iGov/RFP/001/23 – Request for Proposal for a Proponent or Firm for the Implementation of a Pilot Health Information system, inclusive of End-to-End Digitalisation, od the Eastern Regional Health Authority on behalf of the Ministry of Health – June 2023

UNSPSC: 85101700

APPENDIX 7.1

Integrated Requirements for the End-to-End Digitalization of the Eastern Regional Health Authority

Contents

INTRODUCTION

This Appendix 7.1 presents the specifications for the work elements related to the end-to-end digitalization of the Eastern Regional Health Authority. The overall appendix comprises several parts which contain the particular requirements for the sub-projects which make up the overall work program.

The component parts of Appendix 7.1 are as follows:

- Appendix 7.1.1 - HIS Requirements
  This appendix provides the context within which the proposed Hospital Information System (HIS) will function and the specific functionalities that the overall solution must deliver. The specifications cover all aspects of the management and operations of a health region which must meet the secondary and primary care needs of its constituents. The HIS specified must cover the main hospital in Sangre Grande, the District Health Facility in Mayaro and the various health facilities/centres distributed across the eastern region of the country. The solution as specified must operate as a seamless whole and contribute to a dramatic improvement in the patient experience and fully support quality healthcare. The solution must be integrated with the San Fernando General Hospital facility to address the interoperability of medical records across the two platforms.
- Appendix 7.1.2 - Change Management
  It is recognized that a full end-to-end digital solution is required within the ERHA (Eastern Regional Health Authority) which will significantly change the way that staff of the ERHA work and how patients interact with the institution. As such, change management is foundational to the successful implementation of the HIS. This appendix provides details of the change management support required from the proponent, taking into consideration the HIS proposed, its ways of working, and its workflows. The proponent is expected to integrate the implementation of the HIS with the required change management support.
- Appendix 7.1.3 - Digitisation of Existing Patient Records
  It is expected that the new HIS will be implemented with the required patient databases so that it is operationally effective from the patient perspective from inception. This will require a level of digitization of paper and other electronic records held across the many institutions of the ERHA. The proponent is required to provide specific support with respect to this sub-project and is responsible for integrating its activities into the overall implementation plan.
- Appendix 7.1.4 - National Medical Health Record Identifier

The Ministry of Health (MOH) is working with the Ministry of Digital Transformation (MDT) and iGovTT Limited on the specification and development of a national medical health record identifier which will assist with the creation of a single electronic medical record across all five health regions, and to some extent with the private healthcare sector. This appendix provides high level requirements that the proponent must satisfy with respect to integrating this identifier into the proposed HIS to ensure that the new identifier is effective at a national level.

- Appendix 7.1.5 - Interoperability with the New Unique E-IDentifier (e-ID) and the new Interoperability Solution

  And finally, this appendix anticipates the introduction of a new national e-ID which will allow improved and secure e-service delivery at participating MDAs, and the creation of end-to-end services across the public sector. The interoperability solution will allow secure data linkages between MDAs, and therefore this appendix specifies the requirements of the new HIS as it relates to integration with the national e-ID and the Interoperability Solution as they become available during the life of the HIS implementation.

It is noted that that proponents are required to respond to the full specifications, that is Appendix 7.1. **The solution must include all hardware, software and licenses which would allow the MOH / RHA to utilize the full functionality of the system.** There are no optional requirements, nor are proponents allowed to pick which work element (or appendix) to respond to. The Ministry of Health (MOH) requires a single proponent to be responsible for the delivery of all five sub-projects and to be accountable for its delivery and success in accordance with the full specifications in this Appendix 7.1.

APPENDIX 7.1.1

Statement of Requirements for the Health Information System

7.1.1.1. Introduction

The Ministry of Health is the designated authority for the implementation of Government's broad mandate for the management and delivery of health care services to the population of Trinidad and Tobago, and has envisioned the development of a Health Information System (HIS) including Electronic Medical Records (EMR) within Trinidad and Tobago to enable greater efficiency and easier access to all persons seeking health care services. The first phase of this HIS would be the rollout of the solution across the entire Eastern Region Health Authority (ERHA) with a rollout to the wider health sector appropriately scheduled, subsequent to successful completion of this first implementation.

As the authority for the governance and/or management of the healthcare system in Trinidad & Tobago which includes both public and private health care operations, the MoH has the overall responsibility for the implementation of Government policies for health and provides leadership and direction for the sector by focusing on policy making; planning; assessing the population's health needs; mobilizing funding for delivery of health services; regulating the sector; and ensuring that health services delivered by both private and public providers are properly run and meet quality standards set out by the Government and governing international bodies.

In this regard, the MoH operates as a 'hybrid' management-focused entity, responsible for coordination and management of the health care system, with the majority of health services delivered through a range of partners, in particular the Regional Health Authorities. This HIS must therefore be able to integrate with the San Fernando System and with any other systems or platforms that are currently being explored by the Ministry.

With the implementation of the Regional Health Authorities Act No. 5 in 1994 where the MoH was charged with the management of the health care system, health services delivery was devolved to the Regional Health Authorities (RHAs). Through the RHAs, health services are managed closer to the point of delivery,

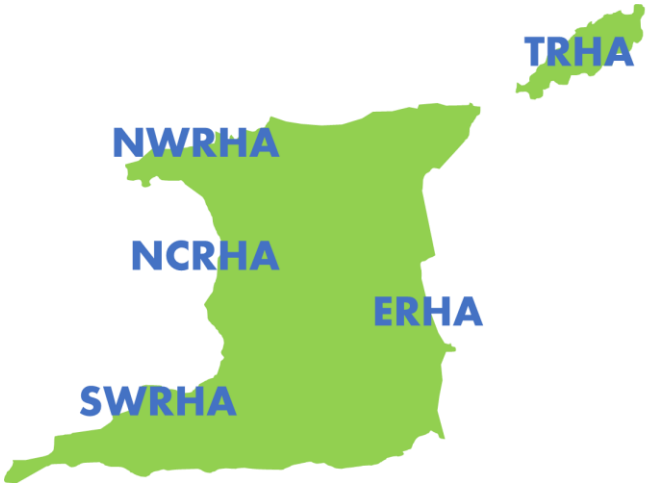


Figure 1: Trinidad and Tobago – Health System Administrative Map

in order to make them more responsive to consumer needs and preferences. The Government of the Republic of Trinidad and Tobago believes that primary healthcare is the foundation of the health system. Administratively, the country is organised into five (5) Regional Health Authorities, which are essentially semi-autonomous (Figure 1). The public health network comprises of ninety-five (95) health centers, eight (8) District Health Facilities (DHF) and eight (8) hospitals. Roughly two-thirds of health centers are located in the North-West, North-Central and South-Western parts of Trinidad. However, each RHA is served by at least one DHF and one referral hospital.

Decentralization has contributed to shaping a more responsive and equitable health system but there have been some unintended consequences. In particular, the human resource and institutional capacity building needed to mold strong, independent RHAs have not kept pace with devolution of authority. Communication problems between the MOH and RHAs (and within RHAs) also hinder coordination of services, as well as standardization of processes and technologies. These are some of the challenges confronting the health system at present.

Primary health care is usually defined as the care provided at the first level of contact with the health system, that is, where people first enter the system and services are mobilized and coordinated to promote health, prevent illnesses, care for common illnesses and manage ongoing health problems. Primary care services include but are not limited to screening, health information gathering, examinations, treatment in physicians' offices, pre-natal and post-natal care, immunization, home visits, nutritional counselling, and drug dispensing and information provisioning. Patients can then be referred for appropriate secondary and tertiary interventions where necessary; and later discharged to primary care clinics for monitoring and follow up.

Hospitals perform a range of services, from in-patient care to laboratory and diagnostic services, from accident and emergency to open heart surgery. In order to provide continuity of care as the patient moves from Primary Care to Secondary and eventually Tertiary Care and back, access to timely and accurate patient health information is vital. Other facilities also provide additional services through special national programs such as HIV/AIDS and the Chronic Disease Assistance Programme (CDAP).

For the purpose of modelling the software and licensing requirements, the following demographics can be used.

Classification	Staff / Devices (peak in brackets)	Beds	Patient Size	Daily peak
Large Hospital	>500 (300)	>500	>100,000	>10,000
Medium Hospital	300-500 (200)	300-500	60,000 – 100,000	60,000 – 100,000
Small Hospital	<300 (150)	<200	<60,000	6,000
District Health Facility	100 (60)	N/A	30,000 – 60,000	2,500
Health Facility	15 (8)	N/A	<30,000	600

Table 1. Health Facility sizing model

Health Care Services are delivered across all Regions as indicated in Table 2 below:

Regional Health Authority	Population	Health center / facility	District health facility	Hospitals	Name of Hospital
NWRHA	500,000	17	1	2	Port-of-Spain General Hospital (L)
					St. Ann's Hospital (M)
NCRHA	350,000	15	1	5	Eric Williams Medical Sciences Complex (L)
					Couva Hospital and Multi-training Facility (M)
					Caura Hospital (S)
					Arima General Hospital (M)
					Mount Hope Women's Hospital (S)
ERHA	120,000	16	1	1	Sangre Grande Hospital (M)
SWRHA	600,000	33	3	2	Point Fortin General Hospital (S)
					San Fernando General Hospital (L)
TRHA	60,000	19	N/A	1	Scarborough General Hospital (M)

Table 2. Healthcare facilities in Trinidad and Tobago

The preferred type of licensing is concurrent licenses and where possible we would prefer an option to have tiered licenses so we can use cheaper licenses to deploy the HIS to standard users whilst at the same time giving the high end licenses and features to administrators and "super" users.

7.1.1.2 Health sector reform

Background

Health Sector Reform, initiated in the early 1990s, had a significant effect on the functions of the Health System. The reform sought to reorganize the health system based on international trends and recommendations of international health organizations. The Health Sector Reform process resulted in new legislation and updated policies, changes in the structure and management of the health system, rationalization of health care facilities and services, a review of human resource and other needs, improvement in information systems as well as the introduction of new services.

The strategic planning for Health Information Systems was conducted by the Ministry of Health in collaboration with national stakeholders. These include the Central Statistical Office, Ministry of Legal Affairs, iGovTT, private sector organizations, and the Pan American Health Organization (PAHO). The HIS strategy represents another milestone in the effort to reform the health system and reaffirms the Government's commitment to promoting use of evidence in decision-making.

Current vision of ICT

The Ministry of Health has been actively pursuing the implementation of a Health Information System across the sector for several years. The MOH views this initiative as an integral component of its transformational plan to develop a new model for healthcare management and delivery through process and technology reengineering and institutional adaptation. The implementation impacts on the Regional Health Authorities and health partner agencies as well as the general administration of health.

The mission aims at achieving the modernization of the information systems and technology of the Health Care System involving all the actors related to it: public health providers, Regional Health Authorities, social workers, National Health Financing entities, National Health Service, Clinical Laboratories, Pharmacies, Ministry of Health, Vertical Services etc. and eventually the private sector. The MOH requires a new model for conducting business where information is a critical resource that significantly affects our ability to provide high quality, cost-effective health care. It is therefore necessary to develop a comprehensive information strategy to make better-informed decisions that benefit both our patients and staff.

The ICT Vision – Ministry of Health

Comprehensive and reliable information, everywhere and every time through the use of efficient technology solutions and services.

The ICT Mission – Ministry of Health

To create and sustain a reliable and available ICT environment by providing the overarching goals of a robust technology infrastructure, implementation of appropriate business application systems, reliable information and information services to facilitate effective decision making and a responsive user environment.

For the successful implementation of a comprehensive HIS, the use and deployment of advanced and relevant ICT throughout the health sector is critical. Whilst this is done, it is imperative that compliance and alignment with the National Strategic Plans be maintained, namely:

- **Vision 2030 – The National Development Strategy of Trinidad and Tobago 2016-2030**
  - THEME I: Putting People First – Nurturing Our Greatest Asset
  - THEME II: Delivering Good Governance and Service Excellence
- The Comprehensive Economic Development Plan 2013-2017[1]
  - Priority Area II: Good Governance and Institutional Reform
  - Priority Area V: Social Development and Resilience
- **National ICT Plan 2018-2022**
  - Strategic Thrust 3: Digital Government

Collectively, these plans forecast the desired outcome of the population for the management, delivery and quality of service excellence for health care within Trinidad and Tobago. The resulting system and the associated legislative and policy framework shall align to international best practices and attainment of international benchmarks. This overarching health system will create synergies that allow for easier collaboration between key stakeholders within and out of the health sector; increased operational efficiencies for clinicians and staff in the delivery of health services; greater affordability of health care services and a better customer experience for all persons accessing these services.

The MOH intends to procure the HIS through this Request for Proposal (RFP) process, in support of the Ministry's mission, vision and core values. This Terms of Reference (TOR) document outlines the scope and requirements for the HIS and associated implementation project for the full end-to-end digitalization of the institutions related to the Eastern Regional Health Authority (ERHA), namely the Sangre Grande Hospital, one (1) District Health Facility and sixteen (16) Health Centres/Facilities. The HIS must enable the institutions, facilities and departments of the ERHA to operate as an integrated whole from both the operational and patient perspectives.

The specified HIS system, once tested, commissioned and operating successfully, will eventually be rolled out within the other Regional Health Authorities in Trinidad and Tobago during Phase 2 and other Phases which are outside the scope of this RFP.

Related National Initiative projects that are linked to the HIS Solution

1 https://www.planning.gov.tt/OurTnTOurFuture/CEDP-2013-2017-Volume-1.pdf

The following table provides an overview of the related National initiatives that would impact the proposed HIS solution to be implemented:

Initiative	Summary	Alignment needs	Implications / Comments
e-ID	An e-ID is an electronic solution for proof of identity that uniquely distinguishes entities such as persons or organizations. It is also a unique digital identifier that can be stored on a mobile phone/device, a physical card (similar to your bank card), SIM card, or computer systems. The following are some key uses of an e-ID: • A proof of identification (or authentication) to access government and eventually private sector services • To encrypt and securely share documents • Acts as a digital signature which in the virtual world is equivalent to a written signature The benefits of a national e-ID are as follows: • Eliminates the need to use multiple pieces of government issued identification (national identification card,	The e-ID must be linked with a HIS record according to predefined cybersecurity standards and policies A citizen must be capable of revoking use, access to and storage of their e-ID while maintaining the integrity of their medical record Identification and development of the required APIs or web services to enable integration with an e-ID Mobile App Consumers of Health services need to be stored and referenced on the HIS using their e-ID	The HIS system must be able to connect to the e-ID system to verify patients

	birth certificate, driver's permit, passport) to transact business • Enable faster transaction times across Ministries Departments Agencies (MDAs) • Produce cost savings by improving existing GoRTT's know your customer processes • Minimize unnecessary and/or duplicate records within and across MDAs • Contribute towards building a digital nation - Trinidad and Tobago Roadmap to Recovery plan • Address the inefficiencies referenced in the Auditor General's report Biometric based Digital ID used by Citizens to access Government and eventually third-party services on a "zero trust" basis. Government stores a hash or proxy ID that citizens volunteer (opt-in) for use in authenticating the digital IDs stored on their smart phones etc.		

Interoperability Framework	An interoperability framework solution that seeks to build an interoperable digital government services framework to facilitate connectivity among MDAs. The aim of the interoperability solution is as follows: • To interconnect MDAs to enable secure connectivity between the various ICT solutions • To provide a digital government services framework which enables MDAs to have controlled access to pre-agreed and approved data • To allow sufficient data access to enable the creation of end-to-end horizontal services • To mitigate the need for citizens' utilization of multiple identifiers when combined with the national e-ID • To facilitate the verification of the validity of the national e-ID • To provide administrative control of the data exchanges which are allowed across MDAs with	Identification and development of the required APIs or web services to enable integration with the Interoperability Solution to enable data sharing and end-to-end e-services The HIS must connect to the Interoperability framework according to predefined cybersecurity standards and policies	Connectivity to the Interoperability framework should facilitate zero knowledge-proof responses The solution needs to be compatible with an Interoperability Open-source integration solution Analytics and reports need to be shared with Government data warehouses and systems

	auditability of transactions		
Government Cloud	Government Hybrid cloud solution comprising a combination of Government owned, Third Party, and SaaS / Public cloud solutions to house government systems and facilitate collaboration and use of Government services	The Infrastructure for the HIS must be portable and housed on Hyper converged Infrastructure that aligns with NIST 800-53 requirements and can integrate with third party Infrastructure and cybersecurity management platforms	Infrastructure architecture along with specifications of the proposed Infrastructure for the HIS should be listed along all of its certifications and attestations.
Developers Hub	Government owned Devops Platform for the Agile development and deployment of services and APIs for enabling "Open Source" Government and private sector solutions	All Government solutions will need to be accessible on the Developer's Hub Ecosystem	Options and Specifications for Government and third parties to build apps and interfaces off of the HIS solution Sandbox environment needed to develop and test potential solutions and APIs
Government Data Centre	This Government Data Centre will form part of an ecosystem of Data Centre infrastructure which is being designed and deployed to securely and reliably share applications, data and services with: • Approved GovNeTT Data Centre Sites (located for example in Tobago) • Approved private and public cloud services hosted on Private Sector Data Centres	Anchoring such Data Centres and Services around a Secure and reliable Government owned and managed Data Centre will allow GORTT to maintain Data Sovereignty while also benefiting from significant cost saving resulting from economies of scale, ability to integrate systems more efficiently when they are housed at a common Data Centre, and an overall reduction in operations and cumulative bandwidth costs to name a few. Given the	Improved Performance and Capacity of Government Services - The consolidation will allow for a larger installed base with increased capacity, which in turn will allow for add on services for monitoring and management, and effective

	• Certified Ministry, Department and Agency On-premise Data Centres within their physical buildings	complex nature of the Needs, along with issues such as Data Sovereignty and legislative requirements around E-ID and the other services we would need to address, establishing a government owned Data Centre as a catalyst to a Hybrid Cloud strategy is the only feasible option at this time.	BCP / IT Continuity which would not be feasible for independent/ siloed systems and services This strategy will also all for the least disruptive migration of Government services as it will entail establishing the new services in the Government Owned Data Centre

7.1.1.3 Context of the Requirement

The Ministry of Health (MOH) has identified Information and Communications Technologies (ICT) as a critical component that is pivotal to the strategic development of the Health Sector and so provides improved and enhanced healthcare services to all citizens of Trinidad and Tobago. Central to the ICT strategy is the implementation of a computerized Health Information System (HIS) which would allow for the focus on public evidence-based health management, while providing state of the art tools for effective clinical management and overall healthcare services delivery.

The MOH in conjunction with all the RHAs, the Pan American Health Organization (PAHO) and iGovTT are seeking to procure and implement a Health Information System to integrate and securely manage the healthcare data while protecting privacy in an electronic format for all subjects interacting with the public service. The HIS shall provide functionality to collect, store, manage and transmit patient's electronic medical records (EMR), provide health operational management information, enforce the policy decisions and provide reporting capabilities. The system is expected to support improvements in the patient outcomes, reduction in operational cost, improve utilization of resources, inform new policy and improve the timeliness of decisions.

The MOH via the Eastern Regional Health Authority (ERHA) is now seeking to implement a fully integrated Health Information System across all institutions and facilities as a pilot program.

7.1.1.4 Objective

The main objective of this requirements document is to provide detailed specifications for the implementation of a Pilot Health Information System for the ERHA, which includes the Sangre Grande Hospital, the District Health Facility and the various Health Centres with pilot integration to another candidate hospital from another RHA namely, the San Fernando General Hospital.

The MOH via the Eastern Regional Health Authority (ERHA) wants to implement a Health Information System (HIS) to enable a focus on public evidence-based health management while providing state of the art tools for effective clinical management and overall healthcare services delivery.

The ERHA provides both inpatient and outpatient services. These facilities within the RHA provides the following medical services: Radiology, Physiotherapy, Psychiatry, Orthopedics / Burns, Optical, ENT, Obstetrics, Gynecology and Surgery and offers ambulatory care, accident and emergency, pharmacy/dispensary, laboratory/blood bank and mortuary services. The regional facilities within the ERHA include the Mayaro District Health Facility (A&E), Rio Claro Health Centre (A&E), Toco Health Centre (A&E), Sangre Grande Enhanced Health Centre and other smaller health centres/facilities.

The HIS is to be implemented as appropriate, based on leading practices and best fit for the ERHA at these facilities and shall include functionality that supports an Electronic Medical Record (EMR) inclusive of registration, scheduling (inpatient and outpatient), emergency, ward and bed management, pharmacy and Lab Information Services (LIS) with an estimated project duration of nine (9) months. The HIS shall integrate with a Radiology Information System (RIS) / Picture Archiving and Communication Systems (PACS) as determined necessary.

The MOH has prioritized the following functional areas:

- **Registration:** - Patient details are recorded based on general and demographic information. This occurs as a patient enters the health system. This will also include the ability to verify/ view patient details across the RHAs via the creation of a unique identifier

- **Scheduling (Inpatient and Outpatient):** - This function deals with the complete treatment and services provided to the patient during their stay at any health facility

- **Ward and bed management:** - Records hospital bed occupancy / availability and manages the rostering and scheduling of clinical procedures, in-patient service allocation, pharmacy orders, and lab and blood bank services for the patient

- **Pharmacy:** - Manages dispensary around the issuing of medicines to patients within public health facilities. This includes inventory management, billing of drugs, surgical and consumables etc. Consideration must also be given to allow the access of prescription information of existing CDAP patients that are currently registered within the CDAP programme which utilizes about 275 private non-public sector pharmacies.

- **Laboratory information services:** - Records and manages patient test results and allows access to information on patient records
- **Radiology:** - Records and manages patient imaging as well as scans and allows access to information on the patient records
- **Emergency services:** - Monitors and records patient diagnosis and treatment from arrival in Accident and Emergency until they are transferred to a ward for further treatment or discharged

The implementation of the HIS is intended to implement a system that, at a minimum, addresses the above-mentioned functional areas in the priority order indicated by the MoH.

Digital Business Model

Item	Details	Main HIS Implications
Key Partners	The key partners form part of the wider eco-system for end-to-end delivery of goods and services in the Health Sector. Consequently, their relationships, services, contracts, plant, and personnel will need to form part of the solution	The HIS should keep track of the key stakeholders, contracts, costs, etc. and assist with monitoring compliance of partners with their terms and conditions, particularly where they impact the quality of health care being delivered.
Key Activities	The Key activities represent the core work being done by the Ministry. The system would therefore need to efficiently capture the inputs, processes, outputs and controls.	The HIS system should have an Architecture, data model, and user interface that is adaptable and can facilitate Agile development, Open Integration, and Analytics along with the supporting security controls
Key Resources	The Key resources refer to the proprietary data and services that will be enabled by the system.	1. Flexible user interface for anywhere, any device access to data and services by authorized personnel 2. Modern Integration capabilities for sharing of the data 3. Data quality and federation tools
Value proposition	The Value proposition represents the major outcomes of the HIS. It goes beyond the data and tools the system provides and speaks to the benefits that must be realized by the system directly and in tandem with other systems	1. Facilitate the end results with minimal customization 2. Have operating model and leading practice to guide the transformation of processes in a manner that is consistent with the system architecture
Customer Segments	These represent the persons who will be accessing the system to utilize data and services	1. The configuration and security features of the system must allow for the different profiles and granular assignment of access and services

		2. For the elderly, we need to have provisions for proxies to collect reports, prescriptions etc. on their behalf
Customer Relationships	These represent the mechanisms that will be used to keep customers engaged and satisfied	1. Engagement tools and services 2. Data and Analytics (inclusive of Robotics process automation and Metaverse)
Channels	Provisions for multiple suppliers, producers and consumers to "Buy", "Make" and "Sell" Health services	The Architecture must be an Omni-channel architecture where persons can conduct business over multiple channels inclusive of being able to initiate a request on one channel and follow up / fulfil on another channel

<table>
<tr><th colspan="5">HEALTH SYSTEM BUSINESS MODEL CANVAS</th></tr>
<tr><th colspan="2">HOW</th><th>WHAT</th><th colspan="2">WHY</th></tr>
<tr>
<td>Key Partners
Government Institutions
Private Hospitals
Medical Network / Association
Insurance Companies
Equipment Maintenance and Servicing
Social Services
Pharmaceutical warehousing</td>
<td>Key Activities
Audit & Certifications
Appointments
Prescriptions
Medical record keeping and Reports
Medicine inventory and dispatch
Manpower planning and scheduling
Vaccination
Records management
Key Resources
Health Information System
Vaccination Database
Health plans and programs
Procurement and Inventory
Maintenance management</td>
<td>Value Proposition
Emergency Healthcare
Preventive Healthcare / advice
Health Monitoring
Drugs and Prescriptions
Vaccination
Chronic Disease treatment
Post Op Care</td>
<td>Customer Relationships
AI enabled push notifications (appointment reminders etc.)
Social Media comms
Leverage ISC (INTEGRATED SERVICES CENTRE) for support
CRM type service for High profile customers / partners
Channels
Website / Mobile app
GovTT Health Institutions
Pharmacies
Private Health Institutions</td>
<td>Customer Segments
Aged Persons
Adults
Children
Nurses
Doctors
Caregivers
Private Health Institutions</td>
</tr>
<tr>
<td colspan="3">Cost Structure
Staffing and Ops, Medical supplies, Medical Equipment</td>
<td colspan="2">Revenue Streams
Third party access to Data, Advanced health subscription and Analytics</td>
</tr>
</table>

Implementation Priorities

Proponents are required to provide a system which achieves the requirements outlined in Table 3 below based on their priorities.

