TECHNICAL REPORT

ISO/TR 19231

Health informatics — Survey of mHealth projects in low and middle income countries (LMIC)

Informatique de santé — Étude de projets de santé mobile dans les pays à revenu bas et moyen

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Foreword

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 215, *Health Informatics*.

Introduction

Mobile Health (mHealth) is a hot topic in the health information technology (IT) industry because it can make a big difference in healthcare services. The United Nations (UN) and World Health Organization (WHO) are interested in mHealth technology to help overcome the current low quality healthcare services in low and middle income countries (LMIC).

The UN describes use cases that are applicable to mHealth in LMIC: Education and Awareness; Remote Data Collection; Remote Monitoring; Communication and Training for Healthcare Workers; Disease and Epidemic Outbreak Tracking; and Diagnostics and Treatment Support. WHO also describes use cases: Health call centres/Healthcare telephone help line; Emergency toll-free telephone services; Treatment compliance; Appointment reminders; Community mobilization and health promotion; Raising awareness; Mobile telemedicine; Public health emergencies; Health surveys and surveillance; Patient monitoring; Information Initiatives; Decision support systems; and Patient records. For more use cases, see References [1] and [2].

There are several eHealth frameworks already developed by a number of organizations such as Health Level Seven (HL7), ISO/TC215, CEN/TC251, and Standards Australia (SA). Before suggesting an interoperable mHealth framework, currently available eHealth frameworks are surveyed and investigated to recognize how suitable each eHealth framework is for mHealth.

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Health informatics — Survey of mHealth projects in low and middle income countries (LMIC)

1   Scope

This Technical Report surveys ongoing national mHealth projects in LMIC, to which some emerging technologies such as zero configuration and proximity computing are applicable, especially when the information and communication technology (ICT) infrastructure is not established in those countries.

The scope is constrained to mHealth use cases and technologies for information and communication infrastructures that are useful for LMICs. In addition, the purpose of this Technical Report is to survey not only national mHealth projects in LMICs, but also possible mHealth frameworks that might be used.

2   Normative references

There are no normative references in this document.

3   Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
clinician
health professional who delivers health services directly to a patient/client

3.2
patient
individual person that is a subject of care

3.3
HIV/AIDS
human immunodeficiency virus infection
acquired immunodeficiency syndrome
disease of the human immune immunodeficiency virus

3.4
SIM card
subscriber identity module
subscriber identification module
(SIM)
integrated circuit that securely stores the international mobile subscriber identity (IMSI) and the related key used to identify and authenticate subscribers on mobile telephony devices (such as mobile phones and computers)

3.5
infrastructure
basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function

3.6
confidentiality
property that information is not made available or disclosed to unauthorised individuals, entities, or processes

[SOURCE: ISO 7498-2:1989]

3.7
standard
document, established by consensus and approved by a recognised body that provides, for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at achievement of the optimum degree of order in a given context

[SOURCE: ISO/IEC Guide 2:2004]

3.8
solution
successful resolution to a medical problem

3.9
service
ability of a system to provide a set of output information based on a defined set of input information

[SOURCE: ISO 12967-1:2009]

3.10
healthcare
activities, services, or supplies related to the health of an individual

3.11
healthcare worker
healthcare professional involved in the direct provision of healthcare

3.12
organization
unique framework of authority within which a person or persons act, or are designated to act, towards some purpose

[SOURCE: ISO 6523-1:1998]

3.13
subject of care
person scheduled to receive, receiving, or having healthcare

[SOURCE: ISO/EN 13606-1:2008]

3.14
use case
textual and graphical depiction of the actors and operations that address information exchange in the context of a set of specific tasks performed by different systems or devices

