

International Research Institute of Disaster Science (IRIDeS), Tohoku University



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Outline

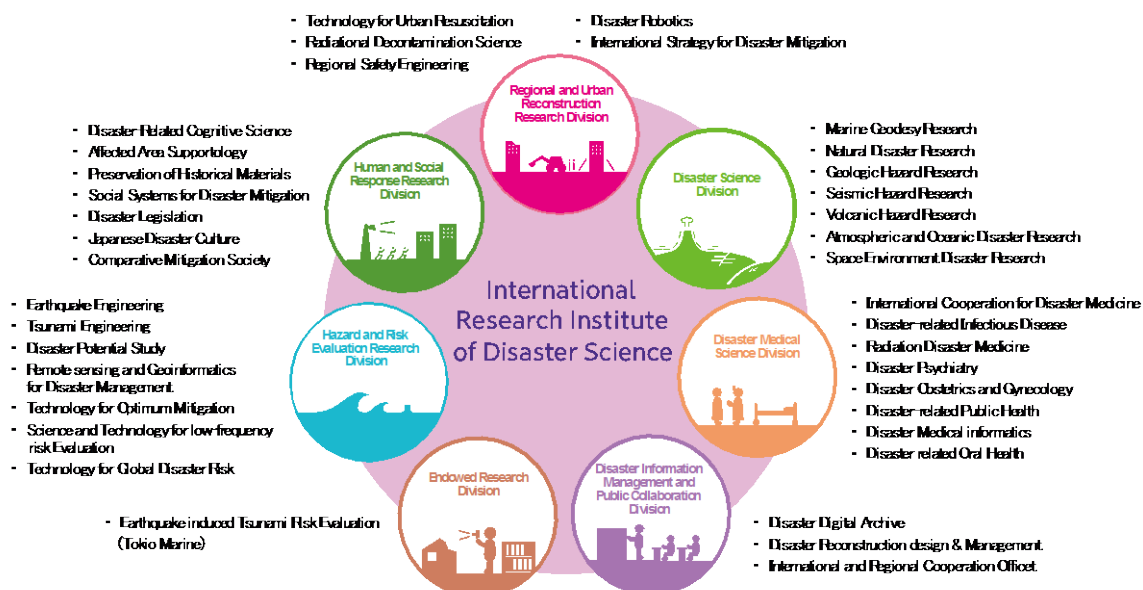
Having experienced the catastrophic disaster in 2011, Tohoku University has founded the International Research Institute of Disaster Science (IRIDeS). Together with collaborating organizations from many countries and world-leading research on natural disaster science and disaster mitigation. Based on the lessons from the 2011 Great East Japan (Tohoku) earthquake and tsunami disaster, IRIDeS aims to become a world center for the study of disasters and disaster mitigation, learning from and building upon past lessons in disaster management from Japan and around the world. Throughout, the IRIDeS will contribute to on-going recovery/reconstruction efforts in the affected areas, conducting action oriented research, and pursuing effective disaster management to build sustainable and resilient societies. IRIDeS innovates the past paradigm of Japan's and world's disaster management to catastrophic natural disasters, hence management and sciences.

Research Achievements and Challenges

Enhancing the cooperation with the local municipalities and governments in the affected areas, and contributing to their recovery and reconstruction efforts, the IRIDeS conducts the action-oriented research. We aim to create disaster-resilient societies to overcome the complex and diverse processes of forthcoming natural disasters, not only by preventing but also preparing and responding to them, and achieving recovery and renovation, hence to engender the culture of disaster-resiliency incorporating into our social systems. The action-oriented research of the IRIDeS focuses on;

1 Investigating the physics of global scale natural disasters such as mega-earthquakes, tsunamis and extreme weather

Organization of IRIDeS



- 2 Reconstructing disaster response and mitigation technologies based on the lessons of the 2011 Tohoku earthquake and tsunami disaster
- 3 Inventing "Affected Area Supportology" in the aftermath of natural disasters
- 4 Enhancing disaster-resiliency and performance of multiple-fail-safe systems
- 5 Establishing disaster medicine and medical service systems towards catastrophic natural disasters
- 6 Designing disaster-resilient societies and developing the digital archive system to pass the lessons from the disasters

In 2014, there are two main pillars that IRIDeS must focus on. One is the promulgation and propagation of "practical disaster prevention studies" and the other is deepening disaster research.

