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Country where the project has been implemented	Philippines
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Abbreviations Used in this Document

Abbreviation	Full Text	Definition
CIISP	Comprehensive Integrated Information System Plan	National information management plan of DOH HEMS
DOH	Department of Health	Philippine government national agency in charge of public and private health
ESR	Event-based Surveillance and Response	Program of the National Epidemiology Center
GOARN	Global Outbreak Alert Response Network	Technical collaboration of existing institutions and networks who pool human and technical resources for the rapid identification, confirmation and response to outbreaks of international importance
HEDIS	Health Emergency Disaster Information System	Name of the ISIF project
HEMS	Health Emergency Management Staff	Agency of the DOH which is tasked with coordination of health efforts during health emergencies and disasters
J2ME	Java 2 Mobile Edition	Subset of Java API used for developing applications for mobile
NEC	National Epidemiology Center	Agency of the DOH in charge of epidemiology and public health surveillance
PIDSR	Philippine Integrated Disease Surveillance and Response	Program of NEC for disease surveillance
SMS	Short Message Service	Technical protocol of GSM which defines the receipt and transmission of alphanumeric text
SPEED	Surveillance in Post Extreme Emergencies and Disasters	Project of WHO Philippines for public health and outbreak surveillance during disasters
WHO	World Health Organization	Agency of the United Nations that acts as a coordinating authority on international public health



Synthesis

This project aims to develop a health emergency and disaster information system using SMS and virtual earth technology. Health and other information from a disaster can be sent via SMS with integration into virtual earth software.

A number of online databases store disaster information for other countries. Most notable among them is the Emergency Disasters Database of the Center for Research on the Epidemiology of Disasters (<http://www.em-dat.net>). It lists more than 12,800 disasters, with some of them from the Philippines. It captures information such as disaster type, date, deaths/affected/homeless/injured, and cost of damages. However, such information needs to be detailed and customized for the Philippine setting, with a particular focus on a health services framework.

According to the GSM Association, mobile technologies can play a role in the gathering and dissemination of information before, during, and after a disaster. The 2005 World Disasters Report notes that the use of mobile phones after the Indian Ocean Tsunami mitigated the absence of official information. An ad hoc peer-to-peer communication network was created that was more effective than information from news organizations or relief agencies. The report also describes the 2001 earthquake in Gujarat, India, where the Self-Employed Women's Association distributed 200 mobile phones to staff and volunteers as they went from village to village to report on the disaster. According to the International Committee of the Red Cross, "Relief and risk reduction have been revolutionized by mobile phones." Mobile communications are especially important in developing countries, where other forms of infrastructure are nonexistent, as compared to the better infrastructure seen in developed countries.

Technologies called 'digital globes' or virtual earth software have allowed users to access detailed satellite imagery of the world. Digital globes have also allowed overlaying with various geocoded data, transforming them into low-cost geographical information systems.

Objectives

1. Development of a J2ME application, which will provide data entry for the health emergency information field report and formatting into SMS
2. Development of a GSM modem gateway for the receipt of SMS messages
3. Development of an online application which will provide data entry for the health emergency information field report
4. Development of a Google Maps interface to display the aggregated data from the data entry forms

Methodological Approach

The project will develop a mobile interface for data submission using SMS keywords. Data will be parsed and collated into a database file by a GSM modem application. The database file will then be imported into NASA World Wind using a customized module.

The project will be developed in conjunction with the Health Emergency Management Service of the Department of Health (DOH-HEMS), who will provide expertise in coordinating with disaster councils in the target municipality.



In the development of the system, gender issues will be addressed through representative feedback and inputs from all concerned. An iterative approach will be used in the development. In the reporting of data, gender-specific data will be detailed (when applicable).

Technologies Used

- J2ME for mobile application development
- PHP for online application development
- MySQL for database management
- Google Maps API for interface with Google Maps

Activities Undertaken So Far

1. Meetings and coordination with Department of Health – Health Emergency Management Service for the design and development of the system
2. Systems analysis and development of design document
3. Development of the online data entry form
4. Development of the database
5. Development of human resource mapping and training database (not included in original objectives, but requested by HEMS for interface in Google Maps)
6. Development of contact information database (not included in original objectives, but requested by HEMS for interface in Google Maps)
7. Development of reference library for distribution through CD and installation on PC. The reference library will provide comprehensive references on disaster management to support the training and response of health emergency management personnel. A copy of the CD will be sent via courier to the Project Secretariat.

