DRAFT

PART I

Facilitating Effective Disaster Management
In the Caribbean

Funding Proposal

**Initiated by the
The Caribbean ICT Virtual Community (CIVIC)
and
sponsored by the Guyana DevNet NGO**

**As a contribution to the
Caribbean regional ICT and development strategy**

November 8, 2004

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Glossary of Terms and Acronyms

CARDIN	Caribbean Disaster Information Network
CARICOM	The Caribbean Community (The Secretariat of this regional Governmental Body)
CBU	Caribbean Broadcasting Union
CDB	Caribbean Development Bank
CDERA	Caribbean Disaster and Emergency Response Agency
CIDA	Canadian International Development Agency
CIDIN	Caribbean ICT and Disaster Information Network
CIMH	Caribbean Institute for Meteorology and Hydrology
CIVIC	Caribbean ICT Virtual Community
DM	Disaster Management
DMFC	Disaster Mitigation Fund for the Caribbean (A desk of the CDB)
ECTEL	Eastern Caribbean Telecommunications Regulatory Body)
EU	European Union
EU-ECHO	EU European Commission Humanitarian Office
GIS	Geographic Information System
GSM/GPRS	Global System for Mobile communications / General Packet Radio Service
GPS	Global Positioning System
GoG	Government of Grenada
HAM	Amateur (A colloquialism for)
IADB	Inter-American Development Bank
ICA	Institute for Connectivity for the Americas (A department of CIDA)
ICT	Information and Communications Technology
ITU	International Telecommunications Union (United Nations)
LEO	Low Earth Orbit (Satellite)
NGO`	Non Government Organization
NHC	National Hurricane Center (A unit of NOAA)
NOAA	National Oceanographic and Atmospheric Administration (A US Government agency)
OAS	Organization of American States
TAMCC	T.A. Marryshow Community College (Grenada)
TDMA	Time Division Multiple Access (cellphone technology)
TEI	Tertiary Education Institution
VHF	Very High Frequency (Part of the communications Spectrum)
USAID	United States Agency for International Development
UHF	Ultra High Frequency (Part of the communications Spectrum)
UNDP/UNEP	United Nations Development Program / UN Environmental Program
UWI	University of the West Indies

Acknowledgement of Contributors

This is to acknowledge the many contributors of the material contained herein, and to the effort and dedication of the other members of CIVIC who helped to draft, revise, edit and proof read this proposal.

Members of the CIVIC Virtual Group also wish to express their thanks to Mr. Lance Hinds, for contributing DevNet's administration to this initiative.
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Preface to Proposal Outline

This proposal has been prepared by Caribbean ICT professionals who network using the facilities of the Caribbean ICT Virtual Group (CIVIC). CIVIC is a Caribbean managed and Caribbean owned virtual community initially supported by The Institute of Connectivity for the Americas (CIDA /ICA) to host the contributions of all Caribbean ICT stakeholders. There have been many expressions of concern within the group on the issue of ICTs in (hurricane) disaster management. There has also been considerable substantive material submitted by other more informed members. As a consequence, a subset of this group has drafted, revised and prepared this document for review by interested developmental agencies that are involved in CARICOM region developmental programs.

Context and Evolution of the CIVIC Initiative

Following the onset of Hurricane IVAN in Grenada, Jamaica and the Cayman Islands, and using CIVIC as a means of communication, several interested Caribbean ICT and development professionals agreed to devise a collaborative response to the disaster. Josanne Leonard provided information on how alternative media networks had provided real time communication, Bruce Potter of Island Resources Foundation, shared with the group his report to the Grenada Government[1] on comprehensive information management for disaster prevention and management. He also offered substantive material on a needs assessment methodology. Daniel Pimienta of Fundredes[2] provided similar information on a proposal for a Caribbean wide information dissemination network.

Finally, scores of emails were received giving resources and advice on how ICTs could be used for regional disaster management. In order to structure the response and share responsibilities, a small working group was convened by Dr. Gillian Marcelle, and the interim results of data collection and analysis were synthesized and included in a

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[1] *INSTITUTIONAL REVIEW OF THEDISASTER MANAGEMENT MECHANISM IN GRENADA April 2004 – Island Resource Foundation , Mr. Bruce Potter.*
[2] Daniel Pimenta -
http://www.dgroups.org/groups/icacaribbean/index.cfm?op=main&cat_id=8474&admin_id=1

presentation to the October 13-15 CARICOM ICT ministers meeting in Barbados[3]. (see ANNEX D). Agreement received at this political level provides much of the impetus for the development of this proposal outline.

The final results of the data collection and consultation have been consolidated into an Advocacy Brief[4] with editing by Roosevelt King, Taran Rampersad and Lance Hinds.

On the basis of that research and analysis, this outline proposal presents the main areas of need and seeks to identify corresponding implementation solutions.

> **This document is, therefore, designed as the basis for constructive engagement with disaster management agencies, development agencies, international partners, CARICOM and national governments, going forward**.

In the course of those discussions, further elaboration and more detailed project implementation details will emerge. In general, the following future stages in the implementation process are anticipated:
- Confirmation of the concept and selection of (preferred) implementation options.
- Funding and resource mobilization
- Development of a detailed implementation plan
- Initiation of project
- Reporting on project progress

Meanwhile, Dr. Marcelle in her capacity as a member of the UN ICT Task Force has invited the wider developmental community to support these efforts in the region, and will present the proposal during the Seventh Meeting of the UN ICT Task Force in Berlin 18-20, November, 2004.

The need to apply ICTs to disaster management has been accepted at the highest political level by regional governments. It is also worth noting that there has been support in principle, for the activities outlined herein to form the central core of an ICT and disaster management flagship programme that will be spearheaded by CARICOM as part of a new development orientated regional ICT strategy.

We therefore invite development partners who wish to contribute to this initiative, or to register expressions of interest, to contact:

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jbritton@caricom.org
CARICOM Secretariat
Guyana
http://www.caricom.org

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[3] Dr.Gillian Marcelle -
http://www.dgroups.org/groups/icacaribbean/index.cfm?op=dsp_resource_details&resource_id=11221&cat_id=8474

[44] Advocacy Brief – Facilitating Effective Disaster Management in the Caribbean -
http://www.DevNet.org.gy/dm/Caribbeandisasterbrief-Final.pdf

Executive Summary

This proposal addresses the challenge of improving all facets of (hurricane) disaster management in the CARICOM region by the effective application of ICT. It explores the broad areas of need including information access, improving reliability of national and regional ICT infrastructures and making use of ICT more effective in regional and national DM agencies, as well as in post-reconstruction and mitigation. Another unique theme is that of scientific research and training to improve decision-making[5]. The research and training component is an appropriate solution that delivers training to regional engineers and planners, and provides for research to support this area of need. These five areas of need have been articulated within the CIVIC virtual group discourse and elsewhere.

These thematic needs are also further developed in an "Advocacy Brief" (see ANNEX E for Abstract). This report seeks to fully explore these thematic needs with a view to indicating a way forward to developing appropriate implementation solutions. The complexity of the regional disaster management environment – its wide range of agencies, responders and stakeholders – suggests that a thorough needs assessment and feasibility study should be conducted for each theme to determine the scope of potentially appropriate solution options.

> **Provision of disaster information and raising awareness is pivotal to the development of effective regional disaster management, and should be addressed as an early priority. With reference to best-practices approaches in other regions, this document presents a compelling justification in support of the immediate development of this thematic area.**

Disaster information sharing and awareness has been identified as a priority and this proposal (Part 2) provides a more comprehensive implementation option for this theme (see Part II of document). We are confident that it will yield demonstrable benefits for a relatively modest investment, and without compromising the more long-term implementation solutions for the other themes. Our recommendation is that the implementation option - A Caribbean Disaster and ICT Information Network (CIDIN) - be considered for funding with a view to implementation by the forthcoming 2005 hurricane season. It should also be noted that thematic area five – will be delivered by Clemson University in collaboration with regional partners and that funding for the first year is modest and will significantly improve the foundation for planning and decision-making.

Thematic area one the CIDIN network requires US $280,000 of funding over three years, of which . $72,000 (US) consists of annual recurrent operating expenses. Thematic areas two, three and four will require funding of $60,000 (US to conduct the necessary feasibility studies and needs assessments preparatory to developing implementation options and budgets. These will then inform an appropriate approach to acquiring further implementation resources.

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[5] It should be noted that this theme will be under the direction of a Caribbean engineer, Dr David Prevatt, who is based at Clemson University; this demonstrates the ability to work with the Caribbean Diaspora.

Our recommendation is that all **mobilization funding** ($70,000 for themes one, two, three and four), be made available immediately pending the completion of the thematic project outlines (as is now the case with theme one -CIDIN).

Funding requirements
   1. **Implementation of a Caribbean Disaster and ICT Information Network over three years**
       US $280, 000.

   2. **Feasibility studies for ICT infrastructure upgrading, post reconstruction and use of ICTs in disaster management agencies**
       US $60,000

   3. **Scientific research and training to support decision-making on disaster mitigation**
       US $75,000

The project proposal for CIDIN is designed so that in three years the network will be fully self-sustaining. This is to be accomplished by revenues from website advertisements by the private sector and by the use of student-volunteers who staff the facility (and thereby obtain valuable work-related skills in the areas of ICT management and media/communications).

The goal of CIDIN will be to provide relevant disaster information in a form that is understandable to a wide audience, and upon which agencies, responders and the general public may make timely decisions to minimize loss of life and economic assets. CIDIN will be established as an operational unit (within or closely associated with) CDERA, and will acquire available real-time information such as remotely sensed data, risk models, meteorological forecasts, and interpretations by professionals in the DM community. Its sources will be both regional and international.

The project contemplates the implementation of CIDIN within three years. Depending on funding and a rationalization of priority needs identified in feasibility studies and needs analyses, projects arising from themes two, three and four could be implemented within five years. The scientific research and training led by Dr Prevatt of Clemson University (theme five) is anticipated in 2005.

The implementation team for CIDIN will consist of ICT professionals (some being CIVIC members) and experts in other disciplines under the guidance of designated project management and execution personnel. Under the initiative of the appointed convener, we will investigate alternatives, including institutions such as CARICOM, the Government of Grenada and regional developmental agencies as potential project executing mechanisms. When implemented, CIDIN will be supervised by accountable management to whom a team of operationally trained staff will report.

Background

Hurricanes and associated meteorological and hydrologic events represent a recurrent and serious threat to the lives of Caribbean residents and to the economic development of the region. Previous cyclonic events have been responsible for tremendous social and economic setbacks in almost every CARICOM island state. The 2004 hurricane season has now brought devastation to Grenada and The Cayman Islands, and multiple instances of storm damage to Jamaica, Tobago, St. Vincent and the Grenadines, Jamaica BVI and the Bahamas.

The forthcoming hurricane seasons have been predicted by the US National Oceanic and Atmospheric Administration (NOAA) to be equally violent. The severity of these events will be further compounded by what is generally referred to in the scientific community as "the "climate change effect" which will increase both the severity and frequency of tropical storms.

While emerging technologies such as cloud seeding are being tested with the hope that by altering storm thermodynamics there may be ameliorating effects, at this time there is no proven preventive solution. Meanwhile, there have been significant advances in ICT – including communications, remote sensing and computing power – that enable access and sharing of information. The CARICOM region must, therefore, apply such available remedies to mitigate, and respond to hurricane events in the near term. Increased and improved use of ICTs for disaster management, represent the most feasible and logical tool for the region.

The discussion following (Proposal Part I) will elaborate on the four broad themes of need elicited from the CIVIC discourse. It will explore the scope and priority of these themes in the context of current announced initiatives, and examine the mandate of regional stakeholders to determine optimal partnerships.

Finally, where the potential to achieve significant remedies to immediate priority needs is identified, the report will more specifically present the rationale for an immediate solution, along with a recommended solution and an implementation approach. (Proposal Part 2).

