RHEA Capacity Development Plan

The purpose of the document is to:

* Identify the different roles required within the Ministry of Health (MoH) for the operation and maintenance of the different components of the Health Information Exchange (HIE)
* Outline the required prerequisite skills and knowledge for individuals who will be receiving training on how to fill these functions.
* Outline the proposed training plans for each component.

The overall training of the various national components is set to take place over a number of weeks. The decision to spread the training out was because:

* The MoH staff being trained may be being trained on more then one component and therefore need to be able to attend more than one training.
* The MoH staff being trained will be continuing in there current roles and this model enables them to continue with their usual activities, between sessions, while the training is taking please.
* Each training is detailed and a presents a lot of information for people to take in. Spreading the training out gives people time to adsorb what they have learnt.

The current training timetable for training on the different national components of the HIE is:

* Terminology Service – 30th July to 3rd Aug
* Facility Registry – 6th to 10th Aug
* Provider Registry – 13th to 17th Aug
* Shared Health Record – 21st to 24th Aug
* OpenHIM (Interoperability layer) – 21st to 31th Aug
* Client Registry – 27th to 31st Aug

The weeks identified here are a guide. The actual timeframes for training sessions in each component may differ and are in the process of being confirmed. Sections 1-6 outlines in more detail the requirements of the different components and the training plans designed to building the required capacity within the MoH.

The methodology and training timetable for the point-of-care applications differs from that of the national components of the HIE and is outlined in Sections 7 and 8.

# Section 1: Health facility registry

The Health Facilities Registry is a database containing details of all government health care facilities in Rwanda. Using a unique identifier the Health Facilities Register provider users with easy access to information about each health facilities including, location, catchment area, services offered and number and type of personal employed.

In order to operate and maintain the registry individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Roles and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data Support & Help Desk User Support** | **Operations Support** | **Developer Support** |
| **Post and description** | Data Manager: Responsible for managing the data, the schema and moving data between this and other systems. | System Administrator: Responsible for deployment of the registry, trouble-shooting of operational processes (i.e. versioning, back-up etc) | Developer: Responsible for updates and queries |
| **FTE** |  |  |  |
| **Basic skills and knowledge required (pre-training)** |  |  | Basic knowledge of web applications required, some experience with Linux and virtual machines a plus. MySQL, Ruby, XML and JSON also a plus. Willingness to learn important. |

## Training plan

The facility registry training will be a combination of 4 distance learning sessions followed by a face-to-face training workshop. The content of the training for the different types of system operation and support are:

* Why a Facility Registry
* The role of a Facility Registry in the HIS
* Compare and contrast to other approaches (spreadsheets, custom dbs, GIS systems)
* HelpDesk User Support & Data Support
* Basic concepts - collections, items, layers, users & permissions
* Defining the forms
* Using filters & search, refining results, how are things ANDed or ORd
* Adding facilities
* Exporting & Importing
* Adding and removing permissions for reads and edits.
* Operations Support
* User interface
* Stack basics (what services, frameworks and utilities need to be deployed to run RM)
* Walk-through of deploying a specific version
* Walk-through of migrating data from an old to a new version.
* Developer Support
* API basics (queries, updates, activity stream)

The focus of each call and workshops session is still being finalized.

InSTEDD will provide post-training support via email and telephone.

# Section 2: Terminology service

The Terminology Service is a system to verified or maintained terminology standards for diagnosis, procedures and medications.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data support** | **Operations support** | **Developer support** |
| **Post and description** | Terminology manager: Responsible for terminology management including; terminology evolution, mapping, extensions and subsets and distribution | Terminology Service manager: Responsible for deploying and maintaining an Apelon DTS installation | Developer: Responsible for maintaining… |
| **FTE required** |  |  |  |
| **Basic skills and knowledge required (pre-training)** | Clinical background with analysis experience OR business analysis background | Linux system administration experience. Tomcat and Apache server maintenance experience. | Knowledge of Java, PHP, HTML, Javascript/jquery and CCS |

Apelon DTS software has been selected as the system for the terminology service. To ensure a high quality of knowledge transfer Apelon has been contracted to provide the majority of the training for the Terminology service. Additional training for MoH developers will be carried out by Jembi Health Systems who have experience of working with backend of the Apelon DTS software and have designed the systems web interface.