Since submission of last project monitoring report (i.e. six month report):

8. *Development of the J2ME mobile application for mobile data entry*
9. *Development of the SMS gateway application for receipt and transmission of SMS messages*
10. *Development of the Google Maps interface for display of geographical information*
11. *Development of online data entry forms*
12. *Integration of HEDIS architecture into Department of Health Comprehensive Integrated Information System Plan (see below in Project Application)*
13. *Integration of HEDIS architecture and software into World Health Organization SPEED Project (Surveillance in Post Extreme Emergencies and Disasters) (see below in Project Application)*



Development Problem

According to the Center for Research in the Epidemiology of Disasters in Belgium, the Philippines has the highest number of natural disasters. Despite being disaster-prone, the Philippines has no comprehensive and reliable database for disaster information with which to base policy and to monitor effectiveness of interventions. The Philippine Council for Health Research and Development, along with several agencies involved in disaster management and health emergencies, held a consultation workshop on 6 April 2006. One of the outputs of the workshop was a priority list of projects for health emergencies and disasters. The participants identified the development of a *Health Emergency and Disaster Information System* (HEDIS) for the Philippines as the top priority among all projects.

This project originally aimed to benefit the municipalities in the region of Bicol, which is the region most affected by typhoons and storms in the Philippines. As it was used as the basis of the WHO SPEED Project (Surveillance in Post Extreme Emergencies and Disasters), HEDIS will now benefit six provinces in six regions in the Philippines:

- Muntinlupa, National Capital Region
- Tarlac, Region III
- Rizal, Region IV-A
- Sorsogon, Region V
- Eastern Samar, Region VIII
- General Santos City, Region XII

(Please see the Project Application section below to read more details on the WHO SPEED project.)

This project will benefit the Health Emergency Management Service of the Department of Health, which manages the health aspect of disaster management. It will aid in the management of health emergencies by allowing access to data for better decision-making and resource allocation. The project will, for the first time, provide detailed health information on disasters in the Philippines such as type, magnitude, and efficiency of interventions. The data will provide useful information in developing policies and strategies for future disaster intervention.

This project will also be applicable in other developing countries which have the same characteristics as the Philippines, namely: (1) poor Internet infrastructure in the rural areas, (2) good mobile infrastructure, and (3) disaster-prone.

Project Application

*During development of the ISIF HEDIS project, HEDIS was chosen as a key technology and information management infrastructure in two major national health informatics projects in the Philippines, the **Department of Health HEMS Comprehensive Integrated Information System***



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Plan (DOH HEMS CIISP) and the World Health Organization Philippines Surveillance in Post Extreme Emergencies and Disasters (WHO SPEED). This ensures that the information management architectures and technologies developed in ISIF HEDIS will be sustainable and applied. It is also notable that the two aforementioned projects are national in scope, contributing to its relevance. DOH HEMS CIISP has a total project budget of PHP 13 million (USD 288,888), while WHO SPEED has a total project budget of PHP 22 million (USD 488,888).

This is an additional section from the documentation template, which is meant to provide information on the DOH HEMS CIISP Project and the WHO SPEED Project.

Department of Health – Health Emergency Management Staff (DOH HEMS) Comprehensive Integrated Information System Plan (CIISP)

The DOH HEMS CIISP will serve as the blueprint for all technical system development for DOH HEMS and will integrate all its various technology projects, such as its online portal, internal database, surveillance, and national information management system for data collection.

The DOH HEMS CIISP has the following objectives and deliverables:

1. Develop and document a comprehensive understanding of the HEMS systems and/or processes associated with the functions of the office.
2. Identify, describe and document the information needs and information flows associated with HEMS functions and processes.
3. Review and document the current information systems capabilities, including hardware and software available, in-house / commercial-off-the-shelf application systems, resources, staff skills, and status of current application systems.
 - i. Assess how well they can serve the functions and requirements of HEMS.
4. Identify a portfolio of information systems applications that will be implemented to support HEMS functional processes, with the minimum description of the following:
 - i. Outputs, inputs, and processing associated with each of the information systems
 - ii. Databases and/or data which will be required by the various systems, their linkages, and interfaces
 - iii. Volumes, frequency, and mode of data transfer between various processing nodes
 - iv. Ownership and location distribution of the application systems, if applicable.
 - v. System security requirements
 - vi. Integration Framework and/or Requirements
5. Specify and document the Technology Architecture and technical requirements required for implementing the CIISP.
6. Formulate a Training Plan to develop/upgrade existing personnel capacity to develop, maintain, and operate the various systems envisaged in the CIISP.