Existing CARICOM disaster management structure

Institutional Structure

An overall disaster management structure exists in the CARICOM region to provide national and regional response to all natural disasters.

The Caribbean Disaster and Emergency Response Agency (CDERA) is the responsible regional entity. It functions as the umbrella organization for the individual national disaster agencies, and provides the essential regional coordinating effort in support of corresponding national disaster responder networks. CDERA functions as both an information provider and a link to regional governments, NGOs, disaster relief agencies, and civil society,

Participating Countries / States
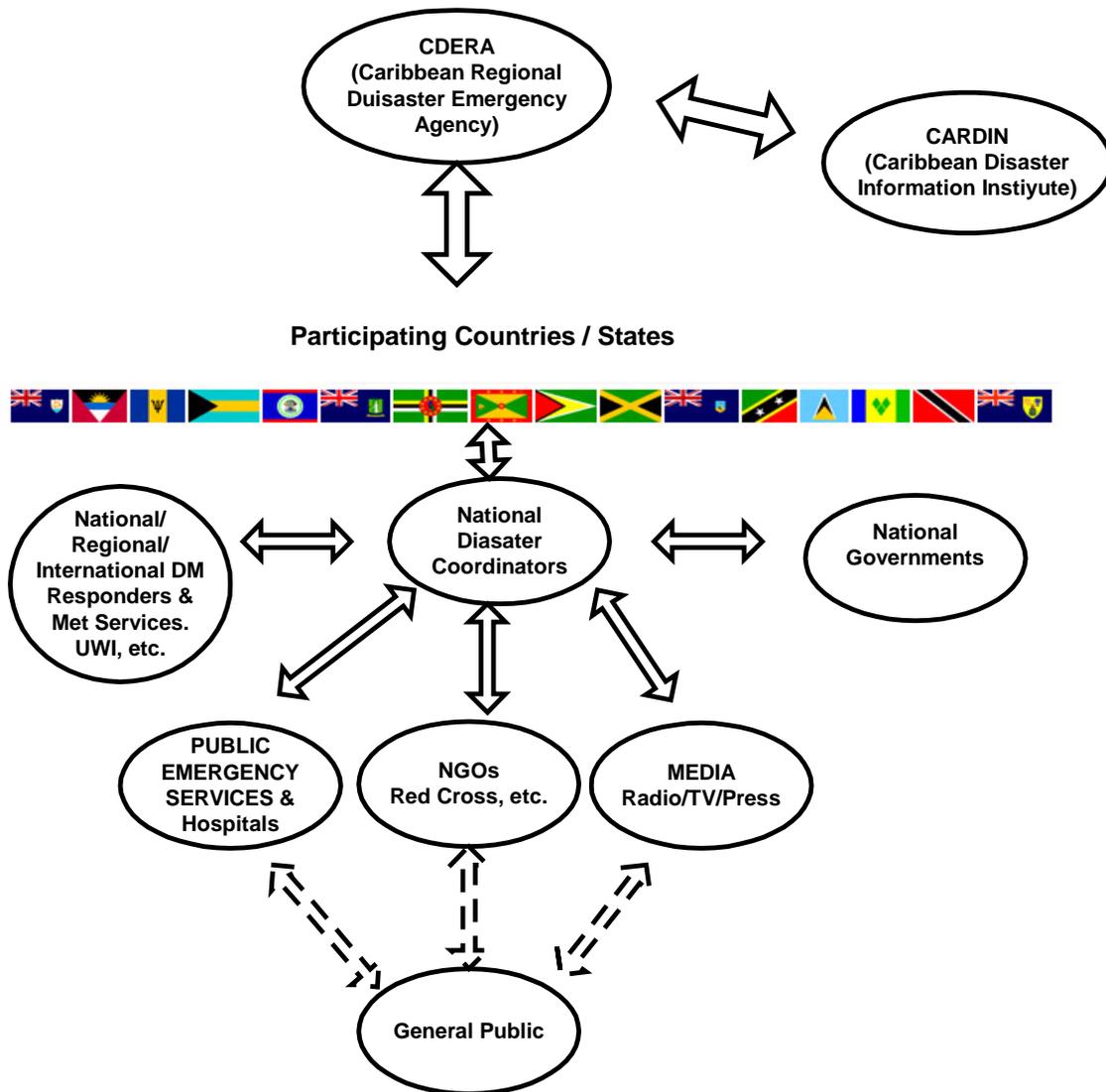
Relevant regional Institutions

Supporting the DM structure (see above) is a wide range of institutions, groups, agencies and interest groups both within and outside the region.

Regional DM agencies for capacity building
- United States Agency for International Development (USAID)
- Disaster Mitigation Facility for the Caribbean (DMFC)
- International Institute for Communication and Development (IICD)
- United Nations Development Program (UNDP)
- European Commission funded – Caribbean Information Society Project
- OAS – Organization of American States
- Inter-American Development Bank - IADB

Task Forces and Interest Groups
- UN- ICT Task Force
- CIVIC – Caribbean ICT Virtual Group

Scientific Research and Educational Institutions
- University of the West Indies
- Florida International University (FIU)
- Clemson University

Meteorological Agencies and Service Providers
- Caribbean Institute for Meteorology and Hydrology (CIMH)
- Caribbean Disaster Information Network (CARDIN)
- World Meteorological Organization (WMO)
- United States National Oceanographical and Atmospheric Agency (NOAA)
- US National Hurricane Center (NHC) a department of NOAA

Disaster management projects under current implementation

There are several projects that have been initiated at both regional and national levels, These include initiatives involving regional agencies (e.g. CDB), multilateral agencies (UN, World Bank, EU, USAID) as well as me specific bilateral arrangements (Government of Finland, Government of Germany, etc.). They all seek to increase the capacity of regional DM institutions and to enhance meteorological infrastructures.
The following is a list of selected projects currently being undertaken by regional and multinational development agencies. The intent is to demonstrate areas of focus and not to identify all initiatives. *This list is based on research on the Internet.*

Project Description	Stakeholders	Implementation
Implement Doppler Weather Radar installations in four sites	EU / CDERA / CIMH	In progress
Provision of equipment for regional meteorological stations	Government of Finland CIMH	In Progress
Strengthen the region's capacity to cope with disasters, specifically:… • DM legislation / regulations • National disaster awareness campaigns • Capacity for assessing / disseminating DM information online • DM teaching / research	EU / CDERA In collaboration with :UWI, CDB, OAS and CIDA	Announced

Currently identified thematic areas of need

Because of the wide variety of needs so far articulated, it has been necessary to classify these needs into manageable thematic groups.

The following thematic classifications have been derived in the CIVIC "Advocacy Brief"[6] on which this proposal outline is based:

No	Description	Lead Agency	Stakeholders
1	Information sharing and awareness in the Disaster Community	CDERA An "operationalized" entity within CIVIC	CMHI / CARDIN ECTEL National DM agencies UWI DM responder community NGOs / Private sector
2	National and regional ICT infrastructure upgrading	CBU /ITU Regional Communications Carriers	CARICOM Regional ICT Strategy "Team" Regional Professional ICT Groups
3	ICT in use by disaster management agencies	CDERA	National DM agencies Representative of WMO
4	Post reconstruction efforts and mitigation	Government of Grenada	National development / planning ministries UWI / & Other Scientific-Research NGOs / Community representatives Private Sector
5	Scientific research and training to improve decision-making	Clemson University and University of the West Indies	UWI – Faculty of Engineering Regional Civil Engineering Associations Regional Associations of Architects

The following sections each address the specific findings of the CIVIC group with respect to each thematic need. Where appropriate, needs are grouped (within each theme) by the appropriate phase of disaster management to which it applies. There has also been an attempt to extrapolate these needs into potential goals and objectives to support further proposal development.

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[6] CIVIC – Disaster Management Advocacy Brief
http://www.dgroups.org/groups/icacaribbean/index.cfm?op=main&cat_id=8476&admin_id=1

THEME 1 - Information sharing and awareness in the disaster community

Preamble

A comprehensive approach to disaster management involves four basic phases: mitigation, preparedness, response, and recovery. In times of disaster, people are preoccupied with response and then with recovery. The greatest potential for loss reduction, though, is typically during the mitigation phase, when communities can be made more disaster resistant. The largest share of costs, however, are directed toward the recovery phase, where good mitigation principles are also needed to be put into practice rather than just rebuilding only to face a similar disaster in the future.
Lessons learned or information gathered during one phase are often valuable when put into practice in other phases.

Such interrelationships argue not only for a comprehensive approach to disaster management, but also a comprehensive approach to managing disaster information.
The challenge for a disaster information system is to meet the widely varying needs of a very broad spectrum of users during all four phases of disaster management. In addition to the needs for basic situational awareness and resource management information, there are needs for information to make critical decisions, needs for training, and needs for communication among people with similar responsibilities or interests.

Identified areas of need

CDERA and its counterpart national DM agencies represent a significant and valuable element to disaster response for the region. Although this institutional structure exists, there are significant capacity and information delivery shortcomings that need to be addressed in order to provide a desirable exchange of regional disaster-related information.

Exploiting Communications Capabilities

There is a need to utilize the broad range of communications capabilities that are currently deployed or that could be made available to the public and the disaster community.

This task requires that the existing and potential capabilities be explored and that where necessary, negotiations with providers, governing bodies, governments (within and outside the region) be initiated. These negotiations should optimally lead to agreements that guarantee the regional disaster community with cost-effective and reliable links, which in turn support, the needs of a more highly functional community.

Such a task envisages a number of negotiation processes that culminate in arrangements for access to communications channels with carriers.

- Internet service providers - to provide the bandwidth and quality of service levels for videoconferencing and streamed multimedia
- Telephone service providers – to offer preferential rates for voice and cell phone local and long distance tariffs in support of clients and the disaster community (precedent set by providers in Jamaica during Hurricane Ivan.
- Satellite Phones – arrangements to acquire and use this technology where /when situations warrant

- VHF / UHF / Citizens Band radio – arrangements to receive and "re-broadcast" live dialog where and when appropriate

<u>Utilizing the broadcast media</u>

This report included the following within this category:
The public broadcast media – Radio and Television (wireless, satellite, cable etc.)
Amateur radio and citizens band operators
Cellular broadcasting via wireless telephone service providers

These considerable broadcast resources remain largely unavailable for use by disaster management community in the region. The use of these media – even during disasters – will require changes in conventions and possibly technologies with broadcasters, and will require legislative changes at the various national levels. Such systemic changes will require the management of regional bodies such as the Caribbean Broadcast Union (CBU) and the International Telecommunications Union) ITU) as well as ECTEL (if spectrum changes are required).

<u>Automatic media broadcasts</u>
There is a need for all public broadcast media to propagate brief storm warning messages using textual, audio and graphic modes automatically as the responsible weather services determine that need. This facility is presently employed in North America by way of the Emergency Broadcast System (EBS) to which all public broadcasters subscribe.

Reference: The ITU Partnership Co-ordination Panel in support of standardization on Telecommunications for Disaster Relief (TDR/PCP),[7]

<u>Interpreted meteorological information.</u>
Presently public broadcast media provide short "weather clips" delivered by their "weather announcers". However these items are insufficient for the purpose of properly informing listeners in the general public or the national disaster community.
These target listeners require much more appropriate information for decision-making which is detailed, frequent and timely.

<u>Real-time broadcast during event onset</u>
Provide for one or more public broadcast (AM. / FM radio stations) to deliver continuous "public affairs" program format that would include:
A hosted "Talk Show"
Live interviews with professionals from the DM community with the objective of interpreting the meaning of meteorological messages in relevant and understandable ways.

Discussions with accountable responder staff who can provide immediate solutions to fast-breaking situations involving public safety. This would include shelter managers, medical personnel, utility service providers, government works and supplies depots, emergency services, etc,

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[7] ITU – EU Broadcast Standards – CIVIC Discussion – D. Moreau

In summary, this thematic implementation option should empower the public broadcast media to deliver the broadest range of disaster related information on which the general public and the disaster community may make informed and appropriate decisions to safeguard life and property
.
More specifically, this might be accomplished by
- Implementing the proposed CIDIN initiative (see Part II)
- Providing the public broadcast media with the widest range of relevant disaster related information
- :Identifying financial mechanisms to underwrite the cost to the commercial public broadcast sector of require (non-commercial) DM programming
- Facilitating access to key personnel from disaster responders and institutions for public dialog.

