



# ICT for Disaster Risk Reduction

*The Indian Experience*



**Ministry of Home Affairs**  
National Disaster Management Division  
Government of India

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## 1. Background

Today it is a proven fact that Natural Disasters can happen at any place irrespective of the developed, developing or the least developed status of a country. It can cause massive destruction to the lives and livelihoods of large population and hence, to the national economies. It is experienced that the least developed and developing countries are impacted more severely by large scale natural disasters.



The unique geo-climatic conditions have made India highly vulnerable to natural disasters. In India, 54% of landmass is prone to earthquakes, 40 million hectares of landmass is prone to floods, 8000 km of coastline is prone to cyclones and almost 68% of total geographical area is vulnerable to droughts. The recent occurrence of massive Tsunami on 26.12.2004 has worsened the situation. Though complete prevention of natural disasters is beyond human capabilities, the adverse impact of any disaster on human lives and their livelihoods can be minimized by taking adequate early warning, preparedness and mitigation measures. The state-of-art Information and Communication Technology (ICT) systems play a crucial role for implementing such preventive measures.

## 2. ICT in Disaster Risk Reduction

With advancement in Information & Communication Technology in the form of Internet, GIS, Remote Sensing, satellite-based communication links; it can help a great deal in planning and implementation of disaster risk reduction measures. These technologies have been playing a major role in designing early warning systems, catalyzing the process of preparedness, response and mitigation. ICT tools are also being widely used to build knowledge warehouses using internet and data warehousing techniques. These knowledge warehouses can facilitate planning & policy decisions for preparedness, response, recovery and mitigation at all levels. Similarly, GIS-based systems improve the quality of analysis of hazard vulnerability and capacity assessments, guide development planning and assist planners in the selection of mitigation measures. Communication systems have also become indispensable for providing emergency communication and timely relief and response measures.

### 2.1 The Indian Experience

In order to reduce the risk and vulnerabilities in India the Ministry of Home Affairs, being the Nodal Ministry for Disaster Management, is taking lead on disaster management and mitigation in the country. The Ministry has drawn up a National Disaster Management Framework for the country. This

National Framework covers the prime sectors such as institutional mechanisms at all administrative levels, disaster mitigation/prevention to be mainstreamed into the development process, envisaged legal/policy framework, early warning systems, preparedness & emergency response measures and human resource development. The Ministry has undertaken various nationwide initiatives to strengthen disaster management systems in the country.



United Nations Development Programme (UNDP) has joined hands in this effort of Government of India and is implementing Gol-UNDP Disaster Risk Management (DRM) programme in 169 most vulnerable Districts of 17 States in India. Information coordination and management is seen as one of the major challenges in India due to the large geography and diversity of language/cultures. The Gol-UNDP DRM Programme addresses these issues very carefully by using Information and Communication Technology tools for faster response, effective decision making and develop well informed practitioners.

There are number of ICT based initiatives, tools and applications developed to help the disaster managers function efficiently.

### **3. Online Inventory of Emergency Resources**

It has been observed that a comprehensive database of disaster management related inventory and organized information dissemination system on availability of specialized resources is very essential for mobilizing the specialized equipment and skilled human resources to respond immediately during disaster. Lack of adequate information about availability has hampered quick and measured response resulting in delays which could be critical in case of sudden eventualities. Therefore, a need to prepare a database of such resources, from District to State level was strongly felt.

When disasters strike, the disaster managers at the District/State level respond with the resources at their command. While the Disaster Manager (District Magistrate/Collector) is generally aware of the resources at his command within the District, he may not be aware of the resources available in the neighboring Districts or in the neighboring States. The disaster manager at the State level [the Relief Commissioner] does not have an inventory of resources available within the State. Therefore, all the resources available within the State are not brought to bear for saving lives, and when some specialist equipment is required, there is a lack of knowledge as to the whereabouts of the equipment either

in the neighboring District or in the neighboring State. Lives can be lost because of such delays or lack of required resources.

### 3.1 What is IDRN?

The IDRN (**India Disaster Resource Network – [www.idrn.gov.in](http://www.idrn.gov.in)**) is a nation-wide electronic inventory of essential and specialist resources for disaster response, covering specialist equipment, specialist manpower resources and critical supplies.

IDRN has been initiated by Ministry of Home Affairs (MHA) in collaboration with United Nations Development Program (UNDP) to systematically build the disaster resource inventory as an organized information system for collection and transmission of information about specific equipments, human expertise and critical supplies database from District level to State level to provide availability of resources for disaster response, so that disaster managers can mobilize the required resources within least response time.



