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Madagascar Telemedicine

Madagascar eHealth Program Structure

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Submitted by

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1.0 EXECUTIVE SUMMARY

In 2006, the Government of Madagascar created the multi-level "Madagascar Action Plan 2007 – 2012: A Bold And Exciting Plan For Rapid Development". According to the Plan, the goals are to "…ignite rapid growth, lead to the reduction of poverty, and ensure that the country develops in response to the challenges of globalization and in accordance with the national vision". The Madagascar Action Plan (MAP) is focused around eight specific commitments in service of those goals. Two of these commitments are most relevant to the creation of Madagascar's eHealth Program; Commitment 5 touches specifically on health ("Health, Family Planning and the Fight against HIV/AIDS") and Commitment 2 stresses the importance of the use of Information and Communications Technologies (ICT) as an effective tool for the development of the country. An eHealth program provides the intersection of these two commitments and it is the opinion of the assessment team that the implementation of an eHealth program is a viable option that can go a long way achieving these MAP commitments.

This document outlines the functional areas, technical structure, and program implementation approach for an eHealth program for Madagascar. It is the companion document to a Financial Sustainability Plan which will be delivered separately. It should be noted that while the scope of this document is strictly eHealth, this program should be considered in the larger context of an eGovernment Plan for Madagascar.

Section 2.0, Background, illustrates the challenges that MAP Commitment 5 addresses and how together, Commitments 5 and 2 play a role in the success of Madagascar's eHealth program. In Section 3.0 we discuss the five functional areas that comprise the eHealth plan: Teleconsultation, Supply Chain Management, Non-clinical Information, eLearning, and Clinical Information. Section 4.0, Technical Structure, shows that the eHealth program is based on a centralized data repository built by integrating Open Source tools that are accessed via either a web interface, or the mobile phone network to ensure access and functionality depending on the telecommunications infrastructure available at each health facility.

The eHealth program would be implemented in three phases as described in Section 5.0. The first would be a requirements gathering and definition phase when the specific technical, content, scope, and scale details are established. The second phase would be the development and integration of the eHealth tools, and the third phase would be deployment, likely a pilot program leading to a country-wide distribution. The program has been designed to allow staged implementation either by functional area or number of health facilities included.

The cost of the implementation cannot be determined until the requirements gathering and definition phase is complete, but the requirements gathering phase would result in a program definition, sufficiently detailed to support an accurate cost estimate. It is estimated that the requirements gathering and definition phase would take a two person team between two - four months to complete, with two – three weeks in country, and would cost between $150-300k. An estimated range of the cost of country-wide implementation of the overall program would be between $5-20 million over five years depending on the specific options identified in the requirements gathering/definition phase.

The implementation would require a team with expertise in Public Health, Application Development Management, System Analysis, Supply Chain Management, and Networks/Telecommunications. It is important to identify and engaged local expertise as early as possible to develop a base of on-going technical support for the program.

It is critical to not only identify and obtain funding for the program implementation, but also to secure a source of ongoing funding to sustain the program past the end implementation project. The Financial Sustainability Plan deliverable focuses on these aspects of the program.

2.0 BACKGROUND

The Malagasy government has created a multi-level MAP in order to "…ignite rapid growth, lead to the reduction of poverty, and ensure that the country develops in response to the challenges of globalization and in accordance with the national vision." Of eight specific MAP commitments in service of those goals, Commitment 5 touches specifically on health ("Health, Family Planning and the Fight against HIV/AIDS"), and is comprised of eight challenges.

Table 1: Commitment 5 Challenges

Commitment 5 Challenges	
Challenge 1	Provide Quality Health Services to All
Challenge 2	Eradication of Major Diseases
Challenge 3	Win the Fight Against HIV/AIDS
Challenge 4	Implement a Highly Successful Family Planning Strategy
Challenge 5	Reduce Infant Mortality
Challenge 6	Reduce Maternal and Neonatal Mortality
Challenge 7	Improve Nutrition and Food Security
Challenge 8	Provide Safe Water and Widespread Use of Hygienic Practices

In order to meet these challenges, Madagascar plans to incorporate the use of appropriate and sustainable ICT. Commitment 2 stresses the importance of the use of ICT as an effective tool for the development of the country.

The concept of eHealth spans the intersection of the MAP commitments to health and ICT, being broadly defined as "…the application of the Internet and other related technologies in the healthcare industry to improve the access, efficiency, effectiveness and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients and consumers to improve the health status of patients".

Figure 1: MAP Commitments 2 and 5 - Foundation of the eHealth Program

In the context of Madagascar's rapidly improving telecommunications infrastructure and the explosive growth in mobile phone use among the general population, this is the first time that Madagascar has a realistic opportunity to extend the benefits of eHealth to every level of the health system, particularly at the most widely used Basic Health Clinic level.

