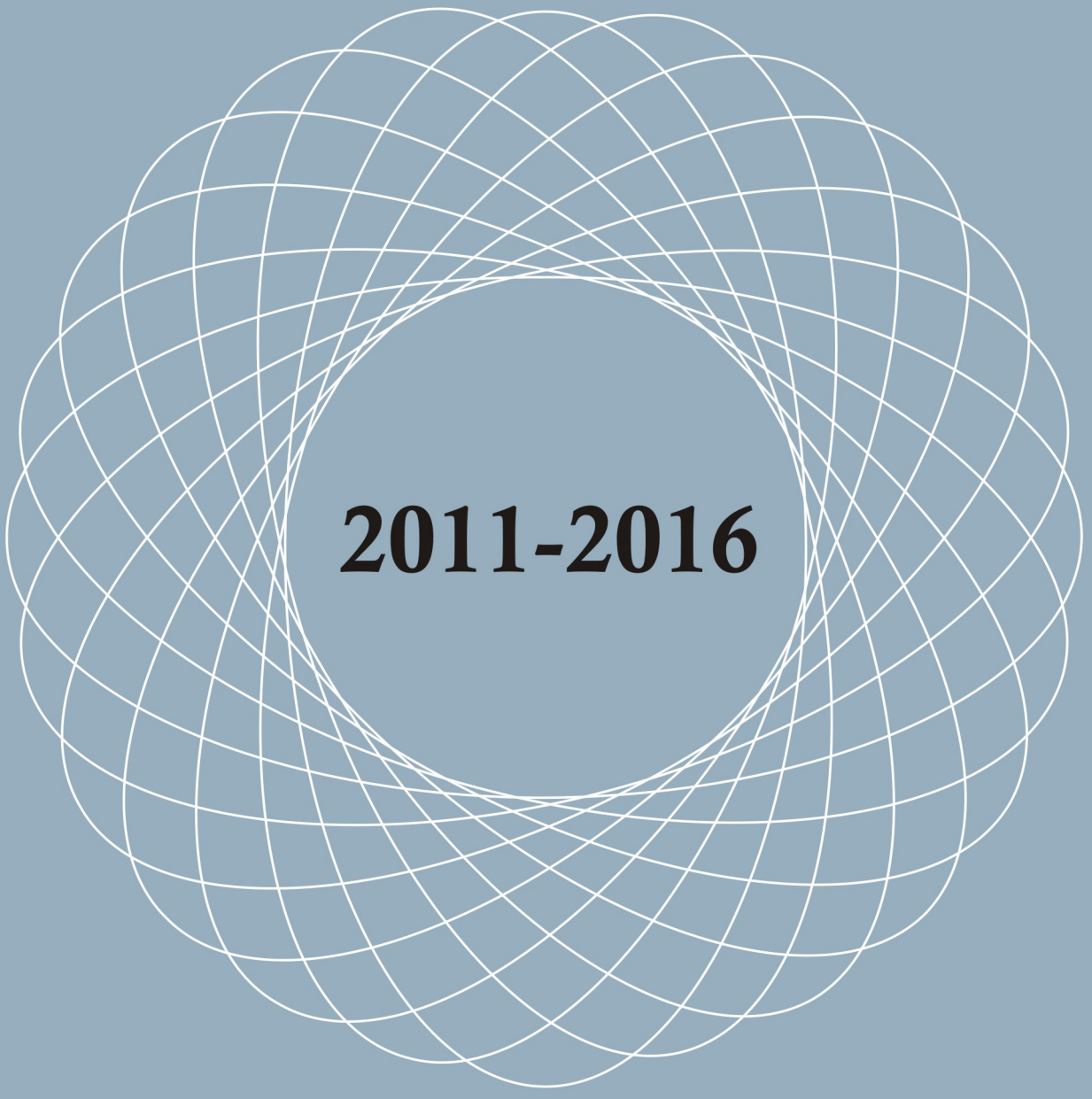
Maldives E-Health Strategy



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FOREWORD

The health policy of the government aims to improve the quality and affordability of health care with focus on access for all, the proposed E- health initiatives focuses to provide standardized high quality medical services, by using interoperable, compatible reliable and scalable E-Health solutions such as telemedicine with integrated Hospital Information Management System.

As per the Constitution of the Republic of Maldives it is a right of every citizen to access good quality health services and this E-Health strategy will direct the government to ensure, that this right is realized for all.

The E- health strategy for Maldives was developed with stakeholder assistance from World Health Organization and Commonwealth during period 2008-2010. This document is the result of extensive consultative process and is the first E-health strategy developed for Maldives. This Strategy is to be implemented in the the period from 2011 to 2016 and has been endorsed by the E-health strategy working group representing pertinent stakeholders at a national level.