Figure 1: The Home Page of IDRN

The IDRN lists out the equipment and the resources by type and by the functions it performs and it gives the contact address and telephone numbers of the controlling officers in-charge of the said resources so that the equipment can be promptly mobilized. The IDRN is a live system providing for updating of inventory every quarter. Entries into the inventory are made at two levels – District and State level.

This online information system can be accessed by authorized Government officials, District level nodal persons, corporate bodies and public sector units. District nodal authority will be responsible for collecting, compiling and updating their inventory data to the central server with the help of concerned District departments. Adequate authorization and security has been in-built and is being maintained in the portal to prevent unauthorized access to this inventory. The user may avail the facilities like analyzing or querying the information resource inventory through given user friendly interfaces to get a list of resources available in the District and State level.

### 3.2 Target Audience:

The users and partners of IDRN initiative are: 602 **District administrations** of 35 States and UTs, all 35 **State/ UT administration** of India, around 5000 member **corporate bodies** with **Confederation of Indian Industry (CII)**, around 33,000 builders, contractors and construction companies with **Builders’ Association of India (BAI)**, the entire **Indian Railways** and numerous **public sector undertakings** in the country.

### 3.3 How it works?

The India Disaster Resource Network is a web-based application with controlled access to the database. 226 items mainly consisting of equipments, human resources and critical supplies are categorized in the system. The data related to these items are collected from the line departments and various organizations at the District level. The data is entered in to the portal at the District level.

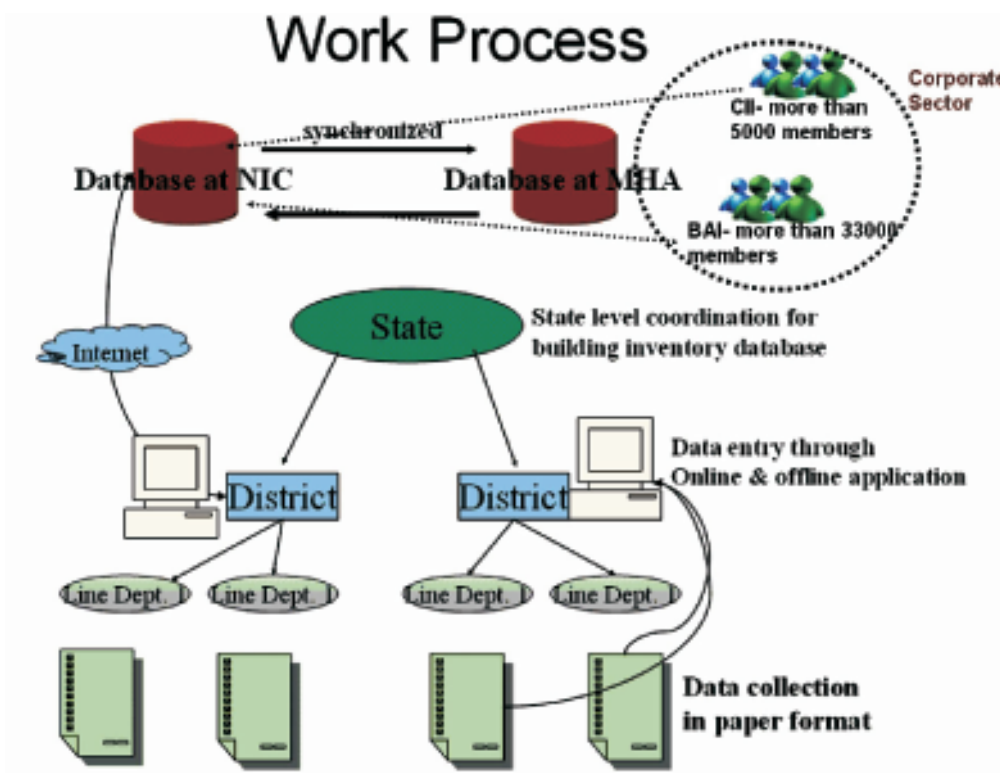


Figure 2: The data collection and collation process in IDRN

### 3.4 Description of the Portal

The authorized users can enter the portal through the User ID and Password provided to them by the IDRN Administrator, Ministry of Home Affairs. Various users can access the portal based on their access level predefined viz. user from the Ministry can access the administration of part of the portal,



whereas a State disaster management department user can view only the data in the database.