One specific part of our practical disaster prevention studies is our "Kakeagare! Japan", evacuation training. *Kakeagare! Japan* is a project that aims to habitualize evacuation behavior in preparation for a tsunami while tackling regional problems based on the lessons learned from the Great East Japan Earthquake. Tsunami evacuation drill programs are being planned and implemented in collaboration with industry, government and academia, including IRIDeS. We aim to have evacuation training that residents can voluntarily participate in. Having people think about detailed actions such as who they will evacuate with and which route they will take enables people to become accustomed to more practical evacuation behavior. Evacuation plans are an essential element of safe urban planning. I believe it is exactly what is required at the moment. I want us to also focus our efforts on disaster prevention education. From last year, we have been overseeing a reader on disaster prevention distributed to all elementary schools in Miyagi prefecture.

April 2014 we also started the "YUI" project for disaster risk reduction. The "YUI" project for disaster risk mitigation was started in April 2014 as a collaboration between IRIDeS and Sendai Television. A "YUI" pocket handkerchief printed with knowledge on disaster mitigation and disaster mechanisms is utilized to conduct school visits at elementary and junior high schools. "By conducting disaster prevention education for children, we can raise the disaster prevention awareness of families. We want disaster risk prevention to become common knowledge in society like traffic safety is now." says Ms. Mari Yasuda, who developed the "YUI" pocket handkerchief. The "YUI" pocket handkerchief was distributed to all 15th year elementary students in the prefecture from mid May, and is scheduled to be

utilized in the disaster prevention education at each school. We will continue to support each school in various ways so that they can conduct their own disaster prevention education. Another pillar that we must focus on this year is deepening research into events from occurrence to recovery when a disaster occurs. Last year, we developed a 3D tsunami simulation system in conjunction with Fujitsu. When a tsunami penetrates inland, its shape changes in a complex manner due to the buildings and geography. The 3D simulation enabled us



Activities

Conducting surveys on mental health during disasters in cooperation with towns clarified the necessity of continued care

Prof. Hideo Torii works on mental healthcare for disaster areas in cooperation with town governments. He conducted the first health survey in February, 2014. The survey found that almost a quarter of people that were in a post-disaster condition after the earthquake were still in a state of distress. He has been conducting surveys in a deep area after it takes time to rebuild. He says that it is important to continue to provide mental healthcare to disaster victims. He says that it is important to continue to provide mental healthcare to disaster victims. He says that it is important to continue to provide mental healthcare to disaster victims.

Learning from a handkerchief filled with knowledge "YUI" project for disaster risk mitigation

The "YUI" project for disaster risk mitigation was started in April 2014 as a collaboration between IRIDeS and Sendai Television. A "YUI" pocket handkerchief printed with knowledge on disaster mitigation and disaster mechanisms is utilized to conduct school visits at elementary and junior high schools. The "YUI" project for disaster risk mitigation was started in April 2014 as a collaboration between IRIDeS and Sendai Television. A "YUI" pocket handkerchief printed with knowledge on disaster mitigation and disaster mechanisms is utilized to conduct school visits at elementary and junior high schools.

Satellite office opened in Kesennruma hopes to promote communication between citizens and researchers

IRIDeS and IFOG opened its comprehensive collaboration project in July 2013 and IRIDeS opened its satellite office in Kesennruma in October 2013. The Kesennruma Satellite Office is a base for practical research activities, such as the "YUI" project for disaster risk mitigation. The Kesennruma Satellite Office is a base for practical research activities, such as the "YUI" project for disaster risk mitigation.

