WORKSHOP REPORT

Maldives Kickoff Workshop and Meetings: 'CAP on a Map' for improving Institutional Responsiveness

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by

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for the

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1 Executive Summary

The 'CAP on a Map' project[1] aims to improve the institutional responsiveness to emergencies in the Maldives. The Maldives National Disaster Management Center (NDMC) is responsible for coordinating emergency response and disaster risk reduction[2]. To enhance the interoperability in their systems the project will Introduce the Common Alerting Protocol[3] (CAP) content standard and associated alerting/waring procedures in support of establishing a Multi Agency Situational Awareness (MASA) platform in the Maldives. The design and implementation requires the participation of multi-agencies in the Maldives and an emphasis on all-hazard all-media approach. Sahana Software Foundation and the Geoinformatics Center[4] of the Asian Institute of Technology (AIT) are providing technical assistance to the Government of Maldives to achieve the goals and objectives laid down by the project.

The project began in January 2015 with a grant made possible by the United Nations Economic and Social Commission for Asia and the Pacific (ESCAP) Tsunami, Disaster, and Climate preparedness Trust Fund. The work in the Maldives, officially kicked-off, on April 15, 2014, with a one day workshop[5] at the Nasandhura Palace Hotel in the capitol city: Male. Workshop participants were a mix of stakeholders belonging to hazard detection/monitoring, alerting authorities, first-responders and communications service providers[5].

An important expectation of the workshop was to convince the existing disaster management technical committee about the expected efficiency gains and effectiveness of the project, once it has been implemented. A significant number of the technical committee members were present at the workshop. They would serve as the CAP working group to oversee and support the CAP-enabled Sahana Alerting and Messaging Broker (SAMBRO) implementation. Those present at the workshop agreed, in principal but would need to discuss with all technical committee members. Appendix B outlines the project's expected outcomes to be delivered by the technical committee members.

The government of Maldives National Disaster Management Center (NDMC) will lead but the Maldives Meteorological Services, Housing and Infrastructure (specifically the Lands and Survey Department), Fire Search & Rescue Department, Maldives National Defense Force

1 CAP on a Map project page: http://eden.sahanafoundation.org/wiki/Deployments/SAMBRO#a1.CAPonaMap
2 Status of Disaster Management and Early Warning System in the Maldives, Captain Mohamed Inayath (Director Programs), Kickoff workshop, 15 April 2015; slides available on the Sahana wiki:
3 Easy to comprehend CAP resources: http://en.wikipedia.org/wiki/Common_Alerting_Protocol
4 Geoinformatics Center website: http://www.geoinfo.ait.ac.th/
5 Workshop announcement on the Sahana wiki: http://eden.sahanafoundation.org/wiki/Event/2015/CAP_MV_NDMC

(Coastguard), Atol Councils, Maldives Red Cross, Communications Authority of Maldives, and TBA are few of the key stakeholders identified during the workshop. The project coalition agreed on a set of immediate activities. One important document is the Terms of Reference (TOR) the Disaster Management Technical Committee would use as a guide deciding on the best path for project; especially the policy implications.

Two meetings followed the workshop on the second day. First was with NDMC (Honorable State Minister Mohamed Zuhair, Honorable Deputy Minister Fathimath Thasneem, and Project Director: Mr. Hisan Hassan) . Second was with the Maldives Meteorological Service (MMS) officials. The two main organizations: NDMC and MMS agreed to support the CAP-enabled SAMBRO implementation. They realize the efficiency gains with the incremental effectiveness the interoperability and automation in alerting/warning would bring to the Maldives people. At present MMS incorporates several modes of communication involving telephone calls and text-messaging. Other authorities such as the MDRF use VHF radios. All of the technologies which can be integrated for disseminating the single entry of a CAP message to multiple agencies and recipients.

Other discussions were on the needs for of building institutional capacity. The NDMC will require hardware and a data center to operationalize the SAMBRO. The software will require the stakeholder emergency management agencies to coordinate and respond to all-hazards using all available emergency communications sharing near-real-time CAP feeds. NDMC emphasized the need for strengthener the resilience of emergency telecommunications for crisis response and management. Although SAMRBO requires robust networks the task of ensuring it is beyond the scope of this project. Nevertheless, the project would inform the International Telecommunications Union regional office in Bangkok, Thailand of the overarching requirement to develop an emergency communications plan for Maldives.