THEME 2 - National and regional ICT infrastructure upgrading

Disaster management comprises the four phases: mitigation, preparedness, response, and recovery. A disaster-related information infrastructure must support each phase of activity. Each phase is unique involving differing:
- data sources and volumes
- timeliness and specificity of information
- target users – differing locations and levels of sophistication

Mitigation Phase.
Includes activities to reduce the impacts of disasters when they occur, such as city/town /rural planning and building codes. It also includes data, analyses, and models (often map-based) indicating risk and hazard assessment and the relative vulnerabilities of communities. Planners and the DM community share in mitigation responsibilities. These activities are not time-critical, but require the transfer of large quantities of data, and connectivity among several organizations.

The need
- The main requirement is to provide for the capacity (bandwidth) to support required data transfers between information providers and users.
- Data providers must store data so as to provide integrity and access as required
- Inter-agency collaboration and training activities will need to make use of electronic mail and interactive video conferencing. Hence compliant messaging and multi-media protocols among agencies is a necessity.
- Communications Providers should be required to comply / cooperate by constructing "hardened" cell-phone towers and antennae to withstand hurricane strength winds. Retrofitting existing towers could be relatively cheap ($5,000 to $10.000 US each)
- The dilemma to alternative communications providers, created by monopoly providers, could be resolved by the implementation of emerging "island wide" WiFi technologies that boost communications ranges from approximately 10 miles to 100 miles.
- Deploy peer-to-peer links between shelters and local response agencies (possibly via the WiFi systems described above), to maintain continuous vital communications.
- Require Cell-phone providers to implement capabilities for cell broadcasting to GSM / TDMA cellphonesl This will facilitate fast locally targeted "broadcasts to mobile users.
- Support marine operators and pleasure craft by integrating marine-bands into the DM broadcast network.
- Equip emergency shelters (prior to onset) with mobile PC/ communications devices (such as the PDAs described above). In addition, consider the installation of backup phone lines.
- Shelters (and shelter personnel) should be frequently contacted and briefed to ensure readiness to support both response and post-disaster recovery efforts.
- Assignment of specific bands of the broadcast spectrum. For example, the National Emergency Broadcast System -NEBS – in North America) requires that all public broadcasters configure their facilities so that independent of regularly scheduled programming, listeners can receive severe weather messages via radio and TV.
- Implement RSS News summaries for the broadcast media and for relevant Internet news sites.

- Alternative broadcasters such as "Amateur radio operators", and local meteorological services might be allowed to transmit brief messages via some of the above mechanisms.

Preparedness Phase.
These activities include logistical support, supply, and resource management systems needed for disaster response. It also includes early warning and monitoring activities preceding onset.
The distribution of warnings during the preparedness phase is intense, and timeliness is essential, Public awareness through broadcast announcements and access to disaster web pages is key. Community awareness is also a key requirement Part II of this report addresses a solution for am Information facility (CIDIN) to address information needs.

The Need
During the onset of recent hurricanes in Grenada, Cayman Islands and The Bahamas, many elements of the region's infrastructure ceased to function. The following are measures to mitigate against infrastructure and data failures during the preparedness phase:

Infrastructure reliability:
- Provide for reliable electricity supplies by way of generators, inverters and deep-cycle battery storage, as a standby to national electricity grids. In the event of outages, vital equipment and services at DM agencies will be uninterrupted.
- Employ higher design standards to minimize structural failure of outdoor antennae and cabling linkages so as to minimize loss of access to communications services.
- Employ higher construction standards to reduce Wind / rain / flood damage to equipment installations.

System loads and monitoring procedures
- Provide for secondary and standby alternatives to primary communications links to handle unanticipated communications traffic
- Establish more stringent service level agreements (SLAs) with service providers such in order to avoid loss of ancillary services on the networks and ensure against degradation or loss of primary service
- Institute both increased training as well as documented procedures and operations manuals to prevent human failure to perform needed system monitoring and management activities.

Co-location and virtual hosting
- Where possible implement arrangements for location of core technologies at hardened service provider sites) Co-location).
- Re-design data repositories and web sites so that they can be "flipped" to other "mirror" sites in the region on a dynamic and "as-needed" basis. This will to allow for the immediate "re-location" of key information services in the event that the primary site is impacted.

Electronic data integrity
- Implement appropriate infrastructure to safeguard the integrity and continued functioning of data repository facilities
- Implement appropriate management software and processes that would provide a combination of backup, co-location, and archiving for critical disaster-related electronic information.

Response Phase.
Rapid Response to disaster events is vital. Logistics, resource allocation options, damage assessment surveys, situation reporting, equipment, human resources, and funds management must be made available responders and the wider disaster community. Communications between response teams and the public is critical.
Rapid, reliable, secure communication is vital to efficient disaster response operations.
(cell phones, satellite phones, VHF/UHF etc) Power loss and normal facility destruction, traffic peaks, an increased number of mobile users, and sensitive data place inordinate pressures on existing communications infrastructures It is envisaged that future applications such as the exchange of property and casualty data, resource information, and response priorities will require special access capabilities beyond normal commercial telephone/ Internet services.

The need
The following needs were identified:
- Redundant communications systems – Regional commercial providers be required to incorporate the highest levels of reliability into their systems.
- DM sites and Internet hosting services configure their systems to enable their services to be "mirrored" on equivalent sites outside of the impact zone.
- DM agencies seek alternative arrangements for both hosting and communications so that they can exercise these alternatives in the event of outages to primary providers. In this regard, provisions should be available under telecommunications regimes to allow for alternatives to a monopoly provider (ECTEL).
- In times of crisis, routine maintenance procedures are sometimes overlooked. All maintenance and support staff at DM agencies should be both adequately trained in procedures for maintaining vital equipment during extreme conditions, this should be effected through a combination of training and written procedures and checklists.

Recovery Phase.
The data needs during recovery include significant onsite data collection related to rebuilding, claims processing, and documentation of lessons learned. Feedback on the mitigation process and historical databases is important to prevent the same mistakes in the future. Timeliness concerns are relaxed in favor of efficiency, and the Internet is often ideal for such transfers.

In summary, the goal of this thematic solution will be to advocate and champion the implementation of accepted international standards for ICT implementation in the disaster management community and to maintain the integrity of vital disaster-related data in regional repositories.
A specific implementable objective might be to strive for "five nines" reliability on all core DM services among regional entities.

THEME 3 - ICT in use by disaster management agencies

The disaster management community throughout the world must continually be improved and benefit from technical assistance, training, and the latest technologies so that it is ready to take crisis preparation and mitigation actions. Recommended improvements in the technologies of regional infrastructures must be matched by corresponding improvements within DM agencies.

The lead role for this initiative should fall to CDERA. Through a methodical strategy for ICT upgrading, compliance and process / procedures best practices, CDERA should lead the activities and plans of all national DM agencies.

<u>The Need</u>

Some recognized needs include:

- Investing ongoing in technologies that have both the capacity and that are standards compliance to ensure that information access / transfer is reliable and accurate.
- In future, much of the data will be GIS-based, incorporating risk assessment, insurance claims profiles, and historical disaster information. Hence participating agencies require relatively unique data manipulation, image rendering and database access software.
- DM agencies should be equipped with portable alternative communications devices that incorporate GPS and simple voice / data applications (examples are the advanced Palm and Blackberry PDAs).
- Employ higher design standards to minimize structural failure of outdoor antennae and cabling linkages so as to minimize loss of access to communications services.
- Employ higher construction standards to reduce Wind / rain / flood damage to facilities and other indoor equipment installations.
- Implement backup services including electricity, HVAC, ICT hardware, software.
- Provide for secondary and standby alternatives to primary communications links to handle unanticipated communications traffic
- Establish more stringent service level agreements (SLAs) with service providers to avoid loss of ancillary services on the networks and ensure against degradation or loss of primary service
- Institute both increased training as well as documented procedures and operations manuals and checklists, to minimize human failure to perform needed system monitoring and management activities.
- Alternative arrangements for website hosting and e-mail services as alternatives in the event of outages be primary providers.
- A number of alternative voice communications should be made available to key personnel in vital services (for example all Bahamian police stations are equipped with satellite telephones, providing a viable alternative to cell and landline services).
- DM sites should incorporate to the fullest possible extent, alternative energy sources such as wind, solar, etc. For low-demand devices such as cell-phones and laptops, even a hand-cranked generator should be available, or a car cigarette lighter adapter.
- A small number of mobile "command vehicles" that are fully self-contained should be available to replace facilities that have been rendered inoperative.

ANNEX B describes examples of emerging technologies that have specific application in disaster management.

THEME 4 - Post reconstruction efforts and mitigation

The Need
This theme addresses the broad responsibility of national and regional governments and associated planning agencies to develop planned strategies and appropriate implementations for the delivery of sound and sustainable town/ city / rural communities.
 Within the context of ICT for such planning, the emphasis will be electronic tools that will increase risk and hazard assessment and render these processes more effective.
These areas will include:

- Reliable and current data in support of community planning
- Archived and relevant disaster-related historical information
- Real-time data from local and satellite sensors that inform on adverse changes in terrestrial and marine environments.
- Tools for developing highly collated and prioritized information form several disparate and varied data sources.(Executive Information Systems EIS)

Negotiated arrangements for access to required planning data sources

- Geostationary satellite sensing and imaging data on a periodic basis
- Low Earth Orbit satellite sensing and imaging on an on-demand basis
- Marine meteorological data from Caribbean data buoys during periods of onset
- NOAA hurricane tracking data observations
- NHC imagery (visible, infrared, water vapor, precipitation, etc.)
- Doppler weather radar imagery for the entire region

Weather satellites such as the National Oceanic and Atmospheric Administration's (NOAA's) Geostationary Operational Environmental Satellite (GOES), in combination with land, marine (ship) , oceanic weather buoys and measurement sensors such as NOAA's Advanced Very High Resolution Radiometer (AVHRR), are essential capabilities for delineating disaster events and their aftermath. New sensors, such as RADARSAT and the planned commercial offerings of Space Imaging, EarthWatch, and other companies, will continue to enhance and support disaster management. [8]

Implementation of managed or hosted repositories and applications

The US National Emergency Management Information System (NEMIS) represents one such model. It is a new hardware/software telecommunications system for use by the US Federal Emergency Management Agency (FEMA) to manage disasters.
Key functions include:

- damage assessment, disaster declaration issues,
- tracking of requests (for disaster relief),
- coordination of donations, grants processing and financial relief processing
- processing of damage survey reports,
- coordination of field inspection teams,
- Logistics and the mobilization of resources (human services. etc.),
- mitigation planning.

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[8] Harnessing Information and Techmol;ogy for Disaster Management – US – DITF – November 1997

These functions are different from but quite complementary to those envisioned for the more widely available US Disaster Information Network (DIN).

It is anticipated that a similar regional entity *similar to the above model) might be developed within the region. An obvious lead agency is CARDIN. (UWI / Mona).

