Description of Request	Turnkey solution for Power System Simulation Tool (PSST) and Protection Settings Management Tool (PSMT) Project = PSSA solution

1. High level background

Eskom Generation (Gx), Distribution (Dx) and National Transmission Company of South Africa (NTCSA) end users make use of Power System Simulations Application (PSSA) for performing the following functions, network optimization analysis, network planning, network design and protection settings calculations. PSSA comprises of capabilities of the legacy systems Power System Simulation Tool (PSST) and Protection Settings Management Tool (PSMT). **PSSA = PSST+PSMT** is a computer software system that consists of functional modules for protection relay settings management, and the studies of power system transmission networks, generation performance and reticulation (also referred to as distribution). Such a system normally caters for power flow, fault analysis (balanced and unbalanced), network equivalent construction dynamic simulation, and serves as a protection settings life cycle management and settings database.

In Dx the tools are used in the Planning department, in NTCSA they are used in System Operator & Operational Performance and in Gx they are used in Engineering Electrical department. Network planning, design, settings and optimization engineers will make use of PSAA to perform various analysis functions. The analysis results will be used to initiate and support proposed network projects and optimization changes to the network configuration, to provide a capable network and ensure integrity of power system operations.

Any reference to “Tx” may be interchanged with NTCSA (National Transmission Company of South Africa)

2. Scope of work/Business requirements

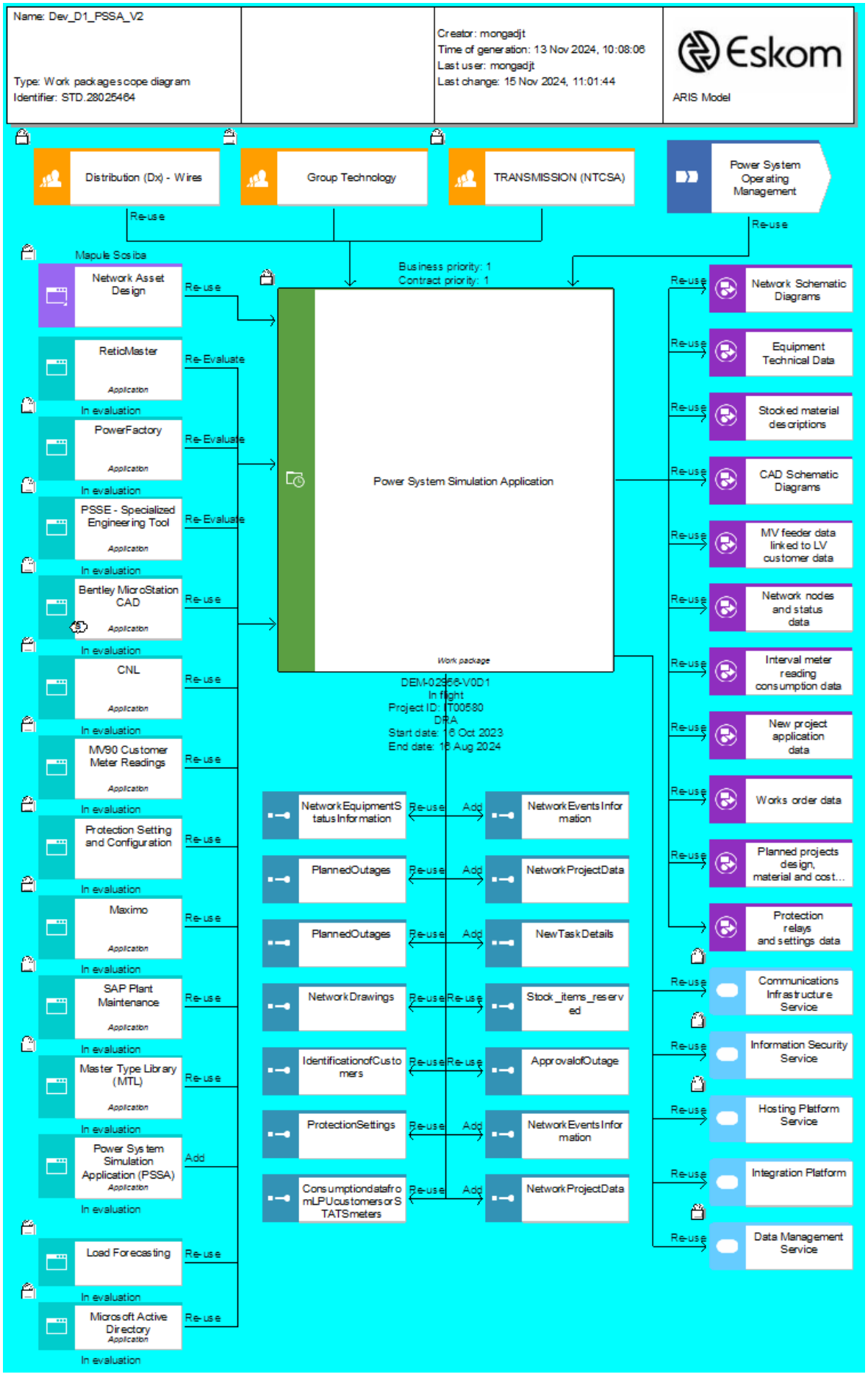
The following requirements should be provided for, in the breakdown or decomposition of the functionalities of the PSSA. The bidders should provide the high-level solution architecture diagram with descriptions and meet the business requirements as listed in the scope document. The bidders should provide cost decomposition as per the pricing schedule template, also provide an implementation approach and timelines (Timelines must be in MS Projects/Excel and PDF). The services required includes providing software licenses (perpetual licenses), design, installation, configure, testing, migration, and Support / Maintenance. The software to be implemented on Eskom’s infrastructure.

For all selected vendors a further demonstration of the solution will be required which will need to align to the use-cases or customer-journeys as per the business requirements. The demonstrated solution should not be any alpha or beta versions but must be an officially released stable version. The solution can include Free and Open Source (FOSS) products.
The technology changes will be covered in the contract, this also includes scalability of data usage, future cloud migration and any platform changes. The bidders should provide a 5 – 10-year technology roadmap of their system.