I sincerely acknowledge the dedicated work of the Secretariat, working group members and stakeholders in their contribution to developing this E-health strategy. I believe this initiative will assist to steer E-health initiatives to improve health of Citizens of Maldives and contribute to further strengthen the health system of the country.

Dr.Ahmed Jamsheed Mohamed

Minister of Health
10th July 2012

Executive Summary

The First drafts and consultation to develop and renew the e- health strategy for Maldives were conducted with the stakeholder assistance from World Health Organization and common Wealth in the period 2008-2010. This document is the result of the consultative process and is the first e-health strategy developed for Maldives. This Strategy covers the period from processing 2011 to 2016 and is endorsed by the e- health strategy working group representing pertinent stakeholders at a national level.

Intended Audience

This document is intended for the perusal/commenting and review by senior management of the following organizations only:

- Ministry of Health
- Health Service Providers
- Local Government Authority
- Local Councils
- Department of National Registration
- Telecommunication Service providers
- Communications Authority of Maldives
- National Center for Information Technology
- World Health Organization

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1. Country Background

The Maldives is a country composing of a group of approximately 2000 islands grouped into clusters designated as Atolls, out of which approximately 200 are inhabited.

2. Introduction

The following is a summary of E-Health activities:

Build from existing E-Health investment

Complete implementation of telemedicine in selected islands

Complete implementation of consumables management and inventory control system

Start new initiatives to develop and introduce over the next five years for:

- Unique citizen identifier for a common citizen database for health services and health insurance
- Currently no unique patient identifier exists for all Maldivian and foreigners residing in Maldives. In most of the health databases the National Identification Card is used as an identification number for Maldivians and work permit number or passport number likewise is used for foreigners. However, a number of duplications still exist in the current health information systems due to several issues including the identification number entry being an optional field, different identification numbers used in the different information systems, user errors etcetera.
- M-Health to support citizens, clinical activities and public health
- To date, m health is not effectively used by the health planners to inform target populations or general public on health information. However, as Maldivians extensively uses mobiles and other wireless technologies quite extensively, m health has the potential of reaching a greater percentage of the public.
- Clinical information and electronic patient records (EPR)
- A number of small information systems developed by individual health programs exist in a single health facility. A lot of these information systems are not linked with each other. The national Identification card database of Department of National Registration is also currently not linked with the hospital information systems. The hospital information systems at different hospitals are not the same. For example, the hospital information system at Indira Gandhi Memorial Hospital is different from the Hospital Information systems at most of the atoll hospitals. Among the information systems, the Health Information System (HIS) developed by Ministry of Health and Family (MOH) in 2007 to capture patient demographics and hospital medical information is now linked with the NCD system built by NCD program. Also, 39 health facilities are linked by a telemedicine network and a separate

telemedicine information system exists for this network. Strategic E-Health interventions where MOH will lead on:

- Establish and strengthen a national E-Health working group
- Nominating the National Coordinator for E-Health
- Organizing and participating in E-Health seminars and conferences
- Develop and complete the draft of the National E-Health Strategy
- The NCIT and the MOH will set technical standards that comply recognized good practice
- Implement security and confidentiality protocols
- Capacity building initiatives
- Seek support from donor agencies for funding options
- Explore the need for an E-Health Act
- Ensure that E-Health initiatives are used for both public health and clinical purposes
- The NCIT and the MOH to develop effective clinical and executive leaders in E-Health
- Set up collaborative arrangements based on effective engagement
- Embed interoperability in E-Health initiatives.
- Create dedicated and empowered positions for E-Health within the MOH to oversee the planning and implementation process
- Finalize the budgets and affordability
- Monitor and evaluate progress.

3. Vision for Health

The government policy includes the aim to improve the quality and affordability of health care with a focus on access for all.

4. Goal for E-Health

The proposed E-Health initiatives aim to provide standardized high quality medical services, by using interoperable, compatible, reliable, and scalable E-Health solutions such as telemedicine with integrated Hospital Information Management Systems (HIMS), whereby all residents of Maldives have equal access medical expertise available in the Maldives as well as international medical care institutes.

4.1 E-Health Objectives

- The main E health objectives include:
    - Establish an integrated health information system
    - Improve access and quality of health care given to general public using e health
    - Strengthen the capacity to monitor health indicators and conduct system reviews in a timely manner
    - Facilitate efficient emergency or disaster management and timely decision making in health emergency situations

4.2 National Health Policies, Strategies and Plans

The right of every citizen to access good quality health services in the Maldives is protected by the Constitution of the Republic of Maldives and it directs the Government to ensure this right is realized for all.

In execution on this constitutional mandate, the Government's health policy is based on four principles

- recognizing health as a *human right* and its *universality*
- ensuring *equitable access* to *affordable, quality* health services based on *primary health care* approach
- harnessing *solidarity* for health in all national policies
- ensuring policy development based on *facts and scientific evidence*

5. Rationale

The potential of information and communication technologies (ICT) to support improved healthcare can contribute to improvements in healthcare quality, delivery, access and efficiency. There are many approaches to delivering this potential. This E-Health strategy sets a path focusing on improved healthcare more than technology. It targets effort on the key identified priorities set for health while also looking to use of information and ICT to promote better, more efficient and safer care for patients.