- Regional GIS / Geospatial data bases
- Topographical, economic, social and infrastructure data associated with the above data bases
- Planning software applications that derive information from the above databases to produce graphic and textual reports and planning scenarios
- Hazard reports and graphic representations to support of risk analyses relating to wind, flood and tidal surge probabilities

  Integration and conversion of existing regional disaster-related historical information
- Activities to prepare and integrate archived information into more efficient electronic formats (refer to CARDIN)
- Linkage to wider regional and international data sources to support risk assessment related to the environment and other multiple event situations

In summary, therefore, the goal of this thematic solution will be to support comprehensive and effective regional planning, risk assessment and disaster response needs.
This might be accomplished by:
- Implementing a physical/ virtual disaster information data repository
- Implementing a software application interface to this data repository in support of hazard risk assessment
- Converting relevant existing archives and historical information for integration with the foregoing applications

Theme 5 - Scientific research and training to improve decision-making

The Need

When Hurricane Gilbert (1988) wreaked damage to 20% of all buildings and to 50% of the housing stock on the island of Jamaica, primary losses were attributable to roof structure loss, and weak connection details. The effect of this storm and Hurricane Hugo's landfall on Montserrat the following year, resulted in significant damages to housing and infrastructure amounting to US$1 billion in economic losses and increases in insurance premiums. These losses also galvanized Caribbean engineering professionals to react, and numerous projects were initiated to address the problems, including the Cyclone-Resistant Housing (Caribbean) project 1990.

Hurricanes are frequent occurrences in the Caribbean where damage occurs annually through the effects of extreme winds, storm surge and flooding. The extensive rain and cloud bands of a tropical cyclone may affect islands far removed from the eye of a storm through rainfall induced flooding and landslides. In addition, the Caribbean is subject to numerous other natural hazards both geological (earthquakes, volcanic activity and landslides) and meteorological (hurricanes, storm surge, and torrential rain and flooding) that make the infrastructure especially vulnerable to the extensive damage that occurred to Grenada during Hurricane Ivan.

These hazards place vulnerable tourism facilities, essential facilities and housing at high risk of damage. Hurricane's Ivan's devastation on Grenada illustrates how a hurricane can destroy the backbone of small economies and create special problems of protection of human life when limited landmass makes evacuation an unrealistic option.

Given these elevated risk levels, coupled with building code practices that do not address critical wind-resistant components, there is an urgency to educate engineers, risk managers and building professionals on island states regarding the demands that mitigation of natural hazards should be the highest priority.

> **In response to this urgent need, Clemson University through the services of Dr. David O. Prevatt[1], Assistant Professor of Civil Engineering and Director of the Wind Load Test Facility, a citizen of Trinidad and Tobago based in South Carolina, will design and deliver training and scientific research projects involving Caribbean engineers and disaster management professionals. Refer to ANNEX C for a biographical sketch of Dr. Prevatt.**

Training

Clemson University proposes to organize in conjunction with Caribbean partners, a five-day short course on design of low-rise structures in hurricane and earthquake prone regions taught by US faculty experts on structural damage mitigation. This course will be located in the Caribbean territory to facilitate maximum participation of engineers, building officials and emergency management personnel from the region.

Research

Hazard mitigation has advanced significantly in the last decade, owing to research conducted in response to Hurricanes Hugo (1989) and Andrew (1992) and the

Northridge (1994) and Kobe (1995) Earthquakes. Much of this research has found its way into building codes standards, including the International Building Code and the American Society of Civil Engineers (ASCE) 7 *Minimum Design Loads for Buildings and Other Structures and the International Code Council's IBC International Building Code 2000.*[9]

Undertaking careful field based scientific studies will improve understanding of tropical cyclone behavior in the Atlantic Basin. The goal of these studies would be to improve design and construction practice, and most importantly, to better prepare for future catastrophes.

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[9] Osborne, R., Imbert, I., Sharma, A., and Prevatt, D., Drakes, P., "Cyclone (Hurricane) Resistance of Residential Buildings in the Caribbean", Proc. Int. Assoc. of Bridge and Structural Eng. Congress, New Delhi, 1992.

Next Steps in the implementation of thematic solutions

The DM community is widely separated and diverse in its national objectives, In addition there is a constantly changing spectrum of information demands, data sources and technologies. There is therefore a pressing need to conduct a comprehensive regional / national disaster requirements assessment in which in which the needs of the following entities should be solicited:

- Regional government bodies, national governments and community groups (specifically those engaged in disaster response)
- The private sector, including critical infrastructure services (banking, insurance, construction, trade, and economic interest groups)
- Scientific and civil engineering, research and educational institutions
- NGOs and the general public including special needs groups.

The objective will be to quantify the importance of information sharing and the role of Appropriate communication between these sectors; It should also serve to define the relationship between the DM community and disaster information providers.

Role of CDERA

The current ICT status as well as the projects and plans of responders in the disaster management community in the region should be analyzed with a view to assisting these institutions to achieve "best practice" objectives. Specifically, the following recommendations are urged:

- Sensitize regional governments, the private sector and civil society as to the need and urgency of the task.
- Charge all regional governments with the responsibility of submitting a complete analysis and description of their current and planned ICT infrastructures in their respective disaster management institutions.
- Support CDERA in undertaking a project to provide guidance and methodology to responders in the disaster community in addressing their individual planning.
- Also require CDERA to submit ongoing reporting on progress across the region.
- Constitute an Implementation Unit to support CDERA in the above undertakings.[10]

Information Needs Assessment[11]

The information needs assessment must address how sustainable development decision making can be fed information on disaster management issues, and how that process can be monitored by the national disaster office. Major data for that process include:

- mapping of hazard vulnerability and risks;
- the national physical development plan-as planned and as built;
- environmental and hazard impact assessments;
- road, utility and communication networks;
- emergency shelters, supplies and public or private warehousing facilities;

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[10] Summary Recommendations – ICT in Emergency Management – CIVIC discussions -George Richards
[11] Information Needs Assessment – CIVIC Discussion – Bruce Potter

Review of Previous Material

In order to apply an organizational and technological "filter" to proposed activities (and so as to not reinvent the wheel), it would be good to coordinate with UN "MOSS" standards ("minimum operational security standards") that have already gone through a long process of design and application. One group that has a long history in trying to apply and adapt these to ICT-based concerns is the WGET, the Working Group on Emergency Telecommunications, which is an UN interagency ad hoc group that meets once or twice a year in various international locales. This group also tends to be "cutting edge" in terms of where technology is or could be going as applied to emergency telecomm.

There are introductions to these themes in the draft "Practice Note on ICTs and Crisis Prevention and Recovery" which was never completed nor approved within UNDP because of the change in ICTD policy direction.[12]

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[12] CIVIC Discussion and Contribution – Gary Garriot

Project Funding and mobilization

To address the application of ICTs both regionally and nationally, and across all phases of disaster management (mitigation, preparedness, response, and recovery), and likewise in considering the needs of many different stakeholders (governments, responders, disaster management agencies, NGO's, the private sector as well as the general public); the task of applying ICTs effectively to regional disaster management is formidable.

> **Before any concrete implementation options can be proposed, with accompanying financial estimates, detailed feasibility studies and needs assessments must be conducted for each of the thematic areas. With the exception of Themes One and Five, therefore no project budget estimates will be presented in this report. Instead, mobilization requirements and some Indicative Capital Expense items will be cited. These latter items are not complete project estimates, and** are presented soley as **a guide to some of the likely major capital expense items.**

Indicative funding requirements for all thematic areas.

Theme	Thematic Topic	Required Funding	Source	Application
1	**Information sharing and awareness in the Disaster Community**			
	• **Implementation phase**	**10,000**	**Agencies, Sponsors and Governments**	**Mobilization – Development of a detailed Project Proposal and Implementation Plan**
	• **Implementation phase**	**140.000**	**Developmental Agencies**	**Project Implementation**
	• **Implementation phase**	**41,500**	**Equipment Providers**	**ICT hardware & Software**
	• **CIDIN – Year 2**	**50,000**	**Developmental Agencies**	**DM information refinement**
	• **CIDIN – Year 3**	**20,000**	**Developmental Agencies**	**Wider access to DM data sources**
2	**National and regional ICT infrastructure upgrading**	**15,000**	**Developmental Agencies**	**Mobilization – Needs Assessment and Project Concept**
	• **MINIMUM indicative Capital Requirements**	**250,000**	**Telephone / ISP Providers**	**Cell Tower hardening & Co-locating ISPs**
3	**ICT in use by disaster management agencies**	**10,000**	**Developmental Agencies**	**Mobilization – Needs Assessment and Project Concept**
	• **MINIMUM indicative Capital Requirements**	**1,170,000**	**National Governments, Developmental agencies, private sector**	**Agency infrastructures, Personnel equipment Mobile vehicles**
4	**Post reconstruction efforts and mitigation**	**5,000**	**Developmental Agencies**	**Mobilization – Needs Assessment and Project Concept**
	• **MINIMUM indicative Capital Requirements**	**170,000**	**National Governments, Developmental agencies, private sector**	**GIS Interpretive software Regional risk/hazard databases**
5	**Scientific research and training to improve decision-making**	**75,000**	**Developmental agencies, private sector**	**Training and Research projects**

PART - 2

Caribbean ICT & Disaster Management Network
(CIDIN)

An implementation proposal

For Phase I of a

Comprehensive Disaster Information Access and Sharing Framework

This Phase to be referred to hereafter as the <u>CIDIN</u> project

Background

There has been significant loss of life and property damage from hurricanes in the 2004 season. Much of this damage was compounded by uninformed decisions by citizens and local disaster agencies. This lack of information in turn, arose from an inability of the disaster management community at both regional and national levels to provide timely, frequent and appropriate information on which both the public and disaster response entities could act to protect life and property. The logical conclusion to be drawn is that were there to have been a mechanism for providing the quality of required information, and had this information been delivered to disaster responders by way of the appropriate channels, then respondents could have acted in a more effective and focused manner.

Identified Information Deficits

Insufficient propagation of disaster-related Information during hurricane events
- Media broadcasts are too infrequent and sporadic – *Commercial broadcast media are constrained to deliver scheduled programming which offers little flexibility for more detailed in-depth weather information*
- Information does not reach the public and the DM community in a timely and direct fashion – *As hurricanes are about to make landfall, more frequent information is needed by both responders and the public. Specifics of time of onset, wind speeds, rainfall intensity, storm surge levels and the timing of these events are vital.*
- Public bulletins contain jargon and terminology that confuse the average listener – *for example, meteorological terms such as barometric pressure are represented in either millibars, or inches of mercury, the general public have no concept of these terms. Even a simple measure of wind speed in kilometers per hour might be foreign to members of the public who still relate to speed in "miles per hour" Therefore the interpretation of this jargon is necessary.*
- The public generally cannot interpret disaster-related information and many DM agencies to make informed decisions regarding life and property. –*Many members of the public and local responders cannot use the disaster information presented. For example during the onset of Hurricane Jeanne in the Bahamas, several residents of Queens Cove, Grand Bahama remained in contact with local authorities, who were unaware of the extent and rate of onset of the storm surge which would soon threaten these residents. Only through the timely intervention of a local radio station was the operator of a large earth-moving piece of equipment able to effect a rescue. In another case, the owner of an unsecured property unaware of a fast approaching squall line was caught unawares and left cling for his life to a large sheet of plywood. Several lives were also placed in peril on the south coast of Jamaica during the onset of IVAN, many homeowners in flood prone areas remained in their houses unconvinced of their predicament, because warnings were insufficiently clear and compelling.*

Broadcast outages during the crucial onset period
- At these times, the general public is unable to communicate with disaster response agencies, public utilities, and medical and shelter / relief centers. A vital element of public information is therefore missing. –*Long lists of several required phone numbers (to shelters, security services, medical facilities, works departments, utility companies, etc.) are inappropriate at such times. Rather, a single central contact point manned by efficient and knowledgeable staff is better. Alternative radio stations (for example. PowerFM 106 (Jamaica) and JAMZ (Bahamas), offered such services (as a public gesture), and were instrumental in providing immense assistance to responders and the public. These stations contributed their staff and resources to remain on the air during these critical times.*
- public safety services are unaware of quickly developing situations – *Responders were made aware of numerous incidents of roads made impassable by flooding, downed trees, exploded transformers and downed power lines; all of which represented extreme hazards to the public. A mechanism for the public to advise of "fast-breaking" local conditions is therefore necessary.*
- members of the public unaware of critical conditions in their communities – *By listening to local conditions about their neighborhoods or adjacent communities, members of the public were are able to decide when and where it was safe to travel.*
- members of the public losing contact with family and support groups. – *A gesture as was rendered by cellphone providers in Jamaica and the Bahamas where free calls were allowed for periods during and after onset of the storms, represents an important community service*
- government decision-makers being unable to respond appropriately to their constituencies – *There were several cases of shelters running short of vital supplies. Again by the intervention of timely situational information senior government decision-makers were able to immediately re-allocate resources to meet this need.*