Application of ISIF HEDIS



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The information architecture of ISIF HEDIS is the prescribed information architecture for the HEMS IIS (Integrated Information System), which is the national information management system of DOH HEMS. The following components of ISIF HEDIS were prescribed for HEMS IIS through the CIISP:

- Collection and transmission of data using SMS
- Display and usage of Google Maps as a geographical information system

Schedule

The DOH HEMS IIS (Integrated Information System), which will utilize the information architecture of ISIF HEDIS, will be developed and implemented in 2011.

World Health Organization Philippines Surveillance in Post Extreme Emergencies and Disasters (WHO SPEED)

WHO SPEED is a project of WHO Philippines, which seeks to develop a national health monitoring and disease surveillance system during emergencies for the DOH HEMS. In September and October 2009, the Philippines was hit by the most powerful typhoons and subsequent flooding in more than 40 years. This resulted in massive destruction in five regions and provinces, affecting more than 2 million families and over 8,000 barangays (communities). The country's health system was challenged by the largest outbreak of Leptospirosis in the world. Decision makers and disaster response coordinators need comprehensive, timely information for optimal response during emergencies to reduce the rate of preventable deaths. The Global Outbreak Alert and Response Network (GOARN) conducted a post-incident evaluation of the response to the typhoons and identified the need for an effective monitoring system for early detection of unusual increases in major public health events during emergencies. This was also the same recommendation given by the pilot study of the Philippine Infectious Disease Surveillance Registry (PIDSR) pilot study.

General Objective

To set up public health Surveillance for Post Extreme Emergencies and Disasters (SPEED) in selected regions in the Philippines by the end of the second quarter of 2010.

Specific Objectives

- Design & develop system (SPEED) architecture, data collection tools
- Design and develop the software for the system
- Develop field manuals, SOPs, and training materials
- Train personnel responsible for health monitoring on data collection, reporting, use of software, and data management during emergencies

WHO SPEED has undertaken the following activities:

- Documents review (policies, guidelines and reports)
- Engagement of all stakeholders including UN agencies and NGOs in the development process



- Field assessment to determine system requirements (human resources and logistics)
- Development of operation guidelines for SPEED
- Development of training materials
- System (SPEED) design and software development
- Training and piloting of in selected regions

WHO SPEED will initially be implemented in six municipalities in six regions in the Philippines, with expansion to the rest of the regions after pilot testing.

