SUMMARY OF THE MOBILISE CONSORTIUM EVENT

Mount Lavinia Hotel, Mount Lavinia, Sri Lanka.

27th - 28th February 2018

Prepared by

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Finally, on the behalf of the MOBILISE consortium team we express our special thanks to the Honourable Minister Anura Priyadarshana Yapa, Minister of Disaster Management, Ministry of Disaster Management, Government of Sri Lanka; the Honourable Sarath Ekanayake, the Chief Minister of the Central Provincial Council; Mr Kingsley Fernando, Secretary of the Minister of Disaster Management, Government of Sri Lanka; Mr. R. P.Samarakkody, Additional Director General of Disaster Management Centre, for their participation and their valuable remarks at the MOBILISE consortium event.

MOBILISE Consortium Team

24th March 2018

THE MOBILISE PROJECT

The MOBILISE project, funded by the Global Challenges Research Fund (GCRF) in the UK, is developing a digital infrastructure that can offer intelligence to a range of agencies to work together to reduce the impact of natural disasters on communities. The project is focusing on the challenges faced by three low-/middle-income countries (LMICs), namely Sri Lanka, Pakistan and Malaysia. These countries are frequently affected by a multitude of natural hazards including floods, landslides, cyclones, droughts and earthquakes and, therefore, have been chosen as the focus for this research project to capture a broader set of disaster risk conditions and governance requirements common to LMICs.

The MOBILISE project aims to address the priority number two of the Sendai Framework for Disaster Risk Reduction (2015-2030) which is to strengthen disaster risk governance to manage disaster risk and also contributes to the remaining three priorities (understanding disaster risks, investing in disaster risk reduction for resilience and enhancing disaster preparedness for effective response). Furthermore, the MOBILISE project addresses three recommendations specified by the United Nations Economics and Social Commission for Asia and the Pacific (UN/ESCAP) which are (a) Urban resilience which needs urgent attention; (b) Capitalising on innovative space technology applications and emerging technologies, and (c) Political leadership for the success of disaster risk reduction and management. The MOBILISE project will directly contribute to three UN Sustainable Development Goals: Sustainable Cities and Communities (SDG 11), Partnerships for the Goals (SDG 17) and Industry Innovation and Infrastructure (SDG 9).

What is MOBILISE developing?

- ✧ Digitally-enhanced multi-agency collaboration models;
- ✧ Resilience frameworks that can measure resilience;
- ✧ Digital approaches for modelling community & infrastructure vulnerability;
- ✧ Modelling of the cascading effect of disasters;
- ✧ Social media and real-time intelligence gathering to support disaster response;
- ✧ 3D visualisation of real-time satellite data for constructing live disaster events to support disaster response.

Who are the Key Partners of MOBILISE?

Academic Partners : University of Salford, UK University of Moratuwa, Sri Lanka University of Colombo, Sri Lanka University of Peshawar, Pakistan Universiti Tun Hussein Onn, Malaysia	**UK Steering Committee** ResilienceDirect The Civil Contingencies Secretariat Cabinet Office The Civil Contingency and Resilience Unit, Greater Manchester The Environment Agency Satellite Applications Catapult Ltd Telespazio Vega Ltd Secure Information Assurance Ltd
Sri Lankan Steering Committee Federation of Sri Lankan Government Authorities (Chair) Disaster Management Centre (DMC), Ministry of Disaster Management Asian Disaster Preparedness Centre (ADPC), Sri Lanka Office Centre for Governance Innovations International Union for Conservation of Nature (IUCN)	**Malaysian Steering Committee** National Disaster Management Agency (Chair) Melaka Historic City Council Construction Research Institute of Malaysia Putrajaya Holdings, Putrajaya Batu Pahat Municipal Council Telekom Malaysia Microcorp Sdn Bhd South East Asia Disaster Preventative Research Initiative (SEADPRI) The Construction Research Institute of Malaysia
Pakistan Steering Committee Provincial Disaster Management Authority, Government of Khyber, Pakhtunkhwa (Chair) Jehanghira Union Council, District Nowshera Inaratech-Pakistan Nowshera Rural Development Foundation-Pakistan	**Regional and International Partners** Asian Disaster Preparedness Center (ADPC), Thailand The Rockefeller Foundation – 100 Resilient Cities

INTRODUCTION TO THE MOBILISE EVENT

This two day event was organised by the MOBILISE project consortium (http://www.mobilise-project.org.uk/) in collaboration with the Disaster Management Centre, Ministry of Disaster Management in Sri Lanka. It brought together international researchers, policy makers and practitioners to discuss how multi-agency collaboration could be enhanced through advanced digital technology to reduce disaster risk and to enhance local resilience targets as specified in the Sendai Framework for Disaster Risk Reduction (SFDRR 2015-2030).

The two day event was attended by over 150 experts from 48 organisations and comprised presentations from ministers, academics and practitioners as well as interactive workshops, panel sessions and discussions to explore subject areas such as resilience frameworks, multi-agency collaboration models, current disaster risk reduction practice and challenges, and state-of-the-art in technology that can enhance multi-agency collaboration and community engagement.

The technology explored during the MOBILISE event include space technology, web platforms, advanced visualisation, risk information databases, mobile technologies and community engagement. Furthermore, the MOBILISE team demonstrated the first prototypes of their multi-agency collaboration platform as well as a Virtual Reality (VR) training environment for early responders.

The following sections present a brief summary of the MOBILISE project, the agenda and the key presentations that were delivered during the two day event.

MOBILISE Knowledge Co-Creation Workshop on Disaster Resilience

Mount Lavinia Hotel, Mount Lavinia, Sri Lanka.

27th February 2018

AIM & AGENDA

The aim of the first day of the event was to present and refine the current findings of the MOBILISE project. Specifically, this workshop aimed at discussing and developing ideas for the following themes:

✧ The Sri Lankan approach to implementing the Sendai Framework & extending the discussion to the Malaysian and Pakistan context.

✧ A resilience framework for Sri Lanka.

✧ Multi-agency collaboration approach in Sri Lanka; new possibilities.

✧ Digital platforms for disaster risk reduction and response; assessing the MOBILISE approach for a creating a digital platform for DRR in Sri Lanka.

✧ State-of-the-art in digital technology for community engagement during disaster response; a possible approach for Sri Lanka.

The agenda used for addressing these themes is presented below.

