

Regional Dissemination of Findings from the Last-Mile Hazard Information Dissemination Pilot Project

(HazInfo Supplemental Project)

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LIRNEasia is a regional information and communication technology (ICT) policy and regulation capacity-building organization active across the Asia Pacific. LIRNEasia's program of actionable research seeks to identify the institutional constraints to effective use of ICTs to improve the lives of the people of the Asia Pacific, not simply in abstract terms but in country context, and to work collaboratively with multiple stakeholders to catalyze the changes conducive to greater participation by users and suppliers. LIRNEasia's overall mission of capacity building seeks to contribute to building capacity for evidence-based intervention in the public-policy process by persons attuned to the specific national contexts within which policies are made and implemented. Additional information is available at www.lirneasia.net.

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1. Synthesis

Following the successful implementation of the “Evaluating Last-Mile Hazard Information Dissemination” (HazInfo) pilot project, it was decided that regional dissemination of the pilot’s findings would enhance the project’s status as a path-breaker in last-mile risk communication for communities at-risk.

The HazInfo supplemental project, as this dissemination portion of the original HazInfo project was called, encouraged the sharing of findings and lessons learned from the HazInfo project with similar last-mile initiatives in three select Bay of Bengal countries (Bangladesh, India and Indonesia). This was achieved by organizing a workshop in each of the three countries in partnership with a local disaster risk reduction/disaster preparedness organization.

The workshops were structured into five sessions with a portion of an early warning system as the main topic (i.e. First Responder Action). Basically, each session featured one speaker from the HazInfo Sri Lanka project and one speaker from the host country. Several pointed questions were posed within the agenda for the ensuing discussions. The workshops unearthed much interest in the topic of last-mile hazard information dissemination for communities and shed light on a topic not otherwise discussed in typical workshop on early warning. Moreover, it produced interest in replicating the HazInfo project to suit the particular hazard makeup of the chosen country.

2. Research problem

The “Evaluating Last-Mile Hazard Information Dissemination” (HazInfo) pilot project could not achieve its proper status without appropriate dissemination of its findings within the region. Given that the pilot’s purpose was to test various technologies’ usefulness in the “last-mile” of a national early warning system, its implications for neighboring countries, particularly around the Bay of Bengal, are highly relevant. Thus, the need for a series of regional workshops arose with the central idea being that the HazInfo pilot would be the focus. Lessons would be drawn from each workshop for purposes of comparison and contrasting with similar host country initiatives.

3. Research findings

The workshops conducted between the inception of this supplemental (June 2007) until the present (February 2008), indicate a number of strong successes. It succeeded in its main goal of engaging practitioners and experts in discussing and speaking to the issue of community-based early warning systems and the potential of ICTs as a revolutionary means of disseminating warning to communities at-risk.

The main research results should be described and interpreted by highlighting the contribution to knowledge that this project represents from a scientific and policy perspective.

4. Fulfillment of objectives

The primary objective of the HazInfo supplemental project was to organize and hold a series of three regional workshops designed to discuss and compare similar community-based early warning systems. This objective was achieved with 75% completed. Meaning that workshops were conducted in Sri Lanka, Bangladesh and India, but not Indonesia. The Indonesia workshop could not be fulfilled due to logistical problems in obtaining visas for Sri Lankan speakers. The Sri Lanka workshop was an unexpected, unplanned (at the time of supplemental proposal submission) event, which not only featured the findings of the HazInfo project, but also brought together Sri Lankan telecom providers to initiate working committees (with the support of the Ministry of Disaster Management and Human Rights) to find effective an effective solution to issuing hazard alerts to the public.

5. Project design and implementation

The activities in this project were workshops. Each workshop was designed to discuss each part of an early warning system including a discussion period. This allowed for maximum speaker-audience interaction so as to derive as many lessons learned. In the final workshop in Indonesia, it was hoped that the session discussion would be revamped such that participants would break off into groups and have worksheets of questions that would encourage further discussion on the major topics.

In terms of gender, speakers from both genders were invited for both the Bangladeshi and Indian workshops. Unfortunately, it was found that during both workshops there was only one female speaker, respectively. More often than not, invited female speakers would be unable to attend due to extenuating circumstances or would hand over the speaking part to their male colleagues.

6. Project outputs and dissemination

Conferences/Workshops:

2nd International ISCRAM-CHINA Workshop: Harbin Engineering University, August 26-27 2007

Attendee: Nuwan Waidyanatha, Project Manager

The 2nd International Workshop on Information Systems for Crisis Response and Management, in China (ISCRAM-CHINA-20071), is a post-conference meeting to the International Disaster Reduction Conference2 (IDRC). ISCRAM-CHINA took place in Harbin from August 26-27, 2007. The ISCRAM-Community3 and the School of Economics and Management - Harbin Engineering University4 (HARBEU), jointly organized the conference. The Workshop provided an outstanding opportunity for researchers, scholars, teachers, students, practitioners and policy makers in China as well as invited International delegates to address and discuss new trends and challenges in the area of Information Systems for Crisis Response and Management.

The subject matter dealt with aspect of design, development, deployment, operation,

and evaluation of information systems for crisis response and management. Authors focused on tools, functionality, and/or interfaces that were being or should be provided for human users involved with crisis response and management. Contributions covered Crisis Response and Management in any phase, intersection of phases, and/or integration of phases of the Emergency Management and Preparedness lifecycle: Planning, Training, Mitigation, Detection, Alerting, Response, Recovery, and Assessment.

Evaluating Last-Mile Hazard Information Dissemination: A Research Project, or HazInfo Project, research findings were presented during Session 1: Information Systems along with 20 other papers that were presented in the same session. The HazInfo paper titled “Common Alerting Protocol Message Broker for Last-Mile Hazard Warning System in Sri Lanka: An Essential Component”, edited by Bartel Van de Walle (bartel@uvt.nl), Xiaodi Li (lixiaodi2000@hotmail.com), and Shuyu Zhang, was 1 of 115 papers published in the workshop proceedings, pages 59-64, selected from over 200 submissions. The residual session themes were – Business/Organization, Public Organizations/Government, and Mathematical Modeling.

The HazInfo paper that discussed cutting edge research in the use of Common Alerting Protocol (CAP) was passionately received by the participants. Moreover, interested stakeholders expressed interest in collaborating in future research that is to be lead by LIRNEasia; especially in the development of the “P2P Multilanguage CAP Broker” for the region.

“The Role of Telecom Operators and Broadcasters in a National Public Warning System”, BMICH, Sri Lanka, September 7, 2007

Attendees: Rohan Samarajiva, Natasha Udu-gama

“The Role of Telecom Operators and Broadcasters in a National Public Warning System”. On Friday, September 7, 2007, the Ministry of Disaster Management and Human Rights (MDMHR), with the support of LIRNEasia, held a meeting on “The Role of Telecom Operators and Broadcasters in a National Public Warning System” with a six of the eight major telecom operators, as well as several disaster management-related government agencies (NBRO, Irrigation Dept., Meteorology Dept., CCP, etc.), UNDP, and a few technical institutes.

Mr. P.D. Amarasinghe, Secretary of the MDMHR, opened the session by discussing the particular disaster role of each of the government agencies asked to attend. He acknowledged the government’s important role in disaster warning. The role of the Disaster Management Center (DMC) will be to disseminate warnings to first responders through various means – RANet, SMS, and fax. First responders will be media, police and armed forces, district coordinators of DMC, and other organizations (NGOs, community). Currently, the MDMHR is in the process of developing a proposal for a network of dissemination towers at Hikkaduwa, Kalmunai and Point Pedro. There will be a total of 50 by the end of this year (latest, Jan/Feb

2008). With further funding, the MDMHR will establish 10 EOCs, 4 EMC, in addition to four managed by police & armed forces. Thus, he declared that the basic warning system is in place and asked how might the telecom operators contribute to a public warning notification system.

Major General Gamini Hettiarachchi, Director General of the DMC gave a presentation on the Disaster Early Warning and Dissemination Strategy of Sri Lanka. He reviewed the progress of disaster management since the tsunami, through the Disaster Management Act No. 13 of 2005, and the establishment of the National Council on Disaster Management in the same year. He stated that there are currently 3 early warning towers, but by the end of next year there should be a total of 150. Emergency response committees have been formed including SLT, municipalities, 25 district secretaries and 9 province secretaries.

Mr. Anjula Godakumbara from Dialog Telekom made a presentation on Dialog's involvement in early warning dissemination. Dialog and the Ministry of Disaster Management and Human Rights have signed an MoU. Dialog along with Microlmage and the University of Moratuwa Research Lab looked into using GSM communication in disaster early warning dissemination by setting up the Disaster and Early Warning Network (DEWN). This has SMS and cell broadcast capabilities. The benefits of the DEWN system are that it is low-cost and uses existing communication infrastructure. Dialog reiterated the fact that only the DMC has the authority to send disaster warnings. For more information on this initiative see www.dialog.lk/dewn.

