



# Using ICT for Effective Disaster Management African Forum

## **EVENT REPORT**

Organized by:

The Commonwealth Telecommunications Organization (CTO)

Hosted by:

The Tanzanian Ministry of Infrastructure Development (MoID) & The Tanzania  
Telecommunications Regulatory Authority (TCRA)

The Mövenpick Royal Palm Hotel  
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## Executive Summary

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This report details a multi-stakeholder Forum, "Using ICT for Effective Disaster Management Africa 2007 (ICT4DM Africa 07)", which was held at the Mövenpick Royal Palm Hotel, in Dar es Salaam, Tanzania from the 12<sup>th</sup> to 14<sup>th</sup> November, 2007. The forum was hosted by the Tanzania Ministry for Infrastructure Development (MoID) and the Tanzania Communications Regulatory Authority (TRCA), and was organised by the Commonwealth Telecommunications Organisation (CTO).

The Africa Forum was the fourth event in a series of ICT4DM forums, which are scheduled to be conducted between October 2007 and January 2009 as part of the CTO's ICT for Disaster Management Programme (ICT4DM). The overarching objective of the (ICT4DM) programme is to increase and improve stakeholders' use of Information and Communication Technologies (ICTs) in all four stages of the Disaster Management Life Cycle: Preparedness, Mitigation, Relief and Reconstruction.

**Section One** of this report discusses how "Using ICT for Effective Disaster Management" can be utilised for mitigating the risks/cost of disasters, formulating and implementing disaster management policy, as well as enhancing the role of regulators and operators in the creation of an enabled operational and regulatory environment, within the African Forum. It also details the broad aims and objectives of all four Forums.

**Section Two** discusses the African Forum's agenda on Preparedness, Mitigation, Relief, Recovery and Reconstruction, as well as the rationale behind the agenda.

**Section Three** provides summaries of the expert presentations that were delivered during the first two days of the Forum. It also highlights the main themes and issues raised in the interactive panel discussions that followed each of the Forum's eight sessions. The summaries of presentations are detailed and can be read in conjunction with the presentations that were made at the event. This will enable stakeholders who did not attend the event to gain a full comprehensive understanding of the presentations. All the presentations from the Forum can be downloaded from the CTO website: [www.events.cto.int/dmafrica](http://www.events.cto.int/dmafrica)

On the third day of the Forum, participants took part in a group exercise in which they produced **Using ICT for Disaster Management Logical Frameworks (Log Frames)**. The completed Log Frames are found in **Section Four** of this report, alongside an explanation of the exercise and some analysis of the Log Frames. Amongst other things, the Log Frames contain actions that stakeholders from the region believe they must take in order to increase and improve their use of ICT in disaster management.

**Section Five** is the final section of this report and provides recommendations for how stakeholders in the African region can improve general disaster management, as well as increase and improve their use of ICT to mitigate the effects of natural disasters. The recommendations were developed following analysis of the presentations and panel discussions at the Africa Forum, as well as the consultation with numerous stakeholders in the post-event phase. In summary, the main recommendations stemming from the Forum are as follows:

1. ICTs should be included in all phases of disaster management and planning
2. The Hyogo Framework of Actions should be implemented fully
3. Disaster risk reduction facilitates the implementation of sustainable development
4. Public Protection and Disaster Reduction are integral parts of disaster management; they should be treated as one part, not two separate groups
5. Satellites have a higher capacity to implement effective disaster relief and response systems, they should be included as part of the disaster management policy formulation process
6. The youth have an important role to play in disaster management
7. Regulators and operators must work together in carrying out disaster management plans; strategic partners in the implementation of national policies and plans have always been the operators

# 1. Introduction to the “Using ICT for Effective Disaster Management Forum”

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## 1.1 Introduction

The opening ceremony of the Forum was graced by three speakers; Dr. Raynold Mfungahema, Engineer August Kowero, and Mr. Bashir Patel. This session was chaired by Mr. Victor Nkya, Deputy Director for Zonal Operations, of the TCRA.

The “Using ICT for Effective Disaster Management Forum” was officially opened on behalf of Hon. Dr. Maua Daftari (MP), Deputy Minister for Infrastructure Development (MoID), by Engineer August Kowero of the Ministry. In his remarks, Eng. Kowero said that the organisation of the Forum was timely due to the fact that the world is experiencing an increasing number of occurrences of both natural and man-made disasters, which have affected and continue to affect our world.

He thanked the Commonwealth Telecommunications Organisation (CTO) for choosing Tanzania as the premier venue for the Africa Forum. He welcomed international delegates and urged them to find time to visit some of the popular attractions available on Mainland Tanzania and in the Isles of Zanzibar.

Mr. Kowero went on to say that the international community has identified four key elements of disaster management, which are Preparedness, Mitigation, Relief, Recovery and Reconstruction, which are in fact the CTO’s agenda for the ICT for Disaster Management Forum (ICT4DM). He said that ICT has an important and vital role to play in disaster risk reduction (DRR) by enabling the effective implementation of the ICT4DM agenda.

He highlighted the fact that, in the event of disasters, it is mainly women, children, handicapped and confined persons who are most affected by the calamities; in these situations, these groups are more vulnerable and disadvantaged due to their family roles and confinement from easy movement.

Noting that the CTO invited disaster management professionals to attend and make presentations at the Forum, he said that it was the belief of the Government of the United Republic of Tanzania that delegates would share experiences, knowledge and develop a common understanding and action line on how ICT can be used to effectively manage disasters in the world.

Eng. Kowero imparted on developments made by the Government of Tanzania, towards the creation of conducive and enabling frameworks for the development of DRR measures. The Government developed and approved policies that facilitate the implementation of DM and DRR measures, such as Disaster Management Policy (2003), Environment Policy (2004), Postal Policy (2003), Telecommunications Policy (1997), Information and Communications Technology Policy (2003), and the Transport Policy (2001). The regulatory framework for the implementation of these national policies is in place.

There are various challenges being faced when using ICTs in managing disasters. Both transport and communications infrastructures are crucial for the creation of a platform, with which ICTs can be used to manage disasters in Africa, particularly in the rural areas where the majority of citizens reside. In conclusion, Eng. Kowero called on ICT stakeholders to cooperate with governments in the implementation of policies that require interventions of both public and private sector players.

The view of the communications regulator was conveyed on behalf of Dr. John Mkoma, Director General of the Tanzania Communications Regulatory Authority (TCRA), by Dr. Raynold Mfungahema, Director of Consumer and Industry Affairs of TCRA.

Dr. Mfungahema reiterated the fact that the Forum was conducted at the right time, with a right message, that all communities should have means and ways with which to manage and mitigate disasters. He said that ICT stakeholders hold a firm belief that ICTs can be utilised to mitigate risks and alleviate the impact of disasters, both natural and man-made.

He noted that in recent years the frequency of disasters has been increasing, as well as the magnitude of impact, that has resulted in high numbers of human casualties and economic suffering. This trend poses a serious challenge to all communities to formulate effective disaster management policies and programmes, taking into account that ICT is one of the most important tools that can be utilised to deal with disasters.

Dr. Mfungahema said that the TCRA understands that there are already a number of national and regional initiatives that have been formulated to deal with disaster management, in terms of prevention, preparedness, response and relief to telecommunication infrastructure, rehabilitation and reconstruction. However, he urged the international community member countries to integrate telecommunications and ICT in their disaster management programmes, and emphasised that this needs to be done especially in developing countries, where concrete projects, activities and plans must be put on the ground.

He commended CTO for its efforts to address this issue, as it is of major concern to many stakeholders, and for choosing Tanzania as the host country for the African Forum.

ICT can play a significant role in disaster management; however, emphasis should be on promoting the utilisation of ICT during disasters, such as strengthening the existing mechanisms for relief through traditional telecommunication networks as well as integrating new systems, in particular, wireless communication networks.

In terms of policy, Dr. Mfungahema indicated that the Tanzania Government has already created a policy framework for disaster management that aims at reducing the risks and hence reducing poverty. To this regard, stakeholders – from the *Ward* to the National level, who include both private and public entities – should be working together in order to be ready to respond faster whenever disasters strike.

Dr. Mfungahema noted that it is the requirement for implementing early warning systems that highlights the importance of ICT as any number of ICT and media tools can be used for the development and implementation of such systems. In this regard, radio and television are considered to be the most traditional electronic media that are used for disaster management information systems in developing countries and rural areas where teledensity is minimal. The telephone plays an important role in the implementation of early warning systems used to inform communities of impending disasters. While SMS has a particular advantage over voice networks, other ICTs such as Internet and email can also be effectively used, depending on their level of penetration in communities. Amateur and Community Radio are also equally important as they can be used to assist communities during disasters by providing reliable communications in conjunction with disaster relief organisations, especially when the communications infrastructure breaks down.

In conclusion, Dr. Mfungahema said that the challenge ahead for any government lies in the implementation of ICT-friendly policies that put in place enabling environment and regulatory frameworks. Innovative utilisation of ICTs has a place in many social, economic situations that include the prediction, prevention and mitigation of disasters.

Mr. Bashir Patel, CTO's Director of Programmes, was the final speaker for the opening ceremony of the ICT4DM Africa Forum.

Mr. Patel informed the participants that two years ago a meeting of heads of state was held to discuss the issue of disaster management and emphasized the use of ICT at National and

Regional levels. Mr. Patel told delegates that natural disasters are rising in number and disasters are also a number one obstacle to development due to the social and environmental impact. The effective use of ICT in management of disasters was very important.

He finally told participants that they were expected to engage in serious discussions and come up with resolutions on actions that these countries must take.

## **2. Session 1: The Cost of Disasters**

Reducing socio-economic and environmental costs of disasters; approaches and the role of ICT.

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This session was chaired by Mr. Julius Kaberere, Commonwealth Secretariat Advisor. Facilitators for this session were Mr. Seth D. Vordzorgbe, Senior Advisor, UN/ISDR Secretariat, and Ms. Mary Mye-Kamara, Director of the Disaster Management Department, Office of National Security, Sierra Leone. While Mr. Vordzorgbe made a presentation entitled "The Cost of Disasters", Ms. Mye-Kamara made a presentation entitled "Examining the Socio-Economic Costs of Natural Disasters; It's Impact on Development".

### **2.1 Presentation by Mr. Seth Vordzorgbe – Rethinking Emergencies**

The first presenter for Session 1 was Mr. Seth Vordzorgbe. His presentation was based on the "Hyogo Framework for Action 2005-2015: ISDR International Strategy for Disaster Reduction/International Strategy for Disaster Reduction - Building the Resilience of Nations and Communities to Disasters". The following is a summary of the presentation.

The Hyogo Framework for Action primarily addresses the challenges posed by disasters, which were addressed during the Yokohama Strategy and the World Conference on Disaster Reduction. The Conference spelled out objectives, expected outcomes and strategic goals, outlining priorities for action in 2005-2015. Among the priorities for action were (i) ensuring that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation; (ii) identification, assessment and monitoring of disaster risks as well as enhancing early warning systems; (iii) use of knowledge, innovation and education to build a culture of safety and resilience at all levels; (iv) reduction of the underlying risk factors; and (v) the strengthening of disaster preparedness for effective response at all levels.

Mr. Vordzorgbe reported that the implementation and follow-up to the strategic goals and priorities for action set out in the Hyogo Framework for Action should be addressed by different stakeholders in a multi-sectoral approach, including the development sector. States and regional and international organisations are called upon to integrate disaster risk reduction considerations into their sustainable development policy, planning and programming at all levels. Civil society, including volunteers and community based organisations, the scientific community and private sector are vital stakeholders in supporting the implementation of disaster risk reduction at all levels.

All States should endeavour to undertake the following tasks at the national and local levels, with a strong sense of ownership and in collaboration with civil society and other stakeholders, within the bounds of their financial, human and material capacities, and taking into account their domestic legal requirements and existing international instruments related to disaster risk reduction.

However, Mr. Vordzorgbe remarked that regional and international organizations with a role related to disaster risk reduction are called upon to undertake the following tasks within their mandates, priorities and resources.

To put matters in a clear perspective, Mr. Vordzorgbe reported that the partners in the International Strategy for Disaster Reduction (ISDR), in particular, the Inter-Agency Task

Force on Disaster Reduction and its members, in collaboration with relevant national, regional, international and United Nations bodies and supported by the inter-agency secretariat for the International Strategy for Disaster Reduction, are requested to assist in implementing this Framework for Action as follows, subject to the decisions taken upon completion of the review process 22 of the current mechanism and institutional arrangements.

This means that States, within the bounds of their financial capabilities, regional and international organizations, through appropriate multilateral, regional and bilateral coordination mechanisms, should undertake the following tasks to mobilize the necessary resources to support implementation of this Framework for Action.

