Development of Software Modules for the HHIMS (Hybrid mobile application for inward section).

Terms of Reference

1. Introduction

ICT Agency of Sri Lanka intended to improve & replicate the Hospital Health Information Management System (HHIMS) In order to improve and increase patient records documentation and batter Health Information Management in Government Hospitals. The Information and Communication Technology Agency (ICTA) wishes to install computer systems to capture and process the patient medical information in 300 government hospitals within three year project period starting from March, 2016.

Hospital Health Information Management System (HHIMS) is an open-source medical database software designed for use in Sri Lanka hospitals. It stores clinical details of patients treated and is designed for use by clinical staff - details are recorded on the system as they examine the patient. The system enables hospital staff to refer previous clinical records when the patient comes in for treatment, print visit slips or discharge letters for patients, print quarterly health statistics and prepare notifications of infectious diseases for the local Medical Officers of Health. The software will thus significantly reduce the need for maintaining paper based records and enable an improved and efficient service to the patient.

The HHIMS offers many advantages to higher level decision makers in the health care administration in Sri Lanka – it can help detect and control emerging and endemic health problems, monitor progress towards health goals, and promote equity in health care by empowering the citizen with timely and relevant health-related information, and drive improvements in quality of service. From the point of view of the policy maker it strengthens the evidence base for formulating effective health policies, permitting evaluation of scale-up efforts, and enabling innovation through research and improves efficient use of resources by way of effective stock controls. From a clinical perspective the HHIMS improves quality by

giving timely access to important clinical information, mobilizing new resources, and ensuring accountability in the way they are used.

2. Objective

1. Develop a hybrid mobile application for Inward Section of HHIMS.
2. Service Layer to be implemented in HHIMS which is to be consumed by the mobile application.
3. Install commission and deploy the hybrid application in a selected hospital as a pilot.
4. Provide comprehensive training on developed application and its features and management.

3. Scope and outline of the tasks to be carried out:

3.1 Develop hybrid mobile application for Inward Section of HHIMS

HHIMS Inward module is intended keep all the records related to hospital inward patient registration, patient management and discharge functionalities. The following scope has been identified to be included in to hybrid mobile application.

Functional Requirement.

1. Recording and maintaining details of Patient admissions
    1.1. Keep admission records on direct admissions received by MO Admissions
    1.2. Refer patients for admissions even from other divisions like OPD, Clinics, ETU/PCU
        1.2.1. Select required details/encounters to send for MO admissions
    1.3. Import already registered patients' details to admission registration
2. Generating BHT along with a unique BHT Number
3. Recording and maintaining each patient's basic management details at the admission.
4. Prescribing initial drug dosage at patient admission
5. Generating Nurses' Drug Chart
6. Recording Nurse's examinations on patients
7. Adding Nurse's notes
8. Recording and maintaining HO examination details
    8.1. Adding updated health condition of patient
    8.2. Allow HO to draw required graphs and pictures

9. Recording and maintaining General Management details.
    9.1. Allow nurses to see the general management plan and generating schedule accordingly
10. Recording and maintaining drug management details
    10.1. Prescribing drug dosage
    10.2. Selecting drugs from drug list
    10.3. Maintaining nurses' drug chart
    10.4. Auto updating ward drug stock
    10.5. Recommend surgical treatments to be taken
    10.6. Dispense surgical items from ward surgical stock
    10.7. Updating ward surgical stock
11. Discharge management
    11.1. Generating Discharge Diagnosis
    11.2. Selecting required information to be included in Discharge Diagnosis
    11.3. Generating Discharge Summary
    11.4. Prescribing drugs at discharge
    11.5. Creating reviewing plans
    11.6. Making clinic referrals
    11.7. Transfer to another hospital
    11.8. Transferring to another ward
    11.9. Keeping records on Deaths
    11.10. Keeping records on LAMA
    11.11. Taking consent for LAMA by taking thumbnail authentication of the patient
12. It is required to designed the mobile application for the Tablet PC with 12'to 13'inches screen size.

