

USING GLOBAL COMMUNICATIONS TECHNOLOGY TO FACILITATE INTERNATIONAL COOPERATION

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SUMMARY

Global communications technology is changing many aspects of society. GEMINI was established as a G7 Information Society project to develop a global emergency management information network to reduce human suffering and destruction of infrastructure. The project comprises 21 sub-projects from four sectors of the UN and five nations. The sub-projects have been grouped into four categories: networks, communications, support functions, and specific hazards. Work has begun on accomplishing initial project objectives. Although a full spectrum of communication technologies are involved, the primary platform for the global information network will be the Internet. This will support the transfer of virtually all types emergency information among virtually all providers and users in near real time, with high reliability, and at relatively low cost. A three-dimensional structure has been proposed to organize emergency information by jurisdiction, function, and hazard. The matrix can be subdivided to denote different hierarchical levels.

INTRODUCTION

The G7 Information Society was conceived at the Naples Economic Summit in 1994 to *"encourage and promote innovation and the spread of new technologies including... development of an open, competitive and integrated worldwide information infrastructure."* The G7 Industry Ministers meeting in Brussels in February 1995, established 11 themes and pilot projects to demonstrate tangible and understandable social, economic, and cultural benefits. The Information society was approved by the G7 Heads of State at the June, 1995 Halifax Summit.

This paper will focus on Theme 7 - a Global Emergency Management Information Network Initiative (GEMINI). It will provide an overview of the project, outline the participants and sub-projects, and summarize project management. It will conclude with a brief discussion of how global communications technology and infrastructure - particularly the Internet and World-Wide Web might be used to serve the information needs of emergency management.

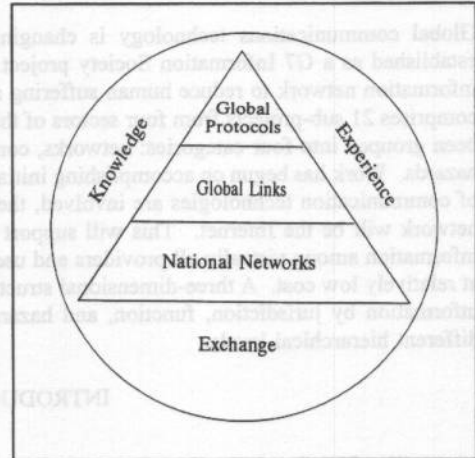
THE GEMINI PROJECT

Goals

The mission of GEMINI is to develop a global emergency management information network that provides electronic access to all emergency management knowledge and experience to anyone, anytime, anywhere. This leads to four project goals (Fig. 1).

The first goal - fostering national networks and systems to exchange all types of emergency information is the foundation of GEMINI. National networks are the source of the shared information and content. Participating agencies provide the resources that will be needed to accomplish GEMINI's goals. Developing a global network will require implementation of a sufficient number of national systems to achieve a critical mass of interconnectivity.

Figure 1 GEMINI goals



The second goal focuses on developing an all-hazard global network of national systems. This objective involves more than simply linking emergency management sites on the World-Wide Web. Value added will stem from organizing emergency management information through a global survey of information needs, creating a generic all-hazard information framework, and developing multi-lingual search capability.

The third goal involves identifying and promoting global standards for information authority, quality, adequacy, and reliability as well as principles for information access, security, and minimizing abuse. This goal includes promoting the concept of an "emergency lane on the information highway" to provide priority Internet access to emergency officials during a disaster response. It also involves encouraging development of radio and satellite links to inexpensively provide Internet capability at any disaster site regardless of remoteness or lack of infrastructure.

The fourth goal relates to exchanging information among the three GEMINI levels and the world. Internal exchanges have already led to synergies, partnerships, and creation of an innovative, learning environment. External communication is two-way - determine the information needs of the emergency management community and demonstrate the benefits of a global emergency information network. Other activities include: participating at international emergency management conferences, publishing papers, and forming partnerships with related international initiatives, such as the UN International Decade for National Disaster Reduction.