2.1. Scope Diagram

The work package scope provides the high-level target architecture components that are expected to be impacted by the architecture engagement. It links the work package to the relevant business, information, application, and technology components that may be impacted:

- Add: New component to be added to the target architecture.
- Remove: Existing component to be removed from the target architecture.
- Change: Existing component to be modified in the target architecture.
- Re-use: Existing component to be re-used in its current format in the target architecture.


Name: Dev_D1_PSSA_V2
Type: Work package scope diagram
Identifier: STD.28025464
Creator: mongadjt
Time of generation: 13 Nov 2024, 10:08:06
Last user: mongadjt
Last change: 15 Nov 2024, 11:01:44
ARIS Model
Distribution (Dx) - Wires
Group Technology
TRANSMISSION (NTCSA)
Power System Operating Management
Re-use
Mapula Sosiba
Business priority: 1
Contract priority: 1
Network Asset Design
ReticMaster
Application
In evaluation
PowerFactory
PSSE - Specialized Engineering Tool
Bentley MicroStation CAD
CNL
MV90 Customer Meter Readings
Protection Setting and Configuration
Maximo
SAP Plant Maintenance
Master Type Library (MTL)
Power System Simulation Application (PSSA)
Load Forecasting
Microsoft Active Directory
Re-Evaluate
Add
Power System Simulation Application
Work package
DEM-02956-V0D1
In flight
Project ID: IT00580
D#A
Start date: 16 Oct 2023
End date: 16 Aug 2024
Network Equipment Status Information
Planned Outages
Network Drawings
Identification of Customers
Protection Settings
Consumption data from LPU customers or STATS meters
Network Events Information
Network Project Data
New Task Details
Stock_items_reserved
Approval of Outage
Network Schematic Diagrams
Equipment Technical Data
Stocked material descriptions
CAD Schematic Diagrams
MV feeder data linked to LV customer data
Network nodes and status data
Interval meter reading consumption data
New project application data
Works order data
Planned projects design, material and cost...
Protection relays and settings data
Communications Infrastructure Service
Information Security Service
Hosting Platform Service
Integration Platform
Data Management Service

2.2. Power System Simulation Tool (PSST) Functionality High Level Business requirements

Eskom as a vertically integrated Utility owns and operates the entire power system domain, and accordingly generates, transmits, and distributes its product to the end customer. To convey the electricity to its end users, the utility requires adequate tools and systems to ensure that all elements associated with the associated value chain and the asset management thereof, are adequately covered. PSST require tools for a wide range of network planning and operational studies, from small micro-grids to large transmission and distribution networks, including High Voltage Direct Current (HVDC) and renewable technologies.

The PSST functionality is thus crucial for Planners, Designers and Network Operations Engineers to understand and simulate the expected power system behaviour, under a variety of conditions and layouts. The risk associated by not using these tools could lead to poor investment decisions, compromising the power system stability (which may lead to a black out), and impacting the operational safety of the plant, operators, and the members of the public.

Electrical power system simulation involves power system modelling and network simulation to analyse electrical power systems using design/offline or real-time data. Power system simulation software is a class of computer Electrical power system simulation involves power system modelling and network simulation to analyse electrical power systems using design/offline or real-time data. Power system simulation software is a class of computer simulation program that focuses on the operation of electrical power systems.

These types of tools are used in Eskom for a wide range of planning and operational situations and include:

- Long-term generation, transmission, and distribution expansion planning
- Short-term operational simulations

Key elements of power systems that are modelled include, amongst others:

- Load flow (Power Flow studies)
- Short circuit or fault analysis
- Protective device coordination, discrimination, or selectivity
- Transient or dynamic stability
- Harmonic or power quality analysis
- Frequency response analysis
- Reliability analysis
- Optimal power flow
- Contingency analysis
- PV Curves Analysis
- QV Curves Analysis
- Power Transfer Distribution Factors
- Transfer Capacity Analysis
- Flow Decomposition

-

Several disruptive elements have also become part of the power system landscape in recent years. Energy efficiency measures, the introduction of Distributed Generation, the advent of Electric Vehicles, and Energy Storage devices have introduced increased bi-directional flow of electricity on the networks. And the need for accurate and extensive network models, fast computing times and easy analysis and reporting (result reporting) has become key to the choice of power system software to be used.

The next sections provide the high-level requirements.

2.2.1 Common requirements for a PSSA tool.

Any power system simulation and analysis software need to be capable of working and be compatible with existing hardware and operating systems. There should be no need for special operating platforms. The PSSA software should

- Be fully Windows compatible and support Windows Server 2019 upwards, Windows 10 operating systems upwards (preferably Windows 11 for support considerations from Microsoft).
- Be able to run on virtual servers environment, without hypervisor restrictions.
- Integrate with other applications and should be 32 bits and 64 bits compliant.
- Support a centralized and de-centralised licensing system to allow access to the software license via Local Area Network (LAN).
- Can check out a license from the network for a limited amount of time to work out of the office (off-line capability).
- The licensing model should allow for use of licenses in the different Eskom environments (QA, PROD, DR).
- The license model should be flexible for usage in preparation of Eskom business separation.
- Enterprise license for about +- 350 users), preference is perpetual licenses)
- Support a hot-standby license server in case of main license server failure with automatic fail over capability.
- Incorporate a disaster recover mechanism.
- Have full functional integration for all power system applications i.e., Transmission, Distribution, Generation, renewables, smart grids, storage etc.
- Provide an Integrated Online User Manual with tutorials and guides to use the functionality.
- Make provision for detailed technical references for models. Explanations for model use and related signals and parameters should accompany this requirement and include a programmer’s reference for scripting.
- Have the Bi-directional ability to exchange data with other systems / 3rd party systems to enable adequate import and export of data.
- Provide a graphical user interface.
- Can model networks utilizing different views i.e., detailed breaker & node representation, simplified single line diagrams and represent these geographically.
- Have a capability for visualization of results in a geo-spatial format.
- Have automation capabilities (scripting/coding for internal and external user defined functions, applications, control, and reporting)

2.2.2 High Level Generation Requirements:

The generation of power lies at the heart of the power system. The efficient, reliable, and stable operation of generators and independent power producers are key to the overall functioning of the power system. The PSSA tool must be able to.