Workshop Agenda

Tuesday, 27th February 2018	
8.00am-08.30am	Registration and Coffee
8.30am – 8.40am	Welcome Speech, Hon. Sarath Ekanayake, Chief Minister, Central Provincial Council
8.40am-9.00am	Introduction to MOBILISE and Workshop Objectives (Prof. Terrence Fernando, University of Salford)
9.00am- 11.00am	**Session 1 : Towards Operationalising a Resilience Framework (Chair: Dr. Chaminda Pathirage, University of Salford)** The Sendai Framework and expected measurable outputs, Mr. Chandradasa Wijesekara (15 mins) Towards a working definition of resilience, Dr. Komal Aryal (10 mins) Participatory Activity 1 – Discussion and agreement on a working definition (30 mins) Current resilience frameworks, Dr. Komal Aryal (10

	mins) Participatory Activity 2 : Discussion on categories and components of a resilience framework (40 mins) Reporting and way forward (15 mins)
11.00 am–11.30am	Coffee Break & Group Photo
11.30am-1.00pm	**Session 2 : Panel session on Multi-agency Collaboration Models (Chair: Prof. Terrence Fernando)** **Panel Members:** Mr. Jon Percival, Greater Manchester Resilience Forum, United Kingdom Prof. Siri Hettige, Department of Sociology, University of Colombo, Sri Lanka Dr. Senaka Basnayake, Asian Disaster Preparedness Centre, Thailand Captain Rohitha Abeysinghe, Sri Lankan Navy Mr. Chathura Liyanaarchchi, Disaster Management Centre
1.00pm – 2.00pm	Lunch
2.00pm – 3.30pm	**Session 3 : Digital Platforms for Supporting Disaster Risk Reduction and Resilience (Chair: Mr Juan Carlos Villagrán de León, UN-SPIDER, Germany)** Current use of digital technology in DRR in Sri Lanka (Srimal Samansiri) (20 mins) Towards a digital platform for supporting disaster resilience : MOBILISE Approach (Prof. Terrence Fernando) (30 mins) Interactive Idea Capture Session & Discussion (40 mins)
3.30pm	Coffee Break

4.00pm – 5.15pm	**Session 4 : Community Engagement Platforms (Chair: Prof. Siri Hettige, University of Colombo)** Brief introduction to open platforms (Mr. Hisham Tariq) (20 mins) Sri Lanka Red Cross Society (Mr. Sudath Madugalle) – (20 mins) Municipal Commissioner of Matara, Mr. Senaka Palliyaguruge (15 mins) Discussion (20 mins)
5.15pm – 5.30pm	Emerging National Disaster Management Plan – Mr. Nuwan Madawan Arachchi, Disaster Management Centre
5.30pm	Close

Summary of the Presentations

The structure of the day comprised an opening session and four sessions that explored (1) operationalisation of the resilience framework, (2) a multi-agency collaboration model, (3) digital platforms for supporting disaster risk reduction and response, and (4) community engagement platforms. A summary of these sessions is presented below.

Opening Session

Professor Terrence Fernando, Director of the THINKlab at the School of the Built Environment, University of Salford and the Principal Investigator of the MOBILISE project opened the meeting, welcoming the Special Guest, the Hon. Sarath Ekanayake, the Chief Minister of the Central Provincial Council, Sri Lanka, and all participants.

Firstly, Professor Terrence Fernando invited Hon. Sarath Ekanayake to make the opening remarks. As a special guest of the event, Hon. Sarath Ekanayake, the Chief Minister of the Central Provincial Council, Sri Lanka, congratulated Prof. Terence

Fernando and his team for securing funding from the Global Challenges Research Fund (GCRF) and the Engineering and Physical Sciences Research Council (EPSRC) to work in Sri Lanka in partnership with academics and researchers from Pakistan and Malaysia. Acknowledging the support from the government of the United Kingdom, Hon. Chief Minister Sarath Ekanayake further highlighted the need for digital technologies to strengthen disaster management at the local level in Sri Lanka and assured of his, and his government's, full cooperation with the project.

Professor Terrence Fernando then spoke about the MOBILISE project initiative, emphasising that the main aim of the MOBILISE project is to facilitate disaster risk governance in Sri Lanka, Pakistan and Malaysia. Prof. Fernando also presented the planned research activities and highlighted how the project is planning to exploit earth observation technologies, big data platforms, mobile technologies, virtual reality and web-based information-sharing platforms to strengthen local disaster risk and resilience governance in low- and middle-income countries in partnership with industry and with the relevant government organisations and Universities.

Prof. Fernando presented the key objectives of the MOBILISE project as:

- Assessing current multi-agency collaboration approaches and proposing a collaboration model/approach that can promote better collaboration using digital technologies and co-ordination processes.
- Establishing a digital platform that can combine both remote sensing data and in-situ data to assess vulnerabilities and build disaster resilience.
- Establishing a community engagement platform.
- Using real-time satellite data for disaster response.
- Creating a computer simulation model that can capture the cascading effects of disasters which will allow the team to understand the dependencies of vulnerabilities and to decide how best to reduce them.

Session 1: Towards Operationalising a Resilience Framework

This session was chaired by Dr. Chaminda Pathirage, the Director of the Disaster Management Centre at the University of Salford and a Co-Investigator of the

MOBILISE project. The main purpose of this session was to understand how Sri Lanka is responding to the DRR priorities promoted by the Sendai Framework and also how to develop a resilience framework that can be operationalised in Sri Lanka. The session had two presentations and interactive workshop sessions. A summary of the outcome of this session is presented below.

Mr. U. W. L. Chandradasa (representing Miss Anoja Seneviratne from the Disaster Management Centre, and Ministry of Disaster Management Sri Lanka) opened this session by giving a presentation on "The Sendai Framework and expected measurable outputs". He first presented figures showing how the number of affected people is increasing due to various disasters such as floods, landslides, high wind and droughts in Sri Lanka and then presented ambitious national targets for reducing the impact of these disasters by 2030. These targets include:

- Halving the annual average disaster mortality by 2030;
- Halving the number of affected people by 2030;
- 50% reduction in direct disaster economic loss in relation to gross domestic product (GDP) by 2030;
- 75% reduction of disruption of education for children during a disaster by discouraging the use of school buildings as safe centres;
- 80% of district offices and local authorities having adopted disaster risk reduction strategies;
- Enhancement of international cooperation by 50;
- Ensuring that the total population at risk is covered by multi-hazard early warning systems.

Furthermore, Mr. Chandradasa presented the activities that are required to implement the four priorities of the Sendai Framework, which include:

Priority 1: Understanding Disaster Risk

- To promote the collection, analysis, management and use of disaster-related data and information.
- To encourage strengthening the baseline and assessing disaster risks, vulnerability, exposure, hazard characteristics and their possible effects.
- To develop and update location-based disaster risk information including maps, and

dissemination to all categories of personnel.

- To make non-sensitive hazard exposure, vulnerability, risk, disaster and loss-desegregated information freely available.
- To promote real time access to data.
- To build up the knowledge of government officers at all levels on disaster risk reduction.
- To promote collaboration in disaster risk knowledge in formal and non-formal education.
- To promote investment in innovation and technological development in multi-hazard solutions driven through research in disaster risk management.

Priority 2: Strengthening disaster risk governance

- To mainstream and integrate disaster risk reduction within, and across, all sectors.
- To review and promote the coherence and further development of disaster legislation, regulation and laws at national and local levels.
- To adapt and implement national and local disaster reduction strategies and plans.
- To reduce existing risks and strengthen economic, social, health and environmental resilience.
- To conduct assessments of technical, financial and administrative capacities with regard to disaster management at local and national levels.
- To encourage justified complaints regarding laws and regulations relating to land-use, urban planning, building codes, and environmental, health and safety standards.
- To develop and strengthen mechanisms to assess the public records on the progress of national and local plans on disaster risk reduction.
- To assign clear roles and tasks to community representatives within disaster management institutions and processes.
- To establish and strengthen national and local platforms for disaster risk reduction
- To empower local authorities with respect to regulatory and financial needs to work in disaster risk management at local levels.
- To formulate policies and regulations addressing the issues of preventing human settlements in disaster risk prone zones.

