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1. Introduction

1.1 Purpose

This document aims to be a clear description of the modules, procedures and general inputs and outputs of the ideal system that is up to date with the current institutional framework, utilising modern technology, will be used by the WaterFund in the foreseeable future (for at least 5 years). The proposed system should be easily adaptable to future changes and enhancements, both business and technological.

Therefore, the purpose of this SRS document is to provide a detailed overview of the software product, its parameters and goals. This document describes the system functional and non-functional requirements, its user interface, and hardware and software requirements. It will also help any designer and developer to assist in software delivery lifecycle (SDLC) processes.

1.2 Intended Audience and Reading Suggestions

This document will be used by the system developer to refer all the functional and non-functional requirements for developing a system that meets the standards and guidelines of the SRS document. The WaterFund implementation teams and other key stakeholders are also among the intended audience of this document.

1.3 Product Scope

The scope of the integrated system will involve the designing and development of a web-based project management information system, work plan tracking and performance contract system, monitoring and evaluation of projects as well as various office automation modules. These will be accompanied by relevant applications to enable access and use of the system through mobile devices. The project system will also include a dashboard to be embedded in the WaterFund's website to provide summary reports to the general public.

The project system will cover all the WaterFund's project cycle from pre-proposal stage, proposal development, and project implementation until post implementation stage.

More specifically the following encompasses details of the product scope:

i. Designing of a Web-enabled system to track project status. The Database and data model should be structured intelligently and appropriately to ensure ease of entry, quality management, access control, processing, visualisation, and reporting that includes a GIS / mapping system to provide spatial perspective to the project status data.

ii. Design and development of a mobile application for Android and iOS based devices with a provision for collecting data and working offline.

iii. The system will have appropriate security arrangements (e.g. for data backup data security, and allocation of access rights etc.).

iv. Design of an online dashboard in order to ensure that the parameters tracked are captured, conveyed, stored, processed, visualised, and reported in an adequate and timely manner to support project status review and adaptive decision-making.

v. The dashboards for reporting should be in easy-to-understand layouts to facilitate status reporting to a wide range of stakeholders. It should include tables, charts, maps, summary text and descriptions/comments with comparison of current status to historical progress and targets. The system admin should have access to raw data.

vi. Design of an integrated project management information system with application programming interfaces to fetch financial data from general ledgers on SAP BusinessOne and another to output the GIS databases for visualisation of project information on an external dashboard based on Carto DB.

vii. Design of a system to track work plans and contribute to performance contract, considering the institution's Strategic Goals, Key Results Areas, strategies, indicators, activities and outputs

viii. Design of various office automation modules that include: Petty Cash Request, Imprest Application, Imprest Surrender, Travel Request, Stores Requisition, Leave Management, Performance Management

(Quantitative & qualitative), Training Request, Institutional Calendar and IT Helpdesk

ix. The system development should have system documentation. This will include:

- **Technical documents:** The technical documents should describe in detail every aspect of the development process, from the point of defining the system through a detailed description of what went into the building of the system. No elements should be ignored – a detailed record of the work which has been done to date must be put down in writing
- **User documents:** A detailed and user-friendly document or manual should be provided for reference purposes
- Source code as part of business continuity planning.
- Training programme / curriculum and presentations / training materials to ensure the users are trained

x. The system should be implemented using modular system development approaches, which will include piloting, beta testing, customisation of each module, and user acceptance testing.

2. Overall Description

The Integrated Information System and all accompanying modules will be built on **SharePoint Online platform.** This section will give a requirements specification overview of the entire system. The system will be discussed in this context to show how users will interact with it, what features and functions will be available and introduce the overall functionality of it. This will also describe what type of stakeholders will use the system and what functionality will be available for them.

This section of the SRS describes the general requirements that drive the design of the software system. The goal is not to state specific requirements, but rather to provide context to make those requirements easier to understand. Lastly, the constraints and assumptions for the system will be presented.

2.1 Product Perspective

In the past, the WaterFund has implemented various systems to manage data for different programmes and for enhanced reporting. However, software applications as intangible assets depreciate in value or worth over time, but more commonly, business requirements change.

The WaterFund has in the past carried out corrective and adaptive maintenance in order to improve the software applications and/or to improve operability. This entailed adjustments of the database, application architecture, and/or source code to perform system workflows in a completely new way to enable the system to generate the required reports.

In the last several years, some areas of improvement and new functionalities have been identified that should be integrated to embrace recent developments in ICT and implement innovative ways that can enhance service delivery. In the assessment of the ICT and Monitoring and Evaluations teams at WaterFund, have concluded that the previously developed systems for project management are not meeting business requirements and need to be replaced with an enhanced system to also factor in the contemplated efficiencies to be realised through the work plan and office automation applications.

These systems include the Projects Management Information System (PMIS), Urban Projects Concept Information System (UPCIS) and SafisApp. It is thus envisioned that all previous project management systems will be replaced with a unified corporate project system, and hence the need for a systems integration project (SIP), culminating migration of data into, and rollout of the new system across the institution.

In-depth analysis of existing WaterFund tools was carried out in order to understand the full intentions of why these systems have been developed, how successful they have been, how easily they could be adjusted, and to explore how future ready they are. Documents that have this in-depth analysis include WaterFund's own concept note on the system's integration project[1]

The system would be accessible to users via web portal or mobile app. The objective of the system is to present project related information to end users at the click of a button. The system is envisioned to have a very neat and clean user interface with minimal to zero learning curve. Rather than having different systems to target each specific device, it will have a very responsive interface to accommodate personal computers as well as common handheld devices such as Tablets and Mobile devices. The interface will adjust to fit on mobile devices and expand on laptop computer to fill up screen space.

The mobile application will need to communicate to GPS sensors within the mobile devices, to capture the location of the user.

The GIS features of the system will provide the mobile and web applications with base maps and the functionality to display the project data on the map. The users should be able to capture coordinates and use the other functions in the application in a seamlessly manner. Both the mobile application and web portal should have an option to submit data to the database.

The system architecture is further decomposed as shown in the figures below.

