Chapter 3 To Create the Future together with Society

In the earlier chapter, we saw the S&T communication activities conducted so far to deepen the relationship between S&T and society.

Science, technology and innovation policies require researchers and technicians to listen to the needs of society, and for them and the public to stand on the same platform and create S&T that is necessary for the future. It is important to strive to create an appropriate governance of S&T so that the public, researchers, technicians, companies, NPOs and other organizations, local governments and the Japanese government can work with the understanding, trust and support of the public, to develop S&T activities.

As seen so far, in recent years, Japan's S&T communication activities have been quite active, with examples of the public voluntarily taking part in S&T activities that target to accomplish specific local issues. In Section 1, emerging leading efforts in Japan that may become the "New Public Commons" [1] were introduced.

In Section 2, recent trends on creating a new policy making process, such as strengthening the public's participation in policies, evaluating the new technology assessment which involves dialogs with society, and creating an evidence-based policy making process were explained.

In Section 3, future developments to realize science, technology and innovation policies for society and the public were shown.

Section 1 Accomplishing Targets by Utilizing S&T Involving Society and its People

Ten years have passed since "Science and Technology in and for Society," how new science should be in the 21st century, was declared at the "World Conference on Science" held in Budapest, the capital of Hungary in June 1999. In that period of time, the situation surrounding Japan and the international society has changed dramatically, with many socioeconomic problems such as global warming, water and food shortages, depletion of resources, declining birth rates and graying populations, safety and security, becoming more serious. In order for Japan to continue developing into the future, it needs to overcome these issues through science, technology and innovation, and such target-accomplishment type of innovations can only be useful to society through cooperation between researchers and local governments, NPOs and local residents.

This section introduces examples of efforts by various projects and universities with local residents to overcome social problems in areas such as crime prevention, disaster prevention and preventive medicine.

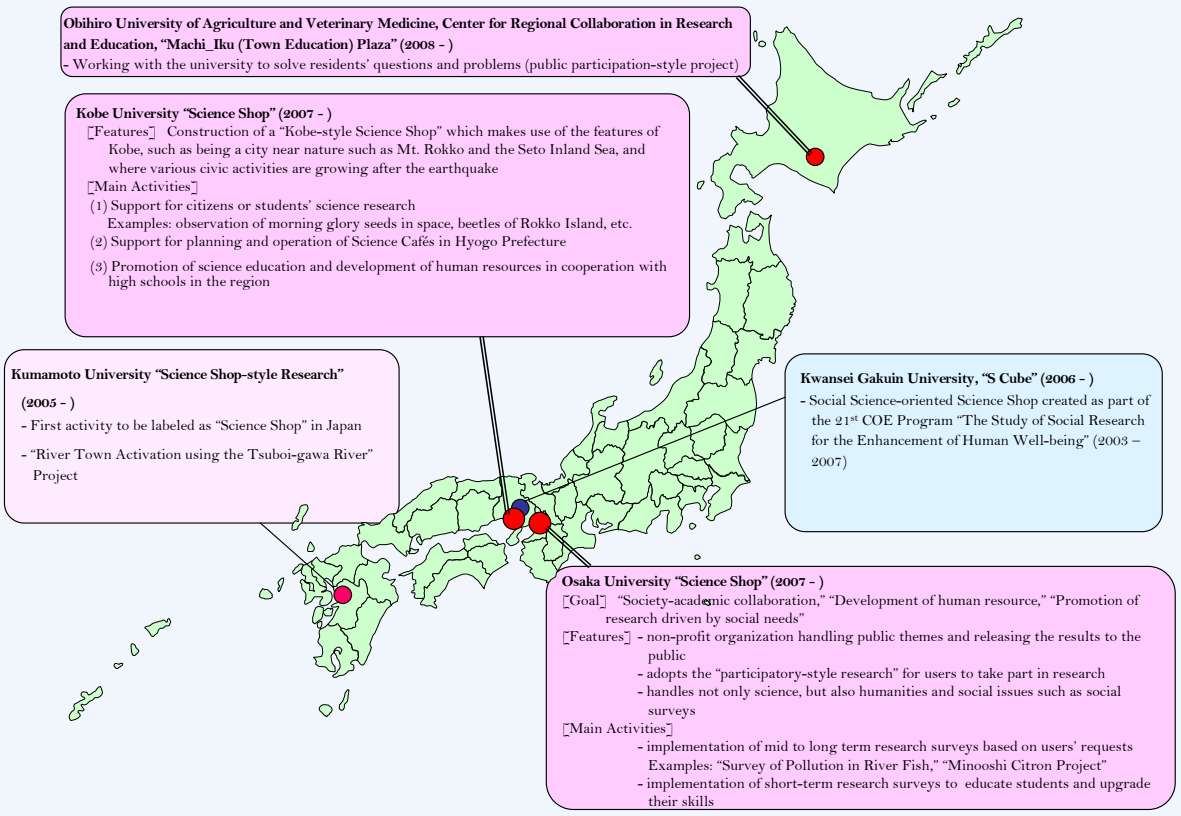
1 A set of values that state that it is not only the "government" that supports people, but also everyone that is involved in the region will participate in areas such as education, child rearing, town activation, crime and disaster preventions, medical and social welfare and that the society as a whole will provide support (general policy speech of the Prime Minister in the 173th session of the Diet).

