Business Requirements Document
Malaria Information System

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Document Control

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1 Introduction

The Malaria Information System is the backbone of South Africa's malaria elimination program. It is a disease surveillance system that equips decision makers at the district, province, and national levels to efficiently and strategically manage the malaria program based upon disease incidence, intervention, and operational data.

1.1 Document Purpose

The purpose of this document is to outline the business requirements for an upgraded Malaria Information System (MIS). The document will assist in the development of the upgraded Malaria Information System and to initiate the development of a scope of work document.

1.2 Objectives

The objective of the project is to deliver a national Malaria Information System that is able to capture, store report on, and inform decisions based on information collected within facilities and at local levels. It is a surveillance system that will serve to manage program implementation and monitor program effectiveness as required by the National Department of Health, Provincial Departments of Health (KwaZulu-Natal, Limpopo, Mpumalanga, Gauteng, Northwest), and National Institute for Communicable Diseases. A strong Malaria Information System will undergird South Africa's malaria elimination activities and reporting. The Malaria Information System will replace existing information systems, but will be integrated within existing operational processes.

1.3 Background

South Africa's existing malaria surveillance system is a combination of vertical systems at province level with manual capturing of paper case notification forms, paper case investigation forms, spraying forms, and other data into local district databases. For surveillance data, Limpopo and KwaZulu-Natal (which is split into Jozini and Richards Bay) provinces use Access Databases, while Mpumalanga uses a Microsoft (MS) SQL Database with an ASP.Net front end. Data is then uploaded into a national database via an upload tool into a MS SQL database. Data uploads are done by a resource weekly from the provincial systems to the national database at NICD. There is web based reporting capability feeding from an MS SQL database. Mechanisms for capture and storing of intervention and reference data also vary by province, with data sets stored in vertical databases and excel files.

South Africa has committed to eliminating malaria by 2018, a goal which is not possible with the existing surveillance system. The Malaria Information System must be rationalized, centralized, and upgraded for the program to move forward in coordination—with national strategy based upon accurate understanding of progress on the ground, and program implementation driven by real-time high-resolution data.

2 Scope

2.1 Inclusions

The users who will be affected by this development will be all district, provincial, and national users.

2.2 Context

The current project will include

- Development of web-based interface for data capture of paper based forms
- Development of an Android-based mobile interface for data capture and data-driven decision making from the field, replacing paper forms and enabling more effective implementation of program activities
- Development of a DHIS 2 Aggregate database to host the data
  - DHIS 2 Aggregate database has modules for malaria cases, case investigation, foci investigation, vector control, entomology, health promotion, training, commodity management, and reference data
  - Users at the district, provincial, and national levels are able to upload data and process reports based upon near-real time data at any time
  - Protocol for closing records to further updates at the end of reporting periods

- Development of a core group of standard reports generated by provincial and national users
  - Including GIS capability
  - Easy querying capability
- Complete and sustainable integration of the MalariaConnect reporting system
- Ability to interface with other existing systems, such as other public health systems that will need to feed or output information into the National Malaria Information System e.g laboratory data, Akros, etc.

3   Current System

3.1   Users and role players

National and Provincial users/ role players:

- National Managers
- Provincial Managers
- National Information Officers
- Provincial Information Officers
- Data Entry Clerks/ Data Capturers

District users/ role players:

- District Managers
- Environmental Health Practitioners (EHPs)
- Case Investigators/Team Leaders
- Surveillance Officers/Surveillance Agents
- Spray Operators
- Entomologists
- Lab Managers
- Health Promotion Managers

3.2   Business Processes

3.2.1 Routine Activities

Activity	Description	Key Role Players	Forms
Indoor Residual Spraying (IRS)	• Identify houses that should be sprayed with insecticide based upon risk factors to plan annual IRS campaign • Hire and train seasonal staff to undertake spray campaign • Purchase consumables (protective clothing, insecticides, spray canister parts, etc.) • Develop detailed spray plan to allocate resources (HR, vehicles, fuel cards, consumables) • Ensure community is aware of IRS campaign plan • Implement IRS campaign • Monitor spray coverage against targets, quality of spray coverage, and efficiency of teams	• Provincial Managers • Provincial Information Officers • District Managers • EHPs • Spray Operators • Data Capturers	• Spray plans • Spray coverage forms • Hut Cards