Prof. Rohan Samarajiva, Executive Director – LIRNEasia, gave a presentation on “Effective use of telecom & electronic media in disaster risk reduction”. He asked how will the DMC communicate with the media and the phone companies. The government must have internal protocols, which must be double-checked with government officials. There must a technically sound system in place to get to all media and must be capable of showing if people got the message and in the right language. LIRNEasia recommends the Common Alerting Protocol (CAP) system with additional software, which is single input, multi-output, multi-language. LIRNEasia can develop this within a few months. Essentially this means that once a button is pressed, the software will translate the message accordingly and send the message by SMS, cell broadcast, fax, etc. The government is clearly interested in standard procedures and templates. Therefore, it would be in its best interest to approve a standard template in the language and simply insert the proper word as necessary. Prof. Samarajiva posed yet another question: How might the government ensure that the person issuing the warning is reliable and not someone who plans to sabotage the process? There must be some sort of encryption or verification method so that receivers know that the warning is official.

In discussing the use of ICTs in public warning (an area not covered by the Last-Mile HazInfo Project), Samarajiva suggested that two of the most difficult cases be addressed: a passenger in a moving train and a tourist at the Yala National Park. If public warning can reach these two individuals, all the other less difficult problems can be solved. In both cases, he suggested that cell broadcasting would be the most important technology, though there may be areas within Yala that would be out of

signal coverage, in which case no public warning was possible.

The discussion that followed the presentations. Mr. Hettiarachchi called for a link with service providers to develop automated procedures. Secretary Amarasinghe suggested that there be a technical committee set up for hearing recommendations on early warning from telecom providers and broadcasters. It was decided that there would be two separate technical committees – one for telecom providers and the other for broadcasters. Dates and agendas for the first technical committee meetings of telecom providers and broadcasters were not discussed.

Mr. U.W.L. Chandradasa, Director – DMC, wrapped up the session by reiterating that the DMC is responsible for disseminating warning messages. Regarding first responders, he agreed that other agencies could be involved. He acknowledged that government alone cannot take charge of “Last Mile” warning without the contributions of telecom providers, broadcasters and the private sector.

***1st Wireless Rural and Emergency Communications Conference: Rome, Italy.
October 1-2, 2007***

Attendee: Dr. Gordon Gow, University of Alberta, Canada

The paper "Community-based Hazard Warnings in Rural Sri Lanka: Performance of Alerting and Notification in a Last-Mile Message Relay," written by Nuwan Waidyanatha (first author), Gordon Gow – University of Alberta, and Peter Anderson from Simon Fraser University.

The paper presents research findings from HazInfo, where a subset of indicators is compared for evaluating system design and performance of the LM-HWS. In particular, it introduces and defines measures for "reliability" and "effectiveness" for assessing the utility of technologies deployed in the last-mile of the HazInfo Project. The measures were applied to data gathered from exercises conducted with the HazInfo System to determine how various combinations of ICTs perform in terms of alerting the ICT Guardians as well as conveying the contents of warning messages.

An important contribution of the paper is the concept of "complementary redundancy." Test results using the reliability and effectiveness measures in the study, showed that overall scores for end-user devices varied considerably and highlighted some important concerns for user training and unforeseen implementation issues. For example, addressable satellite radios rated high in terms of reliability but relatively low in terms of effectiveness, as their messaging capability is limited (English only) and because they are nomadic but not mobile, meaning that the units cannot accompany the ICT-G from place to place (thereby reducing the score on the "Active Alerting" index). On the other hand, mobile phones scored high on effectiveness, with capability to display warning messages in three languages and because they are a form of personal media that will usually accompany the ICT-G at all times. However, mobile phones scored less reliably because of signal coverage and battery maintenance issues.

When combined, however, addressable satellite radio and mobile phone technology compensate for each other's deficiencies and produce a synergy we refer to in the paper as "complementary redundancy." As such, results from the initial field tests and technology assessment suggest that appropriate combinations of wireless technologies will provide the best performance if they exhibit complementary redundancy. These results have a number of implications for emergency planners.

First, planners should consider deployment of multiple devices with the aim of achieving complementary redundancy in reliability and effectiveness at the last-mile. Second, planners should adopt the Common Alerting Protocol because of its ability to support the goal of complementary redundancy by providing consistent and complete messaging across multiple devices. Third, that research is needed to further refine the reliability and effectiveness measures into a more robust index for assessing public warning technologies.

The paper presentation was well received and questions arose about security provisions in the HazInfo system. Security does remain a concern but that significant progress has already been made with provisions included in the HazInfo CAP profile as well as lower layer security measures built into the various ICT gateways, such as the WorldSpace satellite radio access gateway.

The IEEE Communications Society and Italian communications vendor and defense contractor Selex Communications sponsored WRECOM 2007. The aim of the conference (Wireless and Rural Emergency Communications --WRECOM) was to bring together research on various facets of wireless broadband communications for emergencies and disasters, particularly in rural settings where infrastructure may be limited or non-existent. To that end, various sessions covered wireless mesh networks, WIMAX and TETRA technologies, satellite services, as well as operational experiences with emergencies and public safety networks. Being an IEEE conference, most sessions were technical at an engineering level and addressed specialized topics such as routing protocols, transmission control, and technical performance analysis. Unfortunately, several important research papers (e.g., mesh networking in rural areas) presented findings with no mention of the potential application to emergency management! Mesh networking is not as easy as one might be led to believe in the popular literature.

A study led by Nicholas Race from Lancaster University, for instance, has followed the deployment of a mesh network in a small UK village for the past three years, with findings that suggest governance issues are significant. However, the project also noted that user interest and participation in the upkeep and active development of the network was enhanced in a mesh architecture setting. For the HazInfo project, these findings may shed some light on the challenge of long-term sustainability of the system and for building local technical know-how and local capabilities to further integrate the network into everyday activities beyond hazard warning.

Roberto Saracco from Telecom Italia spoke about several paradigms that might be

applied to emergency communications services, such as load sharing, broadcasting, peer to peer, and bit/video torrents. He then went on to explain that the "layered" or "mashed" paradigm is growing in importance, with the likes of Google Maps and so forth. Linking all these paradigms is a tension that emergency planners and policymakers must content with; namely, the choice between piggybacking on commercial networks and the deployment of dedicated infrastructure and services. Of course, the problem with the former is concerns about guaranteed quality of service during critical situations. The concern about the latter is cost and under-utilization. Somewhere in between--and perhaps this is where layered/mashed systems come into play--is a balance between dedicated, specialized services and cost effectiveness.

The US and other countries are now dealing with these economics of emergency communications in terms of the next generation of first responder radio systems. In terms of public warning, HazInfo has been innovative in terms of rethinking the model. By choosing to implement an open source like Common Alerting Protocol and by working closely with industry stakeholders to connect communities using everyday technologies, the project has in effect created a layered system that can in future expand in functionality and scope through mash-up applications with, for example, Google Earth for map sharing, as well as other applications as the need becomes evident. The ongoing challenge is to take this to the next level through a sustained research project that builds on the current achievement.

“Sharing Knowledge on Last-Mile Warning: Community-based Last-Mile Warning Systems”: Dhaka, Bangladesh. October 25, 2007

Attendees: Rohan Samarajiva, Natasha Udu-gama, Nuwan Waidyanatha

“Sharing Knowledge on Last-Mile Warning: Community-based Last-Mile Warning Systems”: The workshop took place in Dhaka on October 25, 2007. LIRNEasia and Bangladesh Network Office for Urban Safety (BNUS) – Bangladesh University of Engineering and Technology jointly organized the Workshop. The Workshop provided an outstanding opportunity for researchers, students, practitioners, and policy makers in Sri Lanka and Bangladesh as well as invited international private sector participants to address and discuss early warning activities from the South Asia Region.

The focus was on:

- Obtaining feedback on the findings of “Evaluating Last-Mile Hazard Warning Dissemination: A Research Project”,
- Exchanging lessons learned from end-to-end hazard detection and alerting systems that serve grassroots communities in Bangladesh,
- Merging knowledge from Bangladesh to develop practical solutions for communicating risk information to rural communities
- Analyze and determine methodologies for measuring the performance of Community-based Early Warning Systems
- Commencing dialogue on the development of a regional last mile warning

system.

The excitement started with heated debates between the academics and the bureaucrats. Dr. AMM Safiullah, Vice Chancellor of BUET acted as a moderator to point out the mistakes made during past events and the need to upgrade existing systems based on the lessons learned and not immerse in the glory of “half baked” systems. The Bangladeshi participants agreed on the proof that the existing systems for Cyclone preparedness do not apply to all-hazards; especially tsunami and earthquake; modification is eminent.

The audience had to be reminded constantly that the LIRNEasia tested Last-Mile Hazard Warning System was not a traditional warning system that is usually used by governments but it was a community-based model used for alert and notification. The HazInfo project and other similar community-based hazard information systems can only be responsible for providing clear and accurate hazard information alerts. Another issue that arose from discussions, was whether individual nations within the South Asian region should replicate hazard analysis, leave that responsibility to international hazard analysis organizations (such as the Pacific Tsunami Warning Center), or have a regional hazard analysis entity. Currently, Bangladesh is in the process of replicating similar tsunami models and earthquake risk maps already available at international hazard analysis organizations. The much-studied Common Alerting Protocol (CAP) used in the HazInfo project was new to the Bangladesh audience. They are yet to understand the value and strengths of using this content standard.