[1] *Concept and Roadmap for WSTF's Systems Integration Project (SIP)*, WaterFund's ICT & M&E departments, July 2019. See: https://waterfund.go.ke/publications

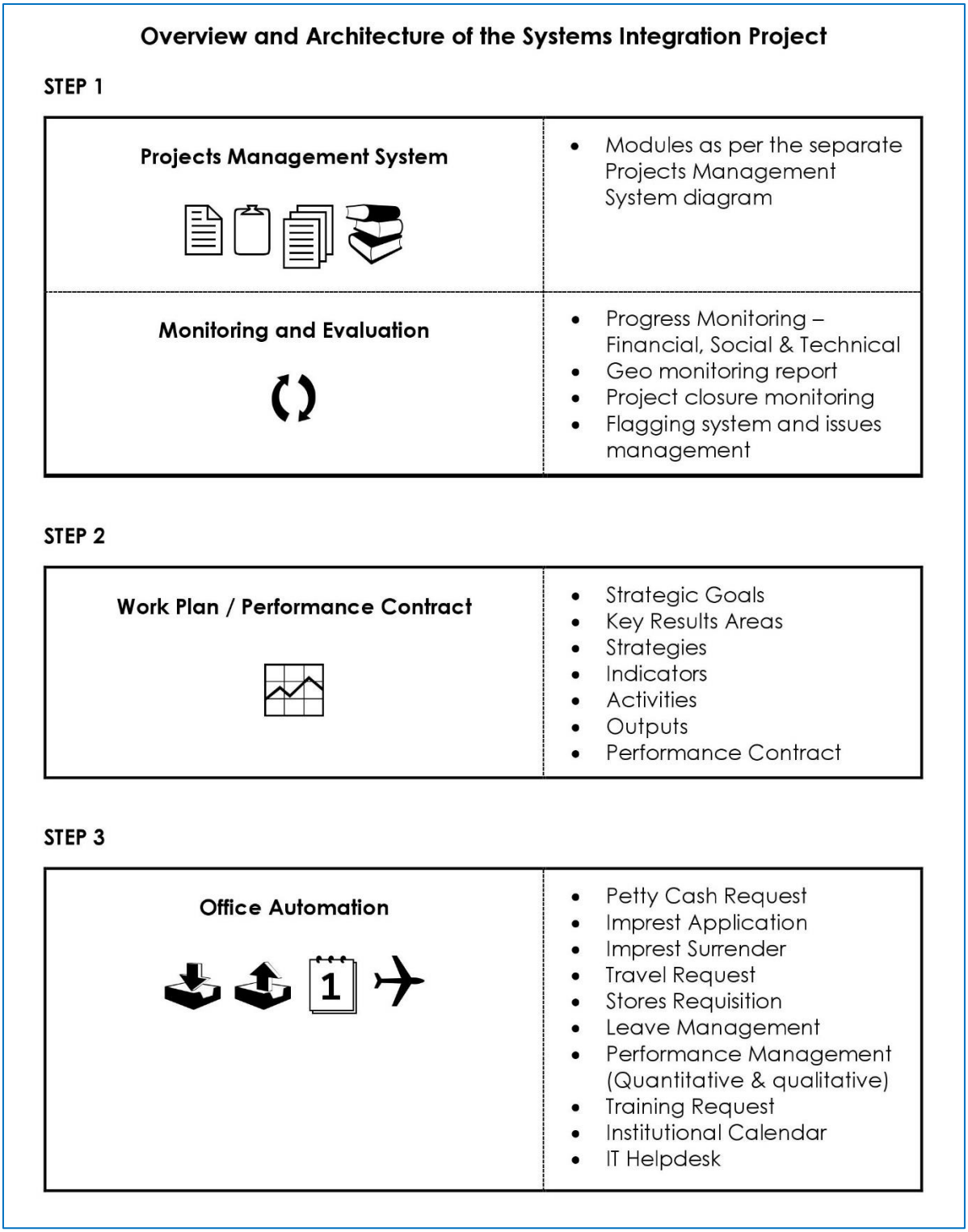

Figure 1: Overview and Architecture of the Systems Integration Project

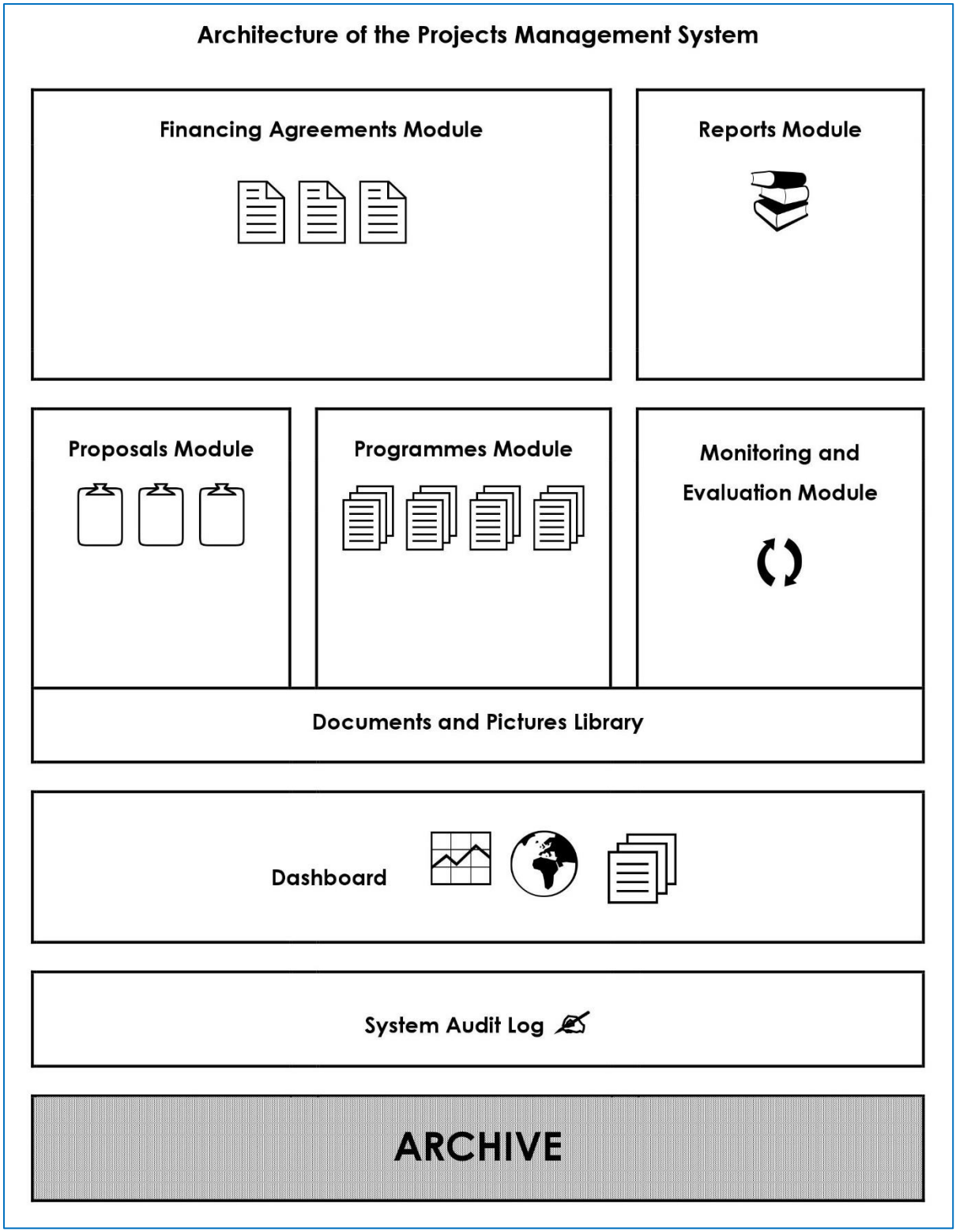

Figure 2: Module architecture of the projects system

2.2 Product Functions

The web portal will provide functionality to manage the system and the project information. With the mobile application, the users will be able to enter or retrieve information from the system. The result will be based on the criteria the user inputs. There are several search criteria and it will be possible for the administrator of the system to manage the options for those criteria. The result of the search will be viewed either in a list view or in a map view, depending on what criteria included in the search.

The projects workflow on related requirement of the WaterFund's project cycle is as shown below.

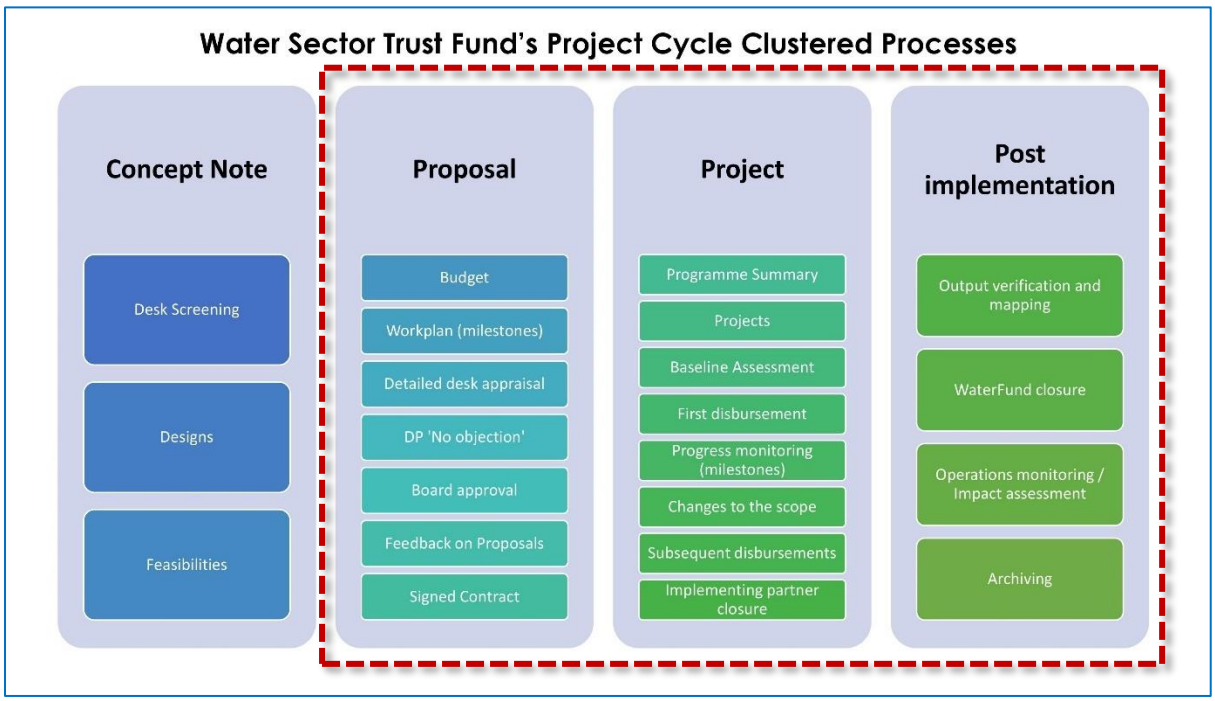

Figure 3: WaterFund's project workflow clustered processes showing the project system boundary

The data entry will encompass the following workflow clusters: (The Concept note cluster is not part of the project management module. Concept notes will be prepared and managed as part of proposal development.)

- **Proposals cluster –** highlights budget, definition of work plans, board approval, feedback on proposals, and signed contract
- **Project cluster –** describes or manages programme summary, projects disbursements progress monitoring change of scopes and implementing partners closure
- **Post-Implementation cluster –** highlights output verification and mapping, WaterFund closure, Operation monitoring and archiving.

2.3 User Classes and Characteristics

There are five categories of users of the system:

- Administrators: The administrators will be able to manage permissions, monitor apps, use app catalogue, toggle customisation options such as branding, navigation, page content etc., as well as configure the system using out of the box SharePoint Online features.

- Approvers: Reports/Information that is submitted by enumerators will require to be approved before updating the main database. When Approvers reject the reports / information the enumerators should be prompted to review.