In conclusion, Mr. Vordzorgbe said that among the multi-lateral frameworks and declarations that are of relevance to this document there are the following:

- The International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States, held in Mauritius in January 2005, calls for increased commitments to reducing the vulnerability of small island developing States, due to their limited capacity to respond to and recover from disasters.
- The Agenda for Humanitarian Action adopted by the International Conference of the Red Cross and Red Crescent in December 2003 includes a goal and actions to “reduce the risk and impact of disasters and improve preparedness and response mechanisms”.
- The Johannesburg Plan of Implementation of the World Summit on Sustainable Development, held in 2002, paragraph 37 requests actions under the chapeau: “An integrated, multi-hazard, inclusive approach to address vulnerability, risk, assessment and disaster management, including prevention, mitigation, preparedness, response and recovery, is an essential element of a safer world in the 21st century”, supporting the International Strategy for Disaster Reduction as the first action. The theme of “vulnerability, risk reduction and disaster management” is included in the multi-year programme of work of the Commission on Sustainable Development in 2014-2015, and as a cross-cutting theme throughout the programme.
- The third Action Programme for Least Developed Countries, adopted in 2001, requests action by development partners in view of giving priority attention to these countries in the substantive programme and institutional arrangements for the implementation of the International Strategy for Disaster Reduction.
- The Millennium Declaration of September 2000 identified key objectives of “Protecting the vulnerable” and “Protecting our common environment”, which resolve to “intensify cooperation to reduce the number and effects of natural and man-made disasters”. A comprehensive review of the progress made in the fulfilment of all the commitments contained in the United Nations Millennium Declaration will be held in July 2005.
- The International Strategy for Disaster Reduction was launched in 2007 by the Economic and Social Council and the General Assembly as an inter-agency framework and mechanism (inter-agency task force on disaster reduction and an inter-agency secretariat) to serve as a focal point within the United Nations system with the mandate to promote public awareness and commitment, expand networks and partnerships, and improve knowledge about disaster causes and options for risk reduction, building on the Yokohama Strategy and Plan of Action and as follow-up to the International Decade for Natural Disaster Reduction.

## **2.2 Presentation by Ms. Mary Mye-Kamara: Examining the Generic Impacts of Natural Disasters on Development**

Ms. Mary Mye-Kamara was the second presenter for Session 1. The following is a summary of

her presentation.

This presentation focused on examining the generic impacts of natural disasters on development, the scope being common hazards/disasters in Africa; impacts of disasters on the Millennium Development Goals (MDGs); countering the risks of disasters; achieving MDGs through DRR; DRR as a development concern; making a case for increased investment in DRR; issues to consider for increased investment in DRR; and finally the conclusion.

The presenter cited global trends of disasters as being in two main categories, that is, Causes of Disasters and Generic Costs of Disasters, as follows:

- Causes of Disasters (Inclement weather, climate change, unplanned urbanization, bad agricultural practices, poverty, development within high risk zones, epidemics, etc.)
- Generic Costs of Disasters (average more than 200 million deaths per annum, destroys infrastructure & livelihoods, food insecurity, increased poverty, impedes sustainable development, cross-regional impacts, etc.)

The most common hazards/disasters that have taken place in Africa have been land degradation due to deforestation (uncontrolled logging); floods in Mozambique during 2002-3; locust invasion in Mauritania in 2006, that resulted in the destruction of 80% of crops; drought followed by floods in Ghana during 2007; on-going crisis in Sudan, particularly in the Darfur region; on-going floods, storms, poor farming methods, siltation, erosion in Sierra Leone; and on-going floods and droughts in Kenya.

As a result, these natural and man-made disaster phenomena have adversely impacted upon the MDGs as follows:

- MDG1 (Poverty Reduction and Hunger): There has been a great loss of social amenities, assets and livelihood sustainability
- MDG2 (Universal Primary Education): There have been massive involuntary population movements as well as loss of educational infrastructure as schools built were destroyed during the disasters
- MDG3 (Gender Equality): The population movement has adversely affected women; women have suffered due to lack of security causing them to become victims of rape, resulting in the total lack of distress coping strategies
- MDG4 (Infant Mortality Reduction): Health and water infrastructure that existed have been damaged, as a result, injuries suffered by children have remained effectively untreated, causing severe illness to children and a reduction of the quality of their health status
- MDG5 (Improve Maternal Health): Damage to health infrastructure has caused severe injuries lack of access to health services, whereby injuries suffered by people during disasters resulted in death due to lack of medical facilities
- MDG6 (Combat HIV/AIDS, Malaria and Others): Poor health and increase in respiratory diseases has been a direct impact of disasters, as well as by the damage to health infrastructure caused by disasters
- MDG7 (Environmental Sustainability): There has been enormous damage to temporal dwellings as well as water management systems, while soil erosion and deforestation have also been consequences
- MDG8 (Global Partnership for Development): Overall, disasters have adversely affected economic development plans of developing countries

On the other hand, the indirect impact of disasters on MDGs have been; negative macro-economic performance due to forced sales and long-term poverty for MDG1; increased child labour, reduction of assets and education for MDG2; emergency programmes and marginalization of women, increased domestic and sexual violence for MDG3; increased number of orphans, homeless children, loss of assets and affordability of services for MDG4;

increased responsibilities and stress for mothers, loss of assets and affordability of services for MDG5; increased risks from vector borne diseases as well as exposure to communicable diseases for MDG6; increased numbers of slum dwellers with no access to basic social amenities for MDG7; and adverse impact to good governance and development for MDG8.

In order to counter disaster risks, several measures were proposed, which included using the Hyogo Framework for Action initiatives (public awareness campaigns using media, cellular phones and computers); community preparedness and response plans; implementation of early warning systems; integrating disaster management in the development policies; and finally, the development of sound policies for the promotion of disaster risk reduction. The Millennium Development Goals can be achieved through disaster risk reduction, as following:

- MDG1 – reducing livelihood vulnerability by promoting growth and fiscal stability
- MDG2 – increasing the rate of investment in education
- MDG3 – provision of a platform for gender engagement
- MDG4 – prevention of death and injury by implementing protective mechanism for health infrastructure
- MDG5 – improving livelihood through the promotion of quality nutrition
- MDG6 – reduction of public health risks by enhancing resistance to epidemic diseases
- MDG7 – implementing measures for the reduction of the depletion of the environment and climate change
- MDG8 – reduction of disparities among regions by increasing development and good governance measures

When addressing disaster risk reduction as a cost concern, the presenter said disasters make development risky and unsustainable, because they negate and exacerbate poverty and other vulnerabilities. She added that failed development processes are largely attributed to disasters, thus, disaster risk reduction and development patterns are needed for sustainable development.

If there is increased investment in disaster risk reduction, a case has to be made for such increase, meaning, funds currently being spent on intervention and relief could be devoted to enhancing equitable and sustainable development, whereas disasters create an opportunity for ensuring that subsequent reconstruction investments reduce protective risks. It can also be said that effective disaster risk reduction creates opportunities for sustainable development.

Disaster risk reduction measures also have development benefits besides saving lives and cutting down economic and social losses.

In conclusion, ICT is an invaluable tool that should be used at every stage of the disaster management cycle. She urged experts and Government stakeholders to refrain from ignoring local and indigenous knowledge that can be used during disasters, because natural hazards span international borders therefore disaster management requires global cooperation.

There should be a particular focus on prevention and mitigation of disasters, as Koffi Annan, former UN Secretary General, said that "...building a culture of prevention is not easy. While the costs of prevention have to be paid in the present, its benefits lie in a distant future. Moreover, the benefits are not tangible; they are the disasters that did NOT happen".

### **3. Session 2: Disaster Management Policy**

An examination of the role governments play in effective Disaster Management and capturing the benefits of ICTs.

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This session was chaired by Mr. Julius Kaberere, Commonwealth Secretariat Advisor. Facilitators for this session were Eng. August Kowero, National ICT Coordinator, Ministry of Infrastructure Development, United Republic of Tanzania; Mrs. Rachel Arungah, Permanent Secretary, Special Programmes, Office of the President, Republic of Kenya; and Mr. Haretsebe Mahosi, Disaster Management Authority, Kingdom of Lesotho.

#### **2.2 Presentation by Eng. August Kowero: ICT Policy and Disaster Mitigation**

Eng. August Kowero was the first presenter for Session 2. The following is a summary of his presentation.

Tanzania is an independent sovereignty located in the Eastern Africa region, with a total area of 945,087 square kilometres. It has a coastline of 1,424 kilometres. The climate varies from being tropical along the coastline to being temperate in the highlands, while the terrain is mostly plain along the coast, with a central plateau and highlands in the north and south of the country.

The most interesting aspect of ICTs, in terms of teledensity, is that there are a much higher number of mobile phones being used than fixed line phones. Latest figures show that there are approximately 7 million mobile phones in use, while 2006 figures show that there are only 161,000 fixed line telephones installed.

The railway line has a total length of 3,690 kilometres, while the roads have a total length of 88,200 kilometres, 3,704 kilometres being paved roads.

In terms of Internet hosts, Tanzania has 1,731 hosts as of 2006, with an approximate number of 250,000 users, also as of 2006.

Tanzania today addresses disaster mitigation on two fronts; the world, and the situation on the ground (in Tanzania).

The world is comprised of two facets; yesterday and today. In yesterday's world, everything was handled in a paper-based society, which created a very unique culture. It was a linear world, with a single source of information; paper-based!

However, today's world is quite different, as there are new technologies available. We live in a networked world, which takes into account globalisation occurring on a daily basis (24 hours, 7 days). However, in this highly technical world, false alarms are a reality and reminder of certain vulnerabilities of ICT, which should be taken into account in every disaster mitigation initiative.

Tanzania's situation on the ground is that, the structure is in place for disaster mitigation, and decisions for disaster mitigation have already been made, leaving the matter of awareness to the common Tanzanian being developed at a constant pace. This is notable, as one important executive agency, the Tanzania Civil Aviation Authority (TCAA), has already implemented an on-going air rescue readiness programme, conducting airline crash simulations at regular intervals. This programme has been conducted successfully, involving key stakeholders in emergency rescue operations, such as Fire Brigade (airport, municipal and private operators), Ambulance (airport, municipal and private hospitals), Police, military and national security organs. There have been remarkable rates of improvement in terms of the response time, which has been improving with each simulation exercise. The simulations are conducted

randomly with no prior notice to stakeholders, which helps in keeping them 'on their toes'.

Statistically, in terms of the number of disasters, there have been 30 epidemics, 19 pest-related outbreaks, 17 drought and famine events, 10 major floods, and a little greater than 5 cases of refugee influx into Tanzania. These events have moulded the disaster management framework in Tanzania to the extent that the country has instigated various disaster management mechanisms, such as the National ICT Policy of 2003 and the National Disaster Management Policy of 2005.

Tanzania has already planned a nationwide ICT backbone infrastructure, which will be implemented in five phases. The support mechanism required for the implementation comprises of (i) implementation of policy; (ii) capacity building; (iii) development of infrastructure; (iv) enhancing the use of ICT as a tool for achieving MDGs (e-Disaster, etc.); and (v) development of e-Disaster coordination. Several of these measures are already in various stages of implementation; however, there is still quite a lot of groundwork to be covered in this area.

Conclusively, it can be said that it is not the strongest species that survives, in times of disasters, nor the most intelligent, but rather, the species that survives is the one that is most responsive to change. Human beings are the most adaptive species, the key ingredient for survival, of any disaster or any magnitude.

## **2.2 Presentation by Mrs. Rachel Arungah: Harnessing Technology and Science for Disaster Management**

Mrs. Rachel Arungah was the second presenter for Session 2. The following is a summary of her presentation.

Primary objectives of disaster mitigation, in any environment are; reduction of loss of life; limiting destruction (of infrastructure, property, assets, etc.); minimising disruption (of social and administrative services); and finally, ensuring that critical services survive major disaster events.

Historically, disasters in Kenya have been as follows; in 1994, the Likoni Ferry in Mombasa capsized, leaving 270 persons dead; the El Nino rains that caused massive flooding in 1997/8 affected 1.5 million persons; the terrorist bomb attack that targeted the US Embassy in Nairobi in 1998 left 214 persons dead, and 5,600 persons seriously injured; the 2002 bombing of the Paradise Hotel in Mombasa left 13 persons dead and 80 seriously injured; the 2004 Alfatoxin food poisoning in the Eastern Province left 82 persons dead and hundreds hospitalised; and finally, the 2004 alcohol poisoning in various major towns (particularly Nairobi) left 50 persons dead and scores blinded.

This is quite a tall order, in terms of the number of disasters and the magnitude of their impact on society. However, these disasters have paved the way for the use of ICTs to mitigate disasters as well as to be used as tools for risk reduction.

