INSTRUMENTS AND TECHNIQUES USED IN THE IMPLEMENTATION OF NATURAL DISASTER RISK RESPONSE PROJECT

Virgil Popa, Leonardo Badea, Mădălina Barna*

Abstract: Risk management is the process of identification, measurement, and risk assessment, followed by development of risk management strategies (internal/ organizational management). Emergency situation - exceptional event, nonmilitary nature, that by scale and intensity threatens the lives and health of the population, environment, important materials and cultural values and to restore normality are necessary measures and urgent action, the allocation of additional resources and unified management of forces and means involved. Emergency situation management means identifying, recording and evaluating the types of risk and the underlying factors, stakeholder notification, warning people, limitation, removal or counteracting risk factors and negative effects and impact of these exceptional events. In the emergency response and restoration (Short-term recuperation period) the information about the hazard damages, and the restoration strategy becomes highly uncertain (ICP problems). Project management is the application of knowledge, skills, instruments and techniques on their project activities to meet requirements. The project fits into the concept of local management of emergency situations, seeking lines of organization and functioning of the National System of Management of Emergencies, namely: prevention and emergency management, insurance and coordinate human, material, financial and otherwise needed to restore a state of normality. Project aims to rationally exploit the full potential of the relief, economic and social characteristics given by the area of interest to efficiently and effectively managing risk.

Keywords: Risk Management, Natural Disaster, Emergency Situation, Project Management, Earthquake Risk Response, Planned Activities, Key Elements, Risk Register, Work Breakdown Structure, GANTT Chart

Introduction

The risk management

Risk management is the process of identification, measurement, and risk assessment, followed by development of risk management strategies (internal/ organizational management).

The risk management, as defined in, presents the systematic approach to apply the management policies, procedures and practices to the processes related to the risks context, identification, analysis, assessment, quantification, treatment, monitoring and communication so as to allow organizations to minimize the looses and to maximize effectively the opportunities. [1]

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Traditionally, risk management focuses on risks that are rooted in physical or legal causes (for example: natural disasters or fires, accidents, legal actions). Financial risk management, for example, focuses on risks that can be managed by using financial instruments. Whatever type of risk management involved, organizations have (or should have) risk management teams to practice risk management activity.

The objective faced with the risk management is to identify and control significant risks. This implies the existence of several key stages, with feedback in monitoring process.

The purpose of treating risks [2] is the determination of what will be done as a response to risks that were identified. The treatment of risks transforms previous analysis of risk into actions of substance (effective) to reduce risk.

Emergency situations

Emergency situation - *exceptional event, nonmilitary nature, that by scale and intensity threatens the lives and health of the population, environment, important materials and cultural values and to restore normality are necessary measures and urgent action, the allocation of additional resources and unified management of forces and means involved.*

Emergency situations organization - all activities and procedures used by decision makers, institutions and public services able to identify and monitor sources of risk, evaluation of information and situation analysis, development of forecasts, setting action options and their implementation in order to restore the situation normality.

Emergency situation response is provided by an inter-institutional system, called the *National System of Emergency Situations Management,* which is the basis for establishing, organizing and running the following purposes:

- Prevention and emergency situation management;
- Providing and coordinating human, material, financial and other measures necessary to restore a state of normality.

In Europe and especially in Balkan region an earthquake insurance systems and earthquake risk response management there is no such a system despite the fact that there are countries with high seismicity (Greece, Romania, etc).

The complexity of the fact of seismic phenomenon and the lack of communication between state's decision makers, insurance companies and structural engineers has not allowed until today the development of the particular sector. [5]

Romanian territory manifests several classes of earthquakes: shallow (H <5 km), crustal (normal) with upward focal (5 km <H <30 km) and intermediate (70 <H <170 km). Most powerful and affecting larger areas are intermediate ones, located in the Carpathians Bend in the Vrancea area.