- Support various types of generators (steam, gas, Diesel, hydro) and their control systems governors, automatic voltage regulators (AVRs) and Power System Stabilisers (PSSs) IEEE / International Electrotechnical Commission (IEC) specification to be added.
- AVR control system supporting.
    - Q Mode
    - V mode and
    - Cosphi mode, analysis.
- Voltage dependent Power Quality (PQ) capability curves for synchronous and non-synchronous based generators
- Models of motors, protection relays, power electronic converters and Direct Current (DC) equipment with the power station to model effect operation of the power stations.
- Calculation of short-circuit currents for protection and switchgear rating.
    - in AC grids according to IEC 60909 (VDE 0102, incl. 2016 edition) and American National Standards Institute (ANSI)
    - in DC auxiliary supply grids according to IEC 61660 and ANSI/IEEE 946
- Support Stability (RMS) and Electromagnetic Transients (EMT) simulations to analyse IEEE / IEC specification to be added.
    - Behaviour during short-circuit and load changes.
    - Frequency control
    - Transient stability
    - Sub-synchronous resonances
    - Transformer inrush
- Model frequency response and frequency domain analysis (Bode and Nyquist Diagrams)
- Interface for real-time measurement data systems, if required for state estimation and data imports.
- Include probabilistic simulation techniques for power system generation adequacy evaluation.
- Perform system parameter identification for controllers (on measured data)
- ARC flash hazard calculations to IEEE 1584

1. 2.2.3 High level NTCSA Requirements

The transmission network is the backbone of the power system. The ability to effectively transport power from the larger Power Stations and Distributed IPP Generators to the load centres is the responsibility of the transmission system operator. The displacement of less flexible base-load generation by asynchronous wind and solar power generators imposes new challenges on the ability of the grid to maintain system stability. PSSA tools used for transmission network analysis must have the ability to.

- Simulate AC and DC networks and have the capability to simulate HVDC stability studies.
- Simulate various converter-based types of generation and controllers (SVC, FACTS, and Statcoms etc.) in line with IEEE specifications.
- Detailed modelling of transmission lines, using tower geometry and conductor design information. This should include the ability to model line couplings and places where single-circuit lines merge to double-circuit structures and diverge back again.
- Power quality filters
- Provide a capability for automated and parallel grid safety analysis and outage planning.
- Detailed protection models, notably for distance protection schemes
- Optimal dispatch (real and reactive power)
- Have a flexible scripting capability to enable smooth integration with existing tools and systems.
- Spatially represent outcomes.
- Simulate market conditions for grid and network security measures,
- Support Python based scripts to allow automation of analysis functions.

2. **2.2.4 High level Distribution Specific Requirements**

Distribution networks form the bulk of Eskom's networks hence the power system simulation tool must have no limitation on the size of the network that can be modelled and the detail of the model. New challenges like reverse power flow and voltage rise through distributed generation, as well as the integration of E-mobility, give rise to increased complexity in planning and operating distribution networks. This leads to a greater need for network optimisation together with higher complexity. Furthermore, the ability to model multiple power sources on feeders is critical to fully study the impact of embedded generation. Feeders must be able to be modelled both in radial and meshed formats.

Due to the complexity of the distribution networks, the ability to interface with current Eskom data write-out tools from NIS is of critical importance and must be fully supported by the PSSA (i.e. GIS interfacing). Furthermore, the capability for interactive GIS diagrams and single line diagrams, with flexible layers and background maps is required. The ability to easily interface with measurement systems and data is required to study complex network loading problems. The simulation tool must also support host capacity calculations, normally open point optimization calculations, voltage profiles and phase balancing. With the introduction of storage to Eskom networks, the ability of the simulation software to perform quasi-static (dynamic) calculation is critical. Quasi-static calculations are also essential for energy assessments. At present these assessments are limited to loss energy calculations but will soon extend to DSO activities involving assessments to inform energy trading in flexible markets. Eskom utilise reliability-based planning techniques of the distribution network a reliability analysis capability is required with the PSSA. Reliability, Power Quality and Protection functionality are also crucial tools for distribution engineers and the simulation tool must fully support these functions. Eskom's Distribution Network Planners require a PSSA that models future networks on the same platform as existing networks with the flexibility to switch in and out future networks base on scheduled changes in the project delivery environment. This

functionality is critical to keep pace the constant changes that face a large utility with more than a 1000 capital projects that influence the Power System.

Distribution data systems are extensive and the ability of the simulation software to interface with other system is an important feature that must be supported. The simulation software, if required, must be able to operate in an engine mode, so that it can be accessed by 3rd party systems. These must at least be via Application Programming Interface (API) or Python scripts.
Due to the size and depth of interconnected networks modelled in distribution, the simulation software must be capable of maximizing the usage of computing resources (cater for parallel computation etc.) to ensure that simulations (quasi-dynamic, reliability etc.) run efficiently.
Going forward Eskom are investigating the use of probabilistic planning techniques to further analyse and plan distribution networks. The simulation tool must support such probabilistic calculations / functions.

According to the requestor the high-level requirements support the following strategic intent statements:

Provide reliable, predictable, sustainable, and affordable electricity in line with the approvals and regulatory model by NERSA.

- Provide reliable supply options in line with Grid Code requirements

2.3. Protection Settings Management Tool (PSMT) Functionality High Level Requirements.

The solution should provide the platform that outlines the need to manage protection settings in a centralized management system which has full audit capabilities. Furthermore, due to the large number of relay manufacturers on the market, each with its own interface software, the system needs to be able to have the ability to interface with as many of the different relay manufacturer's settings files as possible.

