



## ■ Introduction

For longtime natural disasters especially earthquake damages have been compensated through foreign loans and tax, which impact societies with unfortunate effects. But provided solution with new technology, not only helps to decrease effects of the natural disasters through transferring risks, but also it increases resiliency and speed of recovery both for government and residents. More than 40 high-risk countries against earthquakes are at risk of major events, which can change anything. Therefore, it is required to be prepared for major events in a way that increases speed of recovery and improves resiliency at a low cost.

There are two regions always under risks of serious damages:

- 1- High seismic regions
- 2- Low seismic regions that they have already lost their preparation because of the feeling of safety

This plan introduces a technology that helps to transfer risks of a major event that threatening critical infrastructures both in high seismic and low seismic regions, at the governmental level.

Public Safety Canada (2014) is introduced the critical infrastructures:

“Processes, systems, facilities, technologies, networks, assets, essential service, safety, security or economic well-being and the effective functioning of government” and that should our critical infrastructure be disrupted it would result in loss of life or severe economic damage.

## Earling Services

Earling issue Earthquake Preparedness Alert (EPA) up to days in advance. The technology that utilizes in Earling monitors seismic activities and through big data analysis our algorithms looking for high-risk seismic patterns. As the patterns detected, Earling issues an EPA for a specific region, which can face destructions in different degrees.

## Earling in the Insurance Industry

As EPA being issued new risks and opportunities appear, which involve the insurance industry managers with 4 different segments of customers including residents, businesses, insurance companies, and governments. Risk management in this domain (governmental perspective) more means transferring risks from the local (re)insurances to the international (re)insurances through ease of access solutions/ products. Otherwise, when an EPA is issued, the local insurances face various high-risk customers in the worst time window, when the probability of a major event is drastically increased.



Insurance industry managers need to provide the required technical tools and agreements for transferring risks for specific regions, in a way that the cost of risk transformation is remarkably decreased. As a result, disaster managers would have access to the funds for recovery if destruction happens while its resources provided through inexpensive insurance policies and without a serious impact on the local insurers.

### **Residents Reaction Risks and Opportunities**

Even in the regions with a very low insurance penetration rate, issuing an EPA, cause notable changes in the behaviors. Based on the latest studies, more than 20% of residents who received EPAs, moved to online brokers/ insurtech websites to make a price comparison. It means a low. Consequently, EPAs potentially are able to increase insurance penetration rate both in life and non-life market.

### **Business Reaction Risks and Opportunities**

Each business companies are somehow vulnerable to earthquakes. In many cases, the economic costs of minor or major earthquakes are much more than the cost of destructions and can be even up to 15 times more. Various provided solutions/ products by different insurers combined with EPAs can compensate those costs to transfer risks that can be interruption, liability, life, and property.

### **Insurers Reaction Risks and Opportunities**

Since we began to serve EPAs to the insurers, soon we studied that many of the insurers desired to transfer their risks to the other (re)insurances. It is a widespread risk, but on the other hand it is an opportunity for those parties who receive EPAs. It means only the (re)insurances, which receive EPAs can manage such emerging risks, that impact almost all of the insurance products; but parametric policies are at risk most.

### **Governments Reaction Risks and Opportunities**

Through connecting disaster management organizations and the insurance industry, governments can manage major risks. The main goal of connecting these two structures is increase the recovery speed after the disaster, alongside defending local insurances facing major events, which eventually can affect the local financial market and it can happen only through transferring risks to the international (re)insurance companies. Therefore, only the least part of losses need to compensate by local insurers, foreign loans or taxation.



## ■ Operational Plan

### Solution

Firstly, two groups need to be covered through accessible insurance solutions 1- critical infrastructures 2- the most vulnerable infrastructure

Secondly, specifying cooperation and roles between the disaster management organization and the central insurance organization in detail. Some of the roles that need to be specified are:

- 1- The technical solution to receive EPAs
- 2- Specifying specialists to receive EPAs and react. The specialist(s) purchase insurance for a prioritized infrastructure list and should be available 24x7 to react quickly as EPA delivered
- 3- Specifying (re)insurances products/ solutions to transfer risks in detail and define the company, product/ solution, prices, time to apply and how to purchase, as EPA delivered.
- 4- Specifying budgeting for purchasing insurance policies, and how to facilitate to avoid from bureaucracy.
- 5- Specifying the organization who receives the payout.