The strong earthquakes in Vrancea that occurred in this century and caused considerable human and material losses occurred in 1940 and 1977. In the

epicenter areas were opened deep fissures, faults and jumps of landslides. Reactivation of some faults also occurred at further distance, as happened in the city of Targoviste (probably Viforata fault), or in the Carpathian villages, Varfuri, Glodeni, Buciumeni of the Ialomita - Prahova interfluves. The reactivation process of earthquake faults was evident at the earthquake in August 30, 1986, with lower intensity (about 6 on the Richter scale), when there was a jump of approx. 1.00 m along the fault Lăculețe – Ocnita - Drăgăneasa, which had the effect of bulging the national road between Targoviste and Pucioasa.[4]

The categories of buildings most vulnerable in case of a strong earthquake are: Tall buildings (7-12 levels) with reinforced concrete frame, built before 1940 without earthquake protection; Construction completed between 1950 and 1976 under existing design norms that have been designed with consideration of lower seismic forces; they have performed satisfactorily in 1977 (the last strong earthquake in Romania) but some cases (for example those with flexible floor) have suffered more damage; Low brick buildings and other local materials traditionally built without specialized technical control. The prediction and forecasting of earthquake are most of difficulties and long-term tasks of human beings. A number of signs warning of earthquakes have been proposed, such as foreshock activities, peculiar animal behavior, increased low frequency EM-noise, concentrations of Radon in water and air. [6]

Although the reported earthquake clouds, either ground watched by naked eyes or remote sensing observed by satellite sensors , have diversiform shapes such as upward tornado, strolling snake, spoke-wise rods, long strip and splitting corridor, but no intersected linear clouds has been reported, even as possible impeding precursor of strong earthquake yet.

In the emergency response and restoration (Short-term recuperation period) the information about the hazard damages, and the restoration strategy becomes highly uncertain (ICP problems).

In and immediately after a disaster, the information regarding the damages are uncertain and the principles of decision making for efficient resource allocation are difficult to use.

Natural hazards are low probability – high impact phenomena and the damages vary considerably from one disaster to another and from one region to another. [7]

Project Management for an Earthquake Risk Response

The project fits into the concept of local management of emergency situations, seeking lines of organization and functioning of the National System of Management of Emergencies, namely: prevention and emergency management, insurance and coordinate human, material, financial and otherwise needed to restore a state of normality.

As part of the National System, the so-called local system is organized by the local government, consisting of a network of organizations, bodies and skill in

emergency situations management, set up by level or area of competence, which has the infrastructure and the resources required to perform under specific legislation. [10]

Vision: Getting a credible earthquake response capability in emergency situations at the local level;

Strategy: Browse all necessary steps to be taken by those responsible for ensuring an efficient and effective response in emergency situations at the local level.

Strategic objectives:

- Risk Management taken step by step;
- Achieving territorial risk map related to the city;
- Risk analysis for an earthquake in the city;
- Answer to the identified risks (Earthquake Response Plan);
- Monitoring and control of risks to the earthquake in the city.

Statement of work (mission):

The project team plans to legally base (or based on good practice, where there are no clear rules) all the project activities. Project aims to rationally exploit the full potential of the relief, economic and social characteristics given by the area of interest to efficiently and effectively managing risk. Project team puts first the protection of human, material values and the environment. The project team proposes that the project results become references of good practices at the county level (a model for other local emergency committees in the county).

*Statement of Purpose of Project***:**

- *Justification for the project*: the need to prepare the response actions in case of a major earthquake;
- *Product of the project*: capacity and response capability consistent and comply with existing legislation;
- *Deliverables of the project*: analysis and risk evaluation, response plan (and training), register of risks, knowledge deposit; (See WBS in Appendix 3)
- *The general objectives of the project with specific sub-objectives:*

*a) Technical objectives***:**

- Setting up the project team, drawing and ownership directives;
- Active involvement in the project of local bodies with responsibilities in managing this risk, and of those who, by law, shall provide support functions for specific emergency situations management;

- Collecting the necessary data for risk analysis and design response to the type of specific risk, ensure functioning of information flow-decision, both for normal cases (training) as for real situations (during the emergency situation);
- Attending the risk management processes, with parallel between requirements of risk management and what is found in the ground;

b) Objectives of programming: implementation of the project in a period of one year, including the verification through two exercises in the field of the viability response plan resulted;

c) Objectives of cost:

- Studies on the impact of the type of risk to the community prepared compared to the one of a community that does not have a response plan;
- Funds requirements for preparing the annual city budget for the response to the earthquake (as proposed tactical variants);

d) The objectives of the organization:

- To raise the project's human resources team that has the expertise necessary to ensure fulfillment of objectives;
- Involvement in preparing the response to specific risk type of university staff from the Valahia University of Târgovişte, which is active in providing support functions in the line of emergency situations management;
- Structure of project team to serve as a basis for the team that will get together advance tactical exercises or during emergencies, later to the implementation of the project;

e) quality objectives:

- All products must comply with the law on line of emergency situations management, regulation regarding emergency situations management caused by earthquakes, the general and specific concept of response and action procedures of each factor with responsibilities in specific emergency management (earthquake);
- Since currently there are many "gaps" on the regulation of specific actions (procedures), we propose that all actions in the response plan to be based at least on best practices gathered from other similar structures in the country and abroad, on the line of management of earthquakes;
- Transparency on action - informing the population in the area of interest about the activities and results of the project team;

f) Environmental objectives:

- Sound management of specific emergency situations posing a risk to the objectives which, according to field of activity, after the earthquake may affect the environment; - Secondary problems management (emergency situations also) caused by an earthquake (epidemics, epizootics);

g) Targets on work health:

- Conducting trainings for targets on work health, as required by law, on:
- Activities within the project team;

- Training on the response actions;

h) Targets for contracting:

- Considering that specific emergency situation management requires the involvement of both factors, the public and private ones, the project team will follow the conclusion of firm cooperation protocols between responsible authorities and private partners, regarding the rights and obligations of each party involved in the management of specific emergency situations;
- Will avoid that, through protocols concluded occur exceptions to the legal obligations of involved factors, both in terms of the normal, everyday, and supporting activities of specific emergency management.

Summary

Management system of an earthquake response plan project:

- The responsible for project wants to achieve the specific objectives in close liaison with the other two coordinates (time, cost) in this respect, aims to brows the *planned activities* (Appendix 1) to achieve specific objectives (Gantt Chart – Appendix 3);
- Work Breakdown Structure (WBS) – Appendix 2;
- Also establishes the "benchmarks" of the project, moments when is analyzed the state of activities development and reporting (communication) to stakeholders of project progress;
- Responsible for attending specific activities that follow established benchmarks for each objective.

It requires the following observations on the register of risks:

- Treatment of all key elements (or risks associated with the earthquake), will be in the Earthquake Response Plan;
- Accepted priority and inherent risk established in project progress communication session, attended by ESLC (met) and the project team;
- Priority Information accepted and inherent risk will be used as follows:

A. Risks classified as EXTREME or LARGE on both scales - is likely that these risks occur and have potential serious consequences, even if exists a control for them. It requires detailed planning and increased attention to the discretion of the management;

B. Risks classified as EXTREME or LARGE on the scale of inherent risks, but not on the scale of priorities approved (by considering the control set) - these have potential serious risks if control fails. Management attention should be directed towards improving the monitoring and control;

C. Risks classified as AVERAGE on both scales - may be likely to occur or to have serious consequences, but not necessarily both, regarding the control. These require planning and attention from management to improve control;
D. Risks classified as AVERAGE on risks scale, but only SMALL on the scale of those accepted, after taking the control into consideration. Attention of management should be directed to monitoring the control and improving it, when applicable;

E. Risks classified as being SMALL on bought scales - may be, typically, managed using routine procedures.

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NARZĘDZIA I TECHNIKI WYKORZYSTYWANE W CELU WDROŻENIA PROJEKTU WYKRYWANIA RYZYKA NATURALNYCH KATASTROF

Streszczenie: Zarządzanie ryzykiem jest procesem identyfikacji, pomiaru i oceny ryzyka, poprzedzonym przez rozwój strategii zarządzania ryzykiem (wewnętrzne/organizacyjne zarządzanie). Sytuacja krytyczna – nadzwyczajne zdarzenie o niemilitarnym charakterze, które przez swoją skalę i intensywność zagraża życiu i zdrowiu populacji, środowisku, ważnym materiałom i wartościom kulturalnym. Aby przywrócić stan *normalności* niezbędne są pomiary i natychmiastowe działania, przydział dodatkowych środków i ujednolicone zarządzanie siłami i innymi środkami. Zarządzanie sytuacją krytyczną oznacza identyfikację, rejestrację i ocenę różnych typów ryzyka i ukrytych czynników, zawiadomienie wspólników, ostrzeganie ludzi, ograniczanie i usuwanie towarzyszących ryzyku czynników i negatywnych efektów i skutków tych nieprzewidzianych wydarzeń. W systemach reagowania na zagrożenia i przywracania (krótki okres powrotu do stanu pierwotnego), informacja o niebezpiecznych zniszczeniach i strategia przywracania stanu pierwotnego jest bardzo niepewna (problemy ICP). Zarządzanie projektami to zastosowanie wiedzy, umiejętności, narzędzi oraz technik w przypadku zaplanowanych działań w celu spełnienia wymogów. Projekt wpisuje się w koncepcję lokalnego zarządzania sytuacjami krytycznymi i funkcjonowanie Narodowego Systemu Zarządzania Sytuacjami Krytycznymi: zapobieganie sytuacjom krytycznym i zarządzanie nimi, ubezpieczenie i organizacja ludzi, przywracanie stanu *normalności*. Celem projektu jest racjonalne wykorzystanie całego potencjału pomocy humanitarnej i charakterystyki terenu będącego przedmiotem zainteresowania w celu efektywnego i skutecznego zarządzania ryzykiem.