The system must also support unique business processes in order manage the life cycle of the protection settings. The Tool should have the ability to facilitate the addition of new product lines and settings management. The Power System Simulating Tool relay modelling function must have the ability to seamlessly interface with the Settings Management Tool by exchanging of the calculated and relevant parameters both to and from the Power System Simulating Tool module.

All settings must be stored in a manufacturer-independent format. Traceability of settings changes are necessary, document management functionality is required, and settings data must be able to be exchanged with manufacturer-specific relay settings software and a Power System Simulating Tool. This is to align with statutory requirement in terms of Occupational Health and Safety (OHS) Act 85 of 1993 to keep accurate records. To cater for business processes related to electrical equipment and protection settings, the system must allow the definition of company specific workflows with unique identifiers to allow interfacing with business systems, e.g., SAP, Maximo etc. The system must be fully accessible via Web services.

Features of the solution should contain, although not be limited to.

A) Protection Settings Management features:

- Management of protection settings
- Management of protection devices and their features and attributes
- Comprehensive protection device reference library for information
- Specific Protection Models, including range checks and multiple settings capabilities.
- Management of manufacturer-specific settings files and related templates

B) Lifecycle and process requirements of Protection Settings

- Acknowledge customer-specific phases and transitions.
- Lifecycle graph which enables interaction and collaboration
- Access rights per phase and transition
- Transition-triggered scripts and email notification
- Customised checklists for users
- Process lifecycles that are able to be defined in multiple ways.
- Free form text settings capability
- Capability of adding new products, and updating settings
- A fully fledged audit trail of all changes, additions, and edits
- Trace of setting changes throughout the history of the device, including all lifecycle transitions

C) Data management and associated audit trail

- Secure logging of events.
- Comprehensive management reports that track both additions of new products and
  changes to existing settings.
- Ability to access settings in a “read only” format.

D) Asset Management Requirements

- Asset Management capability for both primary plant and secondary equipment
- Geo-spatial referencing of equipment which can be user-defined.
- Network and Communications topology model for primary plant
- Network Topology for all signal and telecontrol connections
- Ability to define asset and product types with associated attribute data.

E) Alignment with Business Practices and Processes

- Alignment with asset management business process for all primary and secondary plant
  equipment.
- Process types that can be user defined.
- Ability to define and manage process life cycles of equipment with customer specific.
  lifecycle phases and transitions
- Ability to adapt user requirements and product lifecycles to the business processes.
- Audit trail of all asset changes additions and changes made.
- Assignment of devices and settings with appropriate functionality

F) Reporting and Scripting

- Ability to define user friendly reports and scripts by using the Python scripting language.
- User-defined layout formats: Portable document format PDF, EXCEL,
- Extensible Markup Language (XML), Hypertext Markup Language (HTML),
- Reports and script automation Defined Access rights for the management of reports and
  scripts
- Customised reports defined as per user requirements available as part of the product,

G) Document Archive and Library

- Centralised storage area for all documents and software
- Folder structure that is able to be customized
- Ability to extract customized reports for generic and user specific information.
- Ability to search for information using multiple search capabilities such as full text search.
  capability.
- Access rights and controls for requisite folders in the library

H) Document Management

- Manage the document attachments, specifications, and other requirements for assets as well as document version capability.
- Provision of specific links to web pages
- Provision of specific links to cross reference similar or other assets.
- Ability to add customised notes on specific asset.
- Ability to search for information using multiple search capabilities such as full text search capability.
- Unique file setting capability
- Access to specific PSST Case Files and Substation diagrams

I) Historian Capability

- Access all data and settings for specific assets in relation to specific timelines.
- Provide a static historic view of the system at any point in time.
- Trace all settings history records, including any changes made.

J) Management of User accounts

- Ability to create specific User Accounts
- Concurrent read-only guest account pools
- Windows authentication by using LDAP (Lightweight Directory Access Protocol) security.
- Login requirements for local or domain accounts.
- Access to individual User Pages with assigned settings and task.
- Personalised data confidentiality and anonymization.
- Access rights management for defined user groups with specific requirements for:
  - Location-dependent rights
  - Specific object hierarchies
  - Specific administrative functions
  - Lifecycle-dependent phase and transition rights

- Functional rights
- User specific rights
- Library-dependent rights

K) Means of Data Exchange

- Import/export of numerical protection relay settings files
- Import of related scripting requirements to enable data exchange.
- Import/export of task and other attributes
- Capability to convert specific manufacturer specific file formats.
- Exchange of calculation-relevant parameters from/ and into PSST.
- Excel import/export capabilities to cater for differing firmware configurations and device types.
- Web service interface

L) Manufacture-Specific Interfaces

- The settings files must be viewed and managed independently of their manufacturer software. Converters must provide the ability to import and export settings files directly to and
- from the system for further processing based on support manufacturer-specific file formats, this means that the converter must converse with different device types and firmware configurations.

Import Converters1

Company Name	Converter Protocol
ABB	CAP540
	PCM600
	MCUSetup
	WinECP 7
Basler:	Bestcoms 851G/951
Beckwith	IPScom M-3425
Eberle	WinREG
	WinTM
	Toolbox
GE: various Enervista software versions	MII
	MM2
	MM300/MM200
	SR3
Nari Electric	WSOS 4.4
Reinhausen	TAPCON 240/260
Reyrolle	Reydisp Evolution
	Reyrolle 8/9
Schneider Electric	Easergy Studio Micom S1 (S&R103 IEC • S&R Modbus, S&R Courier), SEPAM converter • WSOS 5
SEL	AcSELerator 4
	AcSELerator 5
Siemens	DIGSI 4

	DIGSI 5
Tavrida	TELARM
Thytronic	ThySetter
VAMP	VAMPSET
ZIV	ZivercomPlus

Export Converters1

Company Name	Converter Protocol
ABB	CAP540
	PCM600 (XRIO)
Eberle	WinREG
	WinTM
	Toolbox
GE	Various Enervista software versions
Nulec	WSOS
SEL	AcSELerator,
	SEL-5010
Siemens	DIGSI
VAMP	VAMPSET
ZIV	ZivercomPlus

According to the requestor the high-level requirements support the following strategic intent statements:

- Pursue financial and operational sustainability.
- Provide reliable, predictable and affordable electricity in line with the approvals and regulatory model by NERSA.