Tohoku University International Research Institute of Disaster Science NEWSLETTER
Conveying the results of practical disaster prevention research from TOHOKU to the World.

IRIDeS Quarterly

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Feature 1: How Japan can deal with earthquakes and tsunamis in cities
Feature 2: How Japan can deal with earthquakes and tsunamis in cities
Feature 3: How Japan can deal with earthquakes and tsunamis in cities
Feature 4: How Japan can deal with earthquakes and tsunamis in cities

"Soma Nomsohi" at Minamisoma city in Fukushima prefecture

the disaster

to view the inland movement of the tsunami in detail, which helps design evacuation buildings, etc. At the same time, we are conducting research into the mechanisms that cause earthquakes. A recent paper jointly published by Tetsu Miura, professor in volcanic hazard research, and Takashi Inuma, professor in marine geodesy research of the Disaster Science Division, was awarded best paper in 2013 by the Seismological Society of Japan. This research conducted a detailed analysis of tectonic fluctuation that occurred during the Great East Japan Earthquake based on GPS data. By deepening our research in each field, we have started to see openings for new types of research. We can further increase cooperation between fields to conduct more comprehensive activities.

Disaster mitigation management aims to reduce or avoid the potential losses from natural hazards, to assure prompt assistance to victims, to achieve rapid and effective recovery, and to build disaster-resilient and sustainable societies, by five stages of the disaster management cycle; Mitigation, Preparedness, Response, Recovery and Reconstruction. The action-oriented research of the IRIDeS is a pursuit of each point in the cycle, integrating and universalizing scientific discoveries to be dedicated to the world. IRIDeS creates a new academia of disaster mitigation that subsumes the lessons from the 2011 Tohoku earthquake and tsunami disaster and the findings of the world-leading research into our societies with the aim of establishing social systems capable to respond promptly, sensibly and effectively to natural disasters, withstanding the adversities with resiliency, passing and exploiting the lessons to the forthcoming disaster management cycles.

Preamble

Having experienced the catastrophic disaster in 2011, Tohoku University has founded the International Research Institute of Disaster Science (IRIDeS). Together with collaborating organizations from many countries and with broad areas of specializations, the IRIDeS conducts world-leading research on natural disaster science and disaster mitigation. Based on the lessons from the 2011 Great East Japan (Tohoku) earthquake and tsunami disaster, IRIDeS aims to become a world centre for the study of disasters and disaster mitigation, learning from and building upon past lessons in disaster management from Japan and around the world. Throughout, the IRIDeS will contribute to on-going recovery/reconstruction efforts in the affected areas, conducting action oriented research, and pursuing effective disaster management to build sustainable and resilient societies. IRIDeS innovates the past paradigm of Japan's and world's disaster management to catastrophic natural disasters, hence to become a foundation stone of disaster mitigation management and sciences.

Mission of IRIDeS

Disaster mitigation management aims to reduce or avoid the potential losses from natural hazards, to assure prompt assistance to victims, to achieve rapid and effective recovery, and to build disaster-resilient and sustainable societies, by five stages of the disaster management cycle: Mitigation, Preparedness, Response, Recovery and Reconstruction. The action-oriented research of the IRIDeS is a pursuit of each point in the cycle, integrating and universalizing scientific discoveries to be dedicated to the world. IRIDeS creates a new academia of disaster mitigation that subsumes the lessons from the 2011 Tohoku earthquake and tsunami disaster and the findings of the world-leading research into our societies with the aim of establishing social systems capable to respond promptly, sensibly and effectively to natural disasters, withstanding the adversities with resiliency, passing and exploiting the lessons to the forthcoming disaster management cycles.