### 3.5 Capturing Inventory:

The inventory data of the specified item are collected from various departments below District level in a paper format and Data is entered at the District level through the IDRN portal [www.idrn.gov.in](http://www.idrn.gov.in).

### 3.6 Locating Resources:

The database can be queried by using various options available in the portal viz. Country wide query, summary report, department wise report, common query, date based report etc. The most commonly used report to access country wide data is shown below. The user can choose one or multiple Activity, category, item and State, District and the source of the equipment and find the details in a report.

Figure 3: The data entry interface in IDRN

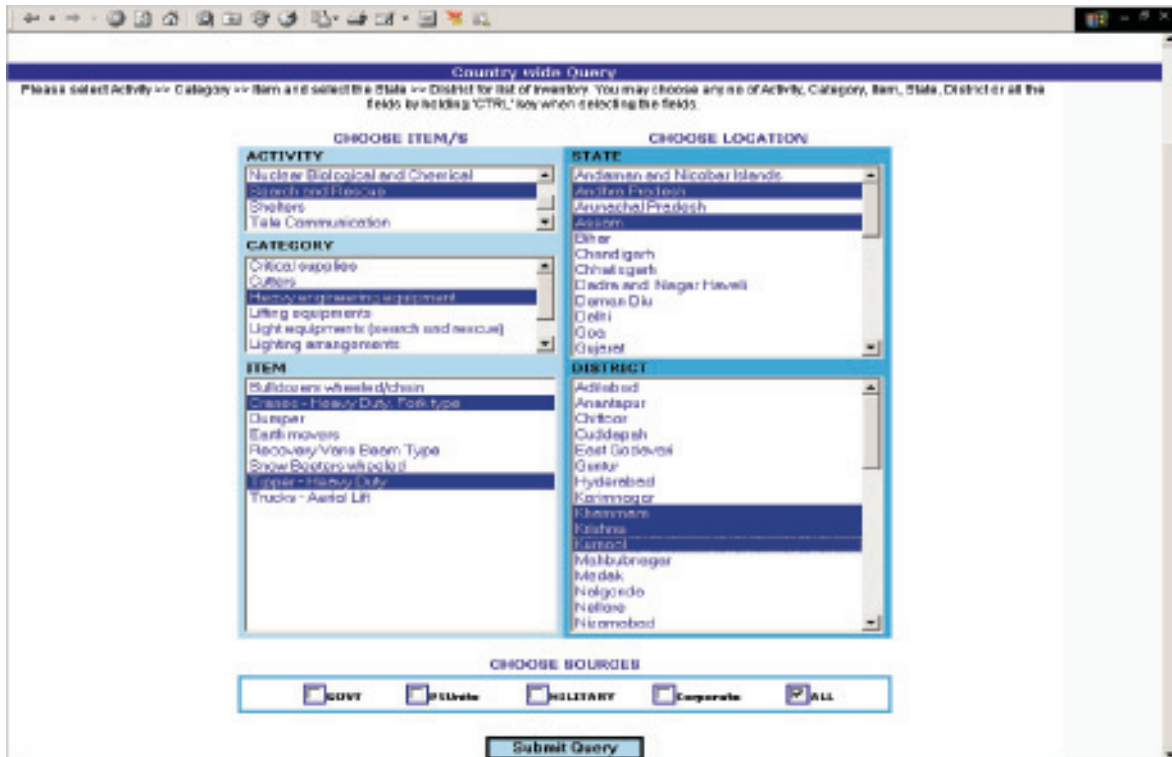


Figure 4: Query Interface in IDRN

The reports generated by the system gives a detail of the equipment, human resource or critical supplies in terms of its availability, contact person details, quantity available, location, operators provided or not, transport options etc.