The impact of not having a Power System Analysis tool or Protection Settings Management tool available will run the risk that operations at local and national level are severely compromised. This could lead to single or multiple Unit trips at Power Stations, loss of major network corridors and load centres, -and a consequence of Under Frequency Load Shedding, or full-blown Load Shedding schedules, being enacted. The consequences to the country would be disastrous, and an accumulated cost to the country more than R1 B would be expected.

Supported NTCSA objectives:

- Sustain system performance for system minutes and major incidents.
- Continue asset renewal and strengthening of the network towards attaining N - 1 compliance.
- Undertake grid expansion to unlock system capacity for IPPs and new load customers.
- Contract and facilitate the connection of IPP's into the Eskom grid.

Supported Distribution objectives:

- Operate a sustainable Distribution network that delivers on client expectations.
- Ensure financial prudence- Implementing innovative technologies for business efficiencies across the value chain.
- Migrate towards full compliance to the regulatory framework governing network performance.

Generation objectives:

- Regulatory compliance - Maintain adherence to the regulatory requirements as stipulated in the South African Grid Code, GCR 1.
- Public image - it will have a positive impact on the EAF of generation plant which will result in higher availability of plant and therefore lower stages of load shedding.
- Governance – improve maintenance/availability of setting database.

For detailed functional requirements, please see:

- PSST Business requirements Annexure B_DEM-03218-N3V3_BRSF_Power System Simulation
- PSMT Business Requirements Annexure A_DEM-02956-V0D1_BRS2_ Protection Settings Management Tool
- PSST and PSMT Evaluation Criteria Excel document (Annexure C_PSST and PSMT Technical Evaluation Criteria~~)~~

2.4 Non-Functional Requirements

Deliverable	Description
Architecture Services (Functional Specifications and Detailed Design)	**Introduction (Architecture Services):** The objective is to define and design various architectural components necessary for the successful implementation of the application. The Tenderer is required to render solution architect services to this project which includes making sure that Enterprise Architecture committee approval is gained before build (Physical Application Design (PAD) and again before go-live (Pre-Transfer). Sufficient time must be allowed for requirement refinement and functional design workshops, as well as the physical design (s) detailing all configurations. **Scope:** Deliver approved functional specifications and detailed design (physical design) based on the user requirement specifications and Enterprise Architecture design guidelines and requirements provided as part of this RFP. The scope of the architecture work includes the following key areas: **Data Architecture:** Data Architecture Scope: • Define the data architecture, including data modelling, storage, retrieval, and data flow diagrams.

Deliverable	Description
	• Design data schemas, considering scalability, data integrity, and performance optimization. • Recommend appropriate database technologies and data storage solutions based on project requirements. Resource Requirement: Architect(s) with knowledge for Data/Information System Analysis Architecture design. Deliverable: Data architecture documentation and diagrams. **Solution Architecture:** Solution Architecture Scope: • Collaborate with stakeholders to understand functional and non-functional requirements. • Develop a comprehensive solution architecture that outlines the application's components, their interactions, and the overall system behaviour, while ensuring that it would be portable across different platforms. • Identify key software modules, frameworks, and technologies required for the solution. • Provide guidelines for designing and developing each module while ensuring alignment with project goals. Resource Requirement: Architect(s) with knowledge of Solution Architecture. Deliverable: Solution architecture documentation and diagrams. **Technical Architecture:** Technical Architecture Scope: • Define the technical infrastructure required to support the application's deployment and operation. • Recommend hardware, network, and infrastructure configurations to ensure scalability, availability, and performance. • Specify software development tools, frameworks, and best practices to be used by the development team. • Collaborate with internal technical stakeholders. • Address technical constraints, such as latency, bandwidth, and system compatibility. Resource Requirement: Architect(s) with knowledge of Technical Architecture on either physical/virtual environment. Deliverable: Technical architecture documentation and infrastructure specifications. **Security Architecture:** Security Scope: • Collaborate with internal IT Security stakeholders. • Identify potential security threats and vulnerabilities relevant to the application.

Deliverable	Description
	• Design security measures, including authentication, authorization, encryption, and access controls. • Define security policies, protocols, and procedures to safeguard sensitive data and ensure compliance with relevant regulations. • Ensure cyber security compliance. • Conduct security risk assessments and propose mitigation strategies. • Secure by Design solution modelling and deployment in compliance to Eskom governance to be applied. • Design security measures for all data exchange interfaces including authentication and authorisation mechanisms. Resource Requirement: Architect(s) with knowledge of Security and Cybersecurity Architects/ Specialists Deliverable: Security architecture documentation and threat model analysis. **Integration Architecture:** Integration Scope: • Collaborate with internal integration stakeholders such as the Integration CoE. • Identify and outline all the required integration points between the application and external systems, services, or APIs. • Design data exchange formats, protocols, and communication patterns for seamless integration. • Specify middleware or integration platforms if needed, considering performance and reliability. • Ensure proper error handling, data consistency, and fault tolerance across integration points. • Integration Business Service API activities to expose/consume and test Services to/from the Eskom Integration Services Bus. Eskom will be responsible for the development of the Integration Services to/from the bus to the internal systems. Resource Requirement: Architect(s) with knowledge of Enterprise Integration Specialist, Data/Information Architects, System Analysts, Solution Architect. Also refer to the integration scope and requirements. Deliverable: Integration architecture documentation and integration process flowcharts. **Architecture Deliverables:** • Design workshops with business stakeholders to clarify and define in detail business, functional and implementation requirements. • Comprehensive documentation for each architecture domain (Data, Solution, Technical, Security, Integration), including diagrams, flowcharts, and textual descriptions as outlined above. • High-level presentations to key stakeholders explaining the architecture rationale, design decisions, and benefits. • Collaborative sessions and design workshops with the development team to clarify and define in detail non-functional requirements and architectural concepts, and address implementation challenges. • Functional specifications document

