to enable application of the proposed EA Blueprint, reference Architecture and design patterns by the team.
 - Four (4) Staff in Passenger Operations Function
 - Six (6) Staff in Train Operations Function
 - Twelve (12) Staff in Engineering Function (Civil, Mechanical, Electrical & Signaling)

- Two (2) Staff in the Business process re-engineering function
- v. Delivery of all the editable versions of all documents delivered to *KR* and training of the *KR* officers on the use of any special editing tool used in the development of the documents.
- I) Submit required reports in the format outlined below:
 - i. One signed Hard copy report
 - ii. One PDF version soft copy report
 - iii. One editable version soft copy report

6.2 The Deliverables and corresponding output requirements and payment schedule are as tabulated in Table below:

Deliverables/Milestones	Due Date from the commencement of work	Output Requirements	Payment Schedule
Stakeholder consultations, interviews, desk reviews and field visits whenever necessary and delivery of Inception Report	Week 3	The report to outline findings detailing opportunities, issues and challenges identified in the ICT landscape.	5%
Detailed work plan	Week 6	detailed work plan towards developing a Digital roadmap and Enterprise Architecture for <i>KR</i> and clearly outline constraints and assumptions	10%
Submit first progress report	Week 9	The Progress reports are to report on the status of activities outlined in the detailed work plan and highlight any items/risks that require attention of <i>KR</i> management. The report to detail existing Business, Application, Information/Data, Security and Integration architecture	
Submit Second progress report	Week 12	Status of activities outlined in detailed work plan highlighting risks/items that require KR management attention, Report detailing the desired "future state" and how all the EA components will work together, while making critical	15%

		interdependencies visible for;	
		 Business Architecture Application Architecture Information/ Data Architecture Technology Architecture Security Architecture Integration Architecture 	
Submit initial draft (complete version) of EA and Digital transformation Roadmap	Week 16	focusing on process optimization focusing on process optimization, customer experience and employee empowerment and highlight proposed Systems Architecture, Blueprints, Reference Architectures and Design Patterns; Governance Framework and Structure and Capacity building plans	30%
Stakeholder Workshop	Week 18	Stakeholder workshop to get feedback & comment on Draft report	
Capacity Building	Week 20	 Capacity building on EA include but not limited to; Six (6) KR ICT officers to enable application of the proposed EA Blueprint, reference Architecture and design patterns by the team. Four (4) Staff in Passenger Operations Function Six (6) Staff in Train Operations Function Twelve (12) Staff in Engineering Function (Civil, Mechanical, Electrical & Signaling) Two (2) Staff in the Business process re-engineering function 	
Submit Final version of the Digital transformation Roadmap	Week 24	Report detailing <i>KR</i> digitalization roadmap focusing on process optimization, customer experience, employee empowerment and provide detailed Systems Architecture, Blueprints, Reference Architectures and Design	40%

Patterns; Governance Framework and Structure and Capacity building plans. Technical Design and Specification documents that will talk to standards while detailing integration/interoperability and
change management aspects.

6.3 CONSULTANT QUALIFICATIONS & STAFFING REQUIREMENTS

The Consultant is required to demonstrate in detail the existing experience and how they intend to accomplish the set objectives under defined scope for the following key areas, that are critical to *KR* operations:

- a) Fare Collection System
- b) Railway Specific Systems
- c) ICT Systems Security and Project Management

The selected consultant must have key staff who possess the following qualifications and experience:

Staff	Qualifications
Team Leader	 Education: Master's degree in Computer Science/IT, Management/Engineering or equivalent working experience. Experience: Experience in Railway Related Field: At least Fifteen (15) years relevant experience and 10 years' railway related specific experience. At least two (2) experiences in leading a consultancy team in carrying out a EA study. At least ten (10) years of relevant experience in enterprise architecture, with a focus on government or public sector projects. Experience of IT EA including the development of, and adherence to, architecture principles and standards. Knowledge of international best practices and standards in the field of EA, such as TOGAF (The Open Group Architectural Framework), FEAF (Federal Enterprise Architecture Framework), or similar frameworks. Experience of IT strategy and Government formulation, Standards, Procedures and Policies formulation.
	Business domains.

All Key staff should be fluent in communicating in English (writing and speaking)

	 Demonstrable knowledge of architecture governance using EA artifacts including principles, policies, views, viewpoints and building blocks. Professional Registration Must be Professionally Chartered / Registered. The registration body must be Internationally recognized
Fare Collection System Expert	 Education: Master's degree in Computer Science/IT, Management/Engineering or equivalent working experience. Experience: Must possess practical sound knowledge of railway Fare Collection systems covering the entire life cycle, with a good grasp of the systems aspects of operation and development. At least two (2) projects on Rail Fare collection design and rollout. Experience in risk assessment and management across both IT and Business domains. Proven minimum 8 years of work experience in Enterprise Architecture design. Experience of IT architecture including the development of, and
	 Experience of Ar architecture including the development of, and adherence to, architecture principles and standards. Demonstrable knowledge of architecture governance using enterprise architecture artifacts including principles, policies, views, viewpoints and building blocks. Professional Registration Must be a Professionally Chartered / Registered The registration body must be internationally recognised.
Rail Operation System Expert	 Education: Bachelor in Electrical and Communications Engineering, Electrical and Telecommunications Engineering or Mechatronics Engineering or equivalent working experience. Experience: Must possess practical sound knowledge of railway management systems covering the entire life cycle, with a good grasp of the engineering/systems aspects of operational and development of railway management systems: Ten (10) years or more Experience of IT architecture including the development of, and adherence to, architecture principles and standards. Experience of IT strategy and formulation of Standards, Procedures and Policies formulation. Experience in risk assessment and management across both IT and Business domains.

	Professional Registration		
	 Must be Professionally Chartered / Registered Engineer. 		
	The registration body must be internationally recognised.		
ICT Security Expert	 Education: A Bachelor's degree in systems engineering, computer science, 		
	or a related subject.		
	Experience:		
	• Five years of professional experience in forensics, incident detection and response, and other cybersecurity-related tasks.		
	 Knowledge of Networking, System Administration, Operating Systems and Virtual Machines. 		
	 Knowledge and experience of Network Security Control 		
	 Deep knowledge of operating systems and virtual Machines 		
	Experience in Cloud Security		
	 Knowledge and/or experience in Artificial Intelligence, Block Chain Technology and Green Data Centre. 		
	 Knowledgeable in Security systems – SIEM, DAM, PAM 		
	Professional Registration		
	Must be Security Certified expert		
	 Must be Professionally Chartered / Registered 		
	• The registration body must be internationally recognised.		

7. Duration

The assignment is a fixed price contract and the duration for the project shall be 26 weeks as detailed in proposed work schedule.