



TRANSNET NATIONAL PORTS AUTHORITY

A DIVISION OF TRANSNET LIMITED

SCOPE OF WORK

PORTS INFRASTRUCTURE & CAPACITY ENABLEMENT SIMULATION

1. PURPOSE OF SUBMISSION

To seek information of simulation software for ports infrastructure and capacity enablement at Transnet National Ports Authority ((TNPA). The information is critical and is required for end to end planning, costing, commissioning and support/maintenance of the software for a duration of **48** months.

2. BACKGROUND and NEED

Transnet National Ports Authority (TNPA) Infrastructure Planning & Capacity Enablement is embarking on a journey of acquiring its own Simulation Software that will be an intellectual property of TNPA. The main objective of the Simulation acquisition of the Software is to enable the port engineers, analysts and capacity enablement specialists to predict the effect of changes in any operational precinct within TNPA. The simulation software will encompass ports system validation techniques which will include simulating the model under known input conditions and comparing model output with system output.

The Simulation Software will allow the simulation team to also test different scenarios by changing the inputs to the model. The model interprets and applies the inputs, to simulate the operations over time, based on rules and logic built into the model, in order to produce meaningful outputs. The Software needs to be creative in calculating and validating capacity in all South African Ports and ensuring that all port users are utilising the Ports to its capacity. This will then assist the Ports in performing their oversight role by setting meaningful targets for the Terminal Operators (TOPS) based on the scientifically proven capacity of each terminal, in order to improve port efficiencies. The Software will also assist TNPA in planning ahead of demand and identify bleeding areas that dominantly affect the overall terminal capacity.

3. MOTIVATION and PURPOSE

The Software needs to be creative in calculating and validating capacity in all South African Ports and ensuring that all port users are utilising the Ports to their full capacity. The Software will also assist TNPA in planning ahead of demand and identify bleeding areas that dominantly affect the overall terminal capacity.

The main objectives and purpose of introducing Simulation Software is to:

- Align Port Infrastructure Plans with future growth demand taking into consideration Port performances.
- Shed light on mechanism that controls TNPA's real-world processes, operations or systems for gap analyses, business alignment and eliminate unforeseen challenges of the business.
- Forecast future behaviour of TNPA's systems and fulfil Planning & Development department's objectives about the organisation.
- Prevent under or over-utilisation of the Port Infrastructure and its resources as it will assist on identifying those loopholes in the organisation.

The major benefits for introducing Simulation Software will result to:

- Detailed scientific analysis of maritime logistics and supply chains to optimize port solutions.
- Collection and processing of real system data.
- Analysis of port capacity indicators relative to demand and efficiency.
- Assessment of cargo movements and analysis of demand models.
- An efficient and effective Demand Modelling of all traffic.
- An improved TNPA performances across all Ports.
- Greater and clear anticipation of the future in all TNPA Ports.
- Completed capacity analysis and forecasts for input into NPP and PDFs.
- Analysis and assessments of demands on port infrastructure from industry

The Simulation model should enable to integrate all business process and fulfil the following requirements:

- Minimise bottlenecks – identify all areas that are causing delays in TNPA Port’s processes resulting in less utilisation of Port Infrastructure.
- Planning and Development – Provide TNPA with the insight of future demands (Plan ahead of demand) as per planning department’s objective.
- Business Process Reengineering – mapping and interpreting data in all TNPA business processes for Port Capacity, GAP Analyses and Performance improvement.
- Benefits tracking – tracking of system outcome against initial project objectives.
- Capacity Validation - validate if TNPA Port infrastructure’s current operating model is as per the current capacity study with current level of performance

4. SCOPE

The scope of the simulation software solution will be provision of information with regards to varied software capabilities & license, estimated cost of installation & configuration, support and maintenance for a contractual period of **48** months performed by highly technical and functional service provider for TNPA but not limited to:

- Provision of a technical solution, architecture and operational documentation (design, implementation and administrative guides, user manuals).
- Ensure the interoperability of the system in a diversified software environment.
- Integration with TNPA structured and unstructured existing solutions.
- Provision of extensive technical & functional training sessions including training material and skills transfer.
- Provide helpdesk and Administrative support, including upgrades, for a period of three years.
- The supply, installation and configuration of the software must be completed within nine (9) months from the date of Kick off and TNPA approval.

5. SPECIFIC REQUIREMENTS

5.1. RESOURCE REQUIREMENTS

During the contractual period, the structure will be as follows:

- Delivery Manager

Notes: TNPA expect number of responses and further expected that the bidders will be evaluated and shortlisted to bid for the implementation, support and maintenance phase of the simulation solution. The successful service provider is expected to provide a comprehensive project plan to deliver the solution and to meet stipulated TNPA's time frame to conclude implementation of the solution. The resources must be experienced because the solution will be treated as a TNPA business critical system for most of TNPA operations.