Potentially valuable DM information is unavailable via existing communications channels
- Doppler weather radar information was unavailable to the broadcast media.- *The Martinique-based Doppler weather radar system could have provided immediate and understandable graphical depictions of hurricane IVAN as it approached Grenada, including tracking, speed, wind / rainfall intensity and time and location of onset. With the implementation of four new stations in the Eastern Caribbean, much more precise and timely information will be available to responders and to the public*
- GIS information is unavailable for agencies responsible for emergency preparedness – *While this technology is of especial relevance for long-term planning and risk / hazard assessment, nevertheless, responders will find maps of population, flood-prone areas, storm surge susceptible coastal areas, etc. of vital use in evacuation planning and community preparedness.*
- Cellular broadcast mechanisms have not been implemented – *GSM / GPRS technologies for the broadcasting of text message alerts to cell phone owners in the vacinity of designated cell towers. This has gained wide use in other parts of the world, but has not been implemented locally.*

- Full use is not made of the Internet for streaming of Audio and Video disaster-related information – *The broadcast of audio and video (live and archived). Across the Internet holds immense potential for the exchange of information between the providers and public broadcasters. The Internet viewer can now observe radio/TV transmissions from locations that are inaccessible via their local radio/TV broadcasters; in addition, these local broadcasters can receive content (for re-broadcast) from many several sources via an Internet connection. An example of this would be an interview with a knowledgeable meteorologist could now be picked up by a local TV station and re-broadcast for its viewers.*

- In Jamaica and the Bahamas, radio / TV broadcast media provide 24 x 7 call-in (talk-show) allowing the public and responders to share vital information - *Alternative radio stations in Jamaica and the Bahamas provided continuous programming where announcers receive calls from the public or from responders, and relay this information (by way of their "on-air" broadcast) to their listeners. This was one of the most useful contributions of the broadcast media during recent storms*.

- The dialog arising from amateur radio networks operators has not been integrated into the broadcast / communications network for disaster management. – Amateur radio offers two outstanding capabilities. The first is the ability of HAM operators to continue communicating via their relays during and after onsets when the telephone and power services might be compromised. By linking into this radio network a reliable alternative mechanism for information exchange is harnessed. The second is that of short-wave radio to carry digitally coded Internet communications, thus providing another alternative to compromised Internet communications.

Rationale for the priority implementation of CIDIN

The following compelling benefits support the case for immediately implementing the CIDIN initiative:

- Most of the disaster information (including archives and real-time) remote sensor data is freely available. It may be necessary to establish relatively simple usage agreements, but in most cases, no license or access fees are necessary.
- In keeping with current trends, nearly all this data exists in a form that is readily accessible with standard and software such as MS Internet Explorer and similar Web browsers and MS Office Productivity application software
- Data is "real-time". It is current and immediately and directly available.
- Most data is graphical and user-friendly. An outstanding example of this, is the proposed Doppler weather radar imagery, which will provide digital images of weather systems. Even the general public can readily understand the relationship of local geography to the potential impact of a storm event.
- Technologies for both data access and propagation are widely available, standard, and modestly priced. It can easily be managed and maintained by an ICT practitioner with modest skills.
- A disaster information network can be implemented without need for onerous inter-agency structures. Being self-contained by nature, it allows for rapid implementation and flexible operation.
- The integration of audio and video information (interviews, discussions, interpretations, etc/), into the more textual and graphic website offerings greatly enhance the effectiveness and understanding of forecast information. All these technologies are standard and modestly priced

Implementation Model

Hurricane City, is a privately owned and operated hurricane information portal with a web presence at http://www.hurricanecity.com. The facility has been in operation for several years, and has become a recognized and respected source of storm-related information for the southeastern US. Hurricane City operates out of Palm Beach Florida, and therefore has a geographical overlap with the proposed CIDIN initiative.

The US-led GDIN initiative points the way to an ideal model, for a Global Disaster Information Network. This US federal government, has proposed this capability for a robust, interactive knowledge base of disaster-related information which will be accessible to disaster managers throughout the US and internationally.[13]

The current EU-ECHO project is another such example of the priority being given to disaster information networks for the CARIFORUM region. The details of this initiative (to be delivered through UWI) are unknown, however to the extent that scientific "storm-related" data is generated by this initiative, CIDIN will seek to establish complimentary linkages with this program.

It is anticipated that there will be a significant role to be played by the flagship ICT / DM project governance mechanism and for the engagement of regional developmental agencies toward the resolution of the terms of reference of CIDIN and other concurrent or associated initiatives

Scope of CIDIN

We propose that initially, CIDIN be designed to meet the needs of participating CARICOM states alone. However, its architecture will conform to internationally accepted technology standards and adhere to common data interchange protocols. in this way gaps in required information could be provided by other regional and international disaster information systems (such as GDIN).
CIDIN will be designed to:

- Provide access in the English language to the CARICOM regional states
- Address only hurricane events and related outcomes such as wind, rainfall and flood and tidal storm surge effects.
- CIDIN will function in a fully operational mode only during the months of the "Hurricane Season" (June through November), but could be mobilized in the event of significant extra-seasonal events.

Proposed implementation Solution

The task should to harness and utilize the existing and widespread array of communications infrastructures and communications channels in a reliable coordinated and appropriate manner so that the public and the disaster community are well informed.

The primary elements will include a solution that coordinates and directs the right information at the right time to the right audience in the right way.

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[13] *Harnessing Information and Technology for Disaster Management – November, 1997 - DMTF*

Using available Internet, cellphone services, amateur radio networks, and the broadcast media, a robust architecture will be proposed to deliver this information. In addition, by engaging other regional and international services and institutions a wider and more relevant variety of monitoring and analytical tools can then be presented. The solution will offer the real-time interview of key professionals and responders who can interpret available technical information at an appropriate level for target audiences.

In other countries the above approach has been adopted with proven results. These experiences have shown that with an appropriately designed and operated network facility, these technologies and communications can be harnessed in a way that effectively supports the disaster management community.

In the CARICOM region, most of this infrastructure is available, and can be relatively quickly integrated into an appropriate network. This would include Internet and streaming services as well as the linkage to the media and civilian disaster responders. Further access to information sources such as commercially owned or foreign storm-related products would require arrangements and negotiation, This would also apply to the use regional information repositories and expertise for a wider variety and depth of information. Finally, there are some information sources that are not immediately available but which are anticipated in the future (such as Doppler weather radar, oceanic weather buoys, Low Earth Orbit sensing satellites (LEOs), and the implementation of Geographic Information Systems (GIS); all of which would provide rich and vital information sources that would further enhance CIDIN's value to the region.

Many of the infrastructure and information sources indicated above could be implemented at relatively modest expense. In fact a functional and effective network could be made operational before the 2005 hurricane season. Other offerings and arrangements will take time and involve further expenditures. The initiative however will anticipate and allow for such future expansion, and the financial model would allow for sustainable operation through this transition.

Goal

To establish a capability within the regional, national and local disaster management community to access and disseminate accurate, timely and <u>appropriately interpreted</u> disaster-related information.

Objectives
The theme of disaster information awareness and access comprises not only the technological mechanisms for sharing information, but also its organizational, governance and policy aspects. Furthermore, effective information sharing requires the technology to be supported by an incorporation of the key aspects of connectivity, directed technology usage, outreach and awareness and extra-regional linkages into the strategic plan. Each of these areas is discussed below. However no specific implementation details are offered for these areas. The next implementation stage will be the development of a specific project proposal in which each of these areas is fully explored.

<u>Organization:</u>
Build a framework that involves regional, national local public and private-sector stakeholders in forming a long-term organization.
Begin immediately to resolve challenges to inter-agency information sharing, by establishing executive governance within the CARICOM Secretariat (or an appropriate delegated authority.

<u>Executive governing body:</u>
Explore potential mechanisms for the creation of a governance forum that might comprise institutions such as CDERA, CMHI, national governmental representatives, UWI, and private-sector representatives of the banking, insurance, trade and vital economic sectors. This body will develop the broad strategic mandate within which issues of disaster management information sharing are decided, and become the linkage between implemented solutions such as CIDIN and the regional strategic direction.

<u>Policy:</u>
Through the auspices of the executive governing body, (above), formulate a policy environment that fosters regional and international interagency cooperation .The mechanisms to facilitate this might include integrated strategic planning and coordination disaster (information) budgeting. Policies will seek to integrate and promote public/NGO/private-sector partnerships to address the economic and social consequences of disaster events.
Develop a sustainable mechanism for timely access to all appropriate disaster-related information, data and derived products – (refer to <u>Information Access</u> following.

<u>Information Access:</u>
Formulate a logical arrangement of data, information, models, tools, and other resources accessible to all levels - regional, national, local -, and for all relevant institutional groups – public, NGO, private-sector and research / educational.
Implement an integrated information facility that will provide all above agencies, as well as the general public with appropriately interpreted information to facilitate disaster-related decision-making.

NOTE: This specific objective has a clear and actionable framework. It can be articulated as an easily implementable solution with considerable benefits and minimal financial costs. Furthermore such a solution can be structured for phased implementation the first phase of which can be immediately executed, with subsequent phases being delivered as the larger organizational, policy and procedural structure of the proposed disaster Information Network becomes formalized.

In this area, the CIVIC group contemplates itself as being capable of facilitating the implementation of the recommended "solution". In collaboration with willing funding stakeholders, and under the direction of a suitable executing agency, CIVIC will undertake to engaging with key delivery stakeholders (such as CDERA and the national disaster response agency) to implement the solution.

Connectivity:
Develop procedures and policies to ensure the infrastructures of the stakeholders within the Disaster Information Network are robust, reliable and secure and that and that disaster information, in all formats, stored in participating stakeholders' sites (both physical and virtual) remain accessible as and when required.

Directed Technology:
Engage the ICT professional community as well as regional research / higher-educational institutions in an approach to continually explore cost-effective emerging data sources, application software, modeling / simulation tools and delivery and presentation options that can be integrated to provide a more useful information access mechanism.

Outreach and awareness:
There is a need to demonstrate that enhanced information access, connectivity, and directed technologies has measurable value in reducing disaster costs. This will be achieved by developing targeted programs for delivery over the public broadcast media, schools, seminars to NGOs and the private sector, and other public awareness campaigns.

Extra-regional Extension:
Having established a regional disaster information network, Collaborative mechanisms will be developed to share information, and best-practice policies and procedures with the wider international disaster information community. Examples of such collaborative partnerships may be with the Global Disaster Information Network (GDIN), and the PAHO-sponsored Central American Network on Disaster and Health Information (CANDHI). Other obvious linkages will be with the UNEP-sponsored Environmental initiatives, and the UWI- managed geophysical / seismic entity.
While these examples are not exhaustive, they demonstrate how the proposed Information network can both benefit and contribute in an ever-increasing environment of information exchange.

Specific Deliverables of a network

Provide reliable continuous exchange of information between:
- The community (civil society) general population (radio, TV listeners, the private sector, and volunteers)
- Disaster Management Agencies (Shelter management and relief coordinators)
- Public services (Police, Fire, Ambulance, Works, water service and transport/ roads departments)
- Public Utilities Coordinators (Electricity, telephone service providers)
- Shelter Managers and Shelter coordinators
- Influential members of civil society (Ministers of Churches, Labor, Community groups, etc.)
- Professionals (Meteorologists, seismologists, vulcanologists, geologists, Civil Engineers, etc)
- Hospital, medical sites, and trauma units

Provide a channel of communication between the general public civilian services and disaster relief agencies for the exchange of information on imminent threats to individuals and local neighborhoods. This will include:

- Propagate and Interpret vital local information. The interpretation might be to use local experts to provide specific information regarding the timing, duration, threat intensity and demographic / geographic analysis in language that all citizens can understand. Where necessary, such analyses will be provided by interviews with experienced local experts. These sources might include storm and other event bulletins from disaster agencies, meteorological forecasts. Doppler weather radar information. Etc.