Table 1 –Presentations and notes from each of the sessions

Presentation Title and Speaker	Presentation Main Points	Rapporteur Notes/Comments
Inauguration Mr. K. M. Massud Siddiqui, Director General, Disaster Management Bureau (DMB) dmb@bttb.net.bd	It is a tricky subject for government to make early warning Need to identify technical deficiencies Lessons are not only for government policy makers but also must activate CBO, NGO, Private Sector, Civil Society, Medics, etc DG invited LIRNEasia to contact his bureau for future collaborative work	
Elements of Community-based warning Prof. Rohan Samarajiva, Executive Director, LIRNEasia samarajiva@lirne.net	ICTs play a key role in distancing the physical world where hazards occur from the symbolic world where media and first responders live giving time to alert the public Elements comprise national early warning center, government first-responders, media, community CAP Broker a 1-to-many software application is an essential non-existent component essential for last-mile warnings Planners must take in to consideration	
Elements of Community-based warning Prof. Rohan	ICTs play a key role in distancing the physical world where hazards occur from the symbolic world where media and first responders live giving time to alert the public	

Discussion Director, Bangladesh Meteorological Department directorbmd2005@yahoo.com	Cyclone warnings are initiated by the Meteorological department Tsunami warnings are initiated by the Geological department, which was practiced during Nias earthquake in March 2006 as well as Bengkulu earthquake in September 2007 Bulletin received from Japan had mentioned that it would take 9 hours before tsunami would hit Bangladesh coast but did not mention wave height; hence ran simulation model to estimate wave parameters Warning was issued and withdrawn at 0120 September 12 th Bangladesh Govt. instructed to “play fail safe”	www.lirneasia.net Heated debate between director and audience based on the fact that experts were not consulted prior to issuing warning General public was forced to understand expert knowledge in early warning
Session I: Local Transmission of Warning An Overview of the Bangladesh Cyclone Preparedness Program Mr. Md. Nasir Ullah, Director, Cyclone Preparedness Program, Bangladesh Red Crescent Society cpp@bdmail.net	Overview of CPP CPP and ways in which local communities receive information about cyclones through BRCS’ extensive network of trained volunteers. Use of HF and VHF transmitters; HF for short range and VHF for long range Street dramas best way of community awareness	How are volunteers trained to receive and disseminate cyclone information? 1965 Cyclone shelters collapsed after 5 years because they were not utilized during normal times Current cyclone shelters are better utilized as they are integrated in to schools
Nuwan Waidyanatha Project Manager, LIRNEasia Waidyanatha@lirne.net	Presented data on transmission of warning to communities through the experience of the HazInfo project.	
Discussion Dr. AMM Safiullah, Vice Chancellor, BUET safi@ce.buet.ac.bd	Need to perfect warning and avoid false warnings Warnings are ineffective if too many simulation models have to be run to predict situation Need schemes for better prediction Communicated message has to be precise	Is cyclone warning system applicable to all-hazards? Need to address vulnerable area, clarify meaning of warning
Discussion Dr. AMM Safiullah, Vice Chancellor, BUET	Need to perfect warning and avoid false warnings Warnings are ineffective if too many simulation models have to be run to predict	Is cyclone warning system applicable to all-hazards? Need to address

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<p>Session II: Determination of Hazard from National Level</p> <p>Determination of Hazard from National Level Prof. Aftab Alam Khan, Department of Geology, Dhaka University aftab@univdhaka.edu</p>	<p>Tsunami and Earthquake must be given high priority in Bangladesh</p> <p>Low land, 1 – 2 ft above sea level land area in Bangladesh vulnerable to sea surge and high tidal waves</p> <p>Bangladesh Meteorological Dept. must be authority for cyclone, flood, and tidal warnings but this formal method is not yet decided</p> <p>DART system is inaccurate as the bottom pressure sensor and surface buoy can be activated by other phenomenon; hence, cannot accurately predict tsunami</p> <p>Limitation on DART system must be understood</p> <p>Tsunamis cannot be modeled simply with the use of Laplace and Gaussian equations need to consider other factors</p> <p>Earthquake hazard warning cannot yet be done</p> <p>“almost entire Bangladesh coastal region is free from any potential tsunami threat.”</p>	
<p>Determination of Hazard from National Level: Sri Lanka Experience Natasha Udu-gama, Project Dissemination Manager, LIRNEasia udu-gama@lirneasia.net</p>	<p>Drew comparisons between government action in Sri Lanka during the Indian Ocean tsunami of 26 December 2004 and the tsunami warning of 12 September 2007</p> <p>National level maybe able to use and integrate elements of the HazInfo project alerting structure in its monitoring and warning relay systems.</p>	
<p>Mr. Sujit Kumar Debsarma, Pr. Meteorologist and System Manager, Bangladesh Meteorological Department swcbmd@yahoo.com</p>	<p>Tsunami modeled using propagation of gravity waves; better to be modeled using vertical azimuth of pulses</p> <p>Low bandwidth and slow speeds in Bangladesh prevents acquisition of high resolution data for accurate simulations</p>	
<p>Session III: First Responder Action</p>	<p>Discussed the CDMP-BUET project on the Development Tsunami and Earthquake</p>	
<p>Session III: First Responder Action First Responder Action</p>	<p>Discussed the CDMP-BUET project on the Development Tsunami and Earthquake Preparedness for Cox’s Bazaar within the context of the session</p>	

First Responder Action Nuwan Waidyanatha Project Manager, LIRNEasia Waidyanatha@lirne.net	Discussed the full process of first responder action from the Hazard Information Hub through to the Emergency Response Plan Coordinators	
Session IV: Methodology, Preparedness, Community Organization and Training WorldSpace Early Warning Systems Dr. S. Rangarajan, Senior Vice President, WorldSpace Corp. SRangarajan@worldspace.com	Overview of the various satellite radio systems available from WorldSpace Corporation for use in warning systems. During his interactive presentation, Dr. Rangarajan showed the various systems and their configurations.	
Methodology, Preparedness, Community Organization and Training: HazInfo Experience Natasha Udugama, Project Dissemination Manager, LIRNEasia udu-gama@lirneasia.net	Screening of “The Long Last Mile” (HazInfo video)The video gave a comprehensive overview of the background of the project, its inception and implementation in Sri Lanka. Summary of best practices in training, community organization, methodology and preparedness demonstrated within HazInfo project.	
Session V: Next Steps Roles of policymakers, regulators, private sector and civil society Session V: Next Steps Roles of policymakers, regulators, private	Working with incomplete probabilistic information Cannot do disaster management work on usual turf based politics Early warning should give priority to “rapid onset’ hazards, which will be a catalyst to solving other hazard warning events. Working with incomplete probabilistic information Cannot do disaster management work on usual turf based politics Early warning should give priority to “rapid	Sri Lanka has recorded history of 8 – 9 tsunamis in the past Sri Lanka has recorded history of 8 – 9 tsunamis in the past
www.lirneasia.net +94 (0)11 267 1160; +94 (0)11 493 9992; +94 (0)11 497 9795; f: +94 (0)11 267 5212	Sri Lanka +94 (0)11 267 1160; +94 (0)11 493 9992; +94 (0)11 497 9795; f: +94 (0)11 267 5212	Sri Lanka has recorded history of 8 – 9 tsunamis in the past

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The workshop initiated much healthy debate and discussion on the issue of early warning, particularly on the government's provision of early warning to Bangladeshi communities. Government officials in attendance were most vociferous in defending existing EW infrastructure – particularly its monitoring and detection equipment. What was lacking, however, was government acknowledgement and interest in equipping the “last mile” to respond effectively to warnings.

Mr. Md. Nasir Ullah of the Cyclone Preparedness Program (CPP) described an early warning system very much akin to the HazInfo system in that it utilized information technology (i.e. transistor radios) and trained locals (i.e. militia or *Ansars*). The most significant difference between the two systems is the use of transistor radios in CPP-Bangladesh, while the technology stressed in HazInfo is a combination of technology – mobile and satellite radio.

19th Meeting of the Wireless World Research Forum: Indian Institute of Technology, Madras, November 2007

Attendees: Nuwan Waidyantha, HazInfo Project Manager

The Forum took place in Le Meridien Hotel from November 5 - 7, 2007. The conference was jointly organized by the WWRF, Midas, and the Indian Institute of Technology - Madras. The forum provided an outstanding opportunity for researchers, scholars, operators, original-equipment-manufacturers and policy makers working in the area of wireless communications to present and discuss the trends of the various technologies, latest research/developments, and services/applications in the field. The forum offered several Plenary Sessions, Working Groups (WG), and Special Interest Groups (SIG), which focused on disciplines within the global wireless communications community.

In general the theme was to shape the global wireless future by develop a common vision for the year 2020. Moreover, the forum focused on influencing the decision makers' views of the wireless world, enable powerful R&D collaborations, and advance wireless frontiers to serve the global customers. A main aspect of all the speakers was on the need to optimize the Kilo Bytes per second per Hertz per Cell (KB/Sec/Hz/Cell) in order to achieve very high spectrum efficiencies. The routes to the wireless future are WiMax (802.16) for the IT community and 3GPP/LTE for the Telecommunication community. In terms of commercial roll out, technologies such as cognitive radio are beyond the 2020. The overall impression exemplified by the experts is that wireless broadband such as WiMax could not replace the kind of capacity and services that are offered by wired broadband such as DSL in the present day of the game. In all cases the backhaul problem cannot be neglected.