5.2. BUSINESS PROCESS REQUIREMENTS

- Software solution information (i.e. System, Application & Hardware Requirements)
- Solution implementation quotes
- Technical knowledge transfer quotes
- Resolve unexpected problems that might arise (Support & Maintenance quotes)

TNPA Change Control Process:

TNPA follows **IT-Service Management & Change Release Management** process for change control, system access, permission and the service provider must adhere to this processes prior to implementation of any solutions within the ICT landscape. The Change Control established at TNPA ICT environment is based on a 3 tier system architecture which includes the following:

- Pre-Dev and Development (DEV) Environment
- Quality Assurance (QA) Environment
- Production (PRD) Environment

Therefore work done is subject to the following:

- Successful delivery of the simulation software solution will be dependent in the migration of the software into production environment and the software must have undergone rigorous testing, validation and acceptance signed off by the respective TNPA Business unit.

The Current Operating System and Environment:

The successful bidder will be required to implement changes when the system is at low transactional volumes and must be ready to plan or execute any downtime accordingly so as not to disrupt business operation. Rollback strategy for each change is expected and the service provider should collaborate with the TNPA SAP Basis team to ensure that system backups is taken before major changes.

Critical Software Releases & Upgrades:

The TNPA SAP Basis Team can assist with the technical upgrade and furthermore, the SAP Basis Team will only implement any of the hardware, operating systems and database requirements as per guidance of the successful vendor.

NB: Software Releases & Upgrades prior to implementation will be required from the service provider

However, the service provider must implement or provide detailed functional steps required for the software solution to operate optimally.

5.3. BUSINESS REQUIREMENTS

The following scope and requirements for information will mostly comprise of commission, support and maintenance.

Scope & Requirements	Information	Requirements
Implementation, Support and Maintenance	Provides operation capabilities	<p>Software solution information (i.e. System, Application & Hardware Requirements) and</p> <p>Solution design, integration, Automation, Simulation and implementation quotes</p> <p>Extensive Technical & ICT knowledge transfer quotes</p> <p>Resolve unexpected problems that might arise (Support & Maintenance quotes)</p>

6. EXTENDED SIMULATION REQUIREMENTS

Simulation Software Capabilities

Software Design Capability encompasses the ability for the tool to perform desired IT related activities and transactions through its features and technical infrastructure to achieve business needs, these will include but NOT limited to the following:

Software Simulation Model

The proposed Modelling methods that will address Port capacity constrain for each cargo types to include the follow:

Determining Theoretical and Installed berth, storage and gate capacities of the ports for all commodity type. The Service provider must have a basic understanding of the Port operations processes and develop Port configurations model based on those processes (this is a starting point)

Port Process includes the following:

The model must be set up in two different object, Berth object and Storage object whereby the Vessels will be an entity to berth object and trucks/trains will be an entity to storage object.

Each object got a process it goes through which is similar to both objects and are indicated as below

Berth object

- Arrival duration of the vessel from Port encourage to the Berth
- Pre-loading/pre-offloading duration of the vessel from (Import/Export)
- Loading or offloading duration of Vessels (import/export)

- Pre-inspection duration
- Departure Duration of Vessel from Berth to encourage

Storage object

- Arrival Duration of trucks / train from Port boundary in and Port boundary out
- Pre-loading/Pre-offloading duration of trucks/train
- Loading/offloading duration of trucks/train
- Pre-Inspection duration
- Dwell time of cargo in the port.
- Stacking and picking factor of cargo in the stacking area
- departure duration of trucks/train from storage area to Port boundary out
- From the above generic processes you need to do the following:
- Set constrain parameters on the model (such as time constrain, Berth capacity and storage capacities , trucks and train maximum loading capacities and maximum number of gangs in each object)
- Data input analysis (to includes- process times as mentioned above, demand forecast, throughput/parcel sizes, berth capacities, storage capacities, number of gangs etc.) the service provider to make assumptions during proposal
- Run your model and the model must be able to generate the result to the dashboard
- The dashboard should be able to give you a number of Scenarios, based on the variations and operational parameters you have put on the model.
- The final result must be able to indicate the bottlenecks on the system and give solutions (e.g. whether the terminal operators need to maximise their productivity rate or the Port need to provide more capacity)