The expected benefits are:

- Improved access to medical advice
- Improved access to information
- Improved access to diagnostics
- Improved patient and population health outcomes
- Patient empowerment
- Support to program reform or health system change management
- Improved population health outcomes

Additional generic benefits include:

- Resource sharing through complimentary investments
- Capitalizing on experience and previous successes
- Cost sharing and efficient utilization of resources by not duplicating resources
- Efficiency
- Capacity in maintenance of hardware and software etc and other noncore business activities
- Technological transfer.

6. Current Situation

The use of ICT for health is one of the most rapidly growing areas in health today. There are several E-Health initiatives already in place. Most of these are independent systems that prevent the use of integrated information.

6.1 ICT Infrastructure and Services

Due to the geographical nature of the Maldives it is a huge challenge to provide connectivity to some of the remote islands. Network connectivity through the Government Network of Maldives (GNM) is available at the 20 atolls capitals. Work is in progress to provide connectivity to all inhabited islands and is expected to be completed next year. Currently the infrastructure is in place to provide leased lines to any of the inhabited islands when needed.

6.2 Current Investments, goals and plans

Various E-Health tools used in healthcare include:

- Patient centered information systems
- Electronic health record systems
- Telemedicine
- Information databases that help to generate reports and analyze health-related issues for policy and performance management.
- Preventive health services using Mobiles

6.3 Major healthcare initiatives in Maldives

- On-line Nutrition and Child Health Surveillance System (ONCHSS)
- SEARO Integrated Data Analysis System (SIDAS)
- Hospital Information System (HIS)
- E-Government Portal for online birth and death registration

There is a strategic need to finalize a concrete E-Health plan, with clear policies, practices and management mechanisms. However, it is necessary to raise awareness and commitment of the public and the private sector to invest in E-Health, to strengthen and solidify the use of ICT in healthcare.

6.4 Policy and Strategy Initiatives

- Under WHO's Knowledge Management and Information Technology (KMI) initiative in 2008, information was collected to draft a National E-Health plan. This was not successful as the draft was not finalized
- National Telemedicine Standards and Protocols

- Under the Integrated Human Development Programme (IHDP) telemedicine project a National Telemedicine Standards the Ministry of Health and Family (MOH) drafted a protocol document, which is currently being finalized and endorsed.
- National Information Communication Technology (ICT) policy, finalized in 2009, which the National Centre for Information Technology is currently implementing.

6.5 Initiatives to enhance Interoperability

- Considering forming a National E-Health Committee
- Developing telemedicine standards and guidelines, requiring telemedicine software to be compliant with latest approved international standards for interoperability in health systems (at a minimum to be compliant with)Health Level 7 (HL7)and Digital Imaging and Communication in Medicine (DICOM) compatible
- Enforcing the standards such as having a unique identifier in all the software developed
- Considering that health solutions require reports and the data exchanged to be compatible
- Inform all key stakeholders and staff of all relevant information at all times.

6.6 Capacity Building Initiatives

1. E-Health capacity building requires the development of a trained workforce capable of developing and dealing effectively with E-Health projects over time
2. Active participation in training programs, seminars and workshops by relevant MOH staff and other stakeholders
3. Currently training 70 nurses, 2 biomedical engineers and 8 specialist doctors from several locations under a donor driven project, with these trained staff bonded to serve in the assigned island to support telemedicine initiatives

6.7 Procurement and Financing

- Projects are financed by a mixture of government donor funds
- The main financial challenges are procuring equipment and telecommunications infrastructure
- Viable, affordable long term planning of the financing model is essential
- Financial sustainability at the initial stages of the strategy is essential.

6.8 Sustainable Affordability, Plans and Initiatives

- In the current projects, budget provision is until the end of the project and the recurrent costs that occur after implementation
- There is a need to secure a sustainable E-Health budget.
- Explore Public private partnership/PPP initiatives

7. Challenges

The main challenge is developing capacity of MOH, in leadership of E-Health in the new healthcare system.

Another main challenge is introducing interoperability between information and healthcare information systems into the current setting where systems are stand-alone and with different definitions.

Health services management, patient records and supplies management rely on several E-Health tools. While the use of ICT has expanded and proven efficient in high-level management, it still lags in the clinical care areas in the Maldives, and needs integrating.

Existing information, systems and tools face issues of compatibility, scalability and interoperability. Examples include messages exchanged between healthcare applications, interoperability of Electronic Patient Records (EPR), interoperability of patient identifiers and coding terms.