- View and Update users: permission to add/update content that is assigned to their account on the system. Users will be able to view project information and feed specific project section information as assigned by the administrator

- System Auditors: Auditors will be view-only and have special access to the audit log and ability to generate audit reports

- General users: The whole system will be read-only to these users

2.4 Operating Environment

The server-side components of the software system will operate on **SharePoint Online**. The client-side components of the software system must operate within common web browser environments using Secure Hypertext Transfer Protocol (HTTPS) with mapped private ports. The mobile application should be able to support both Android and iOS devices. The minimum set of browsers that should be supported is:

- Google Chrome
- Microsoft Edge
- Mozilla Firefox
- Apple Safari

2.5 Design and Implementation Constraints

Developers of the system should be aware that portability, scalability, maintainability, reliability, testability, interoperability and security are important features of the system. Therefore, they should use common libraries and tools that can work with all the common internet browser application with no problem and provide the required level of data encryption. Developers should also be careful about the privacy of users. Since system will be web-based, all

user data will be kept on an online server and necessary precautions should be taken to protect user data. Developers should limit the privileges of the users so that they cannot harm other users' data and system server.

The users should be able to download system data when on an active internet connection and work on it with the ability to save when offline.

2.6 User Documentation

Any user of the software system is the target audience for user documentation generated about the software system. A range of short document types (e.g., guidelines, tutorials, and frequently asked questions) in Hypertext Markup Language (HTML) and/or Portable Document Format (PDF) format must describe the use of the software system. The "help" and "about" sections of the system should contain useful information.

2.7 Assumptions and Dependencies

A number of factors that may affect the requirements specified in the SRS include:

- The system will not require additional licenses apart from the annual subscription for Office 365.
- Users use single login credentials to access the apps based on their access rights.
- The system will be built on a relational database structure and the data model will utilise primary keys as well as secondary keys to ensure efficient storage of data.

3. External Requirements

This section of the SRS describes the following external requirements: user interface, hardware specifications, software requirements, and communication architecture.

3.1 User Interfaces

The user interface of the system should provide an organised method that separates each sections of the application for easy access. The user should be able to intuitively find the sections of the system using visual cues.

The user interface for administrative tasks must include the ability to manage Users, manage Groups, manage permissions, manage data templates and master records.

Pop-ups displaying notifications, error messages, or warnings should use the same theme and template as the rest of the application. Details on system interface are available in the functional requirements section of this document. The system will be simple with a friendly user interface.

3.2 Hardware Specifications

The minimum hardware requirement for accessing the system should be the following specs:

- 1GB RAM
- 1GB storage

3.3 Software Requirements

The software required to use the system via web portal will be Microsoft browser, Firefox, Safari or Chrome. The system should also be able to be accessed through mobile apps with offline capability. The system should support mobile devices that run on Android version 4.0+ or iOS version 6.0+.

3.4 Communications Architecture

The communication architecture must follow the client-server model. Communication between the client and server should utilise a web service and must be served over Hypertext Transfer Protocol Secure (HTTPS). *There should also be a staging server in place to store unapproved records.*

4. Functional Requirements and System Features

The features on the project management app include the Proposals module, the Programmes module, the Financing Agreements module, the Reports module, the Dashboard, Monitoring and Evaluation Module, Documents and Pictures Library, system audit log and archive.

The work plan / performance contract app includes Strategic goals module, Key results areas module, Strategies module, Activities module, Outputs module, and indicators for tracking activities that contribute to the institution's performance contract.

The Office automation system module features the following apps: Petty Cash Request, Imprest Application, Imprest Surrender, Travel Request, Stores Requisition, Leave Management, Performance Management (Quantitative & qualitative), Training Request, Institutional Calendar and IT Helpdesk.

4.1 Project Management System

4.1.1 Financing Agreements Module

The module shall accept and keep track of financing agreements between WaterFund, Government of Kenya (GoK) and the various Development Partners. This is a key function to the system and is a high priority feature.

Specifically, the Financing Agreements module should be able to:

- Allow creation of a financing agreement including: Summary of financing agreement, funding amount (grant/loan), GoK counterpart funds, County contribution, validity period of the financing agreement, key results areas, geographical location (Counties covered)
- Allow uploading of the signed financing agreement document
- Allow modifications to the Financing agreement

4.1.2 Proposals Module

The module shall accept and keep track of project proposals. Specifically, the Proposals module should be able to:

- Generate a Call ID under a specific programme
- Generate a unique Proposal ID for each proposal
- Present a form for entry of the proposal summary

- Allow for uploading of the proposal document in the prescribed format via email or web forms
- Submission of the proposal for review by the respective process owner
- Allow the process owner to edit the proposal and recommend for approval
- Keep progress track of the proposal status (draft, final, board approval)
- Upload key documents or scanned pages at the respective stage: Detailed desk appraisal, development partners' No Objection, board approval, Signed contract
- Allow manual archiving of proposals (irrespective of status) on demand

4.1.3 Programmes Module

The module shall allow creation of programmes and receive projects (from approved proposals) and keep track of these projects. These are key functions to the system, and are high priority features. The programmes module encompasses project implementation phase and some components of post-implementation as follows:

Implementation phase

- Allow creation (definition) of a programme (programme builder) with a choice of requirements (that affects all projects under the programme)
- Provide a programme summary screen
- Allow creation of a project from an approved proposal
- Allow input of the baseline information based on the proposal, including contract amount and contract period
- Allow receiving of project disbursement information from SAP, and manual keying in of the disbursement information (amount, date, tranche, beneficiary bank details, etc.)
- Allow capturing of progress monitoring data (financial, technical, social, etc.) including GPS coordinates and geotagged pictures through a mobile or client app into a draft record
- Allow for downloading one or a few projects information offline to the mobile app Projects section. This is in order to allow projects information offline access in the field when visiting the projects

- Allow exporting the project information to a suitable format e.g. XML, CSV, Excel, etc.
- Allow for approval of the progress monitoring data by the process owner
- Allow for changes in project scope and attach documentation
- Allow iteration of disbursements
- Allow for contract extension
- Allow for project closure (by the implementing partner) and attach documentation (including commissioning report)
- Allow for searching of the Documents library that stores all documents attached to the projects
- Allow for searching of the Pictures library that stores all pictures attached to the projects

Post-implementation phase

- Allow for keying in of information from the Output verification, Impact assessments and mapping reports.
- Allow for final project closure monitoring and accompanying documentation (such as bank account closure evidence)
- Allow for continuous operations monitoring of completed and closed projects
- Allow for project archiving of completed and closed projects that are older than 5 years

4.1.4 Monitoring and Evaluation Module

The M&E module allows the following functions:

- Progress Monitoring of projects – Financial, Social and Technical
- Geo monitoring report
- Project closure monitoring
- Flagging system and issues management

4.1.5 Reports Module

The system shall feature a Reports Module that can generate predefined reports, and has ability to create ad-hoc reports based on data stored in the system.