Deliverable	Description
	• All documents and diagrams to be submitted as digital editable copies (MS Office, MS Visio) **Communication:** Regular update meetings will be held to discuss architecture deliverable progress, address concerns, and ensure alignment with project goals. **Deliverable Acceptance Criteria:** The architecture work will be considered successfully completed upon support/approval of the architecture documentation by both Enterprise Architecture and project stakeholders. Facilitate review and approval of the design as required by Eskom methodology and governance. A lead time of at least two weeks needs to be provided for in the timelines in order to allow for review and approval processes. • Detailed design approved by EAAB. • Approved functional specifications. • Development environment ready for Build/ Configuration
Integration	The Tenderer must provide technical resources to build and implement all required Business Services for the interfaces. Please reference "Group IT End Systems Integration Design Requirements v1.0.1 (4)" document to provide guidance on the availalbe communication protocols. Please be aware that the Eskom Integration team will do the integration activities.
	The application must have the capability of secure communication when exposing the services via the business services
	• Additionally, the tenderer must: • Provide the required detail to the Eskom Integration Team to enable the design of the end-to-end solution and work closely with Eskom's Integration team. • Provide input and contribute to the Analysis, Design, Message Modelling, Unit testing, SIT testing, UAT testing and Non-Functional testing. • Provide Application Business Services that conform to the specific security and Integration standards. • Provide Application Business Services that can receive an Integration reply with a full-service response (pre-defined message structure) in case the Application is invoking an Integration Web Service. • Provide Application Business Services that can communicate via One-Way or Two-Way certificate (SSL/TLS) to secure the channel. • Provide Application Business Services that support Basic Authentication for Web Services, Database or SFTP for Authentication security. • Provide Application Business Service with the capability to distinguish between Technical and Business error and handle each one in a separate manner.
Testing	The testing team is responsible to Acquire the testing requirements, develop the test cases, and conduct testing to ensure that the solution is comprehensively evaluated for implementation in the Eskom IT environment.

Deliverable	Description
	The testing staff may not be the same staff as the configuration, development and implementation staff assigned to the Project. The tenderer must make sure skilled adequate resources with an experienced test manager are deployed to test the system All testing must be completed on Eskom's test management systems namely Application Lifecycle Management (ALM), Load Runner and Unified Functional Tester (UFT). The testing team must provide unit test results before resuming the next cycle/level of testing as per defined entry and exit criteria outlined in the master system test plan A signed off test closure report is required before a test milestone is completed. The following testing and testing milestones must be completed: • Unit Testing – test results from the Tenderer's team. • System Integrated Testing, Functionality testing (in QA – end to end functional testing and integration testing. That means testing with other systems and ensuring that all requirements have been successfully configured). This testing must be driven & executed by the Vendor but must include Eskom staff for completeness & authenticity. • Non-Functional Testing (performance testing and disaster recovery testing). This testing must be driven & executed by the Vendor but must include Eskom staff for completeness & authenticity. • User Acceptance Testing (Testing by the Eskom customer team that the system is working and meets requirements). This testing must be driven by the Tenderer but must be executed by Eskom staff for completeness & authenticity. The testing team must complete Disaster Recovery Testing on the Disaster Recovery (DR) environment and complete and Vulnerability Testing. The testing team must adhere to the Eskom's TCoE testing standard to be provided as part of the RFP document. All the levels will require an internal Eskom resource unless communicated otherwise. The vendor will be required to sign-off knowledge transfer acceptance certificate as part of every deliverable to ensure knowledge is transferred throughout the process and does not need to wait until the end of the project.
	The solution will undergo comprehensive testing following Eskom's standards to ensure its completeness and authenticity. The testing team is responsible for gathering testing requirements, creating test cases, and executing the tests to thoroughly evaluate the solution for deployment within Eskom's IT environment. Please note that the following: • All testing, except unit testing, will be carried out by the Eskom testing team. The tenderer is responsible for conducting unit testing.

Deliverable	Description
	• All testing (including unit testing) must be performed within Eskom's test management systems, such as Application Lifecycle Management (ALM), LoadRunner (for performance testing), and Unified Functional Tester (UFT). The implementation team must coordinate with the testing team to ensure sufficient time is allocated for testing, and that all testing activities are incorporated into the project schedule. • Before the official test cycle begins, the development team must provide unit test results, adhering to the entry and exit criteria outlined in the master system test plan. A signed-off test closure report is required before marking any test milestone as complete. The following tests and milestones must be completed: • Unit Testing (Development Environment): Results provided by the tenderer's development team. • System Integration Testing & Functionality Testing (QA Environment): This includes end-to-end functional testing and integration testing, ensuring the solution works with other systems and meets all requirements. The Eskom testing team will lead and execute this testing, while the tenderer's team must provide necessary inputs. • User Acceptance Testing (Pre-Prod Environment): Facilitated by the testing team but executed by Eskom's customer/business team to verify that the system meets the requirements defined in the BRS for completeness and authenticity. • Non-Functional/Performance Testing (Pre-Prod Environment): Led and executed by the performance tester. • Disaster Recovery Testing (for the on-premises option). Led and executed by the Disaster recovery team.
	All testing requirements must cover all identified interfaces that have been identified. The testing team must adhere to the Testing Centre of Excellence (TCoE) standard document provided as part of the RFP documentation.
Business Training	Recommend and provide suitable method whether online and physical / virtual (MS Teams) or classroom training. Develop training material and train Eskom business users. Dx 450 users NTCSA 50 users Gx 50 users
	The supplier must provide super user training
	Train business super users / administrators for each capability included in the scope of work.
	The supplier must provide Eskom with a training approach indicating how training will be implemented during project implementation phase for super users (training the trainer approach), Overall Eskom end users will be trained by their super users for their respective capabilities.
	Supplier must also make provision for a training video or noddy guide. Training material must also be provisioned as part of this transaction. Supplier to work together with the LSO business unit and training platform to formalise training for Eskom users.