COUNTRYWIDE DISASTER MANAGEMENT RESOURCE INVENTORY - QUERY RESULT			
ITEM DESCRIPTION	DEPARTMENT & CONTACT ADDR	QUANTITY, LOCATION & SOURCE	DM N
ITEM: Cranes - Heavy Duty, Fork type DESCRIPTION: Cranes - Heavy Duty, Fork type (76 Tons)	DEPT NAME: Bhyarat Heavy Electricals CONTACT ADDR: General Manager TELEPHONE: 04172241141, DIST: Vellore STATE: Tamil Nadu	QUANTITY: 1Nos SOURCE: Govt LOCATION: BHEL Factory DATE OF LPDATE: 9/2/2003 DISTRICT MAP: ... STATE MAP	DM NAME: I CONTACT: C 2222000,04
ITEM: Cranes - Heavy Duty, Fork type DESCRIPTION: Cranes-Heavy duty, Fork Type	DEPT NAME: POLICE CONTACT ADDR: Superintendent of police TELEPHONE: 04146-223555, 04146-228133 DIST: Viluppuram STATE: Tamil Nadu	QUANTITY: 1Nos SOURCE: Govt LOCATION: Armed Reserve, Kakkuppam DATE OF LPDATE: 9/23/2004 DISTRICT MAP: ... STATE MAP	DM NAME: I CONTACT: C 222450,041
ITEM: Cranes - Heavy Duty, Fork type DESCRIPTION: Heavy engineering equipment	DEPT NAME: Transport Department CONTACT ADDR: Muthu Anand TELEPHONE: 04562-252089, DIST: Virudhunagar STATE: Tamil Nadu	QUANTITY: 1Nos SOURCE: Govt LOCATION: At the Department DATE OF LPDATE: 9/1/2003 DISTRICT MAP: ... STATE MAP	DM NAME: I Aslam I.A.S CONTACT: 2
ITEM: Cranes - Heavy Duty, Fork type DESCRIPTION: Cranes - Heavy Duty Fork Type (100 Tons)	DEPT NAME: Bhyarat Heavy Electricals CONTACT ADDR: General Manager TELEPHONE: 04172241141, DIST: Vellore STATE: Tamil Nadu	QUANTITY: 1Nos SOURCE: Govt LOCATION: BHEL Factory DATE OF LPDATE: 9/2/2003 DISTRICT MAP: ... STATE MAP	DM NAME: I CONTACT: C 2222000,04

Figure 5: Detailed Report in IDRN

## 4. GIS in Disaster Management

During any emergency situation, the role of a reliable Decision Support System is very crucial for effective response and recovery. Geographic Information System (GIS) provide most versatile platform for Decision Support by furnishing multilayer geo-referenced information which includes hazard zoning, incident mapping, natural resources and critical infrastructure at risk, available resources for response, real time satellite imagery etc. GIS-based information tools allow disaster managers to quickly assess the impact of the disaster/emergency on geographic platform and plan adequate resource mobilization in most efficient way. Thus, a reliable GIS-based database will ensure the

