RESEARCH ON THE PLATFORM FOR EARTHQUAKE RISK COMMUNICATION

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Abstract

China is one of the countries with high strong earthquakes, which have a profound effect on China. Wenchuan earthquake caused more than 87 thousand deaths and a direct economic loss of 845.1 billion RMB in May 2008. Earthquake risk communication (ERC) is the effective way to achieve the strategic objective of earthquake risk reduction, but a sound platform for ERC has not been established in China. The advantages and disadvantages of the existed communication platforms and means have been summarized and the framework of new internet-based ERC platform has been proposed in this paper.

Keywords: *Earthquake risk communication (ERC); Platform; Risk perception*

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1 INTRODUCTION

China, located on the pacific seismic belt and Asia-Europe seismic belt，is one of the countries with high-frequent strong earthquakes. According to the statistics from earthquake department of China, 59 million people, killed by earthquake in the 20th century, are about half of the deaths in the world during the same period [1]. Earthquake risk communication (ERC) is defined as "an interactive process of exchange of messages and views about earthquake risk reduction among stakeholders" [2]. A sound ERC platform which can make earthquake risk messages quickly and accurately transferred among the stakeholders is absolutely necessary for ERC. Only through mutual communication and information sharing can earthquake stakeholders cooperate well with each other and exert maximum power to

minimize the earthquake risk.

With the development of information and communication technology, ERC platform has also experienced many different forms. Currently, the ERC platforms, used by people, are mainly based on radio and television, mobile and fixed phone, short message service (SMS) and internet. Radio and television, which are mainly used to release earthquake risk message by government for their characteristics of extensive coverage, mature technology and weak interaction, still play an important role in ERC [3]. Fixed and mobile telephone, with the advantages of real-time and interaction, is not reliable because the infrastructure of fixed or mobile phone is vulnerable to earthquake disaster. SMS, with characteristics of easy to use, low cost, concise content, quick message transfer, "one to many" message sending and especially able to smooth during the communication congestion, is more and more applied in ERC activities [4]. Compared with the past forms of message transfer, the internet, with characteristics of easy to browse, wide coverage, interaction, affluent forms in displaying message and making every internet user potential message provider [5], plays an extremely important role in ERC.

Internet, due to its unique advantages and more than 300 million netizens of China [6], becomes the ideal choice to establish the ERC platform. In China, it's definitely necessary to integrate a large number of dispersed resources and knowledge about earthquake, provide all stakeholders with all aspects of information and knowledge about earthquake risk reduction, facilitate all stakeholders to communicate with each other, learn from each other, cooperate with each other, and promote the quality of all stakeholders comprehensively, by using the internet. The first website for earthquake risk message sharing, which was built by a student called Hannu Aronsson from Finland in 1995 [7], provided only one-way transfer of disaster images and reports of Kobe earthquake, but not a platform for two-way communication. Later, with the development of the internet technology, many websites for earthquake risk message sharing have been established by international government organizations, non-governmental organizations and research institutions (see Table 1).

Table 1. Websites for earthquake risk message sharing

Name	Scope	Main User	Website
Disaster Management Information System (DMIS)	international	non-governmental organizations	http://www.sristi.org/dmis/ [9]
Global Disaster Information Network(GDIN) [8]	international	non-governmental organizations senior	http://www.state.gov/www/issues/relief/gdin.html [10]
The Natural Hazards Research and Applications Information Center	international	researchers, individual and organizations	http://www.colorado.edu/hazards [11]
Global Hazards Information Network (GHIN)	international	researchers and individual	http://www.pdc.org/mde/explorer.jsp [12]
The Caribbean Disaster Information Network	regional	researchers and individual	http://www.preventionweb.net/english/ [13]
Asian Disaster Reduction Center	regional	organizations and individual	http://www.adrc.asia/ [14]
Australia Disaster Information Network(AusDIN)	national	governmental organizations	http://www.ema.gov.au/ [15]

NASA Earth Observatory	national	researchers and individual	http://earthobservatory.nasa.gov/ [16]

By summing up these websites the following problems can be found:

- The authenticity and safety of the resources and messages supplied by the earthquake stakeholders can't be guaranteed without classifying earthquake stakeholders clearly and identity check.
- The communication efficiency is not high because many stakeholders can't find out the resources and messages that they really want timely without good classification of the resources and messages provided by these websites.
- The means of communication is single because many advanced internet communications technologies have not been used sufficiently.