A SWOT Analysis was conducted during the workshop for the participants to realize the potential of the intervention. The results are discussed in Appendix C: the SAMBRO software is free to use and the source code is open for change without any licensing obligations; There is an inevitable need to sturdy the National emergency communications systems and develop a National Emergency Communications Plan. TV/Radio broadcasters, Telecommunications Service Operators, Communications Authority of Maldives (CAM) would be key stakeholders contributing data to the study. The data and documents are important for realizing the risk profile and the emergency communication needs.

2 Purpose of this report

This report serves several purposes:

- share the discussions and outcomes perceived by the author to be used by Sahana developers to develop a blueprint (software requirements specification document)
- feed in to the project's kickoff workshop report to be produced by AIT and communicated to ESCAP
- Serve the National disaster management technical committee as a reference to initiate project specific discussions

3 Ecology of Maldivian disaster management

The 2004 Indian Ocean Tsunami was an eyeopener. The National Disaster Management Center (NDMC) was formed and a bill was developed and is being debated by legislation, remaining to be passed as an Act. Fires on the Islands[6], boat accidents, water shortage, swell waves and windstorms frequent with a decade long impact loss amounting to more than the Tsunami in 2004.

The Multi-hazard Early Warning Standard Operating Procedure[7] (SOP) lays down the process sequence (or work flows) for monitoring, detection, alerting/warning, and response. The chain of information flow is well established with a combination of technologies for limited set of medium to high impact hazard events.

First-responders use a range of technologies: mobile phones, TV/Radio, VHF radios, Inmarsat voice/IP services, Thuraya satellite phones, and other specialize devices. There are weak or shadow GSM/WCDMA coverage areas in the Maldives. The project team will inquire from JAXA (Japanese Aerospace X Agency) the possibility of using the Sentinel Asia project's Satellite service to issue alerts on to smart phones. That may open up opportunity for deploying other specialized devices that application communication with IP-based packets.

2014 December, the Government of Maldives, commemorated the Tsunami + 10 anniversary with public warning and response drill. It may be ***possible to combine the project's SAMBRO system and operating procedures with the December 2015 drills in the Maldives***.

6 Fire in the water treatment plan, in Male, halts water to one third of Maldivian population residing on the single densely populated Island. Bulletin consulted on Releifweb: http://reliefweb.int/report/maldives/maldivessouth-asia-water-crisis-information-bulletin-n-1

7 Standard Operating Procedures for a National Early Warning System. ()

4 Discussion topics

There were six key discussion points:

1. Public broadcast services: TV/Radio and cell broadcast for public warning
2. Priority calling and text-messaging for emergency first-responders, also to be used during 'peace' times
3. Severity, Certainty, and Urgency mapping to MMS alert level and color codes
4. Manageable set of events for the initial implementation and evaluation focus with a selected set of stakeholders
5. Data documents for extracting risk assessment data for identifying severity specific geographical alert areas
6. Train the trainer regime for building local capacity with a system administrator and CAP technology steward

4.1 Public broadcast services

The Ministry of Broadcast was an important stakeholder that did not attend the workshop. However, they serve on the NDMC lead technical committee. Nevertheless, Diragu TV broadcasting, present at the workshops, was keen in possibly integrating CAP feeds for the TV scrolls.

The project would work towards implementing RSS feeds to share CAP messages, not just with the broadcasters but also with Telcos. Cell broadcasting is an effective and efficient mode for broadcasting text messages. At present CB is inactive. Costly licensing fees with no return on the investment is the main factor. LIRNEasia had

4.2 Priority calling and text-messaging

Service outage and congestion during crises is a persistent problem. The limitations are further enhanced with terrain and geographical challenges. Redundant communications and priory channels are a way. However, there are costs involved and implementers should be cautious. The NDMC will need to ensure that SAMRBO Alerting Authorities would have a reliable access and uninterrupted service for issuing and managing alerts. Moreover, message recipients should receive the messages in a timely complete consistent and concise but actionalble form.

4.3 Severity, Certainty, and Urgency

Since 2010, the National multi-hazard early warning system was operated by MMS. They have developed a parameter limit-based color coded messaging protocol to indicate the

priority of a message (pp 30-35, Capt. Mohamed Inayath). The coded message priorities are established for tsunamis, earthquakes, and wind (predict wave swells and tidal waves). The project would adopt from the established message priority categorization. The generalized description for the 'alert levels' provide information for mapping the color coded alert levels to values of the CAP severity, certainty, and urgency attributes.