High Priority	Medium Priority	Low Priority
► Creation of a Unique Patient Health Identifier ► Basic patient profile including demographic data, medical history and family history ► Capture of patient visits at health care facilities ► Recording of laboratory test results and diagnostic imaging results ► Capture of and dispense of patient prescriptions ► Inventory management of medications and consumables utilized ► Terminology services (e.g., CELLMA, OSIRIX, etc.) ► Appointment booking for clinics, operating theatres, beds, etc. ► Recording of clinical documentation (e.g., consult letters) ► Master person / patient index ► Integration capabilities ► Configurable reporting tools	► Lab order entry ► DI order entry ► Referrals ► Patient alerts ► Wait lists ► Scanning and electronic storage of paper documents ► Calendar view of appointment ► Forms of support for "offline" operation – i.e., without network access ► Mobile device support	► Blood bank management including cold chain ► Billing / invoicing features ► SMS appointment reminders ► Telehealth support ► Population health features including: ○ Prevention campaign ○ Immunization campaigns ○ Surveillance and notifiable disease case management ○ Notifiable disease investigation management ○ Outbreak management and contact tracing

Table 3. Features prioritization

For further information on the current state environment, please see Appendix A – Current ICT and Business Environment.

The full list of requirements can be observed in Appendix B – Functional Requirements and Appendix C – Non-functional requirements.

7.1.1.5 Scope of Services

The Ministry seeks to implement the Health Information System within the ERHA as a regional pilot to develop a comprehensive HIS for the health sector, that will allow for efficient capture and utilization of patient data, with the aim of improving services provided by the Ministry of Health (MOH). This will

include for the training of staff, capacity building, change management at facilities, integration with other GoRTT (Government of the Republic of Trinidad and Tobago) programs and projects (such as the E-ID Program, national unique medical record identifier), development of policies and standards for data communication and sharing, and data cleansing/migration/strengthening activities.

The project aims to implement a 'single' HIS for the entire Eastern Health Region, from secondary to primary care health facilities. The Ministry is seeking to contract one proponent to provide a turn-key solution which satisfies the specified requirements. In particular, the scope of services will encompass:

- Provision of a single Health Information System (HIS) for the hospital and other facilities for the following functionality including but not limited to:
  - Patient registration and scheduling
  - Clinical assessment
  - Admission, discharge transfer
  - Ward and bed management
  - Pharmacy
  - Laboratory Information System (LIS)
- Deployment of Distributed infrastructure that provides access through a central repository
- Provision, installation and configuration of all hardware, software and licenses required to operate the solution
- Provision of Data Strengthening activities including the development of National Standards (Procedures, Coding, etc.)
- Provision of Project Management services for the duration of the project up and until handover
- Provide business process reengineering and change management support in relation to the successful implementation of the HIS
- Provision of quality assurance services and maintenance of internal communications for the duration of the project up and until handover
- Design and execution of a data migration strategy and approach by providing services, plan and templates to migrate the data from the following systems within the ERHA and the other candidate RHA and will include but not be limited to:
  - Existing Internally Developed Solutions
    - SGH (Sangre Grande Hospital) Client Records System
    - ERHA Electronic Pharmacy Information Systems
    - ERHA Ward Management System
    - ERHA Cancer Registry
    - ERHA Primary Care Client Information System
  - Purchased Solutions
    - Lab Information System (LIS)
    - Radiology Information Systems

- Provided by MoH
    - CELLMA (via HACU)
    - SALMI (Pharmacy Logistics) – a current initiative being implemented by the MoH that is being rolled out in locations. (MoH to indicate whether SALMI implementation is scheduled to ERHA)
    - SIP (PAHO)

- In addition to the migration of existing patient registration details, the approach is expected to address the cleansing and digitization of actual physical medical records stored at the ERHA's hospitals and District Health Facilities. Further details on the overall data cleansing, migration, and digitization are outlined in Appendix 7.3
    - Key activities include; Evaluate existing applications and/or databases, electronic or paper-based, to determine migration requirements for the HIS
    - Document and communicate migration requirements for the HIS
    - Develop fully detailed data migration plans and templates and provide support for the migration of existing data *(Note that the proponent is not responsible for execution of the digitization of the paper records themselves)*
- Integration with a Radiology Information System/Picture Archiving and Communication System (RIS/PACS)
- Development of policies and standards for data communication and sharing
- Establish performance metrics for the HIS
- Monitor and evaluate performance for HIS
- Training services and knowledge transfer
    - Delivery of necessary training and knowledge transfer to allow Administrators to perform administration duties including the operation, configuration and maintenance of various system components
    - Develop training material and provide training services for HIS project teams
- Provision of risk management services
- Provide post project solution deployment support and maintenance for the HIS for 3 years – Maintenance and Service Level Agreement

7.1.1.6 Key Deliverables

The Proponent is required to provide the following mandatory deliverables during the implementation. Deliverables to the MOH will be submitted in three versions; initial draft (substantially complete); final draft (comments addressed) and final.

- Project management deliverables
    - Project charter
    - Project plan – This will include:
        - All major project phases
        - Groups of activities
        - Activities
        - Resource requirements and level of effort required against each activity
        - Start and end dates
        - Key milestones
        - Deliverables (draft and final versions)
    - Quality assurance plan
    - Communications plan
    - Configuration plan
    - Integration plan
    - Testing/ Test Management plan
    - Implementation plan
    - Define and execute management plan for the implementation of the HIS
- Data migration plan
- User Acceptance Testing (UAT)
- Operations and maintenance plan
- Change management plan
    - Support for the change management strategy which will include system and end-user documentation and training
    - Perform change management during the Implementation of the HIS
- Integration plan for key GoRTT programs and projects, including the National Unique E-IDentifier, the Interoperability Solution, and the National Unique Medical Record Number
- Training and knowledge transfer plan
    - Capture lessons learned in the knowledge transfer documentation
- Risk Management Plan
- Provide support plan for the HIS
- Provide SLA for the HIS. This will include but not limited to:
    - Support and maintenance
    - Monitoring and control

- Service availability
- Storage and archive
- Backup and restore services
- Security administration and support
- Problem support
- Knowledge transfer
- Exit management
- Target and key performance indicators (e.g., technology and performance service levels, incident service levels, incident response, resolution and status updates time frames)

- Provide improvement evaluation and recommendations
- Provide a post implementation support plan for a period of 3 months – in country, on site
- The proponent should provide a documented release management plan for any contracted modifications and/or customised modules
- Additional requirement for the Test Management Plan – Proponent should indicate within the RFP their project management approach (Agile- focused is highly preferred) and how their testing methodology will be incorporated within the overall plan.

7.1.1.7 Project Duration

The project shall be completed within a period of nine (9) months, and the overall project plan submitted by the proponent must be consistent with this requirement.

The proponent is expected to detail their implementation plan which minimally should comprise the following:

1. Scoping (along with change management and requirements traceability)
2. Operations design and documentation
3. Deployment plan inclusive of rollback procedures
4. Operations readiness plan inclusive of – Service desk empowerment, contract & license formulation, SLA / OLA,
5. Design and baseline configurations
6. Vendor roadmap and end of life information

Note: Given the other solutions within MoH, the proponent should describe how their project governance approach will deal with decisions involving the integration and/or recommended

architecture changes (if deemed to be required) during the implementation to achieve the 9-month implementation period

7.1.1.8 Project team

Table 4 below provides the minimum, mandatory roles and qualifications required for the technical team assigned to this project. Proponents must identify all team members and their roles in the "Key expert" column. Roles can be combined under one (1) resource (i.e., a single person fulfills multiple roles), if the project plan and time demands on the individual support this approach and must be mentioned in the Proponent's proposal.

The proponent shall name and commit the key project team members who shall remain constant throughout the project (**FULL TIME)** to the project for the duration of the implementation efforts. Proponent should also expressly state any non-working times and include that in the development of the implementation plan. The proponent will also be required to define the change process that will be followed if there should be any unexpected change in the resources (i.e. suitable impact/ replacement considerations and handover / protection of intuitional knowledge)

Role	Seniority	Qualifications required	Key expert(s)
Project manager	Senior	► Strong preference for post-graduate level degree (list achievement, discipline, year) ► Minimum requirement: Possess at least an undergraduate degree in healthcare / IT disciplines (list achievement, discipline, year) ► Certified in project management such as PRINCE2 or PMP (list certifications) ► Previous experience on at least 2 projects managing implementation of healthcare IT solutions of similar nature in size, scope and approach (list projects) ► Have a minimum of (10) ten years of relevant project management experience of which includes managing / leading healthcare projects of a similar nature in size, scope and approach (list projects, experience)	►
HIS Informatics Specialist		► Bachelor's degree in healthcare administration, computer sciences, or a related field. ► A Master's degree in health informatics would be considered an asset ► Have a minimum of three to five years of clinical experience. ► A minimum of two years' experience as a health informatics specialist. ► A proficiency in programming languages and EMR software ► Exceptional knowledge of health information system design and database management. ► In-depth knowledge of best practices in healthcare information management.	►
Business analyst	Senior	► Strong stakeholder management skills (list approaches, experience) ► Possess at least an undergraduate degree in healthcare / IT disciplines ► Excellent stakeholder management and engagement skills ► Excellent presentation and facilitation skills	►

Role	Seniority	Qualifications required	Key expert(s)
		► Have a minimum of (10) ten years of relevant health IT experience, predominantly business analysis related ► Have a minimum (2) two years of relevant project management experience working with health information systems projects	
QA testing analyst	Intermediate	► Possess at least an undergraduate degree in software design, engineering, or computer science ► An understanding of software QA methodologies, tools, and processes ► Knowledge of scripting ► Working experience in software development and software quality assurance ► Excellent organization skills ► Have a minimum of (5) five years of relevant health IT experience, predominantly testing related ► Have a minimum (3) three years of relevant analysis experience working with health information systems projects	►
Privacy / security engineer	Intermediate	► Possess at least an undergraduate degree in software design, engineering, or computer science ► An understanding of privacy approaches, technologies and frameworks ► An understanding of security approaches, technologies and frameworks ► Excellent organization skills ► Have a minimum of (5) five years of relevant health IT experience, predominantly testing related ► Have a minimum (3) three years of relevant analysis experience working with health information systems projects	►
Integration engineer	Intermediate	► Possess at least an undergraduate degree in software engineering, computer engineering, or computer science ► An understanding of integration standards such as HL7, IHE, SNOMED, LOINC, ICD, etc. ► Knowledge of markup languages ► Excellent technical and organization skills ► Have a minimum of (5) five years of relevant health IT experience, predominantly building and / or implementing interfaces ► Have a minimum (3) three years of relevant integration experience working with health information systems projects	►
Infrastructure engineer	Intermediate	► Possess at least an undergraduate degree in software engineering, computer engineering, or computer science ► Experience in technical infrastructure components including knowledge of cloud, network management, software as a service, disaster recovery, security, data centers, routers ► Excellent technical and organization skills ► Have a minimum of (5) five years of relevant health IT experience, predominantly building and / or implementing interfaces ► Have a minimum (3) three years of relevant integration experience working with health information systems projects ► Possess at least an undergraduate degree in software engineering, computer engineering, or computer science	►

Role	Seniority	Qualifications required	Key expert(s)
Implementation engineer	Intermediate	► An understanding of software configuration management ► Experience with integration and testing approaches ► Knowledge of markup languages ► Knowledge of privacy approaches, including consent management ► Excellent technical and organization skills ► Have a minimum of (5) five years of relevant health IT experience, predominantly building and / or implementing interfaces ► Have a minimum (3) three years of relevant implementation experience working with health information systems projects ► Possess a bachelor's degree in business management / business with subjects such as like organizational behavior, industrial psychology and behavioral sciences, or equivalent certification from a recognized training institute	►
Trainer	Senior	► An understanding of health information system benefits, challenges and proven training approaches ► Demonstrated experience in addressing adoption challenges ► Excellent organization and people skills ► Have a minimum of (5) five years of relevant training experience ► Have a minimum (5) five years of relevant training experience working with health information systems projects ► Have a minimum (5) five years' experience managing contracts, including change management, negotiations and progress reporting	►
Change Management Specialist	Senior	► At least 10years of relevant experience leading complex change management initiatives within the health care industry ► Certified in the Change Management disciplines ► Delivered significant large scale change management initiatives across geographical regions and institutions ► Experience in mentoring and developing coaching, learning and development programs to support transformation initiatives	►
Data Migration Specialist	Senior	► At least 10 years of relevant data management, data & analytics experience ► Deep experience in implementing data migration projects and developing data migration strategies for implementation for large scale projects ► Experience in data profiling and defining data governance standards ► Experience in utilizing ETL (Extract, Transform and Load) tools and OCR technology to facilitate conversion in environments where significant paper records exist ► Experience in QA methodologies to manage and certify data migration process ► Proficient in the data classification framework controls related to Health Medical records) (e.g., HITRUST CSF v9.4)	►
Integration Specialist	Senior	► At least 10 years' experience as an Enterprise IT Architect ► Experience in managing the data conversion process across integrated solutions ► Excellent communication skills ► Possess technical experience in defining and managing the deployment of integrated solutions ► Extensive experience with API protocols	►

Role	Seniority	Qualifications required	Key expert(s)
		► Project Management experience	

Table 4. Project team members

All CVs must be included within the proposal for all members of the Project Team and their proposed roles. CVs for other members of the Proponent's project team are also required and must be included within the proposal.

Proponent's experience will be scored accordingly based on their years of experience.

7.1.1.9 Reporting and Communications

The proponent shall prepare a detailed Communications Plan for approval within five (5) days of execution of the Contract. This communication plan shall include the following:

- **Reporting Structure/Communication Protocol**: – indicating that MOH and its duly appointed representative shall be the main point of contact on the Service. The Provider shall further identify the interactions required by the MOH as it pertains to service delivery
- **Frequency of Reporting**: – The proponent shall, in accordance with the ToR, include in its detailed communication plan the various reports to be provided and the frequency of same. Where practical, the proponent shall identify the dates at which these reports will be delivered to the MOH
- **Contact Registry**: – The proponent shall maintain a contact registry of all parties required to adequately manage the service. This registry shall be routinely updated and circulated to the team
- **Approval process**: - The proponent shall be required to provide reports in accordance with the requirements. All reports should be signed by the proponent and a MOH representative. Where approvals are not granted, the proponent shall identify the defects and submit to the MOH for rectification. Only upon written approval will the respective deliverable be considered as accepted.

7.1.1.10 Payment Schedule

The contract price for this engagement shall be fixed. This price must be all inclusive of project management and deployment of a system to meet the functional requirements identified.

It is proposed that the selected Proponent be paid upon successful completion of each phase of the project milestones as captured below:

Phase	Milestone	Percentage
	► Mobilization	20
Phase 1	► Confirm current state and requirements ► Build, configure, customize HIS ► Design and implement internal and external communications ► Design and implement change management ► Design data migration ► Integrate HIS with other GoRTT systems ► Stabilize HIS environment ► Test HIS	30
Phase 2	► Complete training and user guides ► Migrate data ► Successful End to end testing (Hospital to Health Centre) ► Successful Integration with San Fernando General Hospital ► Deploy HIS to production ► Successful operation	40
	► HIS acceptance ► Project close-off	10

Table 5. Phased payment approach

It is expected that every activity required for the successful delivery of each phase outlined above shall be completed and agreed before payment is finalized.

Payment for support and maintenance services shall be made against agreed project deliverables within sixty (60) calendar days following the end of the month in which the invoice is rendered, subject always to the prior receipt of the invoices correctly detailing the services including levels of effort supplied at the agreed price. Invoices are to be rendered directly to the Permanent Secretary, MOH.

7.1.1.11 Intellectual Property/ Copyright

The selected Proponent shall not, except as authorized in writing by the Ministry or unless required by the stipulated duties under the contract, use for the firm's own benefit or gain or divulge to any persons, firm, company or other organization whatsoever any information belonging to the Ministry or relating to the affairs or dealings which may come to the provider's knowledge during the engagement. This restriction shall cease to apply to any information or knowledge that may subsequently come into the public domain other than in breach of this clause.

If the selected Proponent requires access to information such as IP Addresses, IP schemas and any information that the Ministry deems to be confidential in nature, they will be required to sign a Non-Disclosure Agreement (NDA). The NDA shall bind the selected Proponent to confidentiality and non-disclosure of information to which it has become privy. If the selected Proponent declines to be bound by the NDA, they shall not be entitled to be granted access to or knowledge of information deemed to be confidential in nature.

7.1.1. - Appendix A – Current ICT Business Environment

Current hardware devices

A variety of hardware components are in use across the various institutions of the ERHA. The existing medical equipment and devices that are needed to connect and/or interface with the doctors, nurses and patients and the equipment currently used at the Sangre Grande Hospital and District Health Facility Centres will be provided upon request.

For the purpose of evaluation, proponents are expected to share requirements and assumptions related to end user devices that inform their estimates related to infrastructure, licensing, deployment, and support costs for the solution. The proponent is also expected to outline the factors that will impact the following:

- Quantity and type of licenses
- Deployment and migration costs
- Operations and support costs

Network infrastructure

The following architecture diagrams have been provided to allow the proponent to determine the requirements that will be needed to support their solution. In addition, the proponent will be required to factor in GORTT's proposed cloud policy.

ERHA

The existing ERHA network infrastructure is currently managed by an external proponent and includes the following components:

- Cloud PBX
- Switches (Cisco)
- Routers (Cisco)

The WAN connected health facilities sites are as follows:

- Sangre Grande Hospital
- Sangre Grande Enhance Health Centre
- Mayaro District Health Facility
- Toco Health Centre
- Valencia Health Centre
- Rio Claro Health Centre
- Cumuto Outreach Centre

- Manzanilla Outreach Centre
- Matura Outreach Centre
- Cumana Outreach Centre
- Guayaguayare Outreach Centre

There also exists an Internally managed network infrastructure:

- Firewalls
- Wireless AP's and Controller

Internet services are currently provided at all ERHA sites.

Proponents are expected to state their LAN / WAN / Security assumptions and requirements for the deployment and support of their proposed solutions.

7.1.1 - Appendix B – Functional requirements

To ensure the success of the implementation, the system shall meet the requirements as listed in Table 6. Proponents are asked to respond using the codes defined in Table 7.

Requirements prioritization	
M (Most Desired)	the requirement is most desired and is considered a critical component. If it is not provided naturally within the system details on how the requirement will be met must be provided in the comment section. It is needed to satisfy identified business needs and for the system to be considered successful.
D (Desired)	the requirement is desirable and would enhance the most desired requirements. It is negotiable or slightly deferrable concerning what is required to accomplish the purpose of the most desired requirements. It is still considered a high priority item that should be included in the system if possible.
O (Optional)	the requirement is useful and flexible but not considered necessary. It can readily be changed and not affect what is required to accomplish the purpose of the most desired requirements.

Table 6. Requirements prioritization

Response codes	
FP	Full provided (out-of-the-box)
TP	Third party software required
M	Modification to existing software
C	Custom development required
NA	Not available
O	Other

Table 7. Proponent response codes

Section 1. General HIS Management

ID	Requirement description	Priority (M/D/O)	Response	Comments
1.1 General system requirements				
1	The system shall display a User Acceptance Agreement (External and Internal users) upon login with the option to either accept or decline the Ministry's responsibility of use policy/Patient portal usage policy. The User shall only be allowed to continue their session by clicking on the Accept option as defined by MOH	M		
2	The system's language support: HIS Portal and registration landing page (or labels only) shall be bilingual i.e., in English and Spanish language	M		
3	The system shall support single sign-on for authorized users logging onto the system and access to functions/modules defined by user roles and responsibilities	M		
4	The system shall be capable of allowing users to log into the system using employee access cards and a code ("tap and go") to access functions/modules defined by user roles and responsibilities	M		
5	The system shall display the user account that is always signed on the current session with time-out functionality after defined period of non-usage and support privacy protection by strict (pre-defined) authorization profiles	M		
6	The system should display a statement informing users of the confidential nature and purposes of personal health information and its usage onscreen in a consistent location (using as minimal an amount of screen real estate as possible)	D		
7	The system's display label shall not affect the user's workspace and their interaction with onscreen controls	M		
8	The system shall be capable of operating in an offline mode in the event that connectivity is lost to the central repository and redundancies and enable automated syncing back to the central repository and redundancies once connectivity is restored	M		
9	The system shall have the capability to maintain a minimum of 99.95% uptime for availability	M		
10	The system shall provide secure, reliable, real-time access to patient health record information, including access via mobile devices	M		
11	The system shall provide suggestive text capability following any standard that exists for health information	M		
12	The system should allow for speech to text functionality which shall be editable and searchable	D		
13	The system shall allow for interoperability with the Ministry of Health (MOH) enterprise systems (e.g., SALMI, SIPS, etc.)	M		
14	The system shall support the use of optical character recognition (OCR) software	M		
15	The system shall provide the functionality to interact with and receive data that is read by a barcode, QR Code or similar coded reader and can be automatically linked to a patient's electronic health record. The system shall provide the functionality to generate Bar Codes, QR Codes and other similar standard coded data representations	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
16	The system shall allow printing by authorized personnel only. The system shall provide printing of patient information inclusive of patient outcomes related to patient condition, treatment and care delivery processes	M		
17	The system shall include the functionality to set up alerts via emails and SMS	M		
18	The system should capture and maintain patient, submitter, supplier, and other client billing information for costing, invoicing, collecting, reporting, and other billing activities	D		
19	The system shall capture and maintain patient, submitter, supplier, and other client demographics information	M		
20	The system shall provide an Inventory Payment to facilitate management and inventory of pharmaceuticals and supplies across the entire supply chain including MOH/NIPDEC central stores and be interoperable with C40's system	M		
21	The system shall provide an Inventory module for all relevant non-pharmaceuticals modules to facilitate management of inventory of non-pharmaceuticals and supplies across the entire supply chain	M		
22	The system shall allow administrators to configure multiple levels of user rights and security by site location, department, group, role, and/or specific function	M		
23	The system shall allow administrators and super users to reset user passwords	M		
24	The system shall lock a user out after a specified number of consecutive failed log-in attempts	M		
25	The system shall record audit information on all transactions, including users which create, read, update, delete and archive information with time stamp	M		
26	The system shall verify that a requesting user has the required access prior to carrying out a system or data function related to health information	M		
27	The system shall support role-based access capable of mapping each user to one or more roles, and each role to one or more system functions or access privileges	M		
28	The system's User Authentication shall be managed on a central server	M		
29	The system shall allow the authorized creation, modification, and duplication of user profiles	M		
30	The system shall integrate with the RIS/PACS at the hospital/health facilities	M		
31	The system shall be able to integrate with other solutions using common integration protocols (APIs, etc.)	M		
1.2 Search component				
32	The system shall provide the user with "Search / Advance Search" features to get necessary information, based on the certain parameters or criteria pre- defined in the system with the ability to use a wildcard character in the search parameters. The results should be displayed to the Users in a User-friendly manner with features like pagination, sorting, drill down etc.	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
33	The system shall allow search on Unique ID and / or Bar code through an attached Bar code scanner as first preference	M		
34	The system shall allow search on basic demographic information like name, mobile number, father's/family name, address, etc. as second preference	M		
35	The system should allow for "Soundex" phonetic searching, in addition to the second preference searching mechanism	D		
36	The system shall allow search on IDs issued by government, like National ID number, Passport ID, Birth Certificate PIN, Driver Permit Number, etc. and the proposed National E-ID (when available)	M		
37	The system shall allow for free text search with a combination of other parameters, like last visit date, couple of first or last digits from Patients Unique ID, department visited, etc. to authorized users	M		
38	The system shall display the records to authorized users if the criteria match. The system should allow sorting, filtering and selecting the existing record after search is performed by authorized users	M		
1.3 Dashboards				
39	The system shall have the ability to analyse database according to variables and filters such as, but not limited to: ▶ Age ▶ Gender ▶ Religion ▶ Symptoms ▶ Clinical findings ▶ Investigations ▶ Diagnoses ▶ Treatment ▶ Location of patients ▶ Ethnicity ▶ Age Groups ▶ Occupation ▶ District ▶ Geographical Area ▶ RHA ▶ Constituency ▶ Non-nationals ▶ Returning Patients returning on a user defined date/time ▶ Returning Patients returning between user defined dates ▶ Returning Patients returning to ED within 24 hours ▶ Returning Patients returning to ED within 48 hours ▶ Returning Patients returning to ED within 72 hours	M		
40	The system can produce reports based on PAHO indicators and CSO statistics requirements	O		

