

GIROJ

Earthquake Loss Model

General Insurance Rating Organization of Japan

Earthquake insurance in Japan (for householders)

■ Insurable property

- Limited to buildings for residential (including condos) use and/or movables for living (household goods).

■ Losses to be covered

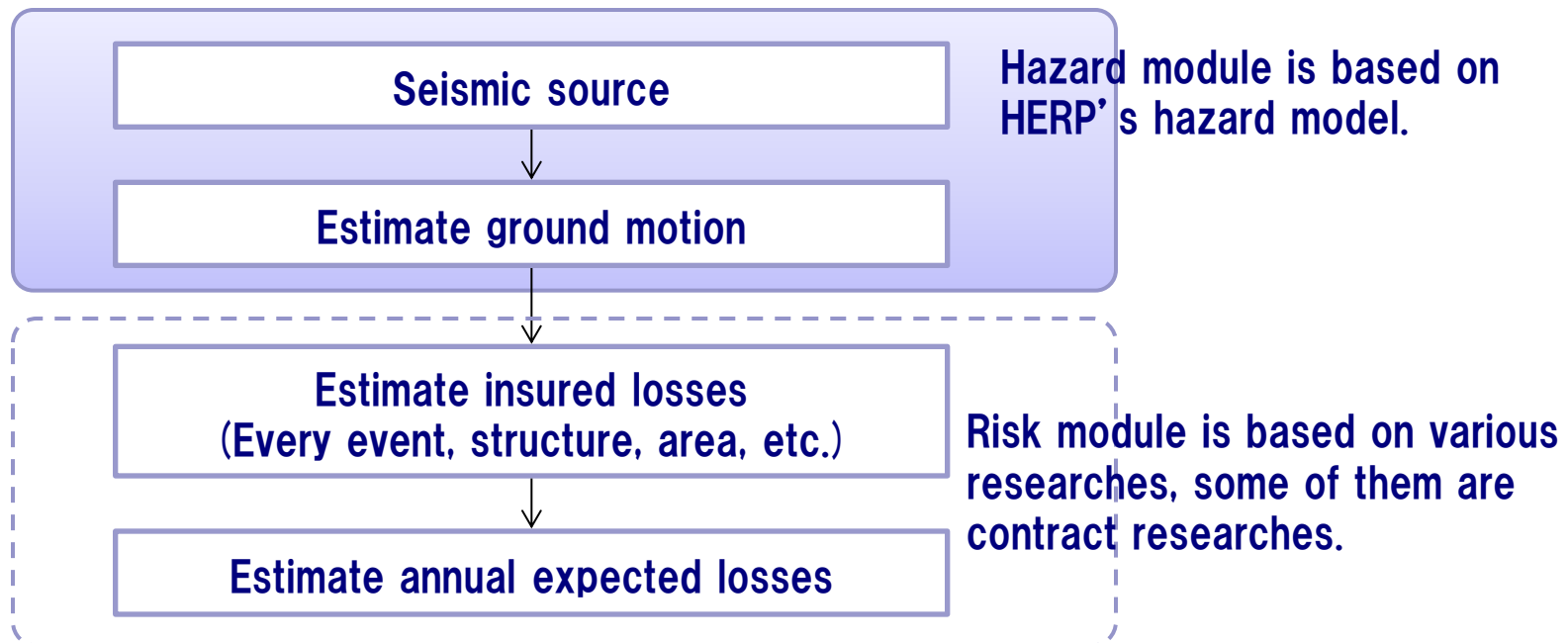
- Losses due to fire, destruction, burial and flood directly or indirectly caused by earthquakes, volcanic eruptions and tsunami.

■ Payment patterns of insurance claims

- Insured properties damaged by earthquakes are investigated and classified into following 4 categories.
 - Total loss (100% of insured amount will be paid.)
 - Large half loss (60%)
 - Small half loss (30%)
 - Partial loss (5%)