System Architecture

Figure 1. Information flow of WHO SPEED

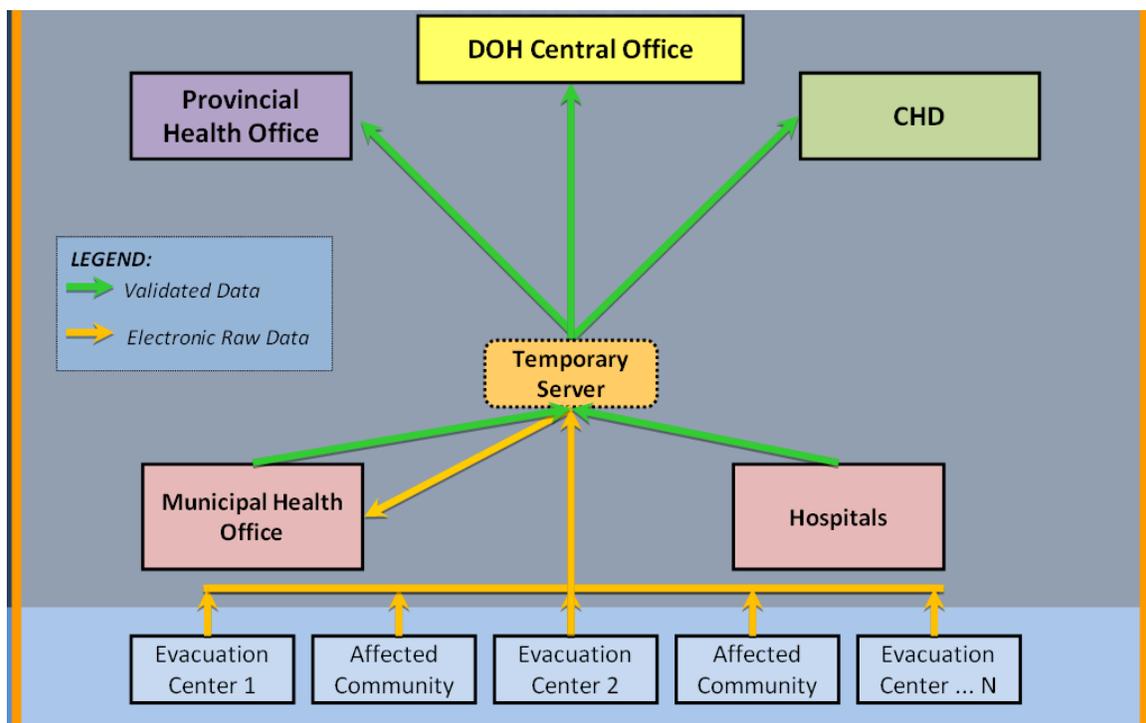


Figure 2. Linkages of WHO SPEED with DOH HEMS IIS, DOH NEC PIDSR, and DOH NEC ESR



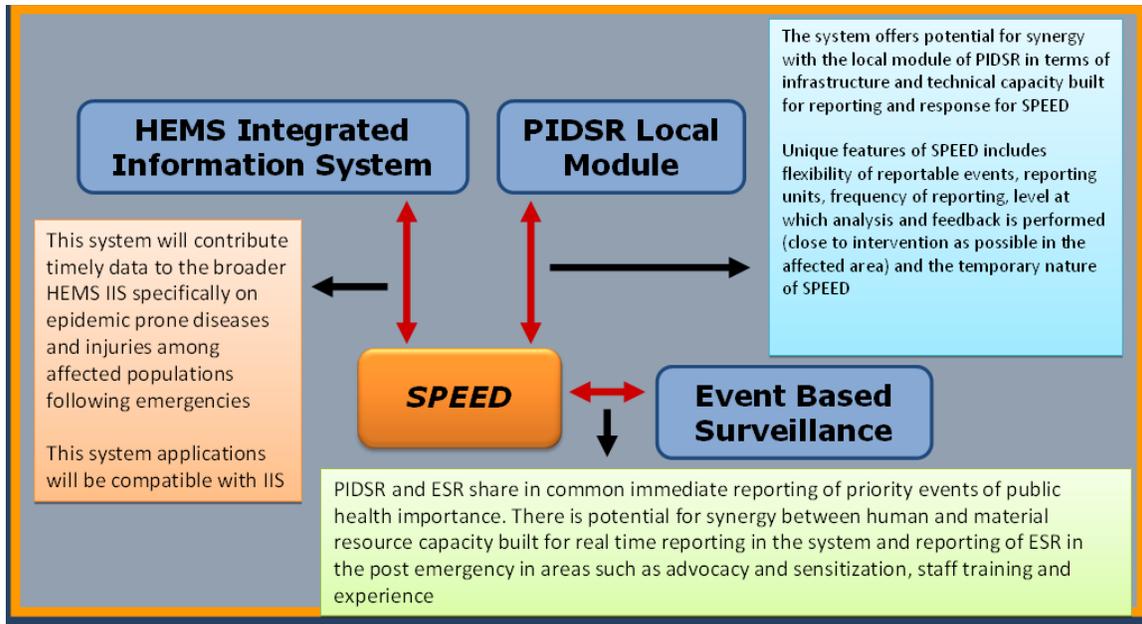
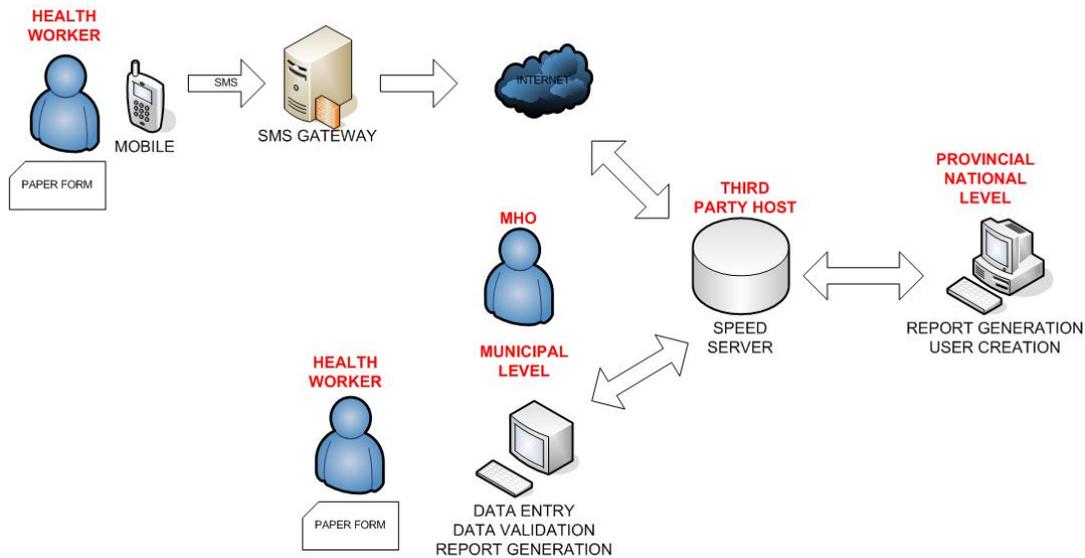


