



Enhancement of National Resilience against Natural Disasters

Overcoming national crises resulting from severe damage to the Japanese economy in the event of a large-scale natural disaster by making optimal use of satellites, IoT, big data, and other latest science and technology

In order to be equipped to respond to national crises resulting from severe damage to the Japanese economy in the event of a large-scale natural disaster, it is necessary to construct a “Society 5.0” for such scenarios—namely, a society that responds as effectively as possible with a self-sufficient approach based on citizens helping themselves, supporting each other, and receiving assistance from public entities. We aim to do so by making optimal use of satellites, IoT, big data, and other latest science and technology to develop an information system to support decision-making on a national and municipal level. This will enhance national resilience for overcoming national crisis, thereby ensuring the safety and confidence of both today’s and future generations.



Program Director

Muneo Hori

The University of Tokyo
Earthquake Research Institute
Research Center for Large-scale Earthquake,
Tsunami and Disaster (LsETD)
Professor/ Head of Center

Profile

Professor Hori graduated with a degree in civil engineering from the University of Tokyo in 1984. In 1987, he was awarded a Ph.D. in Applied Mechanics and Engineering Sciences from the University of California, San Diego. His earlier career included serving as a senior assistant professor in the School of Engineering at Tohoku University and as an assistant professor in the Faculty of Engineering at the University of Tokyo. He became a professor at the University of Tokyo’s Earthquake Research Institute in 2001, and the head of the LsETD in 2012, two positions he holds presently. Since 2012, he has also served as the unit leader of the Computational Disaster Mitigation and Reduction Research Unit at RIKEN Advanced Institute for Computational Science. His areas of expertise are applied mechanics, earthquake engineering and computational engineering, and his main research topics include the application of high performance computing to earthquake engineering.

Anticipated Outcomes

Addressing the potential outbreak of large-scale natural disasters by helping to ensure the safety and peace of mind of Japan’s citizens and secure the country’s international presence and industrial strength

Striving to completely prevent fatalities due to failure to evacuate by ensuring that each and every citizen has a secure means of evacuation

Successfully creating a society that is capable of promptly restoring the economy on a broad scale, allowing those affected by disaster to quickly return to normal daily life



Exit Strategies

■ Participation by related organizations—organizations where the relevant measures will be implemented—from the initial stages of development in order to ensure reliable social implementation

Guaranteeing social implementation by starting out with a clear vision of how measures will be implemented and ensuring that organizations where the measures will be implemented participate from the initial stages of research and development to ensure that user needs are taken into account.

■ National government operation of a system to support national government decision-making and ensure that citizens are able to evacuate as they should

Ensuring an integrated system for assisting evacuation and emergency response activities to support national government decision-making, by having the cabinet operate the necessary functions required by the national government for emergency response activities, etc. through collaboration with related organizations, in addition to each ministry, agency or other such organization running their respective systems for enhancing responses in the event of natural disaster.

■ Facilitation of the introduction to municipal governments of a system to support decision-making by municipal governments at the front line of disaster response

Using the renewal of the existing system as an opportunity to facilitate the introduction of an integrated system for municipal government disaster response, aimed at supporting decision-making by municipal governments.

Research and Development Topics

1. Development of an integrated system for assisting evacuation and emergency response activities

Guaranteeing the evacuation of each and every citizen by supporting government extensive evacuation and emergency response activities

- Technology that contributes to national government disaster prevention activities by ensuring the prompt application of big data to ascertain social dynamics at the time of a disaster and swift use of satellites and other such equipment to observe, analyze, and interpret the state of damage
- Prediction technology to ensure the necessary lead time and accuracy required to ensure extensive emergency responses, evacuation activities, and other such measures across a region in the event of super typhoons and line-shaped precipitation system

2. Development of an integrated system for municipal government disaster response

Successfully providing support for judgements regarding evacuation advisories or orders by municipal governments

- Data processing technology to quickly analyze big data and automatically extract the information required to make judgements on the specification of evacuation areas and the timing of issuing evacuation advisories or orders

National government disaster response

Large-scale disaster

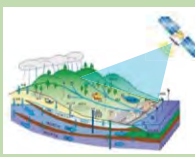
Predicting and analyzing the disaster situation

Developing a system for analyzing and sharing data on disaster situation by using AI and other technology to analyze satellite data and big data to ascertain the state of the disaster and share said information as necessary



Efficient securing of water resources

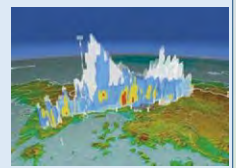
Securing emergency water resources and mitigating drought damage in the event of a disaster by developing a system for groundwater use which ascertains the sustainable amount of groundwater available for use in accordance with the state of damage to groundwater supply



Climate change

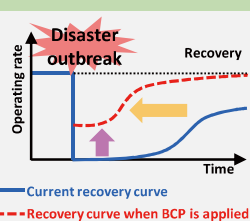
Measures in response to line-shaped precipitation system

Developing a combined system for observing and predicting line-shaped precipitation system caused by training thunderstorms, a system that will be used to specify evacuation areas and determine the timing of evacuation advisories or orders in the event that such rainfall causes flooding or landslides



Support for rapid restoration of wide-area economic activities

Developing a system to support rapid restoration of wide-area economic activities that will conduct the most effective assistance for emergency recovery by creating regional business continuity plans (BCPs) and promptly monitoring the state of damage to major infrastructure.



Support for evacuation and emergency response activities

Developing an integrated system to support evacuation and emergency response activities to ensure the secure implementation of extensive evacuation or emergency response activities and the provision of disaster information required for evacuation of each and every citizen in the event of a major disaster

Large-scale, extensive evacuation

Using every means available to gather disaster information required for evacuation and provide it to each and every citizen

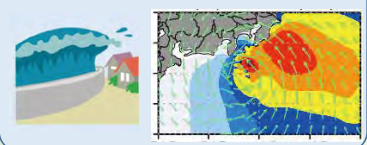


Operating evacuation shelters

- Ascertaining traffic levels and establishing diversion routes
- Optimal distribution of health and medical resources
- Matching supply of and demand for commodities

Measures in response to super typhoons

Developing a system to predict super typhoon damage, which can be used to estimate the storm tides or surges, river water levels, and flooding areas caused by super typhoons



Collaboration

Municipal government disaster response

Developing an integrated system for disaster response by municipal governments which uses AI to process large amounts of disaster information and automatically extract the information required to assist judgements on defining evacuation areas and the timing of issuing evacuation advisories or orders.



Defining evacuation areas
Timing of evacuation advisories or orders

Establishing an order of priority for emergency response activities

Municipal government disaster response

Implementation Structure

Overall responsibility is assumed by the Program Director, who is assisted by the Sub-Program Director. The innovation strategy coordinator supports practical implementation, while the managing body—the National Research Institute for Earth Science and Disaster Resilience (NIED)—acts as secretariat. Alongside the promoting committee, which serves as a forum for cooperation between the government ministries and agencies, they facilitate research and development and social implementation by universities, national research and development bodies, and private corporations.