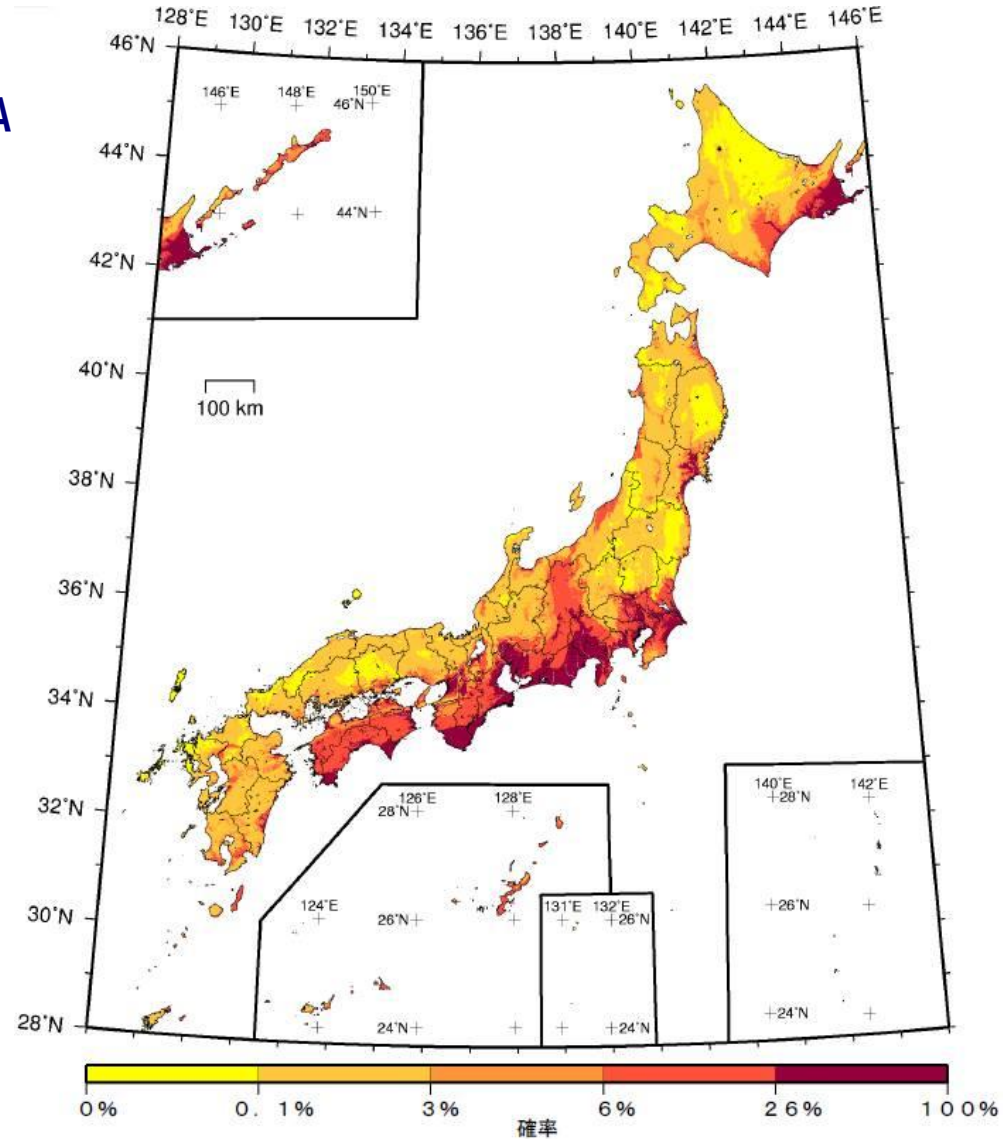
Our Earthquake Risk Model for Rating

- Our earthquake risk model consists of two major modules. One is estimating hazard, and the other is calculating risk.
 - The hazard simulation module is based on the method of National Seismic Hazard Map made by Headquarters for Earthquake Research Promotion (HERP).
 - The risk calculation module builds up with many sub-modules (reflecting outcomes of contract researches and others).