4.4 Manageable set of Events

The workshop participants agreed on a manageable set of events and implementing SAMBO to initially serve the alerting authorities and first-responder agencies:

1. Maritime Response Services (Coast Guard search/rescue) Alerts
2. Maldives Meteorological Service Alerts (floods, sea swells, tidal waves, storm surgeons)
3. Ministry of Health Public Health Alerts (begin with Dengue)
4. Other stakeholder alerting services (tourism, water shortage, education)

4.4.1 Maritime

Sea transportation is most common with short, medium, and long range vessels between the Islands (or Atols) and out of the country. Sea is the livelihood of a large portion of the population. GSM/WCDMA coverage is weak or dark in certain areas within the boundaries of Maldives. VHF radios relatively a lot more reliable. The Government mandate is the every size of vessel must carry a VHF radio to be seaworthy. However, enforcing such a rule is laborious for the authorities. All boats used in public transportation carry a VHF radio.

4.4.2 Meteorological

The Maldives Meteorological Services expressed interest for a human readable output of a CAP message. The audio message or the text transcript would serve as a voice message for transmission over VHF radios. The same audio could be adopted for any other voice-enabled dissemination technology.

A challenge would be with automating such a process by introducing a Text to speech (TTS) software engine. One must be careful that such an engine is reliable in producing the correct pronounceable the culturally sounding way. However, NDMC or other agency should not neglect the opportunity to research or evaluate such a text to audio and transmission procedure.

The Maldives Weather Services has implemented a 24 hour Dial Weather answering machine for current weather information. Such a machine could be replaced with an Interactive Voice Response (IVR) to serve the dual languages of English and Divehi (Maldivian) in the Maldives context. With the 1 million tourist vising Maldives each year, MMS should, at least, consider disseminating the alerts in the United Nations languages. Thereby the IVR could be scaled to serve non-English speaking such (e.g. Chinese).

4.4.3 Other agencies

The Safe Island Strategy, part of the Tourism Disaster Management Plan, describes the steps for insuring the wellbeing of the guests, which is an utmost priority for the Ministry of Tourism. Standard operating procedure is maintaining a database of, minimum two, focal points at each resorts, safari boats, and other relevant entities. Then informing them of relevant hazard events, mainly, through a bulk SMS service provided by Diragu.

The Ministry of Education practices a similar alerting procedure; whereby, focal points (first-responders), namely, principals and teachers in the targeted school areas, are informed of events. The teachers maintain their own address book group of parent's phone numbers, to which they push the message. The sequence of processes can be reduced to shave of time to alert the populations through SAMBRO. The State Secretary: Hon.

4.5 Data and Documents

The project calls for delivering a set of hazard, severity, and geographic location specific alert area templates. To develops meaningful polygon requires several GIS data layers. Population densities, The Department of Land Survey of the Ministry of Housing and Infrastructural would lead in assembling such available data. NDMC also volunteered to fetch relevant statistics, data, and documents that would support the design aspects.

4.6 Train the Trainer Regime

The NDMC, in consultation with the Disaster Management Technical Committee (DMTC), will determine the two senior technical officers to be trained as Trainers. They will receive knowledge and practicums on the SAMBRO system administration, implementation, and operational aspects in supporting the MASA platform. The trainers will immediately train a group of 10 other local cadres (potentially new CAP Stewards) belonging to various alerting authorities. One of the trainers is expected to be proficient in administering computer systems. The other would be skilled in early warning and would be introduced to CAP, its

procedures, and ways for implementing and operationalizing SAMBRO.

5 Conclusion

The project team is excited that the NDMC is interested in moving forth with the CAP on a Map project and collaborating with relevant stakeholders to work towards achieving the project objectives. An indirect outcome is that the CAP on a Map activities are realizing new activities applicable to the developments of the Sahana Center of Excellence @ Geoinformatics AIT.

6 Acknowledgement

The author wishes to recognize the Government of Maldives National Disaster Management Center for organizing the mission in Male with the workshop and coordinating meetings with relevant stakeholders. The workshop would not have been a success without the participation of the relevant emergency management stakeholders. Appreciate our project co-lead: Asian Institute of Technology Geoinformatics Center for being proactive in organizing the events with Maldivian counterparts and facilitating the related mission logistics.