Beyond its ability to strengthen the clinical system, eHealth can also increase efficiencies in the public health system: facilitating community-based assessments of vaccination coverage and disease prevalence, strengthening evaluation of program effectiveness, and aiding campaigns to distribute vaccines, bed nets, Vitamin A, and other essentials. Without community-based surveys, in fact, much of the progress towards the MAP commitments would be impossible to gauge (e.g. Commitment 5, Challenge 2: Eradication of major diseases). Use of tools like the EpiSurveyor mobile data collection toolkit, already being implemented within the health ministry, allows community-based surveys and other tools of monitoring and evaluation, to be more regularly, frequently, and effectively implemented and embedded into the health system.

Importantly, eHealth can provide improved communications between health providers, officials, and those within the population who have access to modern communications, such as mobile phones. As the access to modern communications is increasing rapidly, this connection can also be harnessed for educational and other purposes. For example, while local clinics in rural areas may not be able to support desktop computers, they are increasingly capable of supporting cell phone use, and those cell phones are capable of operating as an access point to the databases, materials, and systems more commonly accessed via desktops.

3.0 FUNCTIONAL AREAS

We have broken down the aspects of eHealth into 5 elements that can be applied to the needs of Madagascar as defined within the MAP and its challenge areas:

Figure 2: Five Elements of eHealth

1	Teleconsultation	Providing specialized information, including drug reference, specialist opinions, reference materials to clinicians at every level of the system, and to the population
2	Supply Chain Management	Extending capabilities for management of supplies to the clinical system (e.g. antibiotics), and the public health system (e.g. bednets)
3	Non-clinical Information	Strengthening community-based public health activities, including vaccination campaigns, distribution of bednets and Vitamin A, and determination of disease incidence and prevalence
4	eLearning	Extending educational opportunities, including written, audio, and video materials, to providers at every level of the system, and to the public.
5	Clinical Information	Supporting treatment of patients within hospitals and clinics, including management of labs, medical records, and radiological reporting.

Though ultimately, the Government of Madagascar will determine the relative importance of these categories, we have listed the elements in an order we felt would have the most rapid impact on the health of the population. As an example, a clinical information system which allows the tracking of patient records, is obviously important, but follows teleconsultation and supply chain management on the theory that it is better to ensure that patients get treated correctly for their illnesses than to record that they did not.

3.1 Teleconsultation

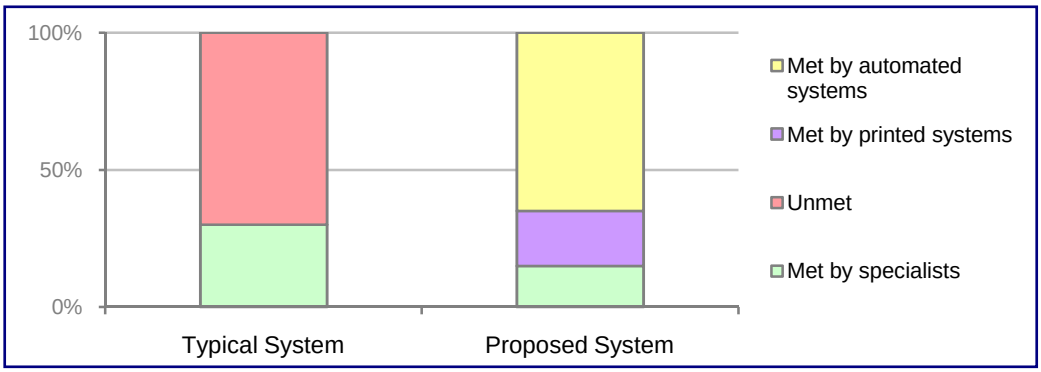
Teleconsultation, or the practice of allowing clinicians to exchange information and expertise at a distance, has already been introduced in Madagascar simply via the mobile phone network. As that technology becomes more widely available, and as costs decrease, this will be an increasingly viable tool.

At the same time, there are inherent limitations in the human-to-human model of teleconsultation, since specialists are always in short supply, and will always be vastly outnumbered by the generalists wishing to consult with them. A key strategy in addressing this imbalance is to divide consultative information – what the generalist receives from the specialist/expert – into that which can only be provided by a human, on the one hand, and that which can be provided by an automated or paper-based system, on the other. Generally, the latter category, which we will refer to as automated consultation is theoretically much larger than the former, human consultation.

A good example of this is found in looking at pharmaceutical information, including dosages, recommendations of antibiotics for various conditions, drug interaction warnings, and other similar information. While most generalists do not carry a large amount of this information in their heads, in practice they do not need to consult with a pharmacist if an information system is in place. Importantly, the information system need not be electronic: it can be something as

simple, inexpensive, and durable as a book of drug information made accessible to the generalists. A good teleconsultation implementation, utilizing modalities from paper to web-based tools, should greatly decrease the workload for the specialists in the system, by routing many specialist requests to the paper or automatic parts of the information system.