Data Support

Apelon will deliver it’s Terminology Asset Management (TAM) Training package which runs over three (3) days. The training will focus on the principles and practice of TAM. Topics covered will include:

* Terminology process governance
* Terminology management and evolution
* Terminology mapping
* The use of extensions and subsets
* Terminology distribution

In order to support those training as part of the RHEA project, Apelon will provide ten (10) hours of additional TAM telephone consultation over the period to Sept 30th 2012.

Operations Support

Apelon will deliver it’s DTS Operations training package The course runs for two (2) days and will train MoH and Jembi Rwanda staff on deploying and maintaining an Apelon DTS installation. Topics covered will include:

* An overview of DTS applications and utilities
* Loading the Apelon DTS Knowledgebase
* Installing DTS software
* Configuring installation and operational parameters

Apelon will provide post-training support via telephone, email, and web access to Apelon’s Customer Support organization to Sept 30th 2012. User problems can be easily reported, tracked and resolved. In addition to this standard “break/fix” service, our Customer Support organization provides answers to questions, installation and tuning assistance, and web conferencing interactions to ensure the most effective use of DTS.

Developer Support

The developer training will be carried out by Jembi and is planned to take place over 2 days. The initial day will cover the operational aspects of the DTS system (could be replaced by the Apelon Operations training depending on specific content of the training package). The Second day will cover the development aspects of the system. The sessions’ breakdown will be as follows:

Operational sessions (1 day):

* Presentation: An overview of the overall structure of terminology service.
* Detailed look at each of the components running on the system:
* Apelon DTS server
* Apache server and the Jembi built website
* Tomcat server and the TS API layer
* Discussion on each component. This will include explanation on:
  + setup/installation
  + troubleshooting: i.e. where to look for the logs, etc.
* Uploading of terminologies (bulk loading, this is a back-end overview i.e. not using the apelon front-end tools)
* Workshop: During this session each participant will, starting with a clean system, install the terminology service and try to get it up and running.

Developer sessions (1 day):

* Presentation: Building on the operational presentation: the developers will be given an overview of the different technologies involved in each of the TS components ie.
  + Apelon DTS server
  + Apache server and the Jembi built website: PHP, html, javascript/jquery
  + Tomcat server and the TS API layer: DTS Java APIs
* An overview on terminology importing (this is a bulk-loading back-end overview).
* Workshop: During this session the participants will develop some minor test features for the system, and try to deploy this on their systems. The idea is to have hands-on experience stepping through the system code, and gain enough knowledge to be able to work on the system at a later stager.

# Section 3: Shared Health Record

The Shared Health Record (SHR) is an OpenMRS implementation that hosts a longitudinal record of individual patient medical encountres, captured by point-of care systems through the interoperability layer, which can be accesses remotely.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data support** | **Operations support** | **Developer support** |
| **Post and description** | Existing MoH OMRS System Administrator: responsible for updating SHR concept dictionary and general configuration and system meta-data management. | Existing MoH OMRS System Administrator: responsible for SHR deployment and system maintenance, management of errors flagged in the SHR error queues for RHEA Message transactions and configurations, upgrading to new SHR Adapter versions and potentially upgrading the OMRS version in the future | Existing MoH OMRS Developer Team and Jembi: Responsible for maintaining and extending the code base of the SHR Adapter Module. Bug fixes, debugging of the software etc. |
| **FTE required** | 0.5 FTE | 0.5 FTE | Response to need |
| **Basic skills and knowledge required (pre-training)** | Familiarity with OMRS Implementation management. Clinical background advantageous | Experience with Linux system administration.  Experience with Tomcat and Apache server maintenance. Experience in OpenMRS implementation management | OpenMRS development and implementation experience. Core web technologies, RestFul Web Services. HL7 Experience Implementation experience would be great (but not essential) |

All SHR training will be carried out by Jembi Health Systems (Jembi). All trainees will be issued with reference material. Post training Jembi staff will be available online or by telephone to answer queries and provide general support.