Overall forum was quite intriguing especially to see the actual progress of cutting edge wireless technologies such as WiMax, LTE, etc that are paving the way for the communication industries to take them to the next level. Most importantly the researchers laid out the truth about the shortcomings and the realistic potential of the

innovative technologies, which seem to defy theoretical frameworks. If not had been exposed to this forum the knowledge and awareness of the current state of affairs in the wireless world would have been oblivious and backwards.

Two papers submitted by authors from LIRNEasia were accepted for presentation in 2 different working groups and publication in forum proceedings. The first paper titled “Challenges of Optimizing Common Alerting Protocol for SMS based GSM Devices”⁴ was an output of the “Evaluating Last-Mile Hazard Information Dissemination Project” (or HazInfo Project) research findings, which were presented in the WG1: Human Perspectives and Service Concepts. The second paper titled “Wireless Mesh Networking – as a means of connecting rural communities was based on the design considerations of implementing the mesh network at Mahavilachchiya, Sri Lanka. Both papers were based on practical field level experiences. As a result they were well received by the audience and were inquisitive of the practical issues that sometimes defy the theoretical frameworks.

***“Sharing Knowledge on Last-Mile Warning: Community-Based Last-Mile Warning Systems”:* New Delhi, November 19, 2007**

Attendees: Rohan Samarajiva, Nuwan Waidyanatha, Natasha Udu-gama

This report presents a summary of the “Sharing Knowledge on Last-Mile Warning: Community-Based Last-Mile Warning Systems” workshop which took place at the India Habitat Centre in New Delhi, India on 19 November 2007 from 9:30am - 4pm. The All India Disaster Mitigation Institute (AIDMI) and LIRNEasia jointly organized the workshop. This workshop proved to be an ideal venue for the dissemination of findings from the “Evaluating Last-Mile Hazard Information Dissemination” pilot project in India through an intimate gathering of practitioners, private sector, international organizations, local NGOs, and government.

The primary objectives were:

- Obtaining feedback on the findings of “Evaluating Last-Mile Hazard Warning Dissemination: A Research Project”,
- Exchanging lessons learned from end-to-end hazard detection and alerting systems that serve grassroots communities in India,
- Merging knowledge from India to develop practical solutions for communicating risk information to rural communities
- Analyze and determine methodologies for measuring the performance of Community-based Early Warning Systems
- Commencing dialogue on the development of a regional last mile warning system.

This workshop proved to be one in which the participants engaged well throughout the duration of the day’s proceedings. Participants showed great enthusiasm for the subject of the workshop and the findings presented by LIRNEasia. The presentations and discussions were well on topic and discussions were fruitful and highly informative. As expected, discussion topics were not relegated to their individual

sessions, rather, discussion on the overall topic of community-based early warning systems and the particular role of the HazInfo pilot project dominated all sessions.

Media attention was much higher than in the previous workshop in Bangladesh, due to having a public relations manager for this event. Press kits were prepared and distributed to journalists who joined the workshop proceedings throughout the day. Media outlets such as MINT publications (Wall Street Journal) and *Indian Express* were just some of the up to seven outlets that interviewed LIRNEasia on the HazInfo pilot project.

Session Title	Presenter	Title and Comments
Inauguration Opening Remarks	Mehul Pandya, Risk Reduction Transfer Initiative Coordinator, AIDMI, dmi@icenet.co.in , Natasha Udu-gama, udu-gama@lirne.net	
“Long Last Mile” Video Screening		The video provided a sound basis for the audience’s understanding of the workshop’s main topic, “Evaluating Last-Mile Hazard Information Dissemination” pilot project.
Opening Address: “Elements of a community-based warning system”	Dr. Rohan Samarajiva, Executive Director, LIRNEasia Samarajiva@lirne.net	Reviewed the basic elements of a community-based early warning system. The disaster cycle, early warning chains (standard vs. HazInfo), reasons for this type of system, overview of HazInfo results and implications for regionalization.
Session I – Methodology Preparedness, Training and Community Organization	P. Prasad Chief Consultant Welfare Organization for Rural Lean Development (WORLD)	“ICT Application in Community-Based Early Warning System”. Mr. Prasad gave an overview of natural hazards in Andhra Pradesh. His primary point was that WORLD has found a huge gap in the dissemination of hazard information from

		<p>the <i>mandal</i> level to the villages despite wireless and other ICT communications systems available to the national and state level systems.</p>
	<p>Mr. Menake Wijesinghe, Program Director, Sarvodaya Community Disaster Management Centre Menake_Wijesinghe@yahoo.com</p>	<p>Discussion Sarvodaya's role in the HazInfo project particularly in terms of formulation of methodology, participation in training, community organization and preparedness.</p>
<p>Session II – Transmission of Warning to Local Levels</p>	<p>Vijay Pratap Singh Aditya Ekgaon Technologies pvt. Ltd. vijay@ekgaon.com</p>	<p>Mr. Aditya gave a thorough overview of the communications policies governing dissemination of hazard information. He explained the key acts and policies and how and why they sometimes enable and disable appropriate hazard information dissemination to those that require the information most – the last-mile. He claimed that LIRNEasia and Sarvodaya would not be able to implement a pilot such as HazInfo in India because need for a strong interface with a local (governmental) institution.</p>

	Natasha Udu-gama, LIRNE <i>asia</i>	“Transmission of Warnings to Local Levels: HazInfo Experience”. Outlined the differences between a traditional alerting system and HazInfo. Explained the HazInfo input applications and terminal devices, Common Alerting Protocol (CAP), Calculation of certainty and efficiency and results from HazInfo in determining the most effective methods for transmitting warnings to communities.
Session III – First Responder Action	Suresh Mariaselvam Coordination and Networking Associate Tamil Nadu Tsunami Resource Centre (TNTRC) suresh@tntrc.org	Gave an overview of TNTRC’s aid coordination and community capacity development in disaster risk management in Tamil Nadu. Explained the role of village information centers, community radio and ICT initiatives by sector in obtaining most effective “last-mile” connectivity.
	Natasha Udu-gama, LIRNE <i>asia</i>	“First Responder Action in HazInfo”. Explained “first responders” in the context of HazInfo then gave descriptions of first responder roles and methods of dissemination.
Session IV – Determination of Hazard from National Level	Nuwan Waidyanatha, HazInfo Project Manager, LIRNE <i>asia</i> Waidyanatha@lirne.net	“Determination of Hazard from the National Level: Sri Lanka Experience”. Drew comparisons on government action between Dec. 26, 2004 and Sept. 12, 2007 and described how the

		HazInfo pilot might help in structuring a national early warning system to be effective throughout the EWS chain.
	Dr. K.J. Ramesh, Advisor, Ministry of Earth Sciences, Government of India kj.ramesh@nic.in	-Push-through technology: Geneva Technologies works with WorldSpace Corp. to enable alerts to be sent in up to 24 languages. - 24 State government levels have a toll-free calling number
Session V: Next Steps	Dr. Rohan Samarajiva, LIRNEasia	“Roles of policymakers, regulators, private sector and civil society”. Organizational problems must be solved for EW technologies to be fully realized. Early warning must be complemented by preparedness, evacuation plans, etc. Reiterated the need for the government to take the lead in providing early warning. Private sector and civil society can support and strengthen.
	Mehul Pandya, AIDMI	“Lessons for Early Warning from Tsunami Evaluation”. Discussed AIDMI’s role in the Tsunami Evaluation Coalition

	<p>Mihir R. Bhatt Honorary Director All India Disaster Mitigation Institute (AIDMI) dmi@icenet.co.in</p>	<p>Discussed whether early warning is early enough or not. He then went on to talk on designing an early warning system and developing a strategy for an EW system saying that it must be an iterative process – an organization cannot have a prototype and just “do”, it must be simultaneous. Bhatt spoke of having a “pre-mortem” – declaring a failure prior to a launch of an early warning system.</p>
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Media Coverage

- Press kits were prepared for up to 15 journalists that included copies of all the presentations and electronic copies of LIRNEasia’s presentations.
- Several journalists joined the HazInfo workshop during its proceedings over the course of the day.
- Between 6-7 media interviews followed the workshop proceedings, including one for NDTV and a Hindi channel.
- Questions brought up by media:
 - Who is following through in India, where all the focus has been on hazard detection and monitoring?
 - Do you realize that getting such a system operational in India will be extremely complex because of center-state issues, etc.?
 - Are there plans to do a pilot in India?
 - Plans for more dissemination?

Summary

Like the HazInfo workshop in Dhaka, Bangladesh, the Indian workshop provoked much discussion on the use of technology in the “last mile” of an early warning system. Several small community-based organizations invited as speakers at the workshop, particularly TNTRC and WORLD, noted the use of village information centers and community radio in reaching the “last mile”. WORLD mentioned that the use of ICT has not breached the information gap between the *mandal* level and the village level. This signifies that though there is an acknowledgement of the use of ICTs to leverage greater participation at the “last mile”, the importance of training and active community participation has not been stressed enough. In comparison, HazInfo has not only stressed the usage of dual, complementing technologies (i.e. mobile and satellite radio) – complementary redundancy – but it has also highlighted

the utmost importance of a comprehensive training regime with adequate inclusion of ICTs. The Indians were most receptive to the concept of complementary redundancy introduced by HazInfo. The number of early warning initiatives in India struck HazInfo researchers, mainly by the fact that many of them were unaware or had few ties to initiatives in other parts of the country. For a community-based early warning system to be successful, it will be crucial that various initiatives start meeting and working together. The HazInfo workshop has provided that meeting ground for these national initiatives, while informing them of an international model (HazInfo) to optimize the use of technology and training within their systems.