So the clear classification of earthquake stakeholders for easy management, the clear classification of risk messages and resources supplied by stakeholders for higher communication efficiency and the adoption of many advanced internet communications technologies for security of risk message and stability of communication have been tried in this paper.

2 RESEARCH ON THE FRAMEWORK OF INTERNET-BASED ERC PLATFORM

Internet-based ERC platform, with the support of modern internet technology, combined with earthquake risk management system of China, is a technology platform used for earthquake risk message exchange and sharing among the stakeholders. The proposed overall framework of internet-based ERC is composed of three key elements as Portal, Background management system and Database (see Figure 2.1).

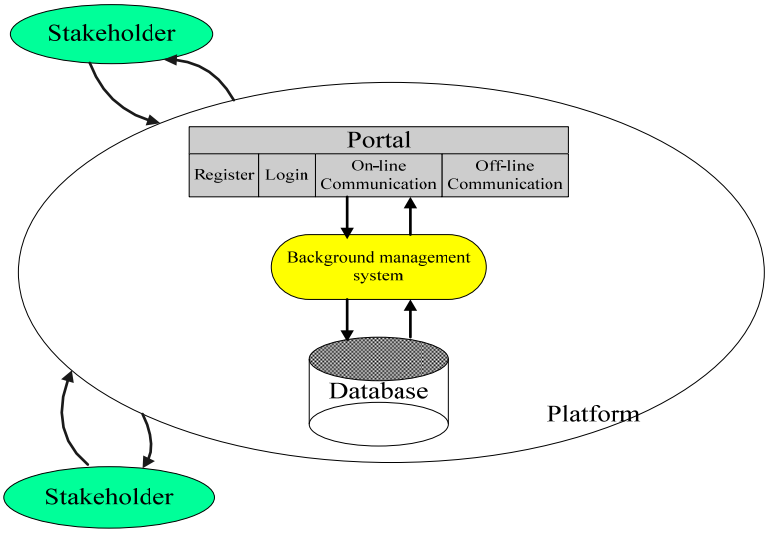

Figure 2.1 The framework of ERC

Portal is the entrance to ERC platform for stakeholders by portal page, including user registration, user login, choice of communication means (on-line communication or off-line communication). Database has two main functions, which are user information storage and earthquake risk messages storage. The three main functions of background management system are user management, including adding new users, classifying users, distributing users' rights, modifying and deleting users' information, user authentication, searching user, etc, message management, including adding new messages, classifying, modifying, deleting and searching messages, etc, and communication means management, including connecting and disconnecting, etc.

2.1 User Management

The users of ERC platform are consisted of all stakeholders. User management includes user classification, user registration, user login, user rights assigned, user information searching, modifying and deleting, etc.

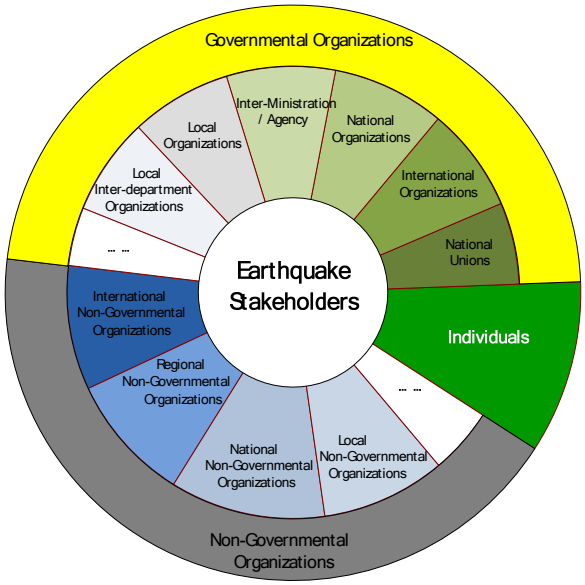

Figure 2.2 The ERC users classification

The users of ERC platform are divided into three categories: governmental organizations, non-governmental organizations and individuals (see Figure 2.2). Governmental organizations are composed of the United Nations, international governmental organizations, national governmental organizations, inter-regional governmental organizations, local governmental organizations. According to different functions, governmental organizations can be divided into earthquake departments, water departments, meteorological departments and transportation departments, etc. Non-governmental organizations are divided into international non- governmental organizations, regional non-governmental organizations, national non-governmental organizations, local non-governmental organizations.