From this perspective, the role of ICTs in disaster mitigation becomes modelling and simulation (in particular flood models using specialised software), hazard mapping (using GIS software), design and implementation of early warning systems, monitoring, forecasting, knowledge hubs (such as portals and databases), dissemination of information on impending dangers, disaster preparedness through education (radio, TV, etc.), and the coordination of relief distribution.

According to a survey study conducted by the International Telecommunications Union (ITU), of the 800 million people living in sub-Saharan Africa, one in four own/have access to radios (200 million); one in thirteen own/have access to TV sets (50 million); one in thirty three

have fixed telephone lines (24 million); one in fifteen have GSM lines (53 million); one in one hundred and thirty have a PC (6 million); and only one in one hundred and thirty use the Internet (6 million). These statistics are useful in gauging the effectiveness of ICTs in disaster mitigation, as appropriate mitigation measures can be planned and implemented on the basis of high proliferation of particular ICTs.

From the statistics, radios have proved to be most useful and suitable for disaster warning applications because they are widespread, even in the rural areas. Satellite radios are used in remote areas where conventional radio broadcast media do not reach. In terms of telecommunications, the Short Message Service (SMS) can be deployed, as there are currently 10 million mobile subscribers in Kenya. SMS can be used when there is congestion in the phone lines, especially when the cell broadcast technology is used, which is a particularly advantageous technology as it is only dependent on the transmission sites, not the actual voice and SMS switching systems.

Other technologies, such as Internet and email can provide reliable means of communication, particularly through satellite systems (VSAT), which can be very useful when fixed line communications and GSM transmission infrastructure are destroyed and disrupted due to disasters. They can be relied to provide communication with the outside world in the most extreme cases.

Even while several ICTs exist, which can offer viable means of disaster mitigation, the challenge lies in the low penetration of ICTs in sub-Saharan Africa. This is a challenge to policy makers and disaster management stakeholders to implement measures that will allow for a higher penetration of ICTs, putting into perspective disaster risk reduction as an integral part of ICT, especially towards the formulation of viable sustainable development policies.

### 2.3 Presentation by Mr. Haretsebe Mahosi: Disaster Management Policy – The Role of Government

Mr. Haretsebe Mahosi was the third presenter for Session 2. The following is a summary of his presentation.

Before a clear and viable disaster risk reduction (DRR) policy can be designed and implemented, some important terms must be defined:

- **Policy:** An adopted principle/course of action. A declaration of intent/objective
- **ICT:** An information highway and/or platform. An art & science of utilising technology to acquire, process/manipulate, store, retrieve, send and receive information to and from the targeted environment with a high standard of penetration, efficiency and effectiveness
- **Disaster Management (DM):** The process of planning which seeks to improve measures relating to the **management of disasters** throughout all stages of the DM cycle, with particular focus on Preparedness & Response
- **Disaster Risk Reduction (DRR):** The philosophy and/or way of life in which people individually and collectively shift their focus from the management of disasters to the **reduction of the risks & vulnerabilities** that have the potential to bring about disasters (**management of disaster causes**)

From this perspective, the role of government in disaster management, which is, for the purpose of this document, termed disaster risk reduction becomes, setting a national policy, provision of legislation that sets minimum standards in respect of the outlined policy, as well as the coordination of the role players and monitoring of their progress towards the attainment of the pre-set national policy in a country.

To ensure that a national policy is based on issues of national importance, certain key issues

must be taken into consideration. These are DRR, HIV and AIDS, hunger and poverty, gender issues, development issues and ICTs.

In order to set a national policy on DRR, two important approaches should be looked into, that is, the utilisation of the Hyogo Framework for Action (HFA), which provides a policy framework for all national governments, and the alignment of these policy frameworks with existing MDGs, National Vision, Poverty Reduction Strategy, and Disaster Management Setup.

ICT has a certain relevance to DRR, in the sense that it is a tool that provides a competitive advantage to those who harness and utilise it appropriately. ICT is said to be the eliminator of space and time, as it (i) brings communities and nations closer together (Global Village); (ii) discards the effect and impact of global time differences; and (ii) provides the opportunity to access information at the same time irrespective of where one stands on the surface of the earth. In essence, ICT is the number 1 weapon for success in DRR, because good DRR begins with good Information Management.

Perhaps, before concluding this perspective, one important question should be asked; what is ICT and what are its benefits?

ICT is a vehicle that has an infinite capacity to carry the DRR strategies and challenges across to all communities and nations. It has the infinite capacity to expand in order to accommodate all communities and nations and their unique issues in the DRR arena. It also has the infinite capacity to be customised to different situations in order to ensure maximum flexibility in an endeavour to win the war against disasters.

Thus said, it can be concluded that ICT is both an environment and a medium, and a framework where past, present and future can live together in harmony; a highway with a high standard of flexibility for ever-increasing traffic; a platform upon which the basic and the advanced forms of communication prevail to allow for cross pollination of ideas across the communities and nations; a language that helps people to understand their environment; a school/college that sharpens human development skills; and finally, a culture and a glue that binds all nation together for them to appreciate, understand and celebrate their similarities, rather than uphold their differences.

Additionally, it can also be summed up that ICT is a catalyst for success, that provides a competitive edge, provides winners with a competitive advantage over others, and facilitates provision of information regarding oncoming disastrous events and for people to take the necessary steps in safeguarding their lives and livelihoods.

For all this to become reality, ICT must be viewed as a prerequisite for better performance and/or management in DRR, whereby governments will be required to formulate, pursue and promote policies that can ensure DRR-aware ICT as well as ICT-laden DRR. This is the winning recipe for any development endeavour during our times.

As mentioned by previous speakers, sustainable development without DRR foundations cannot be assured, and DRR without a proper ICT platform cannot be wholly realised. Governments in Africa must make deliberate efforts to put their priority on formulating policies and passing laws for DRR with the guidance of the HFA. Furthermore, governments in Africa must uphold ICT policies and laws that will enable DRR to achieve its intended objective.

It must be taken into consideration that we live in the information age, when winners are those who harness technology to manage information and communications better than others. But Africa must be warned, that, in this game, there are no permanent winners and there are no permanent losers.

The fact that others have claimed greater successes before Africa is not, by itself, a

guarantee that they will forever remain winners, nor does it mean that Africa will remain a loser permanently, irrespective of whose yardstick is used!

#### **4. Session 3: The Role of Regulators and the Creation of an Enabled Regulatory Environment**

An assessment of the regulatory environment for the use of ICTs in disaster management; how to realise the full potentials of ICTs in disaster management.

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This session was chaired by Mr. Seth Vordzorgbe, Senior Advisor, UN/ISDR Secretariat. The facilitators were Mr. Cornelius Fonzouk, Chief of Service for Emergency, Ministry of Posts and Telecommunications, Cameroon; and Ms. Elizabeth Kachamba, Vice Chairperson, Communications Authority Board, Zambia.

Discussion panellists were Mr. Ethan Lavan, Dr. C. Kassianides, Mr. Bashir Patel, Mr. C. Fonzouk, and Ms. Elizabeth Kachamba.

##### **4.1 Presentation by Mr. Cornelius Fonzouk: The Role of Regionally/Globally Harmonised Frequency Bands in Public Protection and Disaster Relief**

Mr. Cornelius Fonzouk was the first presenter for Session 3. The following is a summary of his presentation.

The Public Protection radio communication frequency spectrum is used by responsible agencies and organisations dealing with maintenance of law and order, protection of life and property and emergency situations, whereas the Disaster Relief radio communication frequency spectrum is used by agencies and organisations dealing with serious disruption of the functioning of the society, posing a significant widespread threat to human life, health, property or the environment, whether caused by accident, nature or human activity and whether developing suddenly or as a result of complex, long-term processes.

In Cameroon, emergency and disaster management is the responsibility of the Ministry of Territorial Administration and Decentralisation, and is carried out through the Department of Civil Protection and the National Risks Observatory. Other important and relevant agencies involved with this task include the national fire brigade; the national police force; the Red Cross organisation; Non Governmental Organisations; and the Emergency Health Service.

In carrying out disaster relief, the Government of Cameroon has a National Contingency Plan, which specifies the different actors and their respective roles in disaster management. The plan is activated by the Minister of Territorial Administration and Decentralisation in the event of an emergency or disaster situation, whereby all actors are summoned and relief operations coordinated by the Department of Civil Protection;

The contingency plan could not have been put in place without taking into account Cameroon's historical record of disasters, which took place during the past 25 years. The different disasters are:

- The exit of toxic gases from lake Monoun (West Province) in 1984, from lake Nyos (North West Province) in 1986 and at Nsimalen (Centre Province) in 1984. These together have caused over 1785 deaths;
- The Nsam Efoulan fire disaster in Yaoundé in 1998 that caused over 200 deaths with the damage estimated at about 740000 US dollars;
- Land slides that have occurred in nearly every part of the country;
- Floods that have occurred in nearly all parts of the country especially the coastal town of Limbe, causing the destruction of several houses, the loss of cattle and

- human lives;
- Plane crashes in 2003, causing the loss of over 180 lives and over 110 wounded; the most recent being the crash of a Kenya Airways plane on 5th May 2007 near Douala (Littoral Province) that killed 114 people;
- Numerous road accidents that have caused the death of over 300 people within the last three years;
- The collapse of a major bridge in the country over the river Mungo that links the two parts of the country causing damage estimated at over 1.8 million US Dollars;
- Volcanic eruptions of Mount Cameroon in 1998 and 1999 that caused damages estimated at 600000 US Dollars;

During these disasters the role of Telecommunications has been essential in facilitating rescue operations.

Like many other African nations, and the rest of the world, Cameroon is not immune to disasters, natural or man-made.

### **Emergency Telecommunication**

Emergency Telecommunication in Cameroon is an area that falls within the responsibility of the Ministry of Posts and Telecommunications. The National Emergency Telecommunication Service is a unit that exists within the Ministry that has been charged with Emergency Telecommunications, having responsibilities that include, designing and implementing emergency telecommunication plans in collaboration with the competent government agencies and non-government agencies in charge of disaster prevention and management; participating in the coordination of the public warning service; defining the role of telecommunication operators in emergency telecommunications; coordinating the management of programmes to ensure the availability of telecommunication resources in case of disaster; creating emergency telecommunication committees; and finally, carrying out local, national and regional emergency telecommunication simulations.

### **The National Emergency Telecommunication Plan**

Presently, under the auspices of the National Emergency Telecommunication Service, Cameroon is in the process of drawing up a national emergency telecommunication plan to support the national contingency plan. This process will involve, carrying out a baseline survey of the emergency telecommunication systems in Cameroon and their performances during disasters of the recent years, for events such as volcanic eruptions, floods, emanations of toxic gases, plane crashes, fires, etc; identifying the major actors of the National Contingency Plan and their emergency telecommunication needs; making an inventory of existing emergency telecommunication resources (personnel, equipments and frequency bands); identify the weaknesses of existing systems; identify additional resources to acquire; drawing up the proper means for the implementation of both the National Emergency Telecommunication Plan and the National Contingency Plan.

Among other key activities that have been foreseen in the near future, as part of the implementation of both Plans, include the ratification of the Tampere Convention, which will concentrate on the key actors of emergency management.

Recently, Cameroon hosted the ITU Sub-regional Workshops, which took place from 30th May to 1st June 2007, in Yaoundé. The workshops were centered on the role of telecommunications and ICTs in disaster management for Central Africa. At the end of the workshops, participating Central African countries drew a plan of action for the development of emergency telecommunications that recommended the implementation of a regional harmonization of spectrum for public protection and disaster relief (PPDR).

### **Benefits of Spectrum Harmonization**

The benefits of regional/global spectrum harmonization for PPDR include, the implementation of more effective relief teams using systems that operate on a common frequency band;

enhanced cross-border coordination and assistance for a proper multinational response to a large-scale disaster (e.g. earthquake, hurricane, tsunami, crime or emergency incident); and reinforced benefits of open standards, open technologies and radio compatibility leading to reduced costs of product development and lower prices for PPDR users.

Other benefits include the greater interoperability between public protection and disaster relief agencies and organizations; lesser amount of regional/global spectrum as required by individual administrations for implementing public protection and disaster relief; better orientation of manufacturers for design purposes; and finally, improved cross-border circulation of equipment for disaster relief.

#### **Factors hindering Spectrum Harmonization**

However, the severe disparity in spectrum vision for Public Protection and Disaster Relief, has directly caused some administrations to consider the two as going together since the same agencies are involved in the two activities; whereas, other administrations believe that some aspects of disaster relief activities by their nature have different requirements regarding spectrum availability.

The disparity causes severe hindrances to spectrum harmonization, as public protection activities are considered as being within national borders and not requiring regional/global spectrum harmonization, whereas disaster relief operations are said to involve international relief efforts, thereby requiring regional/global spectrum harmonization. The fact is, both public protection and disaster relief require spectrum harmonization, whether on a regional or global scale.