Figure 3: Percentage of Met and Unmet Need for Specialist Information in Typical and Proposed System *(note: not based on actual data)*



Of course, the wide availability of mobile telephones allows the possibility of more sophisticated and complex systems of automated consultation. For example, DataDyne.org is currently developing open-source systems allowing clinicians to query drug databases by Short Message System (SMS). The proposed system will allow significant functionality accessible at all levels of infrastructure and incorporate electronic materials, accessible by web, voice menu, or SMS, to include

- Pharmaceutical reference information, including drug dosages, recommendations, precautions, contraindications, and interactive calculators;
- Treatment guidelines, including automated algorithms;
- Text-based, or voice-to-text reading of lab and radiology results; and
- Video-conferencing capabilities to provide live consultation with specialists.

3.2 Supply Chain Management

Health systems around the world face significant challenges in providing quality health services and Madagascar is no exception. Supply chain inefficiencies, which cause drug stockouts leading to lack of treatment, as well as other health system failures, only compound the growing burden of disease, limited infrastructure, and unequal access to healthcare. The eHealth framework utilizes an integrated approach to supply chain management that includes the entire range of hospitals, basic and medical supplies, and linkages to other participants in the healthcare system to ensure a safe and efficient supply and delivery of essential medicines, equipment, and services. The planned system will be text-based, allowing significant functionality at all levels of the system. Enhancements to the system could also include visual depiction of supply packaging to minimize errors. Any new Supply Chain Management (SCM) system would provide significant functionality accessible at all levels of infrastructure.

3.3 Non-Clinical Information

Every nation requires health information about its population that cannot be gathered from clinic records since some percentage of the population does not access medical care. This is especially true in developing countries with lower levels of access to transport, communications, and care. In those countries, data regarding many of the causes, manifestations, and consequences of health can only be captured with population-based surveys. The data from such surveys is essential for planning and managing the health system.

A good example of such population-based data includes measures of HIV prevalence in a population, or vaccination coverage levels. When measured in clinics, the data is inherently biased towards those who have greater access to clinics, and therefore population-based measures yield more accurate estimates.

The vast majority of non-clinical data is still collected on paper leading to delays due to the laborious and error-introducing data-entry procedure. Those delays, which routinely last for months to years, along with any data inaccuracies, have a serious impact on the situational awareness of the government, and its ability to assess, monitor, respond, and re-assess.

In recent years, electronic data collection software has become available and ranges from proprietary commercial solutions requiring a high level of technical expertise and ongoing costs, to highly functional, standards-compliant, free, and open-source software (FOSS). Among these solutions is the Open Source EpiSurveyor data collection system which has already been implemented on a broad scale throughout sub-Saharan Africa by the World Health Organization (WHO) including within the Madagascar Ministry of Health.

3.4 eLearning

Lack of access to information remains a major barrier to knowledge-based health care in Madagascar. Health workers are often isolated, working in remote settings and have little or no access to up-to-date information and have few opportunities to exchange experiences with colleagues.

eLearning, as an integral element of the eHealth framework, facilitates regular training at affordable cost to all health professionals and greater access to new and global advances in diagnosis, treatment, and management. Health workers are provided access to medical knowledge and medical content tailored to local conditions in order to strengthen prevention activities and research programs. Health professionals from different categories and working in geographically distant places can share their knowledge for comprehensive patient car. For example, professors and specialists can share their expertise in various fields with general practitioners, primary health centers communicate with hospitals, medical doctor with paramedics, public with private sector, and health institutions with social welfare organizations. Another aspect of eLearning, often neglected, is that of providing information and instruction to patients. In addition to providing paper-based or video materials for patients to view at clinics, it is now possible to deliver health education information directly to patients' mobile phones, via SMS, audio, and other modalities.

Any system created should allow content to be created once and automatically parsed into the appropriate form for each delivery system (including web, GPRS-equipped cell phone, or SMS-equipped cell phone). The content will include such elements as:

- Treatment guidelines and other updates;
- New material for training;
- Reinforcement of previously-trained curriculum; and
- Health education for public consumption.

In addition, any system should be capable of delivering quizzes keyed to content and of tracking respondent performance with automatic reports highlighting personnel requiring attention. It should also be capable of providing appropriate health education to the public via video, audio, SMS, and other modes. Any new eLearning system would provide significant functionality accessible at all levels of infrastructure.

3.5 Clinical Information

Healthcare practitioners capture and record clinical information about their patients to provide a history of care for ongoing clinical care and to share with other clinicians involved in the care of the patient. The ability to record the information in a standard and accurate format is critical to the process of its safe exchange. A standard clinical terminology, in conjunction with standard data specifications can provide clinical data with both consistent meaning and context, enabling entry, storage and communication of clinical information in ways that allow it to be safely and consistently reused, retrieved and processed by different software applications.