Deliverable	Description
Technical Training/ Transfer of skills	Develop training material and support material. Train Eskom Group IT support teams and ensure sufficient knowledge transfer. The vendor will be required to sign-off knowledge transfer acceptance certificate as part of every deliverable to ensure knowledge is transferred throughout the process and does not need to wait until the end of the project. The requirement for training will be of functional application support, 1st line support, 2nd line of support, including the application technical support and database support to assist users with self-service and configuration.
	The service provider is required to provide all levels of support services, even though they will be training Eskom support resources.
Build and deploy	Provide test cases, provide unit testing evidence, once all the necessary testing is complete, testing reports are produced, all governance approvals are obtained, the solution will need to be deployed to production. The Tenderer must articulate clearly as part of the response the implementation and deploy approach.
	Update requirements traceability matrix. Ensure all environments are updated following successful test conclusions. Compile a go-live plan and ensure the solution obtains the necessary governance approvals as follows:
	Enterprise Architecture Advisory Board (EAAB) for pre-transfer, Change Review Management Committee (CRMC), Go/No-Go pack and decision by Group IT General Manager.
Data Migration	Solution must have the option for data to be exported to other solutions at the end of the contract term. Eskom to retain the ownership of all the data that business stores, transmits, and creates during the period of the contract.
Security	The following are security requirements for the PSST and PSMT System: a. The Tenderer shall have a valid ISO27001 certificate. b. The PSST and PSMT System shall be able to integrate with existing Eskom's MS (Microsoft) on-prem active directory (AD), and MS Entra ID to enable Multi-Factor Authentication (MFA) and single-sign on (SSO). c. Role base access control (RBAC) shall be employed. d. Data at rest (using AES-256), in use and in transit or in motion (using TLS 1.2, Eskom prefers and recommends TLS 1.3) shall be encrypted. e. Audit trails, logs, user administration and user activity logs shall be enabled, encrypted, and securely kept with limited access to administrators. f. Sensitive information such as personal identifiable information (PII) data in development (DEV) environment shall be marked. g. Incremental daily back-ups shall be done, encrypted, and securely kept offsite. h. Real-time data synchronization or data replication to a secondary or disaster recovery (DR) site, located in different regions shall be employed. i. Disaster Recovery Plan (DRP) shall be defined, annually tested and such DRP test results shall be submitted to the Eskom Cyber Security team. j. Back up Restore Plan and Procedure shall be defined, annually tested and such test results shall be shared with the Eskom Cyber Security team.

<table>
<tr><th>Deliverable</th><th>Description</th></tr>
<tr><td></td><td>
k. Patch Management Process shall be defined. The software updates and patches shall be tested on non-production environment prior being deployed into production environment.

l. The static application security test (SAST), dynamic application security test (DAST), vulnerability assessment and penetration test shall be conducted prior deploying the cloud system and on-prem system to production environment, all critical, high, and medium vulnerabilities shall be addressed prior deploying production environment, and the summary of the test results shall be submitted to the Eskom Cybersecurity team for review and acceptance.

m. The database shall be placed within Eskom’s private network behind the perimeter firewall.

n. The PSST and PSMT System shall support the prevailing enterprise services bus (ESB), application programmable interfaces (API’s) and Integration Platform as a Service (iPaaS) platforms for security, logging and monitoring for both on-prem, hybrid-cloud and multi-cloud environments such as IBM App Connect, TIBCO Cloud Integration (including Business Works and Scribe), WSO2 Carbon, Software AG web Methods, Neuron ESB, Apache Camel, WebSphere Message Broker, RSSBus Connect, Azure Service Bus and Oracle Service Bus, Saleforce MuleSoft, IBM DataPower, Oracle API Platform, Cyclr, Dream Factory JDBC, Microsoft SQL Server Integration Services (SSIS), SAS Data Integration Studio, Integration Adaptor DirXML, Oracle X AI Services, SAP Business Process Automation, SAP NetWeaver, Oracle Fusion Middleware, Connect Direct, HP Data Protector, WINSCP, FreeFileSync, SAP PI/PO, SAP CPI, HP SOA Systinet, JCAPS, Cloud Pak for Data, K2, Microsoft Power Automate and Zapier but not limited to these listed.

o. The PSST and PSMT system shall be able to integrate with SIEM standard technologies such as Syslog, Windows events logging, SNMP and API, etc.
</td></tr>
<tr><td>Reporting</td><td>Reporting requirements are to be provided as stipulated on the Business Requirements Specification document and Technical Evaluation functional requirements.</td></tr>
<tr><td>Service Level Agreement</td><td>Eskom will provide 1st line support however, 2nd line, 3rd line, and 4th line support will be required from the service provider to Eskom, which will entail an escalation process.</td></tr>
<tr><td></td><td>Supplier should provide 24/7 on site or remote support. The tender must have a service desk and a call logging system which Eskom can log ticket and track them.

Service performance management:
<table>
<tr><th>Defect Category</th><th>Description</th><th>Acknowledgement and solution scoping</th><th>Resolution</th></tr>
<tr><td>Code defect</td><td>Are defect in code that result in the software not functioning properly or operating as designed. Code</td><td>24hrs / 1 day</td><td>72 hrs / 3 Days Acknowledgement and solution scoping</td></tr>
</table>
</td></tr>
</table>

Deliverable	Description

	defects refer to software errors		
Product defect	Third party software product anomalies, interoperability, and integration. Product defects refer to improper system operations	24 hrs / 1 day	72 hrs / 3 days
System defect	is a configuration fault, error or failure associated with embedded system software or custom build	16 hrs	16 hrs
Operation defect	defect related to user misunderstanding or incorrect use of the software and/or operational end-user error	Case by Case	Based upon agreed scope

Escalation procedure:

Escalation level	Eskom	Supplier
First level	Application Support Manager	Operations Manager
Second level	Middle Manager solution support	Senior Manager
Third level	Senior manager	Managing Director

SOFTWARE PRODUCT MAINTENANCE & UPDATE SERVICE

The vendor will remedy software defects and provide corrected versions to the business, notify representatives about new releases, and maintain the software products throughout the agreement's term.