From the above, it is safe to conclude that the analysis brings out the likely benefits that would result from regionally/globally harmonized spectrum. From it, we should be able to perceive that it would be difficult to come to a consensus on which band to use at a global level; however, starting with regional harmonization at different regions could be a gradual approach towards global harmonization.

#### **4.2 Presentation by Ms. Elisabeth Kachamba: Disaster Management and Mitigation – Case Study for Zambia**

Ms. Elisabeth Kachamba was the second presenter for Session 3. The following is a summary of her presentation.

The emphasis of the disaster management and mitigation case study for Zambia was centred upon the challenges being faced by Zambia.

Zambia implemented a National Disaster Management Policy in 2005, which has several weaknesses. The primary weaknesses identified are that, most relevant disaster management organisations run independent communication systems, whereby there are no interlinkages between these stakeholders.

As part of the Policy, Zambia established the Disaster Management and Mitigation Unit (DMMU), which has the primary objective of managing critical networks as well as acting as custodian for mission critical data.

Another part of policy implementation was the establishment of the Task Force on Emergency Communication Systems, which made an inventory of existing systems and conducted a readiness survey.

From the case study, it was recommended that, there is a need to establish a link between television stations, especially Zambia National Broadcasting Commission (ZNBC), and DMMU. This should include a toll free line of all telephone networks to ZNBC and the Emergency

Operations Center at DMMU. DMMU should acquire or coordinate acquisition of satellite news dissemination equipment for transmission from scenes of events. In addition, it was recommended that DMMU should hold regular awareness programs on both radio and TV, which, in essence, is an implementation of one of the most important aspects of the Hyogo Framework of Actions.

The case study also recommended that a database of relevant stakeholders in various sectors be established, which would also include statistical data on disasters/accidents. However, in terms of interoperability, communication harmonization should be achieved by putting in place a trucked system (intelligent system for inter-operability). The system should support Data, video, voice Transmission, GPS and AVL (automatic vehicle location) facilities. The radios (handheld and fixed) will support all these advanced features and shall have necessary expansion slots/ports for such services so that these features can be implemented at present or at a later stage without replacing any of the radios, repeaters, controllers, etc. The system should have provision for cell, telephone and fax connectivity. The phone component should have a provision for creating hotlines.

Conclusively, the meetings of the core team addressed among other things the methodology to establish greater relationships and the technical cooperation of the working team to prepare the inventory of all communications available and frequency of operation with stakeholders and contingency plans mapped out to agree and send a team to visit such countries where these facilities of interoperable systems are up and running. The purpose of the trip shall be to assess the actual equipment requirement as first hand information to adequately build the system.

In conclusion, the ultimate objective of achieving interoperability is actually the need to develop and install the trucking system which will cater for all stakeholders privately in peace times and enable responders to come together when the need arises.

Public safety and disaster professionals have been aware of the need for interoperability as in almost every post-incident "after action report", we find the inability to communicate listed as a critical problem or as an item requiring future attention. Zambia has learned some tough but valuable lessons in some of the disasters encountered and is a critical element of protecting our country and responding to all kinds of disasters, whether the disaster is natural or human induced.

Emergency medical teams, fire fighters or Police have to be able to talk to each other at least on the command level so that they can coordinate what takes place during catastrophes. The recent simulation exercise organized by Japan Paramedical in November, 2006 brought out this aspect clearly.

## 5. Session 4: The Role of Operators and Disaster Management

Fixed line operators, satellite communications, mobile telephony, Internet Service Providers, backbone operators and new technologies

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This session was chaired by Mr. Dag Nielsen, Director of Ericsson Response. The facilitators were Mr. Constantinos Kassianides, of the Research & Development Department, Hellasat, which is a member of the European Satellite Operators Association (ESOA) and Mr. Ethan Lavan, of Inmarsat, which is also a member of ESOA.

Panellists were Mr. C. Kassianides; Mr. Mark Wood, Secretary General of CEASA; and Mr. Dag Nielsen.

### 5.1 Presentation by Mr. Constantinos Kassianides: The Role of Satellites in Effective Disaster Management

Mr. Constantinos Kassianides was the first presenter for Session 4. The following is a summary of his presentation.

In essence, satellites enable the delivery of imagery and communication. With one coverage beam, both Europe and Africa can be served. Satellites are recognised by the international community; in 1999, Space Agencies came together to provide *satellite imagery* to UN Member States. The Charter has been triggered over 80 times by the UN itself, providing satellite imagery to nations in need following disasters.

Satellites played an important role in recovery efforts following the tsunami disaster in 2006, by providing before and after satellite imagery, taken from several locations. The imagery provided an accurate depiction of the extent of the damage caused by the tsunami disaster.

Because today's satellite technology allows for a portable infrastructure, where land lines are down or overloaded, portable satellite solutions, such as VSATs, can save the day. This becomes possible because a satellite dish can be installed anywhere, even in rubble, the only requirement being a direct 'line of sight' - the terminal needs to 'see' the satellite. In cases where roads remain intact, satellite vans can be deployed to assist in recovery communications operations.

While the international space community has a framework (Agreement) to provide satellite imagery in times of need, the same does not exist for satellite communications. Land-based communications infrastructure is one of the first things to fall in a disaster. In 2007, Satellite Operators have come together to assist the UN with satellite connectivity in emergency regions. Satellites can provide essential communications within hours of a crisis, which would include a range of services, from vital co-ordination of relief efforts, to giving reassurance to family and friends. ESOA members deliver fixed and mobile communications, Voice and broadband data, in order to meet immediate and on-going needs of government agencies and NGOs.

One of the strategic partner organisations, which works in close cooperation with a number of recovery and space-based organisations, Télécom Sans Frontières (TSF) was appointed by United Nations to deploy satellite communications in Lebanon, August 2006. It established two telecoms centres, which supported 22 aid organisations and over 600 displaced families. In less than a month, 3 gigabytes of data were sent and 1,850 minutes of calls were made.

The services provided by TSF during disaster recovery include the provision of logistics support for relief agencies, telephony, email, internet access, videoconferencing, instant messaging, telemedicine to connect with world-class trauma specialists, Tele-education to

bring normality to displaced children or destroyed schools, media coverage in order to raise the profile of the disaster, as well as support to business continuity, which in turn supports the community.

ESOA represents all *European satellite operators*. The Association works with policy-makers to ensure that satellite technology and services are taken into proper account in the delivery of public sector objectives so citizens all over the globe can benefit from them. The availability of satellite services depends on political support, a favourable regulatory environment, a fair industrial policy and awareness.

The Members of ESOA are, EADS Astrium, Aurasiasat, Eutelsat, Hellasat, Hispasat, Inmarsat, SES, Sirius, Telenor and Telespazio.

## **5.2 Presentation by Mr. Ethan Lavan: Mobile Satellite Services (MSS) for Relief Efforts – Introduction and Best Practices**

Mr. Ethan Lavan was the second presenter for Session 4. The following is a summary of his presentation.

Before the advent of MSS, communication existed via the ship-to-ship radio, Morse code and flares. The International Maritime Organisation (IMO) reviewed the use of satellite communication, and in 1979, an Intergovernmental Organisation (IGO) was established in order to provide Satellite Global Maritime Disaster and Safety Systems (GMDSS).

Under the IGO, a new framework was established, which provided communication for maritime operations, whose range included large merchant vessels to small fishing boats and yachts; whereas, in landed operations, communication solutions included 'luggable' kits introduced in the 1990s, to the handheld sets of today; and finally, in the aeronautical arena, communication solutions have been deemed as 'GSM in the sky'.

Today's MSS services include Voice telephony, Data communications (Fax, Email, SMS, Internet access, Instant messaging, Videoconferencing, FTP, and Access to LANs/VPNs) with data transfer rates of up to 492 Kbps.

Among the applications of MSS, particularly in times of disaster recovery, have been Media coverage, restoration and coordination of Oil & Gas services, operations by aid agencies, Government agencies, Mobile office or communications centres, Voice telephony, and contact with remote resources, such as mining operations or arctic shelf operations.

Mobile satellite communications solutions have several advantages in disaster situations. These advantages include a global availability of the services (satellite provide coverage beams across the globe), they are reliable, their deployment and installation is usually fast (due to their portability, installation is often established in minutes), and they can provide faster than land fixed data connections in certain cases.

During natural disasters, vital components of telecommunications infrastructure become inoperable; land lines are destroyed, GSM antennas are damaged, and/or GSM networks become saturated.

Today, particularly using the Broadband Global Area Network (BGAN), there are several portable mobile terminal solutions for MSS, which can be used within the three geostationary satellites which are needed for global coverage, that each has a narrow spot beam of approximately 800 kilometres in diameter. The presentation was concluded with a live demonstration of the BGAN system, during which Mr. Lavan connected a portable BGAN terminal, with it managed to make a voice call and an Internet connection.

## 6. Session 5: Preparedness

Protecting citizens through disaster preparedness; strategy and bench mark examples of creating community awareness.

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This session was chaired by Mr. Dag Nielsen, Director of Ericsson Response. The facilitators were Mr. Guy Weets, Director for Africa, The International Emergency Management Society (TIEMS); Mr. Philemon Mutashubirwa, UN-Habitat Programme Manager, Tanzania; and Dr. Mohammed Mhita, Director General of the Tanzania Meteorological Agency (TMA).

Panellists were Dr. M. S. Mhita, Mr. Philemon Mutashubirwa, Mr. Guy Weets, Mr. Aribo Lawrence, of the Department of Meteorology, Uganda, and Mr. Tinus de Beer, Co-Director of Disaster Management Solutions, South Africa.

### 6.1 Presentation by Dr. Mohammed Mhita: Using ICTs for effective Disaster Management

Dr. Mohammed Mhita was the first presenter for Session 5. The following is a summary of his presentation.

Dr. Mhita started by declaring that natural disasters account for 70% of all disasters worldwide. Access to information is important for all aspects of disaster preparedness. ICT is a key to modern ways of disaster mitigation, as more than one ICT can be used in parallel for preparedness. For example, both fixed and mobile telephones can be used in tandem, while text messaging can be a standalone application. Satellite telephony is very useful in cases of extreme impacts of disasters, whereas radio is widely used in developing countries as a tool for disaster preparedness. Increasingly, amateur radio is becoming popular worldwide, while Radio Internet (RANET) has just emerged as one advanced form of ICT, as is evidenced in the use of the WorldSpace digital radio system. Tanzania will inaugurate its own WorldSpace program in December 2007.

Of all ICTs, television has the advantage of being a visual medium, however, other advanced and user-friendly ICTs have emerged, which are cell broadcast, Internet/Email, GIS/Remote Sensing, as well as the traditional satellites, which are increasingly being used in disaster operations.

In conclusion, Dr. Mhita stressed that ICT should be used in all phases of disaster management and disaster management planning.

### 6.2 Presentation by Mr. Philemon Mutashubirwa: Rethinking Emergencies towards Sustainable and Connected Settlements

Mr. Philemon Mutashubirwa was the second presenter for Session 5. The following is a summary of his presentation.

Mr. Mutashubirwa started by saying that we live in an interdependent and urban world, with cities hosting most of the world population. Cities of today struggle with unprecedented challenges ranging from mass migration, global economical competition to climate change. It is a century that is largely defined on how well we manage our cities, their connection to their rural and national counterparts and the well-being of citizens. There are great challenges to be faced but at the same time those challenges are faced with unprecedented potential.

Future cities and most urban settlements of today are situated in disaster prone areas, vulnerable to natural disasters and human made conflicts. Traditional planning approaches both in the developing world as well as cities in the post-conflict and post-disaster context

have failed to address the challenges of rapid urbanisation and poverty, exclusion, informality and vulnerability which it brings in its wake.

This has led to cities with inadequate and poor housing and a rising number of settlements that are excluded from the formal realm of planning processes and governance. The challenge seen in cities with the faster growth of informal settlements than formal settlements will require a fundamental shift in the thinking of planning in cities, and especially cities in vulnerable settlements.

Natural and man-made emergencies and their impacts on populations and human settlements are rising alarmingly. In addition, when hazards turn into disasters, or a struggle for political and economic control turns into an armed conflict, it is always human settlements, people and property that are worst hit.

The changing nature of conflicts and natural disasters calls for a fresh vision of conventional approaches to recovery assistance. Coupled with cycles of dependency and shortage of resources, this evolution points to a need to develop innovative approaches and re-examine long-established policies on relief, recovery and mitigation assistance.

Conflict is in many cases followed by complete breakdown of governance institutions and utter anarchy in human settlements. While a disaster can result in a breakdown of governance, settlements are also worst hit in areas of weak governance, as seen for example in recent Latin and North American hurricanes and respectively in armed conflicts and natural disasters in Africa.