“Sharing Knowledge on Last-Mile Warning: Community-Based Last-Mile Warning Systems”: Jakarta, Indonesia. March 5, 2008

Attendees: Rohan Samarajiva, Natasha Udu-gama, Nuwan Waidyanatha

A “Sharing Knowledge on Last-Mile Warning: Community-Based Last-Mile Warning Systems” workshop took place at the Hotel Borobudur in Jakarta, Indonesia in partnership with the Indonesian Institute for Disaster Preparedness (IIDP). The workshop provided an opportunity to discuss and share the findings of the “Evaluating Last-Mile Hazard Warning Dissemination: A Research Project” (HazInfo) with Indonesian counterparts while at the same time learning about similar initiatives and community-based hazard warning systems.

The primary objectives were:

- Obtaining feedback on the findings of “Evaluating Last-Mile Hazard Warning Dissemination: A Research Project”,
- Exchanging lessons learned from end-to-end hazard detection and alerting systems that serve grassroots communities in Indonesia,
- Merging knowledge from Indonesia to develop practical solutions for communicating risk information to rural communities
- Analyze and determine methodologies for measuring the performance of Community-based Early Warning Systems
- Commencing dialogue on the development of a regional last mile warning system.

OBSERVATIONS AND COMMENTS

Overall, the workshop went well despite earlier setbacks (i.e. planning for the workshop to be on 30 January, speakers dropping out at the last minute, etc.). IIDP did an excellent job in organizing the event in Jakarta and finding a range of speakers from government to community-based organizations.

The workshop began approximately 20 minutes late due to waiting for participants and some speakers. Workshop agendas were not printed and distributed prior to the event commencement, and when they were distributed the version was incorrect. Due to a late start, group discussion following each session had to be cut and put at the end of the workshop. This precluded asking questions on particular parts of the HazInfo research and their comparisons with the Indonesian experiences.

Session Title	Presenter	Title and Comments
Inauguration Opening Remarks	Ms. Chandra Lukitasari, Executive Director, IIDP Chandra.lukitasari@yahoo.com	Made some opening comments to participants and speakers including a brief introduction of LIRNEasia participants.
	Dr. Ir. Tatag Wiranto, MURP, Deputy Minister for Economic and Private Business Development and Chairman, Board of Advisors, IIDP. tatagwiranto@gmail.com	Gave opening remarks on the 4 th anniversary of IIDP's existence.
“Long Last Mile” Video Screening		The video provided a sound basis for the audience's understanding of the workshop's main topic, “Evaluating Last-Mile Hazard Information Dissemination” pilot project.
Opening Address: “Elements of a community-based warning system”	Dr. Rohan Samarajiva, Executive Director, LIRNEasia Samarajiva@lirne.net	Reviewed the basic elements of a community-based early warning system. The disaster cycle, early warning chains (standard vs. HazInfo), reasons for this type of system, overview of HazInfo results and implications for regionalization.
Aceh Tsunami Victims Testimonial	Ms. Titi Moektajasih, UNOCHA	Gave a brief overview of the impact of the 2004 tsunami in Aceh from a personal perspective.
Session I – Methodology Preparedness, Training and Community Organization	Jan Sopaheluwakan, Ph. D., Indonesian Institute of Sciences (LIPI)	“From Emergency Response to Community Preparedness”. Prof. Sopaheluwakan discussed the involvement of LIPI in monitoring and detection, warning and community preparedness. He noted that Indonesia is taking the lead on driving the process of early warning. It has been most

interested in pushing preparedness, mitigation and response within community preparedness. He discussed 4 main elements of community-based early warning systems:

Risk knowledge

Monitoring of EW

Dissemination &

Communication

Response Capability (*Can people evacuate?*)

There are 3 spheres:

Environmental -> ocean monitoring

Social -> early warning

Economic -> tsunami preparedness

LIPI does community preparedness and public education.

Prof. Jan discussed the National Framework developed by LIPI in conjunction with UNESCO and ISDR. He went on to explain the IOC-UNESCO end-to-end system. He introduced the audience to the LIPI "hourglass" concept where warning and emergency response meet at a critical point but are not mutually inclusive. He showcased lessons learned from the 2007 intervention and community expectation on TWS. To sum, he discussed challenges and recommendations noting that no agreements have yet been made at the national level.

Session II – First Responder Action

Natasha Udu-gama,
Dissemination Manager –
HazInfo, LIRNEasia udu-gama@lirne.net

Mrs. Patra Rina Dewi, M.Sc.,
Executive Director, KOGAMI
Padang
patrarinadewi@gmail.com

Nuwan Waidyanatha, Project
Manager, HazInfo, LIRNEasia
waidyanatha@lirne.net

Discussion of the HazInfo project from the perspective of methodology, participation in training, community organization and preparedness.

“Tsunami Early Warning System: Lessons Learned from Padang City”. Mrs. Dewi gave a comprehensive overview of disaster preparedness in Padang, Sumatra. She mentioned that Padang was not affected by the 2004 tsunami but that the risk to both tsunami and earthquake is the highest in the world. Evacuation time in Padang is only 30 minutes. Early warning must be lightning fast to notify the densely populated city. She discussed an ideal Tsunami Early Warning System (TEWS) to meet the particular needs and concerns of Padang. Noted that electricity would be an issue for many technologies deployed for early warning (i.e. RA-Net). Current warnings and information from government is inconsistent and incomplete. She highlighted that education, particularly among children, is key to the success of early warning systems.

“Transmission of Warnings to Local Levels: HazInfo Experience”. Outlined the differences

**Session III –
Transmission of
Warning to Local
Levels**

Mr. Aim Zein, Padang Advisor,
GTZ - GITEWS

between a traditional alerting system and HazInfo. Explained the HazInfo input applications and terminal devices, Common Alerting Protocol (CAP), Calculation of certainty and efficiency and results from HazInfo in determining the most effective methods for transmitting warnings to communities.

“An Experience from Padang”. Mr. Zein noted that warning dissemination only allows for 10-20 minutes reaction time. Discussed the RDS (Radio Data System) and said that radio is most effective to override other technological deficiencies, particularly in Padang where at least one radio can be found in every house. Discussed RABAB, a local radio innovation, based on the need for guidance and information following a warning. RABAB is based on walkie-talkie information being transmitted by repeater to radio; either live or pre-recorded on FM 99.9. Current warning consists of SMS only. Future warning system should be RAP1 (Citizen Band Radio Broadcast). Most in Padang are already aware of what to do in the event of an earthquake.

Drs. Sunarjo, MSc.
Kepala Pusat Sistem Data dan
Informasi Geofisika, Bureau of
Meteorology and Geophysics
(BMG) Sunaryo@bmg.go.id

The BMG is responsible for the first 5 minutes of a disaster. Afterwards, other institutions are responsible. RA-Net has a 2-minute delay and is installed in more than 100 locations throughout Indonesia. They have SMS and radio dissemination systems – the technology used is more advanced than that of the GoSL. They say that the problem with SMS is the 150-character limit (CAP could solve this). There is also a tsunami siren network consisting of both federal and TELKOMSEL (largest national telecom provider) sirens. The local government is the one that decides to push the “button” or not. Since both police and army are deployed 24/7 the government works closely with them to be responsible for assisting at all levels.

**Session IV –
Determination of
Hazard from
National Level**

Natasha Udu-gama,
Dissemination Manager –
HazInfo, LIRNEasia, udu-gama@lirne.net

“Determination of Hazard from the National Level: Sri Lanka Experience”. Drew comparisons on government action between Dec. 26, 2004 and Sept. 12, 2007 and described how the HazInfo pilot might help in structuring a national early warning system to be effective throughout the EWS chain.

Dr. Ir. M. Dirhamsyah, Director,
Tsunami and Disaster
Mitigation Research Center

Dr. Dirhamsyah explained that an MoU has been signed with several other

(TDMRC), Syiah Kuala University,
mdirham@yahoo.com

universities in February 2005 on coordination for early warning systems. He explained the TEWS framework, DRR framework (policy, non-structural and structural elements), the work of Syiah Kuala University in tsunami and disaster mitigation, their annual regional meeting in December and the DRR-A (Disaster Risk Reduction for Aceh) project.

Session V: Next Steps

Dr. Rohan Samarajiva,
Executive Director, LIRNEasia,
samarajiva@lirne.net

“Roles of policymakers, regulators, private sector and civil society”.

Organizational problems must be solved for EW technologies to be fully realized. Early warning must be complemented by preparedness, evacuation plans, etc. Reiterated the need for the government to take the lead in providing early warning. Private sector and civil society can support and strengthen.

Kusuma Adinugroho, Senior Programme Officer, Crisis Prevention and Recovery Unit,
kusuma.adinugroho@undp.org

Mr. Adinugroho as moderator gave brief summaries following each session. Here he gave a summary of points discussed throughout the workshop and their implications for Indonesia.