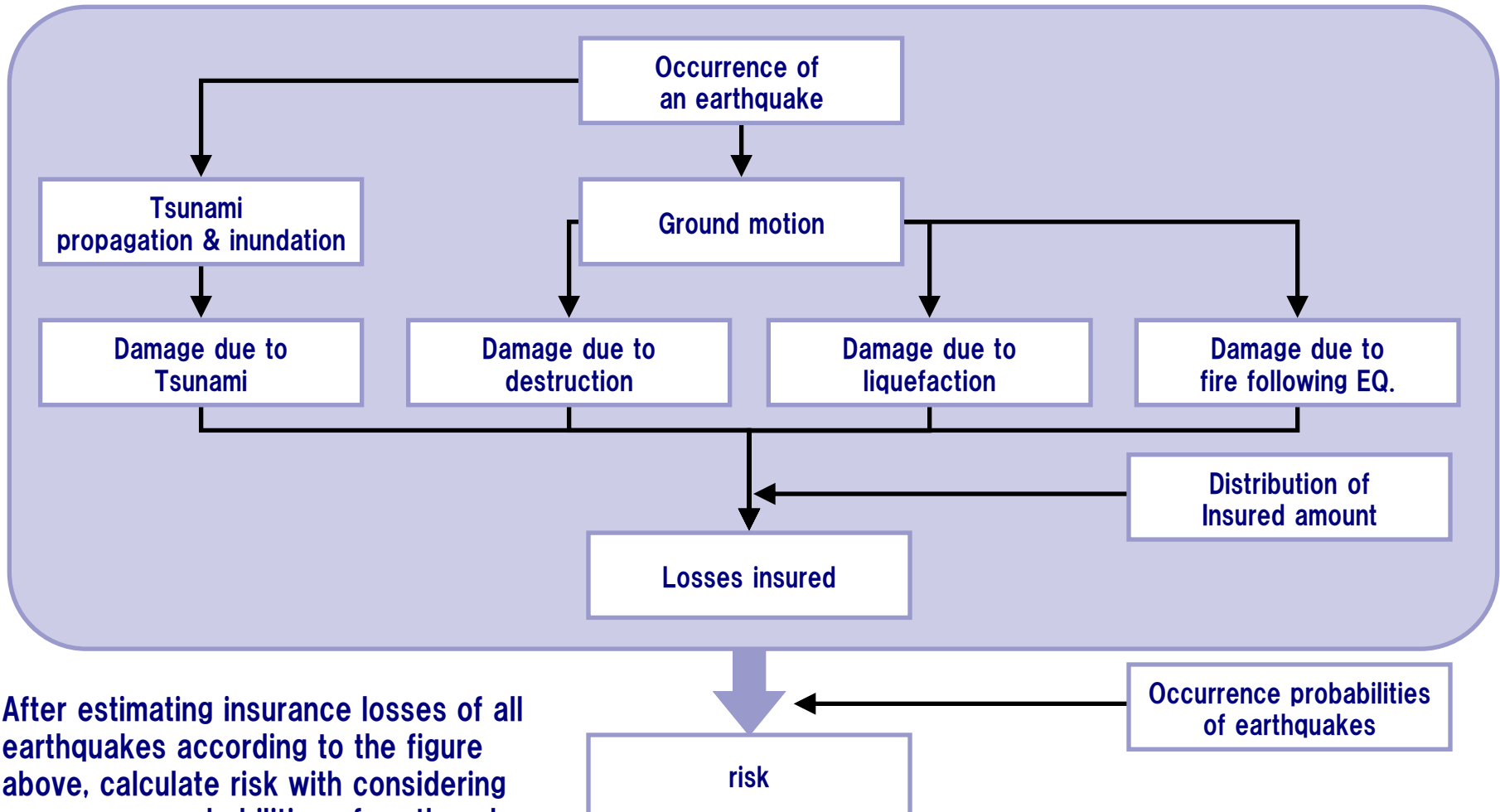
“HERP’s Hazard map”

This map shows the event probability of ground motions equal to or larger than JMA seismic intensity 6 Lower, occurring within the next 30 years from the present.