It is the social, cultural, economic and political settings of a country that define the degree of vulnerability or resilience of its people and communities. Therefore, disaster mitigation and management must look beyond the hazards alone to consider the prevailing conditions of susceptibility.

Post-crisis responses by national governments, bilateral aid agencies, NGOs and UN agencies with rehabilitation projects including water and sanitation, housing, food-distribution and health tend to be ad hoc, palliative and separate from the overall development objectives of disaster-hit countries.

Piecemeal efforts that are not connected with a long-term development strategy can not only worsen precarious social conditions as they create dependency on aid, but are also a waste of financial and human resources for the sake of short-sighted emergency relief plans.

However, and perhaps ironically, disasters do provide opportunities for sustainable development. But sustainable recovery and reconstruction requires that both relief and rehabilitation efforts are integrated into long-term development strategies on one hand, and risk and vulnerability reduction plans are incorporated into disaster recovery on the other – making cities and towns secure before the next calamity strikes.

The difficulty lies in communities that are often unaware of the hazards they face, thus they do not put much trust in mitigation strategies, and rely heavily upon emergency responses from others when disaster strikes.

Mitigation is an obvious and important part of reducing humanitarian ordeals, but it is equally a sound financial strategy. Every dollar spent on disaster mitigation, saves up to 3 or 5 dollars on economic losses whenever a catastrophe strikes.

Experience has also shown that it is essential to mobilise affected people for recovery and reconstruction in order to ensure a seamless transition between relief and reconstruction. The value with building back better after a disaster is in providing shelters that are sustainable and locally adequate, rather than providing shelter materials without further inputs into the

building phase. Approaching disaster with a long-term point of view is a win-win situation both for the aid actors involved and the people vulnerable to the disaster circle.

It is commonly understood that the recovery phase starts when the emergency relief phase ends. Recovery and development actors working together from the early stages of disaster relief have helped our partners to address the immediate needs of saving lives and providing protection, in a manner that catalyses recovery and incurs less cost while initiating transitional activities that reduce the crisis period.

However, once again our experience has shown us repeatedly that the gap between relief and recovery not only costs more, but also prolongs the crisis phase as affected people are left dependent on relief aid. By rethinking the way we have worked previously, we can and should dramatically provide better and more extensive assistance for less time and money.

Disasters tend to strike back whether they are hurricanes or armed conflicts. Knowing this, we need to build a network that not only warns communities of possible disasters, but connects them with each other before, during, and after an emergency.

Tools, methodologies, networks and new technologies are means to achieve objectives to build sustainable and resilient settlements by the local governments, communities, and various practitioners. Different stages of an emergency require adequate tools to achieve the long-term objectives. To mention an example; computer assisted techniques and the use of software programmes has allowed for automation of the risk management process. This has led to hazard mapping becoming more comprehensive with the use of GIS and remote sensing.

The challenge however with the use of technology and communication tools lies in the reliance on equipment and expertise, which may not be readily available in crisis affected communities who may be undertaking the assessments. This may widen the breach between the information produced by technical risk assessments and the understanding of risk by people.

Early warning systems and techniques to build better preparedness can obviously help mitigate disasters. During an ongoing disaster, however, information networks can help share vital information between the various actors on the ground. Making information open and available, especially between the victims and the aid agencies, strong and independent settlements can be built quicker and more efficiently.

Not only do we need to help settlements access tools of communication, but we also need to build settlements that can contribute to the development of information sharing. Involving victims and local governments in the development of ICT, by letting them be part of the information loop will raise greater awareness of disasters which is vital for disaster mitigation. Also, ideas and thoughts on mitigation when shared with the local population will give valuable insight to aid agencies before, during and after an emergency. Therefore, rethinking the use of ICT is recommended. Instead of viewing technology as an external tool, it should be viewed as an integrated tool, part of the larger mitigation objective, where information is shared openly between all the actors.

### **6.3 Presentation by Guy Weets: TIEMS Vision for Africa and Program Proposal for an Emergency Management Project in Africa**

Mr. Guy Weets was the third presenter for Session 5. The following is a summary of his presentation.

Mr. Weets started by remarking that Africa is underserved in disaster management capacity building, which is the reason behind the vision for TIEMS in Africa. TIEMS already has

established existing contacts with various stakeholders in Tanzania, Kenya, Botswana and South Africa. An action plan has been prepared to go into effect starting 2010 until 2012.

TIEMS is implanting an EU strategy, whereby there is a shift from prevention to mitigation. This shift relates to policy measures, as well as integrated risk management, risk reduction and innovation. Notably, the secondary impact of disasters has always been higher than anticipated, due to the lack of an effective strategy, viable for disaster preparedness in Africa.

### **EU Network Enabled Capacity**

The EU has established a network capacity which enables full access to intervention in times of disasters. This capacity allows various players to conduct effective monitoring programmes, as well as implement effective warning and alert systems. The outcome has always been an effective response, which has been facilitated by the availability of broadband communication services.

### **Activities**

TIEMS manages a collaborative effort in disaster management planning, which takes various approaches, amongst them being the Command and Communicate approach. This approach is facilitated by the Common Alert Protocol (CAP) and the Tactical Situation Object (TSO), two measures which enable TIEMS to carry out its missions, in both Europe and Africa.

In short, TIEMS is an international network of individuals, institutions and companies with a common interest in emergency and disaster management. It is complimentary to other EM organizations and encourages international cooperation; TIEMS thinks globally and acts locally. TIEMS events are arranged in cooperation with a local TIEMS host and local and international institutions, companies and organizations, thus TIEMS projects and programs welcome international support and cooperation.

### **What the Future Holds**

TIEMS is looking for local partners to begin the Africa Project, whereby TIEMS also is working to expand TIEMS membership in Africa as a base for the virtual network linking local emergency managers to the rest of the world. TIEMS hopes to engage African emergency managers as focal points in the Africa Project, whereby it will look deeper into how ICT can be integrated into the Africa Project.

## **7. Session 6: Mitigation**

Harnessing technology and science for disaster mitigation; coordinating the disaster response.

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This session was facilitated by Mr. Torsten Feurehake, Product Line Manager, Rohde and Schwarz, Germany; Mr. Arome Salifu, International President, Africa Youth Growth Foundation, Nigeria; and Mr. Mark Wood, Secretary General, Cellular Emergency Alert Systems Association (CEASA).

### **7.1 Presentation by Mr. Torsten Feurehake: Intelligent solutions for effective disaster management**

Mr. Torsten Feurehake was the first presenter for Session 6. The following is a summary of his presentation.

Disaster management and public safety systems demand that, in order to implement effective disaster management systems, there must be an overall improvement in the manner in which the available communication is delivered, in terms of reliability. In order to achieve this, there must be an optimal coordination of the disaster recovery fleet (vehicles), in order to have a flexible scenario for adapted communication. Thus, at all times, secure communication must

be available, such that mission critical communication channels will not be (unintentionally or intentionally) interfered with by non-involved parties, during disaster management exercises.

Rhode and Schwarz, as a technology provider, has developed a disaster management solution which has four key components; public safety network, network management, command control and applications. This solution is available under the TETRA communication framework.

The services available include, voice/mailing for users, paging systems, hotline operations, PSTN dialing, voice/data transmission, and emergency calls.

The applications of technology solutions include, access control systems, AVL for mission critical vehicles, reporting systems, telemetry, alarms/signalling, fleet management, and ID-Card identification systems.

Rhode and Schwarz is actively participating in the development of the international ETSI TETRA standard right from the beginning. It has extensive technological experience in scalable network solutions (Single Site to County-Wide), high degree of customization in digital radio networks, rapid deployment radio network solutions, and Outdoor/Indoor PMR infrastructure high precision manufacturing.

## **7.2 Presentation by Mr. Arome Salifu: Disaster Mitigation – Exploring the resources of the youth through ICT**

Mr. Arome Salifu was the second presenter for Session 6. The following is a summary of his presentation.

Mr. Salifu started by stating that Africa is faced with a great capacity challenge for ICTs in disaster management. Currently in Africa, the youth are often ignored as mere instruments of entertainment, either in music or sports, but they have a greater role to play in disaster management.

Disaster management activities are designed to alleviate the effects of a major disaster or emergency. Air disasters are prominent in Nigeria, but also, floods have had a devastating effect due to the unplanned nature of many Nigerian settlements. The youth population accounts for over 60% of African populations. Realising their role and potential, some African youths have developed software that can be used for disaster management operations.

Recommendations made by the International Youth Growth Foundation (IYGF) are, African countries should become more active in building local capacities, in order to create partnerships and alliances. Also, they should exchange and share information that will assist in the process of the development of learning and decision making tools, which are ICT-based.

## **7.3 Presentation by Mr. Mark Wood: 'Cell Alert' System via Mobile Broadcast.**

Mr. Mark Wood was the third presenter for Session 6. The following is a summary of his presentation.

Mr. Wood began the presentation by outlining several key and obvious advantages that the Cell Broadcast technology (which is an embedded technology in mobile telephony) already has over other systems, as follows:

Attractions of using mobile phones;

- The user buys the terminal at own cost.
- The user charges the battery up every day.
- The user carries the terminal around day and night, and whether at work or off duty. Often also carries it when touring.
- If the terminal fails, the user repairs it or replaces it at own cost.
- The user upgrades the terminal at own cost about every 2 years.
- There is about an 80% penetration of mobile phone ownership in places where there is mobile network coverage.

However, mobile phones, while advantageous, also come with their own fair share of problems:

- They are only useful where there is mobile phone network coverage.
- If the infrastructure itself is destroyed, then they can be of no use until the infrastructure is repaired.
- Usually, mobile networks are in severe overload modes in the periods leading up to emergencies and often for days afterwards. This can make them a very poor fit for any mass communications purposes. Injecting millions of text messages into the networks would crash the network at this moment of maximum stress.

### **Cell Broadcast - Advantages**

Thus, the advantage cell broadcast has, within a more or less problematic mobile telephony framework, can be emphasized by remembering these points; (i) cell broadcast is an already existing feature of the GSM and UMTS systems (3GPP 023.041) and the IS95 CDMA system. The feature is supported by most phones and the feature is already loaded into most switches and base stations. However many network operators have the feature switched off; (ii) cell broadcast works during emergencies! It is administered by the Base Station controller, which generally is not suffering from overload conditions during emergencies (BSC does not have any mobility management functions). The CB messages are trafficked over a dedicated Cell Broadcast Channel (CBCH), one of the SDCCH sub channels. This is not allocated to carrying public traffic. Accordingly it should work even during network overload conditions. In addition the use of the facility does not itself place any load on the network; (iii) cell broadcast is natively and passively Geo specific. The feature is a base station feature. As the base station positions are known, we can select a different message to each base station, or any group of base stations of any size. Accordingly messages can be geo specific down to the size of a cell. A cell is typically about 4-5KM across, but can be hundreds of meters across in dense urban areas; and finally, (iv) cell broadcast can be 'Authentic'. Since only authorized maintenance technicians can gain access to the base station controller, it is possible to secure the communications link from the BSC to a secure management system, so that citizens can know that the message really has come from an authentic source. Terminal behavior is different for CB so the user can know when the message is by CB, improving his trust.

### **Reasons for Non-Implementation**

If cell broadcast is such an advantageous system, why is it not being implemented now? Many network operators have the feature switched off because they would have to pay a license fee to have it on. If they are not getting any profit from its use, it makes sense for them to desist using it. Accordingly networks will need to be asked to enable the feature if they have it off. They are making big profits from SMS and so prefer to offer SMS solutions even if they do not fit the situation. When the feature is switched on, one of the control sub channels is taken out of service and reserved for CB messages. This makes it usable as an emergency management tool but also takes a small capacity out of the cell. Accordingly the network may wish to be compensated for this loss of their capacity.

Further, a secure management system needs be installed so that network owners can be sure that their subscribers will be informed only by authorized sources such that spammers, hackers and spoofers are kept out of the system. Some networks may want to make commercial gain from the service if they will have in on in any case. Accordingly a Message

Identifiers coding system may be arranged so that commercial and civic functions can live side by side without interfering with each other.

Presently, the 'area information' feature is normally shipped to the user in the "off" state by default. Very few users know how to turn it on and the menus are often very unclear. Accordingly government would need to launch an education campaign to help users to understand what they must do and how. In the future terminal vendors should be encouraged to ship terminals with the feature 'On' by default, and with the correct emergency warning channel switched on.

### **Regulatory considerations**

There is an urgent need for harmonized channel identification scheme to make it practical for travelers and tourists, and to prevent spamming. Improvements to standards needed to make sure phones give priority to emergency messages and give a distinct tone.