7 APPENDIX A – Glossary of terms and acronyms

MASA	Multi Agency Situational Awareness (platform)
CAP	Common Alerting Protocol
NDMC	National Disaster Management Center (Government of Maldives)
AIT	Asian Institute of Technology (Bangkok, Thailand)
SSF	Sahana Software Foundation (Los Angeles, USA)
UN	United Nations
ESCAP	Economic and Social Commission for Asia and the Pacific
SAMBRO	Sahana Alerting and Messaging Broker
MV	Maldives (2 letter code)
MDRF	Maldives Disaster Response Force
MMS	Maldives Meteorological Services
SWOT	Strengths, Weaknesses, Opportunities, and Threats
CAM	Communications Authority of Maldives
SOP	Standard Operating Procedure
GSM	Global System for Mobile
WCDMA	Wireless Code Division Multiplex Addressing
JAXA	Japanese Aerospace Agency
IVR	Interactive Voice Response (system)
TTS	Text-to-Speech
SMS	Short Message Service
GIS	Goegraphical Information System

8 APPENDIX B – TOR points for the Technical Committee

8.1 Risk assessment data

Understanding the risks are a first step towards implementing a SAMBRO as a component of a national MASA platform. Risk assessment includes hazard mapping, vulnerability assessment, and risk analysis. Such an exercise is most effective in the presence of GIS-enabled hazard, vulnerability, census data, infrastructure data, and other points of interest. The Land Survey and Home Affairs bureau, a member of the NDMC lead technical committee, will lead the initiative in compiling the necessary GIS and other location specific data. NDMC also promised to provide relevant statistics to use in the alert area mapping exercises.

8.2 Two National Trainers

The project will train two members belonging to agencies of the technical committee. There are two key resource persons:

1. Systems administrator who will be responsible for the maintenance of the SAMBRO system – beyond the current period of the project
2. CAP Technology Steward (an advocate and trainer scaling SAMBRO among all alerting authorities.

The Maldives community using SAMBRO will not be abandoned. There Sahana Community will be available to assist you and answer any of your questions.

8.2.1 Systems Administrator

A graduate in Engineering or Information Technology with credentials to prove they have, at least, two years of experience administering computer systems. SAMBRO system administration is minimal with simply updating the code from github (free), archiving the data and logs, ensuring continuity of the communications connecting the SAMBRO cloud services. The system administrator may be asked to alter the software code or develop new forms and work flows to enhance the SAMBRO human (user) computer interactivity and quality of experience.

8.2.2 CAP Technology Steward

CAP Steward would be the shorter label. The competent resource person would essentially be the CAP Guardian and a trainer also responsible for administering the CAP implementation in the Maldives. That includes learning the technology and procedures of CAP

and how it would serve in MASA. The individual will be trained to support a team of trainers who would become lead users of SAMBRO. The Technology Steward would continue to support and improve the CAP implementations and the new CAP resource persons of all relevant alerting authorities.

8.3 Data Center

8.3.1 Networking (TCP/IP)

The data center will comprise the computational capacity and the networking infrastructure. Redundancy is always encouraged for business continuity and disaster recovery for the data center. To begin with, a server to support SAMRBO Maldives instance and a network complementary redundancy for disseminating alerts [3].

A dedicated 128 kbps Internet line with another 128 kbps redundancy satellite Internet connection. A country vulnerable to earthquakes should be cautious of undersea interconnections and wireless towers exposed to severe weather. It is expected that NDMC would own and operate the date center.

8.3.2 Server (high-end PC)

The project will contribute a high end server for NDMC to host the SAMBRO National instance. The server will reside in the same data center, whereby only authorized users can access alerting and situational-awareness services. The server will run on a Debian operating system with the Sahana Eden Web2Py http application. The high end PCs would be sufficient because there will not be a great load of authorized users simultaneously accessing SAMBRO. The telcos and broadcasters would bare the dissemination communications load. Recommendation is a Dual Core Intel Pentium IBM xSeries like processing power high storage to work possibly in the capacity of a map server as well.

8.4 Evaluation

The evaluation is specific to the intervention and not the project in general. The project is keen in realizing the human computer interaction factors of the Maldivian users. The study would involve simple interviews with relevant stakeholders part of the implementation, participatory rural appraisal with the communities, general recipients of the public alerts. Additionally, other goal oriented usability testing for technology acceptance would provide insights to better customize for an effective SAMRBO implementation. At this stage of the project, the Maldivian counterparts were made aware that there is a participatory evaluation as part of a simulation campaign.