自然灾害应急反应技术

摘要:风险管理是风险管理策略中的识别，计量，风险评估过程。紧急情况-特殊事件，非军事性质从规模和强度上威胁人口生命健康，环境，重要物资以及文化价值。为了恢复正常实施必要的措施，紧急行动，额外的资源配置和统一管理是必要的。紧急情况管理包括识别，记录，评估风险类型，潜在因素，利益相关者，警告人们，限制，排除或抵消风险，负面影响以及特殊事件影响。在紧急情况应急和损失信息更新方面，恢复策略变的极其不确定。项目管理是知识，技能，工具以及项目相应技术的应用。该项目符合纳入地方管理的紧急情况，寻求组织线和管理突发事件，即国家制度的运作理念：预防和应急管理，保险和协调人力，物力，财力和其他需要恢复状态常态。项目旨在合理利用资金支持，经济，社会特点，进而有效地进行风险管理

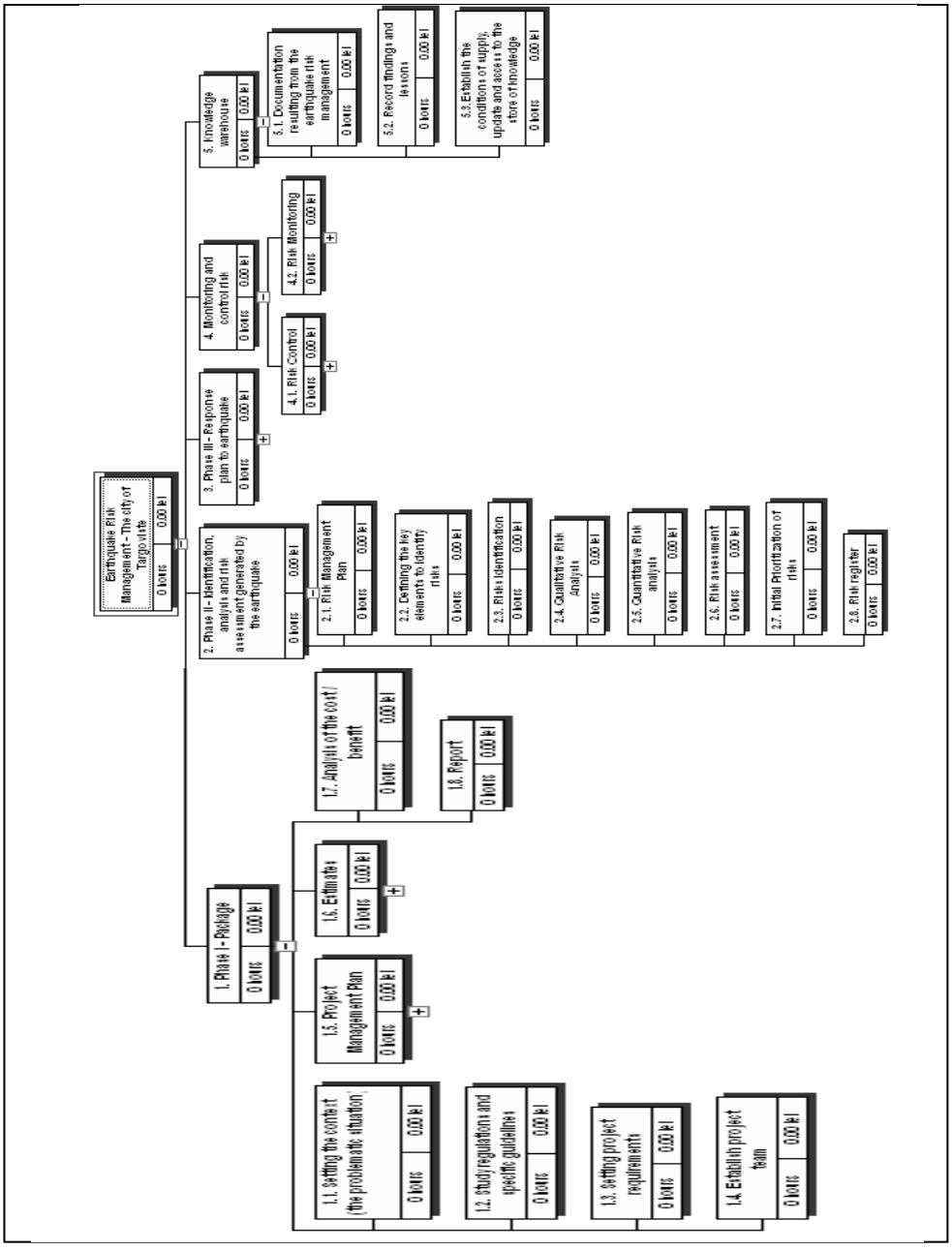
Appendix 2

Planned activities

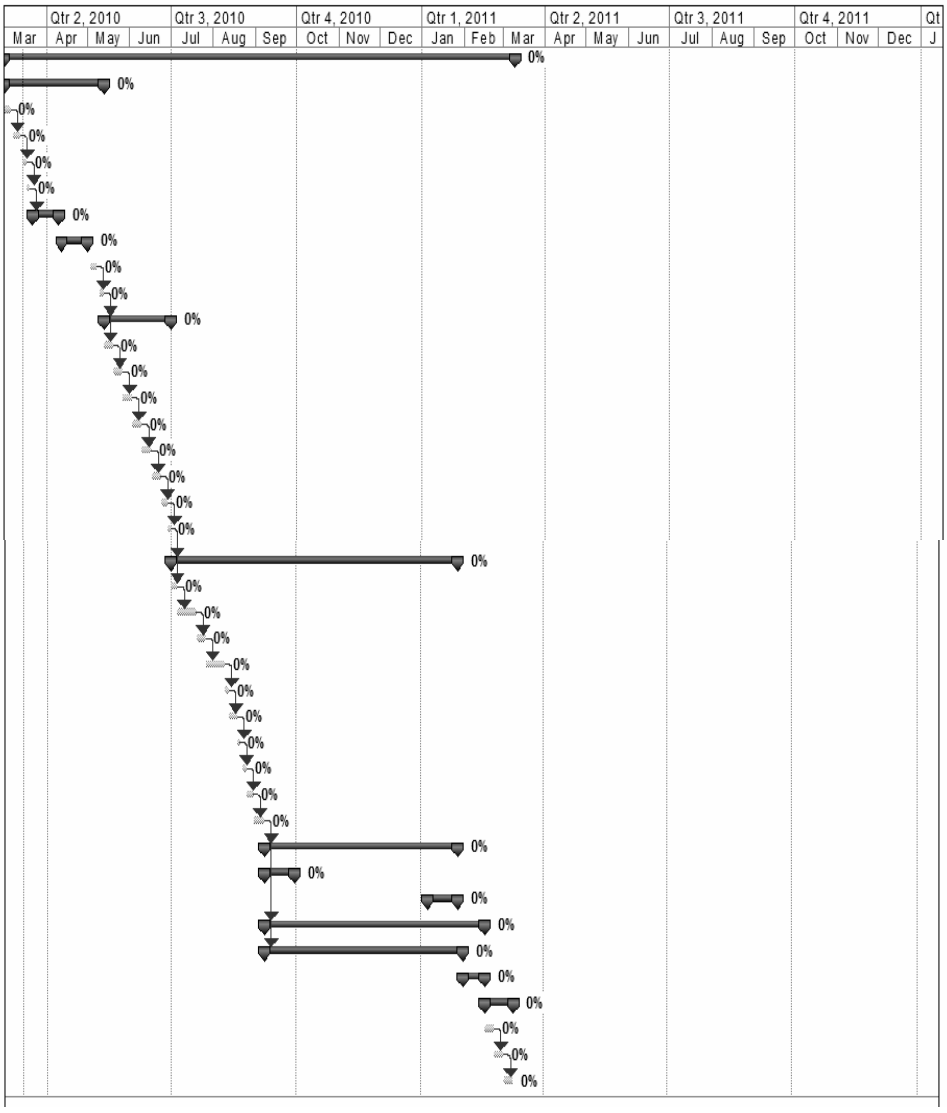
ID	Task Name	Duration	Start	Finish	Predecessors
1	Earthquake Risk Management - The city of Targoviste	268 days	Mon 3/1/10	Wed 3/9/11	
2	1. Phase I - Package	53 days	Mon 3/1/10	Wed 5/12/10	
3	1.1. Setting the context (the problematic situation)	5 days	Mon 3/1/10	Fri 3/5/10	
4	1.2. Study regulations and specific guidelines	5 days	Mon 3/8/10	Fri 3/12/10	3
5	1.3. Setting project requirements	3 days	Mon 3/15/10	Wed 3/17/10	4
6	1.4. Establish project team	2 days	Thu 3/18/10	Fri 3/19/10	5
7	1.5. Project Management Plan	15 days	Mon 3/22/10	Fri 4/9/10	6
14	1.6. Estimates	15 days	Mon 4/12/10	Fri 4/30/10	13
18	1.7. Analysis of the cost / benefit	5 days	Mon 5/3/10	Fri 5/7/10	17
19	1.8. Report	3 days	Mon 5/10/10	Wed 5/12/10	18