Specifically, the Reports module should feature the following reports:

- *List of system generated reports from the Reporting Requirements section*
- Report Builder for user generated custom reports

4.1.6 System Dashboard

The system shall feature a system dashboard that is able to pull highly summarised key information from the whole system, and display it intuitively in the form of pie charts, bar graphs, tables, etc. This is a key function to the system and is a high priority feature.

Specifically, the system dashboard should be able to:

- Display high-level information in the form of pie charts, bar graphs, tables, etc.
- Allow for display of georeferenced data
- Enable filtering of information as per various funding agreements, programmes, proposals, projects
- Allow insertion of summary text and descriptions/comments and comparison of current status with historical progress and targets.
- Allow for exporting of this summarised information from the dashboard

4.1.7 System Audit Log

The system shall maintain an audit log that captures every user's interaction with the system. This is a key function to the system and is a high priority feature.

Specifically, the system audit log should be able to:

- Capture all system logins and log offs
- Capture all edits and views of the user's interaction with all modules: programmes, projects, proposals, dashboard

- Allow for generation of audit trail reports by system auditors or administrators
- Allow for generation of audit trail by User ID, user class, activities and performed actions, period of time, etc.
- Allow for periodic automatic exporting (through email) of the audit log to a specified class of users (e.g. audit manager or system administrator)

4.1.8 Archive

The system shall feature an archive, which is a permanent repository of all funding agreements, programmes, proposals, and projects that have been archived.

Specifically, the system should be able to:

- Manually archive funded proposals
- Archive financing agreements, programmes and projects after their closure

4.2 Work Planning / Performance Contracting System

The work planning / performance contracting system includes the following modules:

- Strategic Goals module
- Key results Areas module
- Strategies module
- Activities module
- Outputs module
- Indicators for tracking activities

Some of these activities can be specified to contribute to the institution's performance contract.

4.3 Office Automation Apps

Office automation includes the following apps:

- Petty Cash Request – Users will be able to lodge petty cash requests to this app, and the request goes for approval to their supervisor and finally to Finance department
- Imprest Application – Request for advancement of money for an approved activity. The request must receive approval from the relevant department head or equivalent and finally being received in Finance
- Imprest Surrender – Accounting for the previously advancement imprest.
- Travel Request – Request for allocation of a vehicle and driver.
- Stores Requisition – Request for items in store managed by Procurement department. App should allow replenishing (restock), stocktaking, etc.
- Leave Management – Leave application (absence request) approval by supervisor(s) and finally to HR, escalation for overdue applications, leave quota management, leave earned, carry over, etc.
- Performance Management (Quantitative & qualitative) – Quantitative performance includes setting of performance objectives with appropriate weights by staff and approved by supervisor; half-year appraisal; and end of year approval. Qualitative performance includes Values and competency appraisal on specified criteria using a Likert-scale assessment, with possibility of assessment of the staff from senior, equivalent and junior colleagues in addition to supervisor. The aggregate score forms one item of the main performance appraisal.
- Training Request – Request for training by staff, and with approval by supervisor and HR, forms part of the training plan. HR can see the overall training plan for the institution.
- Institutional Calendar – this app will allow staff to publish their calendar of events or meetings for viewing by other staff.
- IT Helpdesk – app to log in support requests, issue tickets and track them to resolution.

5. Reporting Requirements

Reporting is a major function envisioned for the system. Reporting communicates a programme or project's impact on an organisation to the relevant stakeholders. Reports will provide a summary of the overall performance, the degree to which the funded projects have been realised and any key achievements. This allows maintaining of high accountability standards and for improving of the quality of information and ultimately continuous learning.

5.1 Types of reports generated

The system should be able to generate the following reports:

a) Executive Reports (Board of Trustees and top management)

   This will be a summary of programme reports and would include the following:

   - Financial performance (absorption)
   - Technical (projects performance)
   - Risk management report
   - Summary of challenges

b) Donor reports

c) Programme Reports

d) Project reports

e) Special purpose reports (ad hoc)

f) Monitoring and evaluation reports

   - Field visit reports
   - Project issue logs
   - Projects mapping

g) Work plan reports

5.2 Key fields for the report

1) Summary of the programme

- Outcomes areas
- Cumulative output areas
- Targets for particular outcomes
- Cumulative achievements / impact (periodically based on the set frequency)
- Cumulative financial performance
- Changes of scope (Financial, technical, geographical targeting etc.)
- Cumulative summary of flagged projects (number of days to receive funds from the exchequer)

2) Project report (What sort of report is the system expected to generate?)

i. Summary of the project

- Name of the project
- Contract amount and contract period
- County
- Sub County
- Constituency
- Ward
- WRA Region
- WRA Sub Region
- KFS Conservancy
- KFS Forest Station
- Other conservancies
- Contract period (Start date and End date)

- Targets (Infrastructure, no. of people reached, area conserved, no. trainings, etc.)
- GPS coordinates
- Project contacts (Executive, telephone numbers, address)

ii. Outcome areas

- Non-revenue water reduction
- Service levels (1-4)
- Round trip time
- Area in kilometres conserved
- Incidences of water related diseases (typhoid, cholera, etc.)
- Improved forest cover
- Improved income levels

iii. Cumulative output areas

- Number of Water Kiosks installed
- Number of water connections
- Number of Public Sanitation Facilities
- Number of House hold sanitation facilities
- Number of DTFs
- Number of Rain Water Harvesting Tanks
- Number of Water pans installed
- Number of common intakes constructed
- Number of steel tanks
- Number of concrete tanks
- Number of Masonry tanks
- Number of hectares rehabilitated
- Number of Kilometres pegged
- Number of sewer connections