Within the eHealth Framework, the main goal is to provide some access to a patient-centered Clinical Information System (CIS, sometimes referred to as an HMIS) at all levels of the system from university hospitals to basic health centers (CBS). The degree of access will depend on the capabilities at each level. A fundamental requirement of this CIS is that it is entirely text-based, in recognition of the fact that the vast majority of clinical information is in the form of text, rather than images or audio.

The CIS will be based around the concept of unique patient records, and this will require both planning and adaptability. While there is a unique identifying number (ID) issued by the government of Madagascar, much of the population has not applied for or been issued such an ID. Government sources indicated that roughly 50% of the population has a national identification number, and for this 50% that ID number can be used as the unique identifier. For the remaining half of the population, initial discussions suggest that a unique identifier can be created from a combination of name, date of birth (DOB) and home village/town/city.

4.0 TECHNICAL STRUCTURE

The technical structure is based on a centralized data repository built by integrating Open Source tools that are accessed via either a web interface, or the mobile phone network. It would provide two levels of functionality depending on the telecommunications infrastructure available at the health facility. As many of the Basic Health Clinics, which provide the core of the public health system in Madagascar, are located in areas lacking Internet connectivity attention must be given to developing a range of effective tools that can be used with inexpensive mobile phones and hand held computers.

The technical architecture of the eHealth system will be based on the design tenets of:

- A centralized data repository;
- Flexible connectivity options; and
- Integrating existing Open Source Software (OSS) tools.

4.1 Central Data Repository

The eHealth system would be based on a central data repository, likely located in Antananarivo or wherever offers the best combination of telecom infrastructure and administrative support. The data structure would need to be a custom development defined during the requirements gathering/definition phase. It is anticipated that Intel-based computers would suffice for the database and application servers which will keep the cost of procurement and maintenance low. As this site will be accessed by potentially thousands of users, the connection to Madagascar's Internet infrastructure needs to be the highest capacity link in the system. It should also be noted that adequate power conditioning and backup power should be included. Our recommendation is sufficient auxiliary power to keep the ICT infrastructure up for 48 hours without public electricity.

Regarding Infrastructure and Bandwidth

Telecommunications firms in Madagascar are currently expanding an already significant internal infrastructure to greatly increase available bandwidth within the country. In addition, there are two separate initiatives to reduce the country's reliance on satellite connectivity to the rest of the world by connecting the country to two submarine fiber optic cables: EASSY (East Africa Submarine cable System) and SAFE (Southern Africa Far-East cable).

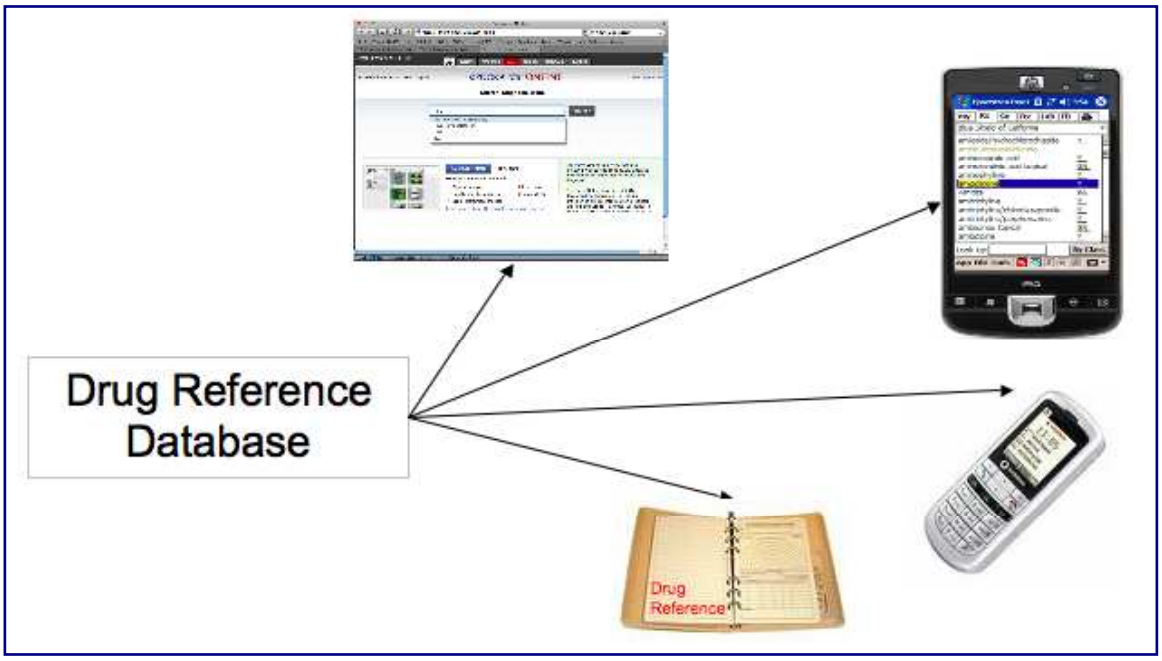
It is important to remember that the information within the Madagascar eHealth system will originate and be utilized almost entirely within the country. The effect of enhanced intra-country bandwidth, via the internet backbone, will be to expand the reach of intra-country broadband, and this will enable more clinics to utilize higher capabilities of the system (e.g. accessing patient records via a rich browser interface) as time goes on.