For all patient records, unique identifiers for patients, healthcare professionals and locations are needed. It contributes to patient care, accessibility, information as well as resource sharing and records located at one place. Considerations are:

- The medical council has legal power in terms of ethics, code of conduct and confidentiality in sharing patient records
- MOH need to discuss with Medical Council on how to go forward with having an Electronic Medical Record (EMR) system
- MOH also needs to decide which data goes into the EPR system

- Strategy should comply with the current laws of the country
- Begin the process of development of an EPR system over the 5 years. In the strategy we need to define EMR, what data and contents of the system.

7.1 Guiding principles

The following principles will underpin and inform the proposed strategy and approach.

- Government is committed to provide an efficient, effective, affordable equitable and accessible Health care services
- Deliver core elements of enabling national E-Health infrastructure once, rather than duplicating development costs and efforts and increasing the likelihood of rework
- Actively engage key healthcare stakeholders in the design and delivery of E-Health solutions
- Build the long term national E-Health capability incrementally pragmatically, focusing initial investment in areas that deliver the greatest benefits for citizens, patients, healthcare providers and healthcare entities
- Recognizing different starting points to balance active support for care providers with less developed capability, while not constraining the ability for more advanced participants to progress
- Effectively leverage and scale E-Health activity across the country
- Balance alignment and independence to drive the alignment of national E-Health activities whilst not unnecessarily limiting the ability of Health Service Corporation (HSCs)and vendors to implement locally relevant solutions
- Ensure sufficient numbers of skilled practitioners are available to support delivery of the national E-Health strategy
- E-Health projects should be self- sustaining
- Adopt good practices to ensure ethical and quality health standards.

8. Governance principles, roles and structures

8.1 E-Health Governance

The MOH will adopt recognized principles and practices of:

- Leadership
- Engagement
- Collaboration
- Accountability
- Program management
- The MOH in collaboration with HSCs will explore and adopt appropriate information standards
- Project management.
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8.2 Structure and Institutional Framework

- Department and Director responsible
- Form the E-Health working group
- Nominate the National Coordinator for E-Health

Responsibilities for e- Health

- MOH is responsible for developing national E-Health policies and strategies and securing donor funds.
- A steering committee representing MOH and HSC coordinators will oversee the policy and strategy development
- MOH will have an E-Health framework that the HSCs and other stakeholders are involved in and will contribute to
- HSCs will develop their E-Health plans in line with the MOH E-Health framework
- The MOH will aim to increase the willingness of healthcare professionals to adopt and use effective E-Health solutions by involving the doctors from the planning stage and training doctors in the use of E-Health technology and equipment.
- Should the MOH and HSCs aim to use binding and enforceable service contracts with E-Health activities and initiatives incorporated in service contracts

8.3 Project Management

- Plan and timeline -all E-Health projects will have basic plans clearly identifying the deliverables, responsibilities, and timelines. This is particularly important when interdependent pieces of work must be coordinated between multiple entities.
- Clear responsibility - entities responsible for specific deliverables will be clearly identified
- Process and methodology - the MOH, HSC and the private sector will develop and agree on a common methodology and process for work and documentation
- Withdrawal or continuation plan - partners will create a withdrawal and continuation plan to ensure the continuation of the project in the event that one or more members of the collaboration, withdraw from the partnership.
- Value for money - when the collaboration requires financial resources, the best value principle will be used rather than the lowest price principle.

9. Capacity development

Successful E-Health programs need to build the capacity of the personnel involved. For capacity development, the following measures will be undertaken:

- Promote capacity building in ICTs for health workers, including administrative and management, technical and processes
- Address CPD by distance learning for employees and health workers
- Recruit and retain ICT personnel
- Train E-Health specialists using eLearning
- Establish health informatics for health research and health services management
- Foster public private partnerships in the areas of telemedicine,) Mobile Health (m.health) information for citizens
- Collaborate and exchange programs with other organizations, local, regional and international E-Health centers of excellence to build capacity and learn from best practices
- Identify and develop E-Health leaders and champions in the health facilities.

9.1 Standards

- Confidentiality and data security are paramount and achieved by applying standards rigorously
- The strategy will institutionalize the standardization of ICT products, solutions and services for quality assurance and comply with the requirements of the National Centre for IT to ensure quality and compatibility of ICT products, solutions and services to be deployed to E-Health projects
- Solutions will use a distributed network to reduce downtimes.
- There should be appropriate standards and solutions for the service delivery levels from primary to tertiary level
- ICT systems should be interoperable on the converge medium of data, voice and video across the service delivery levels
- ICT Systems should have a common User Interface Standards to allow for easier maintenance and training across the different applications
- Implementation will be phased to target quick wins as opposed to grand projects
- Projects with a web based front end may have the highest chance of success, such as a central web based referral system
- All systems developed and implemented should have standard guidelines with clear protocols for evaluation, procurement, and validation of hardware.