Discussion and Lessons Learned

The group discussion at the end of the workshop served to sum up the main points of the workshop. Mr. Kusuma Adinugroho of UNDP led the discussion by asking participants to review the questions posed in the workshop agenda and flesh out issues that had arisen during the workshop. Mr. Adinugroho made copious notes during the workshop so that group discussion turned out to be both interesting and

fruitful.

What is the cost of the technologies used in the HazInfo pilot? [Nuwan Waidyanatha gave an approximate cost for each of the technologies]

Are communities still panicking despite disaster preparedness?

[Patra Rina Dewi, KOGAMI] Despite having many earthquakes in Padang, those that are uneducated and untrained still panic. However, children who have been trained and educated tend to educate others.

[UNESCO] Since disasters can happen at any time there must be a disaster curriculum. The problem is the lack of education on disasters. There should be scheduled table-tops and/or drills, there should be good dissemination of technical knowledge and know-how. Despite having a national certification for training officials, trainers do not always have disaster management experience and expertise. This is essential.

Training:

[KOGAMI] Training must be culturally appropriate. The trainer must be able to adapt to the local culture. In some places KOGAMI can approach local government directly about these issues, but in other cases, it must first approach the religious/traditional leader of the community who would then approach the local government. Every school now has different Standard Operating Procedures (SOPs); SOPs must be standard throughout and is key to disaster risk reduction in communities.

[LIRNEasia] Since Sarvodaya trainers are young and oftentimes have difficulty getting through to village committees comprised mainly of elderly females, they train through asking pertinent questions. Other problems faced by trainers include caste differences. HazInfo is highly context specific; local knowledge in communities is of the utmost importance. However, in some cases, where communities requested certain items like loudspeakers, neither the item nor money was given. Communities had to figure out how to disseminate with the resources in existence.

[IIDP] Does community-based training exist for communities in Padang?

[KOGAMI] Still in process. Only 35% completed so far, but optimistically this will be completed in the long run. Religious leaders play a very important role in making decisions.

How many people are ready to accept EW systems?

[GTZ] BMG sends messages to first responders, etc. and others interested.

[University of Surabaya] In East Java, mountains are erupting. The government gives warning but some people are refusing to evacuate. There is rampant distrust of government because of the number of false warnings. High tech. vs. local warning systems is also an issue.

[UNESCO] Emphasize education. It is impossible to change the paradigm within local societies entirely. There are many false warnings in Indonesia because the Gol shares information, but warnings are not fully developed.

[KOGAMI] Police and army should have similar approaches to DRR regarding specific scenarios.

Currently, how long does warning reach communities?

[KOGAMI] SMS = 5-7 minutes; when electricity goes out the TV is useless

[Syiah Kuala] In Aceh, when warning was given there was no information at all.

Recommendations to the Organizers

- Presentations must be received prior to workshop commencement. This has been an ongoing problem; speakers must be forced to take the workshop seriously.
- Workshop documentation, such as programs, must be printed and distributed prior to the onset of the workshop.
- Coordination with partner organization needs to be improved. There must be a reliable contact who will keep documentation received updated and share necessary documents.
- Ensure that the partner organization is equipped with necessary technical equipment (such as computer, recorder, etc.) for timely and accurate proceedings.
- Start the workshop at a later time. Nine o'clock start times are difficult in several parts of Asia.
- Having one moderator in this workshop turned out to be more efficient. It is best to have a moderator who is not a speaker but experienced in the subject matter.

GK3 Session ET4: Emerging Technologies Session on “Making Communities Disaster Resilient”: Kuala Lumpur, Malaysia. December 11, 2007

Attendees: Rohan Samarajiva, Nuwan Waidyanatha, Natasha Udu-gama, Vinya Ariyaratne (Sarvodaya), Michael De Soyza (Dialog Telekom), Mala Rao (WorldSpace)

The ET4: Emerging Technologies Session on “Making Communities Disaster Resilient” took place on 11 December from 16:00 to 17:30 at the Kuala Lumpur Convention Center in Kuala Lumpur, Malaysia. The session addressed how an alliance of civil society and private sector organizations since the 2004 Indian Ocean tsunami have been striving to develop a robust solution for strengthening community resilience in the face of natural disasters. Efforts have ranged from technological innovation, such as remotely activated warning devices, to field simulations. Initiated pilot projects can now provide real data to support implementation.

Panelists shared learning for regional scaling-up of these pilots through discussion, videos and actual equipment demonstrations. The pilots highlighted were the satellite radio from WorldSpace and the GSM-based warning device developed by Dialog Telekom, University of Moratuwa and Microlmage.

This session addressed the following key questions:

- What would be the new thinking on private supply of public goods, new technologies and novel forms of community involvement?
- How can the essential public good of hazard warning be produced in adequate

quantities and quality?

- Why do governments appear to have other priorities? How can communities organize themselves to become disaster resilient?
- How can the Common Alerting Protocol (CAP) be successfully implemented in a multi-technology, multi-language, multi-country environment like the Bay of Bengal region?

Panelists included:

- Vinya Ariyaratne, Executive Director, Sarvodaya Shramadana Movement of Sri Lanka
- Natasha Udu-gama, Former Consultant, Sarvodaya Community-based Disaster Management Centre / HazInfo Project Dissemination Manager, LIRNEasia
- Nuwan Waidyanatha, Project Manager, LIRNEasia
- Mala Rao, Manager Closed User Group Solution, WorldSpace Corporation (India)
- Michael De Soyza, Senior Manager, Corporate Responsibility and Public Policy, Dialog Telekom PLC

Moderator:

- Rohan Samarajiva, Executive Director, LIRNEasia

***CPRsouth2 “Empowering rural communities through ICT policy and research”:
Chennai, India, December 15-18, 2007***

Attendees: Rohan Samarajiva, Nuwan Waidyanatha, Natasha Udu-gama

The HazInfo project was presented during session 5 “National and Regional Innovation Systems” on December 15, 2007. Nuwan Waidyanatha presented his paper on “Last-Mile Hazard Warning System in Sri Lanka: Performance of the ICT First Responder Training Regime” and Natasha Udu-gama presented her paper on “A Last-Mile Hazard Warning System for disaster risk reduction in Sri Lankan villages: Community organization”.

Nuwan Waidyanatha’s paper explained that the Sri Lankan experience shows that the LM-HWS is neither efficient nor effective without competent human capacity at the message-relays: Hazard-Information-Hub and Last-Mile Communities; a necessary condition to supplement the deficit of an end-to-end automated alerting system. Despite the training that was offered to the Hazard-Information-Hub Monitors and Community ICT Guardians; their performance was well below the 95% benchmark. The project identifies that the Common Alerting Protocol intensive ICT based last-Mile alerting and notification system requires periodically repeated training and certification to improve the reliability and effectiveness of the human resources who are entrusted with mission critical LM-HWS processes.

Natasha Udu-gama’s paper discussed the hypothesis during the pilot phase that purported Sarvodaya level 4 villages would use and perform better with the ICTs than levels 1-3. Evidence found through the pilot demonstrates the congruity between highly organized communities and a better understanding and adoption of

wireless technologies. It addressed why community organization is significant to Sarvodaya and the HazInfo project within the context of disaster risk reduction, preliminary findings from the pilot supporting this argument, and policy recommendations for stakeholders.

GK3 Session Paper – “Promoting Community Disaster Resilience through Technology, Training and Community Empowerment: The HazInfo Experience”

GK3 organizers asked that a session paper be prepared for the “Making Communities Disaster Resilient”. The session paper entitled “Promoting Community Disaster Resilience through Technology, Training and Community Empowerment: The HazInfo Experience” discussed the main themes of community and technology defining HazInfo that have contributed to the success of the pilot and ways in which the expansion of the project may contribute to sustainability and disaster resiliency at the community level while utilizing appropriate information communication technologies (ICTs).

CPRsouth2: Empowering rural communities through ICT policy and research IIT-Madras, Chennai, India; December 14-18, 2007

Session 5 – National and regional innovation systems

Attendees: Natasha Udu-gama, Nuwan Waidyanatha

This session was chaired by Prof. Myeong Cheol Park (South Korea) and the discussant was Prof. Harmeet Sawhney (USA). Three papers were presented by Nuwan Waidyanatha (Sri Lanka) on ‘Last-Mile Hazard Warning System in Sri Lanka: Performance of the ICT First Responder Training Regime’, Natasha Udu-gama (Sri Lanka/USA) on ‘A Last-Mile Hazard Warning System for disaster risk reduction in Sri Lankan villages: Community organization’, and Bernard Francis Chogi (Kenya) on ‘The impact of mobile phone technologies on Medium and Small Enterprises/Jua Kali (MSEs).’

Nuwan Waidyanatha’s presentation on the Last-Mile Hazard Warning System (LMHWS) in Sri Lanka focused on the lessons learned during the pilot phase of the project, which established the networking capability for 30 tsunami-affected communities with a heterogeneous deployment of five ICTs. One of the key lessons was the fact that the LM-HWS was neither efficient nor effective without competent human capacity at the message-relays, a necessary condition to supplement the deficit of an end-to-end automated alerting system. Nuwan’s presentation showed that despite their training, the ‘First Responders’ performance was well below the 95% benchmark.

The presentation made by Natasha Udu-gama, on the same test case described above by Nuwan, provided insight into the organizational aspects of the pilot. Natasha’s study provided evidence that demonstrated the congruity between highly organized communities and a better understanding and adoption of wireless technologies deployed. The presentation also addressed why community

organization was significant to Sarvodaya and the HazInfo project within the context of disaster risk reduction, the preliminary findings from the pilot supporting this argument, and policy recommendations for stakeholders.