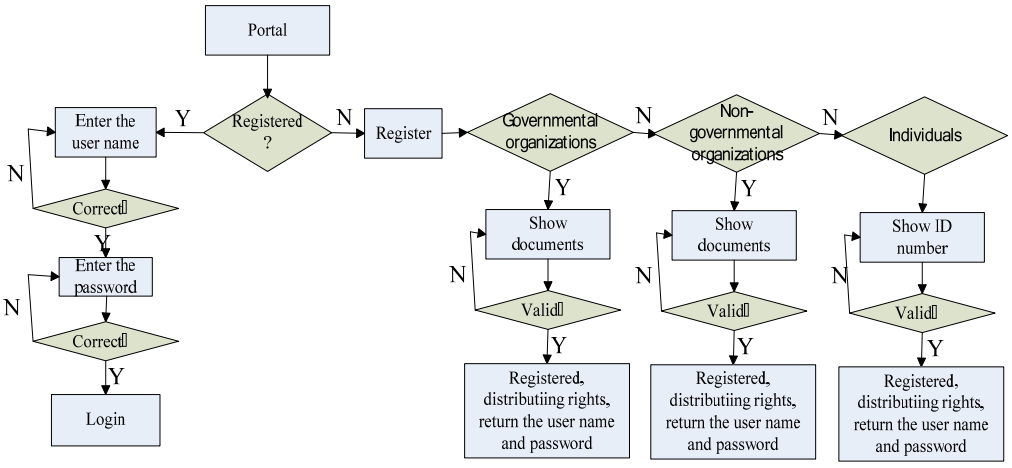

Figure 2.3 User register and login

Register (see Figure 2.3) requires user authentication. Governmental and non-governmental organizations must provide relevant valid documents and individuals must provide valid identification number. Different categories of users are assigned with different rights after user authentication and the user name and password would be returned to the user. User registration information, such as the user name, password, type, rights, location, online duration, credit

accumulation, etc, is stored in the database.

Login (see Figure 2.3) requires the authentication of the user name and password. Only by this way can the user get appropriate permissions to communicate with other users. During the process of communication, the credibility of message can be judged according to the provider's category and credit accumulation. The user information can be modified by themselves under the permission of the administrators.

In order to save time and heighten communication efficiency, the user can search the specific people according to registration information by using keywords and choose whom to communicate with.

2.2 Message Management

Jan M. Gutteling (1996) emphasize on the impact risk message on the cognitive and behavioral reactions of the general public [17]. Message management is divided into on-line message management, including sending, browsing and replying message, etc, and off-line message management, including message classification, message browsing, message searching, message release, message replying, message modification, message deletion, message transformation, etc.

Earthquake risk messages (see Figure. 2.4), which come from earthquake stakeholders, are composed of risk management information, individuals' experience, experts' knowledge, stakeholders' concerns, opinions and reaction, etc.

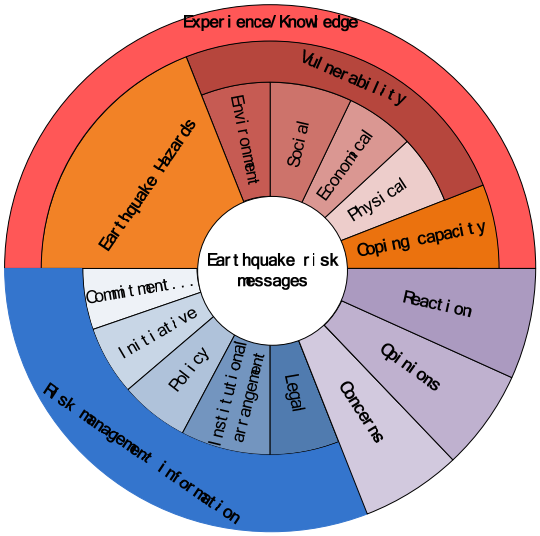

Figure 2.4 Types of ERC Messages

Message can be browsed by way of web page in the form of text, sound, static graphics and animated video. The user can send on-line messages to other on-line users and reply to messages from them after successful login and the messages would be recorded in his personal message database. The off-line messages can be set to open to particular people, modified and deleted by the provider and some special operations can be done if the user has been given higher rights by the administrators. Both on-line messages and off-line messages are stored and managed according to the classification of ERC messages. So by entering the keywords of related message users can find out what kind of message they really want quickly, and by this way, the communication efficiency would be heightened.

