

INFORMATION TECHNOLOGY FOR ADVANCEMENT OF EVACUATION

-Development of Interactive Evacuation Simulator-

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1. INTRODUCTION

The preparation of tsunami and storm surge hazard maps, that facilitate successful evacuation of residents from tsunamis and storm surges, are progressing nationwide. However, in fact, many residents do not evacuate even though tsunami evacuation warnings or orders are officially issued. Therefore, what can be done in order to get such residents to evacuate?

Interactive evacuation simulators, which have been developed and advanced by the National Institute for Land and Infrastructure Management, are tools that promote the evacuation of residents by destroying stereotyped disaster images and normalcy bias i.e. the entrenched “I’ll be alright” biased mindset, and also enhance risk communication among residents administrative agencies and experts in disaster mitigation planning.

2. TACKLING ‘RELUCTANT TO EVACUATE RESIDENTS’

The behavioral pattern of the ‘Reluctant to Evacuate Residents’ is diagrammatically illustrated in Figure 1. When a tsunami is generated, evacuation instructions or orders are reported by community wireless systems together with information about the level of risk being broadcasted on television networks, which compel us to recognize the nature of the threat and necessity for evacuation. In contrast, a normalcy bias, an entrenched biased viewpoint, comes into play that makes one believe that one will be alright and that there is no ‘real’ threat of personal imminent danger. People who are placed into this kind of conflicting paradoxical train of thought (cognitive dissonance) act to eliminate dissonance. Such attitudes result in the occurrence of two categories attitudes:

‘Escape and Evade Residents’ and ‘Reluctant to Evacuate Residents’. The ‘Escape and Evade Residents’ eliminate dissonance; whereas the ‘Reluctant to Evacuate Residents’ find reason to justify themselves by not running away. For example, there is the ‘stereotyped disaster image’ whereby, according to the distributed paper hazard map, a person’s house is shown not to be at risk from flooding or the depth of floodwater is low. Despite tsunami warnings/alerts being issued hitherto, nothing happened; therefore, a ‘false sense of security’ ensues which leads the person to believe that, this time also, they will be safe from imminent danger.

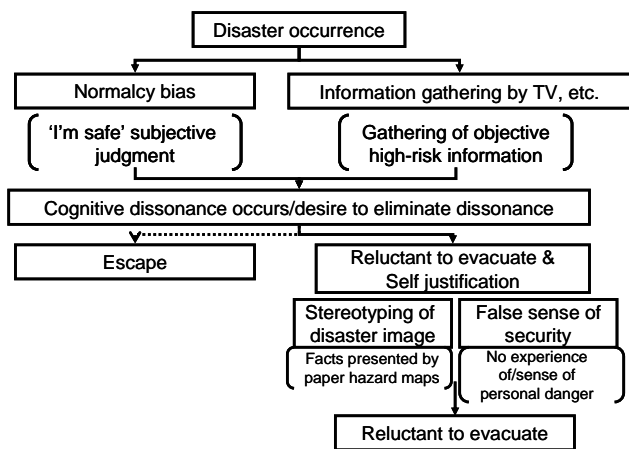


Figure 1. Behavioral Pattern of
‘Reluctant to Evacuate’

3. INTERACTIVE EVACUATION SIMULATOR

Actual disasters are dissimilar in that the scale of disaster and the mode of damage do not follow advanced forecast models. In order to facilitate actual safe evacuation behavior, it is necessary to advance the level of risk communication for the purpose of cultivate understanding by relaying information regarding the various aspects of disasters and the best ways in which to evacuate between residents, administrative agencies, and trained experts. The National Institute for Land and Infrastructure Management is advancing the development of interactive evacuation simulator, which should be called an animated hazard maps on PCs, aimed at tackling the problems of hazard maps while promoting risk communication.

Simulators are intended to be used by residents and administrative agents at workshops, town meetings and so on. These are evacuation simulators that can assimilate hourly changes in

tsunami inundation statuses, housing collapses due to earthquakes, and evacuation route blockages due to fires, as shown in the image in Figure 3. As for the residents, as shown by the system layout and operation procedure in Figure 2, they will be able to deepen their understanding firsthand through trial and error in deciding whether safe evacuation is possible, what are the optimum evacuation methods available, and so on, by individually inputting the evacuation start sites and timescale, evacuation methods: on foot or by wheelchair, etc., and available evacuation routes.

A feature of this system is that it will give the user a personal sense of evacuation under disaster generated conditions by allowing the user to optionally select the evacuation routes and evacuation sites of the region.

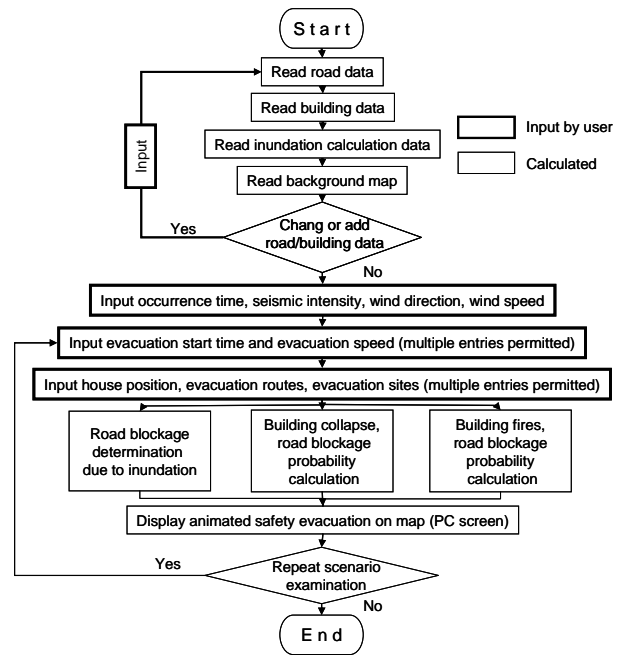


Figure 2. Basic System Configuration

4. ACTIVITIES AIMING FOR PRACTICAL APPLICATION

The development of the simulator is almost finished. The interactive evacuation simulators are presently undergoing trials in several participating regions where studies aimed at taking practical effective measurements along with efforts for promoting their popularization are progressing.

A trial simulator was developed at a coastal part of Kochi City prone to huge tsunami disaster. This simulator is scheduled to be trialed using multiple earthquake and tsunami inundation scenarios together with surveying feedback from residents by questionnaire for the purpose of analyzing the evacuation decision-making arrangements that exist at the residents' personal level and to reflect these findings in the system.

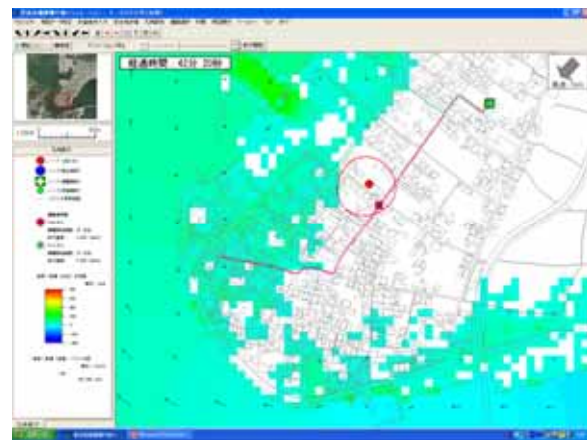


Figure 3. Snapshot of Display of an Evacuation Simulation

5. REFERENCES

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