Examples of this type of information are:
- Risk levels associated with decisions not to take shelter
- Likely types and degree of disaster effects (wind, rainfall, flooding, etc.)
- Timing and level of preparation to be made prior to onset
- Evacuation planning - timing and shelter options

An optimal disaster information sharing process

Disaster information involves more than just data. Several interconnecting steps are typically required to generate the types of action-oriented information needed by the disaster management community. The exact steps taken depend on the disaster phase and how time critical the need is. The following describes each step in the information generation process:

Optimal Disaster Information Flow
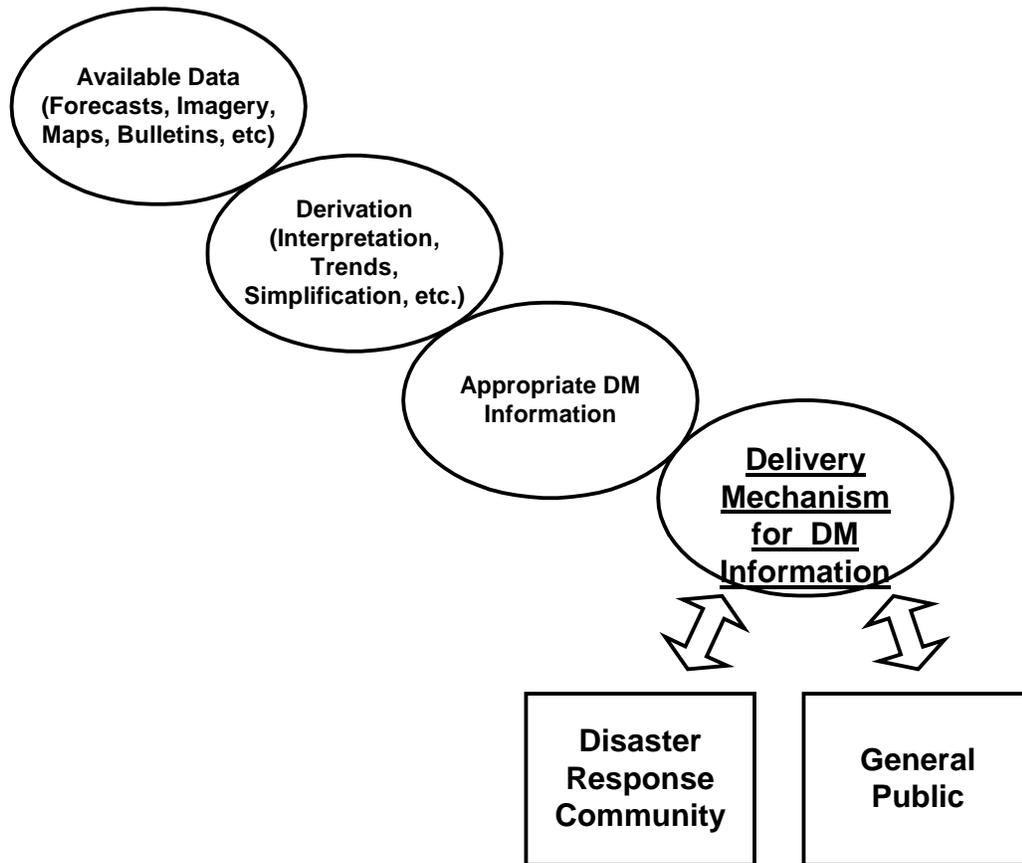
Disaster management Data sources

CIDIN will be an operational service that becomes functional at the time of onset of a hurricane. It will complement and enhance the services and activities rendered by disaster responders. CIDIN will therefore not develop any informational products, which are the responsibility of currently established regional institutions.

Because CIDIN's communications connections are via the Internet, CIDIN can remain operational (despite severe local impacts). Using mechanisms such as website mirroring. Co-location and virtual "re-location" the highest level of reliability and redundancy can be implemented.

There are extensive communications media, information sources and meteorological products in the Caribbean that remain relatively unexploited for the disaster management. This network will seek to integrate as many of these capabilities into a unified delivery mechanism (CIDIN)

CIDIN will host and maintain a website that delivers the following information - either with CIDIN as the source, or via links to other sites:

Forecast Information – partial list
- CDERA http://www.cdera.org Status reporting and bulletins in addition to general storm-related informational documents
- NHC/NOAA - http://www.noaa.gov - satellite imagery, forecast predictions and meteorological information for pending events
- US Marine Situation Reports http://www.boatus.com - Wind and tracking charts as well as access to marine data bout feeds.
- http://stormcarib.com. – postings of local conditions across the region
- Hurricane City   http://www.hurricanecity.com   – One-stop website and facility similar to this proposed network that services the South Eastern US and parts of the Caribbean.
-

Streamed Audio/ Video
- dialog from local call-in shows streamed onto website
- Amateur radio (see Hurricane watch Net below) picked up by the operator the network operator and streamed onto the website.
- Live real-time interviews with responders and regional professionals / meteorological, experts to be streamed over the website
- Pre-recorded interviews and audio clips (historical archived audio video footage) to be streamed over website

Live graphic images of Doppler Weather Radar
- French DOM – based Weather radar sites (Martinique)
- Netherlands Antilles Weather Radar (Aruba)
- Eastern Caribbean Doppler Weather Radar Sites – Eastern Caribbean.- (presently being implemented) under an EU-ECHO initiative
-

Cellular Broadcasts

By way of prior arrangements with telephone providers, timely and specific textual messages will be created by CIDIN and relayed to phone providers, who

will then "Cell Broadcast" this text to cellphone owners in within range of cellular nodes in affected areas..

Amateur radio (live dialog):

By way of prior arrangement, CIDIN will re-stream the audio dialog between amateur radio operators and local contacts in the impact area. . An understanding will be established with "Hurricane Watch Net" --a loose ham radio group network of 35 licensed Amateur Radio operators who are "supported" by the National Hurricane Center in Miami

Archival electronic databases

Links to relevant archived information such as CARDIN (UWI/Mona) for historical disaster-related documents and information

GIS and other geospatial databases

From time to time CIDIN's operators will access relevant information to demonstrate historical trends or to indicate geographic locations with of specific concern such as vulnerability because of topology, proneness to flooding, low lying coastal areas subject to storm surge, etc.

NOTE: A current UNEP initiative is expected to result in the such a regional database for use in environmental risk assessment. Linkages to this data represent a logical integration to DM

Other satellite remote sensed data

A number of other products will soon become available by way of US Disaster Information Networks (NDIN) and the proposed Global Disaster Information Network (GDIN). CIDIN will seek to link to these sites as and when appropriate data becomes available

Future Capabilities

o **LEOS:** The "Disaster Monitoring Constellation" of low earth orbiting satellites built and launched by Surrey Satellite Technology Ltd., UK in collaboration with a number of world governments.

Derivation of data

While much of the meteorological forecast information will be freely and immediately available to CIDIN, there are other data sources that might require the intervention of:

- Commercial services (such as satellite and remote sense operators) where access arrangements / fees are require.
- Regional data from GIS models and simulations that require providers to create appropriate files and datasets for use by CIDIN

Developing Appropriate disaster management Information

CIDIN will itself not only act as a gateway for relevant DM information, but will also seek to "add value" to such data when necessary. This will make CIDIN a unique provider of DM information on which regional responders and the general public will come to rely. An example will illustrate the benefits of such a service:

Interviews with regional meteorological "experts" in which the precise relevance of an event – such as an approaching hurricane – can be fully and simply described. The objective will be to provide information on which responders and the public can make informed decisions). Such an interview might discuss when and where wind, rain and floods might occur, and what level of intervention (securing of property, evacuation planning, logistical resource deployment, etc.) might be necessary at the community level.

All such material will be recorded and made available via the broadcast mechanisms described below.

Delivery of disaster management Information

CIDIN will facilitate appropriate DM information to users by way of two primary mechanisms.

1.   Internet website: Target agencies all presently have access to the Internet, and
       can therefore receive all information provided by CIDIN. There may be a need to
       encourage some agencies to upgrade their ICT infrastructures to receive
       enhanced multimedia products from CIDIN.
       The usage of (and access to) the Internet within the region, is quickly
       developing. Present adoption levels by country are detailed at the CIDA / ICT
       website : http://www.icamericas.net/Map/mapa/mapa_ing.html
       Regional acceptance of the Internet as a delivery mechanism is expected to be
       similar to the experience in other developed countries; although a lower adoption
       rate can be expected because of present (relatively) high communications
       access tariffs.
       While the primary CIDIN website will be hosted regionally (see implementation
       solution following), in the interest of reliability, the site will also be "mirrored"
       outside the region. It is expected that an appropriate sponsoring provider can be
       identified to meet this need.

2.   The broadcast media: This mechanism will complement Internet information
       delivery. Through appropriate arrangements with regional media (TV and radio),
       CIDIN DM information will be propagated to listeners / viewers of commercial
       broadcasts. Several modes are anticipated:

- Broadcast media will feature CIDIN forecast information (images, maps, graphics, etc.) for use with their regular "weather programming".
- Broadcasters will feature CIDIN interpreted DM information during various phases of disaster management (e.g. Interviewers with meteorologists prior to

onset, discussions with responder personnel during the response phase, and general DM documentaries to promote public awareness and mitigative efforts).

- CIDIN will receive broadcasts of "call in/ talk-show" community service programs by the media, and re-stream these feeds over the Internet, thus providing an alternative broadcast "reach" to listeners outside of the local TV/radio broadcast range.

An issue requiring careful consideration is the timing and emphasis of such broadcasts. While the responder community can be expected to receive and act on such disaster information responsibly, the sensitivities and attitude of the general public must be carefully considered before such information is broadcast over radio / TV. Inaccurate or untimely information may result in public cynicism thus defeating desired objectives.

(Refer to - Timing of Delivery of Information[14])

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[14] Maintaing the credibiliy of an information source – CIVIC Discussion – Mick Reid
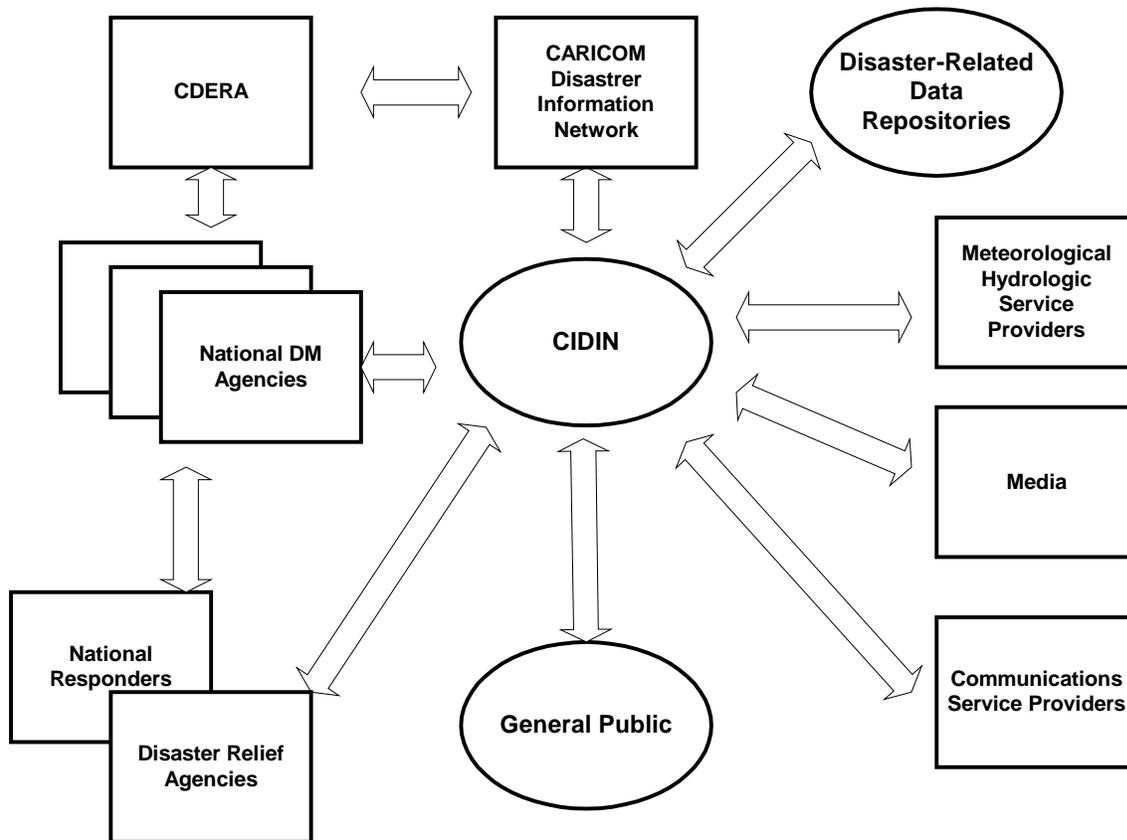
Organizational Structure of CIDIN

The Caribbean ICT and Disaster Management Network (CIDIN) will be a regional facility that links product providers and disaster-related information repositories with disaster management agencies responders, disaster relief entities, media, and the general public including the private sector.
. It will therefore have linkages with CDERA, disaster prediction agencies, and the national DM community, broadcast media, governments, NGO's and private sector institutions.