9.2 Data security and Confidentiality

E-Health applications and solutions should address standard security measures as spelt out in Communication Amendment Act 2009. The solution and system should address the following:

- Disaster Recovery (DSR) off-sites or off-shore will ensure continuity of services and recovery of data in case of a disaster
- A standby data back-up system should be in place
- Clearly defined levels of access
- Audit log trails of all activities, including access and time
- Create strong passwords including combined passwords
- A back-up policy.

E-Health applications and solutions should address system Administrative measures such as healthcare professionals screening, training, chain of responsibility, disciplinary

measures, patient disclosure and review, fair use policy, technical measures, identification, encryption, access control, audit trails, non-repudiation and firewalls.

9.3 Ethics

All E-Health initiatives will comply with adopted ethics policies. An E-Health code of ethics will include the following principles:

- Openness
- Honesty
- Quality
- Informed consent
- Privacy
- Professionalism in online healthcare
- Responsible partnering
- Security
- Accountability.

9.4 Legislation

The potential E-Health developments will comply with the law, including the status of electronic patient and clinical information, the ability to share patient information electronically between authorized healthcare professionals, data confidentiality and data security. Potential E-Health developments will seek to minimize litigation costs.

All E-Health developments will comply with the Right to Information Act.

The following will be areas that will need addressing by legislation:

- Data protection
- Emergency and disaster preparedness recovery
- Medication arrangements
- Quality assessment system
- Security, policies and guidelines
- Good telemedicine practice

10. Resources, finance and affordability

10.1 Cost effectiveness

Finance for telemedicine and consumables management is already in place. Finance for m-Health and clinical information is not in place and relies on donor contributions. The existing teams at the MOH and NCIT can develop the unique citizen identifiers and a common citizen index within existing budgets.

The availability of finance will determine the pace of implementation. Individual Health Services Corporation (HSCs) should provide funds for ICT infrastructures. MOH will subscribe for access to medical journals and providing this information to doctors and HSCs. Everyone involved in E-Health has a responsibility to mitigate E-Health risks.

10.2 Funding Strategies

Donor funding used to finance most of the initiatives in this strategy. Government funding as well as co-funding by relevant national agencies including financial aid from private partners is imperative to supplement any donor funding.

11. Monitoring and evaluation Framework

Monitoring and Evaluation will:

- Maintain quality and standards in service provision
- Improve disease surveillance –outbreaks and key service delivery indicators
- Ensure benefits are realized and service delivery is improved

12. Proposed E-Health initiatives

The following tables present the breakdown of proposed initiatives under establishing E-Health within the Maldives.

Table 1 E-Health governing structure

<table>
<tr><td colspan="4">Objective: establish a governance structure to deliver the E-Health strategy</td></tr>
<tr><td>Result Area</td><td>Goals</td><td>Activities</td><td>Success criteria</td></tr>
<tr><td>Establish strong governance and leadership</td><td rowspan="3">• Implement, support and Coordinate the E-Health strategy
• Resource mobilization, Cost benefits; subsidized
• Increase speed of delivery of solution
• Reduce risk of failure; implement workable, adaptable and ready solutions
• Replication of successful projects and systems
• Ensure continuity of E-Health projects</td><td>• Produce a strategy to guide all E-Health activities
• Identify and formalize E-Health working groups
• Strengthen the E-Health unit by giving budgetary allocation, staff and other working resources</td><td rowspan="3">• E-Health working groups
• Proper E-Health unit within the ministry of health with dedicated staff and clear goal of successfully delivering the E-Health strategy.
• Activities will be implemented at national level and rolled out to community level… (this way we reduce duplication of effort and reduce wastage in costs)</td></tr>
<tr><td>Foster collaboration and partnership</td><td rowspan="2">• Create clear guidelines for involvement to provide strategic advice on E-Health activities
• Define specific activities for stakeholders and partners involvement and support</td></tr>
<tr><td>Leverage available resources</td></tr>
<tr><td>Safeguard privacy and security through</td><td>• Ethics, risks and privacy considerations</td><td>• Work in consultation with the relevant Ministries to provide</td><td>• Patient information and have privacy and proper consent process to</td></tr>
</table>

appropriate legislation Build on existing foundation	as relates to the health sector • Improve existing rather than recreating • We have many strengths to build on • Can be modified for good-fit in E-Health • Resource mobilization, cost benefits; subsidized	them with E-Health recommendation • Develop guidelines on patient information flow • Identify available and customizable medical systems • Exploit opportunities based on SWOT analysis • Identify and bring-on-board the Private sector capacity	safeguard confidentiality as per legal requirements • Partnerships established • Establish a robust regulatory body for E-Health
Implement strategy in phases	• Measure E-Health activities • Manage change and • Use available resources • Learning process	• Phase 1: Provide Access to priority clinical information • Phase2: Enhance capabilities and provide Knowledge-based tools • Phase 3: integrate systems throughout the continuum of care	
Project and program management	• Adopt recognized project and program management • Mitigate risk	• Expand program board role to include new strategic E-Health initiatives • Take actions to mitigate risk • Set project timescales for whole project life-cycles, including benefits realization	• Risks mitigated • Project benefits realized

Table 2 Unique citizen identifiers for a common health services and health insurance

Key Objective:

- create a core, single citizen database for other health systems to access
- MOH and Hospitals will integrate the existing databases into one common database and the MOH together with Hospitals will identify the requirements of a common citizen database, with NCIT responsible for developing the database to meet the requirements, leading to an initiative for unique citizen identifiers.