4   Symbols and abbreviated terms

mHealth   Mobile Health

LMIC   Low and Middle Income Countries

SMS   Short Message Services

PDA   Personal Digital Assistant

UHI   Universal Health Identifier Service

NASH   National Authentication Service for Health

NPC   National Product Catalogue

CADA   Chinese Aged Diabetic Assistant

AESSIMS   Acute Encephalitis Syndrome Surveillance Information System

SARS   Severe Acute Respiratory Syndrome

TCD   Trinity College Dublin

ATNF   Apollo Telemedicine Networking Foundation

5 mHealth survey around the world

Mobile devices have been reaching more people in many developing countries than power grids, road systems, water works, or fibre optic networks. Mobile services offer a way for the public and private sectors to reach these communities, and one of the most important spheres for this interactive contact is health.[3] As a result, this report survey mHealth projects which are conducted nationwide around the world. Furthermore, several use cases of mHealth are illustrated in the next chapter in order to classify the possible mHealth services.

5.1 Africa

5.1.1 Project: Masiluleke

Country: South Africa

Participants: Pop! Tech Accelerator, Parakeet Foundation, iTeach, frog design, MTN, Nokia-Siemens Networks, National AIDS Helpline, National Geographic Society, Ghetto Ruff Records, Children of South African Legacies, Aricent

Application Area: Education and Awareness

Description: Project Masiluleke was proposed and this project is in progress to harness the power of mobile technology as a high-impact, low-cost tool in the fight against HIV/AIDS. The project provides a suite of interventions targeting the entire HIV/AIDS care continuum under the guidance of an international, multidisciplinary team. The project contributes to HIV/AIDS care by promoting testing, treatment connection/adherence, and, ultimately, improved access to testing through an innovative home HIV test kit supported by mobile counselling. Project Masiluleke is encouraging people who are scheduled to be tested and treated for HIV/AIDS in South Africa by sending one million text messages per day. Capitalizing on the ubiquity of mobile devices in even the most resource constrained areas makes the potential for this project to revolutionize the public health response to HIV/AIDS in South Africa and other parts of the globe. The model is designed for scale and replication and can be modified to address a variety of public health and social challenges. Local languages are used for these messages and messages are used to direct recipients to the National AIDS Helpline. Representatives of the hotline provide information about testing services and locations when patients call.

5.1.2 Project: The Dokoza system

Country: South Africa

Participant: Dokoza, State Information Technology Agency (SITA), Centre for Public Service Innovation (CPSI), Centre for Scientific and Industrial Research (CSIR) and the Meraka Institute, with the cooperation of South Africa's National Department of Health

    3

Application Area: Remote Data Collection

Description: The goal of Dokoza system in South Africa is to provide solutions for integrating mobile data collection with existing health information systems which is essential for advancing patient care. In other words, this solution is SMS-based mobile system designed to fast-track and it improves critical services to HIV/AIDS and TB (tuberculosis) patients. In this solution, SIM cards, which can be used across the networks, interact with a more complex back-end system that integrates with existing hospital information systems. Integrating with existing infrastructure offers the possibility of dramatic improvements to existing patient health information records. Also, in the 2004 pilot, both doctors and patients found the system to be user-friendly. During the pilot test, some problems have been detected including the duplication of data entry in instances where paper-based systems already exist and staff shortages which hampered information collection. Despite the availability of this technology, there are little new data on its impact until the end of the pilot.

5.1.3   Project: Mobile HIV/AIDS Support

Country: Uganda

Participant: Trinity College Dublin

Application Area: Communication and Training for Healthcare Workers

Description: In the developing world, 'training the trainers' (providing healthcare workers in the field with accessible and reliable medical information) is essential for improved health service delivery. To explore the potential advantages of using PDAs in HIV/AIDS care and treatment, Trinity College Dublin (TCD) is collaborating with the medical school at Makerere Hospital in Kampala, Uganda. The aim of this project is providing high-quality medical information and advising healthcare workers in Uganda and throughout sub-Saharan Africa. The project leaders (a group of academic clinicians from TCD, the Dublin Institute of Technology, and North American universities) developed a prototype of a training program on the clinical care, research, and prevention of HIV/AIDS, after an initial needs assessment. By selecting a group of healthcare workers in the field, this program was scheduled to be evaluated, however, testing and evaluation results have not yet been published.