Visions of IRIDeS

Enhancing the cooperation with the local municipalities and governments in the affected areas, and contributing to their recovery and reconstruction efforts, the IRIDeS conducts the action-oriented research. We aim to create disaster-resilient societies to overcome the complex and diverse processes of forthcoming natural disasters, not

only by preventing but also preparing and responding to them, and achieving recovery and renovation, hence to engender the culture of disaster-resiliency incorporating into our social systems. The action-oriented research of the IRIDeS focuses on:

- Investigating the physics of global scale natural disasters such as mega-earthquakes, tsunamis and extreme weather
- Reconstructing disaster response and mitigation technologies based on the lessons of the 2011 Tohoku earthquake and tsunami disaster
- Inventing "Affected Area Supportology" in the aftermath of natural disasters
- Enhancing disaster-resiliency and performance of multiple-fail-safe systems in regional and urban areas
- Establishing disaster medicine and medical service systems towards catastrophic natural disasters
- Designing disaster-resilient societies and developing the digital archive system to pass the lessons from the disasters

Organization of IRIDeS



Logo mark



English name

IRIDeS
Iris, Iris laevigata or Japanese Iris
Symbol of hope and nobility

Logo meaning

It is the deformed image of the Japanese character of disaster (災, wazawai) turned upside down, based on the idea of Japanese saying "Turn your misfortune to good account". It represents our mission of learning the lessons from the 2011 Tohoku earthquake and tsunami disaster and pursuing effective disaster management to build sustainable and resilient societies. Iris is the symbol of "hope" and "dignity".

Projects	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Comprehensive study on the 2011 Tohoku earthquake and tsunami disaster	Surface geodesy measurements	Geological investigations of the 2011 Tohoku earthquake and tsunami	Technology enhancement of early detection of earthquakes and tsunamis by GPS and/or ground-based measurements	Geomatic and volcanic interactions: 3D and long-term prediction of earthquakes and volcanic hazards	Early tsunami detection by offshore tsunami monitoring and offshore geodesy measurement	Modeling volcanic source processes of mega-earthquakes				
Digital archive system of natural disasters	Developing the digital archive of the 2011 Tohoku earthquake and tsunami	Standardization of metadata structure of the digital archive	Disaster education program using the digital archive	Establishing the world standard of disaster digital archive	Utilization of the disaster digital archive for disaster response					
Resilience for disaster management	Enhancement of disaster-resilient societies and contribution to disaster relief	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response	Development of warning technologies for disaster response
Assessment of the impact of the 2011 Tohoku earthquake and tsunami disaster	Assessing the structural damage by the strong ground motion	Uncovering the damage mechanism of the 2011 Tohoku earthquake and tsunami disaster	New generation warning system	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake	Development of next-generation earthquake tsunami warning system for mega-earthquake
Development of warning and monitoring technologies for early earthquake and tsunami warning systems	Developing tsunami highly sensitive and low-cost monitoring system	Remote sensing approach for assessing the impact of the earthquake and tsunami	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing	Disaster recovery and reconstruction monitoring by remote sensing
Inventing "Affected Area Supportology" in the aftermath of natural disasters	Developing processes underlying human perception of and behavior against risks	Developing new approaches to building comprehensive national response or sectors from the national disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster	Establishing technologies of preserving cultural heritage and historical materials for passing the lessons from the catastrophic disaster
Establishing disaster-resilience and medical service systems towards catastrophic natural disasters	Establishing disaster-resilient societies	Reducing risks of disaster-related infectious diseases	Requirements analysis for disaster medical information	Establishing disaster medical information	Establishing disaster medical information	Establishing disaster medical information	Establishing disaster medical information	Establishing disaster medical information	Establishing disaster medical information	Establishing disaster medical information
Development of new disaster mitigation systems for catastrophic natural disasters	Technology development towards comprehensive disaster mitigation systems	Establishing the design of comprehensive disaster mitigation systems	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation	Enhancing the feasibility of comprehensive disaster mitigation systems and its implementation

Lessons learned from the 2011 Tohoku earthquake toward disaster reconstruction towards disaster-resilient societies