Priority 3: Investing in disaster risk reduction for resilience

- To allocate the necessary resources for the development and implementation of disaster risk reduction strategies, policies and plans.
- To promote mechanisms for disaster risk transfer and insurance, risk sharing.
- To strengthen disaster resilience in public and private investments particularly in schools, hospitals and physical infrastructure.
- To promote the disaster risk resilience of work places through structural and un-structural means.
- To promote disaster risk assessment in land use policy, development, urban planning and rural development.
- To encourage the revision of existing building codes and standards with a view to ensuring disaster resilience structures.
- To enhance the resilience of national health systems.
- To increase business resilience and the protection of livelihood and production assets.
- To promote and integrate disaster risk management approaches throughout the tourism industry.

Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better"

- To prepare, review and update disaster preparedness and contingency plans and programmes.
- To develop and maintain people-centered multi-hazard forecasting and early warning systems, disaster risk and communication mechanisms.
- To promote the resilience of water supply, transportation, telecommunication, education and health facilities.
- To promote public awareness and the material necessary to implement rescue and relief activities.
- To develop public policies and actions supporting the strengthening and coordination of funding mechanisms for relief and disaster recovery.
- To promote regular disaster preparedness, response and recovering exercises including evacuation drills.
- To incorporate disaster risk management into post-disaster, recovery and

rehabilitation processes.

- To consider the relocation of public facilities and infrastructure outside the disaster-prone areas.
- To establish a mechanism for creating databases of mortality caused by disaster in order to assist in preventing the mobility and mortality
- To enhance the recovery schemes that will provide psycho-social support and mental health services for all people in need.

However, there are many challenges to implementing these recommendations in Sri Lanka according to Mr. Chandradasa. The challenges are:

- Slow progress in mainstreaming DRR into sectorial development plans.
- Non-availability of profiles of frequently occurring hazards, vulnerability and exposure.
- Reluctance of agencies to share data.
- Non-availability of DRR-related regulations.
- Legal provisions to involve Local Government Authorities in Disaster Risk Reduction are not available.
- The trend of increasing dependency on relief adversely affecting the resilient capacity of communities.
- The awareness of communities and government agencies on disaster risk and risk reduction measures is low.
- The private sector is more actively involved in response and not in risk reduction activities or in building the resilience capacity of communities and agencies.
- A loss of confidence on disaster insurance schemes.

Mr. Chandradasa's presentation was followed by a brief presentation from Dr. Komal Aryal from the THINKlab, University of Salford. He presented his report on the characteristics and components of the available resilience frameworks and the application of these frameworks in building resilience in various parts of the world. Dr. Aryal summarised his findings and compared them with the categories and characteristics of the Community Resilience Framework developed by the Disaster Management Centre, Ministry of Disaster Management Sri Lanka.

Following these presentations, Dr. Chaminda Pathirage, Dr. Aryal and Mr. Tariq Hisham coordinated a digital participatory exercise (DPE) to agree on a community resilience definition in the context of Sri Lanka and to enhance the current existing community resilience framework with the workshop participants. The main objective of the exercise was to enhance the existing community resilience framework prepared by the Disaster Management Center, Sri Lanka.

The following ideas were derived from this exercise:

Resilience Definition:

Resilience is the ability of individuals, households, communities, nations and systems to absorb and recover from sudden disruptive incidents, whilst positively maintaining, adapting and transforming their behaviour, physical structures and means for living in the face of long term stresses, change and uncertainty.

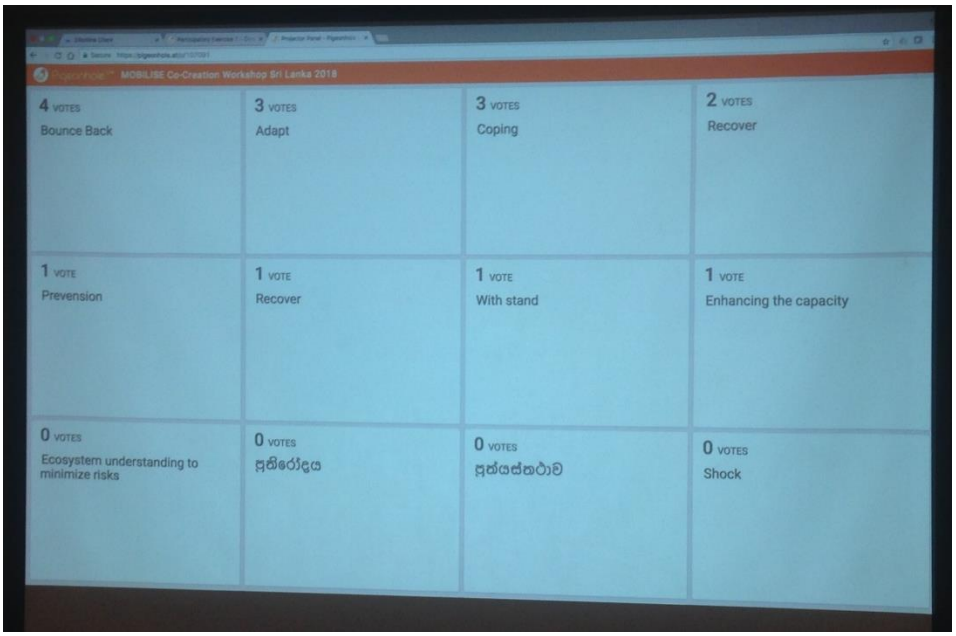

Photo (above): Digital Participatory Exercises (DPE)

Photo (above): Workshop participants discussing the components of the Sri Lanka Community Resilience Framework.

The participants agreed to include the following components under five categories within the Sri Lanka Community Resilience Framework developed by the Disaster Management Center, Ministry of Disaster Management Sri Lanka. They are:

Category	Current Components	Participants added during the MOBILISE event Feb. 2018
Human	• Food security • Health & education	• Volunteerism • Public awareness • Protection (vulnerable and marginalised population)
Environmental	• Land use • Access to Natural Resources • Ecosystem Sustainability	• Environmental hazards and risk auditing
Social	• Communication • Support networks • Organisation • Inclusion • Cohesion	• Multi-Faith groups participation • Communal assets sharing • Simulation/First aid exercise
Physical	• Structures • Water supply • Sanitation • Road	• Local geo-technical sknowledge • Religious places • Open spaces

Economic	• Income security, • Access to market and employment • Livelihood diversity and flexibility • Financial service • Land tenure	• Risk insurance • Soft loan and financial aid to small and medium scale industries.

Session 2: Panel Session on Multi-agency Collaboration Models
(Chair: Prof. Terrence Fernando)

Session 2 was delivered as a panel session comprising experts who had experience of working with many stakeholders in disaster management and responding to disasters. The panel comprised Mr. Jon Percival, Greater Manchester Resilience Forum, United Kingdom; Prof. Siri Hettige, Department of Sociology, University of Colombo, Sri Lanka; Dr. Senaka Basnayake, Asian Disaster Preparedness Centre, Thailand; Captain Rohitha Abeysinghe, Naval Operations & Maritime Special Forces, Sri Lanka; and Mr. Chathura Liyanaarchchi, Disaster Management Centre.

The panel session started with two brief presentations from Captain Rohitha Abeysinghe and Mr. Jon Percival. In his presentation Captain Rohitha Abeysinghe shared his 2016-2017 flooding response experiences in the Ratnapura district and highlighted the importance of civil and military cooperation during major disaster responses. He shared key lessons learned during the 2016-2017 flooding events.