Result Area	Needs	Activities	Success Criteria
Design and implement citizen database, including access by existing databases	• Database to extend across all citizens and expatriates • Find the appropriate tools	• Specify requirements, including data transfer to patient databases • Design, procure and test solution • Implement solution • Operate solution	• System operating on time and within budget • Benefits realized
Routine access to citizens demographic data when they use healthcare	• Information about patients using a range of services needed by some clinicians • Information needed about the healthcare use by patient, demographic and geographic groups for health policy development • Information needed about the healthcare use by patient,	• Add all new births to the citizen database routinely • Remove all deceased citizens from the database routinely • Add and remove all expatriates to the database as they enter and leave the country permanently • Integrate other databases to access the core citizen	• Clinicians can combine data from several databases to improve effectiveness of healthcare • Health policy reviews supported by data from a common database • Health utilization reviews supported by data from a common database

	demographic and geographic groups for healthcare utilization reviews	database	
Create and maintain the citizens index needed for future clinical and EPR information	• Common citizen database needed for clinical information and EPR architecture for shared clinical information	• Include core database in requirements, functions and architecture of shared clinical information • Maintain the database	• Core database operates within new architecture

Table 3 Implementing telemedicine

Objective: enable people on islands to use teleconsultation and avoid travel and support continuing medical education			
Result Areas	**Needs**	**Activities**	**Success Criteria**
Implement telemedicine service	• Telemedicine service extended across all inhabited islands	• Specify requirements • Procure solution • Implement solution • Operate solution • Consistency in the term Telemedicine: • Should have similar or some basic diagnostic services available in any telemedicine enabled hospital/health center/clinic: vital signs, general examination etc	• Acceptance of Telemedicine by medical service providers and consumers • Easy path to telemedicine services • Awareness and understanding of benefits of telemedicine by general public

Specify specialties	• Lack of adequate specialists on islands • Enable people's access to outpatients when travel from islands is not possible • Save cost by reducing physical transfer of patients for outpatients • Enhancement of communication in the sector among health specialists • Continuous medical education to health workers by the specialists	• Train the healthcare providers on ICT and the specialized skills • Install ICT infrastructure, medical equipment to support telemedicine • Implement telemedicine initiatives to the islands • Establish consultation at IGMH for specialists to provide a scheduled service for the specialties • Specify, procure and install telemedicine equipment	• Number of specialists available for consultation • Installed equipment to support telemedicine • Specialized healthcare professionals available • Workflow diagram for the whole Telemedince process-without any grey area for misconception.
Telemedicine referral	• To have scheduled and coordinated referral system	• Establish telemedicine referral system for 35 islands linked with a database of specialists, specialized clinics, their availability and location. • Create an alert system for emergency cases, to alert healthcare professionals on cases • Establish guidelines to ensure security, confidentiality and adherence to practice ethics and norms • Design a disaster recovery strategy for the referral system for the 35 islands	• Improve quality of healthcare to all patients Improve response to emergencies when the referral site is informed in advance • Provide specialist consultations • Services in remote islands Improved response rate to telemedicine cases

Table 4 Availability of needed health information at national level

Key Objective: ensure accurate, complete and timely health information is available from public and private sector for policy division and mainly of overall performance of health system.			
Result Area	**Needs**	**Activities**	**Success Criteria**
information system from Hospital's integrated with the related health information system	• All health information linked at national level and available for policy decisions.	• Coordinate with NCIT to develop and integrate health information system for public and private health providers. • Provide training to relevant staff at all levels. • Start a feedback process to share with all stakeholders the health reports compiled at national level.	• Health information from all health service providers available at MOH for use by policy makers. • Health Statistics feedback reports shared with all public and private health service providers annually.