Entomology	• Identify areas to undertake entomological surveillance based upon risk, rainfall, and activities from the previous year • Undertake entomological surveillance, catching mosquitos in selected areas to understand vector bionomics and potential resistance • Develop seasonal report on changes in population density and habits, which can inform planning of IRS	• Provincial Managers • Provincial Information Officers • District Managers • EHPs • Entomologists	• EP2 • EP3 • Hut Cards • Bioassay
Health Promotion	• Develop implementation plan based upon risk factors and activities from the previous year • Implement media awareness campaigns (radio, signage) • Implement community awareness campaigns • Implement door to door campaigns	• Provincial Managers • Provincial Information Officers • EHPs • Health Promotion Managers • Data Capturers	• *Unknown*
Foci Classification	• Desk review incidence rates and intervention coverage from the previous year annually to reclassify foci of transmission • Undertake thorough annual foci investigation to confirm the classifications of the desk review • Develop revised profiles for each foci, with descriptions of the foci and recommended response protocol	• National Managers • National Information Officers • Provincial Managers • Provincial Information Officers • EHPs • Case Investigators • Entomologists	• Annual foci classification form
Operations Management	National • Revise Annual Performance Plan (APP) targets • Develop Operational Plan to deliver on APP targets • Develop budget for Operational Plan • Track performance against Operational Plan, and spend against budget, quarterly Provincial • Annual budgeting • Track spend against budget quarterly	• National Managers • Provincial Managers	• Annual Performance Plan • Operational Plan • Budget Submission
Information Management	• Regular data validation and monitoring of data quality • EPR monitoring • Monitoring of case investigation rates and key operational indicators to improve program performance	• Provincial Information Officers • EHPs • Provincial	

3.2.2 Reactive Activities

Activity	Description	Key Role Players	Forms
Passive Surveillance	• Health Care Worker diagnoses malaria case • Health Care Worker completes paper notification form • Health Care Worker submits MalariaConnect notification • EHP, Case Investigator, and Information Officer receive real-time notification of case from MalariaConnect, triggering response activities • Case Investigator collects paper notification form from facility during routine follow up • Paper forms are captured by Data Capturer • Information Officer validates the data periodically	• Health Care Worker • EHP • Case Investigator • Provincial Information Officer • Data Capturer	• Case Notification Form • MalariaConnect
Case Investigation	• When a MalariaConnect notification is received, case is investigated by Case Investigator based upon foci response protocol and within 72 hours of patient diagnosis • Case Investigator completes Case Investigation Form • Case Investigation outcome is approved by EHP • Paper forms are captured by Data Capturer	• Case Investigator • EHP • Data Capturer	• Case Investigation Form (electronic and paper: paper to be replaced by the electronic form if system is proven stable)
Foci Investigation	• If required by foci protocol, foci investigation is undertaken subsequent to Case Investigation and based upon the results of the Case Investigation • Foci Investigation Form completed • Paper forms are captured by Data Capturer	• Case Investigator • EHP • Entomologist • Data Capturer	• Foci Investigation Form (electronic and paper: paper to be replaced by the electronic form if system is proven stable)
Active Surveillance	• Rapid Diagnostic Tests are taken as part of Case Investigation, based upon foci protocol • If positive, Case Investigator completes Active Case Notification Form and refers the patient for treatment • Blood smears are taken as part of Case Investigation, based upon foci protocol • Blood smears are processed in Malaria lab • If positive, results are returned to the patient and Active Case Notification Form is completed • Follow-up blood smears are taken by Case Investigators	• Case Investigator • Lab Manager • Data Capturer	• Active Case Notification form (electronic and paper: paper to be replaced by the electronic form if system is proven stable) • *Lab forms unknown*

	and processed in Malaria lab according to foci protocol		
Entomological Surveillance	• Entomologist does spot checks in areas of risk regularly, if there is an outbreak, or subsequent to Case Investigation if required by the foci protocol • Entomologist undertakes larviciding, if required by spot check • Entomologist/Lab Managers undertakes QA on % of slides submitted through active surveillance • Data is captured by Entomology team	• Entomologist • Lab Manager	• *Unknown*
Health Promotion	• Health Promotion activities are undertaken by Case Investigator or EHP in the community in the event of an outbreak, or if required as a response to case notification by foci protocol	• Case Investigator • EHP	• *Unknown*
Indoor Residual Spraying: Mop-Up (IRS)	• Mop-up IRS is undertaken by EHP and spray team, in the event of an outbreak or subsequent to Case Investigation if required by the foci protocol • Spray coverage forms are completed by spray team, approved by EHP, and submitted to Data Capturer	• EHP • Spray Operator • Data Capturer	• Spray coverage forms

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5 Requirements

5.1 Functional Requirements

5.1.1 Web-based data entry

- Case Notification: Active or Passive
- Case Investigation
- Foci Investigation
- Spraying
- Entomology
- Health Education\Promotions
- Follow-Ups/Smear Re-takes
- RDT usage

5.1.2 Mobile Android-based interface

- Receive MalariaConnect and web-entered case notifications
- Electronic Case Investigation forms, prepopulated with fields captured during notification
- Electronic Active Case Notification forms

- Electronic Foci Investigation forms

5.1.3 Integration of MalariaConnect

- Hosting of MalariaConnect data set, validated against web-entered case notifications
- Processing and administration of MalariaConnect SMS and email services

5.1.4 Database functionality

- Centralised database for all data sets across all provinces
- Allow data query both for standard queries and ad hoc queries
- Data cleaning and validation of reports: number of duplicates, extent of missing information (minimum dataset vs complete notification), unclosed case investigations