The effect of enhanced connectivity to the wider internet will surely provide a variety of content to Madagascar that has up to now been prohibitive in cost. However, since most of the eHealth system traffic originates and terminates within the country, this will not affect the system as much as the increase in intra-country bandwidth.

4.2 Flexible Connectivity Options

The technical structure of the project is based on a central repository of data accessed via either a Web or mobile phone-based interface depending on the available infrastructure. This approach affords the most complete coverage of Madagascar's public health facilities. While there would be different levels of capacity depending upon the method of connectivity, this approach would provide useful of functionality at every level of the system.

Figure 4: Example of Multiple Levels of Access to a Common Database



An underlying principle of our approach is that Madagascar can provide rapid increase in capabilities throughout its system of clinical medicine and public health, no matter what the available telecommunications infrastructure. While we recognize that a university hospital, with broadband internet available on large-screen computers, will have increased functionality over a CSB with only a cell phone, we believe that significant functionality of the eLearning system will still be available for that CSB.

Because of the varying levels of capacity, we also recognize the tremendous benefit to having consistent, useful, and appropriate printed reference materials available to clinicians, since such materials are not dependent on the electrical system and are available even when the server is not.

4.3 Integrated Existing Open Source

The third tenet of our technical architecture design would be to maximize the use of existing Open Source applications. This will minimize the initial and recurring costs of custom development and commercial software as well as provide stable and secure tools upon which to build. This would include general tools such as Linux for the server, MySQL for the database, and Zope and Plone for the web application. It would also include more specialized Open Source tools such as EpiSurveyor for non-clinical data collection and World Vista for patient records systems. The degree of Open Source utilization would depend in part on the ability of local firms to provide support.

There would be significant customization required to integrate the components into a coherent whole. This is certainly true in the area of data structure development. It is also likely that some commercial or custom software would need to be included to fill in gaps in the architecture. It could also be possible that some commercial software components are the most cost effective, in which case those elements should be incorporated into the system.

5.0 PROGRAM IMPLEMENTATION

The Madagascar eHealth program would be implemented in three phases:

- Requirements gathering/definition;
- Development and procurement; and
- Implementations and training.

The implementation would require a team with expertise in Public Health, Application Development management, System Analysis, Supply Chain Management, and Networks/Telecommunications. It is important to identify and engaged local expertise as early as possible to develop a base of on-going technical support for the program.