Overview of Our Earthquake Risk Model

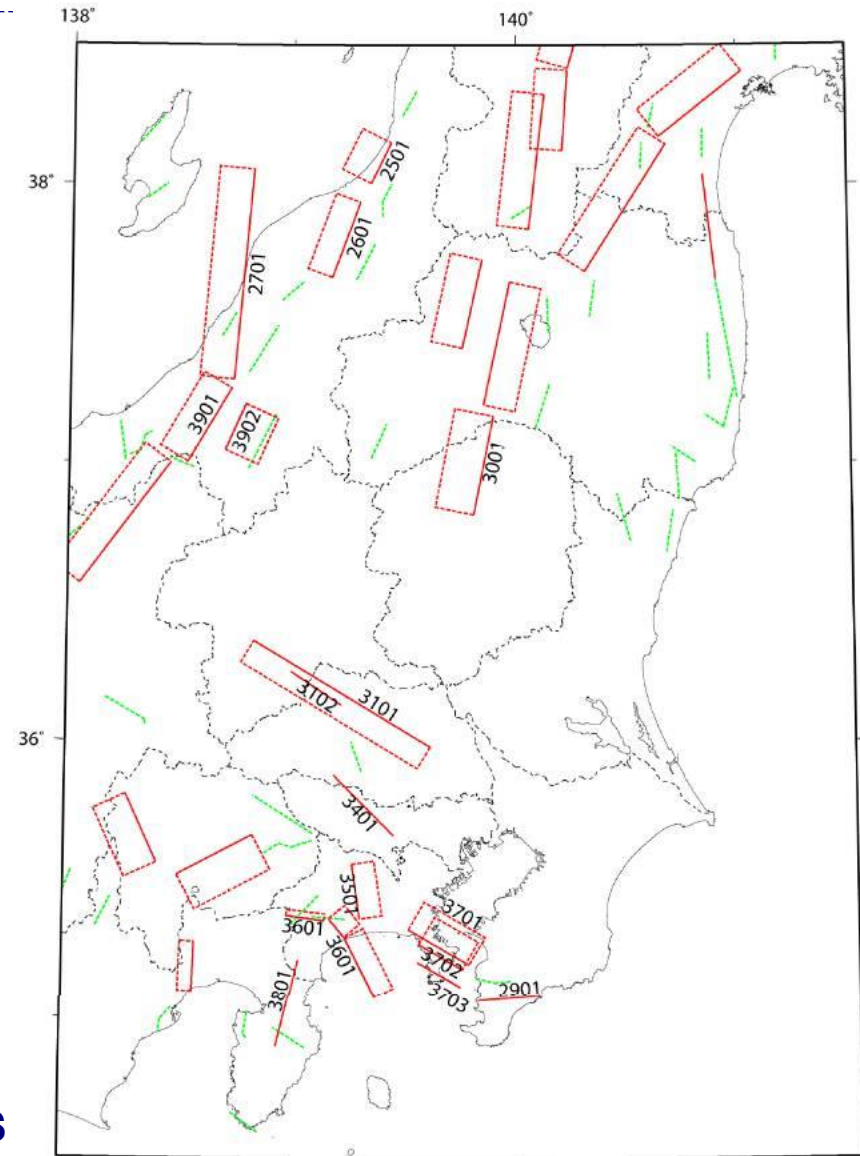
■ Process of our earthquake risk model



After estimating insurance losses of all earthquakes according to the figure above, calculate risk with considering occurrence probabilities of earthquakes.

Based on HERP's Seismic Source Models

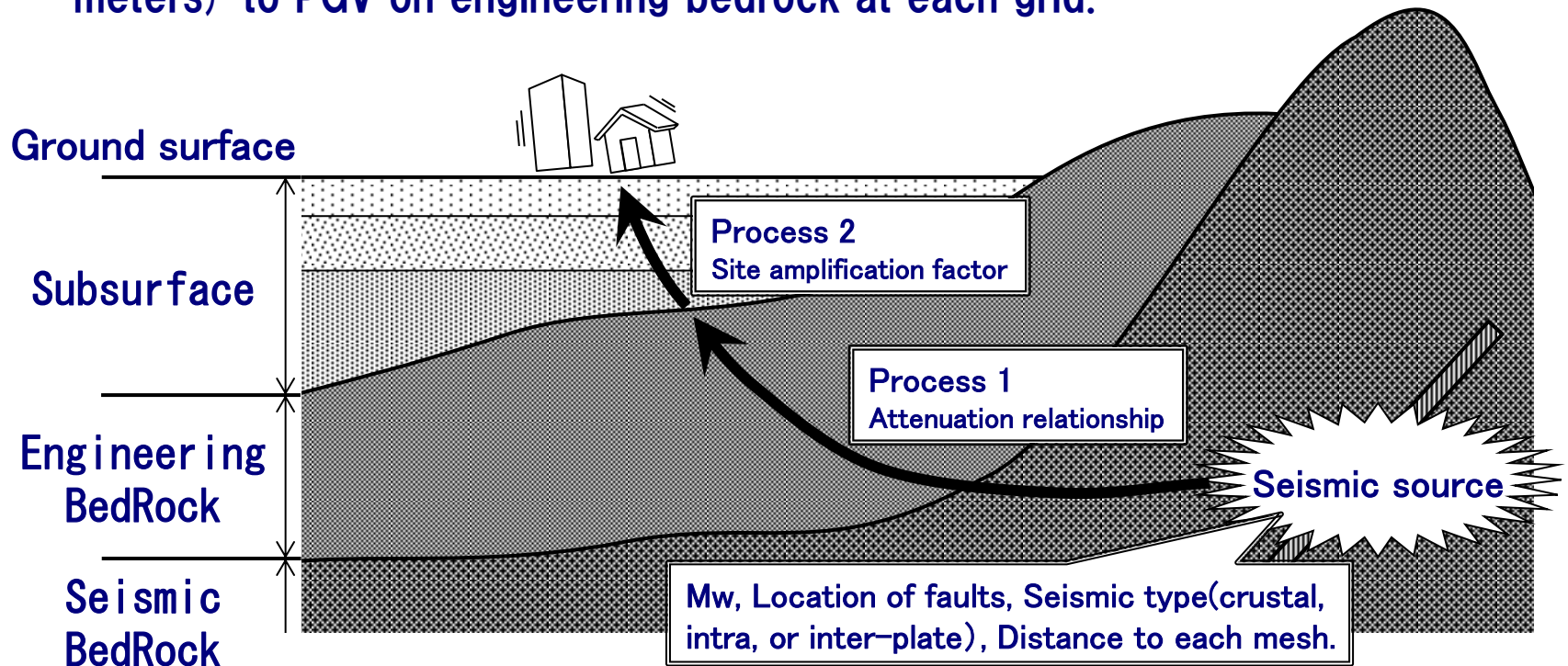
- Seismic sources used in the “HERP’s Hazard Map” are considered in our earthquake risk model.