Benefits

The success of GEMINI is expected to reduce human deaths, injury, and suffering, mitigate damage to and destruction of homes, businesses, and infrastructure, disruption of lifestyles, work, and community functioning, loss of natural resources and environmental degradation. This will be accomplished through four processes.

- * Information exchanges will stimulate improved emergency management.
- * International communications will foster development of international standards.
- * Improved coordination of international disaster response will aid people everywhere.
- * A global network will provide an interoperable platform to facilitate appropriate and sustainable technology transfer.

Principles

Several principles have been adopted that define our perspective on emergency management and how we intend to conduct business. These are adapted from the G7 Information Society objectives and principles for the emergency management domain. GEMINI will:

- * Recognize that emergencies are local but that support can be global.
- * Incorporate perspectives of both developed and developing nations.
- * Build upon and add value to existing emergency management information activities.
- * Evaluate and adapt new technologies to support emergency information exchanges.
- * Promote international standards that support emergency information exchanges.
- * Encourage participation by all emergency organizations around the world.
- * Adapt emergency management information to diverse stakeholders and cultures.

Organization

GEMINI has a simple organizational structure comprising five components.

- * Steering Committee (G7 country contacts) implements the action plan, coordinates activities, and interacts with outside interests and G7 National Coordinators.
- * Management Committee (all sub-project leaders) establishes project goals and objectives, tasks, priorities, and an action plan.
- * Sub-projects (organizational representatives) have the authority and resources to develop and implement national emergency information networks.
- * Task groups (selected sub-project leaders) address project objectives: stakeholder interaction, information organization, and architecture and technology.
- * Committees (selected sub-project leaders) address project functions: coordination, promotion, private sector involvement, and project technology.

Activities

A number of short-term milestones have been established. The present focus is on promoting the benefits of GEMINI, increasing global participation, and initial accomplishments for task groups and committees. This is being accomplished primarily through participation at international emergency management conferences and project meetings. Sub-projects have individual work plans and milestones. GEMINI has not yet developed a long-term strategic plan - a key objective of the Rome project meeting.

PARTICIPATION

Participants

Many governments, agencies, organizations, universities, companies, and individuals around the world are developing and implementing a broad range of emergency management information systems and networks. GEMINI participants are drawn from this dispersed activity. Some of the benefits of participating in GEMINI, include:

- * Supporting a universally recognized humanitarian mission

- * Providing enabling technology to developing nations
- * Enhancing the global visibility of organizational programs
- * Having a voice in developing international standards
- * Developing international agreements and partnerships
- * Creating synergy from different experiences and perspectives
- * Exchanging information with other organizations
- * Augmenting potential funding opportunities.

All emergency management organizations are facing increasingly stiff competition for limited funds, resources, and time, while workloads continue unabated or are also increasing. Therefore, it is important that participation in GEMINI imposes minimal burdens. While recognizing this imperative, a few requirements are needed for meaningful participation and to facilitate project management. Participants in GEMINI are expected to:

- * Have an e-mail address
- * Fund the cost of their participation
- * Accomplish what they promise to do
- * Interface between their systems and global standards
- * Share their information, knowledge, and experience

Essentially, the extent of participation is up to each organization. As of March, 1996, there are 19 formal participants in GEMINI, not including partnerships. Although GEMINI is still in its formative stages, we have already linked different sectors and nations in a common purpose. The sector breakdown is: international (2), government (6), private (8), and universities (3). These participants represent the United Nations and five countries: Canada, Norway, Switzerland, the United Kingdom, and the United States.

Sub-Projects

We have established a number of criteria for evaluating the suitability of proposed GEMINI sub-projects. Proposed sub-projects are evaluated and approved by the Steering Committee.

- * Relevance to some aspect of emergency management.

- * Compatibility with G7 Information Society principles and objectives.
- * Fully or partially funded.
- * Probability of successful completion.
- * Value of contribution to emergency management.
- * National or larger in scale (or capable of expansion).
- * Endorsement and support of an organization.
- * Public accessibility and openness of architecture.

There are currently 21 sub-projects, employing a wide range of information technology, knowledge, and experience. They are grouped into four categories: networks, communication, support functions, and specific hazards.