ID	Requirement description	Priority (M/D/O)	Response	Comments
41	The system shall have Inpatient Dashboards which provide a real time view of inpatients on each hospital ward. Wards include, but not limited to: ▶ Emergency Room ▶ Intensive Care Unit (ICU) ▶ Neonatal Intensive Care Unit (NICU) ▶ Maternity Unit ▶ Paediatric Unit (Medical and Surgical) ▶ Medical Unit (Adult) ▶ Surgical Unit (Adult) ▶ Surgery ▶ Recovery ▶ Isolation The wards that will be implemented will be those applicable to the ERHA	M		
42	The system shall have Outpatient Dashboards which provide a real time view of outpatients at the outpatient clinics possibly based on scheduled visits and will be able view the patients who missed their appointments as well as the walk-in scheduled patients. Clinics include, but may not be limited to: ▶ Dialysis ▶ Therapy ▶ Oncology ▶ Paediatrics Medical ▶ Paediatrics Surgical ▶ Antenatal ▶ Antenatal High Risk ▶ ECG/Cardiology ▶ Orthopaedics ▶ Ophthalmology ▶ Eye Screening ▶ Gynaecology ▶ Epilepsy ▶ Renal ▶ Urology ▶ Surgical (Adult) ▶ Medical (Adult) ▶ Family Medicine ▶ Cardiac ▶ Dental ▶ Oncology The clinics implemented shall be applicable to the ERHA	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
43	The system should have Census dashboards should show patient census sorted by ward, by gender, by initial diagnosis, by final diagnosis, by attending physician, and by patient payment category	O		
44	The system shall have the type of information and content displayed on the personal Dashboard of Users to be dynamically controlled through the Access control module / Admin Module	M		
45	The system shall allow patient registration record to be automatically forwarded to the dashboard of the concerned OPD doctor. The Patients should be queued from initial Patient registration to later	O		
1.4 Reporting				
1.4.1 Medical Record Reports				
46	The systems shall allow the generation of automatic reports	M		
47	The system shall produce reports for any given time period such as, but not limited to: ► Utilization Report comprising of: ○ Bed Complement ○ Available bed days ○ Admissions ○ Discharges ○ Deaths ○ Gross death rate ○ Transfers ○ Patients Days ○ Average length of stay ○ Occupancy Rate ○ Turnover Rate ○ Clinic Visits and Outcomes ► Annual Service Agreement Reports comprising of: o Admissions o Discharges o Patient throughput ► Patient demographics ► Waiting Times ► Clinic Schedules ► Ad-Hoc Reports	M		
1.4.2 General Reports				
48	The system shall be capable of generating a dashboard report	M		
49	The system shall have the ability to analyze database according to variables such as:	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	▶ Age ▶ Gender ▶ Religion ▶ Symptoms ▶ Clinical findings ▶ Investigations ▶ Diagnoses ▶ Treatment ▶ Location of patients ▶ Ethnicity ▶ Age Groups ▶ Occupation ▶ District ▶ Geographical Area ▶ RHA ▶ Constituency ▶ Returning Patients returning on a user defined date/time ▶ Returning Patients returning between user defined dates ▶ Returning Patients returning to ED within 24 hours ▶ Returning Patients returning to ED within 48 hours ▶ Returning Patients returning to ED within 72 hours			
50	The system shall produce reports based on PAHO indicators	M		
51	The system shall produce reports from operating theatre captured parameters highlighting the following indicators but not limited to: ▶ Wheel-in time ▶ Anesthesia start time ▶ Surgery start time ▶ Surgery end time ▶ Anesthesia end time ▶ Wheel-out time	M		
1.4.3 Pharmacy Reports				
52	The system shall produce reports such as, but not limited to: ▶ Drug Consumption Report ▶ Expiry Report ▶ Drug History Report ▶ Non-nationals accessing pharmacy items including the cost factor	M		
53	The system shall produce reports based on user statistics such as, but not limited to:	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Number of Prescriptions ► Number of Items ► Length of Time to do Prescription ► Transfers (no. of requests, no. of items)			
1.4.4 Emergency Department Reports				
54	The system shall produce reports for a specified period such as, but not limited to: ► Number of patients presenting with or diagnosed with diseases and syndromes required by Ministry of Health ► Triage level ► Presenting complaints ► Diagnosis ► Injury Surveillance Rates ► Absconded Rate ► Discharge against medical advice (DAMA) ► Mode of Arrival (any) ► Waiting time for handover of patients by (via GRMTT or Facility Ambulance) ► Average waiting time spent between triage and being seen by doctor for each Triage Level (1&2, 3, 4, 5) ► No. of patients registered for each shift; 6-2, 2-10, 10-6 ► Time from arrival to Triage ► Time from Triage to Registration ► Time from Registration to Treatment ► Time from Treatment to Discharge ► Total Time spent in the Emergency Department ► Time from Registration to first time sensitive investigation such as ECG, Head CT, etc.	M		
55	The system shall produce a real-time Emergency dashboard showing: ► Patient list including associated information on: ○ current status ○ current disposition ○ arrival time ○ waiting time by triage level ○ triage level ○ Doctor assigned ► Summary data including: ○ Total in Department ○ Numbers per triage level ○ Average waiting time ○ Average length of stay	M		
1.4.5 Ward and Bed Management Reports				

ID	Requirement description	Priority (M/D/O)	Response	Comments
The system shall produce reports for a specified period such as, but not limited to:				
56	No. of beds occupied by specialty, by geographical area, by age and diagnosis	M		
57	Length of patient stay by specialty	M		
58	► List of Admitting wards ► No. of Admissions to wards ► No. of Readmissions to Wards including time since discharge of the readmission and diagnostic codes of the last discharge and readmission	M		
59	No. of referrals to Clinics	M		
60	Mortality rates by specialties	M		
61	Total No. of Births	M		
62	Total No. of Deaths	M		
63	Conditions / Diagnosis	M		
64	Percentage of Bed utilization by clinical & diagnostic services	M		
65	Pharmacy consumption by specialty	M		
66	Laboratory works by specialty	M		
67	Radiology works by specialty	M		
68	Ward Arrival Times, but not limited to: ► Time patient was discharged from ED ► Time patient was admitted to Ward ► Time patient was taken to the Ward ► Time patient was assigned to a bed ► Time patient was placed on a bed	M		
1.4.6 Ad-hoc and Custom-Built Reporting				
69	The system shall have a reporting module which allows the generation of predefined reports, creation of ad-hoc and custom-built reports via a drag and drop report builder. The reporting module should allow for authorized users to access the system's data for analytics and reporting purposes.	M		
1.5 Helpdesk				
70	Provide a centralized Helpdesk and Incident Management Support till the end of contractual period	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
71	The Implementation Agency (IA) shall ensure the proper set up of the Helpdesk services in a timely manner along with application for logging the calls. The IA must procure the necessary licenses for the Call Logging Software. (Incident Management Software shall be separate). The help desk service shall serve as a single point of contact for all IT related incidents, information and service requests, grievance redressal, resolution and tracking status of incidents. Service is expected on a 24x7 basis	D		
72	Facility for providing assistance to all internal as well as external users regarding general information related to management healthcare services, facilities, timings, fees, pre-registration to name a few along with information related to automated modules / workflow in the application, interpretation of any errors, functionalities and usage	D		
73	The system shall receive, record, and maintain customer and employee feedback and apply tools to track the investigation, resolution, and success of any necessary corrective action	D		
74	To provide a service desk facility and to set up all necessary channels for reporting issues to helpdesk. The incident reporting channels will be the following: ► Specific e-mail account ► Toll Free Phone Numbers ► HIS portal/application	D		
75	It will be the responsibility of the Implementation Agency to obtain the toll-free number	D		
76	The Toll-free number shall be used for reporting all issues – The requirement is now limited to setting up a Toll-free number that shall be used for reporting all issues related only to the HIS software that is within the scope of the Implementation Agency	D		
77	The Helpdesk shall undertake the following activities: ► Log issues / complaints / Grievances related to Application, IT infrastructure, Data Center, IT systems at client locations, grievances related to services availability and quality etc., as under different categories and issue an ID number against the issue / complaint / Grievance ► Assign severity level to each issue / complaint / Grievance ► Track each issue / complaint / Grievance to resolution ► Escalate the issues / complaints / Grievances, to management authorities, if necessary, as per the escalation matrix ► Provide feedback and resolution to the callers ► Follow up on the collection of reports, revisit and record general feedback / complaints on the services provided in the hospital facility	D		
1.6 Audit module				
78	The system shall have an audit module. This module should log all transactions so that audits can be carried out to determine who accesses the system, when the access was done and what was done. Audits will be used to maintain the integrity of the system, enforce patient confidentiality and investigate questionable or illegal usage	M		
79	The system's audit module shall allow authorized users to be able to determine date and time and by whom records were viewed, edited	M		
80	The system's audit module shall allow authorized users to be able to identify the date, time and by whom records were created	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
81	The system's audit module allows authorized users to be able to determine date, time and by whom records were viewed accessed	M		
82	The system shall log all significant actions performed by a user, including: ► Logging in (including attempted/failed logins) ► Logging out ► Searching for a patient ► Viewing a patient record ► Changing a patient record	M		
83	The system's user activity log entries shall include, at a minimum: ► Date/time ► User ► Action ► Search term(s), if applicable ► Affected patient record, if applicable	M		
84	The system shall store activity logs in a format which can be accessed by external reporting tools for the purpose of auditing user activity	M		
85	The system's user activity logs shall retain for a period of at least one year; the retention period SHALL be configurable at MOH's request	M		
86	The system shall include a feature that facilitates auditing of user activity within the system itself	M		
1.7 Import/Export module				
87	The system shall be a cloud-based solution and must ensure if native functions are not possible (i.e., patient portal) they are easily integrated if sourced from a standard provider	M		
1.7.1 Import module requirements				
88	The system shall demonstrate interface-ability with common database electronic file transfer merge and editing functions. The HIS shall allow import of data into the databases to populate tables of the information. For example, the system shall import the services list when new services are added. Likewise, the system shall import the list of new physicians when they are employed. This does not preclude adding entries manually. It merely facilitates updating tables when a large number of entries are required. The system shall have the functionality to allow batch uploading of medical records into the system with defined templates and instructions for uploading (the facility should have a batch upload scheduling tool as well). The system shall have the functionality to upload and attach all digital document files in a variety of formats including, but not limited to: ► Excel format (.xls, .xlsx)	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Database format (.mdf, .dbf, .dbs) ► Web format (.xml, .json) ► Text format (.txt, .csv, .pdf, .docx)			
1.7.2 Export module requirements				
89	The system shall demonstrate interface-ability with common database electronic file transfer merge and editing functions. The system shall allow authorized users to export information for data analysis in a variety of formats including, but not limited to: ► Excel format (.xls, .xlsx) ► Database format (.mdf, .dbf, .dbs) ► Web format (.xml, .json) ► Text format (.txt, .csv, .pdf)	M		

Section 2. Electronic Medical Records Management

ID	Requirement description	Priority (M/D/O)	Response	Comments
2.1 Registration (Medical Records)				
90	The system shall provide a system generated unique enterprise master patient index that is linked to separate and multiple medical records numbers	M		
91	The system shall facilitate the creation of a single patient record for each patient by authorized users at designated points of contact as defined by the MOH. (e.g., Accident and emergency, registration, admissions)	M		
92	The system shall have the ability to capture for patient's consent for their singular patient medical record to be accessible to all health institutions through a National Health Information Management System. The system should have the facility to allow patients to sign electronically at the point of registration or capture the patient's consent manually/physically, upload and attach to the patient's record	M		
93	The system shall provide the ability to create a temporary record for a patient when the identity of the patient is unknown. (e.g., Jane or John Doe)	M		
94	The system shall be able to store more than one identifier for each patient record. (e.g., national ID, Driver's license, birth certificate pin, etc.)	M		
95	The system shall be able to query patient records by more than one attribute or field. (e.g., national ID, Driver's license, birth certificate pin, name, national registration number)	M		
96	The system shall identify potential duplicates and alert the user of a potential duplicate during assignment of a new medical record number	M		
97	The system shall provide access to demographic information such as name, date of birth and gender needed for patient care functions	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
98	The system shall be able to maintain and make available historic information for demographic data including prior names, addresses, phone numbers and email addresses	M		
99	The system shall be able to merge patient information from multiple patient records into a single patient record. The system should be able to de-duplicate person's information for multiple registrations using a heuristic algorithm and establish a unique identifier for the patient	M		
100	The system shall be able to Unmerge Patients: This feature will enable the user to undo any incorrect merging. The user will have the facility of assigning the merged information from the date of merger back to the corresponding records by assigning them appropriately	M		
101	The system should accept patient self-reported health information or information from private healthcare providers	D		
102	The system shall automatically perform error checking and input validation	M		
103	The system shall allow patient files and reports to be scanned and uploaded	M		
104	The system shall have the capability to accept inputs from registrars to update the system with the current registration of its membership of providers and clinicians (e.g., Medical Board of Trinidad & Tobago, Nursing Council of Trinidad & Tobago, Pharmacy Board of Trinidad & Tobago, etc.)	M		
105	The system shall support the recording of the following demographic items for each patient (with the ability for authorized users to set mandatory items), but not limited to: ► Unique identification number ► Surname or family name ► Given name(s) ► Gender ► Date of birth ► Health insurance data, including: o National health insurance policy number & effective dates o Supplemental health insurance insurer name, policy number & effective dates ► Address ► Phone number(s) ► Email address(es) ► Aliases or other names ► Place of birth ► Father's name ► Mother's name ► Occupation ► Religion ► Nationality ► Temporary address ► Next of kin ► Contact person, including:	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	○ Name ○ Relation to person in question ○ Address ○ Phone number(s) ► Family doctor ► Mobility			
106	The system shall support the recording of familial relationships between patients. (e.g., parent/child, spouse)	M		
107	The system shall support the change of status of emergency registration to inpatient visits	M		
108	The system shall have a facility to capture the photograph of patient at the point of registration. The registration counter should have a web cam with good resolution to capture the photo and add it to the database linked to the patient electronic record. This capability must be usable by, and support, the proposed national e-ID which will include a biometric hash.	M		
109	The system shall automatically queue patients from the OP registration counter based on clinician's availability and patient load. (Patients will report at the OP clinic after registration at the OP counter for same-day consultation/assessments)	M		
110	The system shall allow the Registration desk operator to select the relevant OPD doctor and specialty as per the defined roster available for the scheduled day. The system should automatically queue patients as per sequence and based on equal distribution of the patient queue for all doctors in the same OPD	M		
111	The system shall be integrable with PAHO's Perinatal Information System or institution's equivalent system for new-born registration (antenatal, neonatal, postnatal). And, have the capability to become the main form of perinatal registration	M		
112	The system shall be able to print the patient's card as a registration receipt or print a sticker which can be attached to the pre-printed OPD card. The registration receipt is proposed to have the following information, but not limited to: ► Bar Code (generated as per Unique ID) ► Unique ID ► Date and Time Stamp ► Any other relevant information, as applicable	M		
113	The system shall have a feature to create, edit & update the already available details of the patient by an authenticated user at a later stage after registration	M		
114	The system's Unique ID issued to the patient shall have lifetime validity. The Unique ID will be valid for seeking healthcare services within and across Trinidad and Tobago	M		
115	The system's integrated operation of the Registration requirements shall be both in online and offline mode in a Centralized & Integrated manner	M		
116	The system's color codes shall be used to highlight the patient information and to define the validity of the registration (this would indicate information is outstanding for patient registration).	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
117	The system shall provide integrated disease management support for education, outreach and care to enrolled patients	M		
118	The system shall identify and tracks patients who are enrolled in health management programmes	M		
119	The system shall support the identification of patients for clinical trials and evidence-based research for recruitment	M		
120	The system shall provide historical evidence of using EHR for clinical research and responding to public health requirements	M		
121	The system shall support the protocols and additional documentation and reporting needed for clinical trials	M		
2.2 Medical Records (Release of information / Medical Records department)				
122	The system shall provide tools for generation of a unique universal patient identification and allow for integration across other systems (electronic or manual) to unify patient information	M		
123	The system shall perform validation checks to support regulatory and accreditation requirements based on hospital care against the predefined clinical pathways	M		
124	The system shall provide a summary report on patient outcomes related to patient condition, treatment and care delivery processes	M		
125	The system shall capture data for continuous quality improvement, utilization review, risk management, resource planning and performance management including Daily Ward Census	M		
126	The system shall comply with approved industry standards for message and vocabulary/content	M		
127	The system should have the ability to record privacy restrictions (e.g., "VIP flag") on either the patient's record as a whole or this specific visit	D		
128	The system shall support discharge checklists through the completion of a discharge checklist (or similar), recorded in system – e.g., discharge summary completed, ICD coding completed, discharge status, patient follow ups communicated to patient, etc.	M		
129	The system shall have the ability to track the location (at any RHA location) of the patient's paper (i.e., hard copy) record	M		
130	The system shall have the ability to see patient diagnosis, by authorized users, for the current visit as part of the patient summary (i.e., with patient demographics) including the ability to display a summary view of the patient's record with key information, including: ► Allergies ► Immunization history ► Recent referrals/consults (with attending provider indicated) ► Recent emergency visits ► Recent lab and imaging results	M		
131	The system shall enable clinicians to record how complex an encounter is (i.e., how much work was involved, hours utilized, resources used, etc.) to assist in workload management	M		
132	The system shall ensure the following process (or a demonstrably similar process) is used to change notes (notes may not be deleted):	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Submit reason for change ► Review by authorized body / person ► Approved change ► Change applied All changes must be logged with who approved, when and reason for Change			
133	The system's Medical Records Module shall allow authorized users to generate reports of patients' medical records. These reports should be printable in physical or electronic format and be ready for email to the email address found in the patient's medical record. This will include scanned documents that form part of the patient's electronic medical record	M		
134	The system's Medical Records Module shall allow any updates to the medical record to add treatment, diagnosis, notes or other elements. However, a link to do so should be available in the Medical Record Reporting Module	M		
135	The system should allow the printable / email ready medical report should be filterable based on, but not limited to: ► All diagnoses ► A specific diagnosis ► A specific period of time ► A specific physician's care ► Patient age bracket	D		
136	The system shall restrict deletion of medical records once they have been confirmed. Records for deceased persons shall be closed and archived, but NEVER deleted	M		
2.3 Referral module				
137	The system shall provide the ability to capture, store, display and manage referrals as part of a patient's EMR (both internal and external)	M		
138	The system shall route the referral to the clinician for review and acceptance as part of the patient's workflow	M		
139	The system shall be capable of accepting e-Referrals from multiple sources (including private and public care facilities) with a mechanism to enable transfer of patient information from one provider to another for specialized care	M		
140	The system shall be able to record and print discharge disposition with authorized e-stamps (including instructions for medicines, homecare and private doctors), once all criteria for discharge are met, as either: ► Referral (to clinic) ► Ward Review (come back to ward at a specified time) ► Home (no follow up required)	M		
141	The system shall permit authorized users to review existing referrals, searching by: ► Status ► Patient ► Referring physician or organizational unit	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Physician or organizational unit referred to ► Urgency			
142	The system shall permit selected types of high priority referrals to be “pre-approved” by a supervising physician	M		
143	The system shall support approval of referrals by a supervising physician	M		
144	The system shall have the ability to record whether a visit is the result of a referral and, if so, from what provider and/or facility	M		
145	The system shall have the feature to flag referral and transfer cases	M		
146	The system shall have the feature to generate reports of the referred and transferred patients	M		
147	The system should allow for requesting ambulance services for referral cases, through user friendly select options. The system should automatically forward these requests to the Ambulance services operator dashboard for further action	D		
2.4 Patient portal				
148	The system can include a “patient portal” where patients can access a designated subset of their own health record and allow patients to securely view their health information online anytime, anywhere via a web browser or mobile device The patient portal must support use of the national e-ID, including the use of a biometric hash, to enable secure authorized access to their own health record.	O		
149	The system can allow patients to view demographic and medical data	O		
150	The system can allow patients to view various data points, including lab and imaging results, physician notes, their health histories, discharge summaries, and immunizations	O		
151	The system can allow patients to upload medical documents and health information that is required for their profile, in approved formats as stated by the MOH, with the ability to submit health information such as immunizations received elsewhere, blood glucose measurements, etc.	O		
152	The system can allow patients to view appointments, schedule and cancel appointments	O		
153	The system can send reminders to patients for appointment and follow-up care reminder	O		
154	The system can allow patients to respond to surveys to measure patient experience	O		
155	The system can have the capability for Online Registration. There shall be facility to do online registration for OP consultation. There shall be facility for patient registration for online services. Patients can log in and view the doctors on duty and register online for consultation	O		
156	The system can allow for pre-registration online (HIS Web Portal)	O		
157	The system can allow the capability for patients to be able to determine if a particular pharmacy item is available at a particular health institution’s pharmacy	O		

Section 3. Scheduling and Ward & Bed Management

ID	Requirement description	Priority (M/D/O)	Response	Comments
3.1 Out-Patient / In-Patient				
158	The system shall be able to schedule clinic visits, procedures, lab, medical imaging and surgery appointments as well as schedule waiting lists and urgent lists for instances when appointments are cancelled or missed	M		
159	The system shall be able to display a schedule of patient appointments to authorized users, along with status (e.g., Confirmed, missed appointment, etc.). It shall support the recording of patient attendance at appointments and the identification of "no-shows"	M		
160	The system should allow patients to view the patient's appointments, schedule and cancel appointments	D		
161	The system shall allow authenticated users to view appointments, schedule/re-schedule and cancel appointments	M		
162	The system should support the scheduling of appointments for a resource by authorized users (e.g., patient, room, shift equipment)	D		
163	The system shall support the creation of recurring appointments	M		
164	The system shall be able to generate, print and maintain a list of appointments or a calendar of appointments for a given range of dates based on the following parameters: ► Date range ► Time range on a specified date	M		
165	The system shall support capacity limits for clinicians using block appointments – e.g., how many patients may be booked into a clinic simultaneously	M		
166	The system should support booking follow up outpatient or clinic appointments from other departments, clinics or sites – e.g., emergency can book a follow-up appointment in a clinic for a patient	D		
167	The system should support appointment reminders and change notifications via text message to a patient	D		
168	The system shall support appointment reminders to clinicians	M		
169	The system shall permit authorized users to see all a patient's appointments. (To help avoid scheduling conflicts)	M		
170	The system shall allow specified resources to be associated with an appointment. (Clinicians, radiology equipment etc.)	M		
171	The system shall alert if there are conflicting appointments	M		
172	The system should allow for Duty Scheduling: There shall be facility for scheduling duty for the employees, including Doctors, Nurses, Paramedics and other hospital staff as required daily. The attendance module shall confirm that the employee has reported for duty as per the schedule. Thus, the service history of each employee will be updated automatically after the implementation of the Software. This should be controlled through authenticated users in the system	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
173	The system shall allow for appointments with non-physician healthcare professionals	M		
174	The system shall allow physicians to invoke clinical orders and view previous records during Consultation	M		
175	The system shall merge with EMR (Electronic Medical Record) to allow Doctor to record history, physical examination, investigations and other clinical details/observations & view them	M		
176	The system shall allow for the classification of a patient scheduled prior to the day of the clinic. These patients will be known as "Scheduled patients". It shall allow for the scheduling of walk-in patients to a clinic (with authorization). These patients will be known as "Walk-in Patients"	M		
177	The system shall be able to identify the maximum number of patients that can be seen in any clinic and allow the attending physician to override this number if necessary	M		
178	The system shall allow authorized users to block out user-defined days (e.g., holidays) so that a clinic cannot be scheduled on these user-defined days. This will require identifying days annually which can be managed by the functional administrator in the control tables of the system	M		
3.2 Operation Theatre Scheduling				
179	The system shall allow for OT scheduling on a daily basis. Also, the system shall allow mapping of patients to "concerned" surgeon / doctors / specialist	M		
180	The system shall allow for re-scheduling / cancellation of the prescribed surgery, after recording the reasons for re-scheduling by authorized users	M		
181	The system shall allow for the conversion of the scheduled patient's status from outpatient to inpatient based on the type of surgery	M		
182	The system shall allow the facility to view a list of surgical doctors scheduled and on-call	M		
183	The system shall allow both Emergency and Elective surgery scheduling as advised by the doctor/ surgeon on a daily basis. Also, the system shall allow mapping of patients to "concerned" surgeon / doctors / specialist	M		
184	The system shall allow the authorized user to select the vacant slot for the prescribed surgery from the calendar / schedule of the "concerned" surgeon	M		
185	The system shall allow for authorized re-scheduling of the prescribed surgery, after recording the reasons for re-scheduling	M		
186	The system shall allow for "time scheduling" one day before the actual date of surgery, as per available slots for the next day with automated notifications (call, email, SMS) sent on confirmation of scheduled surgery	M		
187	The system shall have a pre-defined checklist for the scheduled surgeries, in order to keep a check on the preparatory work done before the actual OT process begins. The system shall trigger pre-operative screening on scheduling of surgery, i.e., pre-op investigations pending or completed, and pre-op consultations/ anesthesia assessments pending or completed, etc. The system shall support these appointments and the outcomes form part of the workflow in the surgery checklist as well as form part of the patient's electronic medical record	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
188	The system shall allow should allow prioritizing of the Surgery schedule (date and time) and inform all concerned, in case of Emergency surgery	D		
189	The system shall capture the surgery parameters through single click options in the system. Following are parameters that may be captured (or standardized parameters as defined by MOH) but not limited to: ► Wheel-in time ► Anesthesia start time ► Surgery start time ► Surgery end time ► Anesthesia end time ► Wheel-out time	M		
3.3 Bed Management / Ward Management				
3.3.1 Wards – Inpatient Admissions Nursing Module				
190	The system shall manage ward and bed assignments	M		
191	The system shall allow authorized users to view, classify, create, edit, update and delete wards and beds by institution	M		
192	The system shall be integrable with any existing ward and bed management system and/or smart ward and bed technology	M		
193	The system shall display vacant and occupied beds with the aid of an interactive graphical ward map	M		
194	The system shall allow acceptance of patients when they arrive on the ward noting time of arrival	M		
195	The system shall support reporting to evaluate processes and outcomes of care while patient is on the ward	M		
196	The system shall capture and manage episodic and longitudinal electronic health record information while patient is on the ward	M		
197	The system shall allow the authorized retrieval of demographic data and pertinent patient data	M		
198	The system shall accept warded patient self-reported health information	M		
199	The system shall support ordering ward and assessment consumables appropriate to the clinical situation by authorized users e.g., gloves, masks, medical gowns etc.	D		
200	The system shall provide a dashboard on each ward with alerts, charts and recommendations to the individual patient condition, situation and preferences and supports clinicians in directing the course of care	M		
201	The system shall provide a dashboard on each ward with drill down to suggests potential and time relevant problems to care providers to consider for a patient based on automated scanning of pertinent data documented by all members of the care team	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
202	The system shall be capable of supporting warded patient discharge planning including reviews and assessment checks at various points and locations through the discharge process	M		
203	The system shall allow the classification of wards and bed by male/female/children beds/ rooms/suites etc.	M		
204	The system shall allow a Bed bureau dashboard access at authorized stations in each institution and filtered to show availability and utilization of wards and beds of that institution	M		
205	The system shall provide bed-waiting facility to track time from when a patient is to be transferred till when it actually takes place, including tracking the time of receipt of patient at the ward and by which orderly	M		
206	The system shall be able to create / modify room and bed details in a ward by authorized users, including transfer to another bed/ unit including movement of beds to other wards	M		
207	The system shall allow User defined type of beds, including multiple occupancy – mother/baby beds	M		
208	The system shall record and identify out of service beds	M		
209	The system shall display the status of the beds in all the wards in real time by institution or integrate with existing systems to enable this functionality	M		