Table 5 Implement consumables management information system

Objective: improve availability of consumables, better ordering and reduced stock holding			
Result Areas	**Needs**	**Activities**	**Success Criteria**
Implement consumable management information system	• Information system to extend across all consumables	• Specify requirements, including data transfer to financial systems • Procure solution • Implement solution • Operate solution	• System operating on time and within budget • Benefits realized • Availability of appropriate consumables at the right place at the right time with required stocks • Have appropriate audit trails and approvals levels
Consumables availability	• All consumables required by healthcare professionals are available on demand	• Specify consumables needed by just-in-time delivery • Specify ordering protocols for just-in-time deliveries. • Specify consumables to be held in stock • Specify the minimum stock holding reorder levels and ordering protocols • Maintain consumables catalogue • Maintain complaints on noncompliance and act on issues	• Specify the minimum stock holding reorder levels and ordering protocols • All consumables required by healthcare professionals and delivered by just-in-time are available on demand • Number of stock outs reduced to nil for critical items

Effective, efficient ordering	• All consumables required by healthcare professionals ordered and delivered promptly • All consumables ordered at contracted prices and volumes	• Agree contract prices. volumes and delivery performances for all consumables • Set reorder levels and timings • Maintenance	• Reduced unit costs of consumables • Ordering requirements met by suppliers
Reduced stockholding	• Stock levels reduced to a minimum to reduce stock holding costs	• Set stock holding levels for all commodities • Quarterly stock take and match to book volumes and values • Review stock issues and write off obsolete and unneeded consumable stock holdings • Report monthly on stock holding performance	• Stock holding levels minimized • Stock holding costs reduced to a minimum

Table 6 Begin introduction of more clinical information systems and EPRs

Key Objective: provide healthcare professionals with access to comprehensive clinical information about their patients and to share clinical information			
Result Area	**Needs**	**Activities**	**Success Criteria**
Engage with healthcare professionals from the outset	• Meet users requirements and needs • Enables healthcare professionals to participate fully in decisions on new clinical and EPR information	• Formal engagement, reviews and decisions on options, implementation and ethics • Define an EPR and its content	• Healthcare professionals effectively engaged and participating
Data definitions, common terms and dictionary	• Common terms enable reliable data sharing and use between healthcare professionals • Reliable data analysis	• Review and adopt recognized international data definitions and terms • Formal review and approval of definitions to be adopted by Maldives Medical bodies Regular reviews and updates • Design, procure and test solution • Implement solution • Operate solution	• Implementation accepted and operates effectively
Information architecture	• Fit architecture to clinical and public health information needs	• Design information architecture for the full range of clinical and EPR information as a model to be assembled • Maintain architecture to match new ICT opportunities	• Architecture supports clinical information sharing and public health needs

Interoperability standards	• Fit interoperability requirements to information needs	• Design technical, syntax and semantic interoperability standards and requirements • Maintain interoperability standards for the full range of clinical and EPR information as a model to be assembled • Maintain interoperability standards to match new ICT opportunities	• Interoperability supports clinical information sharing and public health needs
Identify clinical and EPR systems that healthcare professionals need	• Meet user needs for clinical ad EPR information	• Compile descriptions of a range of potential information systems from actual use • Review and assess these with healthcare professionals	• Healthcare professionals assign relative priorities to potential opportunities
Professional for clinical information EPR	• Information	• Administrative staff about their requirements. • Design ways that these can be met • Determine the requirements and design with healthcare professionals and administrative staff	

Select a sequence of clinical and information solutions for implementation	• Complete business cases for preferred clinical and EPR information for decision makers	• Evaluate options over their whole life cycles • Implement preferred options over their whole life cycle	Benefits realized

Table 7 Expand use of M-Health

Key Objective: • Expand citizens' access on their mobile phones to an increasing range of health information provided by healthcare professionals • Increase the health information collected and shared by healthcare workers using mobile phones			
Result Area	**Needs**	**Activities**	**Success Criteria**
Research and assess the increasing range of m.health solutions available to healthcare systems and select the most appropriate for the diseases in	• Prompt access by citizens to health information • Prompt access to health information by healthcare professionals	• Regular review and assessment of new M-Health solutions • Identify potential benefits to citizens, healthcare professionals and the healthcare system • Collaborate with telecommunications providers on potential opportunities and implications for the healthcare system	• Quarterly reports sent to MOH and HSCs on potential initiatives • Increasing conversion of opportunities into high priority initiatives • Benefits for health initiatives, communication, public health initiatives, disaster management, awareness, decision support, to provide information to healthcare providers

the Maldives			
Design and implement selected m-Health priorities	• High priority health needs identified in Maldives health strategy • Form E-Health subgroup for technical guidance	• Design, procure and test solutions, including access to evidence-based health information and public health databases needed to receive data from healthcare professionals and workers • Implement solution • Operate solution	• Benefits for citizens, healthcare professionals and the healthcare system realized
Collect data remotely through the use of mobile phones, PDAs	• Require data on various health indicators for easy data analysis and transmission		
Disease and epidemic outbreak tracking	• Rapid response to disaster and resource mobilization • Requirement for data on various health indicators	• Identify the data to be collected, stored and analyzed • Design and implement the data repositories • Evaluate and identify solutions available for communication • Evaluate solutions available for communication in emergencies	• Increased speed of health alerts • Faster responses to health issues, emergencies and crises .
Communication and training healthcare workers	• Deliver health information to targeted groups	• Identify the kind of data to be collected	• Healthcare workers more effective and efficient