Figure 3. System architecture of WHO SPEED



The WHO SPEED form has the following data fields:



Evacuation Centres and BHS Daily/Weekly Reporting Form

(FILLED BY HEALTH WORKER IN CHARGE OF HEALTH FACILITY OR EVACUATION CENTRE AND SUBMITTED TO RHU)

Province: _____ City/Municipality: _____ Barangay: _____

Name of Evacuation Center/BHS: _____

Population size of Evacuation Centre: < 5 yrs _____ ≥ 5 yrs _____

Name of Reporting Officer: _____ Mobile Number: _____

Date submitted: _____ Reporting Period (dates): From _____ To _____

#	Disease Syndrome / Health Event (Main Clinical Manifestations)	<5 years old		≥5 years old	
		Cases	Deaths	Cases	Deaths
1	Fever and any of the following: cough, colds or sore throat (please specify) (ARI)				
2	Fever with rash (MEA)				
3	Fever with spontaneous bleeding (i.e. nose bleeding, gum bleeding) (AHF)				
4	Fever with other signs and symptoms (FOS)				
5	Loose stools, 3 or more in the past 24hrs with or without dehydration (AWD)				
6	Loose stools with visible blood (ABD)				
7	Open wounds and bruises (WBS)				
8	Fractures (FRS)				
9	Skin disease (SDS)				
10	Animal bites (ANB) (please specify animal):				
11	Eye itchiness, redness with or without discharge (CON)				
12	Yellow eyes or skin with or without fever (AJS)				
13	Spasms of neck and jaw (lock jaw) (TET)				
14	High blood pressure ≥140/90 (HBP)				
15	Known diabetes (KDM)				
16	Acute asthmatic attack (AAA)				
17	Suspected meningitis (MEN)				
18	Acute flaccid paralysis (AFP)				
19	Others (please specify):				



Application of ISIF HEDIS

The information architecture of ISIF HEDIS is the prescribed information architecture for the WHO SPEED, in particular:

- Collection and transmission of data using SMS
- Display and usage of Google Maps as a geographical information system
- The following software modules were also used in WHO SPEED :

SMS gateway application for receipt and transmission of SMS messages

- Google Maps interface for display of geographical information

Schedule

Pilot testing of WHO SPEED is scheduled to begin the second week of June 2010, with launch and implementation in August 2010.

Project Process

Processes That Worked

- Initial weekly meetings and output reports, which are now bimonthly meetings
- Project documentation
- Rapid prototyping of systems
- System pre-visualization using user stories and screen mock-ups

In the case of the DOH HEMS CIISP Project:

- Referencing existing models of health emergency information systems around the world, with a particular focus on models in similar developing nations

In the case of the WHO SPEED Project:

- Integration with existing Department of Health technical infrastructure, such as the use of open source software (Linux, PHP, and MySQL) and Philippine geocodes (PSGC) to minimize change management and ensure maintainability by DOH Information Management Service group.