ex. Active-fault earthquakes

Estimate Ground Motion

- **Process 1: Estimate PGV (Peak Ground Velocity) on engineering bedrock at each grid in regular grids (about 250m square) using attenuation relationships.**
- **Process 2: Estimate PGV on ground applying site amplification factors estimated by AVS30 (the average shear wave velocity of the upper 30 meters) to PGV on engineering bedrock at each grid.**



Estimate Damage due to Destruction

- Fragility curves, in which parameters are based on PGV, are used to estimate the damage due to destruction.

Calculate a component ratio

- Total loss
- Large half loss
- Small half loss
- Partial loss

Ground surface

Subsurface

Engineering
BedRock

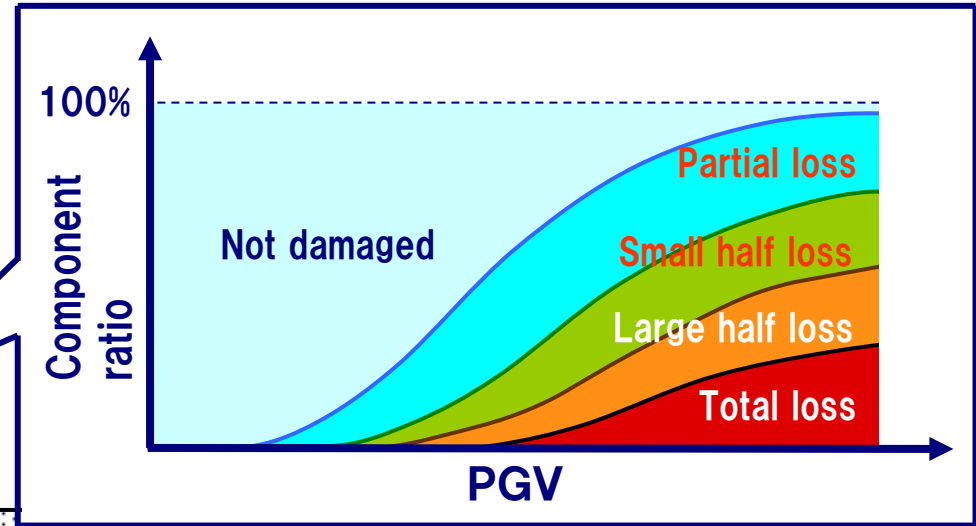
Seismic
BedRock



Process2

Process1

Seismic source

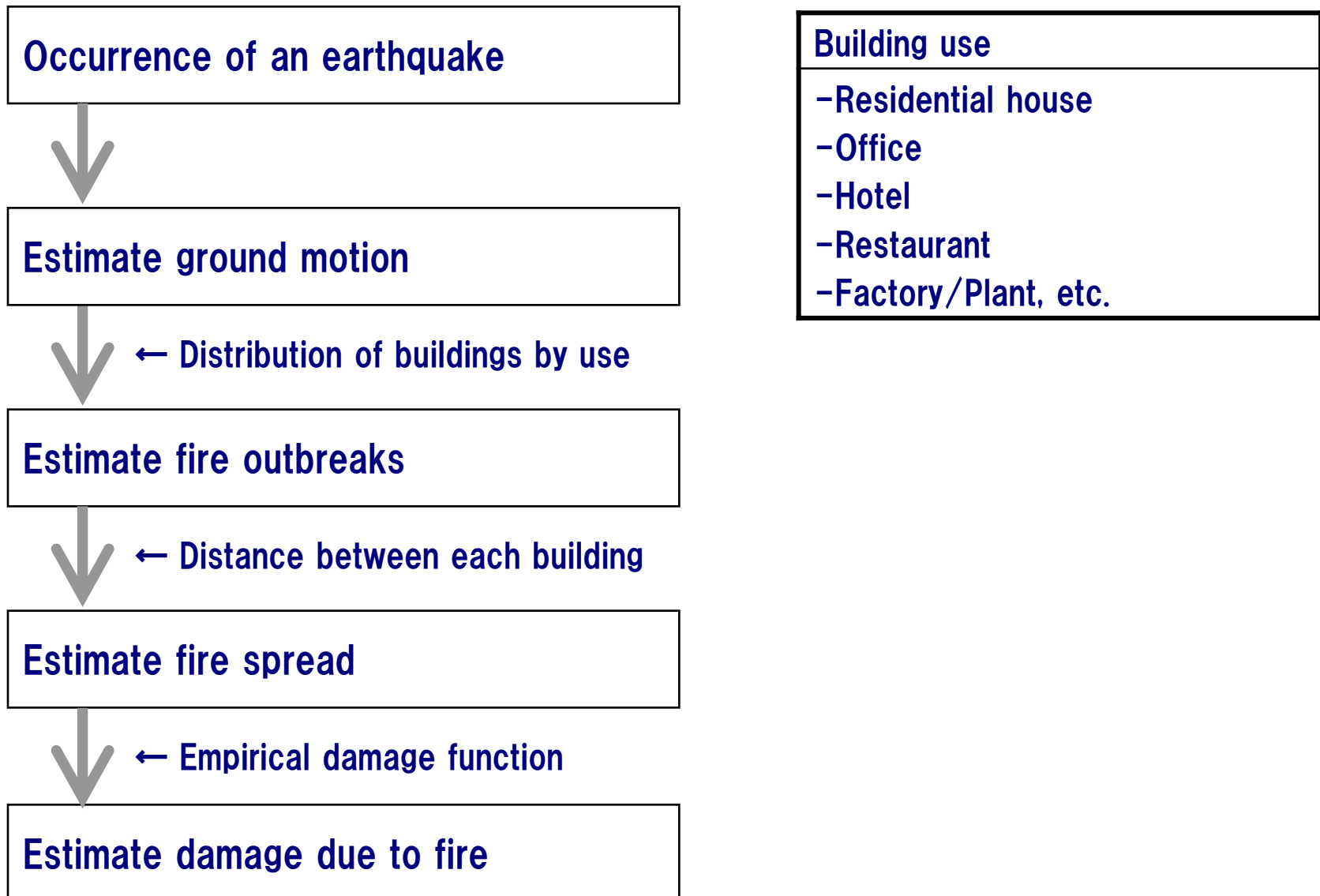