Captain Abeysinghe stated that to a large extent the 2016 and 2017 floodings were partially linked to the El *Niño* phenomenon, which had affected Asia and the Pacific region. Initially, Sri Lanka had experienced lower than average rainfall (with prolonged water storage required and drought) which was then followed by sudden heavy rains and storms causing floods and landslides. According to Captain Abeysinghe, a large number of NGOs, CBOs and volunteers were supporting humanitarian relief; however due to lack of proper communication between the organisations involved the effective and transparent distribution of humanitarian relief was highly challenging.

Mr. Jon Percival, Greater Manchester Resilience Forum, United Kingdom, made a presentation on how multiple agencies work together to reduce and manage disaster in the UK through local resilience forums. He also talked of recent disasters which had occurred in the United Kingdom and the lessons learned from these disasters. Mr. Percival stressed that, in strategic terms, comprehensive measures are required to address risk and response governance. Local risk reduction must be addressed using existing policies and the countermeasures for strengthening local responses need to be implemented through international partnerships. Mr. Percival stressed the importance of knowledge-sharing between first responders, policy makers and academics to plan for effective future disaster response collaboration.

Prof. Fernando asked the panel members to elaborate on the following points:

- What are the barriers to collaboration within the current organisational structures that exist within Sri Lanka?
- What are the barriers that exist in terms of data and knowledge sharing within Sri Lanka?
- How can the MOBILISE project help in terms of overcoming these technical and organisational barriers?

During the discussion, the panel members raised the following points that needed addressing:

- **Knowledge Management**: At present there is not enough information on risks and vulnerability. Furthermore, there is a reluctance to share data among organisations. Therefore, it is important to explore a well thought-out knowledge management approach to creating, sharing and using knowledge for DRR and response. Such a knowledge management system could help organisations to identify risks and act as well as using this intelligence to support urban development and to 'build back better'.
- **Multi-agency Collaboration**: There is a need to strengthen the collaboration among agencies. It is important to explore how to strengthen collaboration within vertical structures (within an organisation) as well as collaboration across horizontal structures (different ministries). Further investigation is required to understand the

barriers to coordination and communication (including information sharing) to better prepare and respond to disasters.

- **Simulation Exercises**: The panel members felt there are many simulation exercises to make sure that agencies are well prepared for response. However, it was felt that these simulation exercises could be enhanced to bring greater realism though advanced digital technologies.
- **Open Risks Data**: There is a need for freely available risks data in Sri Lanka. Much post disaster assessment is qualitative in nature and is not representative of the entire affected population. Freely available risks data in pre-disaster situations can help to prepare as well as enhance effective recovery process.

Session 3: Digital Platforms for Supporting Disaster Risk Reduction and Resilience (Chair: Mr Juan Carlos Villagrán de León, UN-SPIDER, Germany)

Mr. Srimal Samansiri, Assistant Director, DMC Sri Lanka, gave a presentation on Sri Lanka's national disaster management information system. The presentation covered an account of the occurrence of past disasters, national hazard and risk assessment, the Disaster Management Center's local risk and hazards' information dissemination activities, disaster related legislation, earth observation capability in disasters etc. He particularly emphasised the detailed exposure mapping work in the area of Manmunai North in the Batticalo district as well as in Attanagalu Oya. Following a recommendation from UNISPIDER TAM, progress has been made to establish a data sharing agreement through the Disaster Risk Information Platform (RISK INFO)

Mr. Srimal Samansiri's presentation was followed by a presentation from Prof. Terrence Fernando who presented on the key technological areas that the MOBILISE project is planning to address. In his early remarks he emphasised the need for risk-sensitive urban development information, stakeholder collaboration, shared intelligence-driven intelligence and a consideration of cities as complex systems in order to address the four priority areas of the Sendai Framework. He then presented the four technical research challenges that the MOBILISE project aims to address, which are:

- Extracting value out of data to support risk-sensitive urban development through data fusion, data analytics, and making data human-centric with appropriate data governance mechanisms in place.
- The creation of dynamic city models for offering sustainable city services by exploiting the advances of low-orbit satellite technology, sensor technology and social media.
- The exploitation of 3D satellite data for disaster response and training.
- The use of modelling techniques for capturing the dependencies in social, economic, physical and environmental systems in a city.

Prof. Fernando also presented the state of the art in current digital platforms, such as GeoNode and OpenGeo, GeoMesa, GeoTrellis which have been developed for supporting large-scale GIS data sets in disaster management applications. He then demonstrated the first prototype of the MOBILISE platform which is capable of integrating hazard and vulnerability data from a range of sources such as sensors, satellites, in-situ data from distributed data bases, social media, mobile apps etc. The current platform has already been integrated with the RISK INFO platform that was presented by Mr. Samansiri. In addition, the platform provides access to real-time sensor data to monitor river levels, water speed, wind speed as well as satellite images from remote satellite databases to get real-time information on rapid and slow onset disasters.

These two presentations were followed by an interactive session. The key questions posed to the audience were:

- What are the key limitations of the current digital platforms employed in Sri Lanka?
- What technical challenges can the MOBILISE project address that can contribute to the creation of an advanced technology platform for DRR and disaster response in Sri Lanka?
- What case studies should we use to test our technical prototypes?

The key messages resulting from the discussions were:

- RISK INFO is a good step in the right direction since much work is being carried out to collect and publish risk data. However, further work is required to make these platforms more human- and team-centric to promote collaboration among agencies.
- The incorporation of real-time data is a valuable aspect since it can help teams to get a true picture of what is happening on the ground.
- MOBILISE can help to support the integration of data sets from other agencies to build up a holistic view of the vulnerabilities and potential hazards.
- The use of VR with display devices (such as touch tables and VR head up displays) in presenting complex datasets can help teams to build a common understanding of the risks as well as to respond better.

Session 4: Community Engagement Platforms (Chair: Prof. Siri Hettige, University of Colombo)

The session comprised three presentations by Mr. Hisham Tariq, THINKlab, University of Salford; Mr. Sudath Madugalle, Sri Lanka Red Cross Society, and Mr. Senaka Palliyaguruge, Municipal Commissioner of Matara.

Mr. Hisham Tariq, Researcher from the THINKlab, University of Salford, presented the concept of digital humanitarianism and illustrated how current technologies such as sensors, mobiles, satellites and crowd sourcing can be a useful tool for responding to disasters by volunteers. He also presented the following three digital platforms:

- Ushahidi Platform: This platform was founded by a group of Kenyan entrepreneurs in 2008 to capture intelligence from social media. This platform has been used in 90,000 projects in 159 countries in 31 languages.
- Tomnod Platform: This platform has been used to attract crowd sourcing efforts to assess satellite images for damage assessment.
- Kobo Toolbox: This system has been used for crowd sourcing to collect information to build up a better understanding of a disaster situation on the ground.

Mr. Sudath Madugalle from the Sri Lanka Red Cross Society (SLRCS) introduced

the vision of the SLRCS which is " *to create safer and resilient communities that live in peace and harmony" and its mission is "*to *reduce risk, build a culture of safety enhanced coping capacities through promoting volunteerism, strengthening resource mobilisation and reinforcing the Red Cross role through partnership and advocacy".* He described how SLRCS conducted community building projects through community volunteers. Mr. Madugalle mentioned SLRCS's plans for creating a mobile app for citizens to provide guidance on health issues and expressed his interest in working with the MOBILISE team to develop a citizen app.