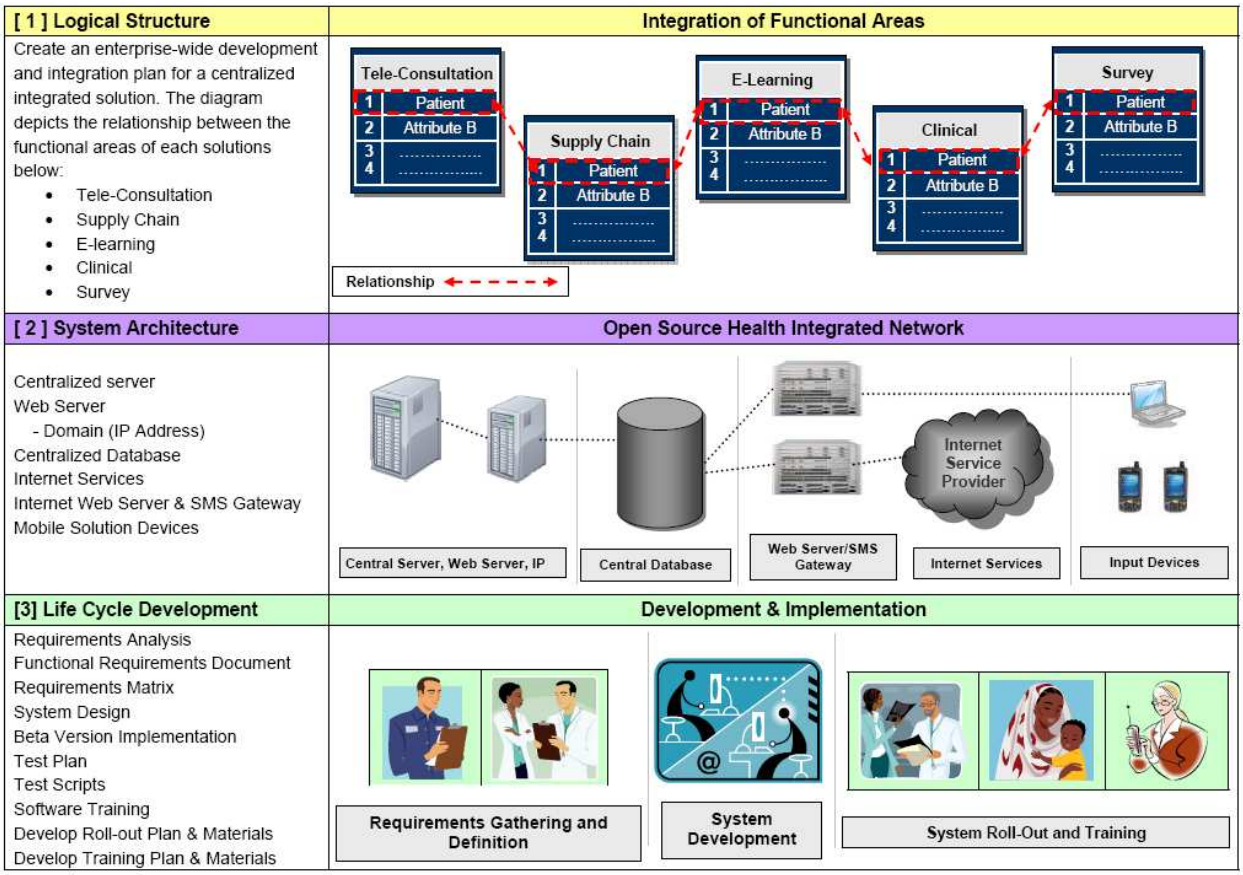
5.1 Requirements Gathering/Definition

The requirements gathering/definition phase is the first and most critical phase of implementation. It is during this phase that the program is defined to the level of detail that allows accurate cost and schedule estimates, testing of the finished product, and the development of a clear project implementation plan.

Using interviews and surveys, assessments would be conducted for the five functional areas to determine:

- The current numbers and types of information requests from generalist in the field to specialist, including unmet needs;
- The current process needs and components of the supply chain;
- The current capabilities of the public health system to collect data essential to the MAP for the non-clinical data module including, disease prevalence and incidence, effectiveness of vaccination, bed net distribution and other programs, and access to clean water;
- The current training capabilities and needs of the health system and its personnel, as well as of the public need for health information; and
- The requirements and needs of clinical workers for patient records.

Figure 5: eHealth Integrated Solution



As a result of the information and analysis of this phase the following technical details would be established:

- The database structure of the system including tables and their relationships resulting in an initial Entity Relationship Diagram (ERD);
- The specific software tools to be used including version numbers;
- The make, model number, and quantity of hardware equipment;
- The configuration of the network infrastructure;
- Security framework of the application including application and system-level security including, roles, access control, firewalls, intrusion detection, backup and restore procedures; and
- Types of technical documentation and training.

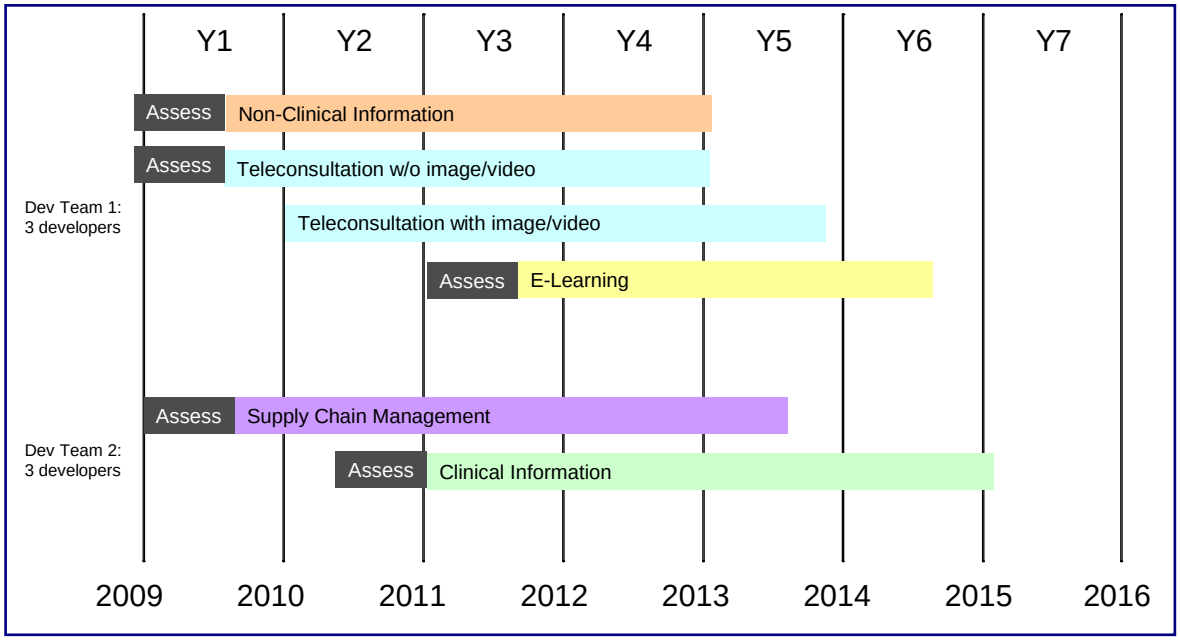
This phase would also identify and define the following general project details:

- The precise scope and scale of the implementation including the pilot program and subsequent implementations;
- An inventory of the telecommunications infrastructure available to each of the health care centers of the pilot area(s);

- An inventory of the availability and capacity of local ICT companies to assist in project implementation;
- The user training requirements; and
- Target cost and schedule.

The timeline in Figure 6 represents one possible implementation strategy, requiring two developer teams of three people each. There would be an additional requirement for personnel to deploy the new systems and train Madagascar personnel in their correct operation. Importantly, it would be possible to develop, deploy, and train faster if more funds were available.

Figure 6: Sample Implementation Schedule *(assumes 2 developer teams of 3 persons)*



5.2 Development and Procurement

The primary activities that occur during this phase are the:

- Procurement of equipment and software needed;
- Establishment of an application development and test environment;
- Development and testing of custom software;
- Integration of existing and custom software components;
- Procurement of equipment for the field rollout;
- Development of system documentation;
- Development of user training materials;
- Preparation of equipment for the field rollout; and
- Testing of all components.

During this phase the following components would be either identified, configured, and integrated into, or custom developed for the functional areas of the eHealth system:

- Reference materials, both printed and electronic, accessible via Web and Mobile phone interface;
- A Supply Chain Management (SCM) system accessible via Web and Mobile phone interfaces;
- A web-based application to aggregate and provide easy reporting and query capabilities of epidemiological data for health professionals within the countries;
- A curriculum based on results of the assessment, requirements of the MAP, and input from current clinicians and the public;
- An eLearning delivery system to deliver curriculum to all levels of infrastructure, and accessible via Web and mobile phone interfaces; and
- A clinical information system addressing needs and requirements, and accessible via Web and mobile phone interfaces.

5.3 Deployment, Testing, and Training

This phase would consist of taking the components developed in the previous phases and bring them to Madagascar to install, test, and train system users. The primary components of this phase would be:

- Installation of hardware and software for central data repository;
- Issuance of equipment to health facilities;
- Establishment of communication links to the central repository;
- Field testing of system;
- Bug fixing; and
- Training users.

APPENDIX A: MADAGASCAR HEALTH SYSTEM STRUCTURE

There are 119 health districts in Madagascar, with a 3 level-system. At the primary level are the basic health centres (CSB) and district hospitals (CHD); at the secondary level, regional hospitals (CHR); and at the national level, university hospitals (CHU).

Table A-1. Madagascar Health Systems Facilities excluding Military, Non-profit and Private

Structure	Localization	Team	Specialties	Number
CSB1 CSB2	rural and urban areas	1 doctor 1 nurse 1 midwife	primary care childbirth	2,948
CHD1 CHD2	districts	hospital	medicine surgery gyn-obs	140
CHR	regional	referral hospital	all	12
CHU	national	university hospital	all + training	6

Basic Health Centres (CSB)

Basic health centres number in all 2,417 including 2,138 in the public sector and 279 in the private sector. There are two types of CSBs in the public sector, including CSB-1 (numbering 2,034) that provide basic health care (curative and preventive cares) and are run by a para-medical officer. CSB-2 provide the same health care as above and additionally, urban dispensaries and mother and child health care centres are attached to them and they are run by a physician.

District Hospitals (CHD)

District hospitals number in all 110, including 91 in the public sector and 19 in the private sector. There are also two types of CHDs in the public sector, including 67 CHD-1 that provide hospital care to medical cases, and CHD-2 (24) that have standard surgical operation facilities. Province-wide bed capacity is as follows: Antananarivo: 1046 beds; Antsiranana: 653 beds; Fianarantsoa: 829 beds; Mahajanga: 404 beds; Toamasina: 633 beds; and Toliary: 595 beds.

Regional Hospital (CHR)

There are four regional hospitals (CHR): Toamasina, Fianarantsoa, Antsiranana and Toliary. Bed capacity in the CHRs in each province is as follows: Antananarivo: 1502 beds; Antsiranana: 300 beds; Fianarantsoa: 309 beds; Mahajanga: 195 beds; Toamasina: 335 beds; and Toliary: 242 beds

University Hospital (CHU)

University hospitals (CHU) are found at the national level. They number in all 16, including 13 in Antananarivo and 3 in Mahajanga. They provide reference health care, impart initial and continuous training and conduct some research.