1. Networks (6 sub-projects)

The network group of sub-projects focuses on linking information providers. In essence, these sub-projects do, at a national or regional level, what GEMINI hopes to do on a global scale. Sub-projects include: international disaster information network (IDNDR), global emergency management system (FEMA), Canadian emergency management network (EPC), modular emergency management system (Quasar), regional disaster preparedness network in Latin American (PAHO), and environmental network interface (CIESIN).

2. Communication (5 sub-projects)

The communications group emphasizes communications technology and infrastructure that supports national and global information exchanges, networking, disaster response, and emergency management. Sub-projects include: emergency response management center (Spar), government emergency telecommunication service (NCS), low-cost telecommunication architectures (Response Net), emergency response link (NCS), and thin route radio for emergency management (ETH).

3. Support Functions (7 sub-projects)

This group of sub-projects provides information content to support emergency management. They are not directly related to a specific hazard but generally cut across many or all types of disasters. Sub-projects include: global emergency observation warning network (NASA),

global system to analyze and disseminate satellite data (IBM), global insurance network (ETT), disaster relief supply management (PAHO), multiple interfaces for emergency management information (Shebute), disaster/emergency management training (U Wisconsin), and global disaster counselling support network (U Plymouth).

4. Specific Hazards (3 sub-projects)

These sub-projects provide the technical emergency management content. The information is generally derived from fairly sophisticated and complex scientific process-based models that monitor and forecast the probability of occurrence and evolution of a specific hazard. Projects include: global wildland fire network (CFS), chemical and biological information network (FEMA), and global emergency interactive medical care delivery (Symed).

EMERGENCY INFORMATION AND THE WORLD-WIDE WEB

To consider how the World-Wide-Web might serve the information needs of emergency management, we will examine some attributes of the Internet, the nature of emergency information, and how a global emergency information network might be structured.

The Internet and World-Wide Web

The Internet has been operational for nearly 3 decades. During that time, it has evolved considerably from its original purpose - a network for exchanging scientific information among main-frame military computers. Development of Gopher and File Transfer Protocol (FTP) greatly facilitated fast and efficient transfer of large files. Development of an e-mail protocol (SMTP) has led to the Internet becoming the largest electronic network in the world. Listservers to support news and discussion groups have become a popular way for people around the world to exchange information. As the Internet grew, development of search capability such as Archie and Finger facilitated finding information, sites, and people.

Using the Internet requires a PC that is connected to a server that is, in turn, connected to the Internet. This increases the cost and complexity relative to using a telephone or radio. The need for connectivity to the Internet could limit its use in emergency management,

particularly at remote sites, when the communications infrastructure has been damaged, or in developing nations. However, the capability for unlimited communication anywhere in the world within minutes, regardless of time zones, travel schedules, or communication loads is a powerful attraction of the Internet.

It is the World-Wide Web's ability to process graphics and hypertext connections that has transformed the Internet into an increasingly popular communications media. Web browsers, such as NETSCAPE are expected to do for the Internet what word processing and spread-sheets did for the PC - make it easy to use and, eventually, indispensable. Part of their power lies in combining all the Internet tools into one package that is transparent to the user. The ability to incorporate and disseminate text, data, and graphics within documents has transformed desktop publishing into a global enterprise. Although the Web has multimedia capability, it will be some time before audio and video can compete with current communication technologies.

The ability to automatically link to any site anywhere and download information with the click of a button permits networking on heretofore unprecedented scales. One can create a vertical network from the World Health Organization in Geneva to a disaster relief site in Rowanda. Or one can horizontally link all jurisdictions and sites within a domain, such as a global tropical storm network. Finally, one can create a meta network comprising all hierarchical levels and domains. GEMINI will focus on utilizing the latter capability.

Emergency information

Emergency information has certain attributes that determine the design requirements of a global network. Warnings must be available virtually in real time. Monitoring systems must scan large regions efficiently yet drill down to provide detailed information for a specific disaster. This necessitates automation to quickly process large amounts of data. Emergency information must be accurate, reliable, and available when it is needed. Some disasters will damage essential communication facilities, necessitating a robust and redundant infrastructure. Because emergency managers have limited opportunities train,

infrequently operated information systems must be easy to use and interpret. Finally, the cost of accessing information must fit within limited information budgets.