Mr. Senaka Palliyaguruge from the Matara Municipality shared his experiences on working with multiple agencies and communities during the May 2017 floods. This flood started on 26th May and prevailed until 31st May and affected roughly 27,432 citizens. The key challenges in responding to this disaster were the widening of the Nilwala River Mouth, managing the refugee camp and providing food, and the clearing of debris, roads and main canal areas.

Mr. Nuwan Prasantha from the Disaster Management Center gave a presentation on the emerging National Disaster Risk Management Plan 2018-2030 in Sri Lanka and relevant future activities. Mr. Nuwan introduced efforts made by the Sri Lankan Government to implement the NDRMP 2018-30 in line with the Sendai Framework for Disaster Risk Reduction (SFDRR). This National Disaster Risk Management Plan report presented detailed information on disaster risk reduction in the Sri Lankan context, on the approach for understanding disaster risk & vulnerability, the need for strengthening disaster risk management governance, the need for investing in disaster risk reduction for resilience, disaster preparedness for effective response and to "Build Back Better" in recovery, institutional arrangements, implementation arrangements, enhancing stakeholder capacity for disaster risk management and monitoring mechanisms.

Conference on
Digital Technologies for Enhancing Disaster Resilience

Mount Lavinia Hotel, Mount Lavinia, Sri Lanka.

28th February 2018

AIM & AGENDA

The aim of this conference was to bring together international researchers, policy makers and practitioners to discuss how multi-agency collaboration can be enhanced through advanced digital technology to reduce disaster risk reduction targets as specified in the Sendai framework. Those attending discussed current disaster risk reduction practices and how advanced technology such as web services, remote sensing via satellites, social media, and mobile and sensor technology can be used to support collaborative risk reduction activities as well as disaster response.

Wednesday, 28th February 2018	
8.00am-08.30am	Registration
8.30am-8.45 am	Welcome Speech: Minister of Disaster Management, Honourable Minister Anura Priyadarshana Yapa, Ministry of Disaster Management
8.45am - 9.05am	MOBILISE Project: Multi-agency Collaboration Platform for Building Local Resilience Prof. Terrence Fernando, THINKlab, University of Salford, United Kingdom
Session 1 : Disaster Risk Reduction and Resilience (Chair: Prof. Siri Hettige, University of Colombo)	
9.05am – 9.35am	Approach for Measuring Ten Essentials for Creating Resilient Cities Mr. Jon Percival, Greater Manchester Resilience Forum, United Kingdom
9.35am - 9.55am	Importance of Disaster Risk Reduction in Sri Lanka Mr. Kingsley Fernando, Secretary of Minster of Disaster Management, Sri Lanka
9.55am – 10.15am	Measuring Disaster Resilience and Challenges Dr. Chaminda Pathirage, Centre for Disaster Resilience,

	University of Salford, United Kingdom
10.15am – 10.35am	Ecological Approach to Disaster Risk Reduction Dr. Ananda Mallawatantri, International Union for Conservation of Nature, Sri Lanka.
10.35am - 10.50am	Panel Discussion
10.50am - 11.20am	Refreshment Break
Session 2: Multi-agency Collaboration (Chair: Dr. Chaminda Pathirage, University of Salford)	
11.20am – 11.45 am	Challenges in Building Multi-agency Collaboration in Sri Lanka Emeritus Prof. Siri Hettige, Department of Sociology, University of Colombo, Sri Lanka
11.45am - 12.10pm	Stakeholder Collaboration for Knowledge Management in Preparedness, Dr. Buddhi Weerasinghe, ADPC
12.10pm - 12.35pm	Community Engagement Platforms During Disaster Response Mr. Sudath Madugalle, Sri Lanka Red Cross Society, Sri Lanka
12.35pm – 1.00pm	Panel Discussion
1.00pm – 1.50pm	Lunch
Session 3 : Applications of Space Technology in Disaster Risk Reduction (Chair: Prof. Terrence Fernando)	
1.50pm – 2.10pm	Role of Satellite Technology in Disaster Risk Reduction and Response Mr. Juan Carlos Villagrán de León, UN-SPIDER, Germany
2.10pm – 2.30pm	The Use of Space Technology in DRM in Sri Lanka Mr. Srimal Samansiri, Disaster Management Centre, Sri Lanka.
2.30pm – 2.50pm	Managing Floods and Drought for Improved Risk Management Solutions Using Space Technology

	Mr. Niranga Alahacoon and Dr Giriraj Amarnath, International Water Management Institute, Sri Lanka
2.50pm - 3.10pm	A Digital Earth Platform in Support of Disaster Risk Reduction Mr. Stefano Natali, MEEO Srl, Ferrara, Italy
3.10pm – 3.20pm	Discussion
3.20pm – 3.50pm	Refreshment Break
Session 4 : Digital Platforms for Disaster Risk Reduction (Chair Prof. Terrence Fernando)	
3.50pm – 4.10pm	Technology Platforms for Accessing Disaster Risk Information Mr. Suranga Kahandawa, South Asia Disaster Risk and Climate Change Unit, The World Bank, Sri Lanka
4.10pm – 4.30 pm	Use of Geospatial Technology and Innovation in Early Warning Systems and DRR: Experience from FAO work Dr. Lorenzo De Simone, Food and Agriculture Organization of the United Nations (FAO), Italy
4.30pm – 4.50 pm	On-going Technology Projects in Asia for Building Disaster Resilience Dr. Senaka Basnayake, Asian Disaster Preparedness Centre, Thailand
4.50pm – 5.10 pm	Multi-agency Collaboration Platform for Building Disaster Resilience in the Local Context: MOBILISE Approach Prof. Terrence Fernando, THINKlab, University of Salford, United Kingdom
5.10pm – 5.30pm	Panel Discussion
5.30pm	Close

Welcome Remarks by Honourable Minister Anura Priyadarshana Yapa, Minister of Disaster Management, Ministry of Disaster Management, Government of Sri Lanka

“It is my pleasure to be here today and to welcome you all to this Conference which is addressing an important global challenge as well as challenges relevant to Sri Lanka. I understand that the experts from several countries such as Germany, Italy, UK, Pakistan, Malaysia, the Netherlands, and Nepal have travelled a long way to take part in this conference.

As you know we see a significant growth in natural disasters during the last few decades at a global level. In this context, Sri Lanka is increasingly facing many natural disasters such as floods and landslides.

The Ministry of Disaster Management was established after the devastating Tsunami that we experienced in 2004. The vision of my ministry is to create a safer Sri Lanka. We are committed to facilitating harmony and the prosperity and dignity of human life through effective prevention and mitigation of natural and man-made disasters in Sri Lanka. Under my Ministry we have the National Council for Disaster Management, Department of Meteorology, Disaster Management Centre, National Building Research Organisation and National Disaster Relief Centre - working together to build disaster resilience in Sri Lanka.

Since the establishment of the Ministry of Disaster Management in 2004, we have managed to improve our capabilities in reducing and responding to disasters. However, we know that we still have a long way to go in creating a world class approach for disaster risk reduction, responses and resilience planning. As the severity of the disasters are getting worse over time we need to respond by improving our approach to disaster management by reducing the vulnerability of community and infrastructure in order to safeguard the lives of our citizens and the economy.