APPENDIX B: THE MAP COMMITMENT 5: HEALTH, FAMILY PLANNING, AND THE FIGHT AGAINST HIV/AIDS

Source: "Madagascar Action Plan 2007 – 2012: A Bold And Exciting Plan For Rapid Development"

Challenge 1: Provide quality health services to all

Goals

1. Adequate and quality health services will be increased to ensure easy access, affordability and reliability.
2. We will have an educated population which understands and uses quality health services and treatment options.
3. There will be partnerships with Community Agents and the private sector at local levels.

Strategies

1. Ensure all existing health centers and first referral hospitals are staffed by medically qualified professionals who can provide the basic package of services.
2. Ensure rural areas have access to medical care.
3. Attract more medical professionals to rural areas by providing appropriate incentives such as improved housing.
4. Ensure medical graduates are attracted to work in the medical field.
5. Decentralize the management and the system of health financing and decision making at Regional and Commune level.
6. Implement a national policy of contracts for public, private, medical, para-medical and other human resources.
7. Build synergies between traditional medicines and modern practices.

Challenge 2: Eradication of major diseases

Goals

1. We will have effectively controlled malaria.
2. We will have eradicated congenital syphilis and tuberculosis.
3. There will be a reduced prevalence of main endemic epidemic diseases and tropical diseases.

Strategies

1. Ensure 100% coverage for malaria prevention and treatment.
2. Sexually Transmitted Diseases treatment kits are fully available throughout the country.
3. Improve capacity of health centers to prevent, diagnose and treat tuberculosis through immunization, education and social mobilization.

Challenge 3: Win the fight against HIV and AIDS

Goals

1. We will maintain HIV prevalence below 1% in the general population, while ensuring care for HIV/AIDS patients.
2. We will have reduced the number of new HIV infections.
3. We will have increased the number of HIV/AIDS patients receiving treatment.

Strategies

1. Improve access to promotional and clinical services for vulnerable groups and general population living in areas at risk of HIV.
2. Improve and ensure implementation of quality standards for delivery of integrated services at all levels.
3. Strengthen leadership, technical and managerial skills as well as inter and intra-sectoral coordination at all levels of the national response, according to the three ones principles.
4. Strengthen the partnership between public and private sectors.
5. Improve results based management especially focused on linking demand creation and service delivery.
6. Improve access to and management of drugs and diagnostic supplies for Sexually transmitted infections and HIV/AIDS, including anti retro viral (ARV) drugs.

Challenge 4: Implement a highly successful family planning strategy

Goals

1. There will be a reduction in the average size of the Malagasy family to improve the well-being of each family member, the community and the nation.
2. The demand for contraceptives and family planning will be met.

Strategies

1. Increase access and provision of contraceptives.
2. Provide educational programs to men, women and youth.
3. Specifically reduce unwanted teenage pregnancies through family planning services.
4. Integrate family planning into other key health campaigns (e.g. vaccination and HIV/AIDS).

Challenge 5: Reduce infant mortality

Goals

1. We will have reduced by half the infant mortality ratio.
2. There will be an increased demand for Basic Health Centers pregnancy services.
3. Broader community participation in child health will have been achieved.

Strategies

1. Increase focus on prevention programs in child health.
2. Combine child care package and services that include nutrition and vaccinations.
3. Increase the number of nurses and midwives available at Basic Health Centres.

Challenge 6: Reduce maternal and neonatal mortality

Goals

1. Increase the demand for antenatal care and preventative services.
2. Ensure all urban and rural areas have reliable obstetrical emergency services.
3. Promote adequate home-based care for mother and child health.

Strategies
1. Develop demand for preventive care among pregnant women.
2. Improve management of high risk pregnancies and complicated deliveries.
3. Increase the availability of midwives, especially in rural areas.
4. Education programs aimed at mothers for homebased care.

Challenge 7: Improve nutrition and food security

Goals
1. We will have significantly reduced both the ratio of malnutrition among children under 5 years and ratio of food insecurity among households and vulnerable groups.

Strategies
1. Focus on malnutrition among children under 5 especially addressing micronutrient deficiencies (vitamin A, iodine and iron).
2. Target food insecurity among vulnerable groups such as the very poor and victims of natural disasters.
3. Coordinate surveillance structures on nutrition at national, regional and local level.
4. New emphasis on prevention of malnutrition and food insecurity through labor intensive activities.
5. Consolidate and extend the national community nutrition program.
6. Address micro-nutrient deficiencies among pregnant and lacating women at community level to reduce low birth weights.

Challenge 8: Provide safe water and widespread use of hygienic practices

Goals
1. All children will have to be educated in safe sanitary and hygienic practices.
2. Infant mortality due to water related diseases will be significantly decreased.
3. The number of lost working days and school days will be significantly decreased.

Strategies
1. Ensure adequate access to safe drinking water for all people.
2. Educate all people, particularly parents and children, in safe sanitary and hygienic practices.
3. Implement the international WASH strategy.