Different types of earthquake stakeholders, such as meteorological departments, water departments, earthquake departments from governmental organizations, non-governmental organizations and the public with different levels of earthquake knowledge, have different ability to understand earthquake risk message and different information needs[17].

In order to make sure that they can get the information they want from the ERC platform, an expert group, composed of experts about all aspects of earthquake, whose main task is to answer the users' online or off-line questions, provide information, and achieve quick transmission and effective understanding of earthquake risk message between different stakeholders, should be established to maintain the ERC platform. For example, professional image data of geological structure, supplied by earthquake departments, must be changed into simple text message, which could be understood by the general public, with the help of related geologist. The message transformation is illustrated as shown in following Figure 2.5.

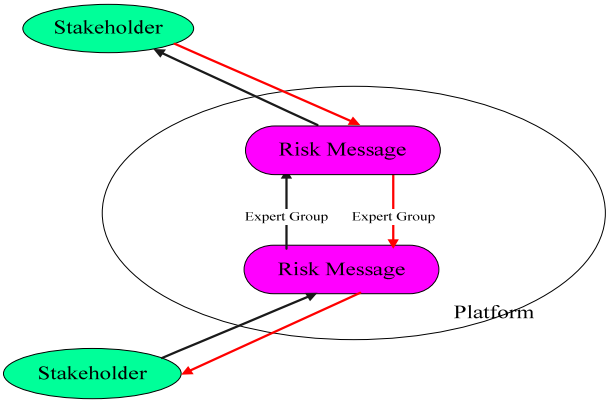

Figure 2.5 Message transformation

2.3 Communication Means Management

A lot of internet-based information and communication technologies have come into being with the development of internet technology. Known from the past practice of the ERC, regarding communication results as the only indicator to measure the ERC platform, it's very necessary for effective ERC platform to integrate a variety of internet-based communication technologies fully. In order to meet different needs of users who are limited by their own communication conditions, many communication means adopted by the platform are classified as on-line communication (see Figure. 2.6) and off-line communication (see Figure. 2.7) according to their characteristics.

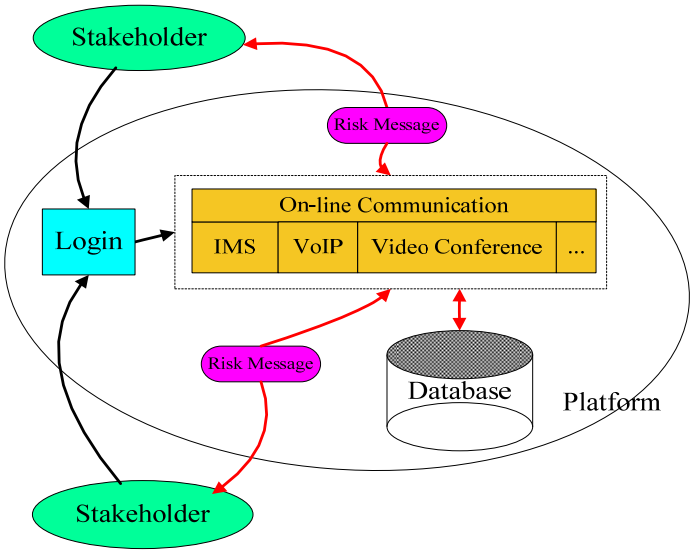

Figure 2.6 On-line communication

The on-line communication means provided by the platform are instant messaging software (IMS) [18] [19], VoIP [20] and video conference [21].

After successful login, the user chooses a kind of on-line communication means and sends a session request to other users whom he wants to communicate with. Only when the session request has been accepted can they be connected and the on-line communication will begin. IMS and VoIP are commonly used for “one to one” communication and the management of them includes session request sending and confirming, communication line connecting and disconnecting. Video conference, with the management of creating and canceling a video conference room, adding and deleting a host, modifying the information of video conference room, releasing a conference room online notice, etc, is commonly used for multi-people communication.