18 Categories for fragility curves, classified by “Structure”, “Storey” and “Construction Age”

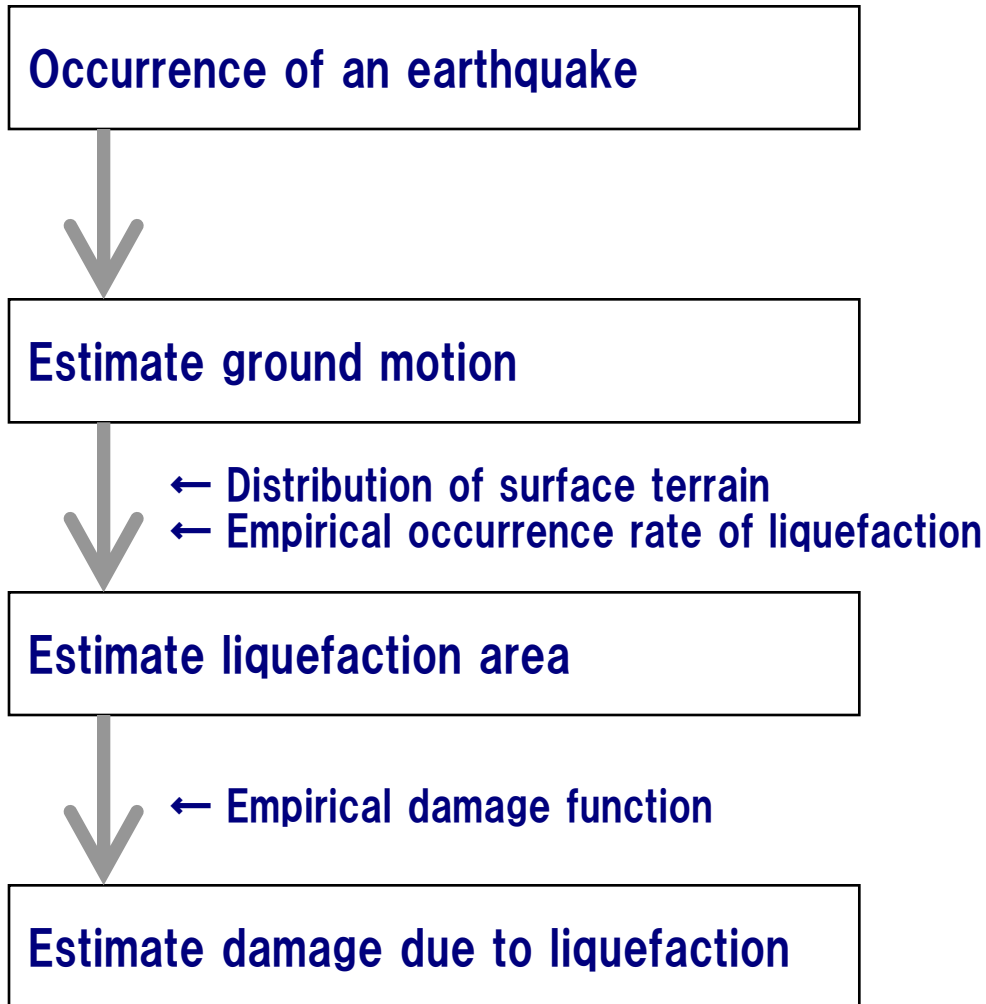
- Categories for buildings are below.

Structure, Storey Age	Wooden		Non-wooden			
	Wood frame	2x4, etc	Steel frame	RC and SRC		
				1-2F	3-5F	6F-
pre 1970						
1971 - 1980						
1981 - 2000						
post 2001						

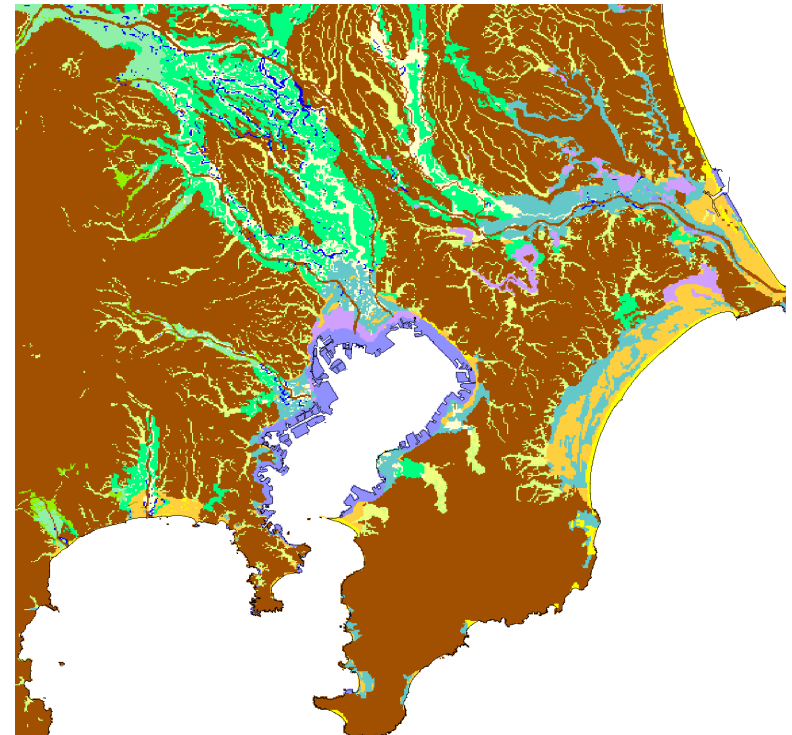
Estimate Damage due to Fire Following Earthquakes