- Number of Nurseries Established
- Number of surveys undertaken
- Number of tree seedlings raised
- Tree survival rates
- Number of people/ households reached, etc.
- Funds disbursements
- Expenditures
- Receivables

iv. Targets for particular outcomes (as per specific project contracts)

v. Targets for particular outputs (as per specific project contracts)

vi. Cumulative achievements / impact (periodically based on the set frequency- Monthly basis and draw data from the outputs indicators)

vii. Cumulative financial performance (periodically based on the set frequency - Monthly basis and draw data from the outputs indicators)

viii. Changes of scope

- Financial (Addendums, variations)
- Technical (Change in design, site, quantities, activities, etc.)
- Geographical targeting (County, sub-county, location, village etc.)

ix. Cumulative summary of flagged projects from flagging system and Issues log

- Delay in projects implementation
- Delay in funds disbursements
- Variation in contract
- Projects questioned costs
- Project completion rate (Time, expenditures, quality and volume of work done)

6. Non-functional Requirements

The following requirements describe how the system will run/work properly as per limitations on timing, limitations on the development process and standards. These requirements are not applied individually to each function but on the whole system. Each requirement must be objective and quantifiable; there must be some measurable way to assess whether the requirement has been met.

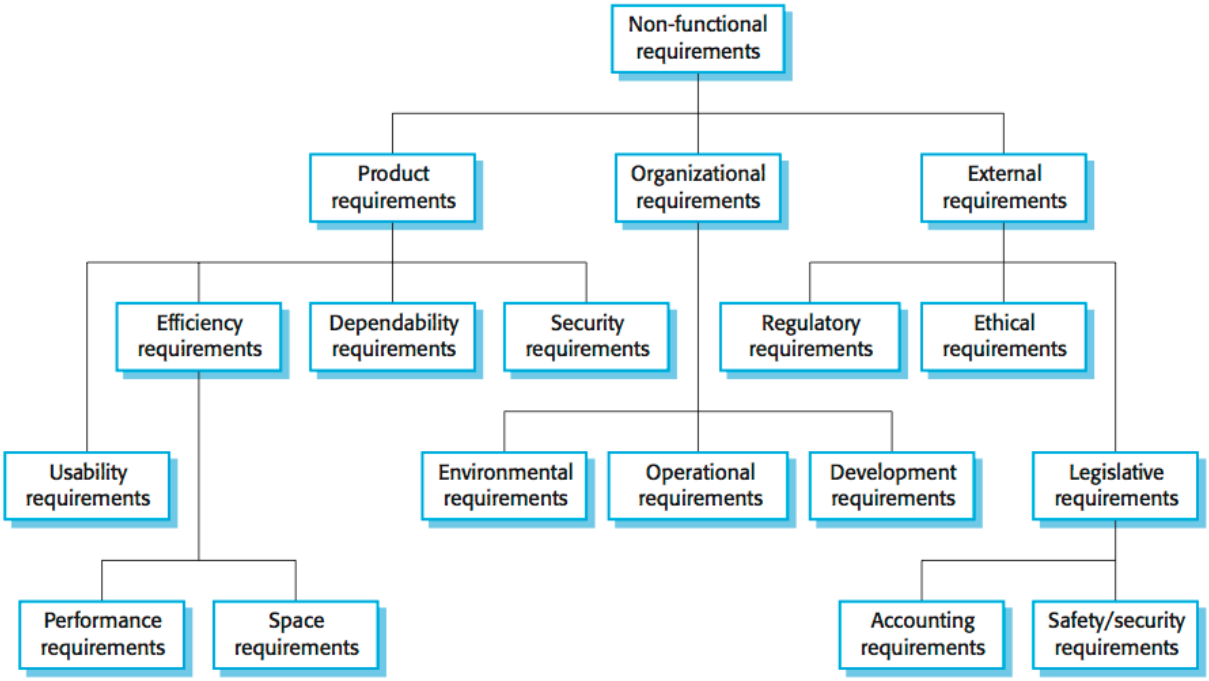

Figure 4: Categorisation of non-functional requirements

6.1 Accessibility

The System will be a web-based application and hence should easily be accessed from any standard operating system if the supported browser is installed. It should also allow access on mobile devices. The access to the system via the internet should ensure enhanced security of Data using authenticated data access and activity Logs. Apps for both iOS and Android based devices should be available on online app stores free.

The system should have GIS capabilities with a user-friendly interface to locate project activities and investments. The GIS data should be exportable to enable WaterFund to analyse the GIS data on other GIS software or utilise processing power of other online servers.

6.2 Availability

The entire system shall be available for use 24 hours a day, 7 days a week. The maintenance weekends are allowed but must be announced 2 months in advance. The maintenance weekends mean that the system is off-line during 48 hours for maintenance activities.

6.3 Capacity and Performance

The system should have the ability to receive and store data and information in large volumes without compromising its performance. Notwithstanding the storage volume, the system should have the capacity to perform and withstand any kind of loading that comes with the demand on system resources. The capacity includes but is not limited to the following areas:

I. Data Storage and Data Backup: The system data storage shall provide authorised user ability to perform an automatic periodic backup of the system data and to restore the system data from the backup in case of system failure. The system data storage shall provide the authorised user the ability to Add/update/remove data in the data storage as well as Perform periodic clean-up and update of data.

II. Disk space consumption: The client applications of the system shall consume not more than 500MB of disk space. The host part (system image and data) shall consume not more than 1TB of disk space

III. Memory consumption: The host part of the system shall not at any point in time consume more than 2000MB of RAM for load generated by one user on average. The client part of the system shall consume not more than 500MB of RAM at any point in time. The average memory consumption must be not higher than 1GB.

IV. Number of concurrent users: Under the condition that the host system fulfils the hardware requirements, the system shall support concurrent work of at least 100 users that are logged on to the system. The response time must not exceed 30 seconds. The DBMS for the data storage must be available and provide enough user licenses to ensure full functionality. The software should enable generating reports for multiple users at a time.

6.4 Compliance

The entire process of development and implementation of the system should conform to the standards and regulations set by the Institute of Electrical and Electronics Engineers (IEEE) and ISO. The performance of the system will be evaluated using IEEE 730, 828, 829, 830, 1012, 1016, 1058, 1063 and ISO 9000

family for Quality management and 27001 for Information Security management systems.