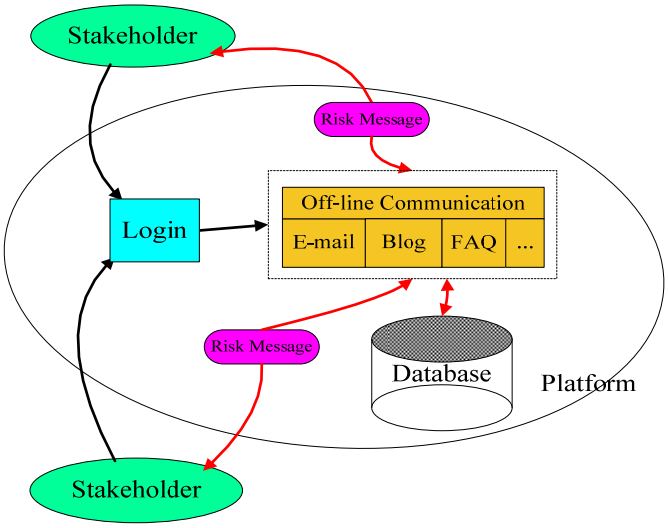

Figure 2.7 Off-line communication

The off-line communication means provided by the platform are e-mail, blog, frequently asked questions (FAQ), etc.

E-mail, with the operations of writing, reading, sending, replying, deleting, etc, is commonly used for “one to one” or “one to many” communication. Blog is suitable for “one to many” communication, and the management of blog includes writing a blog, classifying by subject, searching by using keywords, replying to, modifying and deleting a blog. FAQ is used to collect the user's questions, which would be classified and answered by experts of relevant fields. The operations on FAQ are composed of questions collecting, classifying, searching, replying, modifying and deleting, etc.

Compared with the past platforms, web instant messaging (WIM) technology and software-based video conferencing, which are popular and applied more and more nowadays, have been adopted in this ERC platform. WIM, based on web page, eliminating the trouble of downloading the client, is the most popular online communication means nowadays and the trend of future development of internet communication.

The types of information and communications technology used in process of construction and management of ERC platform are far more than the few listed above. More attention will always be paid to the development of internet information and communications technologies in order to utilize new ones timely in ERC. What’s more important, the users should choose the communicate means, which are suitable for themselves and achieve more effective results, according to their special communication conditions.

3 OPPORTUNITIES AND CHALLENGES

Today, we are evolving in a risk society. Many people are aware of the terrible impact of earthquake disasters throughout the world and realize that this is a problem that we can do something about [9]. More manpower, material and financial resources will be devoted to research on ERC, especially the construction of ERC platform, so as to reduce earthquake risk. This demonstrates a golden opportunity to establish an effective internet-based ERC platform.

In this paper, the users of ERC platform and earthquake risk messages have been tried to classify clearly so as to

make it easy to manage. On-line communication means and off-line communication means, with more interactive, have been provided and many new advanced internet communications technologies, such as WIM, video conference, etc, have been adopted by the ERC platform. Meanwhile, there are several areas where improvements can be made:

- Cultivate a mutual-trustworthy atmosphere among users and encourage them with proactive and positive will to take part in ERC activities and make all users equally partners in ERC. The platform should be just, fair and open to all users, rather than serving for the interests of some stakeholders.
- Provide stakeholders with sufficient, acceptable and timely messages. Enable all stakeholders with different abilities to understand the messages, interpret their relevance and make informed decisions.
- Adopt more advanced internet communications technology to keep stability of the ERC platform and enable the messages be delivered to target audience timely.

ACKNOWLEDGMENT

This paper is supported by the Special Study of the Risk Communication Technologies on Key Technologies for Natural Disaster Risk Prevention of Natural Disaster (2008BAK50B08-03), the Project in the National Science & Technology Pillar Program during the Eleventh Five-Year Plan Period of China.

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Siquan YANG is served as director of satellite remote sensing national disaster reduction center of China, deputy director of key laboratory of disaster reduction and emergency response engineering of ministry of civil affairs, vice chief designer and director of project management office of operational management and disaster reduction application system engineering environment and disaster monitoring and forecasting of small satellite constellation, expert of second expert committee of national disaster reduction committee, expert in the field of 863 earth observation and navigation, member of fourth China association of remote sensing application, photogrammetry and remote sensing professional committee of China surveying and mapping society, and national satellite meteorology and space weather standardization technical committee, engaging in the operation and research in Space Technology and its application in disaster mitigation, having published more than 30 papers in the field of disaster losses assessment and risk assessment by using Space Technology.

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