Advance Warning on Disastruous Earthquakes for Big Cities

"Protecting Belt"

Dr. A. Vilshansky, Technion

We have developed an electronic system for advance warning about an imminent strong earthquake. The system should consist of 4 peripheral data acquisition stations located around a city, at a distance of about 10-15 km from its center. The data from those sensors are transmitted over the Internet to the central location where they are processed and displayed. Each peripheral computer has six to eight sensors. The feature of this system is the simpicity and low cost of the sensors, and they don't need to be very sensitive.

The system can produce the information about the earthquake epicenter relative to the observation zone and, most important, about the possible magnitude of the imminent quake. The system operator (who is a representative of the city administration) is continuously monitoring the station, and makes a decision about alerting the population. After a period of time following the system deployment, accumulating the statistics and improving the prediction reliability, the system might be placed into fully automated mode of operation.

The principle of system operation is based on recent geophysical research, as well as experience of several US and Japanese corporations. The scientific foundations of the system can be found in this article:

http://www.ecoimper.net/articles/stat1h.pdf

The time needed to implement the first stage of the system is no more than 1 year.

There are no similar systems in the world at this time.

A rough estimate of the system implementation

About 330,000 shekels for the hardware;

plus about 21,000 per month during development, debugging and deployment;

plus about 30% for unforeseen expenses.

Altogether, 470,000 shekels.

Running the system will not cost more than 17-20 thousand shekels per month.

Expenses in more detail:

Hardware: A/D cards, 6 pcs @ 300 shekels - 1800 shek.

7 UPS units @ 800 a piece - 5600 shek.

Sensors (first lot of about 40 pieces) - about 8000 shek.

Central computer - 8000 shek.

Peripheral computers (6 pcs @ 1500 shek) - 9000 shek.

Altogether 33,000 shek.

Personnel:

Project Head: not more than 2500 shek. per month (30K per year)

Project Manager: 2500 shek per month, plus car expenses, about 6000 per month (72K per year)

Programmer (contractor): about 7000 per month, from 6 months to 1 year, 2 persons (84K to 170K per half to 1 year)

Electronics engineer: 2500 per month part time, retiree (30K per year).

Altogether 5 positions, 302,000 shekels for one year.

Development time - from 6 to 12 months, needs further consideration (mainly because of software).

Most expenses are for software development for the main station and peripheral computers; approximate time is one year or less. It will be more clear after the negotiations with programmers. All other components are either off-the-shelf units, or will be custom made in not more than 2-3 months.

Ongoing expenses (monthly):

- Power supply for computers and sensors: 250 shek.

- Internet connection: 100 per access point, 400 shek.

- Real estate rental for sensors: 4000 shek. (It can be avoided if the city administration provides open space for peripheral stations on solid surfaces, like rocks, not too far from Internet access points).

- On-duty operator of the central station: (retiree, not more than 2500 shek. per month, three shifts - 7500 per month).

- Technician for sensor maintenance - 1 person, 2500 shek.

- Manager - no more than 2500, retiree.

Altogether about 17K per month during pilot, and about 3K-4K in fully automated mode.

Unforeseen expenses during pilot: 30% extra.

Conclusion:

"Protecting Belt", the Advance Warning on Disastruous Earthquakes System will alert the population on an imminent earthquake in several minutes to several hours before the actual strike (the time depends upon the type of the quake and distance to its epicenter).

A sum of about 470,000 shekels is needed to develop and deploy the system;

A further 17-20K per month will be needed during pilot;

and about 4-5K per month after the pilot is over.

Compare that to multimillion expenses for treating the injured, losses due to chaos in healthcare system and loss of life as a result of a sudden quake.

Note:

At this time, there is interest on part of religious organizations and private investors in funding the system development. However, I would rather hear your advice on the matter, as I feel it is more appropriate for the Government to own the system, not a private party.

Respectfully yours,

Dr. Alexander Vilshansky

Nativ Hen 47/17, Haifa, 32688

Tel. 077-200-1991

0526-044-816

*About **Alexander Vilshansky**:*

Born 1939, Moscow, Russia

Graduated from Moscow Institute of Energy, Radioelectronics Faculty

Career in satellite development: Meteorological ("Meteor"), Communication ("Molniya" and others). In Israel since 1998. From 1999, works in Technion, Space Research Institute, maintenance of Techsat satellite. Participated in development of several scientific an technical projects of the Institute.

Ph.D., 14 publications and 18 patents. Present interests include research of gravity. Articles in Internet publications.