20	2. Phase II - Identification, analysis and risk assessment generated by the earthquake	35 days	Thu 5/13/10	Wed 6/30/10	19
21	2.1. Risk Management Plan	5 days	Thu 5/13/10	Wed 5/19/10	19
22	2.2. Defining the key elements to identify risks	5 days	Thu 5/20/10	Wed 5/26/10	21
23	2.3. Risks identification	5 days	Thu 5/27/10	Wed 6/2/10	22
24	2.4. Qualitative Risk Analysis	5 days	Thu 6/3/10	Wed 6/9/10	23
25	2.5. Quantitative Risk analysis	5 days	Thu 6/10/10	Wed 6/16/10	24
26	2.6. Risk assessment	5 days	Thu 6/17/10	Wed 6/23/10	25
27	2.7. Initial Prioritization of risks	3 days	Thu 6/24/10	Mon 6/28/10	26
28	2.8. Risk register	2 days	Tue 6/29/10	Wed 6/30/10	27
29	3. Phase III - Response plan to earthquake	151 days	Thu 7/1/10	Thu 1/27/11	28
30	3.1. Establish the purpose and objectives	3 days	Thu 7/1/10	Mon 7/5/10	28
31	3.2. Establish the characteristic of high-risk areas	10 days	Tue 7/6/10	Mon 7/19/10	30
32	3.3. Establish structures and their functions	5 days	Tue 7/20/10	Mon 7/26/10	31
33	3.4. Concept of operation of protective measures - intervention	10 days	Tue 7/27/10	Mon 8/9/10	32
34	3.5. Setting-decision information flow scheme	3 days	Tue 8/10/10	Thu 8/12/10	33
35	3.6. Establish procedures for protective measures - intervention	4 days	Fri 8/13/10	Wed 8/18/10	34