Section 4. Patient Care Management

ID	Requirement description	Priority (M/D/O)	Response	Comments
4.1 Triage – Nursing Module				
210	The system shall capture and manage episodic and longitudinal electronic health record information	M		
211	The system shall capture multiple presenting complaints of patients including diagram/drawing illustrating site of injury/pain	M		
212	The system shall allow for the assignment of a triage level based on CTAS system including recording the details of the person performing the triage as well as initial medications that are prescribed and administered to the patient	M		
213	The system shall capture patient vital signs including: ► Temperature ► Blood pressure ► Heart rate ► Respiratory rate ► Oxygen saturation	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Height and weight ► Patient mode of arrival (e.g., ambulance, police, walk-in, GMRTT, organization ambulance) ► Physical presentation as discrete data ► Initial and final diagnosis with the capability to allocate a status of quarantine based on initial diagnosis			
214	The system shall update patient history by modifying, adding or removing items from the patient history as appropriate	M		
215	The system shall support the use of electronic signatures where needed. Particularly for allowing patient consent to share their information between RHAs and MOH	M		
216	The system shall support workflows as defined by the Ministry of Health	M		
217	The system shall differentiate between patient historical data (applicable with one visit, e.g., breath sounds from last respiratory assessment) and facilitate copying data forward as appropriate to support continuity of care, accuracy of ordering and efficiency of clinical documentation	M		
218	The system shall capture and store lists of medications and other agents which can cause the patient to have an allergic or other adverse reaction. This capture should detail sources, date and time and maintain all historical details captured for each patient	M		
219	The system should allow capture of patient time of arrival, wait time and time of departure	M		
220	The system should allow fast capture and retrieval of triage/ treatment details, whenever required through user friendly options	M		
4.2 Emergency				
221	The system shall generate bar-coded wrist tags with unique ID, which can be attached to the patient, based on defined categories (as per clinical conditions of the patient) for cases of 'Emergency Registration' (based on triage level). The system shall have provision to enter the registration details later	M		
222	The system shall record where a patient died: RHA, hospital/DHF, location in hospital (e.g., emergency, pediatrics, etc.), also date and time of death	M		
223	The system shall support the conversion of "emergency registration" to inpatient visits (this should be a status change in the system and on the patient's record)	M		
224	The system shall have the ability to support an Emergency Department whiteboard (i.e., large screen) to provide an overview of the patients currently being treated at ED, their status, alerts and actions	D		
225	The system shall allow the authorized user to enter the registration details along with preliminary treatment details given by the doctors, tagged to the unique ID, through a user-friendly select options as far as possible	M		
226	The system shall allow for requesting ambulance services for referral cases, through a user-friendly select options. The system shall automatically forward these requests to the Ambulance services operator dashboard for further action	O		

ID	Requirement description	Priority (M/D/O)	Response	Comments
227	The system shall forward Patient details to OT scheduler screen or OT surgeon's access terminal and the patient's status changed on their record for cases of surgery. The system shall allow the respective authorized user to allocate a slot for surgery and reserve the respective theatre and surgeon	M		
228	The system's workflow shall forward the patient's details to the authorized user assigned for generating and providing death certificates for cases of death of the patient. The system shall allow the user to generate death certificates. Information transfer from emergency to mortuary shall automatically occur through the HIS, as required. The system shall have the capability to integrate with Ministry of Legal Affairs for registration of deaths and births	M		
229	The system shall provide other options to the clinician's dashboard, like viewing past treatment details, investigation results, any allergies / health conditions, etc. if the doctor requires them. The doctor shall be able to view the required information with single click	M		
230	The system shall allow the authorized user to select the relevant section on the screen for entering diagnosis, treatment and doctor orders like - investigation, minor procedures, drugs, Blood, referrals, etc. whichever is applicable and required	M		
231	The system shall allow health records of the patients to be captured and collated through various touch points in the hospital electronically, after patient visits the Emergency. The system shall automatically forward the relevant sections of the information / data form, to concerned departments, for further action on the patient's case as required and automatically update the patient's status as required. These records may include pharmacy for dispensing medicines, labs for investigations, radiology for X-ray/ ultrasound etc., injection room for administering an injection and/ or any minor OT procedure. The system shall allow entry of treatment details by the authorized users present at the respective functional units, as per the advice of EMO, if that is the procedure adopted by Hospital administrators	M		
4.3 Continuity of Care / Medicine Assessment				
232	The system shall ensure qualitative review of the EMR for each patient ascertaining that all opinions are supported by findings, that there are no discrepancies or errors and that there is sufficient data written in the sequence of events to justify the diagnosis and to warrant the treatment and end results	M		
233	The system shall differentiate between patient historical data (applicable with one visit, e.g., breath sounds from last respiratory assessment) and support copying data forward as appropriate to support continuity of care, accuracy of ordering and efficiency of clinical documentation	M		
234	The system shall include patient's problem list, patient history and physical examination, allergies, immunizations record, medications dispensed and administered orders, diagnostic results and images and most recent vital signs	M		
235	The system shall support queuing and assessment appropriate to the clinical situation	M		
236	The system shall support reporting to evaluate processes and outcomes of care	M		
237	The system shall include decision support tools to guide and critique medication administration – right patient, right drug, right dose, right time and right route	M		
238	The system shall support mandatory reporting defined by MOH and RHAs	M		
239	The system shall support data modelling tools for evaluation of potential changes	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
240	The system shall support interoperability between CDRs defined by the MOH and RHAs. The key function of the CDR (Clinical Data Repository) is to capture and store healthcare transactions from any relevant healthcare domain (Diagnosis, Lab, Medication etc.). To enable interoperability, the system's central software requires an open HL7 V3 standards-based repository to ensure data can be reused for secondary purposes, such as continuity of care	M		
241	In out-patient cases, it is proposed that the follow-up calls from the Help desk may request the Patients to visit the OPD, if the test results depict 'Critical' values	M		
242	The system shall allow for medical diagnosis using International Classification of Diseases 11 (ICD – 11) or latest coding standard	M		
243	The system shall facilitate assessments that provide: ► Patient problem lists ► Patient history ► Physical examination ► Allergies ► Immunizations ► Medications dispensed and administered orders ► Diagnostic results and images (or links to RIS PACS images) ► Most recent vital signs The system shall also highlight the patient's pertinent information to the authorized user	M		
244	The system shall support all laboratory specialties that can be performed by nurses on handy testing devices usable on the point of care, i.e., blood gas, electrolyte, Hematocrit, glucose level. If devices are HL7 compliant then the systems should be integrable	M		
245	The system shall support ordering medication at point of medical assessment from institution's internal pharmacy and manage treatment to patient. This should support internal generation, authorizing, accepting, assigning and return orders to both departments and individuals	M		
246	The system shall provide the ability to request diagnostic tests, including laboratory investigations, imaging studies and assessment appropriate to the clinical situation	M		
247	The system shall have the ability to provide a view of active requests for an individual patient with pending results	M		
248	The system shall provide the ability to create clinical documentation or notes using templates if needed	M		
249	The system shall allow for the centralization of Quality Control (QC) of data from the point of care devices to the point of care data manager	M		
250	The system shall consolidate the point of care testing observation in the common repository of orders and observations	M		
251	The system shall be available for: ► Further historic access by caregivers ► Point of care observations ► Laboratories test results	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
252	The system shall provide the ability to capture external data and documentation (e.g., external laboratory results and images, etc.)	M		
253	The system should identify populations of patients who can benefit from health management initiatives	D		
254	The system shall support reporting to evaluate processes and outcomes of care as defined by the MOH	M		
255	The system shall provide basic decision support tools, interdisciplinary treatment plans and rules as well as care paths and rules-based prompting to reduce practice variance in the ordering and care delivery process	M		
256	The system shall provide alerts and recommendations to the individual patient's (including pediatric patients) condition, situation, preferences and support clinicians in directing the course of care – it shall suggest potential and time relevant problems for care providers to consider for a patient based on automated scanning of pertinent data documented by all members of the care team. Alerts shall include but not limited to: ► Allergies ► Religious restrictions ► DNRs ► Donors ► Domestic abuse ► Suicidal tendencies	M		
257	The system shall permit efficient data entry of all orders and documentation by authorized clinicians. This includes prescription writing and refill management. The system shall support various means of clinician entry (e.g., keyboard, voice, pointer device, and handwriting recognition)	M		