1 S&T Consulting Rooms for Residents for Solving Regional Social Problems

In Europe, universities provide independent and participatory-style research support in response to the worries (concerns) of the civil society. These efforts are called "Science Shops" and were started from a student movement in the Netherlands in the 1970s. There are more than 70 such efforts in Europe alone now, and in recent years, they have also expanded to Africa and Asia (China, Korea). In the USA, universities started a similar activity called "Community-based Research (CBR)" in the 1960s.

Some universities in Japan started their own Science Shops (Science and Technology Consulting Rooms for Residents) from 2005, and have been conducting supporting activities for society and the public to think about science and technology and solve related problems (Figure 1-3-1).

Figure 1-3-1/ Science Shops in Japanese Universities (Science and Technology Consulting Rooms for Citizens)



Notes: The Kumamoto University Center for Policy Studies' effort, called the "Science Shop" was the first activity of its kind in Japan to strive to contribute to the local society. It differs from other universities with the fact that it is basically the university which decides the research themes and which residents can participate in projects, after taking into consideration the views and opinions of the society and local residents.

Source: Created by MEXT based on the websites of the respective universities' science shops.

In this way, to respond to local residents' questions about daily lives in Japan, Science Shops (Science and Technology Consulting Rooms for Residents) have started to appear recently as the science version of legal consultation centers. These consultation centers make contributions to the local society by utilizing the specialized knowledge of S&T in universities and their powers of investigation. The results gained from this organization should be disclosed not only to the person who goes for the consultation (user), but also to society as a whole. This fact makes it different from cooperative industrial-academic activities. In the

future, it is also important to find ways to work with the public administration in order to solve the local residents' problems.

2 Activities to Accomplish Targets by Utilizing S&T in Cooperation with Society and the Public

(1) Integration of Knowledge Toward Accomplishing Regional Targets

-Prevention of Crimes against Children Involving Participation from Stakeholders such as PTAs (Tsukuba City, Ibaraki Prefecture)-

In order to solve the various problems society faces, it is important to integrate the knowledge of both the natural science fields and the humanities and social science fields and create a new social system. Technology required to create such a system can be called "social technology." The Research Institute of Science and Technology for Society, Japan Science and Technology Agency (RISTEX), carries out target-accomplishment type of R&D programs that are useful to the local community and society by involving not only researchers but also "stakeholders," people who are familiar with the ground situation and issues, to carry out social experiments on the ground and go through the PDCA Cycle[1] thoroughly, with an aim to return new results to society and put them to practical use. RISTEX created projects in which universities and research institutions in cooperation with the local residents, NPOs and local public organizations to conduct research activities toward accomplishing S&T related issues.

One of these projects is the "Research on Prevention of Crimes against Children Using the GPS" implemented in Tsukuba City, Ibaraki Prefecture.

For a crime to be committed, three aspects are needed at the same time at the same place: 1) a motivated offender, 2) a suitable target (children), 3) the lack of a capable guardian (Routine Activity Theory). Out of these three aspects, 2) and 3) can be controlled and handled appropriately by local residents. Nevertheless, the current situation for child crimes is that the chances of meeting with chilling (hiyari) and shuddering (hatto) dangerous events which are precursors to the actual crime (the Hiyari-Hatto experiences) are not always accurately noticed, so that when an incident occurs, people tend to take an overzealous approach to crime prevention, but will just as quickly lose interest, creating a problem for crime prevention.

A research group led by the National Research Institute of Police Science, with support from the Research Institute of Science and Technology for Society, implemented a R&D project called "Establishing an Empirical Basis to Measure and Prevent Crimes against Children." Under this project, the research group received support from Tsukuba City to develop a system that supports crime prevention activities in the region by combining the results of surveys of places where children have experiences where they almost fall victim to crime and surveys of their daily patterns using the GPS (Figure 1-3-2). Using this system, PTAs and regional crime prevention organizations hold workshops for local residents in schools with the support of local stakeholders such as local companies, and through discussions on how to protect the children as a region and reflecting on the experiences of going through the Hiyari-Hatto experiences with their children on the way to and from schools, they plan and implement specific crime prevention

1 PDCA stands for Plan, Do, Check, Action and refers to a process whereby the flow of Plan->Do->Check->Action is utilized in subsequent plans. It was proposed by Dr. Williams Edwards Deming in the 1950s as an improvement process which is an iterative feedback loop that repeatedly measures and analyzes the process to specify and change the parts in the production process that require changes or improvements. It is also known as the Deming cycle in Europe and America.

patrol activities to protect children in the region.