9 APPENDIX C – SWOT Analysis Results

The participants formed four groups. Each group spent from 10-15 minutes to discuss the Strengths, Weaknesses, Opportunities, and Threats (SWOT) of implementing CAP and SAMBRO in support of a National MASA.

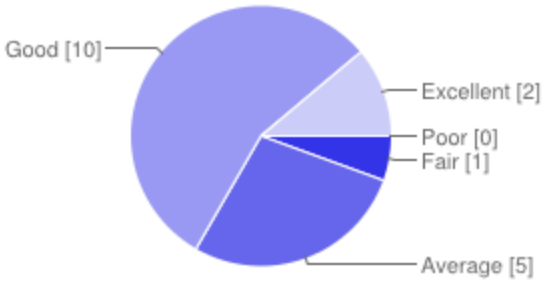
STRENGHTS: 1. Mutli-Agency coordination system 2. consistent end-to-end early warning for improving responsiveness	***WEAKNESSES:*** 1. Software downtime caused by threats/viruses and breakdowns 2. Footprint of the networks and relying on a single technology; I.e not only mobiles although 99% coverage 3. Language disparities between Atols and the transmission efficiencies to serve all the relevant languages, including the 5 main UN langauges
OPPORTUNITIES: 1. SAMBRO will allow for new and reliable sources of information 2. faster early warning can mitigate damage and losses 3. Customizability and open source licensing allows for making it a unique national SAMBRO instance 4.	***THREATS:*** 1. No local capacity to deal with the Sahana technology-enabled SAMBRO application. 2. Harmonizing on the warning related mandates is unclear; i.e. who is doing what where and when? 3. There may be a demand for a subscriber manager for alert recipients to customizing for their alerting needs. 4. The sustainability is yet unclear 5. Relying on a single system may without a business continuity and disaster recovery plan for the SAMBRO deployment 6. Relying on power and the internet with uncertainties for long power and Internet outages

10 APPENDIX D – Results from the Workshop Evaluation

10.1 General workshop objectives

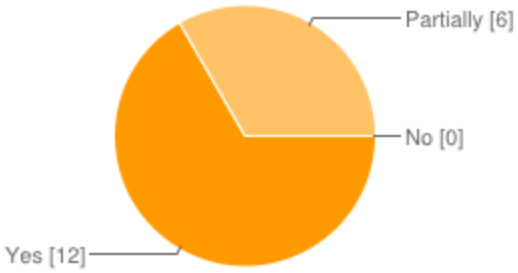
A) General objectives

A1) In general, how would rate the workshop?



Poor	**0**	0%
Fair	**1**	5.6%
Average	**5**	27.8%
Good	**10**	55.6%
Excellent	**2**	11.1%

A2) Would you say that the workshop's objectives were achieved?

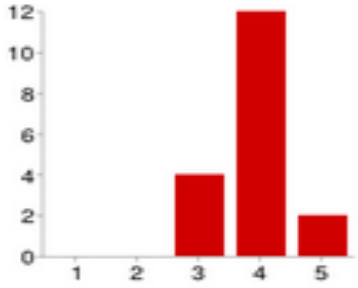


Yes	**12**	66.7%
Partially	**6**	33.3%
No	**0**	0%

10.2 Project specific workshop objectives

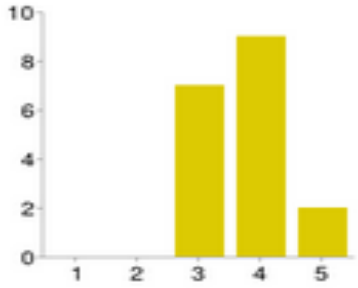
Where the workshop objectives in the following

B1) raising awareness on the CAP standard?



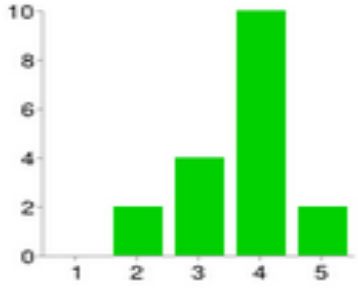
1	0	0%
2	0	0%
3	4	22.2%
4	12	66.7%
5	2	11.1%

B2) realizing the potential of a MASA platform?



1	0	0%
2	0	0%
3	7	38.9%
4	9	50%
5	2	11.1%

B3) determining the steps for implementing the project?



1	0	0%
2	2	11.1%
3	4	22.2%
4	10	55.6%
5	2	11.1%