6.5 Documentation

The system documentation shall be sufficient to instruct a basic user on how to start using the functionality of the system immediately. The documentation shall describe all implemented system functionality. The advanced user roles must be able to start using all functionality of the system after 24 hours of instructor based training. The user in the user role "Enumerator" must not require instructor-based training to fill in basic data. The user in the user role "Administrator" must be able to install, maintain and troubleshoot the system after the training. All technical guidelines must be provided as part of the user manuals.

The system shall provide the on-line user documentation and a help subsystem within the client app. The on-line user documentation provides context-dependent help for all user interface functionality and should include a Frequently Asked Questions (FAQ) section. The help subsystem includes the description of all entities and functionality. The documentation shall contain table of contents and index. The user must be able to perform search in both on-line user documentation and help subsystem. All system messages, texts, log entries and help documentation must be in English.

6.6 Disaster recovery

The system developer should be acquainted to the ever-growing instances of remote attacks that targets the data stored for selfish gains. This therefore requires the vendor to provide early warning systems and means of disaster prevention at the onset of development. Periodic/daily back-ups should be enabled to allow storage and recovery of system image, data and information in case of invasion or system failure. The system should be secured using data and database encryption techniques.

6.7 Effectiveness and Efficiency

The system should be competent in performance and should be able to accomplish all required tasks with the least time utilised and minimum effort deployed. It should enhance performance by providing simple steps for each process to produce the intended/expected result within the intended timeframe.

6.8 Extensibility

The upgrade of the system must fulfil the same functional and quality standard requirements and preserve all user data: projects, tasks, resources, project portfolios. The development of the system should be cognisant to the future conditions or occurrences and be able to adapt to the dynamic world of computing. The system shall provide version control and source code management. Comprehensive system documentation and provision of source code is an integral part of business continuity planning.

6.9 Fault tolerance

The system should maintain an acceptable level of operation despite a section/module of the system malfunction. The System Malfunctions and Database should be automatically checked for correctness. If there are faults, the system should be able to troubleshoot and run integrity checks to provide means for making the required corrections.

6.10 Inter-operability

Implement APIs and an import-export feature for secure integration with other systems and/or departments e.g. finance and accounts to uploaded instead of manually entering the data.

6.11 Maintainability

With a valid maintenance contract in place, the time from finding a critical bug until it is fixed should on average take no longer than 48 hours (2 working days). There has to be a monthly hot fix package release that fixes major critical bugs. Non-critical bugs must be fixed within 3 months after they were found.

6.12 Portability

The system should be designed such that it can be moved to a different target platform in less than 21 days without requiring additional deployment costs.

6.13 Privacy

The system should protect sensitive data and computation at runtime. WaterFund must maintain full regulatory compliance while also protecting institutional and partners'/customers' data. Data is protected at rest, in transit

and, most importantly, at runtime. The cloud should not read the data or access the application logic, queries, or proprietary workflows.

6.14 Quality

The system shall have sufficient quality and a low Error rate. The system should allow fixing of errors using Patches and updates. Provide log information about its state, running processes and encountered errors. The system shall be able to detect failed services and connections and restart them automatically. The system shall provide full information about failures and errors. The information shall include: time of failure, origin (subsystem or component) where a failure occurred, severity and description of error or failure. Diagnostic information shall be logged and saved in independent data storage (disk file or database).

The software should come with a high quality source code that is clean and will stand the test of time. This means that it does what it should, follows a consistent style, is easy to understand, has been well-documented and can be tested. The quality of the source code is critical and all coding errors should be corrected to eliminate system security risks.

6.15 Reliability

The system should have an in-built strategy for error detection, and a strategy for correction of errors to avoid/ protect failures as well as fixing Bugs in the code, hardware failures, or problems with other system components. Example: The database update process must roll back all related updates when any update fails.

6.16 Resilience

The system shall not have any single point of failure. All critical services of the system (data storage, communication subsystem) must be replicated. The system architecture shall allow the use of cluster hardware and support multi-processor systems.

6.17 Response Time and Task Times

Tasks must be done within the specified time by the particular users under the condition that user has completed training in the system functionality. Time required per data set must be no longer than 3 minutes.

Under the condition that the host system fulfils the hardware requirement, the Start-up time (time between initiation of the system start-up and availability of full system functionality) must be no longer than 1 minute.

6.18 Scalability

The system should be able handle large volumes of data during peak times without yielding or noticeable challenges in performance.

The system shall not have the limitation on the number of projects portfolios, projects, tasks, subtasks, users, user roles, dependencies, resources and other objects. It should support Unlimited Number of data fields and allow the administrator to robustly define the extent of the databases.

6.19 Security Requirements

The system authentications should integrate with the Active Directory of WaterFund. The system will access users present in the Active directory, and provision a user management feature to add external users. The system shall protect the data and services from unauthorised access. The system shall also provide authentication and secure transaction.

The system shall ensure secure and tamper proofed data exchange between parts of the system and the user. All data send over network (LAN or WAN) must be encrypted. The encryption mechanism must be defined as well.

All users will have a login ID and a password to connect to System via Web Application.

Users will be divided into User Groups / Roles so that different types of access can be given based on the forms authentication the user belongs to; The system shall provide a mechanism of user authentication to unambiguously identify a user. User groups / Roles will have privileges based on their requirements and authority. The system shall implement Role based Authorisation / Access control model.

The system shall audit some business activities performed by user. The audit entries must be tamperproof or at least tamper evident and be stored in a secured storage. All audit entries must at least contain User name that has performed an action, Time stamp, Action description, Activities that are audited, global events such as logon, logoff, password changes, creation, editing, deletion of user or user role, assigning and reassigning permissions to roles, all security exceptions

6.20 Testability

The first month after deployment is for testing and the system should allow use of test databases. The subsequent six months of handholding period for system's usage should allow for optimisation and a reasonable level of change requests.

7. Other Requirements

7.1 Database Requirements

The system database will provide for an automatic, highly secure system audit and trailing management to ensure any changes are accurately documented. The database will allow for frequent communication and seamless integration with existing databases (see integration requirements). It will allow development of custom reports in line with requirements as may be demanded by the various users, i.e., Management, Programme Staff, Development Partners and other stakeholders.