Section 5. Pharmacy, Lab and Radiology Management

ID	Requirement description	Priority (M/D/O)	Response	Comments
5.1 Pharmacy/Drug Procurement Management				
258	The system shall have Artificial Intelligence (AI) capability to assess scanned prescriptions to identify duplications, multiple submissions of the same prescription, identify drug interactions and alert all teams involved	M		
259	The system shall provide the ability to capture medication administration details as discrete data, including, but not limited to: ► The medication name and dose ► Form of medication (e.g., tab, cap, etc.) ► Unit of issue ► Date and time of administration ► Route and site ► Lot number and expiration date	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Manufacturer ► User ID ► RHA, main store and sub-store ► C40 catalog ID (items coming from C40)			
260	The system shall capture and store lists of medications and other agents for which a patient is allergic or may have other adverse reaction, when reviewing a patient's prescription	M		
261	The system shall capture computerized physician order entry and paper-based prescription orders	M		
262	The system shall allow authorized users to amend a prescription order keeping a secure trail of the previous order	M		
263	The system shall allow tracking of partially filled prescriptions and location facilitated	M		
264	The system shall facilitate the completion of partially filled or incomplete prescriptions, identifying the location where the partial fill was facilitated	M		
265	The system shall track the number of times a prescription has been filled or refilled	M		
266	The system shall print prescriptions	M		
267	The system shall generate prescription history for a patient and allow the prescription history to be used for faster refilling of items	M		
268	The system shall generate a drug consumption report and other standard reports accessible by authorized pharmacy users	M		
269	The system shall facilitate the monitoring both personnel who distribute and distribution of narcotics and other controlled substances (patient, quantity and frequency)	M		
270	The system shall perform checks in real-time by facilitating or integrating with other systems to include the following, but not limited to: ► The ability to create internal electronic requisitions for wards, departments or satellite pharmacies ► The ability to return drugs from the ward or department to the inventory ► The ability to track broken/damaged or expired items	M		
271	The system shall provide alerts for pharmaceuticals that are close expiration date (e.g., due to expire thirty (30) days, etc.) and manage dispensation based on expiration date	M		
272	The system shall provide a report with near to expired and/or recalled pharmaceuticals	M		
273	The system shall record, track and display outpatient prescriptions in real time	M		
274	The system shall record, track and display inpatient prescriptions in real time	M		
275	The system shall track physicians' orders complete with the Drug Name, Dosage, Instructions, Frequency and Duration	M		
276	The system shall provide built-in dose calculators and dose checking based on age, weight, and physician's instructions etc.	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
277	The system shall facilitate verification of prescriptions by a pharmacist with electronic authorization	M		
278	The system shall accommodate the addition of satellite pharmacies all connected to one central pharmacy	M		
279	The system shall generate and print prescription labels which will be affixed to both in-patient and out-patient drugs	M		
280	The system shall provide an Inventory module to facilitate management and inventory of pharmaceuticals and supplies across the entire supply chain (main stores, sub-stores, wards, health centers, etc.) and be integrable with MOH/NIPDEC Central Stores system	M		
281	The system shall print standard pharmacy reports as defined by the MOH	M		
282	The system shall provide drug interaction details at point of being prescribed or being dispensed	M		
283	The system shall update the drug interaction yearly or as needed by authorized users	M		
284	The system shall automatically warn specified users when pharmaceutical inventory counts reach a definable threshold or prompt for a reorder	M		
285	The system shall maintain a master list of suppliers with unit cost of each item	M		
286	The system shall maintain Location master data	M		
287	The system shall facilitate the entering/ selecting of supplies needed patient-wise by entering/ selecting Name of item and Quantity	M		
288	The system shall check the availability and quantity of items / drugs / articles / tools etc. at all sub-stores and main stores	M		
289	The system shall facilitate retrieving details of available drugs (batch number, expiry date, location) in the pharmacy / drug store & reserve drugs for an order/requisition based on the item code and quantity mentioned in the approved order/requisition	M		
290	The system shall support planning methodologies; re-order point, safety point, lot sizing, lead times, min/max levels etc., and will be maintained depending on the policies and procedures adopted for replenishment of stock at the sub-stores or main stores	M		
291	The system shall facilitate the entering of the number of items which are damaged so that it can adjust the stock of that item only after proper approvals on the system by the authorized person	M		
292	The system shall provide the facility such that outgoing medicines and prescriptions will be automatically deducted from its stock list including liquids where conversion maybe required to reduce volumes dispensed	M		
293	The system shall allow for the identification of items to be returned to C40 Central Stores due to reasons (e.g. near expiration, expired, recalled, etc.) defined by authorized users	M		
294	The system shall track and maintain the stock mentioned in Essential Drugs List, especially at Pharmacy level as defined by the MOH and WHO	M		
295	The system shall transfer and record items from one location store to another	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
296	The system shall have a Pharmacy Module which allows the following elements for the end user: ► Identification of ordering physician ► Ordering of medication and pharmaceutical supplies for a patient ► Discontinue medication ordered for a patient ► Review medication history ordered for any patient	M		
297	The system shall create an electronic copy of each prescription that is ordered by physician or other authorized party through the HIS, to be in accordance with the existing Pharmacy legislation requires that the Pharmacist keep a copy of each prescription. Physical documents should be scanned and captured electronically	M		
298	The system shall include a standardized list of frequencies, through drop-down menus (e.g., 3 times per day, twice per day, once daily, every four hours, etc.). The list of frequencies must be dynamic, thereby allowing the functional administrator to add new frequencies to the list or retire unused frequencies from the list; The list of frequencies shall include a frequency type of "Other" and allow free text to enter the frequency type	M		
299	The system shall utilize barcode scanners to read barcodes of items and the ability to scan barcodes to add/reduce from inventory at main store or sub-stores or at point of dispensation. Also, the system shall print the barcode on dispensed items and be able to scan at the dispensation counter	M		
300	The system shall have the ability to maintain an authorized list of physician e-signatures. This may be an electronic signature or an image of the physical signature or a method for secure prescription authorization from the physician. The physician's signature will be required for the electronic prescription. It may be included in the Patient Care Provider table.	M		
301	The system shall allow for the management of documents like SOPs, MSDS, etc. for pharmacy items to better ensure they are current and traceable	M		
5.2 Laboratory Information Services				
5.2.1 Laboratory Information Systems (LIS) Requirements				
302	The system shall provide patient case management and assignment for lab requests processed through the system	M		
303	The system shall provide a Laboratory Information System with the ability to record, track and manipulate data/modules associated with laboratory management for some laboratory equipment	M		
304	The system shall provide physician and clinic laboratory management tools and/or integrate with other modules of the system to access these tools	M		
305	The system should provide outreach and call list management tools	D		
306	The system shall be integrable and interoperable with all HL7 compatible analyzers with the capability to interact with any analyzers that are not HL7 compliant	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
307	The system shall provide the capability to capture result in templates from the analysis of lab tests/procedures requested from non-HL7 compliant analyzers or results to be entered from: a workstation; an analyzer interface; work lists; individually or manual testing (e.g., histology, grouping, etc.) with the capability to review and/or modify by authorized users	M		
308	The system shall support multi-site, multi-laboratory, and multi-physician groups	M		
309	The system shall provide epidemiology and disease tracking functionality with the necessary reporting as defined by the MOH, PAHO and WHO. The system shall record, track and manipulate data associated with Pathology management	M		
310	The system shall monitor and report turnaround time, from test request to clinician review	M		
311	The system shall provide the capability to generate lab tests request from authorized users from designated labs identifying queue status of lab tests requests providing estimated time of completion	M		
312	The system shall track status and workflow of the accession throughout the laboratory lifecycle, from test request to final analysis, including receiving, diagnostic testing, diagnostic test result reporting, and associated cost	M		
313	The system shall provide barcoded specimen labelling and tracking with the capability to scan barcodes at various points of the laboratory lifecycle and the capability to link and track sub-split samples with barcodes	M		
314	The system shall allow authorized users to create, manage, and track viewable specimen container schemata	M		
315	The system shall create and maintain a unique electronic accession record for each accession received	M		
316	The system should support standard-format digital picture and document upload and attachment to electronic accession records	D		
317	The system should support a user-configurable, spreadsheet-style, template based, multi-specimen (batch) log without requiring additional programming	D		
318	The system shall feature order entry rules to authorized users for managing duplicate orders, rejecting inappropriate tests, identifying inappropriate containers, rerouting tests to other/external labs, etc.	M		
319	The system shall support the authorized modification of specimen or specimen batch information prior to actual multi-specimen (batch) log	M		
320	The system shall allow authorized user to create, save, and recall pre-logged groups for routine specimens	M		
321	The system shall maintain the log of recurring specimen groups	M		
322	The system should allow standing orders and test schedules to be defined for future orders	D		
323	The system shall automatically split and manage orders requiring multiple testing locations	M		
324	The system shall differentiate "investigation use only" and "research use only" tests	M		
325	The system shall automatically generate and manage administrative documents for genetic tests	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
326	The system shall allow authorized users to generate user-definable or rules-based chain of custodies, worksheets, routing sheets, and custom labels upon specimen logging. The system shall have an inter-laboratory transfer function	M		
327	The system should allow rules-based chain of custody workflows with barcode scans of specimens and authorized users e-signing for issuing and receipt of specimens at each stage of the workflow. The system shall have an inter-laboratory transfer function	D		
328	The system shall provide a comprehensive view of all specimens and projects in the system using a color-coded status view of the current and scheduled specimens via user-configurable templates, all without requiring additional programming	M		
329	The system shall include environmental monitoring (EM) functionality or integrate with an external EM product	M		
330	The system shall prevent a specimen or analyzed result from being placed in a report queue until approved	M		
331	The system shall include comprehensive scheduling, tracking and flow management of specimens, including across multiple sites	M		
332	The system shall be capable of geographically organizing specimen records and their associated tests for special analysis and reporting	M		
333	The system shall allow authorized users to accept, cancel, re-run, and override attributes of one or multiple tests for a given patient	M		
334	The system shall allow authorized users to review the available test types in the system, including their reference range and units of measure	M		
335	The system shall allow multiple diagnosis codes to be attached to an ordered test	M		
336	The system shall automatically run medical necessity checks (based on diagnosis codes) on a requested test	M		
337	The system shall allow authorized users to schedule routine specimens on an hourly, daily, weekly, or monthly basis or user defined frequency, allowing group/batch enablement and disablement	M		
338	The system shall generate an hourly, daily, weekly, monthly, or user defined frequency for specimen collection schedule from a scheduling database with alerts for collection	M		
339	The system shall support automatic and manual (by authorized users) assignment and scheduling of analysis requests	M		
340	The system should be able to accept request information and schedules from third parties in an electronic format	D		
341	The system shall capture and store patient demographics, risk factors, and epidemiology data such as exposure data from third-party test requests. This information capture would be part of the main registration module at the LIS point of contact	M		
342	The system should process automated uploading of field-derived specimen collection data	D		
343	The system should allow users to manage billable and non-billable tests on the same accession	D		
344	The system should support tracking of shipping and receiving of samples between sites	D		
345	The system shall allow authorized entry, maintenance, and administration of patient previous records and track multiple patient encounters	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
346	The system shall allow authorized creation of user groups for suppliers, physicians and other such entities to be flagged as either active or inactive	M		
347	The system shall support the ability to set up user profiles across multiple facilities based on specific roles and responsibilities	M		
348	The system shall allow the management of information workflow, including notifications for requests and exigencies including approvals through the process workflow	M		
349	The system shall allow for the management of documents like SOPs, MSDS, etc. for laboratory items to better ensure they are current and traceable	M		
350	The system shall allow the authorized management and monitoring of resources by analyst, priority, analysis, and instrument	M		
351	The system shall allow authorized persons to select, schedule and assign tasks by analysts, work group, instrument, test, specimen, and priority	M		
352	The system shall allow authorized persons to review unassigned work by discipline and by lab	M		
353	The system shall allow authorized persons to review pending work by analyst prior to assigning additional work	M		
354	The system shall manage and report on reference specimens, reagents, and another inventory, including by department	M		
355	The system shall automatically warn specified users when inventory counts reach a definable threshold or prompt for a reorder	M		
356	The system shall provide an Inventory module to facilitate management and inventory of laboratory supplies across the entire supply chain and be integrable with MOH/NIPDEC Central Stores system for items received through C40	M		
357	The system should allow for the identification of laboratory items received from C40 to be returned to C40 Central Stores due to reasons (e.g., near expiration, expired, recalled, etc.) defined by authorized users	M		
358	The system shall allow authorized users to monitor and report on reference and reagent creation, use, and expiration	M		
359	The system can monitor proficiency test assignment, completion, and casework qualification for analytical staff	O		
360	The system should include revenue management functionality, including medical necessity checks and profitability analysis	D		
361	The system shall provide analysis tools to better support laboratory functions like resource planning, productivity projections, workload distribution, and work scheduling, and those tools display information in a consolidated view, with the ability to drill down to more detailed data	M		
362	The system should calculate administrative and laboratory costs	D		
363	The system should capture and maintain patient, submitter, supplier, and other client demographics and billing information for costing, invoicing, collecting, reporting, and other billing activities	D		
364	The system should support multi-tiered pricing based on patient type and location	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
365	The system shall track number of requests by type per location (e.g., wards, clinics)	M		
366	The system shall provide a Blood Bank Management system that can record, track and manipulate data/modules associated with Blood Bank management. This shall include donor records capturing demographic data, vital signs including temperature, blood pressure, heart rate, respiratory rate, Hemoglobin level, height and weight, and physical presentation, blood type, rhesus group, and responses to MOH defined questions to donors as discrete data. It shall link to patient medical record in the HIS and related lab test results. The system shall report on unique patient delivered products by lot number etc. and produce an individual (and collatable) report on blood product utilization for individual patients, programs or departments and totals by population and shall include a bedside identification system for product delivery	M		
367	The system shall be capable of tracking and managing the aspects of blood transfusions within the Blood Bank Management system	M		
368	The system shall be capable of managing recruitment of donors within the Blood Bank Management system	M		
369	The system shall record, track and manipulate data associated with managing reagents, controls, calibrators and consumables	M		
370	The system shall allow for the generation, approval and printing of reports for clinical use as defined by the MOH with printable patient instructions that can be associated to patient medical record and appointment card	M		
371	The system shall provide a queuing model to manage requested test and maximize efficiency of usage of analyzers	M		
372	The system shall associate requests made directly through an analyzer with the correct patient record. Process shall be secured by real-time patient identity checking	M		
373	The system shall provide clear specifications of interfaces between point of care devices, data manager and Laboratory Information System. This Integration shall enable the healthcare institution to replace one of these systems without breaking the existing data workflows	M		
374	The system shall support a variety of test protocols as defined by the MOH, each capable of storing test comments, test required, and special information like GC-MS conditions or special objects associated with the test	M		
375	The system shall provide and enforce normal reference range values for diagnostic tests as defined by a particular test/analyzer	M		
376	The system shall include default input values for diagnostic tests as defined by analyzer's manufacturer	M		
377	The system shall provide for a single test code requiring multiple analysts as targets	M		
378	The system shall allow authorized users to make a test code inactive across one or more sites while retaining it for audit and reporting purposes	M		
379	The system shall limit test code authorization to only qualified personnel and maintain their certification(s) to run assigned tests	M		
380	The system shall support single-component tests such as pH, BUN, PSA, etc.	M		
381	The system shall allow users to specify a single-component, multi-component, or group of tests, which represent all tests required	M		
382	The system shall effectively manage complex molecular testing protocols	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
383	The system shall effectively manage genetic testing protocols	M		
384	The system shall effectively manage at least hematology, biochemistry, immunology, microbiology, blood banking, histology and cytology testing protocols	M		
385	The system shall allow for authorized user-definable and procedure-specific protocols for HIV specimens	M		
386	The system shall permit authorized user-generated and modifiable calculations (based on a formulaic language) to be applied to all tests	M		
387	The system shall distinguish between routine and duplicate analysis	M		
388	The system shall notify analysts of applicable safety hazards associated with a specimen, reagent, or test before testing begins	M		
389	The system shall allow for the electronic transfer an item during testing from one functional area to another documenting the time at transfer	M		
390	The system shall provide visual indicators such as status icons to indicate a specimen's status in the workflow	M		
391	The system shall allow file transfer of data from instruments via intelligent interfaces or multi-specimen/multi-test ASCII files, with full on-screen review prior to database commitment	M		
392	The system shall permit manual data entry into an electronic worksheet of test measurements and results.	M		
393	The system shall allow incorrectly inputted data to be manually corrected based on user permissions	M		
394	The system shall prevent out-of-range and other critical results from being posted as final	M		
395	The system shall provide a colored visual indicator if the value is out of specification	M		
396	The system shall allow automated or semi-automated data insertion	M		
397	The system shall update specimen/item status when tests are authorized as completed	M		
398	The system shall automatically reorder a test or order additional tests if results do not meet lab-defined criteria, especially when the original specimen is still available	M		
399	The system shall record test results in or map them to the Systematized Nomenclature of Medicine Clinical Terms (SNOMED CT) and/or Logical Observation Identifiers Names and Codes (LOINC) standards	M		
400	The system shall compare results from previously entered tests to calculate a final result and immediately displays the calculated result	M		
401	The system shall allow authorized users to review all analytical results, including pricing, specification violations, history or trend analysis by analyte, and comments	M		
402	The system shall display the results of one or more tests in a graph (normalized or otherwise) for the purpose of visualizing data or searching for possible trends	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
403	The system shall provide tools for graphical patient and analyte trend plotting	M		
404	The system shall allow review of the stored test result, diluted result with corrected method detection limits (MDLs), and qualifiers after running specimens for multiple dilutions as in gas chromatography–mass spectrometry (GC-MS)	M		
405	The system shall display the standard operating procedure (SOP) associated with each test result to ensure proper techniques were used	M		
406	The system shall store test-related analysis comments with the test	M		
407	The system shall provide auto-commenting for common laboratory results as defined by MOH	M		
408	The system shall provide for high-volume multi-component transfers of test results with the ability to automatically match specimens to data files in either a backlog mode or a designated file mode to parse the data and to review and commit the specimen data	M		
409	The system shall provide result validation by authorized users, access all information about a specimen or group of specimens, including comments or special information about the specimen	M		
410	The system shall support validation at the analysis and specimen level, while also prohibiting specimen validation when analysis validation is incomplete	M		
411	The system should provide secure electronic peer review of results	D		
412	The system shall clearly differentiate released preliminary data from fully validated results	M		
413	The system shall hold all test results on a specimen with multiple tests ordered on it, until all work is completed, and a final report is issued	M		
414	The system shall fully manage all aspects of laboratory quality control, including the reporting and charting of all quality control data captured in the lab	M		
415	The system shall provide a base for a quality assurance program, including proficiency testing, scheduled maintenance of equipment, etc.	M		
416	The system shall distinguish QA/QC duplicates from normal specimens	M		
417	The system shall allow QA/QC tests to be easily created and associated with the primary analytical test	M		
418	The system shall allow manual entry of QA and QC data not captured as part of the system's regular processes	M		
419	The system shall calculate monthly QA/QC percentages for testing	M		
420	The system shall produce reports that detail ordered/requested tests not reported or distributed to prevent any “hold requests” from being forgotten and reducing the potential for long periods when samples are acquired, and results reported	M		
421	The system shall automatically flag out-of-range or abnormal quality control limits and issue alerts/notifications to relevant personnel	M		
422	The system shall automatically report any diagnostic test results deemed "suspect" or "positive" or “abnormal” for reportable diseases	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
423	The system shall have, if not native, a path to biometric identity processes for samples, for Anatomic Pathology, and shall have a functional coroners' pathological system	M		
424	The system shall allow for the capability to allow for free text and voice recognition to be used when developing certain reports (e.g., anatomic pathology, etc.)	M		
425	The system shall allow for the storage and transcription of voice recordings for certain vocalized reports (e.g., pathological reports, etc.)	M		
426	The system shall check data files for specification, allow for correction of specific reporting, analyte limits like dilution factors, and automatically assign reagent based on projected analyte limiting	M		
427	The system shall bilaterally interface with instruments and related software	M		
428	The system shall download data directly from laboratory instruments	M		
429	The system shall permit the defining and exporting of sequences to instruments by authorized users	M		
430	The system shall track and report on the usage of attached laboratory instruments	M		
431	The system shall automatically (or manually allow an authorized user to) remove an instrument from potential use from within the system when it falls out of tolerance limit or requires scheduled calibration	M		
432	The system shall provide a database of preventative maintenance, calibration, and repair records for laboratory equipment, preferably supported by standardized reporting	M		
433	The system shall schedule calibration, verification, and maintenance tasks in the worksheets or workflow process and make that schedule available for viewing	M		
434	The system shall allow authorized users to create and edit instrument maintenance profiles	M		
435	The system shall support a library of common electronic data deliverable (EDD) formats	M		
436	The system shall allow for the transfer data to and from another record management system or module	M		
437	The system shall allow for the transfer of formatted demographic and clinical information to local disease specific registries for patient monitoring and subsequent epidemiological analysis	M		
438	The system shall interface with non-Microsoft programs	M		
439	The system shall interface with electronic medical record or electronic health record systems	M		
440	The system shall provide an interface to facilitate connectivity with external contract or reference laboratories to electronically send or retrieve datasheets, analysis reports, and other related information	M		
441	The system shall provide a real-time interface for viewing live and stored data transactions and errors generated by interfaced instruments and systems	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
442	The system should direct output from ad-hoc queries to a computer file for subsequent analysis by other software	D		
443	The system shall support the manual retransmission of data to interfaced systems	M		
444	The system should support information exchange with specially assigned mobile devices	D		
445	The system shall receive accession/analysis request information from standardized web-enabled forms, with data elements including but not limited to: ► Requisition ID ► Patient identifying information (i.e., reference to patient in Person Registry) ► Ordering physician ► Order date ► Approval needed flag ► Approving physician ► Date approved ► Supervising physician ► Receiving lab ► Requisition type (e.g., general lab, microbiology, etc.) ► Name & code of test(s) ordered ► Specimen information (e.g., type, site, collection date) ► Requisition description & notes ► Tests completed by ► Attachments ► Requisition status ► Urgency	M		
446	The system should allow orders to be printed so that a hard copy may be kept with the specimen	D		
447	The system shall have the ability to link lab results to the relevant encounter or visit	M		
448	The system shall be able be able to specify normal ranges – linked to age and gender	M		
449	Manual/scanned entry of outsourced specimens by scanner, for patients who bring in their own specimens	D		
450	The system shall have defined list of Lab tests under various categories, available for selections by the concerned operator / Nurse / doctor, through user friendly select options	M		
451	The system shall allow Lab technicians to accept the samples sent for testing with maximum capacity pre-determined (however flexibility to be there to accept samples)	M		
452	The system shall highlight discrepancies, if any	M		
453	The system shall have the provision for specimen rejection along with a drop-down menu to select reason for rejection and alerts the requesting clinician	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
454	The system shall transmit whether certain tests cannot be performed due to various reasons to different departments, and the requisition of such tests should not be allowed temporarily	M		
455	The system shall track the dispatch status of Lab test reports from the 'Report Dispatch Counter', when the Patient / relative collects the required reports. Current status of admitted patients shall be reflected on the provisional/ approved reports	M		
456	The system shall have provision to track the 'Critical' values. As soon as the test results are entered / captured in the system, the system shall automatically determine if the test results are within a specified pre-defined range. The system shall send alerts to the concerned Hospital staff / Nurse / Doctor and display the test results on their respective dashboards in all such cases. This provision shall be available for all in-patient cases	M		
457	The system shall flag the need to retest if test results from the same person are starkly different over a short period. For example, the test result from the same day which shows a patient's A1C blood sugar level to be vastly different	M		
458	The system should archive all test and all results for the period to a data warehouse and only maintaining final reports as part of patients' electronic medical record at the end of a period (e.g., monthly, yearly)	D		
5.3 Radiology				
459	The system shall fill requests orders for pre-defined radiology tests for patients	M		
460	The system shall link to radiology tests which were completed on a patient's electronic health record	M		
461	The system shall assign/link radiology reports to patient's electronic medical record	M		
462	The system shall link to RIS PACS network and integrate with RIS, linking patient ID from RIS to patient unique ID in the HIS, enabling the access to view images relating to patient stored in the PACS and having access to radiology reports that are link to or included in the patient's medical record. The system's linkage of patient ID from RIS to patient unique ID in the HIS shall be backward compatible with all radiology modality specific patient ID systems with the HIS patient ID being the universal ID	M		
463	The system shall print patient labels for radiology images (if necessary). This will allow the patient care providers or ancillary staff to affix patient labels to physical radiology images	M		
464	The system shall produce a structured report for all medical imaging and create radiology report using MOH defined templates	M		
465	The system shall assign externally generated radiology report to patient electronic medical record. This will require that the capability to scan and attach the report or upload images to the patient record	M		
466	The system shall allow authorized users access to review radiology report. This shall allow the patient care provider to review the report but not edit it	M		
467	The system shall allow authorized users access to Edit / Update radiology report. This shall allow the patient care provider to edit/update the radiology report keeping a secure trail for change log of edits	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
468	The system shall have the functionality to register/schedule and report all medical imaging modalities, including but not limited to all of radiology, nuclear medicine, ultrasound (general pediatric maternity and cardiac etc.) in a seamless interface from patient registration scheduling and ordering and reporting	M		
469	The system shall be integrable with all existing large image databases	M		
470	The system shall have Artificial Intelligence (AI) capability to assess scanned radiology requests to identify duplications, multiple submissions of the same radiology request	M		
471	The system shall capture computerized physician radiology requests and paper-based radiology requests	M		
472	The system shall allow authorized users to amend a radiology requests, keeping a secure trail of the previous radiology requests	M		
473	The system shall allow tracking of partially completed radiology requests and location facilitated	M		
474	The system shall track the number of times a radiology request has been completed or re-requested	M		
475	The system shall print radiology requests	M		
476	The system shall generate a radiology request history for a patient and allow the radiology request history to be used for faster re-requesting	M		
477	The system shall perform checks in real-time by facilitating or integrating with other systems to include the following, but not limited to: ► Create internal electronic requisitions for modalities, wards, departments or alternative radiology departments ► Access radiology report from wards or departments by authorized users ► Track radiology requests by authorized users from wards or departments	M		
478	The system shall record, track and display outpatient radiology requests and results in real time	M		
479	The system shall record, track and display inpatient radiology requests and results in real time	M		
480	The system shall track physicians' orders complete with but not limited to; the Drug Name, Dosage, Modality, Radiation Dosage, Instructions, Frequency and Duration	M		
481	The system shall provide built-in radiation dose calculators and radiation dose checking based on age, weight, and physician's instructions etc.	M		
482	The system shall facilitate verification of radiology requests by a Radiologist with electronic authorization	M		
483	The system shall provide an Inventory module to facilitate management and inventory of radiology supplies across the entire supply chain and be integrable with RHA's inventory system (if applicable) and be integrable with MOH/NIPDEC Central Stores system for items received through C40	M		
484	The system shall print standard radiology reports as defined by the MOH	M		
485	The system shall maintain a master list of suppliers with unit cost of each item	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
486	The system shall maintain Location master data	M		
487	The system shall enter supplies needed patient-wise by entering/ selecting name of item and quantity	M		
488	The system shall check the availability and quantity of items / radiation drugs / articles / tools etc. at all radiology sub-stores and main stores	M		
489	The system shall transfer and record items from one location store to another	M		
490	The system shall include a Radiology module which will allow the following elements for the end user: ► Identification of ordering physician ► Ordering of medication, treatment and supplies for a patient ► Discontinue medication and treatment ordered for a patient ► Review medication and treatment history ordered for any patient	M		
491	The system shall create an electronic copy of each radiology request that is ordered by physician or other authorized party through the HIS in accordance with the existing legislation which requires that the Radiologist keep a copy of each radiology request. Physical documents shall be scanned and captured electronically	M		
492	The system shall utilize barcode scanners to read barcodes of items and the ability to scan barcodes to add/reduce from inventory at main store or sub-stores or at point of dispensation. The system shall print the barcode on radiology reports and be able to scan radiology reports barcode at any radiology department	M		
493	The system shall maintain an authorized list of radiology physicians' e-signatures. This may be an electronic signature or an image of the physical signature or a method for secure radiology request authorization from the physician. The physician's signature shall be required for the electronic radiology request. It may be included in the Patient Care Provider table	M		
494	The system shall allow for the management of documents like SOPs, MSDS, etc. for radiology items to better ensure they are current and traceable	M		
495	The system shall monitor and report turnaround time, from radiology request to clinician review	M		
496	The system shall provide the capability to generate radiology tests requests from authorized users with queue status of radiology tests requests providing estimated time of completion	M		
497	The system shall track status and workflow of the radiology request throughout the lifecycle, from radiology request to final analysis, including receiving, radiology imaging/scanning/testing, analysis reporting, and associated cost	M		
498	The system shall create and maintain a unique electronic radiology request record for each radiology request received	M		
499	The system should support standard-format digital picture and document upload and attachment to electronic radiology request records	D		
500	The system should allow standing orders and radiology image/scan/test schedules to be defined for future radiology requests	D		
501	The system shall allow multiple diagnosis codes to be attached to a radiology report	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
502	The system shall capture and store patient demographics, risk factors, and other data such as radiology requests from third parties. This information captured shall be part of the main registration module at the Radiology Department point of contact	M		
503	The system should manage billable and non-billable images/scans/tests on the same radiology request	D		
504	The system shall allow authorized entry, maintenance, and administration of patient previous records and track multiple patient encounters	M		
505	The system shall set up user profiles across multiple facilities based on specific roles and responsibilities	M		
506	The system shall manage information workflow, including notifications for requests and exigencies including approvals through the process workflow	M		
507	The system shall allow the authorized management and monitoring of resources by radiologist, priority, analysis, and modality	M		
508	The system shall allow authorized persons to select, schedule and assign tasks by radiologist, work group, modality, patient and priority	M		
509	The system shall allow authorized persons to review pending work by radiologist prior to assigning additional work	M		
510	The system shall identify radiology items received from C40 to be returned to C40 Central Stores due to reasons (e.g., near expiration, expired, recalled, etc.) defined by authorized users	M		
511	The system shall allow authorized users to monitor and report on reference and reagent creation, use, and expiration	M		
512	The system shall provide analysis tools to better support radiology functions like resource planning, productivity projections, workload distribution, and work scheduling, and those tools display information in a consolidated view, with the ability to drill down to more detailed data	M		
513	The system should calculate administrative and radiology costs	D		
514	The system should capture and maintain patient, submitter, supplier, and other client demographics and billing information for costing, invoicing, collecting, reporting, and other billing activities	D		
515	The system shall track number of radiology requests by type per location (e.g., wards, clinics, departments)	M		
516	The system shall allow for the authorized generation, approval and printing of radiology reports for clinical use as defined by the MOH	M		
517	The system shall permit authorized manual data entry into an electronic worksheet of measurements and results	M		
518	The system shall allow incorrectly inputted data to be manually corrected based on user permissions	M		
519	The system shall prevent out-of-range and other critical results from being posted as final on radiology reports	M		
520	The system shall allow authorized users to access specified patient lab test (e.g., renal function tests) results and reports that would form pre-requisites for contrast enhanced studies in Radiology. Additionally, the system shall support the automatic workflow for lab test requests required as pre-requisites for patient of the radiology department/clinics	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
521	The system shall compare results from previously entered images/scans/tests to calculate a final result and immediately display the calculated result. The system shall allow for authorized access to historic radiology reports and images smoothly	M		
522	The system shall display the results of one or more images / scans / tests in a graph (normalized or otherwise) for the purpose of visualizing data or searching for possible trends	M		
523	The system shall provide tools for graphical patient and analysis trend plotting	M		
524	The system shall display the standard operating procedure (SOP) associated with each radiology image / scan / test result to ensure proper techniques were used	M		
525	The system shall clearly differentiate released preliminary data from fully validated results	M		
526	The system shall allow QA / QC tests to be easily created and associated with the primary analytical test	M		
527	The system shall allow manual entry of QA and QC data not captured as part of the system's regular processes	M		
528	The system shall calculate monthly QA/QC percentages for testing	M		
529	The system shall produce reports that detail ordered / requested images / scans / tests not reported or distributed to prevent any “hold requests” from being forgotten and reducing the potential for delays	M		
530	The system shall automatically report any radiology results deemed "suspect" or "positive" or “abnormal” for reportable diseases / diagnosis	M		
531	The system shall allow for free text and voice recognition to be used when developing certain reports	M		
532	The system shall allow for the storage and transcription of voice recordings for certain vocalized reports	M		
533	The system shall permit the defining and exporting of sequences to instruments by authorized users	M		
534	The system shall automatically (or manually allow an authorized user to) remove an instrument from potential use from within the system when it falls out of tolerance limit or requires scheduled calibration	M		
535	The system shall provide a database of preventative maintenance, calibration, and repair records for radiology equipment, preferably supported by standardized reporting	M		
536	The system shall schedule calibration, verification, and maintenance tasks in the worksheets or workflow process and make that schedule available for viewing	M		
537	The system shall allow authorized users to create and edit instrument maintenance profiles	M		
538	The system shall support a library of common electronic data deliverable (EDD) formats	M		
539	The system shall allow for the transfer of data to and from another record management system or module	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
540	The system shall allow for the transfer of formatted demographic and clinical information to local disease specific registries for patient monitoring and subsequent epidemiological analysis	M		
541	The system shall interface with non-Microsoft programs	M		
542	The system shall interface with electronic medical record or electronic health record systems	M		
543	The system shall provide an interface to facilitate connectivity with external contract or reference radiology laboratories to electronically send or retrieve images, retrieve datasheets, analysis reports, and other related information	M		
544	The system shall provide a real-time interface for viewing live and stored data transactions and errors generated by interfaced instruments and systems	M		
545	The system should direct output from ad-hoc queries to a computer file for subsequent analysis by other software	D		
546	The system should support information exchange with specially assigned mobile devices	D		
547	The system shall receive radiology request information from standardized web-enabled forms, with data elements including but not limited to: ► Requisition ID ► Patient identifying information (i.e., reference to patient in Person Registry) ► Ordering physician ► Order date ► Approval needed flag ► Approving physician ► Date approved ► Supervising physician ► Receiving radiology lab ► Réquisition type (e.g., CT, MRI, etc.) ► Name & code of image/scan/test(s) ordered ► Requisition description & notes ► Images/Scans/Tests completed by ► Attachments ► Requisition status ► Urgency	M		
548	The system should allow radiology requests to be printed so that a hard copy may be kept	D		
549	The system shall link radiology results to the relevant encounter or visit	M		
550	The system should allow manual/scanned entry of outsourced radiology results by scanner, for patients who bring in their own reports	D		

ID	Requirement description	Priority (M/D/O)	Response	Comments
551	The system shall have defined list of Radiology lab images / scans / tests under various categories, available for selections by the concerned operator / Nurse / doctor, through user friendly select options	M		
552	The system shall highlight discrepancies, if any	M		
553	The system shall be able to reject, provide a drop-down menu to select reason for rejection and alert the requesting clinician	M		
554	The system shall transmit information to different departments and the requisition of radiology requests shall not be allowed temporarily, in the event of certain radiology requests that cannot be performed	M		
555	The system shall track the dispatch status of radiology reports from the 'Report Dispatch Counter', when the Patient / relative collects the required reports. Current status of admitted patients shall be reflected on the provisional / approved reports	M		
556	The system should be able to archive all images / scans / tests and all results for the period to a data warehouse and only maintaining final reports as part of patients' electronic medical record, at the end of a period (e.g., monthly, yearly),	D		
557	The system shall comply with HIPAA rules and regulations for patient privacy	M		
558	The system shall give all patients a PACS number for quick reference	M		
559	The system shall setup worklist on all modalities	M		
560	The system shall store all acquired images for a minimum of seven (7) years	M		
561	The system shall make available all images in a very timely manner, to clinicians for viewing at multiple locations, simultaneously	M		
562	The systems shall make available all images in a very timely manner, to Radiologists for reporting, at multiple locations, simultaneously	M		
563	The system shall facilitate the quick distribution of reports to clinicians	M		
564	The system shall facilitate easy scheduling of patients' appointments by CSRs	M		
565	The system shall quickly provide current and prior images to be seen by radiologist for comparison	M		
566	The system shall allow quick retrieval of statistical information for planning. This shall include, but not limited to: ► Number of examinations completed per modality, Radiographer, or on specific dates, or daily, weekly, monthly, annually ► Amount of Radiology Reports completed per Radiologist per modality, or on specific dates, or daily, weekly, monthly, annually ► Number of unreported examinations per modality, or on specific dates, or daily, weekly, monthly, annually ► How many referrals were sent by a specific Physician or from a specific ward, clinic or Institution for a specific period ► Number of positive findings found on reports as per modality and coding system ► Number of rejected requests ► Number of images rejected by whom and date ► Number of deferred requests ► Number of patients on the appointment scheduler per modality and date ► Close off or complete studies so that the start time and end time of an examination could be established	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Time the patient registered was identified ► Which Radiographer performed an Examination ► The total number of a specific type of examination performed over a specific period, e.g., amount of only Chest X-rays performed in the last three (3) months ► Electronic Radiology Request, whereby Physicians can remotely complete and then it forms parts of the patient's study			
567	The system shall facilitate easy printing of colored reports	M		
568	The system shall allow images and studies to be copied to various media for distribution	M		
569	The system shall allow images and studies to be uploaded to the system from other institutions	M		
570	The system shall facilitate easy access to archive remotely by authorized personnel	M		
571	The system shall facilitate the storage of acquired images in a MOH authorized cloud	M		
572	The system shall integrate with all modalities: X-Ray, CT, MRI, MG, BD, PET, Fluoro, US, etc.	M		
573	The system shall be accessible on many viewing stations throughout the hospitals	M		
574	The system shall be easily managed by a PACS administrator	M		
575	The system shall ensure that no two (2) patients have the same registered PACS number	M		
576	The system shall allow radiologists to manipulate and analyze studies using various tools	M		
577	The system shall allow for radiologists to have read/write privileges in the radiology module and all other authorized users read-only privileges	M		
578	The system shall allow for the easy merging of patient's studies	M		
579	The system shall allow for quick correction of patient data by authorized users	M		
580	The system shall facilitate daily monitoring of scheduled jobs, using monitoring tools	M		
581	The system shall allow for the easy management and auditing of user accounts by authorized users	M		
582	The system shall allow for the coordination of film digitizing and CD/ DVD/ USB processing activities	M		
583	The system shall correct studies using drag-and-drop operation	M		
584	The system shall facilitate communication with patients for earlier diagnosis	M		
585	The system shall facilitate the quick arrangement of hanging protocols for radiologists	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
586	The system shall provide radiologists with an assortment of measurement tools	M		
587	The system shall allow for scalability and backward migration / integration and be agnostic with RIS and PACS systems	M		
588	The systems should facilitate integration to Advanced Visualization for efficient 3D / 4D reading	D		
589	The systems shall allow for scheduling and setting the frequency for exams to be done by days, weeks, months etc.	M		
590	The system shall allow for viewing an individual modality or all modalities together	M		
591	The system shall have self-training videos and manuals for every aspect of the system	M		
592	The system shall support more than one display for analysis of images	M		
593	The system shall facilitate multi-specialty archiving system of DICOM compliance clinical data	M		
594	The system shall support remote, off-site reporting with access to the RIS & PACS	M		
595	The system shall have ample licenses to perform all the necessary functions of 3D image reconstructions and other reporting functions	M		
596	The system shall save images and final report on electronic devices, to be issued to patients as part of their electronic medical records	M		
597	The system shall allow the PACS Administrator to have the privilege to make necessary edits to the format and style of the Radiology Report	M		
598	The system shall allow the automatic preparation and printing of patient preparations, instructions and dates for appointments	M		
599	The system shall allow authorized user to be able to make the necessary edits on patient preparations as required	M		

7.1.1. - Appendix C – Non-functional requirements

To ensure the success of the implementation, the system shall meet the requirements as listed in Table 8. Proponents are asked to respond using the codes defined in Table 9.