Estimate Damage due to Liquefaction

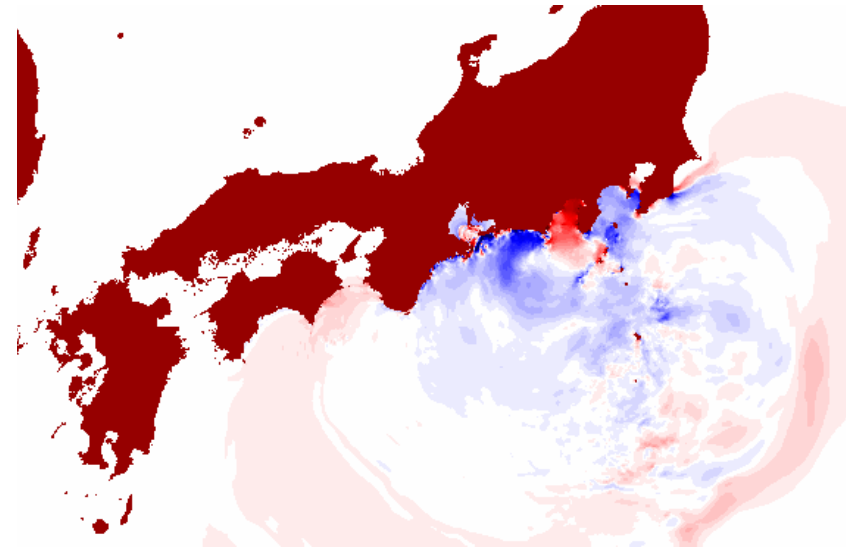
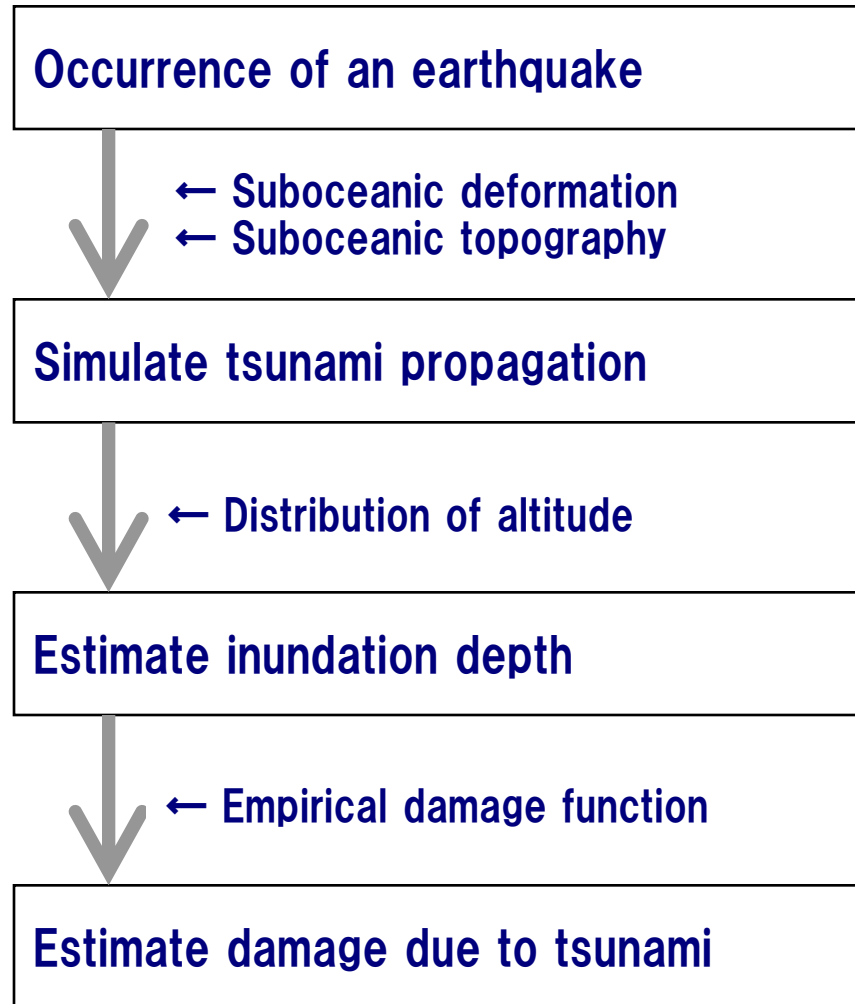


- Mountain, Hill, Plateau
- Filled land
- Natural levee
- Abandoned river channels
- Marine sand and gravel bar
- Back marsh
- Delta and coastal lowland
- Reclaimed land
- etc.



Nationwide surface terrain classification

Estimate Damage due to Tsunami



Simulation image of tsunami caused by Tokai earthquake

Contact Information

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