Data Support

The training for data support personnel will be carried out as a 1-day face-to-Face workshop held in Kigali. The topics covered in the workshop will include updating OMRS Concept Dictionary and Specific RHEA Requirements (i.e. reference mappings and Integration with Terminology Service).

Operations Support

The training for operations support will be carried out as a 2-day face-to-face workshop. The workshops will focus on giving trainees a good understanding of Overall RHEA Component Architecture and Messaging Implementation. This will include how to read, understand and address issues in the RHEA messaging error queues.

Developer Support

The training for developer support will be carried out as a 5 day face-to-face workshop. The workshops will focus on:

* RHEA Architecture and Core Use Cases
* SHR Adapter Use Cases and Implementation
* How to debug RHEA related code and extend implementation.

# Section 4: Client registry

The Client Registry is a database containing details of all clients of government health services in the Rwamagana District. Each client is assigned a unique identifies which is used by health workers to access their records from the Shared Health Record.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Data support** | **Operations support** | **Developer support** |
| **Post and description** | Data Manager: Responsible for evaluating and maintaining the data quality of the Client Registry by running reports and verifying the data on those reports for accuracy (ie. address information in the address field, names in name fields, etc.) | System Administrator: Responsible for maintaining the configuration of the Client Registry and the data connection with the OpenHIMS and SHR. Will perform updates of the system with assistance and instructions from developer/implementation team. | Developer: Responsible for maintaining system at current release, fix bugs, provide updates, and instructions for how to implement updates. |
| **FTE required** | 1 FTE | 1 FTE | 2 FTE |
| **Basic skills and knowledge required (pre-training)** | Ability to generate reports and verify data, detail oriented and comfortable with computer systems | Systems operations experience and good technical troubleshooting skills | JAVA, TomCat, and Relational Database experience |

The Client Registry is being developed by The Regenstrief Institute and SYSNET using an OpenEMPI implementation. These two institutions will be responsible for carrying out capacity building activities around the operation and maintenance of the Client Registry.

Data Support

This will combine on the job distance learning and in country face-to-face training. Jembi developers will work with the data sets with Sysnet during the implementation development. In addition Jembi and MoH staff will take part in a face-to-face training that will explore extending data sets in OpenEMPI and analyzing data types.

Operations Support

This will be a face-to-face training workshop focused on Client Registry system configuration.

Developer Support

This will be done as on the job distance learning. Over the development period of 4 months Jembi developers will engage the Sysnet and shadow the development process. Over this period they will gain knowledge about the:

* Web services
* API calls
* Data model extension

These will then be passed on to the MoH developers who will be supporting the Client Regsitry.

# Section 5: Provider registry

The Provider Registry is a database containing details of all antenatal care health providers working in government health facilities in the Rwamagana District. The Provider Registry assigned each registered provider a unique identifies which the health information exchange uses to identify the health workers and give them access to patient information in the Shared Health Record.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Users** | **Operations support** | **Developer support** |
| **Post and description** | Data Manager: Responsible for responding to requests to edit or add new providers to the Provider Registry in particular in response to error messages in the transaction queue | Systems administrator: Responsible for the deployment and management of the HIE. Keeping system operational and dealing with downtime issues. Dealing with system back-up and system upgrades | Software Developer: Responsible for maintaining and extending the code base of the Provider Registry. Bug fixes, debugging of the software stack etc. |
| **FTE required** | Phase 1: 0.1 FTE  National: 0.2 FTE | Phase 1: 0.2 FTE  National: 0.5 FTE | Phase 1: (response to needs)  National: 0.2 |
| **Basic skills and knowledge required (pre-training)** | Familiarity with MOH health worker management policies and structures. Comfortable with using web based systems | Knowledge of administering software systems under the Linux platform. Database management. Web service knowledge. Networking knowledge | Basic development experience. Knowledge of PHP, XML, HTML, CSS. Understanding of web services. Familiarity with MySQL - or other database systems. Understanding of interoperability between systems. Familiarity with HRIS used by Rwanda |