Requirements prioritization	
MD (Most Desired)	The requirement is most desired and is considered a critical component. If it is not provided naturally within the system details on how the requirement will be met must be provided in the comment section. It is needed to satisfy identified business needs and for the system to be considered successful.
D (Desired)	the requirement is desirable and would enhance the most desired requirements. It is negotiable or slightly deferrable concerning what is required to accomplish the purpose of the most desired requirements. It is still considered a high priority item that should be included in the system if possible.
O (Optional)	the requirement is useful and flexible but not considered necessary. It can readily be changed and not affect what is required to accomplish the purpose of the most desired requirements.

Table 8. Requirements prioritization

Response codes	
FP	Full provided (out-of-the-box)
TP	Third party software required
M	Modification to existing software
C	Custom development required
NA	Not available
O	Other

Table 9. Proponent response codes

ID	Requirement description	Priority (M/D/O)	Response	Comments
Availability				
1	The system shall meet or exceed 99.95% uptime	M		
2	The system shall be available 24x7 with a planned downtime allowance of two hours per week for planned maintenance operations. Such maintenance shall be ideally conducted on holidays and weekends	M		
3	The system shall recover from any unplanned outages and shall be successfully completed within 12 hours of the outage	M		
4	The system shall allow for less than 20 seconds to be needed to restart the system after a failure 95% of the time	M		
5	The system shall be available from all networked office locations and via VPN from off-site locations	M		
6	The system shall be able to provide any data captured during process activities as available across all application locations	M		
Storage, backup and recovery				
7	The system shall be deployed on cloud functionality within Trinidad and Tobago, with the ability to move to a government owned or managed cloud infrastructure if and as required by iGovTT	M		
8	The system shall backup its data daily and in full weekly. Copies of backed up data shall be stored on a local server co-located at the primary site	M		
9	The system shall be able to store mirrored backup copies of its data on a server located at a secondary site in Trinidad and Tobago	M		
10	The system shall support real-time synchronization of data to backup sites using databased replication or similar	M		
11	The system shall ensure that records, components of records, audit trails, metadata, links to metadata or to files, and classification schemes can be converted or migrated to new system hardware, software and storage media without loss of	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	vital information			
12	The system shall produce a report detailing any failure during a conversion or transfer and identifying records that were not successfully exported	M		
13	The system shall retain all records that have been exported until confirmation of a successful transfer process	M		
14	The system shall provide automated procedures that allow for the regular backup and recovery of all records, files, metadata and classification schemes	M		
15	The system shall not consider backup procedures to be regards as substitute for a preservation strategy based on procedures for conversion or migration of records on a regular schedule	M		
Robustness				
16	The system shall experience no data loss in the event of a single disk drive failure	M		
17	The system shall be able to handle a minimum of 10,000 concurrent users when satisfying all their requirements	M		
Maintainability				
18	The system shall allow for the installation of new versions and shall leave all database contents and all personal settings unchanged	M		
19	The system shall provide facilities for tracing any database field to places where it is used	M		
Performance efficiency				
20	The system shall be able to process a minimum of 200 transactions per second in peak load	M		
21	The system shall allow the production of standard report to take less than 20 seconds during peak operating times	M		
22	The system shall allow scrolling one page up or down in a 200-page document to take at most 1 second during peak operating times	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
Portability				
23	The system shall allow no more than 5% of the system implementation to be specific to the operating system	M		
24	The system shall support data exchange via connection to external databases (e.g. Oracle, SQL Server, MySQL, etc.)	M		
Reliability				
25	The system defect rate shall be less than 1 failure per 1,000 hours of operation	M		
26	The system shall allow no more than 1 per 1,000,000 hours of Operation	M		
Scalability				
27	The system shall be able to support an annual minimum growth of 20% of new records	M		
28	They system shall be able to support an annual minimum growth of 30% on the number of transactions	M		
Security				
29	The system shall identify all its client applications (web or windowed) before allowing them to use its capabilities	M		
30	The system shall have the ability to resist unauthorized attempts at usage	M		
31	The system shall continue providing service to legitimate users while under denial-of-service attack	M		
32	The system shall allow only authorized users to only execute system functions for which they have been granted access	M		
33	The system shall allow passwords to be defined of configurable length employing special characters and a configurable expiry period as defined by the accompanying GoRTT policy	M		
34	The system shall prevent the same user from reusing a previously used password as defined by the accompanying GoRTT policy	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
35	The system shall support multi-factor authentication	M		
36	The system shall not allow passwords to be viewable at the point of entry or at any other time	M		
37	Each unsuccessful attempt by a user to access an item of data shall be recorded in an audit trail	M		
38	The system shall employ configurable inactivity timeouts	M		
39	The system shall encrypt data in transit and at rest using modern, industry standard techniques or algorithms (e.g., AES256, TLS, etc.)	M		
40	The system shall retain a full history of all changes	M		
41	The system shall provide configurable role-based access control (e.g. Level 1 user, Level 2 user, Admin, etc.)	M		
Usability				
42	The system shall allow 90% of operators to be able to use the system after no more than six (6) hours of training	M		
43	The system shall provide 90% of responses in no more than two (2) Seconds	M		
44	The system shall provide “Help” text in English and Spanish	M		
45	The system shall support unicode formats for text editing, file name and data storage	M		
46	The system shall support data exchange via file (e.g. reading from / writing to comma-separated value files)	M		
47	The system shall be user friendly via ease of navigation of various system modules, functionalities and features. This includes standard features such as pagination, sorting, scroll and menu navigation bar	M		
Localization				
48	The system shall display all dates in the format DD / MM/ YYYY	M		
Auditability				

ID	Requirement description	Priority (M/D/O)	Response	Comments
49	The system shall maintain full traceability of transactions. The system must maintain audit trails for all processes that create, update or modify, delete, access and use records, categories or files of records, metadata associated with records, and the classification schemes that manage the records. These processes include, but are not limited to creation, import or export process, modifications, transfer, destruction, deletion, access and use of a record, electronic files, metadata, classification schemes, and disposition schedules	M		
50	The system shall be able to execute routine audit procedures for privacy compliance	M		
Compatibility				
51	The system shall be compatible with mobile devices (i.e., tablets / mobiles) and accessible via web browsers	M		
52	The system shall be compatible with systems running actively supported Windows based operating systems, latest version MAC OS, or equivalent OS	M		
53	The system shall be able to support at minimum the actively supported versions of Microsoft Edge, Internet Explorer, Google Chrome, Mozilla Firefox and Apple Safari browsers	M		
54	The system shall be compatible with the MOH's existing network infrastructure and will require minimal changes or upgrades	M		
55	The system shall be integrable and compatible with the existing medical systems and equipment of the RHAs and MOH	M		
56	The system shall be compatible and be able to incorporate the Standards for medical systems, including but not limited to: ► Information Access / transfer protocols: - SOAP, HTTPS/HTTP ► Interoperability: - Web services, Open standards, etc. ► Information security: - ISO27001 compliant ► Operational integrity and security management: - ISO17799 compliant ► IT infrastructure management: - ITIL / EITM specifications ► Service management: - ISO 20000 specifications	M		

ID	Requirement description	Priority (M/D/O)	Response	Comments
	► Project documentation: - IEEE / ISO specifications for documentation ► Internet protocol: - IPv4 and IPv6 compliant ► Medical standards: - DICOM 3.0 compliant ► Imaging: Picture Archiving and Communications System ► Interoperability standard for exchange of electronic health information: - HL7 messages from any system that has similar capabilities ► HIS application: - Web enabled application ► Universal standard for identifying medical laboratory observations: - LOINC coding ► Disease classification: - ICD – 11 coding ► Clinical healthcare terminology: - SNOMED – CT coding (when available) ► Procedure cording: - CPT – 4 9 (Current procedural terminology) ► Reference information model: - HL7 V3.0 RIM			

7.1.2 CHANGE MANAGEMENT REQUIREMENTS

7.1.2.1 Introduction and Background

The ERHA provides both inpatient and outpatient medical services through its operations at eleven (11) medical facilities within its regional bound. These facilities may provide varying service combinations and staffing configurations whilst each having unique challenges that impacts the facilities' readiness for changes that will be brought about by the implementation of the HIS as detailed in **Section 7.1.1**

Due to experiences gained from change initiatives previously embarked upon by the MoH and ERHA, it is anticipated that there will be several internal and external change challenges and points of resistance that will be brought about by the implementation of the HIS. As such, it is recognized that there is a need to proactively manage the expected changes, effectively address the potential points of resistance and implementing appropriate strategies to mitigate against any disruptions associated, thus ensuring the successful implementation and adoption of the HIS.

The MoH and ERHA are cognizant of the fact that the complexity and magnitude of the anticipated change is beyond the current capacity of organization. They also understand that the efforts of the change management and HIS implementation teams must be closely integrated to ensure streamlined and undisrupted progress in delivery. The MoH and ERHA therefore acknowledge that there is a need for change management support to be provided by the proponent responsible for implementation of the HIS.

The proponent will therefore be required to perform and support the necessary change management activities, using an appropriate and well recognized change management methodology, towards:

- Understanding the change issues of all relevant MoH and ERHA business units associated with or that will be impacted by the implementation of the HIS.
- Using appropriate assessment and design tools to, along with the MoH and ERHA, define the vision for the future of organization's operations.
- Preparing the organization for the change to come, including identification of the MoH's & ERHA's change management team and assessing the resistance to the anticipated change.
- Building the capacity of the organization to make the necessary changes.
- Delivering and sustaining the change over the life of the implementation of the HIS.

7.1.2.2 Objective

The objective of this project is as follows:

(1) give context to the environment within which change management activities are required to be performed,
(2) outline the service quality requirements,
(3) define the scope of services that are required to be performed by the proponent, and
(4) identify the tangible deliverables of the change management activities.

7.1.2.3 Context of the Requirement

Current State - Eastern Regional Health Authority ERHA.

The ERHA is one of the five (5) Regional Health Authorities in Trinidad and Tobago established by an Act of Parliament in 1994. It is responsible for providing health care for the catchment population of approximately 120,000 from Matelot in the North to Guayaguayare, Rio Claro and Brothers Road in the South to Valencia in the East, covering approximately 1/3 of the island of Trinidad.

The ERHA provides a variety of services through its operations out of 21 Medical Facilities.

Medical Facility Type	Quantity	Facility Name/Locations
Hospital – Provides medical and surgical treatment and nursing care for sick or injured people.	1	Sangre Grande Hospital
District Health Facility - Provides the county population with comprehensive and high-quality routine and preventive healthcare services, as well as supportive services such as health education, counselling services and ambulance transportation. Specialized Dermatology and Psychiatric services also offered. Primary care services aid in preventing escalation of diseases and aids in achieving healthier communities.	2	Mayaro District Health Facility, Rio Claro Health Facility
Enhanced Health Centre - Provides the community with comprehensive and high-quality routine and preventive healthcare services, as well as supportive services such as health education, counselling services and ambulance transportation. Specialized Dermatology and Psychiatric services also offered. Primary care services aid in preventing escalation of diseases and aids in achieving healthier communities.	1	Sangre Grande Enhance Health Centre
Health Centre - Provides the county population with comprehensive and high-quality routine and preventive healthcare services, as well as supportive services such as health education, counselling services and ambulance transportation. Specialized Dermatology and Psychiatric services also offered. Primary care services aid in preventing escalation of diseases and aids in achieving healthier communities.	4	Toco Health Centre, Rio Claro Health Centre

Outreach Centre - Provides the community with comprehensive and high-quality routine and preventive healthcare services. Primary care services aid in preventing escalation of diseases and aids in achieving healthier communities.	13	Biche Outreach Centre, Brothers Road Outreach Centre, Coryal Outreach, Cumana Outreach Centre, Cumuto Outreach Centre, Grande Rivere Outreach Centre, Guayaguayare Outreach Centre, Manzanilla Outreach Centre, Matelot Outreach Centre, Matura Outreach Centre, San Souci Outreach Centre, Valencia Outreach Centre

These facilities provide in excess of 35 high-demand services that are delivered either on rotation or are constantly available to persons seeking medical attention during their respective operating hours. These facilities are staffed by 1327 employees which does represent the organizations full staff requirement. The staff members range from ages 19 – 65 years, with the highest concentration of employees falling within the ages of 19 - 40 (based on the available data).

Doctors, nurses and medical support staff account for approximately 85% of the ERHA's staff compliment while the remaining 15% being represented by various forms of medical technicians, clerical staff and administrative roles. The ERHA's Internal Medicine, General Surgery and Accident and Emergency departments are where the highest quantities of staff can be found and have been identified as the areas where the HIS's implementation will have the greatest impact on the operations.

Scope of Change Management Initiative

The HIS is expected to be a large-scale implementation; directly transforming the way things work at 47 departments/business units within the ERHA whilst having the potential to affect/modify several adjacent areas of business. It is expected that there will be a high degree of modification to the processes and general operations associated with these departments/business units thus representing a major change to the ERHA.

Several interdependencies exists between the ERHA's core departments, business units and key external stakeholders. These interdependencies are crucial to the ERHA's ability to function effectively, efficiently and to fulfil its mandates. Therefore, the need to closely manage the various moving parts throughout the ERHA's transition to the HIS becomes readily apparent. To aid in this transition, a proponent will be required to:

1. Support timely and effective implementation of business-required changes;
2. Appropriately manage the risk to the ERHA;
3. Minimize the negative impact of changes to/for the ERHA;

4. Ensure the changes brought about by the HIS implementation achieve the desired business outcomes;
5. Ensure the governance and compliance expectations of the ERHA's various business units are met.

For considerations of the possible scope, a list of the Facilities/Units/Departments expected to be directly impacted along with its purpose/function is provided below.

Facility/Unit/Department Name	Purpose/Function
ISIT, Head Office	Provides IT enterprise solutions within the ERHA: deployment and maintenance of basic hardware; LAN and WAN expansion; Data Security and Storage management; File Sharing and Network Printing.
Dialysis Unit	To provide routine and acute haemodialysis services to prolong life of dependents clients.
Toco Accident & Emergency	Provides the community with comprehensive and high-quality routine and preventive healthcare services. Primary care services aid in preventing escalation of diseases and aids in achieving healthier communities.
Medical Records, Sangre Grande Hospital	Safeguards medical records from tampering, loss and unauthorized use. Responsible for overseeing that the patient's right to privacy and the confidentiality of the information stored within the medical record is maintained at all times. The Department also ensures that Files are available for continued Patient care.
Lab, Sangre Grande Hospital	Provides all clients of the ERHA with laboratory support services.
Biomedical Department, Sangre Grande Hospital	The Biomedical Engineering Department manages and maintains all the medical equipment and healthcare technology within the ERHA.

Physiotherapy Department, Sangre Grande Hospital	Delivers Physiotherapy Services to patients of the Sangre Grande Hospital at a highly evidence-based, safe, efficient, timely, equitable and patient-centered manner.
Pharmacy Department, Sangre Grande Hospital	Provides clinical services to all stakeholders to optimize and ensure the safe utilization of pharmaceuticals. Ensures delivery of effective pharmaceutical care such as, Sterile Compounding, Antineoplastic and Hazardous Drug Compounding, Inpatient and Outpatient Dispensing centres. Pharmacists assigned to patient care areas consult with prescribers, check filled medication orders and monitor patient medication therapy to ensure the safe and appropriate use of pharmaceuticals. The department utilizes clinical best practice to positively affect the lives and health of our internal and external clientele.
Medical Social Work, Sangre Grande Hospital	Provides timely psychosocial intervention to patients and / or their support persons and help them cope with problems arising from illness, trauma or disabilities. MSWs The department plays a key role in aligning the medical and social services' to facilitate patients' rehabilitation and reintegration into the community.
Nutrition and Dietetics, Sangre Grande Hospital	Provides client-centered, goal-directed, quality nutrition and dietetic services
Sangre Grande Enhanced Health Center/X-ray	Provides general diagnostic radiological imaging services within STAD and environs
Sangre Grande Hospital/X-ray	Provides general diagnostic and special radiological imaging services within ERHA and other RHAs

Sangre Grande Hospital/CT	Provides general and special CT imaging services within ERHA and other RHAs
Sangre Grande Hospital/Mammogram	Provides screening and diagnostic mammographic imaging services within ERHA and other RHAs
Toco Health Center/Mammogram	Provides screening mammographic imaging services within Toco and environs
Sangre Grande Hospital/Ultrasound	Provides general and special ultrasonographic imaging services within ERHA and other RHAs
Sangre Grande Enhanced Health Center/Ultrasound	Provides general ultrasonographic services within STAD areas and environs
Rio Claro Health Facility/Ultrasound	Provides general ultrasonographic imaging services within NAMA areas and environs
Sangre Grande Hospital/Echocardiogram	Provides in-house echocardiographic services within Sangre Grande Hospital
General Surgery **- Endoscopy**	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Internal Medicine **- Nephrology** **- Gastroenterlogy** **- Neurology** **- Infectious Diseases**	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.

Obstetrics & Gynaecology **- Antenatal** **- Gynaecology** **- Gynae-Oncology**	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Orthopaedics **- Joint Replacement**	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Oncology/Haematology **- Chemotherapy treatment**	
Ophthalmology	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Urology	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Anaesthetics/ICU	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Paediatrics **- NICU**	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Microbiology	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.
Radiology	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.

24 Hrs Accident & Emergency Services	To provide Secondary & Tertiary Care to clients with the aim to have major services available under one institution.

7.1.2.4 Service Quality Requirements

Due to the magnitude and complexity of the change anticipated and the risks associated with a failed implementation or sub-optimum user adoption, the MoH and ERHA require that the proponent to provide evidence to support the quality of the service to be rendered. As such, the proponent is, at minimum, required to:

1. Identify its change management approach, giving evidence that the chosen methodology/model represents the leading best practices within the industry.
2. Provide evidence of existing tools and templates that are to be applied throughout the course of the change activities, along with a description of the systematic manner through which they are expected to be utilized.
3. Determine the change management support necessary for the successful implementation of the HIS and provide a clear rationale that supports the determination.
4. Provide a change management team who will be responsible for delivering on the change management activities.
5. Develop necessary plans that reflect the idiosyncrasies, change challenges and resistance points of each entity to ensure that the scope, scale and complexity involved is fully appreciated.
6. Update developed plans based on approved changes that affect the scope, scale, complexity or any other notable factor of the change management activities that are required.
7. Monitor, manage and track the progress of the benefits of the performed change management activities to the ERHA and HIS implementation by way of an appropriate benefits realization management tool.
8. Document the change management journey in such a way as the experiences and lessons learnt from the change management activities can be used a guide for future roll-outs of the HIS to other RHAs.
9. Recommend the composition of a MoH and ERHA change management counterpart team and provide continuous support and guidance to the counterpart team in their communications and engagements with internal and external stakeholders.
10. Transition the change management activities fully to the local counterpart team on closing of the engagement.
11. Deliver the appropriate documentation associated the change management methodology

7.1.2.5 Scope of Services

In the execution of this engagement, the proponent is required to deliver a structured change management solution that facilitates the adoption of the new work processes and the necessary culture changes towards ensuring the success delivery of the HIS project. This change management solution shall meet the service quality requirements identified and include components that address determining the ERHA's change readiness, determining the extent of possible resistance to the change, and aligning training and knowledge transfer activities towards overcoming resistance, facilitating and sustaining the changes brought about by the HIS implementation.

The proponent shall at a minimum conduct the following services:

- **Change Readiness Assessment:** It is the expectation that an end-to-end analysis of the HIS project's scale, scope, deliverables, timelines, objectives, and impacts are to be performed. This analysis should involve assessment of the project's stakeholders, risks, and the impacted groups and processes towards making a clear determination of the ERHA's readiness to respond and support the adoption of the HIS. In making this determination, the activities conducted should be inclusive of but not limited to the following:

    - Performing a discovery exercise that will give context to the change management activities required and the outcomes to be achieved;
    - Reviewing the current operations of ERHA to determine the current state and readiness for the anticipated change;
    - Collating and analyzing the findings of the discovery and review exercises;
    - Identifying and categorizing any challenges to the successful implementation and adoption of the HIS; and

- **Design and Implementation of the Change Management Solution:** Using the findings of the Change Readiness Assessment, it is expected that an organizational change management solution will be developed. This change management solution should be structured in such a way as to specifically address the scale, scope, and impacts of the change, as well as how receptive or resistant each of the impacted groups are for the changes that will be brought about by the HIS implementation. The design and implementation of the change solution should be inclusive of but not limited to the following activities:

    - Developing an appropriate strategy for bringing about the intended changes requires to ensure the ERHA's HIS implementation and adoption is a success;
    - Recommend the composition of the MoH and ERHA counterpart change management team;
    - Developing tools and techniques to assist in the management of the anticipated changes;

- Executing a structured change management methodology/model along with the practices required to lead the change management process;
- Executing a plan to manage and navigate resistance to the anticipated changes;
- Creating key performance indicators and metrics to measure and monitor change progress; and
- Developing a risk mitigation plan to navigate possible internal and external factors that may inhibit the successful execution of the change management solution.

- **Transfer of Change Methodology:** Once the change solution has been successfully executed, it is expected that a comprehensive transfer of the change methodology occurs. This transfer should ensure that the relevant stakeholders are equipped to sustain the change and that responsibility can be transitioned to the MoH and ERHA. This transfer should include components such as training in the design and execution of the necessary plans, usage of the assessment tools, and a framework for the proponent providing guidance and support throughout the transition. The following activity, at minimum should be included:

    - Executing a coaching plan for ongoing commitment to the change process inclusive of the following:
        - Collecting and analyzing feedback;
        - Diagnosing gaps and managing resistance;
        - Implementing corrective actions; and
        - Analyzing the effectiveness of the change management activities

- **Post Implementation Survey and Analysis:** The performance of a post implementation survey is expected as a conclusion to the change management services delivered. This survey should critically assess the ongoing success in the adoption of the HIS and should be inclusive but not limited to the following activities:

    - Review of identified key success factors associated with the effectiveness of the HIS implementation; and the
    - Providing of guidance on continued execution of the change process.

7.1.2.6 Key Deliverables

The proponent shall provide the following deliverables, which may be required at different timeframes throughout the life of the project.

Deliverables	Description
Change Readiness Assessment Report	A report that details the ERHA's readiness for the anticipated changes. This report should be inclusive of: • **A change management strategy** • **A Project Gantt** that details the change management activities and is integrated with the overall project plan. This will clearly show which activities are required within each and every project management stage. • **A recommendation** towards the members who will form the MoH and ERHA counterpart change management team
Design and Implementation of the Change Management Solution	A plan detailing a comprehensive change solution to be approved by the MoH and ERHA that details the methodology to implement the change processes. This plan should include the following components: • **Communication plan** that is aligned to the project phases and geared to engaging stakeholders. • **Sponsor Roadmap Plan** that will not only identify and clarify the role of the Sponsors required for the project, but will provide these sponsors with the tools and needed to support the employees through the change lifecycle. This plan will be integrated closely with the other plans • **Risk Management Plan** describing how the factors that have the possibility of derailing a successful implementation will be navigated. • **Engagement Plan** describing how commitment and support for the project will be increased across the impacted groups. • **Resistance Management Plan** that will outline and manage resistance to change at the various levels within the ERHA at the various stages of the implementation. The plan should detail the

	processes for tracking and reporting issues that are recurring across the various business units. • **Training Plan** created and delivered across the life of the implementation to ensure a smooth transition to the HIS (all end users must be fully trained in the HIS before the go-live date) • **Coaching Plan** that will assist the management of the MOH and ERHA to understand and assist in engaging employees and introducing them to the skills required to manage and reinforce change within their respective units. • **Benefits Realization Plan** to track adoption & measurement of the change management activities.
Transfer of Change Methodology	A hand over report that are inclusive of: • Proponent issued certificates of participation to relevant stakeholders • Training Materials • Documentation of the change management journey • A guide for future roll-outs of the HIS to other RHAs • Tools for collecting and analyzing feedback, diagnosing needs and developing requisite solutions
Post Implementation Survey and Analysis	A report that details the extent to which the proponent was successful in delivering the change mandate, knowledge transfer as well as establishing key areas for continual success

7.1.2.7 Project Team

The table below provides the minimum, mandatory roles and qualifications required for this project. The proponent must identify all team members and their roles in the "Key expert" column. Roles can be combined under one (1) resource (i.e. a single person fulfills multiple roles), if the project plan supports this approach and must be mentioned in the proponent's proposal.