Francis presented the findings of a survey conducted in Nairobi, Kenya, which looked at the socio-technical dimension of using mobile phones in micro and small enterprises (commonly referred to as jua kali businesses), and the socio-economic impacts it had on the urban micro entrepreneurs in Kenya. The study also discussed the various ways in which mobile phones had transformed the micro enterprises in Nairobi.

Discussant Prof. Sawhney believed that a more comprehensive literature review should have been carried out with regard to the two disaster management papers; he was also of the opinion that the papers presented in this session were not ready for journal publication yet.

IDRC's Regional Director for South Asia and China Stephen McGurk said that he was doubtful of Sarvodaya's role and contribution to the Last Mile project; he explained that more discussion needed to be made on their contributions to the project as well as how the pilot will continue. Another participant questioned how Last-Mile project contributed to sustainability.

HazInfo Documentary: "The Long Last Mile"

"The Long Last Mile" video documentary, produced by TV-E Asia-Pacific, for LIRNEasia was completed in October 2007. The video features Sarvodaya footage from the pilot project; excerpts of interviews with Dr. Rohan Samarajiva, Executive Director – LIRNEasia, and Dr. Vinya Ariyaratne, Executive Director – Sarvodaya; and, a thorough synopsis of the methodology and technologies tested and deployed during the pilot.

HazInfo DVD Distribution

"The Long Last Mile" DVD was distributed to fifty-three (53) partners and organizations in the early warning and disaster risk reduction fields all over the world. A list of these partners and organizations can be found in Appendix B.

Conference Papers Accepted, Not Attended:

4th International Conference on Information Systems for Crisis Response and Management (ISCRAM) – Delft, 13-16 May 2007

The HazInfo paper on CAP titled "Hazard Warnings in Sri Lanka: Challenges of Internetworking with Common Alerting Protocol" has been published in the ISCRAM proceedings. The conference took place from 13-16 May 2007 in Delft, The Netherlands. The final program of the 4th International Conference on Information Systems for Crisis Response and Management available on their website. It contains the complete program, including the abstracts of all papers and presentations.

Conference was held at the Technische Universiteit Delft.

Wireless Personal Multimedia Communications (WPMC) Conference: Jaipur, India. 3-6 December 2007

The HazInfo paper titled “Last-Mile Hazard Warning in Sri Lanka: Performance of WorldSpace Satellite Radios for Emergency Alerts”, coauthored by Srinivasan Rangarajan, PhD (Senior Vice President Engineering, WorldSpace), Peter Anderson (Associate Professor, Simon Fraser University), Gordon Gow, PhD (Assistant Professor, University of Alberta), and Nuwan Waidyanatha (Project Manager, LIRNEasia) was accepted for oral/poster presentation at the Wireless Personal Multimedia Communications (WPMC) at The Birla Science and Technology Center in the heart of Jaipur, India, December 03 – 06, 2007.

WorldSpace, a lead technology partner in the HazInfo research project, field-tested 16 Addressable Radios for Emergency Alerts (AREAs) in the Sarvodaya Communities and 34 AREAs in the Sarvodaya District Centers. Although the AREA solutions lacked bi-directional communication and seemed the least effective, the AREA solution proved to be the most reliable that worked with utmost certainty and greatest efficiency even when GSM and CDMA cells were deactivated for over 2 months, at the beginning of this year, during military operations in the conflict prone North-East regions of Sri Lanka. The HazInfo research introduced a concept called “complementary redundancy”, where coupling the AREA addressable/broadcast technology with a GSM mobile phone or CDMA nomadic phone improves the overall performance (reliability and effectiveness) of the HazInfo system. The HazInfo system was used in a “live” scenario during the Bengkulu earthquake on September 12th.

Future Conferences/Workshops:

International Conference on Earthquake Engineering and Disaster Mitigation 2008 (ICEEDM): Jakarta, Indonesia, 14 April 2008

Title: “Community-based Hazard Warning in Sri Lanka: Performance of the Last-Mile Link”. Author(s): Nuwan Waidyanatha, Peter Anderson, Gordon Gow

Media Coverage:

Print –

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http://www.lbo.lk/fullstory.php?newsID=2122122686&no_view=1&SEARCH_TERM=10.

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Wattegama, Chanuka. “A Tale of Two Tsunamis: What Went Wrong in Each Case”. *Daily Mirror*. 26 December 2007. Online:
http://www.dailymirror.lk/DM_BLOG/Sections/frmNewsDetailView.aspx?ARTID=2220

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http://timesofindia.indiatimes.com/India/New_disaster_warning_technology_on_anvil/articleshow/2625862.cms.

“Tsunami: Need for early warning systems underscored”. *The Daily Star*. 2 October 2007. Online: <http://www.thedailystar.net/story.php?nid=6270>.

TV –

Interview with Natasha Udu-gama. Astro Awari Cable Television (Malaysia). 11 December 2007. Hosted by Kamurul Bahrin Haron.

Interview with Rohan Samarajiva and Dr. A. T Ariyaratne. Channel One (MTV). *Biz First*. Hosted by Harsha De Silva. 26 December 2007

7. Capacity-building

The HazInfo supplemental workshops enabled LIRNEasia’s original HazInfo project to extend its reach beyond Sri Lanka, where it was originally piloted. It has helped the organization strengthen its ties with disaster risk reduction-related university departments, research and implementing organizations. In Sri Lanka it has sparked interest within the Ministry of Disaster Management and Human Rights (MDMHR) to gather a committee of telecom providers to design a mobile solution for an effective public warning system. The Bangladesh workshop at the Bangladesh University of Engineering and Technology encouraged sufficient interest for the civil engineering department to want to replicate the project given Bangladesh’s particular hazard vulnerabilities. Upon completion of the workshop in New Delhi, India, the host (All India Disaster Mitigation Institute) developed a proposal suggesting that HazInfo be disseminated as a “road tour” to four major Indian cities that are particularly

vulnerable to a variety of hazards.

The GK3 session on “Making Communities Disaster Resilient” was a panel discussion involving the various stakeholders involved in the HazInfo project. Each gave a short description of their organization’s role in the project and the lessons learned they gained from it. The session speakers were slightly more representative gender-wise given the venue and its particular attention to attracting minority representation.

The HazInfo workshop in Indonesia was significant in that it was the only one that was organized by a predominantly female disaster risk reduction organization. Unlike earlier workshops, the participation of women was at its highest, including among speakers.

8. Project management

HazInfo supplemental project management during the six-month period was generally good. Administration was done mainly by the dissemination manager for HazInfo with financial support and expertise provided by LIRNEasia’s finance department. Technical oversight and scientific input for workshop organization and presentation design was done by both dissemination manager and HazInfo project manager. Most of this work was done virtually as the project manager is in a satellite location.

IDRC support and administration was conducted directly from its main office in Ottawa. Throughout the duration of this supplemental, interaction with Ottawa was minimal. Administrative matters included the signing of an amendment to the original contract (for the supplemental) in August and last month, request for a no-cost extension to the HazInfo supplemental to take into account changes in the schedule for the Indonesia workshop. All interactions with IDRC regarding technical support and administration went smoothly.

9. Impact

The dissemination of the HazInfo pilot project throughout nations in the region will have a profound effect on the development of early warning systems. Until now, most of the thinking in developing sound early warning systems has focused primarily upon robust technology. Monitoring and detection technologies, especially, have garnered much of the attention. This dissemination sought to educate academia, government, NGO/INGO, research, private and civil society organizations working within the field about the necessity of a community-based last-mile early warning system and the availability of technologies that would be best-suited for relaying alerts/warnings to educated and aware community members within the HazInfo pilot. HazInfo supplemental dissemination reached a level of society already knowledgeable about the basics of early warning, but not necessarily those that had worked or researched the impact of specific technologies in relaying understandable alerts to trained members of a community at-risk.

The series of workshops and additional events mainly influenced various stakeholders – from policymakers and NGOs to researchers and practitioners. The two dissemination workshops held in India and Bangladesh had more reach, rather than pure influence, than other events attended. Specifically, at the Bangladesh workshop, one of the speakers – a professor at BUET – had (at the time of the workshop) already expressed an interest in replicating the HazInfo project within the context of Bangladeshi disaster vulnerability. The Bangladeshi pilot is currently in the process of being developed with WorldSpace AREA receivers in process and pilot commencement scheduled for the end of February 2008. In regards to HazInfo’s reach in India, LIRNEasia’s partner organization, AIDMI, responded so favorably to the HazInfo presentations in Delhi that it suggested that dissemination of HazInfo findings should extend to other major India cities through a “road tour” workshop to 4 major vulnerable Indian cities. Since the Indonesia workshop has just completed [at the time of this report], the reach has yet to be ascertained. The affiliated HazInfo supplemental events within the region (and in Rome) were highly influential in educating academics, researchers and practitioners on various aspects of the HazInfo project. It is expected that through contact with several community-based organizations through the HazInfo dissemination workshops in Bangladesh, India and Indonesia, marginalized social groups such as women, minorities, poor and disabled will derive optimum benefits since these organizations will comprehend and implement ideas garnered from lessons learned in the HazInfo pilot.