Develop a diagnostic support system using existing clinical guidelines	• Facilitate accurate diagnosis, treatment and care of the patient	• Create messages to send alerts for healthcare workers and citizens using customized messages for a range of health conditions	• Healthcare workers more effective and efficient
Establish a drug adherence system	• Monitor compliance with prescribed medication, especially for chronic and infectious diseases	• Create messages to send alerts for patients and citizens using customized messages for a particular health condition	• Increased compliance by patients
Develop m-Health applications for health promotion messages to targeted groups	• Continuous need to educate the public, promote good public health practices	• Create messages to send alerts for patients and citizens using customized messages for a particular health condition	• Improved citizens' health

Table 8 Invest in computing infrastructure

Key Objective: Key hindrance in adaptation of E-Health initiatives is the relative poor quality of computing infrastructure throughout the health sector.			
Result Area	**Needs**	**Activities**	**Success Criteria**
Establish and mandate Health Care Service Providers implement and maintain an acceptable baseline of computing infrastructure	• Otherwise all the E-Health initiatives however well implemented centrally will fail at care level, resulting in lack of consumer confidence in E-Health initiatives	• Develop computing infrastructure needs at health provider level • Ensure availability of baseline systems during approval process • Have a process to ensure the systems are maintained to appropriate level by certified people	• Uniformity of E-Health experience throughout the healthcare service providers • Availability of mechanism to review budget allocations from service providers for IT infrastructure

Table 9 Access to broadband services

Key Objective: Foundation for any E-Health strategy is access to broadband services that provide connectivity between all the participating healthcare providers			
Result Area	**Needs**	**Activities**	**Success Criteria**
Establish and mandate Health Care Service Providers have broadband access with defined minimum access speed	• Have secure broadband access to provide easy access and interchange of information between healthcare providers	• Ensure availability of broadband access during approval process • Make sure service levels are defined and maintained in providing service •	• Secure exchange of information between the organization

Table 10 Adequate communication of E- Health strategies

Key Objective: Ensure all relevant stakeholders are aware of e- health strategies implemented in Maldives.			
Result Area	**Needs**	**Activities**	**Success Criteria**
Communication plan developed and implemented for e- health strategies	• To get maximum benefit from the expansive investments for e-health strategy effective communication is essential.	• Involve relevant communication and public relation and develop a communication implementation plan for e health strategy in Maldives. • Implement actions in e health communication plan.	• 50 % of target population for each strategy reached.via communication channels programs.

Appendix 1 : Definitions

- **Telemedicine:** The delivery of health care services and sharing of medical knowledge over distance using telecommunications. It includes consultative, diagnostic, and treatment services.
- **E-Health:** The combined use of electronic communication and information technology in the health sector
- **m.Health:** involves using wireless technologies such as Bluetooth, GSM/ GPRS/3G, Wi-Fi, WiMAX, among others to transmit and enable various E-Health data contents and services. Usually these are accessed by the health providers and communities through devices such as mobile phones, smart phones, Personal Digital Assistants (PDAs), laptops and Personal Computers (PCs).
- **E-Learning:** It's the integration of information technology in learning. This type of learning is created using digital tools and uses electronic media for delivery, facilitation, assessment, interaction and review.
- **Interoperability:** The ability of systems, units, or protocols to provide services to and accept services from other systems to enable them to operate effectively together.
- **Stakeholders:** These are individuals, groups or institutions that share and contribute towards the achievement of a E-Health goals and objectives. The stakeholders will be drawn from the Public sector, Private for Profit and Private for nonprofit and developing and implementing partners.
- **Electronic patient records**: refers to a detailed health record, with history of the patients.
- **Information Communication and Technology (ICT):** Means technologies employed in collecting, storing, using or sending out information and include those involving the use of computers or any telecommunication system.

Appendix 2 :Abbreviations

- DICOM (Digital Imaging and Communication in Maldives)
- DSR (Disaster Recovery)
- EMR (Electronic Medical Record)
- EPR(Electronic Patient Record)
- GNM (Government Network of Maldives)
- HIMS (Hospital Information Management System)
- HL7 (Health Level 7)
- HSCs (Health Service Corporation)
- ICT(Information and Communication Technology)
- IHDP (Integrated Human Development Programme)
- m.Health (Mobile Health)
- MOH (Ministry Of Health)
- KMI (Knowledge Management and Information Technology)
- PMI (Patient Master Index)
- ONCHSS (Online Nutrition and Child Health Surveillance System)
- SIDAS (SEARO Integrated Data Analysis System)

Appendix 3: National E-Health Working Groups

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Appendix 4: National E-Health Secretariate

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