### Specify Vulnerable Infrastructures

#### Critical Infrastructure against Earthquakes

Utilities	Economic	Transportation	Emergency services	Evacuation Shelters	All Risks
Water mains/ pump stations	Airports	Major road network, bridges and tunnels	Fire halls	Schools, arenas, community centers, convention centers	Domino effects
Reservoirs/ dams	Ports	Public transportations	Hospitals		
Sewage lines/ pump stations	Railways				
Power lines	Oil pipelines				

Table 1. Some of the most important critical infrastructures

#### The Most Vulnerable Infrastructures

Already, some of the infrastructures are vulnerable encountering minor or major earthquakes and depreciation continuously increase their vulnerability. Therefore, infrastructure vulnerability analysis needs to be estimated through a periodic procedure. Also, vulnerability estimation needs to be reevaluating after any major events. As a result, the vulnerability list will be updated and prepared to use as a trustworthy reference. In some regions that regulatory allowed for group dwelling insurance, the risks of many dwellings can instantly transfer with such strategy.

#### Expensive Infrastructure

Besides “The Most Vulnerable Infrastructures” index, there is “The Most Expensive Infrastructure” index that only one of its destruction possibly last a generation for recovery. Therefore, this index is one of the important factors to classify infrastructure risk priorities.



## Specifying Businesses Services

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## Specifying Residents Services

Blank

## Specifying Risk Transformation Solution for Governments

### Legal

Issuing EPAs has some uncertainty, which make it legal. It is not legal to insure anything that definitely will be damaged while Earling EPA, issuing for about 260 regions in 40 countries that studies show acceptable accuracy for the last 20 months results. It means that EPAs are not in a definite probability, which makes them legal in the insurance industry.

### Reinsurances

Reinsurance is also known as insurance for insurers or stop-loss insurance. Reinsurance is the practice whereby insurers transfer portions of their risk portfolios to other parties by some form of agreement to reduce the likelihood of paying a large obligation resulting from an insurance claim. Reinsurances are very helpful to transfer risks in major events. As governments willing to transfer risks to the international insurances, reinsurances should be one of the well-known companies. Hereby, as EPA issued while most of the time the expected event appears days in advance, insurances can launch campaigns to increase earthquake insurance penetration rates in the high-risk regions. Hence, any widespread destructions risks that can cost hundreds of million dollars transfer to the international reinsurance. Otherwise, the costs of recovery need to be provided through foreign loans or tax which would have serious impacts on residents.

### Parametric Insurances

Parametric insurance products are developing rapidly around the world. Pre-agreed payment for a claim is guaranteed upon the occurrence of a triggering event, which needs to be a pre-defined parameter or metric related to the insured's particular exposure. It is impossible to predict when the next seismic event will occur.

Traditional insurance solutions often only provide financial relief following a lengthy claims settlement process, leaving companies and organizations with cash flow problems. Besides this, there are often significant gaps in coverage especially for costs associated with the event. Earthquake parametric insurances close these gaps with a tailor-made solution characterized by an unprecedented level of transparency and a very simple payout process. The new parametric trigger cover is specifically designed for seismic events. Most of the parametric insurances are highly customizable and allows you to pre-define triggers and payout amounts up to US\$ 10 million (or higher on request) per location or defined area. For example, a parametric insurance policy can cover an earthquake with 7 Mercalli intensity scale, up to 200 kilometers from the capital, in 10 days, to payout for the power grid, water supply, airport, schools or any other infrastructures. As any insurance policies have their own payout, damages for most of the critical infrastructures can follow by the insurer's compensation and can be hundreds of millions USD.



## ■ Scenario

Earling issues an EPA for a region new capital. This alert delivers through email, followed by a phone call to explain the situation to the specified specialist. Besides, a message directly sends to the Decision Support System. Receiving EPA to the DSS, which is part of the insurer risk management that actually is a division of the natural disaster management organization, triggers a predefined process known as Earthquake Preparedness Action Plan. This plan runs an autonomous or manual procedure which purchases a parametric insurance policy for a probable 7 Mercalli earthquake to cover predefined critical infrastructures to compensate up to \$10 million for each of the policies if encountered within 10 days. As a result, it highly increases the speed of recovery to compensate destructions.