Data Analytics

Data analysis will enable the process of inspecting, cleansing, transforming and modelling data with the goal of discovering useful information, informing conclusions and supporting decision-making. Data analysis capability should include the following types of data analysis:

Descriptive Analysis

Descriptive analysis will respond to “what happened” by summarizing and analysing past data, these data sets will assist in the interpretation and production of dashboard data. This will also assist in tracking selected Key Performance Indicators for Capacity Planning purposes

Diagnostic Analysis

Diagnostic analysis takes the insights found from descriptive analytics and drills down to find the causes of those outcomes. The Data analysis will be utilised to create a correlation and connection between available data and identifies patterns and the current trends. The data analysis will be integral to identified the current available or existing capacities and the current utilized capacities from an operational perspective

Predictive Analysis

Predictive analysis should assist in predicting the futuristic view of capacity planning and will have a direct influence in the development of National Port Plans and Port Development Framework. This type of analysis is another step up from the descriptive and diagnostic analyses. Predictive analysis uses the data we have summarized to make logical

predictions of the outcomes of events. This analysis relies on statistical modelling, which requires added technology and other factors to forecast. It is also important to understand that forecasting is only an estimate; the accuracy of predictions relies on quality and detailed data

System Integration and Interface

The simulation should have a high level of vertical and horizontal internal integration and interface. The vertical compatibility will enable the Simulation tool to be a citizen of the aggregate of systems in accordance with the Enterprise Architecture. The horizontal component enables the Simulation to interact with relevant sub-systems for seamless flow of information and data. Data and information transactions will be validated and tested prior the deployment

Performance Reporting and Dashboard

The Simulation tool will have an ability to generate performance reports for the selected performance metrics using data and information. The design feature should enable the extraction of data from the data sources and convert into Ms Office application (Power-point, Excel etc). The Dashboard facility can be utilized as the information management tool to display multiple data sets in central repository in various forms and shape

Automation and Digitization (Template Documents)

The Simulation Software internal automation capability should enable the automation of business processes in line with the predefined Business Process Landscape for optimal execution of tasks and activities to improve productivity, efficiencies and quality. The automation will also include relevant templates, documents and any other manual intervention relating to process, these will include automation of specific technical formulas relating to capacity

calculations i.e (Design, Theoretical, Stored and Operational Capacities for each commodity). In addition, automation will include document processing workflow ownership for verifications and approval milestones

Capability to Extract/Export Information

The system need to have a built in capability to export data, reports to other systems such as Microsoft Word, Excel, PowerPoint, Navis, IPMS, VTS and any data related system that may exist in the port environment.

Capability to Modify and Factor Changes

In case of any changes in the Port system with regards to the port infrastructure, equipment in relation to theoretical and installed capacities (e.g. berths, equipment, loading rates etc.) the system need to be flexible and allow such changes to be incorporated into the system, the analysis in terms of the impact as a results of such changes which will be made as and when required. The system need to also have a capability to show a before and after picture through dashboards once changes have been made. This simulation software must be able to factor congestion levels of the ports, weather delays and planned downtimes in the port for accuracy in results.

7. OPERATIONAL REQUIREMENTS

Abstract	Description
High-availability of the solution	The solution must be highly available as per the business need 24H/365D

8. FINANCIAL IMPLICATIONS

Respondents are to provide an order of magnitude estimate of their proposed solution for Transnet's planning and or budgeting and or business case development purpose.

a. Year 1 Software Development, Implementation and Commission: The budget for this Project initiative is R

- R = 9x Months – 100 % Implementation
- R = 3x Months – 100% Extensive Skills Transfer

b. Year 2: Post Implementation Support & Maintenance & Software License Fees (if applicable)

- R = 12x Months - 50% Remote & 50% Onsite Support & Systems Resolution

c. Year 3: Post Implementation Support & Maintenance & Software License Fees (if applicable)

- R = 12x Months - 50% Remote & 50% Onsite Support & Systems Resolution

d. Year 4: The Last period of Support & Maintenance & Software License Fees (if applicable)

- R = 12x Months - 70% Remote & 30% Onsite Support, Enhancement & Systems Resolution

9. COST

Estimated total costs for the Service Provider to conduct support, maintenance for duration of 48 months will be established when end to end project information is provided to TNPA

10. SIGNATORIES

Prepared by:



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Date

Recommended by:



Mahlasoa Madia (Manager: Capacity Enablement)

Date

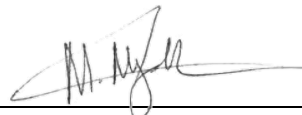
Recommended by:



Sonwabo Nkosana (Senior Analyst: Infrastructure)

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Approved by:



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03 November 2021

Date