Acronyms, and Abbreviations

HHIMS	- Hospital Health Information Management System
SRS	- Software Requirement Specification
BHT	- Bed Head Ticket
LAMA	- Leaving Against Medical Advice
QHT	- Quarter Hourly body Temperature
CNS	- Central Nervous System
HO	- House Officer
MO	- Medical Officer

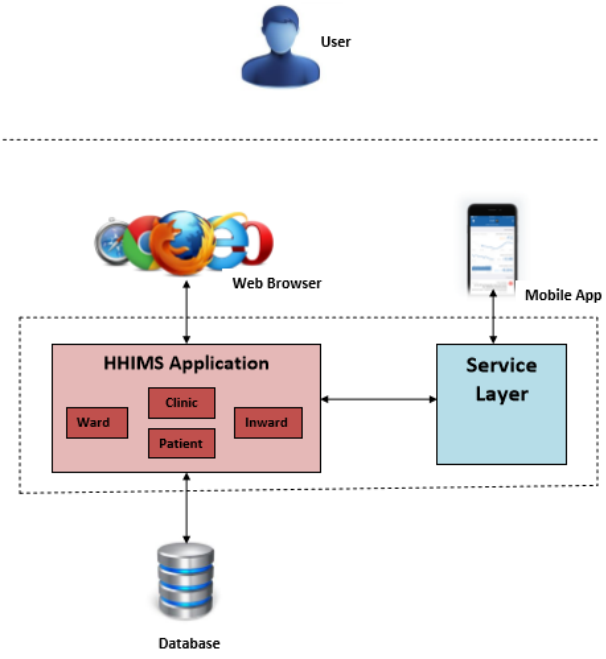
Data Interchange Standards

1. It is recommended to adopt the Lanka Interoperability Framework where necessary.
2. For the purpose of Data Exchange HL7 (Health Level 7) standard should be used (JSON, DSTU 2).
3. It is recommended to adopt HL7-CDA (Health Level 7 – Clinical Document Architecture), based on HL7 v3.0
4. For aggregated data exchange - ADX (Aggregated Data Exchange) Standards should be used.
5. For interchange of Laboratory data it is recommended to use Logical Observation Identifiers Names and codes (LOINC) developed by Regenstrief Institute Inc.
6. For the purpose of coding clinical data, it is recommended to use the Systematized Nomenclature of Medicine – Clinical Terms (SNOMED CT) of the International Health Terminology Standards Development Organization (IHTSDO).
7. For the purpose of statistical reporting of health related data it is recommended to use ICD 10 (International Classification Disease) of the World Health Organisation (WHO).
8. For the purpose of collecting data at the Primary Healthcare Level, it is recommended to use the International Classification of Primary Care Second Edition (ICPC-2).

3.2 Implement a Service Layer to be consumed by the mobile application

When implementing the service layer, above mentioned Data standards will be utilized.

Diagram



3.3 Install commission and deploy the hybrid application in a selected hospital as a pilot.

- Implement mobile application in given Mobile devices
- Setting up the HHIMS with Mobile application, system & clinical tables, Users & privileges, Wards & staff attached, Laboratory tests, Drug lists, Treatments, Medical complaints etc…
- Pilot Mobile Application

3.4 Provide comprehensive training on developed application, its features and management.

Awareness and training should be conducted for hospital staff on functionality and use of system (Report generation, Discharge summary, Management lists & statistics). Minimum of 8 hours training should be conducted for staff of digital health programme on core of developed solution, management and functionality of the developed system.

4. Schedule of Tasks and Reporting:

The Consultant shall prepare and maintain a project schedule based on the Scope of Work outlined above and provide regular, monthly, briefing reports to the ICTA.

5. Period of Performance:

The period of performance is 32 weeks.