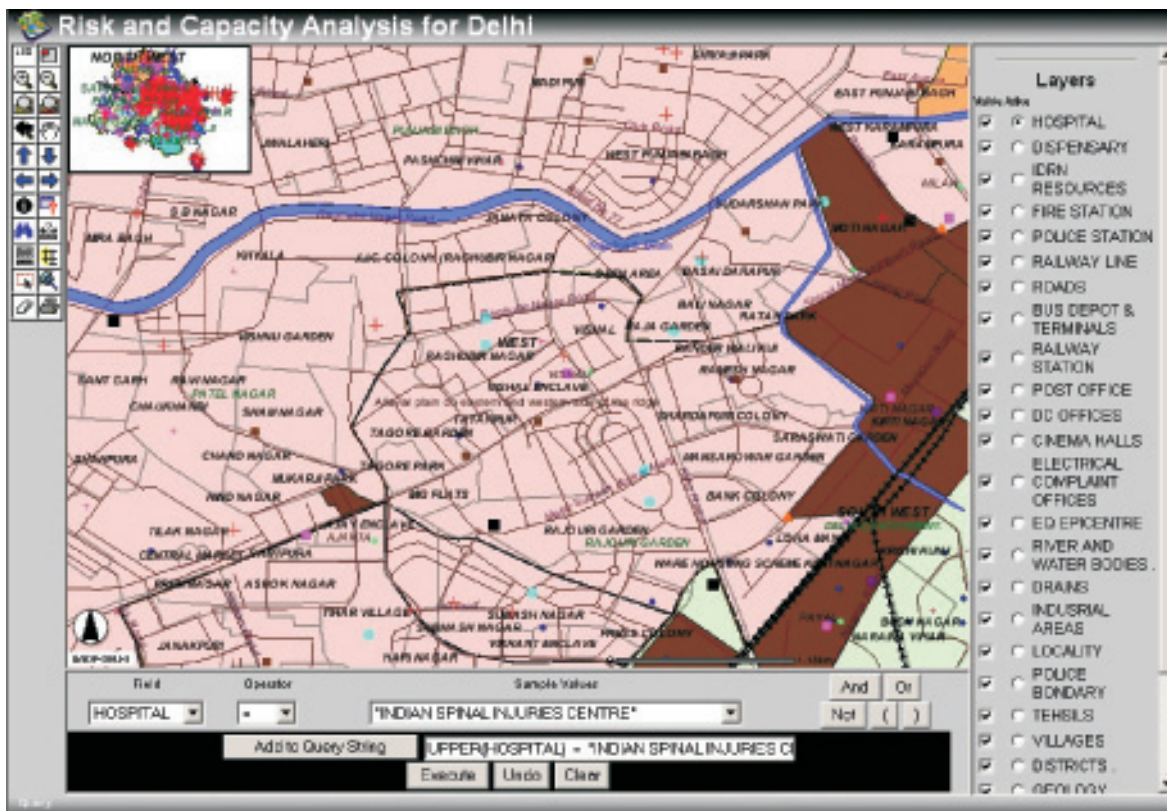


Figure 6: Internet enabled GIS based Decision Support System

Map for Illustration – Not to Scale

mobilization of right resources to right locations within least response time. Such database would also play a fundamental role in planning and implementation of large scale preparedness and mitigation initiatives.

The Ministry of Home Affairs have initiated the development of a GIS-based National Database for Emergency Management (NDEM) in collaboration with various Govt. Ministries/agencies such as Dept. of Space, Dept. of Science & Technology and Ministry of Communications & IT. The Ministry with technical support from UNDP is also in process of developing GIS based tools for emergency management on pilot basis. The resources available, the critical infrastructures etc are mapped for

the national capital as demonstrative system (Figure-6).

## 5. National Emergency Communication Plan

In emergency response and management, it is extremely important to have the communication links *operational* between decision makers at various levels and operational response teams/personnel on the site. Unfortunately at the time of emergency situations such as natural or man-made disasters, the first casualty is the regular telecommunications infrastructure of public wired and wireless (GSM/CDMA) telephones. Considering the crucial role of MHA during such emergencies, it is essential to set-up reliable information and communication network employing both terrestrial and satellite-based communication technologies with redundancies to establish a network for emergency communications

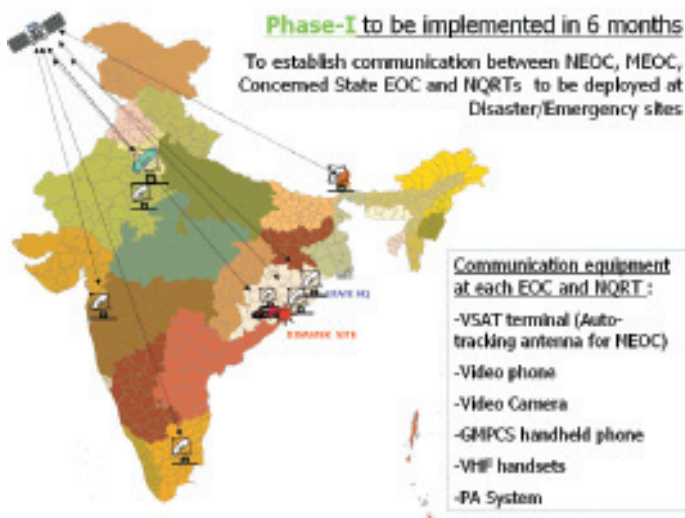


Figure 7: Phase I – National Emergency Communication Plan

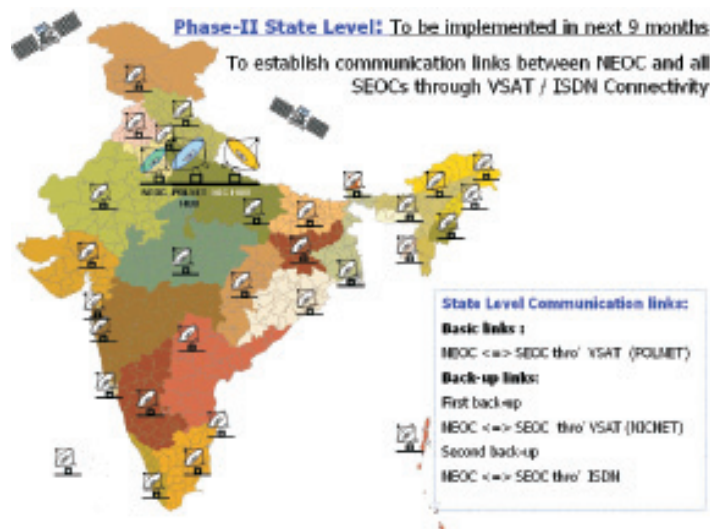
The Ministry of Home Affairs is planning to execute the communication plan in two phases.

