NATURAL DISASTER VULNERABILITY MAP ON INTERNET - GEOINFORMATICS IN NATURAL DISASTER MANAGEMENT

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ABSTRACT

This paper introduces our informatilized project named: Information System for disaster prevention over Internet – FloodMap on Internet. This is a GIS-simulation information system for reporting disaster prevention projects of regions to centre. All projects are presented visualy on maps.

Floodmap on Internet is an information system containing hardware and software and being deployed under the arm of Ministry of Health of Vietnam to informatilize systematically operating process in preventing all kind of disaster and natural calamity from the highest level of centralization (Ministry of Health) to the most basic level of districts and villages and it is also designed with a mapping model.

By applying the strong force in informatilization using the latest technology such as: web technology, wireless technology, GIS simulation… together with material facilities are a computer system connecting the Ministry's network to the districts' stations via Internet, allows regions to receive immediately commands, report their disaster preventing projects, the current situations and even the summary of the task... This helpful operating system is necessary and essential for the protecting and preventing processes concluding: security and saving methods, assisting programs ... in a thorough, systematical and sufficient ways.

1. INTRODUCTION

Information system for preventing natural disaster and calamity via Internet – Floodmap on Internet.

Disaster vulnerability map on Internet of Vietnam (Geoinformatics and natural disaster)
Implemented by:

ID	*Name*	*Position*	*Task*
1	***Professional Advisory Council of Disaster Prevention – Ministry of Health***	*Prof, Dr, Le The Trung, chairman*	*Professional knowledge*
2	***PeaceSoft Solutions Corp.***	*Nguyen Hoa Binh, project manager*	*Technical team*

2. PROPERTY OF PRODUCTION

Floodmap on Internet is an information system containing hardware and software and being deployed under the arm of Ministry of Health of Vietnam to informatilize systematically operating process in preventing all kind of disaster and natural calamity from the highest level of centralization (Ministry of Health) to the most basic level of districts and villages and it is also designed with a mapping model.

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3. INTERPRETING:

3.1 Significant meaning of science and technology

3.1.1 *What is disaster?*

Disaster is an objective event caused by nature or subjective activities of men and create danger, damage to material facilities and life and lead to a long and great consequence. Man has seen many catastrophes and these are still occurring anywhere else on the earth.

Many natural calamities such as: earth quakes, volcanoes, storms, whirlwinds, floods, ice rains... and some other disasters made by men like diseases, explosion and burn, accident... and the hearted current terrorism.

3.1.2 *Practical significance:*

"Disaster never give notice, men must prepare for dealing with it" - this is the warning of WHO (World Health Organization) delivering to everyone. Disaster happens unpredictably so that we should have preventing and solving methods in any case and gather the power of all departments and communities. So that applying IT and other new technologies' achievement for preventing catastrophes is very necessary and essential.

FloodMap on Internet is the information system deploying to satisfy all the above targets for Department of Health and other fields as well. It is a concentrated database system modelized with maps and arranged according to the controlling model of the government: from Ministry to Department and Districts' Offices. All plans, reports, announcements and commands... are remotely controlled and updated to central server. Whenever disaster comes, this database system will reveal its usefulness with rescuing and relieving programs... and migrating plan away from disaster.

The system's practical significance is known as these below 2 advantages:

- Each region has to take initiative to plan a disaster-preventing project and rehearse it. Whenever disaster comes, it will be less difficult and sudden to cope with by itself.

- Before now, rescue teams enforcing for regions in disaster cannot know exactly the happening, the characteristic of the region... so their support is helpful only when everything passed. But now, Floodmap is for sure the best solution by giving out concrete and clear plans (when to evacuate, how to prepare and predict where disaster will occur the most violent…).

3.1.3. *Hanoi Capital of another model:*

On October 2001, the first customers of FloodMap is Hanoi Department of Health and Hanoi Military Center under the guide of Dr.Le Anh Tuan, the moderator of Medicine Department and the guiding monitor of the project. However, the project agreed by guiding team to research largely for only Hanoi because of its special properties.

Hanoi, the capital of Vietnam, has its own disaster preventing model: it never suffers flood and deflect freshets but submergence in and out of Hanoi so that flood, as well as other catastrophes, is not the prerequisite problem. However, Hanoi has an enormous number of concerned issues such as: being nerve-center location of the Government, international organizations, cultural and socio-economic centers, crowed areas... being likely to prepare a scheme for subjective disaster caused by human like explosion and fire, unexpected accidents and especially terrorism...These are far more urgent issues leading to bad consequences in many aspects because of no preparation and solutions. So that, applying IT in preventing disaster and operating through Internet for Hanoi is getting more imperative, especially Sea Games 2003 event is getting closer.

Each level of Hanoi's annually sends its concrete report in case of capability of happening disaster in its area, together with concise solutions and agreement of People's committee (administration), Medicine Organization (rescuing), Military (guarantying safety), Policeman (keeping peace and order), Red Cross (saving from danger), Irrigation Department and other responsible organizations. All circumstances must be defined trends and line out on the maps: wherever it may appear disaster, solutions, evacuated places, the locations of responsible organization... with available photographs and films to keep as archives in the database system with targets to take initiative in coping with catastrophes. All are controlled by the system via Internet.