36	3.7. The management and coordination assistance	2 days	Thu 8/19/10	Fri 8/20/10	35
37	3.8. Logistics preventive and protective measures - intervention	3 days	Mon 8/23/10	Wed 8/25/10	36
38	3.9. Way to ensure human, material, financial resources	3 days	Thu 8/26/10	Mon 8/30/10	37
39	3.10. Develop contingency plan	6 days	Tue 8/31/10	Tue 9/7/10	38
40	3.11. Planning the activities of preparing the response	102 days	Wed 9/8/10	Thu 1/27/11	39
41	3.11.1 Semestrial training I	16 days	Wed 9/8/10	Wed 9/29/10	
49	3.11.2 Semestrial training II	16 days	Thu 1/6/11	Thu 1/27/11	48FS+70 days
57	4. Monitoring and control risk	116 days	Wed 9/8/10	Wed 2/16/11	39
58	4.1. Risk Control	104 days	Wed 9/8/10	Mon 1/31/11	39
64	4.2. Risk Monitoring	12 days	Tue 2/1/11	Wed 2/16/11	63
70	5. Knowledge warehouse	15 days	Thu 2/17/11	Wed 3/9/11	69
71	5.1. Documentation resulting from the earthquake risk management	5 days	Thu 2/17/11	Wed 2/23/11	69
72	5.2. Record findings and lessons	5 days	Thu 2/24/11	Wed 3/2/11	71
73	5.3. Establish the conditions of supply, update and access to the store of knowledge	5 days	Thu 3/3/11	Wed 3/9/11	72

Appendix 3

Work Breakdown Structure (WBS)



GANTT Chart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