### **Political considerations**

There must be a political/legislative framework, whereby senders of cell broadcast messages must be authorized by national law. Messages must be authentic and follow national policy. The systems to be developed will be resistant to hackers, spoofers and spammers. It will not be acceptable for warnings only to subscribers on one network, but to all networks. To make the solution more practical, Government to Government communications are needed in order to reach closed user groups such as off duty reservists (military).

### **Diplomatic considerations**

A cell broadcast system should be implemented with the consideration that national sovereignty is respected. National systems may or may not integrate with international projects, therefore, cell broadcast systems should be complementary to but never compete with existing and proposed system. There should be a harmonized approach to language codes.

### **Proposed International 'Civic' MI/SC Channels.**

Currently, the ITU has proposed channels for Emergency Alerts, Civic advisories, Exercise and test, Maritime service (IMO), Aeronautical service (ICAO), Amateur service (IARU), Scientific services (e.g. ISNDR-PPW), UNDSS (UN Department of Safety and Security), Child security, WHO (health related info), OCHA (IA Co-ordination), and for the Red Cross/Red Crescent organization. Currently, the Cellcast Corporation, among others, has developed the technology and has an operational system in the USA. It is no longer an experimental system but a commercial off the shelf solution (COTS).

## **8. Session 7: Relief**

The importance of ICTs in relief efforts and examples of best practices

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This session was facilitated by Mr. Ethan Lavan of Inmarsat, Mr. Mark Wood of CEASA, Dr. Tarek M. Attia, of the National Telecommunications Regulatory Authority (NTRA) of Egypt, and Mr. Dag Nielsen of Ericsson Response.

### **8.1 Presentation by Mr. Ethan Lavan: Mobile Satellite Systems (MSS) for Relief Efforts – Introduction and Best Practice**

Mr. Ethan Lavan was the first presenter for Session 7. The following is a summary of his presentation.

Mr. Lavan began the presentation with the following key statements, that, Mobile Satellite Systems have proved to be very effective in disaster situations, primarily because, they can be made available everywhere, they are reliable, they can be easily and quickly deployed, they are flexible, and can offer faster data rates than those available on land fixed systems.

Télécom Sans Frontières (TSF) is a non-governmental organisation (NGO) that has been partnered with Inmarsat since 1999. TSF provides rapid response support in emergency situations around the world. It offers standard 3-minute calls per family in each disaster area that support is provided, so as to enable families to communicate with relatives elsewhere in order to provide information that aids in emotional support. Communication is a very essential human need. TSF is able to deploy within 24 hours to any disaster location in the world.

TSF made statements via a BGAN-enabled Inmarsat call, during which a TSF representative, said that TSF has been engaged in various global ICT and satellite technology operations, particularly due to the nature by which ICT can improve disaster mitigation and relief efforts. Currently, TSF has installed an Emergency Communication Network in Nicaragua, as the country is often affected by hurricanes. The network is part of a long-term disaster mitigation process.

In Niger, a national food crisis prevention centre has been established. The centre will cover about 12 million people.

## 8.2 Presentation by Dr. Tarek Attia: The role of the NTRA in coordinating efforts in disasters

Dr. Tarek Attia was the second presenter for Session 7. The following is a summary of his presentation.

Any country might be exposed to various dangers that vary in their intensity, kind and volume. Also, they vary in their impact on various sectors of the state. Hence the following terms can be defined as follows:

- **A danger** - a rare, unexpected, yet severe, occurrence (natural or man-made) that has a harmful impact on people's lives, properties or activities resulting in a disaster.
- **The degree of exposure to danger** - it is the degree of loss resulting from the occurrence of a certain danger.
- **A disaster** - A disaster= danger+ the degree of exposure to danger

To effectively deal with disasters, certain measures must be taken. In the case of Egypt, currently, the National Center for Crisis Management has been established. The Center is subordinate to the Council of Ministers, comprising all ministries, governors and entities in order to coordinate efforts between them in cases of crises and disasters.

On its own, the NTRA has formed two sub-committees, which are the NTRA Committee for Disasters and the Maritime Navigation Safety and Security Committee. These committees have been formed with the aim of coordinating efforts between the competent authorities in cases of disasters and crises.

Following the guidelines set by Egypt's Telecommunications Law, the NTRA, in collaboration with the Armed Forces and the competent authorities has a plan for the deployment of ICT Networks. The plan will be updated periodically in order to ensure the national defense and security is in reliable operational conditions. The telecommunications operators are the implementers of the plan, while the State's complement authorities are entitled to obligate all telecom networks and any operator to be under their management. Furthermore, State authorities can summon the operators who are in charge of the operation and maintenance of such services and networks. During disasters, State operators will compensate the operators for use of their networks.

During disasters the responsibilities of the telecoms network regulatory committee are:

- Determining the cases of natural and environmental disasters and general mobilization.
- Enumerating and determining the public networks that could be utilized in cases of disasters.
- Determining the additional demands and requests, which the telecom networks should fulfill, and implementing them.
- Preparing and drafting a Plan for regulating telecom networks in order to deal with disasters.
- Reviewing the Plan periodically.
- Drafting a number of the pre-prepared scenarios of some crises and how to deal with them.

During disasters, the responsibilities of the Maritime Navigation Safety and Security Committee are:

- Determining the duties and obligations of all the entities taking part in the Maritime Rescue and Safety System.
- Verifying the coverage areas of the coastal stations and completing the coverage plan.
- Holding periodical meetings to discuss the obstacles and problems, and coordinating efforts between entities.
- Coordinating efforts prior to and after attending international conferences which the IMO held.
- Analyzing the periodical tests of maritime alert signals.
- Follow up Updating databases of the Telecom systems of the Egyptian ships.

Thus, the role of the NTRA, in disaster recovery efforts, has been determined as:

- Exemption from the fees of emergency and rescue telecom services.
- Ensuring the abidance of the network operators of public telecom services by the coverage plan and the provision of service at high quality.
- Awarding permits for the usage and operation of wireless equipment used for rescue purposes and informing the customers of the regulations.
- Operating INMARSAT equipment aboard ships, and airplanes as per the public service agreements (PSA).
- Inspecting ships to ensure that alert channels are not misused.
- Awarding four licenses to VSAT networks operators in order to provide their services most of which have been covering the remote areas.

In conclusion, the NTRA is largely responsible for the coordination of efforts in the ICT sector between the concerned entities during the occurrence of disasters. It is the responsibility of NTRA to ensure that databases are updated periodically and unified for all entities. The NTRA also manages and oversees scenarios of communications in times of disasters and ensures they are reviewed and updated periodically. The carrying out of experiments is highly significant in order to improve the system performance through the lessons learned. NTRA ensures that the operators and service providers are prepared to implement the pre-prepared plans for disasters and the provision of support needed for and from them.

### **8.3 Presentation by Mr. Dag Nielsen: Ericsson Response**

Mr. Dag Nielsen, who is the Director of Ericsson Response, made a brief presentation about Ericsson Response, which is a telecommunications emergency response organisation started by Ericsson.

Mr. Nielsen said that Ericsson Response (ER) works by creating faster and more efficient

communications in disaster situations, engaging and involving employees to contribute towards the well-being of the community, as well as promoting the issues of disaster relief and the use of communications technology to support those in need. He said that ER, in carrying out its operations, takes into account critical and important matters such as, Environmental Management System, Code of Conduct, Code of Business Ethics as well as Radio Frequency Exposure and health.

Mr. Nielsen added that among the key organisational components of ER include a Core Team at Ericsson, Kista (Indonesia) which was established during the Tsunami Disaster of December 26, 2004; an Ericsson internal Steering Group; VP Services at Regional Offices; Ericsson Response Volunteers for disaster missions; Local Ericsson Response Volunteers; and local/regional support centres.

Speaking about Ericsson Response Volunteers, Mr. Nielsen said that they are a formidable group of telecommunications experts, who have a strong commitment from both managers and staff; are trained for emergency operations as individuals or in implementation teams; they have the defined skills required in disaster response; and finally, they are usually formed in national, regional or international missions.

Equally important, ER's work could not be made possible without the availability of critical disaster response equipment, which is allocated to the Ericsson Response Unit, which has GSM systems readily available for emergency deployment in Sweden, Spain, Turkey, Panama and Dubai. Additionally, ER has WIDER support in Sweden, Spain and Canada.

**WIDER (WLAN In Disaster Emergency Response)** is a technology applicable for development as well as emergencies being essentially a point to multipoint microwave Metropolitan Area Network (MAN) for supporting local data interconnectivity access to the multiple UN agencies clustered in, usually, the capital city of a country. A technical paper is on the Ericsson Response web site. WIDER does not incorporate satellite backhaul link to the public Internet.

Mr. Nielsen provided additional information regarding the WIDER technology, as following:

### **WIDER Objectives**

- Goal
  - To provide a shared efficient and cost effective communication infrastructure in a disaster area
  - Between the relief organisations at the disaster site
  - To the outside world
- Vision
  - Create and easily set up a reliable, secure, highly available and flexible system for essential IP communications services at a disaster site

### **The History of WIDER**

- Initiated by Ericsson Response and developed in collaboration with UNHCR and OCHA in Geneva
- Designed by students at the Swedish Royal Institute of Technology (KTH) supervised by Ericsson Response Volunteers during 2003-5
- Tests and Trials carried out within Ericsson

In order to achieve a better response in emergency disaster relief work, over the years Ericsson Response has made alliances and partnerships with the following organisations:

- International Red Cross / Red Crescent
- UN and UN Agencies
- Swedish Rescue Service Agency
- Telecom Sans Frontiers
- Private Sector
- Local initiatives (Ericsson has partnered with Celtel in Tanzania)

In terms of significant achievements in disaster response, Mr. Nielsen reported that Ericsson Response conducted successful disaster response missions in the following regions:

- Kabul, Afghanistan (2002) – a temporary GSM network was established with the United Nations' World Food Programme
- Bunia, Democratic Republic of Congo (2005) – a satellite link to Italy to a GSM network was donated to the United Nations
- Asia, December 24, 2004 – Earthquake and Tsunami disaster recovery
- Muzaffarabad, Pakistan (2005) – Earthquake: WIDER and ER Team providing support to UN organisations through UN OCHA

Mr. Nielsen said that, the ideal situation in disaster area is an efficient way of communicating within the local area using email, telephone, intranet web. He said that the system should also provide access to the outside world that is reliable, of high bandwidth, as well as being cost efficient, which is the primary goal of Ericsson Response in all its missions.

Conclusively, Mr. Nielsen said that Ericsson Response relies on solutions made possible through the WIDER technology, because they are easy to deploy and use, they have a high availability, they offer flexible security, they are cost efficient, they are highly mobile, and there is a ready and broad service portfolio available through WIDER.

## 9. Session 8: Recovery and Reconstruction

ICTs and reconstruction; faster recovery and efficient reconstruction

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This session was facilitated by Mr. Julius Kaberere, Advisor of the Commonwealth Secretariat; Mr. Dag Nielsen, Director of Ericsson Response; Mr. Roger Brewster of the Commonwealth Association of Planners; and Ms. Liz Fearson and Alan Jackson, of Aptivate UK.

### 9.1 Presentation by Mr. Julius Kaberere: Supporting Member Countries Recovery and Reconstruction after natural disasters

Mr. Julius Kaberere was the first presenter for Session 8. The following is a summary of his presentation.

Mr. Kaberere began by outlining the vision of the Commonwealth Secretariat, as being "Every Commonwealth country will have institutional capacities for effective democratic governance and sustainable development".

Thus stated, the Governance & Institutional Development Division develops and implements specific programmes on an annual basis, which are implemented in member countries.

The programmes are mostly demand-led, with an emphasis on South–South cooperation. The work programme fits within the framework of the Commonwealth Secretariat's current 4-year Strategic Plan and is developed in consultation with the national Primary Contact Points as well as the Divisional Points of Contact. Furthermore, the Division responds to requests from governments for technical assistance through, the provision of advisory services provided by in-house experts, the provision of experts to fill specific development needs in the short or long term, the establishment of knowledge networks and the provision of training, and

capacity enhancement programmes.

The GIDD delivers its programmes through technical assistance and capacity building measures, whereas technical assistance is provided through the placing of experts, in durations that range from a few days to two years. Another means of delivery is through Public Service Reform and Public Sector Restructuring, under which designs and implementation strategies for improving governance systems, administrative restructuring and integrated public policy management, are carried out. This approach assists governments in building the capacity for sustained public sector reform. Lastly, integrated packages of policy advice and training focus on improving performance in the public sector, restructuring public enterprises, promoting public-private sector partnerships for infrastructure and service delivery; and public expenditure management, are key methodologies for the delivery of programmes conducted by the GIDD.