5.1.4   Project: Cell Phone Apps for Clinical Diagnostic Therapeutic and Public Health Use by Front Line Healthcare Workers

Country: Mozambique

Participant: Microsoft Research and Department of Information Systems, University of Melbourne

Application Area: Diagnostics and Treatment Support

Description: Mozambique has extensive cellular network coverage and a high percentage of health workers who own mobile phones although this country is one of the world's poorest. Microsoft Research supports this project which aims to take advantage of Mozambique's 'wired' reality. A suite of applications that can run on standard mobile phones have been created by the project principals, researchers from the University of Melbourne. Mozambican health workers use this application and get services with diagnostic and analytical tools, including reference material in the phone's memory, a calculator for determining drug dosage, and a program for analysing inputs from medical sensors (e.g. low-cost pulse oximetry probes or a simple electrocardiogram). The project duration was from March 2008 to March 2009 and researchers concluded project result by evaluating the impact and efficacy of the applications suite.

5.2   Asia

5.2.1   Project: Chinese Aged Diabetic Assistant (CADA)

Country: China

Participant: Microsoft Research, researchers from St Louis University, Old Dominion University, Beijing Medical University and Peking University First Hospital

Application Area: Remote Monitoring

Description: Diabetes is becoming an important issue for developed countries such as China because of economic developments and the resultant lifestyle. To deal with this problem, 'Smartphone-based self-management and support system for elderly diabetics in China' project is in progress by Microsoft Research and a group of researchers from several universities and Chinese medical centres. This project provides several functions such as sending elderly diabetics recommendations and guidelines related to physical activity, glucose and blood pressure monitoring, weight measurement, and diet with smartphone. The product gathers and sends data on glucose levels and it is helpful for doctors by tracking patient data and graphically displaying data for patients. The system has been implemented by the user-centred design approach to develop software that improves the preferences and capabilities of the targeted population to achieve maximum usability. This software has been provided free of charge on PDAs and smart phones that run the Windows Mobile operating system.

5.2.2 Project: HealthLine

Country: Pakistan

Participant: Microsoft Research, Carnegie Melon University (CMU), Aga Khan University (Karachi) and Health and Nutrition Development Society (HANDS)—a Pakistani NGO

Application Area: Communication and Training for Healthcare Workers

Description: To provide mHealth solutions, sufficient literacy should be guaranteed. Low and middle income countries such as Pakistan don't have a high literacy rate; therefore, Microsoft and others are developing HealthLine, a speech recognition-based information system based on Microsoft Speech Server2007 beta software. This program supports both landline access and mobile phone access. Callers meet their needs by specifying a topic (or disease) and searching a set of menus until they reach the required information. This information is then provided by pre-recorded message, using their local language. In mid-2007, a test of HealthLine was performed by a group of low-literate maternal and child health community health workers in Pakistan. The test has continued in the field while improving the program through the addition of new features, functionality, and enhancements.

5.2.3 Project: The Acute Encephalitis Syndrome Surveillance Information System (AESSIMS)

Country: India

Participant: Voxiva, Program for Appropriate Technology in Health (PATH) and the Government of Andhra Pradesh

Application Area: Disease and Epidemic Outbreak Tracking

Description: Every year, over two million children die from preventable diseases and over three million children are left impaired in the developing world. Japanese Encephalitis is one of the reasons for this tragedy, which is a devastating mosquito-borne illness. This illness can be prevented by a vaccination, but it is not always provided due to its high cost and a lack of awareness on the disease's true prevalence and impact. To solve this problem, the Government of Andhra Pradesh, where the disease is endemic, performed a pilot test of an Acute Encephalitis Syndrome Surveillance Information Management System (AESSIMS) in one of its districts. Local health providers and clinicians reported incidences of the disease to the AESSIMS system by using mobile phones (or web-based technologies). This service also helped decision makers access and analyse data in real time through a variety of tools which include GIS-based maps. It was predicted that if the pilot test were a success, the AESSIMS system can be applied across India and into other Asian countries.

5.2.4 Project: Ericsson and Apollo Hospitals Initiative

Country: India