It is always good to revisit our approaches, identify limitations and strengthen our capacity in managing disasters. Projects such as MOBILISE gives the opportunity to bring new impetus into our disaster management approaches.

I was pleased that the MOBILISE project led by the University of Salford in UK, together with the University of Moratuwa, University of Colombo as well as University of Peshawar (Pakistan) and the Universiti Tun Hussein Onn(Malaysia), is addressing very important disaster management research relevant to Sri Lanka. We have several world class Universities in Sri Lanka and therefore it is important that we exploit the intellectual capacities that we possess in these universities to develop efficient processes, technologies and organizational structures to better manage disasters. I believe that disaster management provides our Universities with an opportunity to establish a sound interdisciplinary research approach to create real impact on the ground.

I was pleased to hear that the MOBILISE project is addressing a range of key themes that could potentially bring innovation into our disaster management practices. Specially we are interested in knowing how best to strengthen our collaboration approaches among various government organisations by utilizing the power of digital technologies. It is clear that the digital technologies such as space technologies and sensor technologies can pay a key role in identifying slow onset disasters, vulnerability, rapid onset disasters and can help us to intervene well before the disaster strikes, hence saving lives.

It is clear that we also need to consider local risk sensitive urban development approaches to avoid further amplification of vulnerability and risks. Therefore we are very keen to work with the MOBILISE project team to see how our stakeholder collaboration can be further enhanced to create safer environments.

I was pleased to see a fantastic line of speakers in the agenda today addressing a range of subject areas. I hope the knowledge presented today can be further enhanced and applied in the context of Sri Lanka to build disaster resilience in Sri Lanka. I wish you a successful conference."

Special Remarks by Mr Kingsley Fernando, Secretary of Minster of Disaster Management, Sri Lanka

“Good Morning ladies and gentlemen, chairperson, distinguished guests and national and international participants. At the outset let me thank the organizers. Special thanks to Prof. Terrence Fernando for inviting me to this conference and giving me an opportunity to express my views on importance of Disaster Risk Reduction in Sri Lanka.

First of all, I should say that this is a timely event as far as Sri Lanka is concerned. Many other countries in the Asian region also face an equal risk of disasters of unprecedented proportions. Despite the gaps in the existing mechanisms, Sri Lanka was able to achieve several milestones through a holistic approach to disaster risk management over last decade. Sri Lanka’s economy transitioned from a previously predominantly rural-based agriculture economy towards a more urbanized economy driven by services.

In the current context, disasters are no longer viewed as natural events which are extraneous to human society. These should be viewed as events that have been converted to disastrous events by our own decisions in social and economic development. We also believe that sustainable development can never be possible unless we take proactive measures to correct our own decisions and actions.

Like any other developing country in the world, Sri Lanka is making every endeavour to reach possible highest development level. During this process, the country undergoes many structural changes in urban areas and townships. Infrastructure development, town and country planning, construction of bridges and culverts, have become an integral part of this development process we may call urbanisation. Rapid urbanisation has been widely recognised as one of the important indicators of development. The social transformation which takes place with new technological changes and growth of industrial and service sectors will be a noticeable character in development.

According to the National Physical Plan more than 50% of the country's population will move to urban areas to settle down there by 2030. Under these circumstances if urbanization work is not duly planned and due diligence is not exercised it will leave room for increased disaster risk. What I want is to bring home is the fact that non-compliance with approved standards for town and country planning, ad-hoc storm water disposal system, poor landscaping will no doubt aggravate disaster risk. The well-known phenomenon is that most of our planners, builders, technical officers in this field pay scant heed to safety standards when carrying out construction work. This wretched situation is the result of malpractices that are prevalent in this particular field. The observed tendency is that the majority of urban population will concentrate in coastal cities and disaster prone hilly areas. These coastal cities and hilly areas are highly vulnerable to disasters and climate change impacts including rise of sea level, storms, surges, floods, malaria and dengue etc. Therefore, integrating disaster risk reduction measures into the urban development process is essential and of paramount importance.

National, regional and local level mainstreaming of DRR into the housing sector is an identified area for improvement. The present awareness of DRR is very poor in terms of disaster risk and development of settlements in fragile areas. Most of the time awareness is very limited even at the highest level in the country. Therefore, this is a critical situation and necessary remedial action has to be taken early to address this issue. In Sri Lanka DRR is an approach being adapted by many parties involved in this process but measures should be taken to integrate and mainstream this more widely.

Incorporating local authorities in disaster management is another area that our attention should be paid to, when we talk about DRR. Active involvement of the island-wide network of nearly 350 local authorities in disaster management, whether locally or nationally designated disasters, the role that could be played by these local authorities is very crucial and they are in a better position to handle such situations due to the fact that the officials of local authorities are adequately conversant with the geography of the area under their administration. But it has been observed that these local authorities are lacking in the active participation expected of them, therefore there is still room for improvement in key areas. The reason for this has

been generally attributed to weaknesses in terms of financial reserves and other resources. On the other hand, they are legally empowered by written laws; regulations govern their activities and sometimes limit their mandate to some specific areas of activity.

Climate change is another factor that has a greater bearing on the occurrence of disaster situations. As we are living very close to the Bay of Bengal any volatile situation arising in this region has a greater impact on our climatic conditions. New developments that take place in the Bay of Bengal area creates storms, cyclones, and severe rain in the island leading to very adverse climatic condition. Major floods are the final results of such a situation. This situation poses a severe threat to agriculture by destroying paddy cultivation and many other crops of farmers. This has a severe devastating effect on Sri Lanka's economy. We can take Bangladesh as a good example on challenges faced due to changing climatic conditions in the region. Bangladesh faces a real challenge in managing and reducing risk in the face of changing dynamics of climatic change and ensuring effective and quality preparedness and response to slow onset, rapid and recurrent disasters. Sri Lanka's position could not be considered as better.

The next National Disaster Management Plan (2018-2022) is in the development guided by the Disaster Management Policy of the country and in line with the Sendai Framework. We are currently implementing a five-year national programme titled "Sri Lanka Comprehensive Disaster Management Programme", which is also meant to mainstream disaster risk reduction into the sectoral development plans of various other Ministries and agencies. Demonstrating the government's commitment to disaster risk reduction, the Government has already approved and financed over Rs. 10 Billion worth of projects under the Comprehensive Disaster Management Programme.

Having these thoughts in the back mind, the Ministry and the Centre recently have developed a broader framework on Community Resilience together with stakeholder agencies, underpinning risk reduction into development from National level to grass roots. This is further enriched with a comprehensive guideline for development

practitioners. It is paramount that, we as the development group, must adhere and promote the framework in every endeavour focusing on building resiliency.

The Ministry of Disaster Management with the institutions such as; Meteorological Department Disaster Management Center, National Building Research Organization, National Disaster Relief Service Centre is with you all as partners in all these aspects, namely by supporting national, districts and local actions for prevention, building capacity for preparedness for disasters, as well as the provision of humanitarian aid. The new development policy of the country, called the vision 2025 was published late last year and highlights the importance of disaster risk reduction and climate change adaptation and it calls upon the sectors to do more, better, and differently, to reduce the impact of environmental and economic shocks, natural and man-made disasters.