5.1.5 Database modules

- Malaria Cases: passive case notification (MalariaConnect and web-entered case notification), active case notification, case investigation
- Foci Clearing
- Spraying
- Entomology
- Health Promotion
- Training
- Commodity Management

5.1.6 Real-time reporting

- Standard National and Provincial Reports
  - National and provincial NMC Report
  - MNORT Report
  - WHO Report
  - M&E Scorecard
  - Annual Performance Plan
  - Annual Report
  - Malaria Status Report
  - SADC Report
  - E8 Scorecard
  - SARN Report
  - RBM ReportEPR Monitoring
  - Weekly summaries
  - Monthly summaries
  - Trainings
  - Descriptive maps
  - Stratified maps
  - Predictive maps
  - M&E of operational activities
- Standard District Reports
  - Instructions for response to cases based upon foci protocol
  - M&E of operational activities
- Common Ad Hoc Reports
  - Number of cases per district, municipality, locality, per week, month, calendar year, malaria area, financial year, season
    - total, local, imported, unclassified, local and unclassified
  - Number of local cases per source locality per week
  - Number of cases per malaria area per month
    - Source of infection: active/passive
  - Number of cases, deaths per district, municipality per month, financial year, calendar year, season
  - Number of cases per district, municipality per start-end-date
    - Age category
  - Number of blood smears (case investigation) per malaria area per month
  - Number of cases, deaths, pregnant cases, under 5 age cases per district per month
    - total, local, imported, unclassified, local and unclassified

- Number of incidences per district, municipality per season, calendar year
  - total, local, imported, unclassified, local and unclassified
- RDT usage per health facility, per week, month, calendar year, financial year, season
  - Issued, administered, positive, negative
- IRS Summary per malaria area, municipality, district per week, month, calendar year, financial year, spray round
- Insecticide use per malaria area, municipality, district per spray round

5.2   Non- Functional Requirements

- **Usability:** The system must be able to replace the current system processes without creating extra functionality/work for the users. The system must able to be used by users with basic computer skills. The system must be standardised across all provinces.

- **Reliability:** Data validation must be available on certain fields to reduce capturing errors e.g date of birth validation or ID validation. When the system crushes there should be a backup available to restore the data. When there is no network access the system should be able to store data locally and upload when connectivity is back in cases where access is an issue.

- **Performance:** The system must allow use in poor network environment where internet access is poor and slow. The system must be quick to respond when querying complex data queries and be tuned for performance as data changes over time.

- **Security:** The system must allow access control. Not all users should have access to all components of the system but be restricted access to their specific profile. Certain user must be restricted to delete records and if they are allowed to records they should have an audit trail.   A provincial user should only be able to view and edit data for their specific province and district. Users can query or run reports from other districts.

- **Data Integrity:** Data stored in the database should be accurate and consistent. The data must be backed up daily and be able to be restored when required.

- **Capacity:** The system should allow huge volume of users at the same time without compromising on performance as users will be connecting from different provinces. The storage of data should be able to handle huge volumes of data including migration of data from legacy systems. Running of reports should allow running of complex queries from multiple users without compromising on performance.

5.3   Acceptance Criteria

The MIS system will be declared acceptable when its able to replace the current existing decentralised systems at province level and be able to migrate all existing data from the legacy systems. The system should be able to replace the paper based system currently in use with a web based capturing tools, all required reporting and query components including GIS. The system should have a data storing database with easy access for querying and exporting of data. They system should be easily interface with any other existing or public health systems as required. The system should be easy to query and be able to function in all network environments including slow performance internet access areas. The system should be secure and be able to store and query data accurately.

6   Assumptions

It is assumed all provincial forms will be standardised in order to assist with the integration of different forms for each province. All business processes for each province will be standardised in order to integrate the unique and slight differences on each province process.

7 Risks

Some provincial offices are currently not doing any capturing for some of their business processes and therefore those requirements are not clearly documented in this document. Some reports are a requirement but there is no defined business process for a capturing tool.

8 References

8.1 Acronyms and Definitions

An explanation of any specific terms / acronyms used in this document:

Acronym or Term	Definition
NICD	National Institute for Communicable Diseases
EHP	Environmental Health Practitioner
ID	Identification
MSA	Malaria Surveillance Agent
RDT	Rapid Diagnostic Test
MIS	Malaria Information System
IRS	Indoor Residual Spraying
SADC	Southern African Development Community
WHO	World Health Organisation
M&E	Monitoring & Evaluation
SARN	Southern Africa Regional Network
RBM	Roll Back Malaria
DOH	Department of Health
CHAI	Clinton Health Access Initiative

8.2 Interviews

The Information Officers, Data Capturers, EHP and provincial managers were involved in the interview process.

8.3 Evaluation Criteria for the successful supplier

- Written letters of recommendation of current or previous clients not older than 3 years
- Experience in this kind of field
- Similar projects done previously
- Fair and competitive price
- BEE compliant