10. Overall assessment

The dissemination of the “Evaluating Last-Mile Hazard Information Dissemination” pilot project through the supplemental agreement was important on a number of levels:

- 1. Provision of knowledge to the field of community-based early warning.** The HazInfo pilot is on the cutting-edge of hazard early warning systems in that it recognizes the ability of communities to make decisions on its vulnerability to disaster based on a trusted and recognized source of information through appropriate technology. Prior to this project, few had explored the appropriateness of technology within a “last-mile” community-based early warning system as a part of a national early warning system. Thus, the dissemination of HazInfo within the region was vital to expressing its unique findings and contributing to the development of sound, responsible early warning systems. Time, effort and funding towards this purpose were highly effective.
- 2. Congregation of national experts in three nations for regional cooperation on community-based early warning.** HazInfo was quite effective in garnering the necessary interest from disaster management stakeholders though the pilot was administered by a research organization specializing in telecommunications. Not only did disaster reduction and response organizations respond favorably, but so did government, academia, NGO/INGO and civil society. Moreover, HazInfo succeeded in bringing these

various actors together in national workshops for discussion on contributions of community-based early warning systems to national early warning systems as well as regional early warning.

3. **Promotion of cooperation amongst region on community-based early warning initiatives.** Although workshops were conducted in the three individual Bay of Bengal nations, LIRNEasia's organizational regional focus has promoted a regional view of community-based early warning; how organizations at the grassroots level may be able to influence policy through substantial evidence on usage of technology and training in providing an effective solution to early warning systems by incorporating community.
4. **Advocacy of HazInfo findings amongst government officials.** HazInfo has repeatedly been showcased to government so as to demonstrate the benefits of community-based early warning systems within the national public warning system. Building upon one-on-one organizational interactions with the Ministry of Disaster Management and Human Rights (MDMHR), the September 7, 2007 meeting with telecom providers and operators was a significant step in coordinating and advising telecom providers about their potential contribution to early warning. Although provisions were made to initiate a working committee to outline and provide a solution to the issuance of public warning through the use of cell broadcasting, no further action has since been taken. However, LIRNEasia continues to lobby and discuss the issue with the MDMHR through sharing of the HazInfo dissemination paraphernalia and activities.

11. Recommendations

With the conclusion of the HazInfo supplemental on 31 March, 2008, there are a number of recommendations that can be made based on this extension as well as the original HazInfo project.

- **Dissemination of HazInfo should go beyond national workshops to a regional workshop.** A regional workshop would enhance both the reach and influence HazInfo can have on development of an early warning system(s) that account for the last-mile and are community-based.
- **Expansion of HazInfo national workshops.** Workshops should be held in other countries within the region, not just the Bay of Bengal region.
- **Encourage a HazInfo Workshop "Road Tour".** This "road tour" concept was proposed to LIRNEasia from its HazInfo workshop partner in India, AIDMI. Basically, it would be a traveling group of HazInfo experts and affiliated experts who would conduct workshop/demonstrations in several other major (Indian) cities at-risk in more public venues targeting more than just other experts, researchers, policymakers and regulators. The goal would be to mainstream the concept of "last-mile" community-based early warning systems with other community-based NGOs as well as the general public.

- ***Provide support for an Internet database on “last-mile” early warning systems.*** Currently, a comprehensive database on projects/initiatives in this area is lacking. Not only would such a website, feature HazInfo, it would also enable greater cooperation and coordination of existing projects towards a more meaningful and substantial regional workshop should one be held. Eventually, this may enable “last-mile” emergency telecommunications to influence existing regional early warning systems (i.e. IOTWS).

Appendix A: Proposed Participants for HazInfo Indonesia Workshop

Proposed participants include:

- BAKORNAS PB-National Disaster Management Coordination or its replacement
- BMG Bureau for Meteorology and Geophysics
- Indonesian Institute of Sciences- LIPI
- BPPT-National Board for Development and Application of Technology
- Directorate General of Geology
- Directorate of Vulcanology
- Government Institutions related to the community preparedness:
- Directorate General of Social Protection, Ministry of Social Affairs
- Directorate General of Social Assistance, Ministry of Social Affairs
- Directorate General of Social Empowerment, Ministry of Social Affairs
- Directorate General of Community Empowerment of Ministry of Home Affairs (MOHA)
- Directorate General of Governance Affairs, Directorate of Disaster Management, MOHA
- Directorate of Community Protection and Nation Unity, MOHA
- Ministry of Public Works
- Ministry of Health
- Ministry of Education
- Ministry of Environment

- Ministry of Energy and Mineral Resources
- Ministry of Women Empowerment

Universities having faculty or research institute or Section on disaster management:

- Center of studies for disaster - Gadjahmada University, Yogyakarta
- Center of Studies for earthquakes- Institute of Technology of Surabaya
- Center of Studies for conflict and disaster mitigation- Tadulako
- University-Palu, Central Sulawesi
- Center Study of disaster-Bandung Institute of Technology-West Java
- Faculty of Disaster Management-University of Krishna Dwipayana-Jakarta
- University of Jember- East Java
- University of Malang-East Java
- University of Syiah Kuala-Aceh
- University of Indonesia-Jakarta
- CARE IPB, Institute of Agriculture of Bogor-West Java

NGO and UN Agencies:

- CRS
- CARE
- OXFAM
- MPBI
- Community Association of Merapi Mountain (Sabuk Gunung Merapi-related to volcanic eruptions)
- Local NGO of East Java (take care of hot mud flow)
- Local NGO of Padang (take care of earthquake Bengkulu and West Sumatra)
- Local NGO of Aceh (take care of Tsunami in Aceh/Nias)
- UN-OCHA
- UNDP
- UNICEF
- UNESCO

Appendix B: Distribution of HazInfo DVDs

“The Long Last Mile” has been distributed to the following partners/organizations:

1. Dr. Mehedi Ahmed Ansary, BUET
2. Dr. S. Rangarajan, WorldSpace
3. AJJDC
4. Dr. Vinya Ariyaratne
5. All India Disaster Mitigation Institute
6. Tamil Nadu Tsunami Resource Centre
7. Prof. Pete Anderson, Simon Fraser University
8. Dr. Gordon Gow, University of Alberta
9. GK3 South Asia Pavilion
10. Government of Maldives
11. Vijay Pratap Singh Aditya, Ekgaon Technologies
12. GK3 “Making Communities Disaster Resilient” session participants
13. Mr. Michael De Soyza, Dialog Telekom
14. Ms. Mala Rao, WorldSpace
15. Dr. Lareef Zubair, IRI – Columbia University
16. Dr. Kathleen Tierney, Natural Hazards Center, University of Colorado
17. Mr. Sanjana Hattotuwa
18. Prof. Dr. Sudhir K. Jain, Dean & Professor, IIT-Kanpur

19. Mr. Terry Jeggle, UNISDR
20. Dr. A. S. M. Maksud Kamal, UNDP-CDMP, Bangladesh
21. Mr. Mostafa Kamal, Bangladesh
22. Mr. Ravi Kandage, Director – Shanthi Sena, Sarvodaya
23. Mr. Samerendra Karmaker, BMD, Bangladesh
24. Mr. Shisir Khanal, Executive Director, Sarvodaya USA
25. Mr. Spiros Konstantakos, IDEP, Indonesia
26. Dr. Frederick Krimgold, Director – DRR, Virginia Tech, USA
27. Mr. Rahul Kumar, WorldSpace India
28. Mr. Barjor Mehta, World Bank
29. Mr. Mehrun Nessa, SPARSSO, Bangladesh
30. G. Padmanabhan, UNDP, India
31. UNISDR, Switzerland
32. UN-ISDR, Platform for the Promotion of Early Warning, Germany
33. Ms. Meenakshi Ahluwalia, UNDFW, India
34. Ms. Wahida Bashar Ahmed, Action Aid Bangladesh
35. Monowar Hussein Akhand, Ministry of Establishment, Bangladesh
36. Dr. Nihal Attapattu, Canadian High Commission, Sri Lanka
37. Dr. B. K. Bandyopadhyay, IMD, India
38. Mr. Teddy Boen, Earthquake Engineer, Indonesia
39. Ms. Zoe Chafe, Worldwatch Institute, USA
40. Shri G. M. Dar, J & K Institute of Management, India
41. Prof. Dileeka Dias, University of Moratuwa, Sri Lanka
42. Mr. Laurent Elder, IDRC, Canada
43. Mr. Theo Fernando, ICET, Sri Lanka
44. Mr. Michael Renner, Institute for Environmental Security, USA
45. Mr. Satya Sagar, India
46. Jean Slick, Canadian Red Cross, Canada
47. Mr. Man Thapa, DRR Advisor, UNDP, Sri Lanka
48. Dr. John Twigg, Benfield UCL Hazard Research Center, UK
49. Major General Gamini Hettiarachchi, Director General, Disaster Management Centre, Sri Lanka
50. Dr. Ananda Mallawatantri, Asst. Resident Rep., UNDP Sri Lanka
51. Dr. Cosmos Zavazava, Head, BDT, ITU, Switzerland
52. Mr. Md. Nasir Ullah, Director, CPP, Bangladesh Red Crescent Society
53. Mr. Kamaruzzaman, Program Coordinator, BNNRC, Bangladesh