The Government of Sri Lanka has developed a disaster risk informed approach following the Sendai Framework. Since 2016 we are working on the basis of a National Action Plan on Sendai that supports efforts:

- To build disaster risk knowledge;
- To engage with all of society;
- To promote disaster risk informed investments;
- And to develop strategies to prepare for disaster response and Build Back Better for rehabilitation and recovery.

We firmly believe that actions at national and local levels are crucial for supporting the design and implementation of disaster risk reduction strategies. The Ministry of Disaster Management is making every endeavour to achieve the above objectives with the support of all stakeholders. I wish this programme every success."

Introduction to the MOBILISE Project

Prof. Fernando presented the aims and objectives of the MOBILISE project and explained how the project is planning to exploit earth observation technologies, big data platforms, mobile technologies, virtual reality and web-based information sharing platforms to strengthen local disaster risk and resilience governance in Sri Lanka in partnership with the relevant government organisations and the

Universities. Prof. Fernando presented the key objectives of the MOBILISE project which are:

- Assessing the current multi-agency collaboration approaches and proposing a collaboration model/approach that can promote better collaboration using digital technologies and co-ordination processes.
- Establishing a digital platform that can combine both remote sensing data and in-situ data to assess vulnerabilities and build disaster resilience.
- Establishing a community engagement platform.
- Using real-time satellite data for disaster response.
- Creating a computer simulation model that can capture the cascading effects of disaster that will allow the team to understand the dependencies of vulnerabilities and decide how best to reduce them.

Session 1: Disaster Risk Reduction and Resilience

The aim of this session was to present the state of the art approaches for measuring resilience. The first speaker of the session was Mr. Jon Percival from the Greater Manchester Resilience Forum, United Kingdom who presented an approach for measuring city resilience developed as a part of the European Union Funded Uscore2 project (www.uscore2.eu). He presented the 10 essentials as:

1. Organise for Disaster Resilience
2. Identify, Understand and Use Current and Future Risk Scenarios
3. Strengthen Financial Capacity for Resilience
4. Pursue Resilient Urban Development and Design
5. Safeguard Natural Buffers to Enhance Ecosystems' Protective Functions
6. Strengthen Institutional Capacity for Resilience
7. Understand and Strengthen Societal Capacity for Resilience
8. Increase Infrastructure Resilience
9. Ensure Effective Disaster Response
10. Expedite Recovery and Build Back Better

He then introduced the Disaster Resilience Scorecard (DRS) that not only measures cities' resilience more in-depth, but also integrates disaster risk reduction and climate

change adaptation and provides cities with concrete action plans. He then presented the Uscore2 approach for City to City peer review on DRR. Several modules have been developed to measure the 10 essentials, for example the module on disaster risk governance reviews its governance arrangements through the use of available documentation through demonstrating actions taken by facilitating stakeholder interviews.

The evidence used for measuring risk governance is:

- **Plan Making**: Does the city master plan (or relevant strategy/plan) include and implement disaster risk reduction approaches in line with the Sendai Framework? Alternatively, if a city has a stand-alone disaster risk reduction plan/ policy/strategy in place in line with the national strategies this can also demonstrate compliance.
- **Organisation, coordination and participation**: Is there a multi-agency/sectoral mechanism with appropriate authority and resources to address disaster risk reduction?
- **Integration:** Is resilience properly integrated with other key city functions/portfolios?

After Jon's presentation, Dr. Chaminda Pathirage from the University of Salford in the UK presented the Challenges in Measuring Disaster Resilience, based on his experience of the EUCIRCLE project (http://www.eu-circle.eu/). He presented the common elements of a resilience definition as Context (C), Disturbance (D), Capacity to deal with disturbance (CD) and Reaction to the disturbance (R). Dr. Pathirage then explained how the EU-CIRCLE project is addressing critical infrastructure resilience. In that approach, four layers are defined to represent resilience: Layer 1: Climate Hazards, Layer 2: Networks and interdependencies, Layer 3: Disaster Risks and Impacts, Layer 4: Capacities of Critical Infrastructure. The index of indicators of resilience used in this project includes:

- Anticipative: The ability of a CI system to anticipate and reduce the impact.
- Absorptive: The ability of a CI system to buffer, bear and endure the impacts.
- Restorative: The ability of a CI system to be repaired easily and efficiently.
- Coping: The ability of a CI system to face and manage adverse conditions using available skills and resources.

- Adaptive: The ability of a CI system to adjust and to take advantage of opportunities to mitigate against potential impacts.

Dr. Ananda Mallawatantri, Head of the International Union for Conservation of Nature, Sri Lanka, made a presentation on the Ecological Approach to Disaster Risk Reduction from his organisational perspectives. During his presentation Dr. Mallawatantri shared how nature-based solutions could be beneficial to strengthen disaster resilience in an ecologically fragile country like Sri Lanka. Dr. Mallawatantri's presentation covered a few case studies and showed how nature-based solutions can be beneficial for Sri Lanka. Dr. Mallawatantri pointed out that disasters are inseparably linked to development and their occurrences can often be linked to how the physical or urban/rural development pattern takes concern of the local environment. Developments ignoring local environmental or ecological aspects often lead to disastrous situations.

Session 2: Multi-agency Collaboration

In session two Prof. Siri Hettige, Emeritus Professor from the University of Colombo, initially gave a brief overview of the challenges to multi-agency collaboration in Sri Lanka. Prof. Hettige revisited post major disaster events including the 2004 Tsunami, the 2016 and 2017 flooding events and analysed them from sociological perspectives.

Following Prof. Hettige's presentation Mr Sudath Madugalle, Deputy Director General Sri Lanka Red Cross Society, Sri Lanka, shared the national Red Cross society's efforts in implementing community volunteers based on public awareness raising activities through multiple platforms in partnership with government agencies in Sri Lanka.

Session 3: Applications of Satellite Technology in Disaster Risk Reduction

The first speaker in this session was Mr Juan Carlos Villagrán de León, Head of the UN-SPIDER, Germany office. Mr Villagrán de León introduced the activities and responsibilities of the United Nations Office for Outer Space Affairs (UNOOSA) and the UNSPIDER's mission statement in the context of space-based information to

support the full disaster management cycle. Mr Villagrán de León explained in detail how UN-SPIDER activities contribute to two out of four priorities of the Sendai Framework for Disaster Risk action (2015-2030) towards making safe and secure communities around the world.

Mr Villagrán de León said that building resilient societies through better coordination and forging of global partnerships is one of the key challenges in the 21st century. In UN-SPIDER's experiences as development accelerates, many countries (particularly in Global South) are increasingly exposed to new disaster risks. Regular risk mapping is the output of risk assessment which provides visual information needed by disaster managers and the community to enhance their resilience.

Mr Villagrán de León further expanded on UN-SPIDER's contributions including several past Technical Advisory Missions' visits' outcomes and activities to enhance Space Technology-centred Hazard Mapping in Sri Lanka. Besides discussing the current state of use of space-based information for disaster risk management in Sri Lanka, Mr Villagrán de León shared knowledge on the LiDAR Digital Evaluation Model, on the National Spatial Data Infrastructure for flood hazard mapping as well as knowledge on coastal hazard mapping, coastal zone management and integrated shoreline management plans.