CIDIN will be supervised by accountable on-site management personnel who will be governed by policies and practices developed by an oversight team of technical consultants. The operational staff will consist of responsible adult student volunteers from local tertiary educational institutes (TEIs) with a strong academic background in ICT and media communications studies. This staff will receive rigorous training prior to their deployment, and be mandated to adhere to the guidelines of a carefully designed operational "Hand Book"

CIDIN - Caribbean ICT Disaster Information Network

It is anticipated, that some members of the CIDIN project implementation team could constitute an ongoing "oversight team" to direct and provide technical guidance and to establish appropriate policies ongoing.

Since CIDIN's critical success factors are technology, sponsorship and stakeholder communications/awareness, these areas will be represented in the skills, experience and expertise of the oversight team.

Detailed list of management and human resource requirements

Oversight Team	Governance and Policy-making
• Director	• Coordinate activities • Financial control
• Technology Consultant	• Authorize ICT equipment acquisition
• Meteorology Specialist	• Develop operational procedures • Design / deliver orientation and training to student volunteers
• HR & Partner Liaison	• Liaise with TEIs and recruit student volunteers • Networking and communications with stakeholders • Negotiate partnership arrangements
Operational Staff	
• Operations Manager	• Develop duty roster • Supervise and assign tasks • Monitor, record and resolve events and tasks • Responsible for all day-to-day issues • Install and maintain primary and server equipment and software as required
• ICT / Equipment Support	• Monitor and maintain all ICT equipment, radio and broadcast equipment, antennae and electrical power • Install and maintain client equipment and software as required
• Communications and Media	• Conduct telephone interviews with all associated agencies • Draft the text and deliver audio bulletins • Conduct the running commentary • Manage the Internet streaming (and re-streaming) of voice video and graphics
• Web Designer	Update Web site as required
• Office Administrator	• Bookkeeping and record-keeping • Maintenance of files, logs and reports • Liaise with supplier delivery personnel and contractors

Physical Infrastructure and ICT functional components

Category	Function
Location / Site Infrastructure	
Site	Location not subject to: tidal / storm surge, flooding, direct wind exposure, bush fires, earthquake fault or volcano effect Location should be well serviced by roads to/from major cities/ towns
Building	Built to the highest hurricane code. There should be capability of installing reserve power generation, and standby HVAC and storage. Additionally there should be the ability to install a wide variety communications links and antennae.
Electrical Power	Managed and immediately available standby electrical generator ./ UPS battery system to support all electrical requirements
Environmental Monitoring	Independent monitoring system for all aspects of the internal and immediate external environment
ICTs & Spectrum Capacity	
Access / Communications	Internet Links: ADSL, satellite, backup dialup Voice/ Phone: landline, cellular, satellite phone. Citizens Band, Short Wave, scanner, etc. Radio / TV: Directional antenna, Satellite Many of these accesses will be redundant to each other
ICT Facilities	Website (links to radar, radio, TV, database for appropriate target locations), data and document archives) Collaborative services (Chat, message board and e-mail forums) Streamed Audio/video (mixing of audio and video feeds, as well as graphics and animation)
Radio / TV reception	Direct patch to / from live radio transmission and to receive and send Internet streamed feeds to a/ from affiliates
Land line and Cellphone	Landline PBX (with call forwarding and waiting) Cellphone voice (including all GSM service) Satellite Phone Short-wave receiver / transmitter Scanner receiver CB transmitter / receiver

Implementation funding strategies

Project mobilization and facilitation
CARICOM has pledged seed funding and support including:
- An E-Secretariat facility for the implementation task team
- Support for development of project TOR, resource mobilization and consultation

Implementation Supervision
CARICOM (along with the GoG) has designated a convener for the flagship CARICOM ICT Disaster management project framework. A mechanism therefore now exists for liaison between the CIDIN project to the wider regional DM initiatives.

Implementation Resources
The involvement of regionally based members of CIVIC will reduce implementation expenses. They will contribute necessary skills and experience to tasks such as:
- design and layout of the facility,
- ICT architecture and key services
- ICT & equipment acquisition, installation and implementation
- Operational procedures and processes
- human resource acquisition and training

Such services can in large part be performed via remote / virtual modes, without need for expensive travel and conventional meeting formats.
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Project mobilization and Funding
1. The CARICOM Secretariat has responded by providing seed mobilization and administrative facilities for the project.
2. It is proposed that initial grant funding be sought from one or more interested regional development partners, including:
   - CARICOM regional ICT and development strategy
   - USAID
   - CDB / DMFC
   - EU – ECHO
   - European Commission
   - UNDP / UNEP
   - CIDA / ICA
   - OAS
   - IADB

3. These contributions will be matched by in-kind donations from other stakeholders Such as NGOs, equipment vendors and service providers:

Operational financial strategies

Premises
Government of Grenada (GoG)- GoG has expressed interest in providing premises and infrastructure. CIDIN could be located in proximity to a Tertiary Education Institution (TEI), such as the TA Marryshow Community College (TAMCC).   Alternatives include the GoG complex (Tanteen) or NERO's premises.

Operational staffing
At the outset, the project will seek to establish liaisons with national TEIs so that student volunteers can be recruited to provide operation staffing, Such arrangements will enable students to obtain valuable work-related skills in areas such as ICT operations and media/communications.

Private sector sponsorship
Beyond the first year of operation, there will be active solicitation
of sponsors from the national / regional private sector. Sponsors will contribute financially a large fraction of ongoing operating expenses in exchange for visibility and website advertising. Possible commercial sponsors within and outside the region, include:
- Multinational and regional Commercial Banks (NCB, CIBC. Royal/RBC, etc.)
- Funds Transfer Operators (Western Union)
- Transport and Courier Services (FeDex, Laparkan, etc.)
- Commercial Life and General Insurers with regional portfolios (CLICO, etc.)
- Locally based Building supply and construction firms
- Telephone and Internet service providers (Cable & Wireless, DigiCel, etc.)

ICT donors
Equipment represents a significant part of the initial capital budget. Because of the regional visibility of the project, its promotional potential could be leveraged by approaching a wide variety of suppliers and vendors such as:
- Computer hardware vendors (IBM World Trade (Barbados), HP, etc)
- Communications equipment vendors (CISCO Corporation, Nortel Networks Corporation, etc.)
- Software vendors (Microsoft Corporation, etc.)
- Communications providers (Cable & Wireless, Bluestream Corp. etc.)

Financial Budget

The CIDIN project will comprise three phases to be implemented over the coming three calendar years.

Phase I – will consist of operationalizing the CIDIN facility in Grenada with the objective of establishing a Web Presence, and delivering available disaster related information via the WWW. Beneficiaries will be the responder community and Internet users.

Phase II – will involve the consolidation of the processes in phase I, and the implementation of processes for the interpretation and simplification of information for disaster responders and the public. As the broadcast media become closely linked with CIDIN to deliver simple and actionable disaster-related information, listeners and viewers of the broadcast media (ie most of the general public), will benefit.

Phase III - will involve the consolidation of phase II, and the acquisition of a broader range of useful disaster information (GDIN, regional Doppler weather radar, satellite imagery, GIS mapping, etc,) when these services become available. This will benefit planners and agencies involved in both recovery as well as long term mitigation efforts.

First Year Budget Summary (*Refer also to the Indicative budget – ANNEX A)*

Budget Category	Amount
E-Secretariat & support for, recruitment and TOR development (CARICOM)	N/A
Administrative services	N/A
Detailed Project Proposal / Plan (Mobilization Funding)	10,000
Implementation Consulting /Services	40,000
Infrastructure and Equipment	28,000
First Year Operating Expenses (Non-Staff)	41,500
First Year Operating Expenses (Staff)	30,500
Year 1-TOTAL	150,000

We invite developmental agencies with interest in regional capacity building initiatives to review this presentation, and to coordinate with lead agencies and stakeholders to contribute to this initiative.

Implementation Plan

Anticipated implementation time-lines are as follows

Proposal	Funding and stakeholder MOU	February /2005
Phase I	CIDIN Operationalized	June 2005
	Project TOR	November 2004
	Funding Mobilization	January 2005
	Site Acquisition and preparation	February -April / 2005
	Equipment acquisition	March/ 2005
	Recruitment and Staffing arrangements with TEIs	April / 2005
	Design & develop procedure manuals and training curricula	March 2005
	Install, test and dry-run equipment	April /2005
	Domain / Design and implement website	April / 2005
	First simulated test with Media	May / 2005
	Inauguration and launch	May / 2005
Phase II	**Processes to improve and interpret data for the disaster community**	June 2006
	Establish communication feeds to selected public broadcast media	
	Financial sustainability through commercial sponsorship	
Phase III	Gain access to further meteorological products and feeds	June 2007

Indicators of success

The objectives of this project have been specifically defined in ways that allow for them to be measured. In addition, the operating processes and procedures of the network will include tools to readily report on various metrics by way of which ongoing performance may be measured.

This will include (but not be limited to:

- Website visits – time duration and purpose, classified by place of origin
- Qualitative survey results from stakeholder agencies
- Feedback form the broadcast media regarding audience volumes and response

Assessment, evaluation and monitoring

Both project implementation and ongoing operation of the network will be undertaken under rigorous processes. In addition the procedures that are requirements of funding agencies and sponsoring institutions will also be adopted and followed.