6. Clients inputs

- Code base of Hospital Health information Management System
- License of latest HL7, SNOMED CT, ICPC2
- Virtual server and SVN

7. Consultant Qualifications

Successful consulting firms should have demonstrated experience in developing e-Health solution for at least 1 project in the last three years. Proven expertise in deploying e-health solutions in hospitals would be an essential pre requisite. Training health staff in government

hospital and deploying health related solution in department of health service would be an added advantage.

The Curriculum Vitaes (CVs) of the following key staff in the team should be provided with the proposal.

- Project Manager, Teach Lead, Senior Software Engineer , Quality Assurance Lead, Medical Officer and System Engineer

Key Professional Staff Member	***Academic Qualifications***	***Minimum Experience***
Project Manager	*Relevant Degree from a recognized university*	*Demonstrated project management experience in at least one full time project, of similar nature in last 3 years.*
Tech Lead	*Relevant Degree from a recognized university*	*Demonstrated skills on PHP, MySQL,& Mobile App development & Java, in at least 03 project in the last 5 years period.*
*Senior Software Engineer * 2*	*Relevant Degree from a recognized university*	*Demonstrated skills on PHP, MySQL & Mobile App development in at least 01 project in the last 5 years period.*
Quality Assurance Lead	*Relevant Diploma from a recognized university or academic Institute*	*Demonstrated and led the Quality Assurance team in at least 01 project of similar nature in the last 5 years.*
Medical Officer	*Medical officer with a MBBS degree or an equivalent recognized by the Sri Lanka Medical Council with full registration*	*Demonstrated skills on training health Staff & working In Government hospital or department of health service (Minimum of 3 years)*
System Engineer	*Relevant Degree from a recognized university*	*Demonstrated System Engineer experience in at least one full time project, of similar nature in last 3 years.*

Professional Key staff mentioned in the above table must meet all the requirements stipulated in this document as per the above table.

8. Review procedure

The Consultancy firm will be required to work closely with the ICTA Programme Head Digital Health Programme.

In addition, all versions of the documents prepared by the Consultancy firm will be reviewed by the ICTA Technology Team

9. Time line & Payment:

	Stage	Activities	Deliverables	Payment of Total Payment	Due Date (from signing of contract)
1	**Assess** This stage mainly involves the inception of the project, agreeing on the project schedules and analyzing the business requirements of the Client for application development	**Project Inception** - Project Initiation and Kick-off - Project Planning and Scheduling - Project Plan Review and - Analyze proposed solution requirements - High level architecture - Review and sign-off of deliverables	• QA plan and test cases • Acceptance criteria for Deliverables, UAT, Operational acceptance	10%	2Weeks
2	**Design** This stage involves with producing the solution design and other design related activities such as the testing strategy, training strategy, etc... Iteration plans shall be finalised at this stage. Certain activities of the design stage shall be repeated based on the iteration plan.	**Design** - Conceptual solution architecture design - Application screen design - Logical data model design - Services design - Design documentation Testing Strategy and Planning - Define acceptance criteria for deliverables, UAT, operational acceptance	• Design document	10%	4 Weeks

		- Design test strategy and prepare test plans			
3	**Construction** This stage is where the software is developed and tested to suit the requirements. Development shall be carried out according to the agreed upon iteration plan.	**Develop and Test** - Develop, unit test and configure proposed solution - Application development and test - Functional and System integration testing and issue fixing - Deliver code	• Proper maintenance of source code in SCM • Proper maintenance of issues in the Issue tracking System • Working version of the agreed iteration •	30%	16Weeks
4	**Implement** This stage involves the actual implementation of the project where the UAT and production deployment is carried out	**UAT and System Stabilization** - UAT - Production deployment - Operational Acceptance, Testing Documentation and User Training - Prepare and submit user/ technical manuals - User training	• Solutions installation guide, User manual, Administrator manual (if applicable), Successful UAT acceptance of the solution, Production Deployment Confirmation	30%	32 Weeks