Processes That Did Not Work

- Some project delays were encountered due to the additional workload of project documentation and output reports. The provision of only minimum project documentation solved these issues.



- Some project delays were also encountered because too much time was devoted to the design of the application. This was solved through release of more rapid prototypes and then revision of the prototype.
- On the technical side, it was noted that receipt of the SMS messages through the GSM modem gateway was inconsistent. It was further determined that this was more a network problem rather than a problem with the gateway application. A customized GSM modem application was developed instead.
- Since the inception of the project, USB modem dongles for broadband mobile Internet access have become more ubiquitous through the commercial telecommunications providers. Instead of the older and more expensive iTegno modem prescribed initially in the system design, the modem was replaced with a Huawei USB modem dongle. The Huawei dongle (cost: PHP 1,000) is fifteen times cheaper than the iTegno modem, which costs PHP 15,000.

Fulfillment Of Objectives

The following objectives have already been achieved:

- Development of GSM modem gateway for the receipt of SMS messages
- Development of an online application which will provide data entry for the health emergency information field report
- Development of SMS gateway application for receipt and transmission of SMS messages
- Development of the Google Maps interface for display of geographical information

Additional objectives, which were not in the original Grant Agreement, have been added since they were determined during the system analysis phase to hold important information for the Department of Health – Health Emergency Management Service.

These are:

- Development of human resource mapping and training database (not included in original objectives, but requested by HEMS for interface in Google Maps)
- Development of contact information database (not included in original objectives, but requested by HEMS for interface in Google Maps)
- Development of reference library for distribution through CD and installation on PC.
- Integration of HEDIS architecture into Department of Health Comprehensive Integrated Information System Plan
- Integration of HEDIS architecture and software into World Health Organization SPEED Project (Surveillance in Post Extreme Emergencies and Disasters)

Project Design and Implementation

The following activities were planned for the last six months of the project:



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ACTIVITIES	DURATION	TECHNOLOGIES
Coordination with DOH-HEMS	Month 6-12	
Development of the J2ME mobile data entry form	Month 7	Java
Development of the GSM modem gateway application	Month 6-9	Java
Development of the Google Maps interface	Month 6-9	Google Maps API, PHP
Beta testing and revision	Month 10	
Integration with WHO SPEED project*	Month 11	
Integration with DOH HEMS CIISP project*	Month 11	

* Activities added after consultation with DOH HEMS and WHO Philippines

The project beneficiaries were involved in the systems analysis of the project, particularly the identification of the target community, their current information needs, and the current flow of information from the community to HEMS.

Two major telecommunications companies (Smart Communications and Globe Telecoms) were approached for possible collaboration. Globe was approached for access to their SMS API, which would have allowed the sending of SMS messages through a short access code (i.e. 2349 instead of a mobile number). The disadvantage is that the user has to be a subscriber of Globe. This option was later abandoned since not all target users will be subscribers of Globe.

Smart Communications was approached for the possibility of providing free handsets as part of their Corporate Social Responsibility initiative. Due to the sufficiency of funds of the two projects (USD 288,888 for the DOH HEMS IMS and USD 488,888 for WHO SPEED), both DOH and WHO have not yet availed themselves of the handsets. The handsets, which were procured as part of the hardware purchase budget of ISIF HEDIS, have already been allocated to DOH HEMS personnel both at the central office and the provincial office.

Meetings

For HEMS CIISP with DOH HEMS

Meeting	Presentation of Draft Information Architecture for HEMS CIISP
Date	February 11, 2010
Attendees	Dr. Carmencita Banatin (Chief, DOH HEMS) Dr. Marilyn Go (Medical Officer for Planning, DOH HEMS) Dr. Arnel Rivera (Medical Officer for Response, DOH HEMS) Dr. Ayedee Ace Domingo
Agenda	The draft information architecture for HEMS CIISP was presented, along with draft technical architectures for the HEMS CIISP data center, including a training plan. Other documents related to ISIF HEDIS presented included supply management information, knowledge management, and business intelligence and reporting systems.



Outcomes	The meeting ended with a presentation of the schedule for the detailed data model for the information architecture, which was related to ISIF HEDIS but beyond the scope of ISIF HEDIS.
Pictures	None.