## 9.2 Presentation by Mr. Dag Nielsen: Re-establishment of Mobile Networks after a Disaster

Mr. Dag Nielsen was the second presenter for Session 8. The following is a summary of his presentation.

Mr. Nielsen began the presentation by stating that Ericsson is part of the society where it operates. Ericsson has a presence in more than 140 countries. It is responsible for building the cellular networks in even more countries, taking into account that it has an extensive local knowledge and awareness, having been in Africa more than 110 years. This means that Ericsson has an obvious responsibility in the society.

When a disaster strikes, several things happen. In order to re-establish mobile networks, an immediate assessment of telecom infrastructure is conducted. If only the radio part is knocked-out, it can be repaired same day or very soon. However, the biggest problem is usually power (24h backup) and towers. Nevertheless, after a major disaster the network is normally improved with regards to capacity, coverage and maybe even technology. Recent examples of re-establishment of mobile networks after disasters have been:

- **Gujarat, India 2001**  
Ericsson rebuilt and expanded mobile network, donated mobile phones after the earthquake
- **Asia, December 26, 2004**  
Earthquake and Tsunami
- **Muzaffarabad, Pakistan 2005, Earthquake**  
Ericsson provided support to WIDER and ER Volunteers to UN organizations through UN OCHA

### The Future

It should be made clear that cellular communication is a very efficient tool in relief operations, and National and regulatory actions are required – usually the problem is not technical. The technology is in place, but operators should improve their disaster preparedness. Other humanitarian organizations should also improve their use of this technology.

Therefore, after the disaster, any country with an improved infrastructure has the ability to quickly recover in the middle of all the chaos, and there may even be an opportunity for increased social and economical development.

### 9.3 Presentation by Mr. Roger Brewster: Using ICT to Improve Natural Disaster Recovery Planning

Mr. Roger Brewster was the third presenter for Session 8. The following is a summary of his presentation.

Mr. Brewster's presentation began with the introduction of a child's drawing of the Tsunami disaster in Banda Aceh, Indonesia, immediately following with a satellite photograph of pre- and post-Tsunami Banda Aceh, showing the effect of the Tsunami disaster. The introduction continued with additional photographs illustrating post-disaster efforts made by various aid agencies in the disaster area.

Speaking about post-disaster matters, Mr. Brewster remarked that there are three key components of the "continuum", which are, (i) emergency relief, (ii) reconstruction and (iii) development. However, he added, that "there is a crucial weak link here... called planning," meaning, disaster recovery efforts have to be planned in order to be effective.

In order for post-disaster recovery efforts to be practical and effective, several functions and tasks must be carried out. These are mainly behind the scenes activities that can seriously delay the actual recovery reconstruction/development program. Additionally, these activities can give the impression that not much is happening, therefore becoming frustrating for all and eventually politically destabilising. During disasters, the immediate and most urgent need is that victims and aid doctors want to see action. The lack of planning highly contributes towards disaster recovery mismanagement.

Brewster said that developing countries' economies and impacted communities suffer excessively from the secondary post-disaster effects that compound the tragedy. This is primarily due to what are called "nation specific variables", citing the example of Sri Lanka, where:

- The lack of basic ICT resources, mapping and electronic planning and land tenure records contributed to a paralysis of spatial planning action.
- Poor management and coordination between over 76 departments and agencies led to a "silo" approach to planning. This would have been improved by more managed, transparent and auditable communication.
- Poor communication with the smaller affected towns and villages resulted in an information blackout and left them to cope for themselves, unsupported by regional and national agencies.
- Antiquated computer systems did not talk to other networks to enable efficient gathering of information on the disaster and its aftermath.
- Plots of land were unrecognizable and lack of electronic land tenure record systems made it difficult to re-establish the cadastre and ownership details for land claims.

Therefore, in order for post disaster recovery planning to have the desired results, carefully crafted and strategic local area plans in the face of emergency rebuilding of homes, livelihoods and communities must not be considered as a "luxury", and there must be a different approach to traditional land use planning, which is essential in mapping out a workable disaster recovery plan.

Additionally, Brewster said, disaster recovery planning options that must be assessed are:

- Major redevelopment in place [rebuild]
- Relocate and rebuild at the same or better standard
- New development [probably with international aid] as a Strategic Sustainable Spatial Plan
- In any of these scenarios, the aim is to reduce time between disaster response and

recovery reconstruction.

- The most appropriate action will normally be a combination of the above options, either spatially or sequentially – i.e. relocate some or all infrastructure; immediately or later.

Mr. Brewster cited the example of the Australian Emergency Management Authority (EMA), which has implemented a Disaster Recovery Manual, which outlines important aspects of post-disaster planning steps, that:

- “An inherent difficulty in ensuring community participation following a disaster is the need for rapid redevelopment.
- Community conflict can arise as a result of tension between the competing need for a rapid rebuilding process and adequate community consultation.
- The impacted community may not trust outsiders (including planners) to know what is best for them and can obstruct recovery development planning.

Mr. Brewster said that ICT has an important role in the spatial planning component of disaster management, which relies on the following essential information:

#### **In the Disaster Area:**

- What area was affected by the disaster - GIS input, satellite imagery
- What was the scale of the impact - GIS information overlays
- What communities were affected and to what extent of fracturing – community demography
- Risk assessment outputs to determine the spatial planning tasks - computer model data
- Major redevelopment of affected area?
- Relocation of some or all of community and strategic infrastructure?
- New development opportunities utilizing external aid contributions?

#### **In the Relocation Area:**

- Reliable geographic and environmental constraints information – GIS survey data overlays
- Current community development in area and demographic profiles – Population statistics
- Current spatial plans for area – strategic, district and local development plans
- Land tenure and availability of serviced and un-serviced land for housing
- Population projections for planned forecast and unplanned development - strategic analysis
- Strategic infrastructure Construction programs – e.g. rail, road, water supply, energy, telecom
- Groundwater and surface water drainage patterns and water storage options
- Land stability and geomorphology – GIS geo mapping
- Bushfire hazards and other constraints mapping – GIS map data

Equally important, Mr. Brewster said, the socio-economic aspect of ICT also has a significant role to play, as it includes the current community/social information on disaster refugee status (Response Database); who needs/wants to resettle where (i.e. answering the questions “Who are we planning for?” and “Are there any secondary relocations?”); economic data for job creation and livelihoods – agricultural subsistence capacities; as well as the human occupational resource capacities within the impacted community for reconstruction.

Conclusively, Mr. Brewster said, ICT has powerful potential capabilities in inventory of

infrastructure damage and losses; spatial mapping and database generation; personal and community data on displaced population, including household data and location; degree of fracturing in the community, that is, whether the community is relatively intact or scattered; analysis and modeling, finding answers to “what if” questions; information and communication management; inventory of occupational resources and reconstruction programs and projects; and finally, communication within the affected community and between the community and the outside world.

In order for the importance of post-disaster planning to be visible and comprehensible to all, key initial planning actions must take place. The range of planning actions would be linked to methodologies, generally well established in Disaster Management literature. Typically, these would include the following activities:

- Disaster proof all the planning documentation and duplicate it in secure depositories of relevant national and even international agencies
- Appoint project coordinators and teams, request international assistance as necessary from pre- arranged affiliations
- Identify stakeholders and community leaders in the particular event circumstances
- Select from the most relevant Disaster Scenario to identify likely opportunities for improvement
- Select from the relevant matching Scale of Planning Effort pre-disaster prepared plans to determine usability and required resources

From these perspectives, the planning of post-disaster recovery, reconstruction and development would not be complete without the implementation of actions, as following:

- Mobilise aid donors for materials, equipment, personnel and funding
- Build adequate shelter and community facilities if required
- Early feedback in affected area - fine tune actions and level of response
- Assess priorities for infrastructure replacement and relocation
- Liaise with emergency teams for smooth transition from relief phase to recovery phase
- Monitor the physical effects of disaster impact on government, business and the community to reduce the psycho-social upheaval, economic disruption and other disaster-related repercussions, which impede recovery and reduce community functioning
- Monitor for compounding disaster consequences - adjust the planning recovery process
- Implement strategies to develop fully a new vision of the future, review replacement and integrate the re-establishment of what was lost and any new initiatives into a single enterprise bringing together all the community.
- Celebrate the survival by appropriate means

These actions are very important, according to Mr. Brewster, because post disaster recovery planning is considered to be a critical element that appears to be deficient in Disaster Management Manuals and Policy Papers. To that effect, poor management of the urgent land use and environmental planning can seriously delay the actual recovery reconstruction after a disaster, leading to a cascade of psycho-social upheaval, economic disruption and other disaster-related repercussions. However, sustainable development goals can be incorporated into the disaster recovery process so as to enhance the potential for individuals and communities to improve on the situation before the event, rather than merely restoring things to the way they had been previously.

Mr. Brewster noted that ICT should be integrated into all facets of disaster response, recovery & reconstruction. He noted the importance of ***Rapid Planning Assessment<sub>1</sub>***, which has the dual characteristics of a pre-disaster range of anticipated scenarios, based on a visioning type participatory framework; and a systematic approach to post-disaster recovery

planning. Ideally, *Rapid Planning Assessment* would be part of active recovery management systems that would be implemented to mitigate the underlying risk factors related to changing social, economic, environmental conditions and land use.

In conclusion, Mr. Brewster remarked that ICT is a tool that, in well trained hands, will make a critical difference to successful disaster recovery missions. Disaster managers, in particular, as well as land use planners and other professionals have the vital opportunity to make a meaningful contribution to manage and integrate the various multi-disciplinary efforts involved in disaster recovery. The challenge that is being put on the table should be addressed by all environmental professions that exist in an increasingly and continuously fragile world.

Mr. Brewster urged the ICT4DM Forum participants to “put the children’s smiles back by helping rebuild disaster impacted nations and communities.”

#### 9.4 Presentation by Liz Fearson and Alan Jackson: Re-establishment of Mobile Networks after a Disaster

Ms. Liz Fearson and Mr. Alan Jackson were the fourth presenters for Session 8. The following is a summary of their presentation.

Aptivate UK is a non-governmental organization (NGO) that is primarily involved in three key areas; capacity building, sustainability and the total cost of ownership.

In order for these to be effective, the pre-requisites for ICT thus become, power, connectivity, reliability, cost, culture and skills.

Aptivate UK is involved in the management and implementation of Content Delivery Chain systems, through which emphasis is put upon low bandwidth design of websites. The recommended specifications are as following:

- Max Load Time: 10 seconds
- Average Connection Speed: 20kbps
- Max Page Size: 25 Kilobytes!

#### Current Statistics

Country/Entity	Page Size	Loading Time
Afghanistan HIC	452 Kilobytes	181 seconds
Southern African HIC	223 Kilobytes	89 seconds
UNOCHA	470 Kilobytes	188 seconds
AlterNet	504 Kilobytes	201 seconds
Aptivate	20 Kilobytes	8 seconds

The services offered by Aptivate UK include Bandwidth Management, Power Management and Connectivity Solutions. Current projects include the ‘loband’ utility for web-page management, and the low bandwidth design guidelines, which is available as a downloadable book. Others include hardware solutions, such as the BMO Box, and the wind-solar hybrid power solution called the Enclusion Base Station and the Satellite Email solution.

## 10. Using ICT for Effective Disaster Management Logical Frameworks

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In this session, presented by Mr. Bashir Patel, Director of Programmes and Business Development of the CTO, participants were guided through the process of formulating ICT for Effective Disaster Management Logical Frameworks.

The process was presented as comprising the following methodology, that is,

### **Analysis and Research**

- Situation Analysis (the presentations and subsequent discussions have helped to do this)
- Stakeholder Analysis (The contributions of your fellow participants)
- Cause and effect analysis (steps required to achieve the goal of Using ICT for effective disaster management have been identified)
- Alternatives analysis (what are the alternative things one can do to achieve the goal if risks inhibit initial actions).

### **The Components of a Logical Framework – the Vertical Axis**

- Goal, which is defined as being the long term objective or overarching target, with the capacity for reducing the devastating impact of disasters, as well as achieving the Millennium Development Goals
- Objectives; short term objective that must be achieved if we are to achieve the Goal. There must be an increased and more effective use of ICT for disaster management
- Activities/Outputs are the expected results from the project, which are; policy outputs i.e. a change in policy that leads to achieving the goal; regulatory outputs e.g. measures that help stakeholders achieve the goal; institutional outputs e.g. training modules and workshops for the strengthening of a national disaster management agency or a government ministry; and physical outputs e.g. cheaper more effective technologies (cell broadcast).
- Inputs are the resources you will use to produce the outputs, knowledge, designated staff member or consultant, equipment, time, and money

### **The Components of a Logical Framework – the Horizontal Axis**

- Performance indicators are tools with which you will measure progress in each component. They are usually known, established and recorded early in the project, as well as being verifiable
- Monitoring Mechanisms are means by which one can assess progress and achievement, obtain/develop progress/monitoring reports, as well as define project milestones
- Risks are factors outside your control that could hinder your ability to achieve your Goal, meet your Objectives, produce your Outputs, as well as make your Inputs.