Role	Seniority	Qualifications required	Key expert(s)
Change Manager	Senior	► Strong preference for post-graduate level degree in Management, Process Engineering, Policy, Law, Leadership (list achievement, discipline, year) ► Minimum requirement: Possess at least an undergraduate degree in Management, Process Engineering, Policy, Law, Leadership (list achievement, discipline, year)	►

		► Previous experience on at least two (2) projects managing implementation of Change Management Solutions of similar nature in size, scope and approach in the Public Service (list projects) ► Possess a minimum of (10) ten years of relevant Change Management Solutions experience which includes managing / leading Change Management projects of a similar nature in size, scope and approach (list projects, experience)	
Change Management Specialist	Support	► Bachelor's degree in in Management, Process Engineering, Policy, Law, Leadership or a related field. ► A Master's degree would be considered an asset ► Have a minimum of three to five years' experience in Change Management ► In-depth knowledge of best practices in Change Management Solution implementation	►
Trainer in Change Management implementation Solution	Senior	► An understanding of implementing Change Management Solutions in the public service ► Demonstrated experience in addressing adoption challenges to Change Management initiatives ► Excellent organization and people skills ► Have a minimum of (5) five years of relevant training experience and working with Change Management implementation projects	►

7.1.3 – DIGITIZATION OF EXISITING PATIENT RECORDS

Digitization Requirements for Medical and Other Records

7.1.3.1 Introduction

The Ministry of Health (MOH) proposes to implement an integrated Health Information System for the entire Eastern Regional Health Authority (ERHA) as a pilot towards the development of a comprehensive Hospital Information System (HIS) for the full health sector of the country. Such a solution will allow for efficient electronic capture and secure utilization of patient data to significantly improve the quality of the patient experience and the management of the various regional health facilities.

In this context, the MOH is seeking to contract a single proponent to complete the activities and meet the requirements specified below for the digitisation of key records within the various institutions of the ERHA as is necessary for the HIS to go live and for its on-going effective operations. Consequently, these digitisation requirements must be read and considered in conjunction with the requirements defined in the other Annexes.

The general objective of this digitisation project is to support the efforts of the ERHA in modernising its patient records system as part of the overall implementation of the new integrated HIS. This sub-project involves assessing, selecting, cleansing and preparing, digitising including scanning and inspecting, and migrating of essential paper-based patient records from fragmented sources into one integrated, electronic medical record. The completion of the latter action may require the combining of digitised paper records and other records already held in electronic format, such as Microsoft Access databases, at different locations within the many health institutions for the ERHA.

On completion of this sub-project, digitisation of key patient records, a single electronic record will exist for all the patients whose records were digitised which will be accessible and shared by every health institution within the ERHA, whether providing secondary or primary health care. All users at every location will have access to these electronic records and be allowed authorised access to read and/or update as necessary based on each patient interaction with the ERHA. In effect, one unique shared electronic medical record for every patient across the ERHA.

7.1.3.2 Critical Activity Phases

It is expected that the digitisation exercise will utilise the following phases:

7.1.3.2.1 Discovery Phase:

Work with the relevant personnel from the ERHA to examine existing medical records at each of the ERHA's locations (including Sangre Grande Hospital and the other health facilities) for quantities, completeness, current state, level of duplication, and patient data points captured in the paper-based medical record and any electronic relevant database held at any location across the various institutions. Using this information and intimate knowledge of the HIS, the proponent will make recommendations to the MOH on what records should be migrated to ensure effective implementation of their software, and to allow improved medical record services across the region. Recommendations will be required on how records can be rationalised into single patient records using the various records existing across the ERHA while maintaining the integrity of the data and the patient record.

a. Quantify

The proponent will work with the counterpart team to estimate the volume of medical records which would need to be digitized and the logistics of scanning and extracting of relevant data for the creation of the electronic medical record.

The volumes of the Medical Records across the Sangre Grande Hospital and the Mayaro District Health Facility have been estimated as follows:

Medical Institution	Pharmacy Records	Outpatient Records	Radiology Records	Laboratory Records	Maternity Records
Sangre Grande Hospital	180,752	121,119	186,186	unavailable	unavailable
Mayaro District Health Facility	25928	35,074	N/A	N/A	unavailable
Total	206,680	156,193	186,186		unavailable

b. Identify what patient data is best suited to be migrated into the new Integrated Electronic Medical Records format of the HIS, including the assignment of the new medical record number, if recommended

c. Identify the business rules that will be used to determine how duplicate records are integrated for a single patient and what records take precedence, and how the integrity of the final output would be determined

d. Identify the personnel resources, including quantities and skill sets, that the ERHA must make available for the associated digitization activities

The proponent must complete the activities under the Discovery Phase within six (6) weeks of the contract award, which will lead to the Cleansing and Digitisation Phase.

7.1.3.2.2 Cleansing and Digitisation Phase

a. Develop and document, in conjunction with the MOH Project Team, a Medical Records Cleansing and Digitisation Workflow. The process may need to consider independent double entry of essential demographic data, followed by automated matching, before allowing the extracted data to be assigned to an individual

b. Execute the cleansing of the paper file and other electronic records as necessary to prepare for scanning or uploading
c. Scan and digitise the agreed number of records within the prescribed timeline agreed in the overall project plan

d. Store and upload digital images and the extracted data electronically

e. Run data integrity checks on the extracted data for accuracy, completeness etc.

Completion of this phase will lead to the Migration Phase.

7.1.3.2.3 Migration Phase

- Prepare and have approved the new data migration processes, including mechanisms for verifying quality and identifying errors or irregularities in the data
- Prepare the data for migration into the test, staging and finally the production environments
- For Digital records that already exist, all data shall be merged and migrated to the HIS with the exception of where integration is required
- Confirm quality of the migrated data and accept data migration into the production HIS

7.1.3.3 Proponent Scope of Services across all activity phases

- Identify the equipment and supplies that are required across each activity phase.
- Provide budgetary estimates for the acquisition of the above referenced equipment and supplies.
- Provide a personnel resource plan aligned to each activity phase.
- Ensure the confidentiality of all aspects of the process / project, including the data provided by the ERHA.

7.1.3.4 Expected Deliverables

The following deliverables are to be produced by this digitisation sub-project:

1. A preliminary project work plan for execution of the assignment outlining the methodology and detailed planning of the assignment, including a schedule of key activities to be engaged in. This schedule must show how this subproject is integrated into the overall implementation of the HIS.

2. Compliance with the existing policy for digitisation of the ERHA Medical Records. Proponent is required to provide guidance and advice if the existing policy should be updated to support the functioning of the new HIS

3. A draft document detailing quantification of the work involved in the discovery exercise of the ERHA Medical Records.

4. A final document detailing quantification of the work involved in the exercise for preparing, cleansing, integrating and migration exercise of the ERHA Medical Records.

5. Regular and routine weekly reports on the scanning and digitisation of the single electronic patient record.

6. A report detailing achievement of deliverables, any issues, lessons learnt, final recommendations, plans for maintaining the electronic solution, etc.

7.1.3.5 Duration of the Data Cleansing and Migration Work Stream

The proponent is expected to integrate these activity workflows to enable the program to become live in compliance with the go live date of the overall HIS program.

The proponent is required to provide competent resources in sufficient quantities to deliver on this digitisation effort, with the support of an agreed MOH/ERHA counterpart digitisation team.

7.1.3.6 Qualification and Professional Requirements of Data Cleansing and Migration Lead

- Degree in Records Management, Information Management or Library and Information Sciences (with specialisation in archives or records management – Masters Level required).
- Demonstrated ability to work with a wide range of digital library and metadata standards and best practices for creating digital objects from a variety of original formats required.
- Thorough knowledge of standards and best practices for creating digital objects from a variety of paper-based original formats required.
- Well-developed skill in organisation and planning; analytical thinking and problem-solving demonstrated through work experience required.
- Excellent written, oral and interpersonal communication skills required.
- Demonstrated experience planning, co-ordinating, and executing digitisation projects, required.
- Demonstrated expertise and technical knowledge of the standards and best practices of a compliant electronic document and records management system.
- Knowledge of set-up and maintenance of digital imaging equipment, including digital cameras, flatbed and overhead scanners, photo stands, and lighting environments required.
- Demonstrated expertise and technical knowledge in the creation and management of digital information including image capture, quality control, scanning hardware and software, digital file formats, and compression schemes required.

7.1.4 NATIONAL MEDICAL HEALTH RECORD IDENTIFIER

INTERFACE WITH THE NEW NATIONAL MEDICAL RECORD IDENTIFIER

7.1.4.1 Introduction

The newly created National Health Medical Record Identifier project seeks to utilise aspects of the e-interoperability framework for the Ministry of Health (MoH) to create a unique medical health record that will facilitate the interface with any solution being implemented within the Ministry. This identifier once issued would be the digital representation for that citizen and would form the basis for identifying the actual medical details of that citizen once he accesses the Health Care Services at any point of entry, irrespective of location.

The expected benefits include:

Enhanced patient care and Improved patient experience - by leveraging the ability to access this identifier would mean that patient information can be viewed and accessed to ensure that the attending physician, nurse or authorised attendant will have ready access to the patient medical record to obtain or extract information that would allow for more informed patient care.

Exhibit 1A and 1B below provide sample scenarios highlighting the proposed patient experience that a citizen would encounter when they visit the Accident and Emergency Department (AED) of any Hospital within the RHA

EXHIBIT 1A

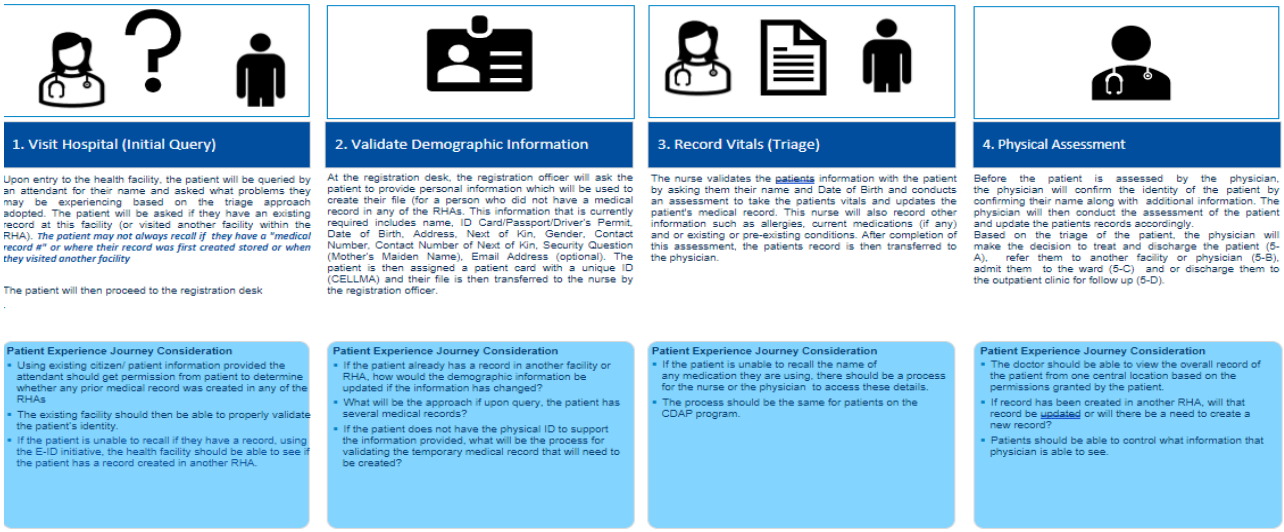
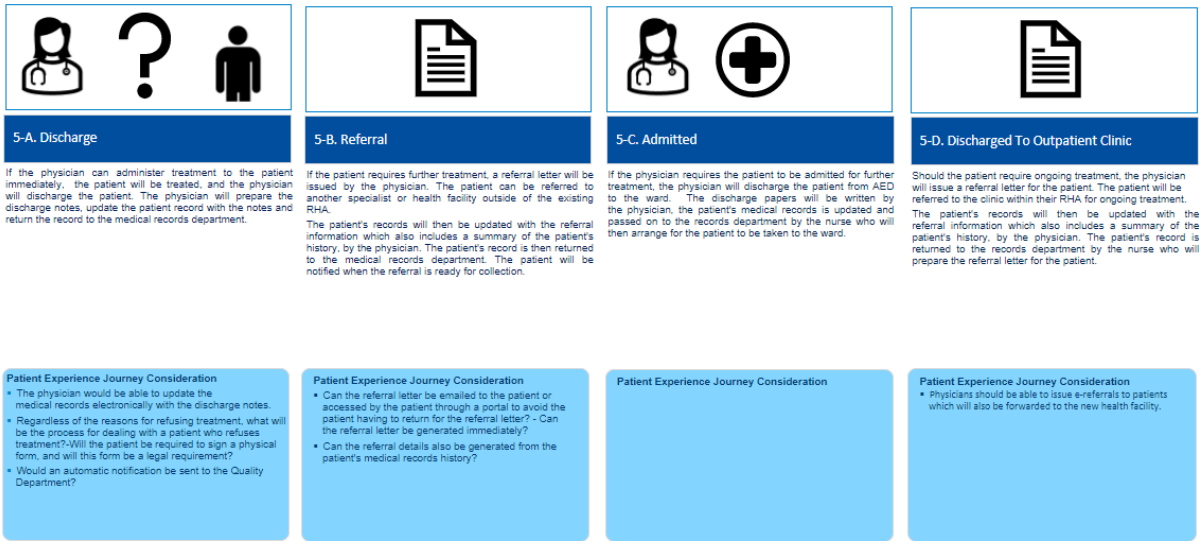


EXHIBIT 1B



Other patient scenarios under consideration are referenced below in the annex for information purposes only.

Future ability to integrate , link and connect with medical records that the patient may have in other RHAs or in other institutions - At a minimum the project will allow the medical records to be integrated across all business solutions, in all Regional Health Authorities, using this identifier as the interface to allow for example the ability for the pharmacist to verify whether the patient had already fulfilled an existing prescription at public facility within the RHA or to verify whether that patient may have previously fulfilled a prescription with medication (from another RHA's public health facility or a pharmacy within the CDAP programme) which may negatively interact with what is being dispensed.

In the past, the MoH had identified challenges in trying to create such a patient identifier, especially where citizens may have visited multiple health facilities and/or locations during their lifetime and where medical records may have been created for the same citizen in different departments, institutions, and/or regions.

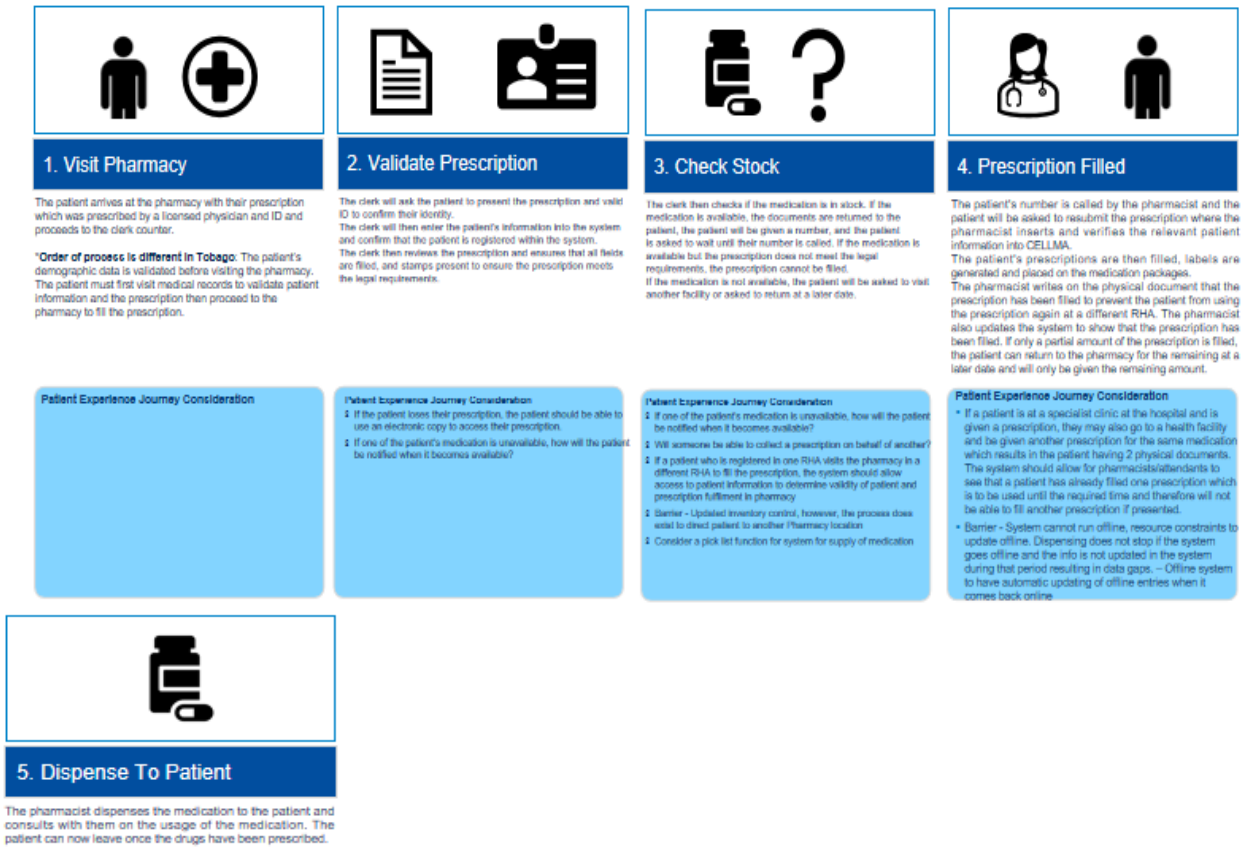
This initiative will seek to a standardize the reference to the citizen's record to allow efficient access to their information for medical analysis and overall reporting, by providing a new Ministry of Health National Medical Record Number which will integrate all other medical record numbers used across the health sector.

The expectation is that the selected proponent will utilise the requirements being developed for this new National Medical Record Number at the point in time that such requirement become available, likely within the first three months of the implementation. The proponent is required to make cost and technical provision for the integration and use of this new medical record number.

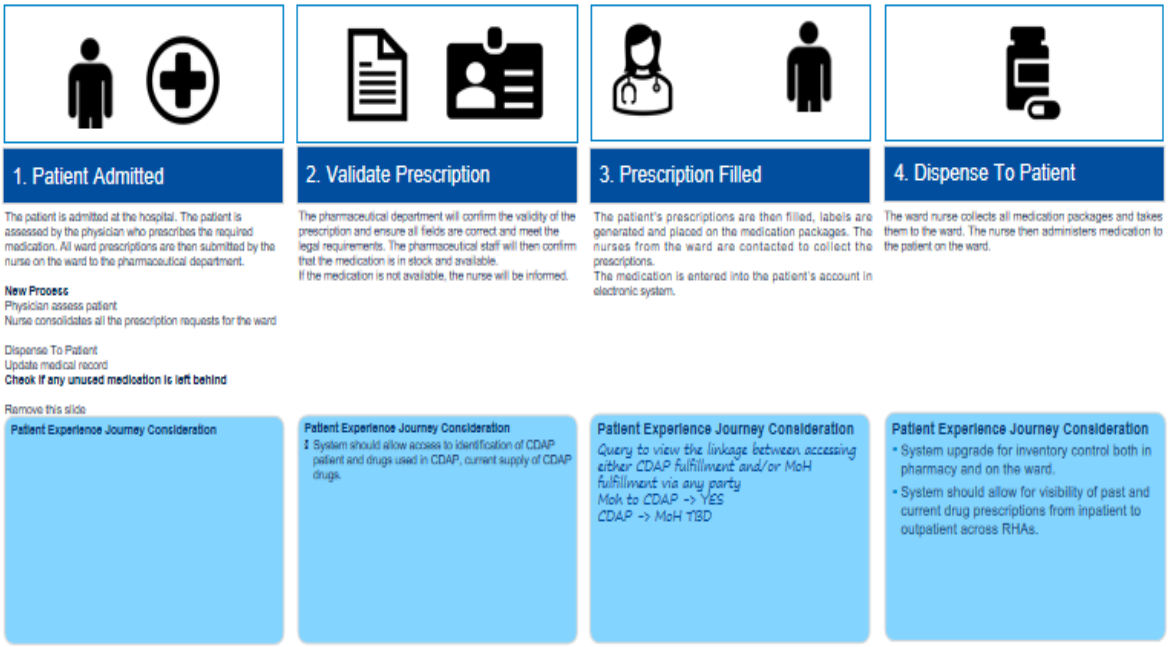
7.1.4 - ANNEX - PATIENT SCENARIOS UNDER CONSIDERATION

Pharmacy

Fulfil Outpatient pharmacy prescription (Non CDAP)