The Provider Registry is being developed by Intrahealth, using an OpenLDAP implementation, and will be carrier out the training for this registry. Trainees will be provided with reference material and online and telephone support offered by CapacityPlus.

Users

This training will be carried out as a 1-day face-to-face workshop. The training will focus on:

* Workflow for responding to requests to add/edit a provider in response to transaction error queue
* Identifying error types and how to fix them
* Understanding of Provider Registry data structure
* Sensitization to data quality issues related to providers and standardized data lists

Operations Support

This training will be carried out as a 2-day face-to-face workshop. Documentation will be provided to trainees before the workshop and they will be required to familiarize themselves with it’s content before the workshop. The workshop will focus on: How to deploy Provider Registry

* How to back-up database and/or ldap server
* How to upgrade versions
* Monitoring system health, debugging performance problems
* LDAP server administration
* Administration of users

Developer Support

This training will be carried out as a 2-day face-to-face workshop. Pre-training trainees will be require to familiarize themselves with documentation provided by Intrahealth and setup the development environment. The training will focus on:

* Architecture of Provider Registry
* How to debug the system
* How to add new data fields within the provider registry data structure

# Section 6: OpenHIM (Interoperability layer)

The RHEA Health Information Mediator provides an abstraction layer between the application requesting services and the application providing services. It also ensures a single point of contact for all supported services and allows security to be managed at a central point. It provides an abstraction layer for all RHEA transactions so that point of service (PoS) application can easily connect to services and that service providers can be easily swapped out as the architecture grows.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Users** | **Operations support** | **Developer support** |
| **Post and description** | (System analyst): responsible for monitoring and management of errors within the HIM transactions and monitoring of service health. | (Systems administrator): Responsible for the deployment and management of the HIE. Keeping system operational and dealing with downtime issues. Dealing with system back-up and system upgrades | (Software Developer): Responsible for maintaining and extending the code base of the HIM. Bug fixes, debugging of the software stack etc. |
| **FTE required** | Phase 1: 0.5 FTE  National: 1 FTE | Phase 1: 0.2 FTE  National: 0.5 FTE | Phase 1: (response to needs)  National: |
| **Basic skills and knowledge required (pre-training)** | Knowledge of messaging formats for healthcare (ie HL7, XML etc). Comfortable with using web based systems | Knowledge of administering software systems under the Linux platform. Database management. Web service knowledge. Networking knowledge | Basic development experience. Knowledge of Java and XML. Understanding of web services. Familiarity with MySQL - or other database systems. Familiarity with Python. Understanding of interoperability between systems |

OpenHIM training will be carried out by Jembi Health Systems (Jembi). All trainees will be issued with reference material. Post training Jembi staff will be available online or by telephone to answer queries and provide general support.

Users

This training will be carried out as a 5-day face-to-face workshop. The focus of the training will be on:

* Workflow for managing error queue
* Identifying error types and how to fix them
* Understanding of Rwandan HIE
* RHEA messaging specification and transactions

Operations Support

This training will be carried out as a 3-day face-to-face workshop. Trainees will be provided with documentation to familiarize themselves with pre-training. The focus of the training will be on:

* How to deploy OpenHIM
* How to back-up database
* How to upgrade versions
* Monitoring system health, debugging performance problems

Developer Support

This training will be carried out as a 5-day face-to-face workshop. Pre-training trainees will be require to familiarize themselves with documentation provided by Jembi and setup the development environment. The training will focus on:

* Architecture of OpenHIM
* Introduction to Mule and Mule studio
* How to build additional services
* How to add services
* How to debug the system

# Section 7: OpenMRS

The Open Medical Record System (**OpenMRS**®) is an open source medical record platform for developing countries. It is a common platform upon which medical informatics efforts can be built. The system is based on a conceptual database and can be customized for different uses. It allows implementers to design a customized medical records system with little or no programming skills. OpenMRS features include a Central concept dictionary, Modular architecture and Standards support.