Following this introduction, participants were divided into four main groups, according to their areas of expertise, and began the logical framework formulation process. The following is a summary of some the groups, as shown in the following tables:

Regulators ICT4DM Logical Framework			
Design Summary	Performance Target – Tangible Result	Monitoring and Oversight	Risks
Goal			
1. Strengthening policy and framework.	Formal documents and timeframe	Follow up and evaluation reports	Lack of carry out policy in timeframe Lack of political will.
2. Coordination 3. Database	Formal agreement to determined responsibilities. Collection of data from operators	Reports from meetings and minutes. Review the reports from operators	Lack of commitment of stakeholders Lack of submit data from operators.
4. Capacity building	Qualified and trained persons	Regular assessment report	Unavailability of the trained persons or incompatibility training with available response equipments.
5. Encourage Investor	Allocation of frequency spectrum.  License agreement.	Frequency spectrum audit.	Misuse of granted frequency spectrum
Objectives			
1. Adequate framework.	Availability of adequate framework within acceptable time.	Evaluation reports.	Political goodwill.
2. Enhancing coordination for DRR for ICT	Formal agreement including responsibility of each authority.	Reports from meetings and minutes.	Lack of infrastructure.
3. Ensure enhancement capacity	Practical test.	Evaluation performance after practical test.	Weakness performance of the trained persons.
Outputs			
1. Policy analysis and National Plan	Implementation of policy and National plan within suitable time frame	Verify and follow up National plan and policy	Lake of political goodwill. Stakeholder participation or lack of.
2. Build a cooperative relationships between stakeholders.	Formal agreement between regulator and stakeholders	Follow up this agreement. Random checks and reports.	Stakeholders do not have the ability to carry out agreements. Difficulty of harmonizing between networks.
3. Work with operators to reduce cost.	Cost analysis and available solution	Feedback from stakeholders	Unaffordable to reduce cost
4. Qualified person after training.			
Inputs			
1. Commitment of other organizations.	Signed agreements between organizations	Reports from periodic assessments	Lack of commitment by other organizations
2. Financial resource	Financial reporting within government and amount committed by donors.	Financial reporting	Lack of funding

1. Incentive for investors and service providers (i. e. reducing taxes, universal service provision fund).	Allocation of frequency spectrum with low cost.	Frequency spectrum audit	Lake from investors and service providers.
2. Training	Choose trained persons and put a training plan.	Follow up training.	Unavailability of persons.

<b>Civil Society ICT4DM Logical Framework</b>			
<b>Design Summary</b>	<b>Performance Target – Tangible Result</b>	<b>Monitoring and Oversight</b>	<b>Risks</b>
<b>Goal</b>			
Empowering communities with coping mechanisms, knowledge and capacity to cope with hazards and disasters.	Identify the number of communities to be reached	Conduct a survey to measure the amount of communities reached and the effectiveness of the campaign	<p>Luke-warm attitude to disaster management, Non-collaboration of stakeholders and role-players</p> <p>Miss out on the identification of certain risks</p> <p>Non-existence of policies, standards and guidelines to support the goals</p> <p>Bureaucracy as a barrier to implementation</p> <p>Inadequate Resources (personnel, time, money, etc)</p> <p>Lack of Commitments, cooperation</p> <p>Lack of Awareness</p>
<b>Objectives</b>			
<p>1) Identify Risks (through community-based risk assessments) using ICTs</p> <p>2) Using ICTs to develop preparedness strategies/contingency plans.</p> <p>3) Develop Response and Recovery Plans using ICTs</p> <p>4) Building institutional capacities using ICTs</p>	<p>Participation of all stakeholders</p> <p>Identification of all Risks (Profile)</p> <p>Early Warning Systems available</p> <p>Preparedness and Response Plans developed</p> <p>Development of systems, structures and resources developed to deal with disasters</p> <p>Less human suffering, minimal injuries, deaths, damage to property and</p>	<p>Pre-assessment, Post and Gap analysis done</p>	<p>Luke-warm attitude to disaster management, Non-collaboration of stakeholders and role-players</p> <p>Miss out on the identification of certain risks</p> <p>Non-existence of policies, standards and guidelines to support the goals</p> <p>Bureaucracy as a barrier to implementation</p> <p>Inadequate Resources (personnel, time, money, etc)</p> <p>Lack of Commitments,</p>

	less environmental degradation		cooperation
<b>Outputs</b>			
Conduct Community –Based Risk Assessment,	Results of Risk Assessments	Simulation Exercises, testing and audits	Luke-warm attitude to disaster management, Non-collaboration of stakeholders and role-players
Using GIS, satellites to support risk assessments	Comprehensive Risk Profiles		Miss out on the identification of certain risks Non-existence of policies, standards and guidelines to support the goals
Develop communication lines between decision makers, communities and ICTs.	Preparedness and Risk Reduction Plan,		Bureaucracy as a barrier to implementation Inadequate Resources (personnel, time, money, etc)
Preparedness: Developing Preparedness and Responses and Recovery plans using ICTs	Recovery Plans		Lack of Commitments, cooperation
Simulation Exercises using ICTs	Evidence of capacity		Lack of Awareness
Team up with corporate and other sponsors			
Disaster Risk Reduction Activities into the School Curricula.			
<b>Inputs</b>			
Integration of inputs from all stakeholders (Government, Private sectors, NGOs etc)	Participation and cooperation of all stakeholders	Participation in Coordination Meetings	Luke-warm attitude to disaster management, Non-collaboration of stakeholders and role-players
Team up with corporate and other sponsors			Miss out on the identification of certain risks Non-existence of policies, standards and guidelines to support the goals Bureaucracy as a barrier to implementation Inadequate Resources (personnel, time, money, etc) Lack of Commitments, cooperation, Lack of Awareness

## Private Sector ICT4DM Logical Framework

Design Summary	Performance Target – Tangible Result	Monitoring and Oversight	Risks
Goal			
Reduce losses of lives and poverty caused by disasters	Comparison of losses with losses expected with no mitigation measures	Government statistics office	Hard to measure what didn't happen
Objectives			
Best use of ICT for effect disaster management particularly in the field of warning and informing the public, disaster management officers and first responders and recovery agencies.			
Outputs			
Cell broadcast; Implement CB in the networks, install broker technology and get terminals enabled.	% of population who have opted to participate in the programme	Government statistics via market surveys	Networks may not grant access, public may not be educated as to how to participate, managers may be confused about when and how to use it
Ericsson Response; provide rapid deploy GSM systems for voice and data	Have standby system ready to deploy on a regional level	Regional and national DR/DP groups	Costs of implementation, availability of volunteers
Deployment of mobile/portable satellite communication/telecentres in affected regions	Establishment of guidelines of capacity, time-to-deploy, and geographic deployment proportional to scale of event	Post intervention field reports/statistics	Lack of funding
Deployment of a network of remote collection points connected by satellite terminals with centralized office for processing and advanced intervention based on relevant data (drought, etc.)	Establishment of a connected network of collection centres scaled to the geography and population.	Metrics against previous means of collecting data, periodic verification on accuracy and timeliness of input data.	<ul style="list-style-type: none"> <li>▪ Lack of commitment</li> <li>▪ Availability of trained personnel</li> <li>▪ Regulatory/licensing clearance</li> <li>▪ Availability of ongoing resources for maintenance</li> <li>▪ Lack of regional</li> </ul>
Deploy a network (satellite, terrestrial, radio) of gathering of key data across wide remote regions (e.g. ocean sensors for tsunami)	Deployed, validated network	Period verification of collection equipment and validation of system modeling by periodic test and simulation exercises	
Interconnection of all stakeholders during disaster alert dissemination	Effective interconnection on warning messages and response	Tests of recognition and response to warnings	Lack of penetration of terminals to receive information
Education of masses on alert recognition and warning mechanism	Knowledgeable community on warning messages and response	Tests of recognition and response to warnings	Lack of penetration of terminals to receive information

Inputs			
CB; stakeholders must meet and form a trust protocol, which enables the technology. Someone needs to pay for the technology and other costs of access	Trust protocol board to be formed having stakeholders, the networks, regulators and disaster managers	Regular meetings of the trust protocol board plus MoU stating the conditions of participants	Some networks may not participate and so need to be motivated
ER; partnerships need to be formed between Ericsson and the local Ericsson office and the assisted agency	DR operator partnerships, licensing agreements for radio channels, implementation of the Tampere Convention	Signed agreements, volunteer bodies established and agreements in place in advance	Slow implementation or obstruction of the movement so slow that the disaster is over by the time we get there
Satellite data terminals, laptops, centralized software, personnel on site and central office, funds, national commitment, ICT support personnel, autonomous data measurement devices, low data rate satellite terminals, central processing centre, software			<ul style="list-style-type: none"> <li>▪ Lack of funding</li> <li>▪ Lack of commitment</li> <li>▪ Availability of trained personnel</li> <li>▪ Regulatory/licensing clearance</li> <li>▪ Availability of ongoing resources for maintenance</li> <li>▪ Lack of regional/national autonomy for sustainability</li> </ul>
Community knowledge	Increase knowledge in community response	Frequency of education on emergency warnings	Low knowledgeable community

### RHODES & SHWARZ TETRA SOLUTION

Design Summary	Performance Target – Tangible Result	Monitoring and Oversight	Risks
<b>Goal</b>			
Provide communication	Always on, flexible, mobile, stable, redundancy, integrated, secure (options), vehicle and person tracking, indoor and outdoor	Scenario testing with core group	Infrastructure damage risk to management by redundancy design including mobile units
<b>Objectives</b>			
Efficient, cost effective solution for communication	To provide effective communications for governments, emergency services	Test and confirm operating and integration with other technologies	Optional risk if full solution is not procured. Minimum skills required.
<b>Outputs</b>			
Specification and Training	To provide effective communications for governments, emergency services	Test against requirement. Exam qualified	Accuracy of requirement

Network design, Base design	Solution to satisfied requirement, project plan, detailed description	Test against requirement	Immediate information. Changes in requirement.
Turnkey solution, possible financing	Plan, installation, commission, logistics, project management, FAT & SAT, local labour	Contract	Country stability, regulation
<b>Inputs</b>			
Description of requirement	Written requirement	Work lap including industry	Poor description of requirement, negative efficiency
Licensing/regulation	Timely opposition, permission	Obtain legal documents	Cannot use network
Site acquisition	Acquire sites as per network	Test against network plan	No sites, no network

## POLICY ICT4DM LOGICAL FRAMEWORK

### GOAL: INCREASED AND EFFECTIVE USE OF ICT FOR DRM

Variable	Output	Indicator
Increased government commitment to increased use of ICT for DRM	Government policy document on the use of ICT for DRM	Allocation of budgetary resources for use of ICT in DRM
Enhanced regulatory institutional and legal framework to facilitate the use of ICT for DRM	Documented legal framework on the use of ICT for DRM	Enactment of relevant legislation on the use of ICT for DRM
Reliable, affordable and secure access to ICT for DRM	Established emergency call centre for DRR	Free calls from all networks to the emergency call centre
Enhanced stakeholder participation in the development and implementation of policy on the use of ICT for DRM	Multi-stakeholder Emergency Communication Committees (ECCs) established at all levels	Reports from stakeholder consultation of the ECCs at national level
Strengthened capacity and awareness creation in the use of ICT for DRM	Trained local level emergency management committees on the use of ICT for DRM	Number of committees trained in the use of ICT for DRM
Local and traditional knowledge incorporated in ICT policy for DRM	Traditional knowledge incorporated in the training of local emergency committees in the use of ICT for DRM	Training manual produced on integration of traditional knowledge in ICT for DRM
ICT policy consistent with relevant internal and external policy frameworks	Documented review of national DRR policy to ensure consistency with international conventions	Regional workshops on harmonization on use of ICT policy for DRM
Enhanced M&E of ICT use for DRM	Framework established for monitoring and evaluation national policy on use of ICT for DRM	Periodic M&E reports on the use of ICT for DRM
Effective contingency and fall-back provision incorporated in ICT use for DRM	Established protocol and standards for priority access to ICT resources for DRM	Priority access manual developed
Increased participation of women in the use of ICT for DRM	Training of women in the use of ICT for DRM facilitated	Number of women trained at all levels

### RISKS

1. Lack of government resources for allocation of ICT use for DRM
2. Government resistance to allocating resources for ICT use for DRM
3. Inadequate internal expertise to develop framework for ICT use
4. Negative mindset of policy makers regarding use of ICT (technophobia)