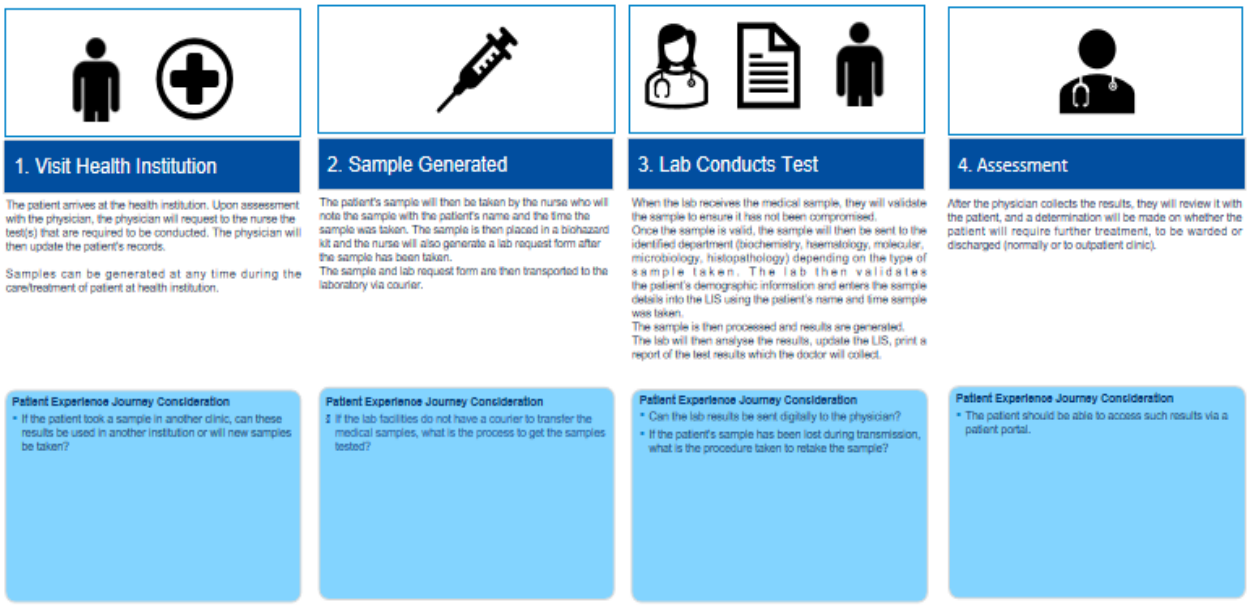


Fulfil Inpatient Pharmacy Prescription



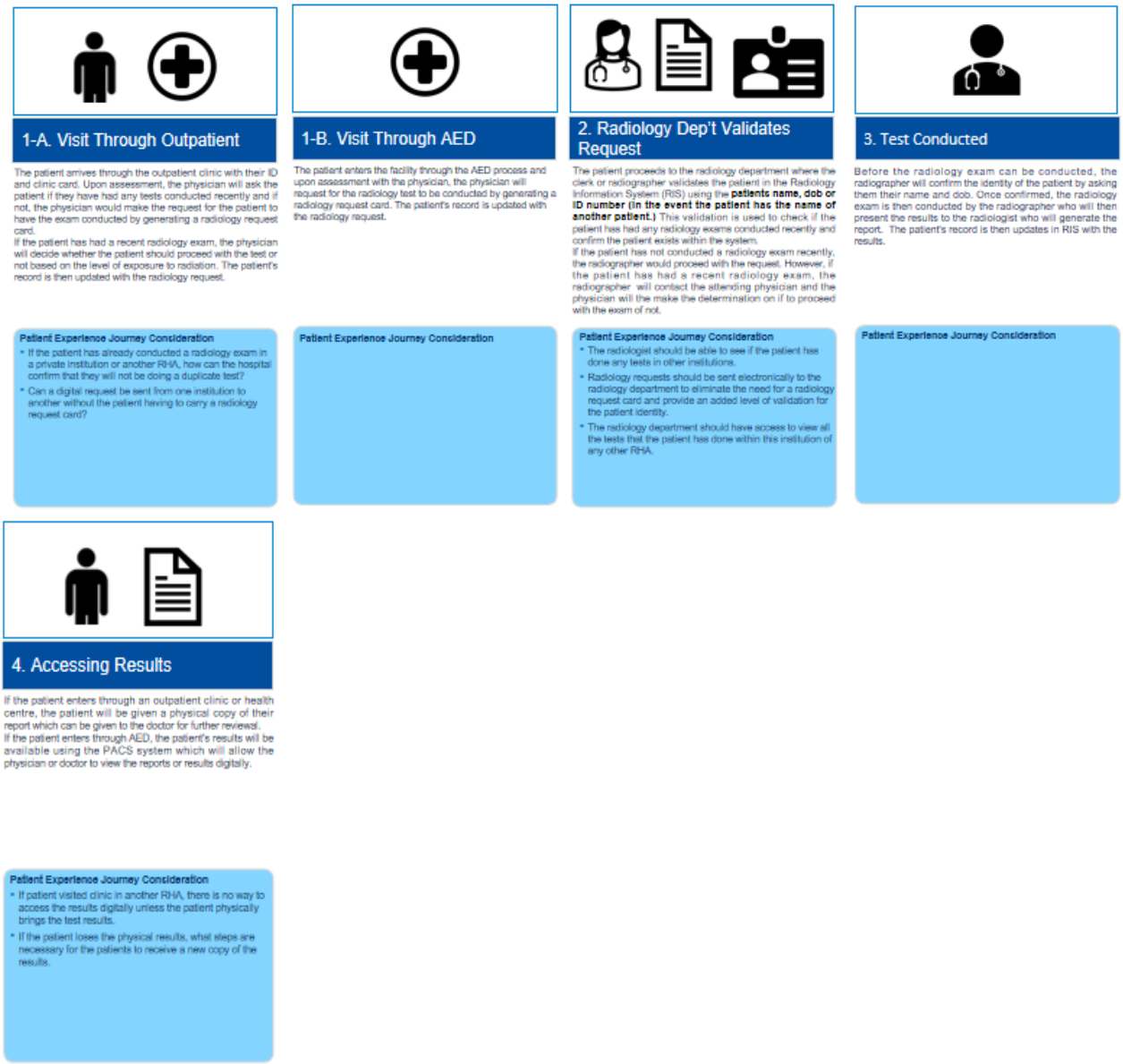
Laboratory Services

Fulfil Inpatient pharmacy prescription



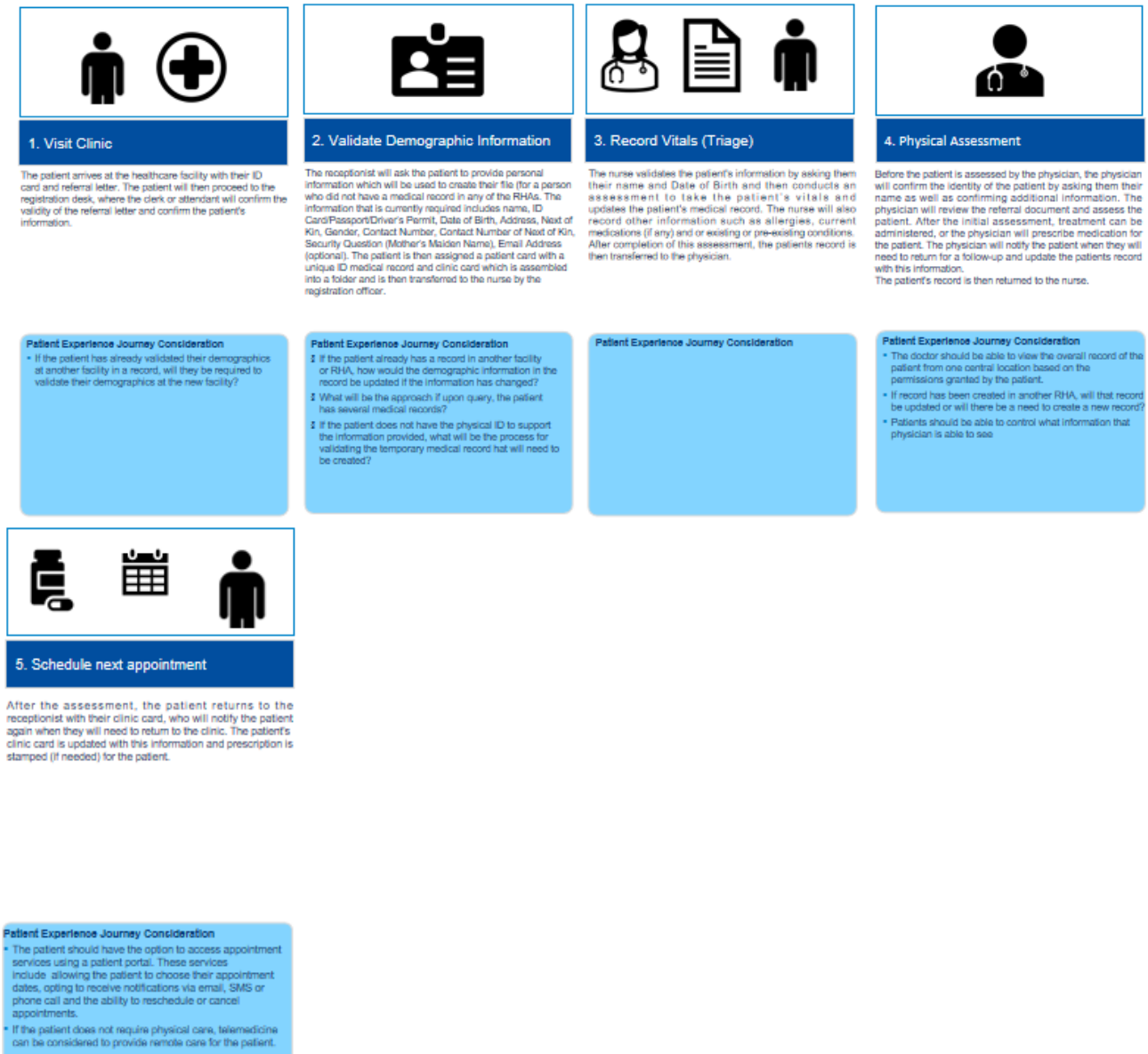
Radiology

Fulfillment of Radiology Services

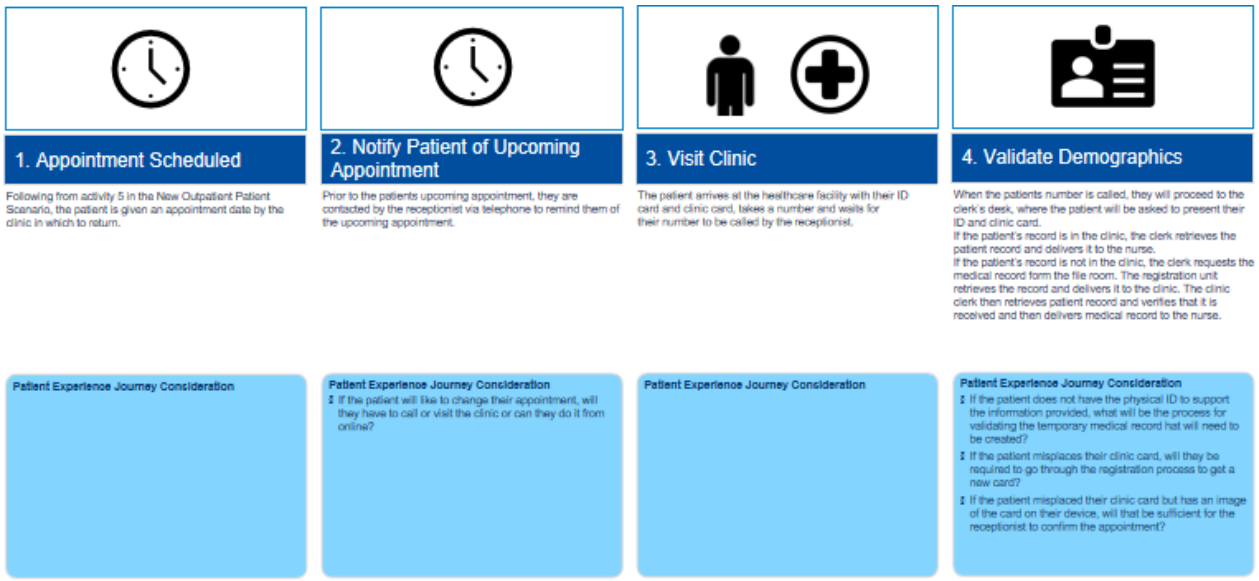


Out Patient Services

New Patient Visit to Outpatient Clinic



Recurring Visit to Outpatient Clinic



5. Record Vitals (Triage)

The nurse validates the patient's information by asking them their name and Date of Birth and conducts an assessment by taking the patient's vitals and records it in their medical record. This nurse will also record other information such as allergies, current medications (if any) and or existing or pre-existing conditions. After completion of this assessment, the patient's file is then transferred to the physician.

Patient Experience Journey Consideration

- The nurse should be able to access this record information if it already exists within another health facility or RHA

6. Physical Assessment

The patient is seen by the physician with the medical record. Before the patient is assessed by the physician, the physician will confirm the identity of the patient by asking them their name as well as confirming additional information. The physician assess the patient and administer treatment. (Once physician determines the patient has completed their treatment, refer to 7-B for patient discharge)
The physician will also write a prescription for the patient and notify them of when they need to return for a follow-up if necessary.
The patient's file is then updated and returned to the medical records department.

Patient Experience Journey Consideration

- Physicians should have the most updated clinic list of scheduled patients for the day so they know which patient they will be seeing next.
- The doctor should be able to view the overall record of the patient from one central location based on the permissions granted by the patient.
- Patients should be able to control what information the physician is able to view

7-A. Scheduling Appointment Card

After the assessment, the patient returns to the clinic clerk with their clinic card, who will update the patient's card and stamp the prescription for the patient.
The clerk checks documentation in record and documents time, date and appropriate information in the HIS, Appointment logbook and the patient's clinic appointment card. The clerk stamps any prescriptions, investigations or x-rays and advises the patient of appointment date and time, as well as scheduling appointment for investigations (if required) and reminds patient to bring appointment card to next visit. The clerk then returns the appointment card, prescriptions and other documents to the patient who then leaves the clinic while the clinic documents relevant statistics.
The clerk verifies records against the list and forwards it to the file room. The file room receives and refiles the patient's records.

Patient Experience Journey Consideration

- If the patient is unable to make the scheduled appointment date, will they be able to request a new appointment over the phone or will they physically need to be there to schedule a new appointment date?
- Should the patient need to reschedule appointment at a clinic in a different RHA, files/patient records should be updated to HIS which should be accessible at a different RHA.

7-B. Patient Discharge

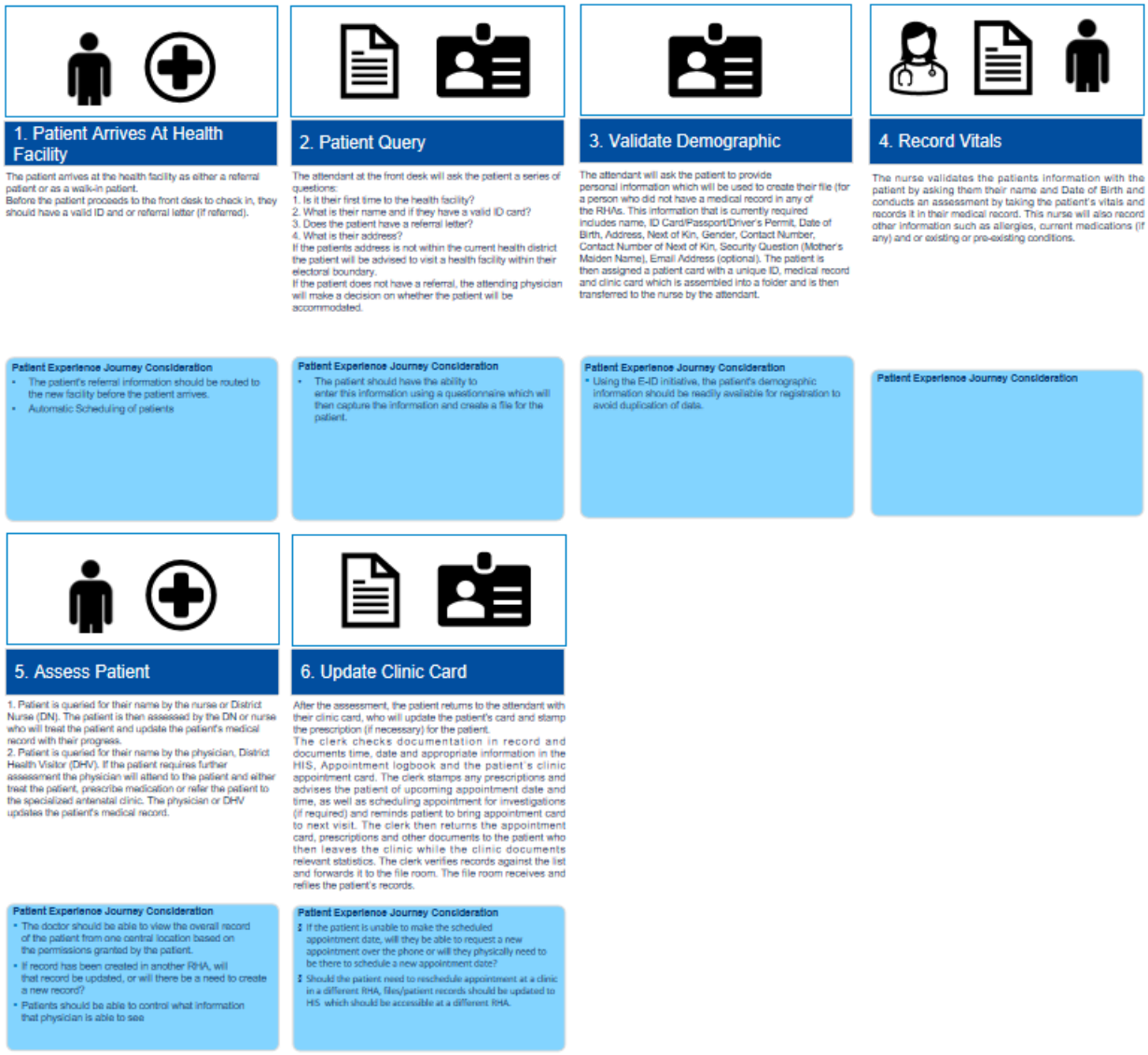
After the assessment, the patient returns to the receptionist who will confirm that the patient is discharged from the clinic and prepare the discharge summary. The patient's file is returned to the records department.

Patient Experience Journey Consideration

- How will the patient record be updated if the patient was referred to another RHA/facility to receive treatment?

Maternity

New Patient Antenatal

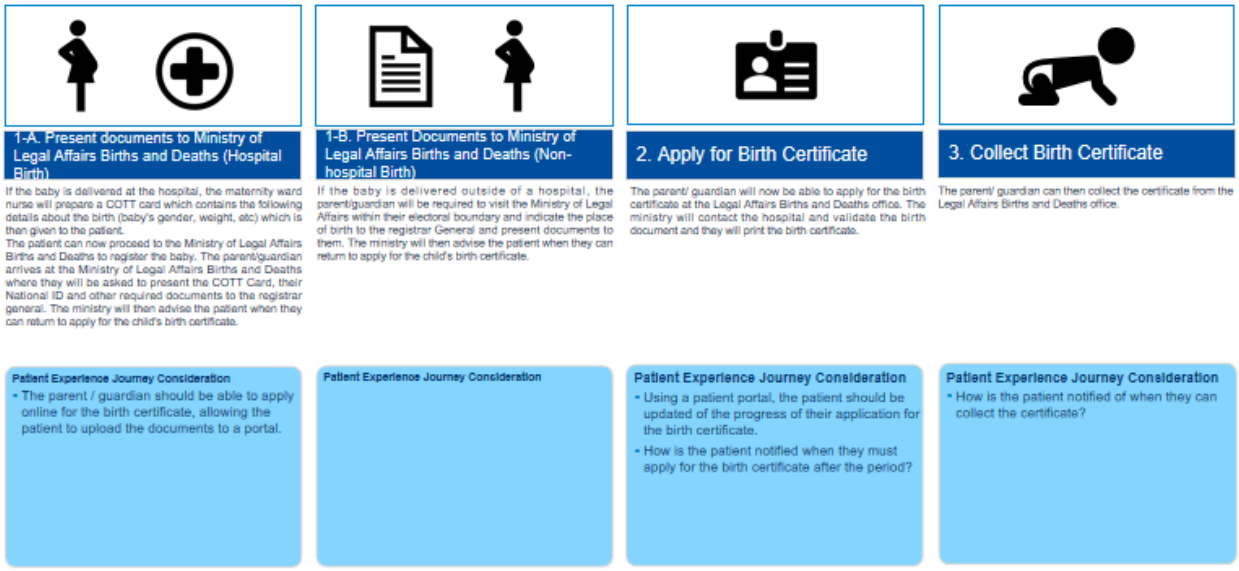


Recurring Antenatal Patient

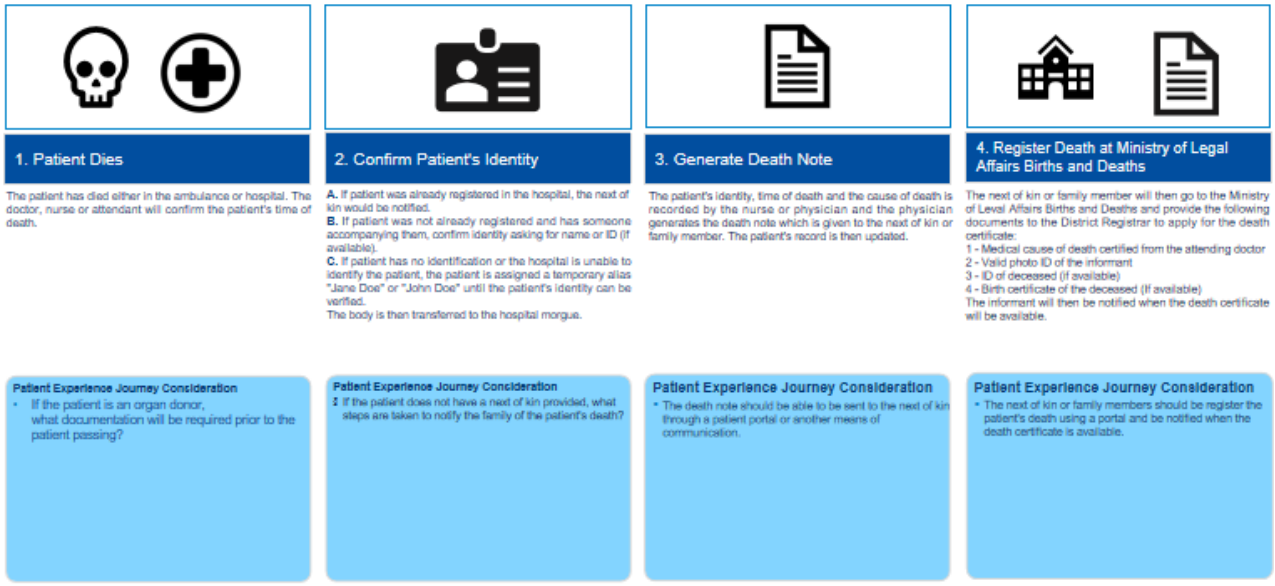
Maternity

Delivery

Register Birth



Patient Mortality



5. Present Death Certificate

The informant or family will present the death certificate to the medical records department of the hospital to issue the release of the body to the funeral home.

6. Contact External Entities

The next of kin or family will then be required to contact the external entities such as NIS, insurance companies, social services, banks, etc.

Patient Experience Journey Consideration

Patient Experience Journey Consideration

- With the E-ID interoperability, the family should have the option to inform all the external entities immediately after the patient passes.

7.1.5 INTEROPERABILITY WITH THE NEW UNIQUE E-IDENTIFIER AND THE NEW INTEROPERABILITY SOLUTION

Integration with the National e-ID system and Interoperability Solution

7.1.5.1 Introduction

The Ministry of Health (MOH) proposes to implement an integrated Health Information System for the entire Eastern Regional Health Authority (ERHA) as a pilot towards the development of a comprehensive Hospital Information System (HIS) for the full health sector of the country. Such a solution will allow for efficient electronic capture and secure utilization of patient data to significantly improve the quality of the patient experience and the management of the various regional health facilities.

The Government of the Republic of Trinidad and Tobago (GoRTT) intends to implement a national e-ID solution. This e-ID will provide an electronic solution for proof of identity that uniquely distinguishes persons. GoRTT will also be implementing an Interoperability Solution based on Estonia's XRoad technology. There must be interoperability and data sharing between the Electronic Medical Records solution and the national e-ID solution. There must be connectivity between the Interoperability Solution and the new ERHA HIS. This means that these different information systems must access, exchange, integrate and cooperatively use data in a coordinated manner across organizational and agency boundaries.

Furthermore, it is expected that the HIS in conjunction with the e-ID be sources of Data and services to aid with supply chain logistics in:

1. Proactive warehousing and distribution of pharmaceuticals and medical supplies
2. Linkage of Health services to the Social Services framework and logistics
3. Control consumption and demand through analysis of patient behaviour to discern patterns and in particular identify anomalies and opportunities for efficiencies (e.g. areas of fraud and underutilization)

In this context, the proponent is required to establish and document the inter-connectivity and data sharing requirements needed for the new ERHA HIS system to securely communicate data to and receive data from the e-ID solution and to provide APIs to integrate with the Interoperability Solution.

Benefits to Citizens:

- Deduplication of effort in accessing GoRTT services across MDAs
- Improved service quality
- End to end e-services

7.1.5.2 Expected Deliverables

The following deliverables are to be produced by this sub-project:

1. A preliminary project work plan outlining the methodology and detailed planning, including a schedule of key activities to be engaged in to allow integrated use of the new national e-ID and its associated mobile application, as well as connectivity to the Interoperability Solution.

2. Identification of the standards and protocols to be established / complied with for secure data sharing including the new e-ID number and the associated biometric hash.

3. Identification and development of the required APIs or web services to enable integration with the Interoperability Solution to enable data sharing and end-to-end e-services

4. A document of all required information on the data sets and operations of the national e-ID system required by the proponent to design and deploy their workflows and data sets.

5. Establishment of the required connectivity to the e-ID once it becomes available prior to testing of the new HIS.

6. Establishment of the required integration with the proposed Interoperability Solution if it becomes available prior to testing of the new HIS

7.1.5.3 Other Related National Initiative projects that are linked to the e-ID and interoperability solution

Initiative	Summary	Alignment needs	Implications / Comments
Government Cloud	Government Hybrid cloud solution comprising a combination of Government owned, Third Party, and SaaS / Public cloud solutions to house government systems and facilitate collaboration and use of Government services	The Infrastructure for the HIS must be portable and housed on Hyperconverged Infrastructure that aligns with NIST 800-53 requirements and can integrate with third party Infrastructure and cybersecurity management platforms	Infrastructure architecture along with specifications of the proposed Infrastructure for the HIS should be listed along all of its certifications and attestations.
Developers Hub	Government owned Devops Platform for the Agile development and	All Government solutions will need to be accessible on the Developer's Hub Ecosystem	Options and Specifications for Government and

	deployment of services and APIs for enabling "Open Source" Government and private sector solutions		third parties to built apps and interfaces off of the HIS solution Sandbox environment needed to develop and test potential solutions and APIs
Government Data Centre	This Government Data Centre will form part of an ecoSystem of Data Centre infrastructure which is being designed and deployed to securely and reliably share applications, data and services with: • Approved GovTT Data Centre Sites (located for example in Tobago) • Approved private and public cloud services hosted on Private Sector Data Centres • Certified Ministry, Department and Agency On-premise Data Centres within their physical buildings	Anchoring such Data Centres and Services around a Secure and reliable Government owned and managed Data Centre will allow GORTT to maintain Data Sovereignty while also benefiting from significant cost saving resulting from economies of scale, ability to integrate systems more efficiently when they are housed at a common Data Centre, and an overall reduction in operations and cumulative bandwidth costs to name a few. Given the complex nature of the Needs, along with issues such as Data Sovereignty and legislative requirements around e-ID and the other services we would need to address, establishing a Government owned Data Centre as a catalyst to a Hybrid Cloud strategy is the	**Improved Performance and Capacity of Government Services -** The consolidation will allow for a larger installed base with increased capacity, which in turn will allow for add on services for monitoring and management, and effective BCP / IT Continuity which would not be feasible for independent/ siloed systems and services This strategy will also all for the least disruptive migration of Government services as it will entail establishing

		only feasible option at this time.	the new services in the Government Owned Data Centre

Further details for the e-ID and interoperability can be found in **Section 7.1.1**