3.2 Technical solutions and structure of system

3.2.1 *Structure of the system*

The system is divided to 2 main parts: disaster news and data.

Disaster news can be logged into as electric news by anyone and updated usually by regions suffering from disaster and natural calamities.

Database system is designed like an family tree or directory structure… so that user and data of a village, district or province as time goes by is an object, lower-level objects are the

children of higher-level object, users will have right to play separately actions (adding, editing…) with their own data. Others have only capability to consulting.

Figure 1. Structure of system is easily visible. Choosing province will appear district's map and pointing district will reveal village's map.

By having been object-oriented modelized. The system has expandable properties, be easy to control and easy to update because objects' structure is designed like arranged level of regions' administrative management. Besides, all kind of objects (province objects, district objects, village objects...) are designed to save data year by year separately.

The highest object in the database is province, but Ministry of Health can view and update any province and other lower objects' data at any time immediately.

Further more, security is also considered as one of the most important issues. By using object-oriented model, the moderator of a object, with his right, can update and edit its data and lower-level objects' data, excepting equal objects and their lower. It means: updating and editing right is also constructed as ranked-level model like the administrative structure of regions.

The data system combines tightly its 2 main parts: disaster preventing regions' map and written data concluding words, photographs and films.

Region's data contains 7 sections:

- Region's general features.
- Disaster preventing report and summary.
- Current state in disaster
- Region's official correspondence and documents concerning with disaster preventing issues.
- Region's statistics data.
- Necessaries kept in disaster preventing process.
- Responsible person list.

Natural calamity mapping data consists of some main contents such as: urgent cases, solutions and migrating ways. In case of disaster, rescuing team with safety means (boats, plane…) can rely on the map to appreciate circumstance and look overall the area to give out the best solution in the shortest period of time. In these difficult conditions, wireless Internet technology's helpfulness is contributing an important role: by using portable computer and Mobile phone, region's moderators and rescuing and relieving teams can report on time and receive commands from the Ministry or Government's leaders and also notice wherever the system working sufficiently or not. These are really the significant and essential properties of the system.

3.2.2 *Technical solutions*

For big cities like Hanoi or Ho Chi Minh city, one more kind of object is defined on the map: the hearted-place of a region. This type of object if directly defined on region's map base on its co-ordinate. This region's moderator should do this work.

After the place occurring disaster is pointed out on the map (for instance, HITC building at Cau Giay district), the moderators can propose several solutions to deal with: outline of the building, fire preventing plans (situation of fire extinguishers), terrorist preventing plans (outline of in and out ways of the building)… The geography information system (GIS) simulated base on Web technology using bitmap photographs are being developing and applied.

Whenever disaster appears, moderators will change its state on Web. Immediately, a SMS will be sent via mobiles to responsible ones for disaster's happenings through Online Notification System.

When gathering rescue teams (fire team, corps man, policeman…), they can have a glance at the plans, outlines, maps to handle circumstance using portable items such as: Notebook, Mobile Web Form… to look for data and maps and give right decisions.

3.2.3 *Applied technologies:*

FloodMap Online is used with the most efficient and newest technologies, making great profits to moderators and users' community.

1. Microsoft with Web Server: Internet Information Server (IIS) 5.0
2. Web programming technologies: ASP, ASP.NET, and JavaScript…
3. Programming languages: VB, Java…
4. Database system: SQL Server 2000.
5. Wireless technology allowing receiving and sending information by Mobile: Microsoft Mobile Web Form.
6. Notification technology: SMS notification, allows FloodMap send a SMS to any mobile devices of any responsible person in case of disaster.
7. Programming tools: Microsoft Visual InterDev 6.0, Microsoft Visual Studio. Net
8. Handmade items: geography information system simulating technology with Bitmap images on the Web.

4. APPLICATION OF PRODUCTION IN REAL LIFE

FloodMap is now being avaiable at:

1. http://www.floodmap.org (for serving users) and Ministry of Public Health's private network.

2. Having been tested at 8 districts: Kim Bang, Thanh Liem, Nho Quan, Gia Vien, Tien Hai, Thai Thuy, Hai Hau, Giao Thuy of 4 provinces: Ha Nam, Ninh Binh, Thai Binh, Nam Dinh with helping of about 100 districts and just under 1000 investigators.

3. Establishing the guiding team to deploy system under the arms of Department of Health and Hanoi Ministry of Military leading by Dr. Le Anh Tuan. Managing representative from Ministry of Public Health is Phd. Le The Trung, president of Professional Advisory Council of Disaster Prevention.

4. Establishing plan to expand private system for Hanoi to protect Sea Games 2003 's safety.

After 1 year researching technology and developing software with non-profit for a long future target, authors and partners have been developing the first achievement in "Disaster prevents system online" from Central to Region. The system has not only ability to expand but also developing potentials in future with its practical usefulness.