WaterFund's admin role should have absolute access and control rights to the database.

7.2 Legal Requirements

The system will be the property of WaterFund. The Kenya Copyright law will be used to protect this software as an original idea that will not be copied without authorisation from WaterFund. The intellectual property rights, patents and trademark rights to the software and the source code will remain exclusive property of the WaterFund. Any commercial or social use, modification and application of the software will require written approval by the WaterFund.

7.3 Data Reconciliation

The system will ensure a verification phase is undertaken during data migration where the new database is compared against the original source data to ensure that the migrated data architecture has been transferred correctly. This will avoid missing records, missing values, incorrect values, duplicated records, badly formatted values and broken relationships across databases or systems.

The data reconciliation process will be undertaken through the following methods: master data reconciliation, transactional data reconciliation and automated data reconciliation which is a critical part of the process.

7.4 Data Migration

Data may be migrated from the WaterFund's legacy systems (PMIS, UPCIS and Safisapp) and databases as per requirements. The data to be migrated will be cleansed, rationalised, transformed (if required) and reconciled (see reconciliation requirements). Queries, scripts or conversion programs may need to be written to handle this task.

The total data migration scope will be finalised by the WaterFund with the consultant developer. The following is the indicated list of the type of data to be migrated from the legacy/ manual systems.

i. All Master Data – Must be migrated
ii. All open programmes – Must be migrated
iii. All transactions in the current financial year – Must be migrated
iv. Historical Transactions – for active programmes

7.5 System development, testing, customisation and piloting

The system shall be developed following a phased approach as follows.

During the Phase 1, the proposed SRS shall be translated into an executive design. The latter shall include the definition of architectures, design of the system wireframes, the definition of testing procedures and design of scaling procedures. Once all details of the design are well defined and approved, the system development shall proceed to Phase 2.

During Phase 2, the system code will be written or customised, beginning with Project System (Step 1), Work plan system (Step 2) and Office automation (Step 3). Priority must be given to the Project Management module, as the delivery of other steps will be contingent on successful delivery and demonstration of an effective project management system.

Under this phase the test system and requested documentation will also be developed. The WaterFund shall evaluate the deliverables of Phase 2 for compliance with the executive design and using the test procedure agreed to in Phase 1. Successive investment programmes will be tested through the system and feedback for further improvement implemented. After the successful completion of Phases 1 and 2, the development will proceed to Phase 3.

Under Phase 3, tasks include piloting, applicable data migration and user acceptance testing. The system will then be fully deployed for the current WaterFund programmes during the financial year within which the system is completed. This will be accompanied by training.

In Phase 4, the consultant shall provide for a six months handholding period that shall include System maintenance such as fixing bugs, customising additional required dashboards and reporting formats and completing non-compliant System features discovered after the User System Acceptance Testing.

The deliverables for all phases shall include detailed documentation and the source code of the product that will be handed over in an appropriate format to the WaterFund during the system handover. This shall give the WaterFund

assurance on the quality of the products in terms of readability and programming style and ensure high quality throughout the duration of the project. It will also provide the WaterFund with a fall back plan in case of bottlenecks in the system as well as provide possibility of future improvements in the system and agility in required reviews further enhancing the system's shelf life.

7.6 Deployment Strategies

The system shall be deployed using the cut-off strategy. Under this strategy, upon completion of the user testing and acceptance, the WaterFund shall communicate a cut-off date where any further programme investments and activities will require to be undertaken in the system.

Constant monitoring will be required at this point to address any emergent system implementation challenges as well as technical backstopping to all the stakeholders.

7.7 Integration Requirements

All required external and internal systems shall be integrated on a continuous basis using an integration middleware layer. The scope of integration of external systems includes IT systems already existing and functional. The integration is expected to be on-line real time or batch where appropriate and shall operate in an automated fashion without manual intervention.

The scope of external integration will be, but not limited to:

i. SAP BusinessOne for financial information sharing both as a programme input and integration in the work planning/ budgeting modules
ii. Desktop applications such as QGIS
iii. QPulse for issues management and escalation services
iv. WASH MIS for data collection of geo-information for projects baseline and monitoring instances
v. Geo-Node for management of Geo-Information Databases
vi. MajiData for mapping of the low-income areas under the investment programmes
vii. Integration with existing messaging and email system

The integration middleware shall be open architecture based. Transactional as well as standing or master data to and from the offered system will require to be interfaced.

Data to be integrated must be validated by the developed interfaces. The data to be integrated will be mapped, transformed (if required) and reconciled automatically.

All interfaces are to be self-checking so that any exceptions or data validation errors are reported by the system. In addition, integration logs should be maintained that confirm the success or otherwise of the interface, complete with control totals.

7.8 Licensing and Maintenance Requirements

The system-licensing regime will be based on WaterFund's existing Microsoft Office 365 subscription.

The developer should provide a comprehensive BoQ for an annual maintenance contract with rates to be discussed and agreed upon with the client. The maintenance contract shall enable the developer to supply of all patches, updates, and bug fixes after completion of the handholding period. The maintenance contract shall provide warranty for a minimum of 1 year extended support (next business day resolution) for all system components including reloading and reconfiguration of all software if required.

7.9 Knowledge Transfer Requirements

Implementation of new or changed business processes will affect the use of the system in WaterFund. During implementation, the WaterFund's system implementation project manager will be supported to create and maintain effective communication and knowledge transfer strategies vital to the successful implementation of the project.

Onsite and offsite training and knowledge transfer sessions will be undertaken to ensure that the WaterFund's staff have adequate technical capacity to effectively and efficiently manage the system.

User-friendly operations manuals shall be developed for ease of reference for the users. These will be provided for in a separate module in the system. The manuals will be updated regularly after every system update for continued suitability in application.

7.10 Managing Change Requests

It is expected that during the handholding period, functional requirements change requests to the system might be received from the users. Once these are received, the WaterFund's system implementation project manager will track these and compile them for passing on to the developer, agreeing on a delivery period. Furthermore, these change requests will be handled according to the System Enhancements and Change Management section of WaterFund's ICT policy.