SOFTWARE DEFECT CATEGORIES AND RESOLUTION TIMES

Defects are categorized into four types: code defects, product defects, system defects, and operational defects. The resolution times vary based on severity, with detailed tracking and updates on the open issues list.

Defect Category	Description	Acknowledgement and solution scoping	Resolution (Severity Level 1)	Resolution (Severity Level 2)	Resolution (Severity Level 3)	Resolution (Severity Level 4)	Resolution (Severity Level 5)
Code defect	Are defects in code that result in the software not	24hrs / 1 day	2 Days	3 Days	5 Days	Based upon agreed scope	Based upon agreed scope

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<tr><td></td><td>functioning properly or operating as designed. Code defects refer to a software error.</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
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</table>
</td></tr>
<tr><td rowspan="4">Project Management</td><td>Deliver project documentation required by the Eskom Group IT PMO. This includes but is not limited to:</td></tr>
<tr><td>Detailed integrated schedule. Weekly progress reports. Payment schedule forecast and actuals tracking against the forecast. Delivery Acceptance Certificates with supporting documents. Provide information required by Eskom team members to facilitate governance of the project and its deliverables. Integrate the current application support teams into the project delivery team. Deliverable Breakdown Structure indicating all fixed cost deliverables with the cost of each deliverable and the total cost of all deliverables.</td></tr>
<tr><td>During execution deliverables will be evaluated by Eskom and a deliverable acceptance certificate will be issued on approval. Approved deliverables can then be invoiced.</td></tr>
<tr><td>A Project schedule in MS Project format. The top-level work breakdown in the schedule must reflect the Software Delivery Life Cycle stages (e.g., Feasibility, Design; Build, Test, Train, Deploy and Stabilise).</td></tr>
</table>

Deliverable	Description
	Please note that, all scope items mentioned on this scope document and all the requirements stated on the Business Requirements Specification and Technical Evaluation Criteria documents must be accepted.
Other Responsibilities	Dependencies and pre-requisites on Eskom must be clearly stipulated.
	All deliverables produced on this contract shall become the property of Eskom with Eskom holding sole rights to it. All deliverables shall be provided in maintainable format for each evaluation (i.e., editable documents).
	Project change control refers to the changes in project scope, time, and Cost. Changes will follow the process below:
	Changes must be approved by the requester, business owner, project manager, and project sponsor. Depending on the scale of the change, other approvals external to the project may be required. Guidance in this regard will be provided by Eskom. Approved changes must be noted in steering committee minutes and scope document must be compiled and signed off.
Cyber security insurance	Stipulate a cyber insurance contract
Exit strategy	Compile and sign an exit strategy

2.4. Group IT Software Standards

The tenderer is to ensure adherence to Eskom Group IT architectural standards. The following is snapshot of applicable base ICT standard(s) for this initiative. Full list can be made on request.:

Integration	End interface points, whether consuming or providing, needs to be done in a secure web service fashion. Eskom standard is: Oracle Fusion and IBM DataPower Gateway underlying the present Enteprise Integration Platform/ Service Bus.
Authentication	• MS Active Directory • Azure AD
Server virtualisation	It is expected that the solution should be able to run in a virtualised environment. Clear motivation and reasons will have to be provided where it is not possible. Current Standards of on-premise environment: - VMware vSphere 7 or higher, PowerVM (RISC) (only exceptional cases shall be supported)
Storage virtualization	Ability to be hosted behind an SVC
Database	• MS SQL 2022 or higher • IBM DB@ V11.5 or higher • Others, any DB not listed above will be treated as an exception
Server OS	• Microsoft Windows Server 2022 64bit or higher • SuSe Linux SLES 15 or higher

	• AIX 7 or higher
Client OS	• Windows 10 or higher
Browser	• MS Edge or higher • Mozilla FireFox V60 or higher • Others (will be treated as exeptions)
Load Balancer (ADM)	• F5 Viprion
Backup	• NetBackup
Communication Protocol	• TCP/IP
Desktop/Laptop specifications	• Provide the minimum applicable specifications for a user desktop or laptop

2.5. Provide detailed description and volumes of the product/service requested:

Use business requirements information as per the approved BRS (Business Requirement Specification), if applicable. Make provision for implementation, transition, migration etc.

Make provision for true up (increase) and true down (reduction) on volumes.

Make provision for technology changes during the contract term.

2.6. Training/Transfer of skills:

Detail training to all users who will be using system daily +- 700 users

Detailed training manuals to be created

Transfer of skills and Knowledge Transfer is required to be done for the Group IT Support Resources that will be providing support.

Recommend the preferred method of training – training delivery method (Online via MS Teams, Web Based or Classroom)

Training to be conducted during implementation phase.

3. Service Level Agreement requirements

Eskom will provide 1st line support however, 2nd line, 3rd line, and 4th line support will be required from the service provider to Eskom, which will entail an escalation process.

Supplier should provide 24/7 on site or remote support. The tender must have a service desk and a call logging system which Eskom can log ticket and track them.

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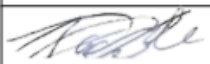
4. Approvals:

Group Tech Eng Convergence, Middle Manager	**Name:**	Leon Fourie
	Designation:	Eng Convergence, Middle Manager
	Date:	2025/05/26
	Signature	
Group Technology Application Support Manager	**Name:**	Randall Van Heerden
	Designation:	Senior Advisor Info Systems Support
	Date:	23/05/2025 15:19:20+02:00
	Signature	
Group Technology Lead Architect	**Name:**	Thabo Mongadi
	Designation:	Enterprise Architect
	Date:	2025/05/26
	Signature	
Group Technology Project Manager	**Name:**	Sibongile Ndlovu
	Designation:	Project Manager
	Date:	26/05/2025
	Signature:	
Group Technology Product Delivery Manager	**Name:**	Lizle de Kock
	Designation:	Product Delivery Manager
	Date:	2025/05/27
	Signature: