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FY 2021

2021 EDGE-NEXT Common Fundamental Project
Ministry of Education, Culture, Sports, Science and Technology-JAPAN

Entrepreneurship Program for Resilient Society

Future Resilience through Review of the Reconstruction Process

A REPORT

Program Overview

During the 20-year period between 2000 and 2019, there were 7,348 disaster events recorded worldwide by the Emergency Events Database of the Centre for Research on the Epidemiology of Disasters (CRED), one of the foremost international databases covering emergency events. In total, disasters claimed 1.23 million lives, in addition to affecting more than 4 billion people. Furthermore, disasters led to approximately US $2.97 trillion in economic losses worldwide (The Human Cost of Disasters 2000–2019, CRED and The United Nations Office for Disaster Risk Reduction, 2020). The extent of disaster impacts depends on multiple factors, including the type of hazard, its location and the contexts of communities, like politics, economy, technology, culture, and other such considerations. In light of the intensification of many environmental hazards and the complex interactions thereof, risk reduction strategies and decision-making activities need to scrutinize integrative, multiscale and multifaceted aspects.

In Japan, due to its location, many significant earthquakes, tsunamis, typhoons, and heavy rains have occurred: the Great Hanshin-Awaji Earthquake in 1995, the Great East Japan Earthquake in 2011, the Western Japan Floods in 2018, Typhoon Hagibis in 2019. As an island nation, we can observe different recovery processes and phases at the same time. Kobe is a city where the recovery and reconstruction process from the damages caused by the Great Hanshin-Awaji Earthquake has been finished, and we can assess the long-term effects as well as the impacts of “Build Back Better” that can be observed through the process. Tohoku is a region where some cities and towns were hit hard by the Great East Japan Earthquake and tsunami, with recovery efforts still ongoing. We can evaluate the recovery process for these ten years and provide feedback on strategies for the decade ahead.

In this program, you will study entrepreneurship for disaster risk management, by studying the disaster damage and recovery processes in Kobe and Tohoku, and by planning a project for disaster prevention and mitigation. You will discuss the subject of disaster management as a social problem, together with faculty and students from different universities.

This program is implemented by the consortium EARTH on EDGE as part of the Ministry of Education, Culture, Sports, Science and Technology (MEXT) EDGE-NEXT project.

(Cover photo)
JR Onagawa Station in Miyagi Prefecture
(Back cover photo)
Ocean View from the JR Onagawa Station in Miyagi Prefecture

About EDGE-NEXT

Exploration and **D**evelopment of **G**lobal **E**ntrepreneurship for the **Next** Generation

Entrepreneurship training programs subsidized by MEXT.

In order to stimulate innovation and economic growth in Japan, educational programs are provided by five consortiums with universities that share academic and extracurricular resources open to all students across all institutions. It aims to encourage entrepreneurship in graduate students and junior researchers with expertise in their particular domains as well as under graduate students, who lead to promote university startups.

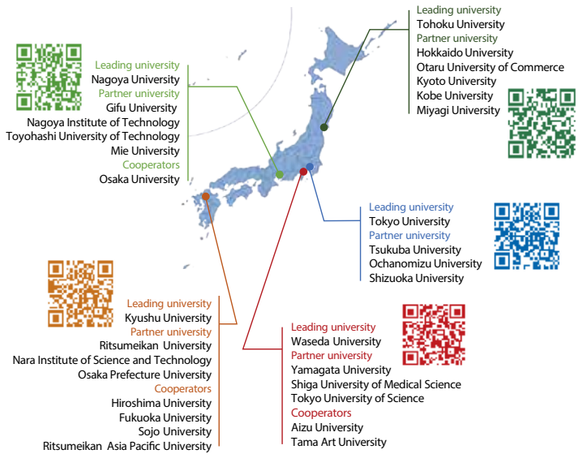
About EARTH on EDGE

Entrepreneurial **A**ction **R**enaissance in **T**ohoku and Hokkaido on **EDGE-NEXT**

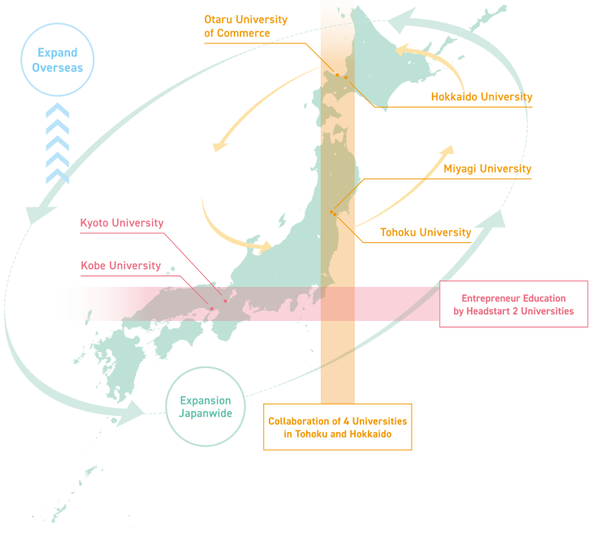
A consortium of six universities focusing on innovation in the Tohoku and Hokkaido areas.

EARTH on EDGE, one of the EDGE-NEXT consortiums, is a new value creation platform consisting of six universities: Tohoku University (principal university), Hokkaido University, Otaru University of Commerce, Miyagi University, Kyoto University, and Kobe University. The vision for entrepreneurship education under the EARTH on EDGE is to cultivate talented entrepreneurs who create (1) new industries originated from regional characteristics and from global market-in strategy, and (2) vitalize local communities in order to tackle with social problems Japan faces such as population decline, aging society, prolonged economic stagnant and environmental issues. To accomplish this goal, we will establish practical and sustainable education system in cooperation with industries, academic communities, public and financial sectors including startups and advanced foreign institutions which form innovation ecosystems.

EDGE-NEXT



EARTH on EDGE

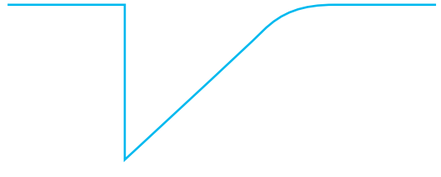


What Is a Resilient Society?

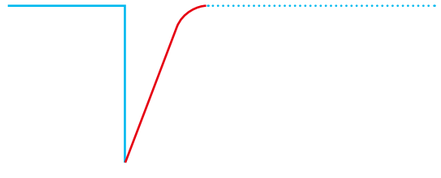
The word “resilience” generally means “the elasticity, restorative force, capacity to recover from illness, etc., or toughness” (Digital Daijisen, Shogakukan Inc.). It is a word used more recently in the context of psychology to refer to “processes or capabilities that adapt deftly despite circumstances posing difficulties and threats.” Moreover, the concept of resilience has come to be seen as a crucial capacity for disaster prevention and mitigation which must be found within industrial and governmental organizations, not to mention in the social and economic fields.

For this program, “resilience” is defined as “the capacity of a system, enterprise, or a person to maintain its core purpose and integrity in the face of dramatically changed circumstances” (Andrew Zolli and Ann Marie Healy, Resilience, 2013), and a resilient society as “a society that can maintain its core purpose and integrity in the face of dramatically changed circumstances." It is supposed that a resilient society is one that can achieve the following three states.

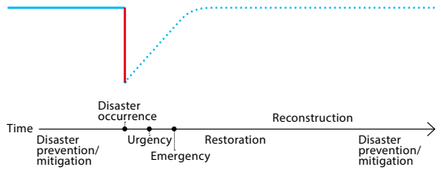
0. A non-resilient society



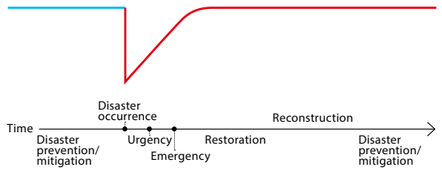
1. A state of rapid recovery from damage



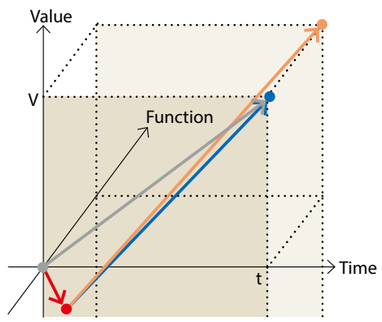
2. A state of minimal damage when disaster occurs



3. A state in which 1 and 2 exist together



Rather than trying to restore society to the same circumstances found before the damage caused by a disaster, achieving a resilient society in the future will most certainly require a new mindset of creative restoration. We must aim for regeneration in a form that improves on the past light of our newfound clarity on how our living spaces were exposed to high risk of earthquake and tsunami (Nobuaki Hamaguchi, On Creative Restoration, 2013). We must also encourage activity that builds new regional histories (Toshihiko Hayashi, Economics of Major Disasters, 2011).



Human Resources Driving Construction of a Resilient Society

Based on the definition of resilience and the concept of creative restoration put forward by Andrew Zolli and Ann Marie Healy, this program defines the "human resources that drive the construction of a resilient society" as "people who create and sustain enterprises that give rise to creative value by discerning the vulnerabilities of social systems and forecasting the changes brought on by disaster." We believe that having the following four capabilities - together with basic entrepreneurial skills and ability - will drive construction of a resilient society through the design and realization of new enterprises, in bringing about reconstruction and disaster prevention and mitigation.

1. Discerning the vulnerability of social systems

The causes of vulnerability in social systems can be divided into (1) design, (2) realization and (3) operation. Moreover, even within the same social system, different vulnerabilities may emerge depending on the context (historical, cultural, geographical, industrial, etc.).

2. Predicting extreme events and their impacts

Rather than merely understanding current circumstances, it is necessary to forecast the ways in which society could change due to potential future disasters.

3. Adopting the three perspectives of self-help, mutual aid, and public support

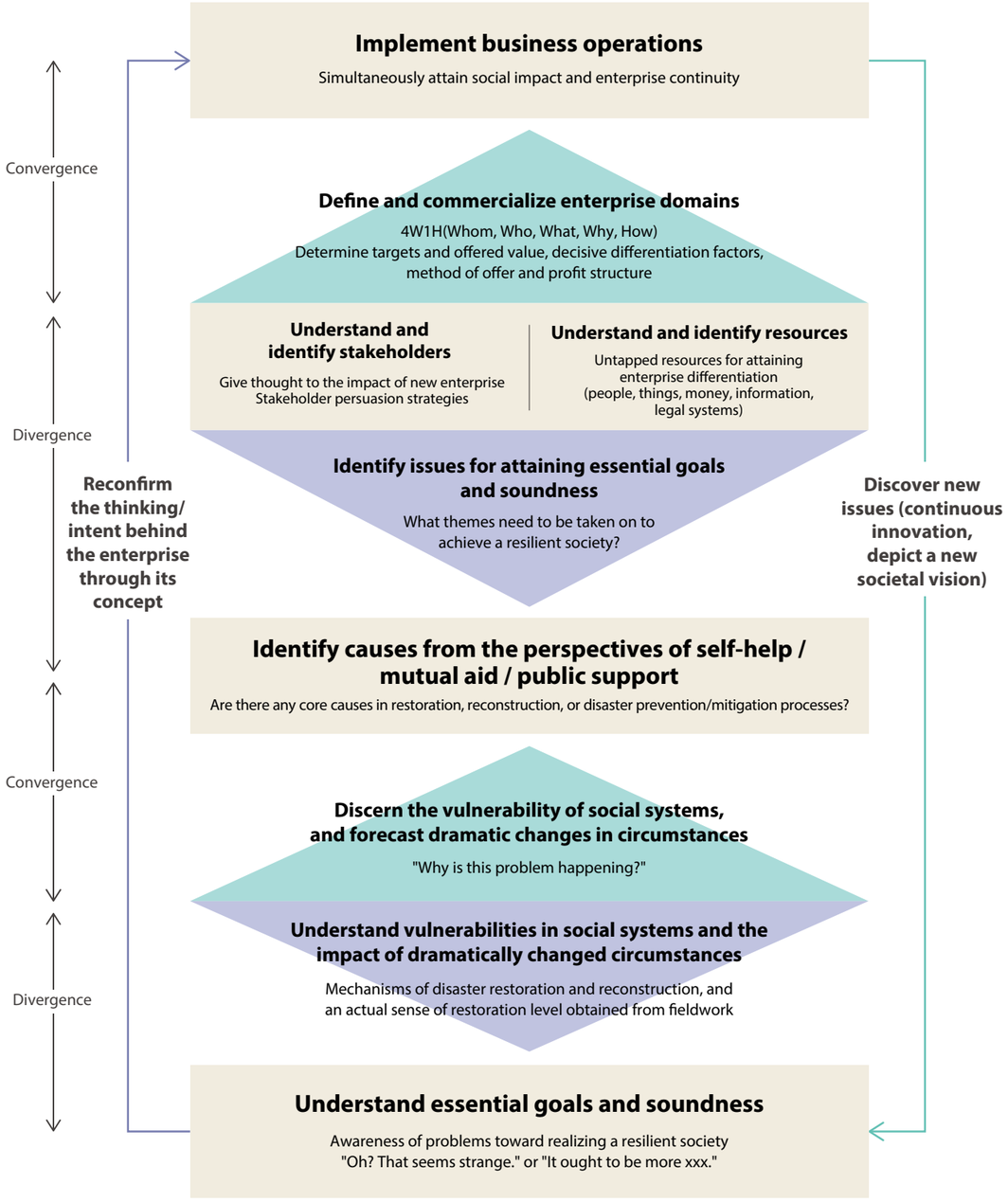
By making use not just of individual personal abilities but also of local communities and governments as well as the national government, enterprises that contribute to reconstruction and disaster prevention and mitigation can improve the potential for instituting and sustaining results.

4. Establishing economic value and social value related to reconstruction and disaster prevention and mitigation

We aim to achieve sustainability of enterprises by providing economic value simultaneously with value related to reconstruction and disaster prevention and mitigation (social value).

Program Process Frame

In considering a project which contributes to the construction of a resilient society, we designed this program assuming that the project makes advances by intercommunicating with processes (iteration).



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(In no particular order)

Schedule Overview

Aug. 26 **Special** Orientation

Discerning the Vulnerability of Social Systems and Predicting Extreme Events and Their Impacts

Aug. 30 **Lecture 1** Workshop on Systems Thinking 1

Sept. 4 **Lecture 2** Workshop on Systems Thinking 2

Sept. 8 **Lecture 3** Disaster and Social Issue: Presentation and Discussion

Lecture material 1 Introduction to Systems Thinking

Lecture material 2 VR-Field Work at Tokushima City

Lecture material 3 VR-Field Work at Okawa Elementary School Site, Miyagi Prefecture

Lecture material 4 Vulnerabilities of Social Systems

Lecture material 5 Disaster Mitigation Based on Study of Historical Heritage Assets

Lecture material 6 Computational Simulation of Natural Disasters (TBC)

Lecture material 7 Increased Hazards Due to Simultaneous Occurrence of Pandemics and Disasters

Lecture material 8 Psychological Aspects of Disasters

Self-help / Mutual Aid / Public Support

Sept. 10 **Lecture 4** Workshop on Self-help, Mutual Aid and Public Support

Sept. 11 **Lecture 5** VR-Field Work and Discussion: Ogatsu and Onagawa, Miyagi Prefecture

Lecture material 9 Creating Resilience Based on Public-Private Cooperation at Local Community - Case Study of Onagawa -

Lecture material 10 Vulnerabilities of Society and Adaptive Systems - Case Study of BCP

Lecture material 11 The Great East Japan Earthquake Recovery - Example of Public Housing Reconstruction

Lecture material 12 Stakeholders and Resources: Cases through Use of Subsidiarity Framework

Social and Economic Values

Sept. 12 **Lecture 6** Workshop on Business Modeling: Achieving a Balance between Social and Economic Values

Lecture material 13 Achieving a Balance between Social and Economic Values

Sept. 17 **Special** Progress–Presentation and Feedback

Sept. 18 -24 **One-to-one instruction**

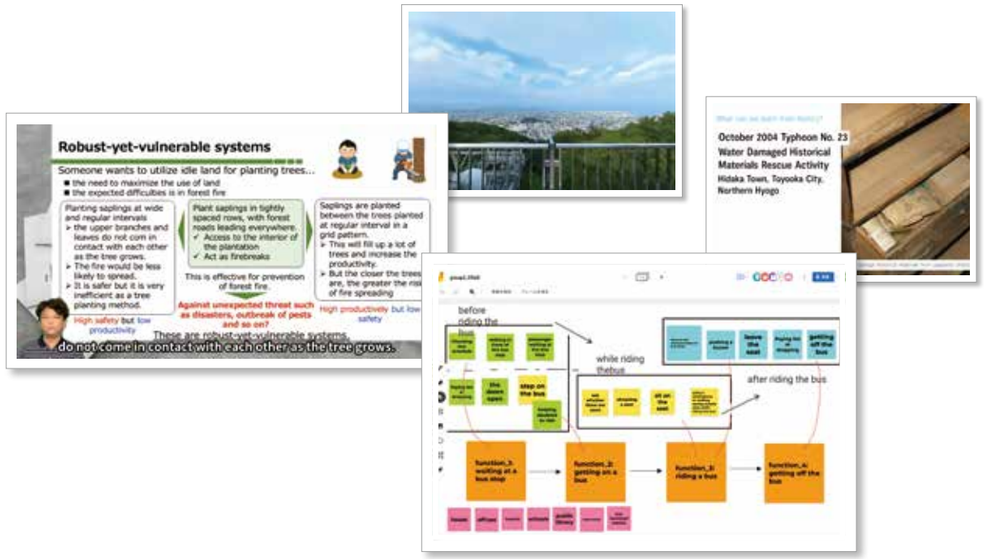
Sept. 25 **Special** Final Presentation

On demand
Real time

Lectures 1 to 3 / Lecture materials 1 to 8

Discerning the Vulnerability of Social Systems and Predicting Extreme Events and Their Impacts

Students were introduced to the ideas of systems thinking and system architecture. They enhanced their understanding about the vulnerabilities of social systems and the drastic changes in circumstances, and their effects on the system. Moreover, they expanded upon this understanding to learn about the state of damage and reconstruction process after the Great East Japan Earthquake while viewing historical materials such as videos of regions affected by the earthquake and data about the damage. These lectures also considered the role of historical heritage in post-disaster recovery, the psychological impact of disasters, and appropriate approaches for evacuation during the COVID-19 pandemic. During the real-time lectures, students learned techniques to flesh out their business ideas by creating systems charts, context analysis diagrams, and other plans in workgroups.



Lecture 1

Workshop on Systems Thinking 1

Aug. 30
Keiko Gion (Associate Professor, V.School, Kobe University)

Professor Gion introduced the idea of systems thinking to the students through the case of "Resil Town," an imaginary community in Japan.

After breaking into five groups, students discussed ideas for the Resil bus service and drew a practical systems chart. During this group work, the lecturer provided guidance on the importance of illustrating relationships and learning concepts while moving on to presentations in the full session.

Lecture 2

Workshop on Systems Thinking 2

Sept. 4
Keiko Gion (Associate Professor, V.School, Kobe University)

In this systems thinking workshop, the students learned about the system architecture needed to identify the vulnerability of social systems, predict extreme events, and their impacts.

The lecturer explained what should be identified within the system architecture and used the example of a skewer. Students analyzed system contexts according to the politics, law, economics, technology, environment, culture, and human (PLETECH) framework.

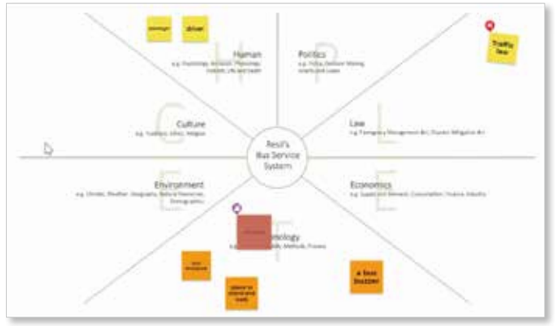
Lecture 3

Disaster and Social Issue: Presentation and Discussion

Sept. 8

Hiroki Tsuruta (Associate Professor, V.School, Kobe University)

A group discussion is held for students to share their thoughts about disasters and social issues with the PLETECH framework.



Lecture material 1

Introduction to Systems Thinking

Keiko Gion (Associate Professor, V.School, Kobe University)

When tackling how to build resilient society, the vulnerability of social systems must be identified while predicting extreme events and their consequences. These are very complicated issues, but systems thinking helps make these complicated problems less complicated. It looks at the given problem as a set of interrelated entities, and a process of discovery and diagnosis. The main challenges are to look at all the elements of the system, consider their relationships to see the whole picture, and then break it down to review the desired outcome. The mutually exclusive and collectively exhaustive (MECE) principle is one of the tools which allows to see things from multiple perspectives by drawing logic trees. The PLETECH framework helps to analyze the context influencing a resilient system.

Lecture material 2

VR-Field Work at Tokushima City

Junko Kanai (Assistant Professor, Faculty of Science and Technology, Tokushima University)

Kazuyoshi Kitaoka (Associate Professor, Institute of Liberal Arts and Sciences, Tokushima University)

Students were taken on a virtual trip to Tokushima, located in Shikoku, a 145-kilometer, two-hour drive from Osaka. The 70–80% probability of a very strong earthquake in the Nankai Trough is predicted within the next 30 years. Business activities and disaster prevention were introduced using the example of Tokushima Toyota Motor Corporation, over 50% of the vehicle market in Tokushima. By focusing on a new generation of eco-friendly vehicles to achieve carbon neutrality, a project based on CSR and cooperation with municipalities to provide power to vehicles in emergencies. Toyota contributes to the resilience of the society and assures the sustainability of the business.

Lecture material 3

VR-Field Work at Okawa Elementary School Site, Miyagi Prefecture

Yuto Naganuma (Storytellers Group of Okawa Area, Japan)

Yuto Naganuma, a storyteller and one of the survivors from of the March 2011 disaster in the Okawa area, took students on a virtual trip to the Okawa school site. He talked about what happened when the tsunami destroyed the school.

Lecture material 4

Vulnerabilities of Social Systems

Hiroki Tsuruta (Associate Professor, V.School, Kobe University)

In the lecture, the definitions of a social system and its vulnerabilities, were presented and explained using examples of tree planting. Understanding the vulnerabilities of a system is necessary to predict how the system will contribute as a catalyst for resilience. The methodology used to estimate the vulnerabilities of the system is the PLETECH perspective. Using PLETECH's seven processes, estimates can be constructed where they exist, and solutions worked upon. Considering the vulnerabilities points of social systems, the PLETECH allows us to understand the system target and the essence of existing problems and thus create a fully functioning system.

Lecture material 5

Disaster Mitigation Based on Study of Historical Heritage Assets

Masakazu Matsushita (Associate Professor, Office of Promoting Regional Partnerships, Kobe University)

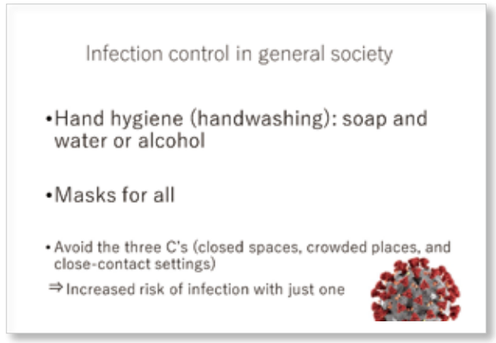
Professor Matsushita talked about the activities of preserving historical documents and supporting reconstruction in disaster-affected areas. In 2002, the Center for Regional Partnership was established in the Graduate School of Humanities at Kobe University. It works with local groups, such as the prefectural government, municipalities, resident groups, and residents' associations, to carry out community development projects that utilize historical culture. Professor Matsushita explained the importance of preserving historical documents and of working with specialists as well as generalists to quantify historical documents, contribute to the reconstruction process, and fill in the gap between ideas and reality.

Lecture material 7

Increased Hazards Due to Simultaneous Occurrence of Pandemic and Disasters

Goh Oji (Associate Professor, Research Center for Urban Safety and Security, Kobe University)

First, Professor Oji introduced the characteristic of the novel coronavirus (COVID-19), explained its infection route and prevention methods. He also detailed different types of disasters and their countermeasures, warning that those natural disasters during a COVID-19 pandemic pose additional complex problems with a list of questions to consider when evacuating. The hexagon exploration tool was presented to students for them to properly and objectively evaluate the situation. The tool shows which indicators should be evaluated in terms of organization (capacity, fit, need) and countermeasure (evidence, usability, support).

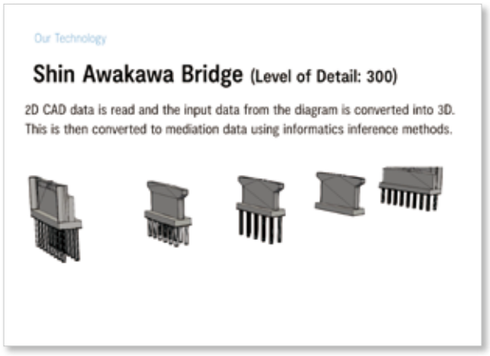


Lecture material 6

Computational Simulation of Natural Disasters

Satoru Oishi (Professor, Graduate School of Engineering, Kobe University)

The specialty of Professor Oishi is the application of meteorology to civil engineering. This discipline uses meteorological forecasts to organize dams and sewage systems. The human-centered society (Society 5.0) based on systems that highly integrate cyberspace and physical space, achieves its goals of economic development and finds solutions for social issues through digital transformation. Professor Oishi provided an overview of how the integration of these two spaces through digital twin models and digital ensembles can be used to achieve a safe society. The lecturer also touched on examples of supercomputer simulations to estimate the scale and frequency of damage as well as the challenges of the technology.



Lecture material 8

Psychological Aspects of Disasters

Seiichi Saito (Associate Professor, Graduate School of Human Development and Environment, Kobe University)

The magnitude of damage depends not only on the type of disaster but also on the nature of the society. In this lecture, students learned to understand the emotional dynamics of disaster victims. Professor Saito described how the psychological situation of disaster victims changes during the acute, reaction and recovery phase, and described post-traumatic stress disorder (PTSD), acute stress disorder (ASD), and other mental symptoms seen in disaster victims, such as grief and complicated grief. His lecture divided psychological support for disaster victims into three stages and introduced the role of mental health assistance deployed to disaster areas, and counselors at each level of care. Finishing the lecture, he pointed out what should be paid attention to when interviewing actual disaster victims.

Lectures 4 to 5 / Lecture materials 9 to 12

Self-help / Mutual Aid / Public Support

Students learned about the idea of self-help, mutual aid, and public support, and their vulnerabilities when a disaster occurs on two examples of companies operating in the post-disaster area: Otsuka Pharmaceutical Factory, which has its head office in Tokushima Prefecture and BC Cooperation Nadeshiko. The students learned about recovery process of Tohoku and the cooperation of private and public sector to strengthen disaster response capabilities as well as the housing reconstruction of Sendai.

Lecture 4

Workshop on Self-help, Mutual Aid, and Public Support

Sept. 10
Takayuki Tomobuchi (Assistant Professor, School of Project Design, Miyagi University)
Yu Ishida (Professor, School of Project Design, Miyagi University)

Takayuki Tomobuchi comes from Wakayama and was studying in Kesennuma city when the Great Earthquake struck. Since then, he has been helping to reconstruct the city. Yu Ishida comes from Osaka, and in 2016, he moved to Miyagi University, where his work is dedicated to the problem of disasters.

This analytical workshop allows students to understand self–help, mutual aid, and public support working in a different background (such as the city size, type of area, etc.) and on specific examples. It also concerns the latest pandemic situation. Some countermeasures were organized in the framework of different types of aid. Students were engaged to think about different conditions and issues they should address while operating a business for a resilient society. The exercise was followed by group discussions. The workshop goal was for students to answer the question of how their projected business contributed to different parts of the aid.

Lecture material 9

Creating Resilience Based on Public-Private Cooperation at Local Community - Case Study of Onagawa -

Takahiro Aoyama (Head of Public and Private Cooperation Office, General Affairs, Onagawa Town)
Hideki Doi (Public and Private Cooperation Office, General Affairs, Onagawa Town)

A virtual trip in Onagawa was held during which students could find themselves in the area of Onagawa, affected by the earthquake and tsunami, and experience the extent of the disaster through VR goggles. The lecturers provided and overview of the reconstruction process in Onagawa. The fishing industry was in the low-lying town near the sea, where almost 90% of the buildings were damaged during the disaster.

The reconstruction process aimed to rebuild lively market-driven town with active community of citizens, vivid economy, and based on a cooperation between private and public sector.

Being proud to live nearby the sea, Onagawa people decided to protect their identity and maintain the character of the city open to the sea, and not to install the seawalls. The residential areas were instead established on a higher ground, and commercial areas on lowlands relatively closer to the sea. Onagawa people recognized the importance of self-determination through open discussion between residents and the government.

Lecture material 10

Vulnerabilities of Society and Adaptive Systems - Case Study of BCP -

Example 1
Kayo Sato (BC Cooperation Nadeshiko)
Yasufumi Yuasa (Research Center for Management of Disaster and Environment, Tokushima University)

This example introduces the BC Corporation Nadeshiko initiatives for facilitating cooperation between 18 construction companies in Tokushima, Okayama, Wakayama, and Kochi prefectures in the event of a disaster. The Business Continuity Plan and effective tool was used not only during the time of disaster, but also during daily operation because of its human resources development benefits and examples of best practice. BCP is based on the observation that during the time of crisis when the cooperation of competing companies is necessary, the process is much easier when women employees are involved as office workers facilitating communication between parties as well as part of the "Nadeshiko Patrol".

Example 2
Kana Sumiyoshi and Takeyasu Nishiwaki (Otsuka Pharmaceutical Factory)
Yasufumi Yuasa (Assistant Professor, Research Center for Management of Disaster and Environment, Tokushima University)

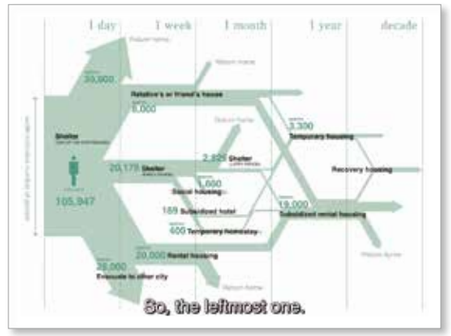
Otsuka Pharmaceutical manufactures the majority of infusion solutions produced (IV solutions) in Japan, which are used to normalize the body's fluid metabolism. This company considers a stable supply of pharmaceutical products backing up the on-site medical infrastructure during disasters as its corporate social responsibility and has positioned its Business Continuity Plan (BCP) as part of its management strategy to fulfill this obligation as well as to maintain the sustainability of the business. The presentation gives an overview of the company's disaster preparedness plan, which takes into account measures from the following perspectives: ensuring the safety of life, preserving corporate assets, securing sufficient product inventory and raw materials as well as securing the means of distribution.

Lecture material 11

The Great East Japan Earthquake Recovery – Example of Public Housing Reconstruction

Masashige Motoe (Associate Professor, Graduate School of Engineering, Tohoku University)

The 2011 off the Pacific coast of Tohoku Earthquake destroyed more than 350,000 homes partially or completely. To visualize the extent of the damage, Professor Motoe used the photos he took after the disaster. After, using a diagram, he explained the process of rebuilding or recovering houses by the inhabitants of the region in the decade after the disaster. As the first response, a few months after the earthquake, various ideas and regulations were applied to provide shelter to people: evacuation centers, public housing, subsidized hotels, temporary homestays, etc. In the longer term, new problems emerge. Victims may gain access to temporary housing or subsidized rental housing, but quality and location are issues, as well as different the needs of people in rural and urban areas. When such a large-scale disaster occurs, various resources and countermeasures are required.



Lecture material 12

Immediate Issues and the Vulnerability of the Three Aids

Takayuki Tomobuchi (Assistant Professor, School of Project Design, Miyagi University)
Yu Ishida (Professor, School of Project Design, Miyagi University)

During this lecture, three types of aid were reviewed: self–help, mutual aid, and public support. First, Professor Ishida explained the definition and meaning behind these terms in forming a resilient society. During the time of the disaster, the circumstances changed, revealing vulnerabilities with different issues that therefore should be taken into account in preparing for the times of emergency. Showing examples of the situation after the Kobe earthquake, he demonstrated that the importance of self-help and mutual aid as much more effective in rescuing people as a first response after the disaster than public support.

Lecture 5

SPECIAL LECTURE

Sept. 11

VR–Field Work and Discussion: Ogatsu and Onagawa, Miyagi Prefecture

Lecturers and survivors of the affected Ogatsu area invite VR-field work at Ogatsu and Onagawa. They talked about what happened in its recovery and reconstruction process. Mr. Yoshihide Abe and Mr. Akinari Abe were invited as lecturers to the real-time lecture and dialog with students on 10th September.

The Lecture was interpreted by Associate Prof. Eilzabeth Maly and Assistant Prof. Julia Gerster from IRIDeS,Tohoku University.

SESSION 1

Yoshihide Abe
Vice President, Onagawa Town Society Commerce, and Industry
CEO, Onagawa Future Planner LLC
CEO, Onagawa Future Creation Co., Ltd.

The first presentation was given by Mr. Yoshihide Abe. His regular work is managing newspaper delivery but he plays an important role in the community recovery planning. He understands the necessity of strengthening the resilience of his community as an important factor for the sustainability of his business.

To explain how Onagawa became a place with many new, creative businesses where young people, who used to leave the town, are now coming back to. Yoshihide first explained the history of Onagawa. It was once a small village that was gradually built into a larger town by reclaiming the land from the ocean. Its fishing business prospered. On March 11th, 2011 the town was hit by the earthquake and tsunami and was destroyed. After the disaster, a long process of recovery started using a unique approach of piling up the soil to lift the ground level so people could safely live on the higher ground. During the process of reconstruction, the Recovery Committee of the town decided to not only rebuild the town taking into account safety and disaster preparedness but also address other issues, such as the aging of the society, to create a functioning and resilient town of the future. Then, a boot camp was organized to come up with good ideas for the town. The local business was revitalized by organizing a farmer's market, promotion of local products online, as well as a new approach to ownership of service areas in order to avoid the "shutter street". Also, many other ideas were implemented to build well functioning structures like rebuilding real estate values and creating an inner economic circle.

Yoshihide pointed out a very important factor behind the reconstruction process, which was the philosophy of a positive approach – the attitude of not thinking about what they are lacking but what they have and investing in people who can move to the town and remain for a long time.

[Questions and Answers]

Should there be more anti-tsunami measures, and also measures to save people from the tsunami. What about tsunami measures for tourists and people who are coming from outside?

This is a very timely question. We are thinking about it right now. Lately, there has been a big earthquake this year late at night and there was a tsunami warning. There were people in the restaurants and bars and the staff managed to take care of the customers, and showed them which way to evacuate, but it was quite a challenge. Even if they managed to evacuate people successfully, now we are thinking about how to improve it. It's perhaps necessary to put up more signage, or undertake another measure. Every year, we have a tsunami evacuation drill for people, but now we are also planning to prepare a drill for the restaurant's staff and owners on how to practice evacuating with customers at night.

What about the measures against other types of disasters like landslides or typhoons?

Onagawa is built on a very hard geological formation, on the stone. Even building any structure requires extra measures such as using dynamite. This type of land reduces the intensity of the earthquake in Onagawa. Also, the land is quite stable, so the risk of the mudslide is quite low.

The disaster recovery for public housing is a reinforced concrete building, so it is relatively safer to stay in this building.

How about the connection between the commercial area and the residential area. What are the transportation challenges?

Everyone in this area has a car. Of course, some elderly people do not use their own transportation and for the few people that do not have a car, there is a bus provided. We think about how to improve it because now it takes a long time to go from the first stop to the last one as it circles around. The challenge is to make the travel shorter.

How do you deal with the declining population?

The aging population is a difficult problem and we face this issue all across Japan. Of course, it is one of the problems we are addressing, and we think of new ways of how to create this modern, lively, successful town. We have a program of trial residency in the town, and we are trying to attract younger people, so not only we are focused on the people that are leaving, but also on those who are staying.

What about the international human resources?

We are not using them very much. There is not much activity in terms of international human resources. There is a trainee program, and we invited about 200 Vietnamese workers in the fish processing industry. However, we have a program of student-based activities, and there is HLAB - Harvard Business School project linked with Tohoku University and other universities. We also have connections with Japanese and foreign students that participate in the summer school program each year, for the past five years. However, this school was held remotely during the COVID time.

What are your activities to support islands?

There are two islands, Enoshima and Izushima, and their population is rather small. Only 100 people registered in Izushima and 20 in Enoshima. One of the activities planned for the future to support these communities is to build a bridge because the only way to evacuate now is by helicopter. Another idea is to build a tunnel for easier evacuation to Sendai.

What is the profile of people who move to Onagawa?

There are three main groups of people. First of all, during the COVID time, some of the those who moved to Onagawa are IT workers who can work anywhere. The second group is people who love mountains. The third group have made connections with people in Onagawa, and because of that decided to search for work there and move to Onagawa.

How can you explain the increasing value of land in Onagawa?

One of the reasons is people want to move to Onagawa because of personal connections, and therefore create a demand for land in the town. The amount of land in Onagawa is pretty limited, so there is not so much can be used as a residential or service area. Also, before the disaster, the parcels of land were very small. We started the process of consolidating them into bigger parcels and this also contributed to the increase in land value.

Lecture 5 Sept. 11

SPECIAL LECTURE

VR–Field Work and Discussion:
Ogatsu and Onagawa, Miyagi Prefecture

SESSION 2

During the disaster of the Great Earthquake and tsunami, Akinari Abe was only 22 years old. When the disaster struck, he was helping his parents with their home appliance sales business. He drifted all night in Ogatsu Bay, but luckily, he was rescued.

During the lecture, he first presented his life story and the endeavors of creating a new business and the struggle connected with it. Then, he compared circumstances before and after the disaster in Onagawa and Ogatsu, presenting aerial photographs of both towns before and after the disaster. Students saw the visual representation of the drastic changes in conditions due to the tsunami and viewed data about the town population along with the damage status resulting from the earthquake. Mr. Abe explained the rate of population decline in Ogatsu was double that of Onagawa after the disaster, even though Onagawa had a higher number of fatalities. The lecture also referenced the distinct vulnerabilities in each town before the disaster and the difference in their approach to reconstruction.

Akinari Abe
Representative of Community Reconstruction Working Group, Ogatsu

[Questions and Answers]

How has the landscape changed with the sea wall and do people feel safer with it?

The landscape became unattractive with the sea wall. You cannot see the sea anymore when driving along the coast.

The question of whether people feel safe with the sea wall is hard to answer and probably depends on a case-to-case basis. I do not feel safer with the sea wall. This sea wall is built to protect against a level 1 tsunami that may happen in 100 years, and not a level 2 tsunami that may happen in 500 years, or as happened in 2011. Even if there is a sea wall, it is still necessary to escape when there is a tsunami.

I have heard that people in some areas had a discussion and acted against building the sea wall. Is this true?

Yes, it is true. That depends on the community because the sea wall is calculated by segments. In all Tohoku, there are some a thousand segments, and out of those, some went in the no sea wall direction and others decided to rebuild in the same way as before 2011. In Ogatsu, for example, there was an anti-wall lobby for two reasons: the strength of the tsunami in the future is unknown, and building the wall may result in more victims. Some research conducted showed that more people died in the places that were supposed to be safe because the wall gave a false feeling of safety.

Is there some pressure of government entities or private entities to build the sea wall?

Yes, there is. Onagawa is one of the rare examples of a town that did not have to bend under this pressure as Onagawa has some political power to say no to public ideas.

How can goals be set for the whole community? If I have my specific goals, can they be shared with the whole community? How can it be made into a shared goal?

It is very different for Onagawa and Ogatsu. Onagawa is very small but independent, so it can function as one unified group. The case of Ogatsu is very different because the town was merged with other towns (due to the declining and aging population) in the past and it is under the control of Ishinomaki city, so it is not fully independent anymore. For that reason, Ogatsu residents do not have the ability, power, and experience, to make decisions on their own. Ishinomaki is the decision-maker in this case. It has a different perspective and point of view as they are not part of the Ogatsu people.

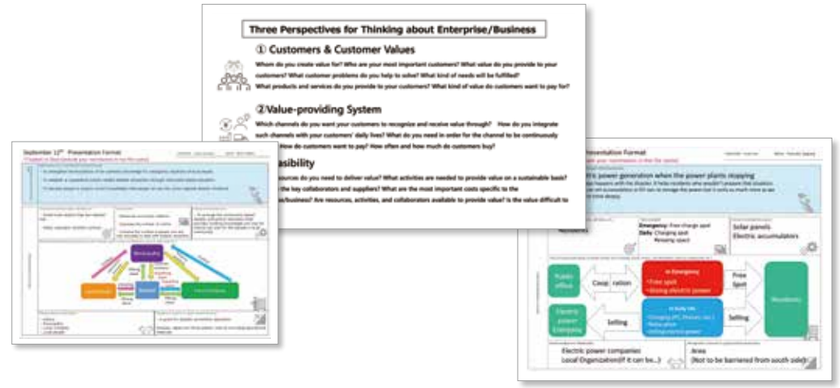
Who was in the lobby opposing building the sea wall?

There were different kinds of people in the lobby against it, but to think about it in another way, the people who were pro-seawall were only people directly connected with the engineering and construction industries.

Lecture 6 / Lecture material 13

Social and Economic Values

Students learned techniques for verifying economic value to elevate the level of the ideas of their projects and work on the sustainability of their businesses. Students learned how to think about social-oriented business by balancing social, customer, and business values as well as methods to draw up business flow charts to be included in the planning worksheet. In real-time lectures, students discussed the actual information included on their planning worksheet in groups to learn from each project and business idea.



Lecture 6

Workshop on Business Modeling: Achieving a Balance between Social and Economic Values

Sept. 12
Jun Mikami (Academic Researcher, Commercial Science, Otaru University of Commerce)

This workshop was concerned with planning a business model which had both social and economic values. Students drew business model diagrams of their business ideas, then broke up into groups and reviewed those ideas to check whether the plans established social value together with economic value. Students learned the “3x3=9” viewpoints framework to check whether their ideas were a system that consistently generated economic value as preparation for presenting their business models. This framework verified the strength of the ideas by checking the Who, What and How of customer value, project value, and technological value as well as inspired answers to nine questions, such as who their customers were. This lecture emphasized various points to be noted, such as making sure no stakeholder loses out. Students also reflected on existing business documents and other materials as an added means of learning business concepts.

Lecture material 13

Achieving a Balance between Social and Economic Values

Jun Mikami (Academic Researcher, Commercial Science, Otaru University of Commerce)

Mr. Mikami explained why some problems cannot be solved through public aid, and therefore why the involvement of business is necessary. However, to create a business with social value, economic backing in still necessary. Later on, he pointed out which factors had to be considered to create a proper business structure and achieve a balance between social and economic values. Perspectives from which the business concept should be analyzed include customers and customer values, a system providing value, and feasibility. Summing up, to create a business contributing to a resilient society vision, it is important to create an economically successful business having a beneficial influence on society. The business idea should be always checked with a vision towards resilience.

Midterm Presentation

Pitching Business Idea

Pitching your idea in a group and getting feedback.

FINAL PRESEN-TATION

Achievements Presentation

Summary of Learning

Kotaro Takeda (Lecturer/ URA, Graduate School of Engineering, Tohoku University)

As the long-awaited crowning moment of the program, students presented their ideas on the final day of the program in the class session ending September, the 25th. This year 26 participants registered in different parts of the world: Chile, Finland, India, and Japan. They also represented different backgrounds: economic, international culture, public policy, psychology, agriculture, architecture, engineering, IT, environmental sciences. Participants were high school students, undergraduate, and graduate students, as well as working adults. During the program, students were learning four capabilities for building a resilient society: discerning the vulnerability of social systems; predicting extreme events and their impacts; adopting the three perspectives of self-help, mutual-aid, and public support; and establishing economic and social value related to reconstruction and disaster prevention and mitigation. There were six real-time lectures and 13 on-demand lectures as well.

Finally, thirteen students presented their business idea. Two were unable to participate in the real-life meeting online. Each of the students had five minutes to present.

THE OPENING ADDRESS

Prof. Tetsuya Nagasaka

Tohoku University
Vice President for Social Outreach and Research Collaboration
Director, New Industry Creation Hatchery Center (NICHe)
Professor of Metallurgy, Graduate School of Engineering

We have started this program with the support of the MEXT in 2017. When we proposed this program to the government, this consortium consisted of four universities Tohoku, which is in charge of the EARTH on EDGE Program, Miyagi University, and Hokkaido University as well as Otaru University of Commerce. After we passed the competition, the government encouraged us to widen the group of participants regarding the program the experience of entrepreneurship education. We were suggested that Kobe University and Kyoto University should join. So now 6 universities are cooperating in this program. We have done many activities together to promote the entrepreneurial mind of students as well as younger faculty. Resilience is one of the most important issues of EARTH on the EDGE Program. What is true resilience, what is the experience of big earthquakes in Kobe, Tohoku area and how did they recover, how can you find the new seeds of the business concept to build resilience? We always enjoy such a discussion.

Final Presentation List

Name	Affiliation	Title	Description
Ayril Amry	Tohoku University	Fostering Mutual Aid Society with Map-based Social App	The idea of this project is to connect users through a mobile application in order to build social cooperation based on social trust to report about problems and provide mutual aid.
Natsuki Yoneda	Hokkaido University	DPES (Disaster Prevention Evacuation System) "Kamakura" as an example	The idea of the project is to raise the awareness of disaster prevention by public authorities through simulation, education, and a national database.
Haruka Maeda	Kobe University	Have a safe evacuation life with cats.	The idea of the project is to create a community of cat owners and pet shops in Kumamoto city to collaborate to provide for the safe evacuation of pets.
Hiroki Kouno	Kobe University	Copollective Village. Revitalization of the disaster area.	The business model is built on the usage of containers as housing to support disaster areas to promote cooperation within the community and a collective way of living.
Haruka Hirose	Tokyo University of Science	Security and privacy at night in refugee life for women.	The project idea is to create a product that would help women to feel secure in the evacuation center.
Keigo Kitazato	Kobe University	Post-disaster support through campsite business.	This project presents the idea of creating a campsite run by an NGO that could serve tourists during normal times, and as an evacuation facility for victims after the time of disaster.
Martin Garcia and Lucas Matsunaga	Tohoku University, One United Resettlement NPO	Post-Disaster Housing Reconstruction: A standardized self-construction toolkit.	The project presents a business concept based on a housing product of a transitional shelter self-constructed by victims and biodegradable to reconstruct the community and reduce psychological distress after the disaster.
Shinjiro Takahashi	Tohoku University	Art has infinite possibilities. Making best memories.	This student presented a business model based on using color boxes with equipment for disaster.
Ryosuke Iwatomi	Kobe University	Resilience for the blackout.	This project presents a transportation system based on the usage of EV and HV cars that can also serve as an energy source during the time of blackouts.
Suzune Yuba	Kobe University	Lessons to be a little emergency guard.	The idea of this project is to offer a long–term emergency preparedness educational program.
Akari Fujiwaka	Hokkaido University	Get under the desk if Japanese scream "Jishin!"	This student would like to promote the idea of incorporating emergency preparedness education in the obligatory university curriculum.
Shiori Osanai	Tohoku University	Organize an experience-based event.	In order to strengthen the sense of community and educate people for the time of disaster, this student proposed the ideas of "Stamp Rally" and "Big Lunch" cooking using stockpiled food.

Comments

Prof. Ryoichi Nagatomi

Professor, Dean,
Graduate School of Biomedical Engineering,
Tohoku University

It is intriguing that everyone pointed out issues that no one has a good solution for. Starting from the identification of your needs, you all have a chance to help the community of people and the stakeholders you mentioned. Get going and communicate with many people, so you could expand your idea. Thank you very much.

Mr. Nobumi Toyoura

General Manager Operations,
Caterpillar Japan LLC

Thank you for inviting me today. It was a very interesting experience for me. I am from a business background so when I think of disaster, normally I think of how it may impact my business and how to continue my business operation even during the time of disaster. However, today the discussion was the other way around. Everybody came up with very innovative ideas of how to create a business from the disaster. For me, that was a good reference and something I would like to keep in mind. I would also like to ask you how you sustain your business through these ideas. If you can take action in all of this, I think some may become a real business.

Prof. Ken-Ichi Tamai

Professor,
Graduate School of Commerce,
Otaru University of Commerce

Your presentations suggest very interesting and unique plans for emerging social innovation in Japan, but the next step is to create solutions for this innovation, and how to implement these plans effectively and efficiently, so keep on trying.

Mr. Chris Engler

CEO,
World Unite Japan

I'm very happy that the students of this course are generally interested in entrepreneurship. There is a lack of entrepreneurship in Japan where many students prefer an apparently "safer" employment at large corporations rather than taking the risk to start a business. But everyone should remember that those large corporations would not exist if not a single person one day would have founded them and risked it. A society without entrepreneurs cannot exist. Entrepreneurs are drivers of innovation, focusing on niches not covered by the "big ones" and essential for Japan's future. All the ideas presented have some potential and I encourage all of you to give those and other ideas a try and become an entrepreneur!

Ms. Chi Chia Huang

Consultant,
SKYLIGHT CONSULTING Inc.
Tohoku Branch

Thank You for inviting me today and I would like to say all of you are great and your ideas so innovative that I have never thought about. BOSAI-TECH is a platform that welcomes you, young entrepreneurs, so I would like to invite you to join. We also support you to create your business and apply it to society. We also support POC, so we encourage you to join BOSAI-TECH from perhaps next year. I am looking forward to seeing you soon. Thank you.

THE CLOSING ADDRESS

Ms. Mutsuko Inoue

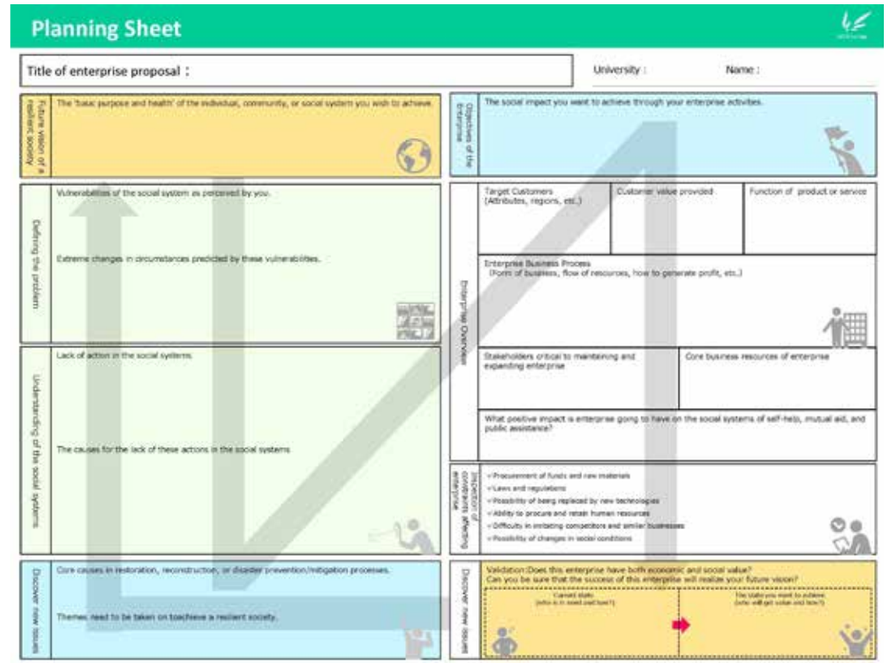
Ministry of Education, Culture, Sports, Science and Technology (MEXT)

I am very honored to be invited to join the EdgeNext program. This year, we got many innovative ideas to apply to the BOSAI field as well. As I represent my team from Sendai city, I am very impressed by the students' presentation and their proposal. It is very nice to know that the young generations are having such a high consciousness regarding disaster prevention and disaster relief. I am looking forward to the future, when we are able to have those solutions in our life, and our world has become a safer and sustainable place.

Steve Jobs once said: “Sometimes when you innovate, you make mistakes. It is best to admit them quickly, and get on with improving your other innovations.” I am confident that the students today have received valuable comments from experts, and those comments will drive them further.

Planning Sheet

Columns are provided for participants to conceptualize their enterprise visions on their own, describe problems and issues in society, specify content of their solutions, etc., with the social and economic values being entered on left and right side, respectively.



Rubric

			5	4	3	2	1
Discerning the vulnerability of social systems	a	Social systems	I understand social systems related to the problem I want to solve from multiple perspectives.	I understand social systems related to the problem I want to solve with entities (stakeholders) and their interactions.	I understand the entities (stakeholders) of the social systems related to the problem I want to solve.	I understand the social systems in minor details.	I do not understand the social systems at all.
	b	Environment and context of a social system	I understand the environment and the context of the social systems from multiple perspectives by organizing the collected information.	I understand the environment and the context of the social systems from one perspective by organizing the collected information.	I collect information to understand the environment and the context of the social systems.	I understand the environment and the context of the social systems in minor details only.	I do not understand the environment and the context of the social systems at all.
Predicting the extreme events and their impacts	c	Prediction of tne extreme events	I predict extreme events from multiple perspectives by organizing the collected information.	I predict extreme events from one perspective by organizing the collected information.	I collect information to predict extreme events.	I collect information to predict extreme events in minor details only.	I do not collect information to predict extreme events at all.
	d	Prediction of impacts of extreme events on the social system	I predict impacts of extreme events on the social system from multiple perspectives by organizing the collected information.	I predict impacts of extreme events on the social system from one perspective by organizing the collected information.	I collect information to predict impacts of extreme events on the social system.	I collect information to predict impacts of extreme events on the social system in minor details.	I do not collect information to predict impacts of extreme events on the social system at all.
	e	Prediction of impacts of extreme events on the environment and context of the social system	I predict impacts of extreme events on the environment and the context of the social system from multiple perspectives by organizing the collected information.	I predict impacts of extreme events on the environment and the context of the social system from one perspective by organizing the collected information.	I collect information to predict impacts of extreme events on the environment and the context of the social system.	I collect information to predict impacts of extreme events on the environment and the context of the social system in minor details.	I do not collect information to predict impacts of extreme events on the social system at all.
Adopting the three perspectives of self-help, mutual aid, public support	f	Three perspectives: self-help, mutual aid, and public support	I understand the solution from three perspectives: self-help, mutual aid, and public support.	I understand the solution from one perspective: self-help, mutual aid, or public support.	I understand self-help, mutual aid, and public support as resources for the solution.	I understand self-help, mutual aid, and public support in minor details.	I do not understand self-help, mutual aid, and public support at all.
	g	Organizing self-help, mutual aid, and public support	I understand the solution to organize self-help, mutual aid, and public support.	I understand the solution to connect self-help, mutual aid, and public support.	I understand connections among self-help, mutual aid, and public support.	I understand connections among self-help, mutual aid, and public support in minor details.	I do not understand connections among self-help, mutual aid, and public support at all.
Establishing economic value and social value related to reconstruction and disaster prevention and mitigation	h	Economic value	I reframe the economic value of the enterprise I planned.	I describe the economic value of the solution I planned.	I understand economic value.	I understand economic value in minor details only.	I do not understand economic value at all.
	i	Social value related to reconstruction and disaster prevention and mitigation	I reframe the social value of the enterprise I planned.	I describe the social value of the solution I planned.	I understand social value.	I understand social value in minor details only.	I do not understand social value at all.
	j	Establishing social value together with economic value	I reframe the sustainable relation between economic value and social value of the enterprise I planned.	I describe the relation between economic value and social value of the solution I planned.	I understand the relation between economic value and social value.	I understand the relation between economic value and social value in minor details only.	I do not understand the relation between economic value and social value at all.

Social system: The organizational form of interrelationships existing between individuals, groups, and institutions and developing a coherent whole.

The Program in the Future

The entrepreneurs who are needed all over the world are most likely those who can act immediately to solve complex social problems likely to emerge in the future.

From the standpoint of Sustainable Development Goals (SDGs), the people needed are those who have a bird's-eye view of the ripple effects from a project, establish social and economic values in tandem, and solve specific problems.

The “Educational Program to Drive Construction of a Resilient Society by Inculcating the Entrepreneurial Spirit” takes on the challenge of developing such human resources on themes of disaster prevention and mitigation.

This fiscal year saw all of the curriculum being held online in English. Over roughly one month, the program faced greater hurdles for both students and staff than the previous classes. Unlike the previous fiscal years however, some students have moved their project and business proposals into the implementation phase after completing this program. With involvement by universities alone, there are limitations on further accelerating this trend toward implementation, which makes cooperation by numerous stakeholders such as industry and local government essential.

Tokushima University participated as a co-operator as same as of the last fiscal year program, and we believe the alliance with Sendai BOSAI-TECH Program, Tohoku University International Joint Graduate Program in Resilience and Safety Studies and International Research Institute of Disaster Science, Tohoku University, has taken our program to another level.

Although the EDGE-NEXT program ends at this fiscal year, we'll keep developing and continuing this program in order to expand it internationally while collaborating with universities and institutions abroad, and promote participation among numerous universities, research institutes, local governments, corporations, NPOs and others with the hope of building an even more fulfilling system.

If you concur with the aims of this program, we would gratefully appreciate any support or cooperation you may be able to provide. We would very much like to work together to educate entrepreneurs who will drive the construction of resilient societies.

Design and Management Faculty of
Entrepreneurship Program for
Leading a Resilient Society

Main Sponsorship / Co-sponsorship / Support / Cooperation

Hosted by : EARTH on EDGE
(Tohoku University / Kyoto University / Kobe University / Miyagi University / Hokkaido University / Otaru University of Commerce)

Co-hosted by : Tokushima University

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Sendai City
Tokushima City
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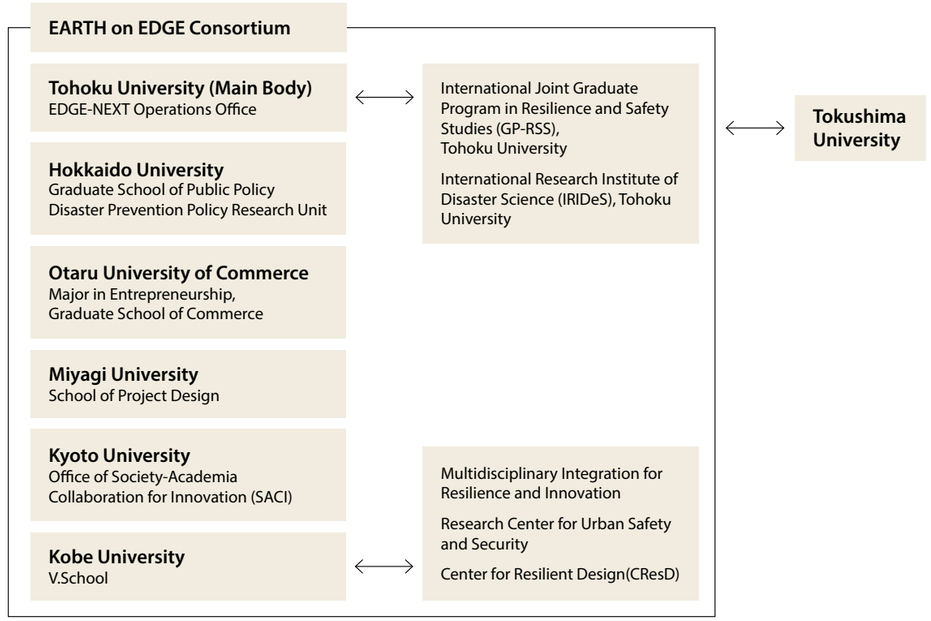
Co-operated by : Sendai BOSAI-TECH Innovation Program
Kamome-Solutions
Pilot Practice Corp

Implementation System



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