### Phase – I

In the first phase, the VSAT network in the first phase will use resources only from POLNET and will provide required communication links between National Emergency Operations Centre (NEOC), remote Disaster sites and respective State Emergency Operations Centre (SEOC).

### Phase – II

The second phase envisages integrated network of all EOCs at national, State and District levels as well as transportable terminals deployed at emergency/disaster sites, using satellite and terrestrial communication networks.



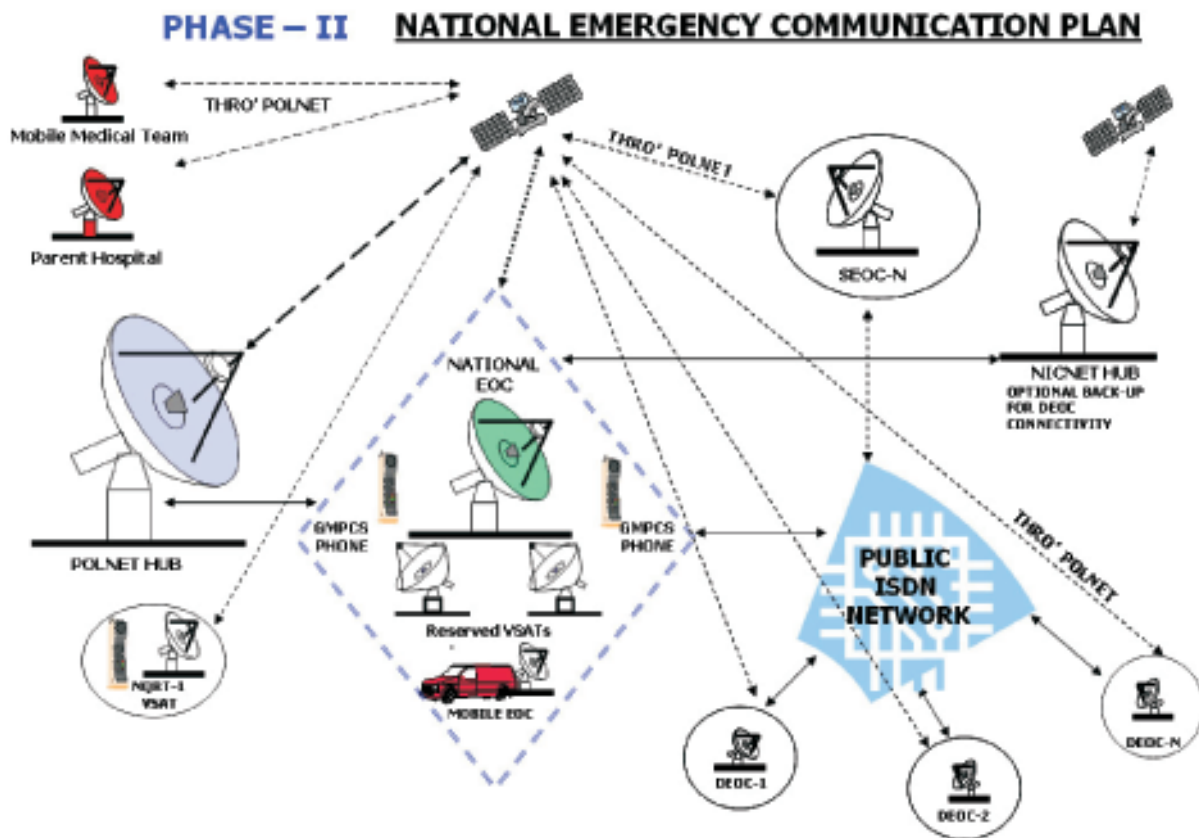


Figure 8 : Phase II - National Emergency Communication Plan

## 6. Conclusion:

Information and Communication Technologies in form of Internet, GIS, Remote Sensing, Satellite communication etc. are indispensable in planning and successful implementation of most Disaster Risk Reduction initiatives. However, the potential of most advanced technologies is required to be harnessed in early warning, preparedness and response systems along with adequate emphasis on building human capacities to use these tools and technologies.



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