Following Mr Villagrán de León's presentation, Mr. Srimal Samansiri, Assistant Director, Disaster Management Centre, Sri Lanka, shared with the participants a presentation on the current state of art regarding the use of space technology for disaster risk management response in Sri Lanka. He gave a detailed presentation as to how space-based information has been used in the Sri Lanka disaster risk governance sector. He informed participants about the cooperation between the Survey Department and the Disaster Management Center, Ministry of Disaster Management of Sri Lanka and provided information on the technical and procedural manual on national emergency mapping mechanisms.

Mr. Niranga Alahacoon from the International Water Management Institute (IWMI) spoke on how space technology has been used to improve risks associated with floods and droughts in Sri Lanka and shared the IWIM's regional research

programme on floods and drought risk management in South Asia region. Mr. Alahacoon shared how the IWMI is helping government agencies including COSTI (Coordinating Secretariat for Science Technology and Innovation) and communities to monitor and provide accurate rainfall data so that the data can be used to manage water in tanks and reservoirs, avoiding flood hazards and assisting in controlling water related disasters. In Sri Lanka, the weather data is measured by the Meteorological Department via World Meteorological Organization (WMO) certified technology. The Metrological Department then issues the rainfall data on a daily and sometimes an hourly basis, and it is calculated on a mm scale. Mr. Alahacoon stated that IWMI researchers use images from the European Space Agency's Sentinel-1 satellites as well as from the PALSAR-2 sensor of the ALOS-2 satellite of the Japan Aerospace Exploration Agency (JAXA). These sensors have the advantage of being able to "see through" cloud cover, providing a clear overview of areas affected by flooding, with a spatial resolution of less than 10 meters. Such activities help with disaster response planning and future disaster preparedness.

The last speaker of the session three was Mr Stefano Natali, from MEEO Srl, Ferrara, Italy. Mr. Natali introduced Meteorological and Environmental Earth Observation (MEEO), a digital earth platform that enables multi-disciplinary geospatial applications based on remote sensing of the Earth-Atmosphere system. According to Mr. Natali, MEEO is able to provide a wide range of services and products to analyse multispectral, multisensor and multitemporal satellite data for environmental monitoring, land management and agriculture particularly he described in details about application of Multi- Sensor Evaluation Analysis (MEA) to identify land cover change. Multi-sensor Evolution Analysis (MEA) an Earth Observation and geospatial data analysis tool empowered with OGC standard interfaces. According to Mr. Natali, MEA helps the user to:

- Define time Evolution Models of features
- Apply Evolution Models across 13 years of (A)ATSR data
- Obtain in a few seconds the results of related spatio-temporal and semantic queries.

Session 4: Digital Platforms for Disaster Risk Reduction

Mr. Suranga Kahandawa, South Asia Disaster Risk and Climate Change Unit, the World Bank, Sri Lanka, started the session by introducing the Global Facility for Disaster Reduction and Recovery (GFDRR) and the Open Data for Resilience Initiative (Open DRI). Mr. Suranga shared how GeoNode, a free and open source software for creating websites to manage and share geospatial data, is used as a part of Open DRI projects in various parts of the world (including Sri Lanka) to support disaster risk reduction and recovery processes. In his presentation he presented how spatial data platforms developed through the OpenDRI initiative have been used in Malawi, Bangladesh, Nepal, Sri Lanka, and Tanzania during disasters.

According to Mr. Kahandawa, OpenDRI Sri Lanka evaluates the accuracy of the resulting data, refine the process accordingly and work with the Government of Sri Lanka to scale up this approach in other hazard prone areas. The World Bank is in discussion with DMC on how to scale up this approach with other key government agencies such as the Urban Development Authority, Survey Department and district authorities to scale up the Open Street Map-based (OSM) approach to exposure mapping in Sri Lanka, especially in flood prone areas.

During the presentation Mr. Kahandawa shared the challenges of implementing Open Street Map. Some of which are:

- The concept of digital map is very new in Sri Lanka and so people are not used to consult maps for their daily needs. They do not consider a map as an important tool at present. This reluctance is also making slow progress of OpenStreetMap implementation.
- There is a lack of technically skilled volunteers for OpenStreetMap contribution. The lack of volunteers is the principle reason behind the slow progress of OSM in Sri Lanka.
- OpenStreetMap can also be multiple uses for the academia including surveying, data collection and many other ways. However in Sri Lanka, the researchers apart from computer science background are mostly unaware about the usage of OpenStreetMap.

Dr. Lorenzo De Simone, Food and Agriculture Organization of the United Nations (FAO), Italy, gave a presentation on the UNFAO's early warning activities with geospatial technology. Dr. Lorenzo also shared the challenges faced by the food and agriculture sector to use digital technologies and showed an Agricultural Stress Index System (ASIS) implementation process.

In his presentation, Dr. Lorenzo recalled that "the World Humanitarian Summit has underscored the need to shift from reactively managing crises to proactively reducing risks and that planning, financing and decision-making should be underpinned by data and common risk analysis. The Sendai Framework for Disaster Risk Reduction has also recognized the need to increase the utilization of modern geospatial technologies and help promote better understanding of risks". He further stated "However, there are number of challenges such as:

1. Absence of integrated analysis of hazards, risks linked with land use, livelihoods' planning and natural resource management.
2. Poor availability of baseline risks/impact/ exposure data to monitor progress over time and forecast scenarios.
3. Data fusion problem from different sources, different time/space resolution.
4. Complexity in data analytics.
5. Absence of real time risk status update."

Dr. Senaka Basnayake, Asian Disaster Preparedness Center, Thailand, shared information on ongoing technology-centred projects in Asia for building disaster resilience. Dr. Basnayake presented on ADPC's weather and climate services' projects in Myanmar, Bangladesh and Vietnam to improve daily and seasonal weather forecasting capacity to further strengthen end–to–end early warning systems. In his presentation Dr. Basnayake shared information on three major ADPC projects' activities and expected outcomes in Myanmar, Bangladesh, Vietnam and Nepal. He further stressed that current ADPC projects are focused on establishing a process that will build more climatic resilient economies and highlighted the current understanding of the multispectral impacts of climate and flood & drought modelling. ADPC thinks that current available scenario analyses are not adequate. In addition, ADPC projects support the implementation of urgent

climate mitigation investments which are required to ensure the short-term integrity of flood control and irrigation infrastructures, transport networks and critical education facilities at risk.

Following these presentations, Prof. Fernando presented the state of the art in digital platforms for disaster risk reduction and identified the missing gaps. He then demonstrated the first prototype of the MOBILISE platform which is capable of integrating hazard and vulnerability data from a range of sources such as sensors, satellites, in-situ data from distributed data bases, social media and mobile apps. The current platform has already been integrated with the RISK INFO platform developed by the Disaster Management Centre in Sri Lanka. In addition, the platform provides access to real-time sensor data to monitor river levels, water speed, wind speed as well as satellite images from remote satellite databases to get real-time information on rapid and slow onset disasters. The next phase of the MOBILISE project is to further develop the MOBILISE platforms through set of case studies to ensure it is a valuable tool for range of agencies to engage in disaster risk reduction and response.

After the demonstration of the MOBILISE platform, Prof. Terrence Fernando thanked all the participants and volunteers and particularly thanked the colleagues from the University of Moratuwa and the Disaster Management Center, Ministry of Disaster Management Sri Lanka, for making the event a success.

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