In order to operate and maintain this service individuals are required to for full the roles outlined in the table below. The table also indicated the Full Time Equivalent (FTE) required to carry out the required activities for the role and a description of the pre-requisite skills for undertaking training for each of these roles.

## Posts and prerequisite skills

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **User** | **User and Data Support** | **Technical Support** | **Developer support** |
| **Post and description** | Clinician: Responsible for the day to day input of patient data | Data Manager: Responsible for supporting clinicians with data entry. | IT Manager: Responsible for IT support for clinicians and maintenance of hardware | Developer: Responsible for….. |
| **FTE** | n/a | n/a | n/a |  |
| **Basic skills and knowledge required (pre-training)** | Diploma or degree in nursing, midwifery or medicine | Knowledge of OpenMRS | Knowledge of OpenMRS | OpenMRS development and implementation experience. |

User

The user training will be carried out in 2 parts, a basic IT skills training and an OpenMRS application training. Both trainings will be carried out in the form of elbow support sessions at a health centre level, by a joint Jembi, MoH team.

* IT skiils training (6 weeks before ‘go live’)
  + Computer will be installed into the ANC clinics and made available to the clinicians to practice on.
  + At the time of instillation the clinicians will be given a brief lesson on how to use a computer- typing, mouse, Ubuntu
  + An illustrative ‘How to’ booklet that is attached to the computer for reference.
  + Computers will be loaded with several applications that help people learn and practice computer skills- mostly games that improve the use of the mouse, and typing tutorials.  Clinicians will be encouraged to make use of these programmes to practice their computer skills.
* OpenMRS Application training (4 weeks before ‘go live’)
  + The clinicians will sit with a support person, side by side, and back enter data from existing ANC forms (those due visits in the next few weeks).  This will be done at a time when there are no patients (an afternoon likely) so there are no additional pressures. Most clinics will have in excess of 200 records each that can be used for back entry practice. The support person will also enter data- and be available at the elbow in case the clinician has any questions.  Also during this process, the support person can share insights into interpreting data- trends, outliers, data quality etc. Questions and difficulties the clinicians encounter will be incorporated into the training materials, tips and trick, cheat sheets.
* In clinic support (‘go live’)
  + During the first few clinics when the application is being used- there will be a support person.  They can help during clinic- so that the clinician can have some time to get comfortable to the workflow and using the computer.  The support person may do things like record information in the register or paper, organise the patient flow etc.

Data Support

Data managers at the health centre level have already received training on OpenMRS from the MoH. They will be included in the ‘elbow support’ process.

Technical Support

IT managers at the health centre level have already received OpenMRS training from the MoH and are familiar with the system. The IT skills training team will run the IT managers though the IT skills training material and work with them to deliver the initial IT skills training. The IT managers will then be in a place to support the clinicians as they develop their IT skills post training.

Developer Support

The existing MoH OpenMRS developer team will be responsible for supporting the ANC OpenMRS rollout. Additional training on interoperability will be done by Jembi.

# Section 8: RapidSMS

## Posts and prerequisite skills

|  |  |
| --- | --- |
|  | **Developer Support** |
| **Post and description** | Developer: Responsible for |
| **FTE** |  |
| **Basic skills and knowledge required (pre-training)** |  |

Pivot Access will work with the Jembi Rwanda developers and nominated developers from the MoH to learn how the RapidSMS platform works.