ANNEX

A   Indicative Implementation Budget (Capital and First Year Operating Costs)

Budget Item Description	Amount ($US)	Remarks
Implementation Consulting /Services		
Project Coordinator/ Convenor	5000	Sponsored by GoG (10 days) (In-Kind)
Project Manager	25000	CIVIC Team member (50 days) Per Diem (Grant Funding)
Technology Consultant	5000	Voluntary – Per Diem (Grant)
Meteorology Specialist	5000	Volunteer – Per Diem (Grant)
HR & Partner Liaison	5000	Volunteer – Per Diem (Grant)
Administrative Support	2000	Sponsored by regional Executive Agency (20 days) (In Kind)
Contingency	5000	Grant Funding
TOTAL	47000	
Infrastructure and Equipment		
Legal Fees / Location acquisition costs	2500	NGO contribution (In Kind)
Facility infrastructure construction expenses	15000	Stakeholder contribution (In-Kind)
Power Generator	8000	Grant Funding
Antennae, cabling furnishings and equipment racks	15000	Grant Funding
IT Hardware (Servers, switches, workstations, etc)	12000	Stakeholder / Sponsor (In Kind)
Software (OS, management, applications)	6000	Stakeholder (In Kind)
Contingency	5000	
TOTAL	68500	
Operating Expenses (Non-staff)		
Non-ICT equipment maintenance	3500	Operational Expense
ICT Hardware Support	2000	Operational Expense
Software Licenses / upgrades	5000	Operational Expense
Telephony Charges	6000	Operational Expense
Internet service provider charges	10000	Operational Expense
Other Providers (satellite Fees, etc.)	2500	Operational Expense
Maintenance Cleaning	3000	Operational Expense
Office & equipment Supplies	2000	Operational Expense
Utility and Energy Costs	4000	Operational Expense
Contingency	3500	Operational Expense
TOTAL	41500	
Operating Expenses (Staff)		
Operations Manager	20000	25-50 days on-site management
ICT / Equipment Support	2500	Travel / Meals /perdiem
Communications and Media	2500	Travel / Meals /perdiem
Web Designer	2000	Travel / Meals /perdiem
Office Administrator	1000	Travel / Meals /perdiem
Contingency	2500	Travel / Meals /perdiem
TOTAL	30500	

B   Discussion of future relevant technologies as applied to disaster management [15]

The concept of "cell broadcasting" (CB) which allows CDMA and GSM cell phones in a given geographical area to receive text messages, for example concerning weather and emergency alerts (it is different from SMS in that the phone number of the recipient is not needed). Cellular emergency alerts' utilize a device that is already in being carried by over one billion citizens worldwide, eliminating the need to develop, implement, and distribute special terminals or transmitter stations. The use of Cell-Broadcast for mass emergency messaging does NOT require maintaining a vast database of mobile subscribers' phone numbers or the tracking of their location, eliminating the cost and political problems associated with database updating and citizen privacy concerns.
CB is already part of the protocol suite, but rarely used. CB is characterized by low network loading which is an advantage especially in situations of high demand. See http://www.ceasa-int.org/ for more info, including explanatory videos describing usage in emergency situations.
Receive-only Ku-band portable ground terminal (a subsidiary of Panamsat Corporation which is interested in co-hosting demonstration) that can download pre-determined Internet sites (can also be "forward cached" meaning that once the determination of which sites to be downloaded has been made, subsequent downloads include just the "updates" to those sites). It may be possible to add an email interface to this system, such that a properly formatted email which arrives at a special server by whatever means (INMARSAT sat phone, packet radio, slow dial-up) actually "triggers" the download from the desired site over the portable terminal(operation is similar to the old "webmail" servers that could request text content at any website by email which was then delivered by email). The demonstration would likely be located here in Panamá for a period of a few months, but we think this represents an innovative opportunity for rural and isolated areas across the region to gain access to Internet information (plus receive-only access means no licensing in most jurisdictions and less electrical energy requirement since there is no transmitter).

"Disaster Monitoring Constellation" of low earth orbiting satellites (LEOs) - built and launched by Surrey Satellite Technology,Ltd., UK in collaboration with a number of government agencies around the world. These satellites provide images of surprisingly good resolution and once the constellation mode has been established, will have the capability of daily re-visits to the same location (which current individual imaging satellites cannot provide). Images during a disaster event will be provided for free and while there would be some kind of fee for disaster planning purposes, they appear to be open to providing "advance data" for planning studies. More info at
http://www.sstl.co.uk/index.php?loc=27&id=746 and at
http://www.sstl.co.uk/index.php?loc=120
by low network loading which is an advantage especially in situations of high demand. See http://www.ceasa-int.org/ for more info, including explanatory videos describing usage in emergency situations. Finally, I have been involved in early discussions with a subsidiary of Panamsat Corporation which is interested in co-hosting demonstration of

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[15] Emerging ICT Technologies – CIVIC Discussion – Gary Garriot

C   Biographical sketch of Dr. David Prevatt

Dr. Prevatt's interest in hurricane research began in the early 1990s when he was a Graduate Research Assistant at the Cyclone-Resistant Housing (Caribbean) Project at the University of the West Indies (UWI), Trinidad, where he also earned his Bachelor of Science degree in Civil Engineering.

After graduating from UWI with a BSc (Honours) in Civil Engineering, Dr. Prevatt worked as a structural engineer with the Designs Engineering Brach of the Ministry of Works, Trinidad and Tobago for five years, where he was a Project Engineer. Dr. Prevatt went on to earn his doctorate in civil engineering from Clemson University in 1998.

In addition to wind tunnel modeling, Dr. Prevatt's research interests include structural performance and monitoring of buildings, post-hurricane data collection and analysis and disaster mitigation to housing in the Caribbean and Latin America.

Prior to his position at Clemson University Dr. Prevatt spent the last 6 years as a building envelope consultant with Simpson Gumpertz & Heger Inc., Waltham, MA, focusing on the investigation, design and repairs to contemporary and historic building facades (roofing, wall and window systems and plaza waterproofing systems).

Dr. Prevatt is a professional engineer licensed in the Commonwealth of Massachusetts and in Trinidad and Tobago.

D   Presentation to the CARICOM ICT Ministers Meeting –October / 2004 [16]

ICT-Enabled Disaster Management

In the wake of a virulent hurricane season the Caribbean has experienced sad loss of life and destruction and devastation on a massive scale. The response to these events underscores the urgent need to improve and strengthen the capability of disaster management systems in the region.

ICTs can be of assistance in all the phases of emergency management :
        Mitigation: The long-view stage, prior to the anticipation of an actual disaster, when action is taken to mitigate the scope or severity of a disaster's impact. Actions might include precautionary measures like bolting a house to its foundation so it might better withstand an earthquake.
        Preparedness: The phase prior to the anticipation of an actual disaster when action is taken to plan and prepare for emergency response and recovery. Actions might include developing response plans and back-up systems, establishing mutual aid agreements among agencies, and stocking first aid kits.
        Response: The phase during or immediately following a disaster when action is taken to respond to the emergency. Actions might include providing emergency medical services, sheltering victims, or conducting search-and-rescue operations.
        Recovery: The phase following an emergency when action is taken to recover from the effects of a disaster. Actions might include restoring utility services or providing loans for the rebuilding of homes.

A rapid prototyping exercise involving consultation with civil society stakeholders has undertaken an analysis of how ICTs can be used to improve the effectiveness of disaster management in the Caribbean region (with particular reference to hurricanes) and has provided a number of key recommendations on the urgent actions required by governments and other stakeholders to use information and communication technologies to save and improve the quality of lives in the event of the occurrence of natural disasters. The individuals involved in this exercise, used ICTs to facilitate collaboration and consultation and are committed to continuing this engagement and to expand their efforts into operational activities on the ground. The principles advocated by the group include the need to consider disaster management in the context of cultural diversity so that all countries in the geographical region and those that identify as Caribbean are involved, rather than restricted membership of disaster management networks to particular political groupings, or organizing on the basis of colonial history. This approach is particularly relevant in the area of disaster management given that the geographic contiguity of the countries. Natural disasters make collaboration across the wider Caribbean proceed from perceived need rather than rhetoric. The group also articulated the need for 'ownership' of proposals by the people of the Caribbean, including our governmental leaders, rather than a dependency on well-intentioned assistance from outside the region. It was believed that all actions, including those for post-reconstruction and management of relief efforts needed to take into account improving the sustainability of regional and national disaster management agencies and mechanisms.

The analysis also highlighted the urgent need to strengthen the regional footprint of broadcast media and to reduce the dependence on extra-regional news networks as a source of up to date information on the Caribbean.   The evidence demonstrated the effectiveness and resourcefulness of community-led initiatives such as District Emergency Officers in Barbados, and informal networks of HAM radio operators. The group made recommendations on using ICTs for monitoring weather patterns and providing advisories on changes in hurricane trajectories, timely dissemination of public interest emergency bulletins and evacuation announcements, providing directions for evacuation centres and for documenting local knowledge about weather patterns and topography.

The Caribbean ICT community also made recommendations on how the operations of formal mandated organizations such as the CDERA can be strengthened through the application of ICTs, including geographic information systems (GIS) and cultural mapping systems. In particular, it is noted that the regional disaster management network and each of the constituent institutions of this community should introduce organizational innovations that enable this system to function during and after the onset of severe natural disasters. In order to achieve this all of the individual disaster response agencies should undertake as a matter of utmost urgency a review and redesign of physical and information infrastructures to

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[16] Extract from Marcelle, G. "Mobilising ICTs for Caribbean Development", background paper prepared for the ICT Ministerial Meeting, 12-15 October, 2004, Barbados www.caricom.org based on consultations with an interested sub-group of the CIVIC virtual community

incorporate the maximum robustness, resilience and redundancy into their system. It was strongly recommended that the disaster management community should begin to evolve its communications and collaborative networks away from a dependence on one physical location and instead toward virtual hosting; thus ensuring that infrastructure, hardware, application software and data are not compromised by outages in one or more sites.

The analysis suggests that the national grids of fixed and mobile communications in the Caribbean did not appear to cope in terms of reliability and redundancy during the recent emergencies. Several recommendations were made for the improvement of national grids including use of cell broadcasting, procedures to secure and harden cell towers and the design and implementation of a back-up emergency communications network, including by integrating HAM and amateur radio users; provision of adequate back-up power systems, including solar power cells. In terms of post reconstruction efforts, there were recommendations made for the establishment of national data centres which would provide back up of all-important key legacy systems and would ensure rapid restoration of connectivity with neighboring territories. Finally, as the total effect of these disasters on life, property and the economies of the region escalate, it behooves decision-makers in the disaster community to adopt "best practice" ICTs that ensure mitigation, preparedness, response and recovery.

The flagship programme proposed here would build on this analysis to elaborate and implement an ICT-enabled disaster management network for the Caribbean.

E   **Abstract– Advocacy Brief – ICT and Disaster Management.**

Abstract

The hurricane season of 2004 will be long remembered for the tremendous devastation that was caused throughout the Caribbean. There was loss of life and still to be estimated loss of property and related infrastructure. ICT infrastructure and support, because of its lack of robustness for disasters of this nature, also sustained extensive damage during this period.   Grenada was unable to communicate effectively after the hurricane and is still way below its normal capacity to provide the relevant ICT services and support. In Jamaica, although the telecommunication infrastructure remained relatively intact, satisfactory internet connectivity wasn't restored until about 6-7 days later. Post evaluations of the disaster period indicate that had Trinidad & Tobago and Barbados been hit directly by Ivan, there is a likelihood that they would been reduced to the same level despite their relatively advanced state of communication and connectivity. The Caribbean media also failed to cover the hurricanes independently, instead offering information from CNN.

A review of national ICT plans within the region show very little if any, concentration on the role of ICT in disaster management. Although the CARICOM Connectivity Agenda for ICT recognized infrastructure as a fundamental pillar in ICT development and evolution, it is only with the adoption of a new development orientated regional strategy that disaster management has been identified as a priority issue. That strategy and the flagship programmes within it, take note of the need to ensure that there are preventative and proactive policies to protect for infrastructure and people from physical threat.

It is against this background that a group of Caribbean based ICT professionals began the process of developing a series of recommendations on how ICT technologies and methods could be used to improve the ability of Caribbean states to respond to disasters, including actions that are necessary before, during and after disasters of this nature occur.

These ideas evolved into a technical blueprint that outlines the role of ICT in the following areas:

- Information Dissemination and Communication for Disaster Preparedness
- Improvements in Regional and National ICT infrastructures and Applications for disaster mitigation and responsiveness.
- ICTs and Effective Emergency Management and Response Systems
- ICT in Post disaster reconstruction
- Summary Recommendations

This document will provide a brief overview of all of these themes put forward some suggestions about the way forward given the realities, economic, social and physical, that are faced in this region. It should be noted therefore that all of the recommendations made in this document are able to be done within the region; and that the implementation of these recommendations within the region through local organizations and community will further reinforce the safety of our region.