For WHO SPEED with WHO

Meeting	Presentation of WHO SPEED Technical Architecture with WHO Consultant
Date	April 23, 2010
Attendees	Dr. Peter Mala (Consultant, WHO Philippines) Dr. Aura Corpuz (Project Officer for WHO SPEED)
Agenda	The proposed information architecture and information flow for WHO SPEED was presented for approval. Other information presented were the proposed format for the SMS messages and reports to be generated (e.g. graphs, document template, Google Map integration, export to Microsoft Excel).
Outcomes	The meeting ended with a discussion of the remaining schedule of the project, including the requirements for system development.
Pictures	None.
Meeting	Presentation of WHO SPEED Technical Architecture to the WHO Representative for the Philippines
Date	May 5, 2010
Attendees	Dr. Soe Nyunt-U (WHO Representative for the Philippines) Dr. Gerardo Medina (Technical Officer for Emergency Humanitarian Action) Dr. Peter Mala (Consultant, WHO Philippines) Dr. Aura Corpuz (Project Officer for WHO SPEED)
Agenda	The refined proposed information architecture and information flow for WHO SPEED was presented for approval.
Outcomes	The meeting ended with requested revisions in the information architecture and the information workflow.
Pictures	None.
Meeting	Presentation of WHO SPEED Technical Architecture to the WHO Representative for the Philippines
Date	May 5, 2010



Attendees	Dr. Soe Nyunt-U (WHO Representative for the Philippines) Dr. Gerardo Medina (Technical Officer for Emergency Humanitarian Action) Dr. Peter Mala (Consultant, WHO Philippines) Dr. Aura Corpuz (Project Officer for WHO SPEED)
Agenda	The proposed information architecture and information flow for WHO SPEED was presented for approval. Other information presented were the proposed format for the SMS messages and reports to be generated (e.g. graphs, document template, Google Map integration, export to Microsoft Excel).
Outcomes	The meeting ended with a discussion of the remaining schedule of the project.
Pictures	None.

Project Outputs and Dissemination

The following project outputs have been developed:

- Development of GSM modem gateway for the receipt of SMS messages
- Development of an online application which will provide data entry for the health emergency information field report
- Development of SMS gateway application for receipt and transmission of SMS messages
- Development of the Google Maps interface for display of geographical information
- Development of human resource mapping and training database (not included in original objectives, but requested by HEMS for interface in Google Maps)
- Development of contact information database (not included in original objectives, but requested by HEMS for interface in Google Maps)
- Development of reference library for distribution through CD and installation on PC.
- Integration of HEDIS architecture into Department of Health Comprehensive Integrated Information System Plan
- Integration of HEDIS architecture and software into World Health Organization SPEED Project (Surveillance in Post Extreme Emergencies and Disasters)

As of today, since the project has not been fully completed, no dissemination efforts have been made. However, information will be shared through the writing of a formal report.

Capacity Building

The following capacity building activities were initiated in the first six months:

- Procurement of new equipment (mobile phones)



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- Development of human resource database for identification of disaster management training recipients in the Philippines. The database will provide information on the number of trainees and their expertise in the field. The database will aid in the identification of appropriate human resources for deployment in disasters.
- Development of contact information database. The database will provide information also on the identification of appropriate human resources for deployment in disasters. Both these databases will have interfaces online and on Google Maps.
- Development of reference library for distribution through CD and installation on PC. This reference library of mostly PDF files will provide information on disaster management in the field.

Project Management

The administration by the research organization was relatively fair. Weekly meetings were initially held but have now been reduced to monthly meetings, with the submission of output reports. Close coordination through email is conducted. With regards to DOH HEMS CIISP and WHO SPEED, meetings with other project personnel of DOH HEMS and WHO were conducted on an as-needed basis.

The scientific and technical management of the project is also fair. Appropriate systems analysis and project documentation methods were utilized.

Project Sustainability

Project sustainability has been ensured through integration of the ISIF HEDIS technical architecture and software modules with the budgets and organization of the DOH HEMS CIISP and WHO SPEED projects. This also ensures that the system will certainly be used even after the project duration, especially during times of disaster, for which ISIF HEDIS was designed.

Process sustainability was ensured through the current project management process of weekly meetings and output reports.

Resource sustainability was likewise ensured through integration with the CIISP and SPEED projects, leveraging off their budgets for hardware purchase. CIISP and SPEED will be ensured through training and transition of DOH Information Management Service personnel.