Table 1 lists the types of emergency information that might be exchanged via the World-Wide Web. Although virtually all emergency information could be shared through this platform, GEMINI will address the appropriate role of the web relative to other media for disseminating emergency information.

Table 1. Emergency information that might be exchanged via the World-Wide Web.

Pre Event

- Laws and regulations
- Policies and strategic plans
- Risk management methods
- Organizational structure
- Resource directories
- Preparedness plans
- Operational procedures
- Education and training
- Monitoring data

Event, Post Event

- Warnings and alerts
- Response calls
- Reference data
- Incident management
- Press releases
- Situation reports
- Mitigation technologies
- Restoration activities

Table 2. lists the potential audiences and suppliers of the information that would be available through a Global network. As the Information Society develops and expands, we expect that virtually no segment of society will remain unaffected. Yet, we must recognize that each audience has particular needs and that messages and information must be tailored accordingly. Similarly, each supplier has particular interests and capabilities which will determine the nature of the available information. All of this is complicated by differing cultures, technologies, languages, functions, and hazards.

Table 2. List of potential audiences and providers of emergency information.

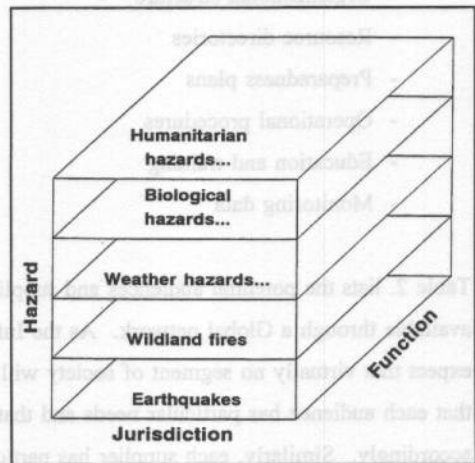
- Politicians	Governments
- Executives	Agencies
- Administrators	International organizations
- Emergency officials	Emergency organizations
- Scientists	Universities
- Educators	Schools
- Reporters	Media
- General public	Interest groups

Emergency information structure

Figure 2 illustrates a prototype three-dimensional emergency information structure. The axes are: 1) jurisdiction (nation, province, community, etc.), 2) function (preparedness, response, mitigation, etc.), and 3) specific hazard (forest fires, earthquakes, oil spills, disease outbreak, etc.).

The three-dimensional structure allows a search by jurisdiction, function, or hazard. This resolves the problem that any 1-dimensional list may not be organized according to the needs of the user. In this scheme, each hazard would be a plane within the matrix, such as a global forest fire network. Similarly, a national all-hazard network would be a vertical slice through the matrix along the plane of a specific country. A global response network would represent a vertical slice at right angles to jurisdiction, along the plane of the response function. Similar planes could be drawn for any jurisdiction, hazard, or function.

Figure 2. A prototype 3-dimensional structure for emergency information.



Continuing the subdivisions, there are also three generic lines at the intersection of pairs of planes. A national earthquake network would be represented by a horizontal line (front to back) at the intersection of the global earthquake plane and the national all-hazard plane. A national response network would be represented by a vertical line at the intersection of the global response plane and the national all-hazard network. Finally, a national nuclear accident monitoring network would be represented by a horizontal line (side to side) at the intersection of the nuclear accident and global monitoring planes. Similar lines could be drawn at the intersection of any two planes in the matrix.

The lines represent the smallest-scale sub-project that is appropriate to GEMINI. Responsibility for developing information systems for individual cells will rest with national, hazard-specific, and functional emergency management organizations.

Communication binds the network. It connects tens of thousands of individual information users and providers into a global network by providing conduits for information flow. An analogy could be made with the nervous system of a higher organism in that both enable thousands of individual cells to function as a collective whole. In a system, interconnectivity among huge numbers of individual elements is a precursor to higher-order structure and purpose. For GEMINI, that purpose will be improved emergency management on a global scale through international cooperation and information exchanges.

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