This project moved forward with the voluntary participation of local residents such as schools, guardians and PTAs, crime prevention organizations, and residents association, in cooperation with regional administrative agencies such as the city office and the police, to integrate knowledge from various aspects such as information science, criminal psychology, and sociology, and it is being reviewed to see how it can be expanded nationwide.

Figure 1-3-2/Density Distribution of Children's Daily Activities Using the GPS

Source: Provided by Crime Prevention Section, National Research Institute of Police Science

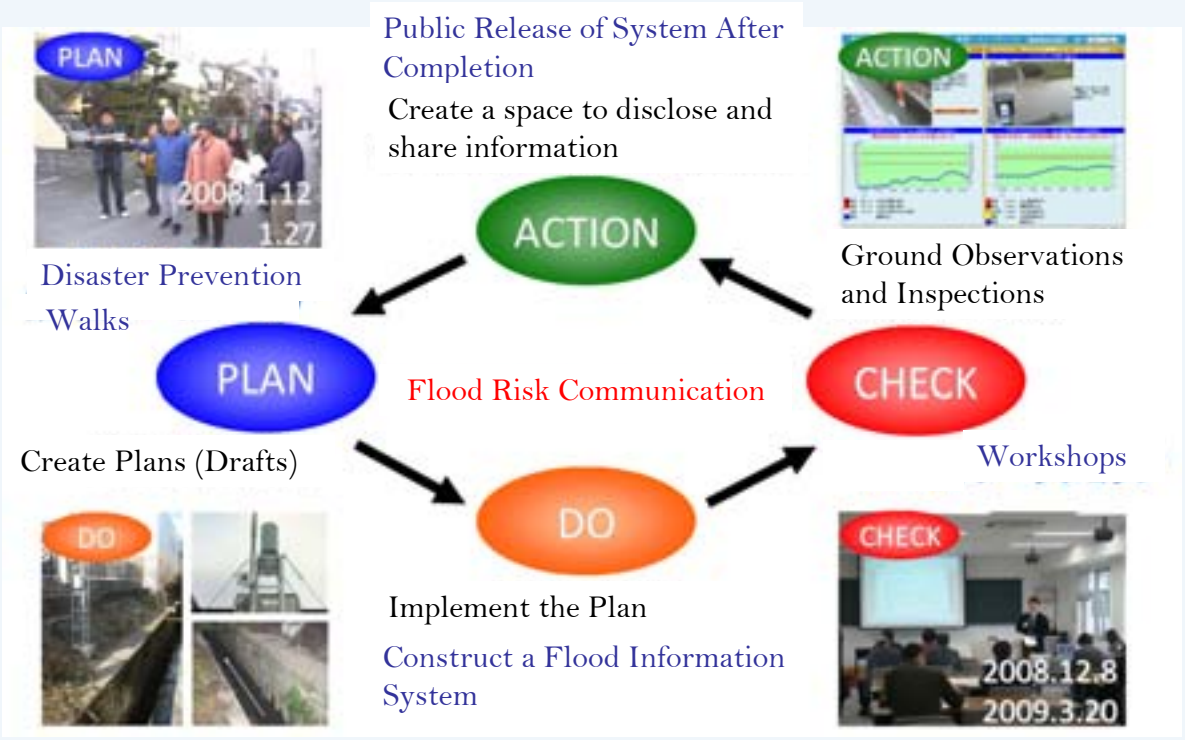
(2) Research Cooperation Between the Local Community and Research Institutions such as Universities

-Realizing a local society resistant to flood damage through residents' participation (Kumamoto City, Kumamoto Prefecture)-

The Shirakawa River and the Tsuboi-gawa River run through the center of Kumamoto City and have been steadily undergoing river improvement works ever since experiencing several cases of flood damage in the past. In recent years, however, cloudbursts and flood flows have increased significantly, and with a graying population and the changes in the local community makeup, there are concerns that the flood damage countermeasures maintained independently by the region are weakening.

As a result, in order to realize a safe and secure regional society against flood damage, Kumamoto University, in cooperation with Kumamoto City, made use of the expenditure from MEXT's "Project on Science and Technology for a Safe and Secure Society," to implement a project to construct and operate a regional flood damage management system that integrates the regional disaster prevention information transmission system and risk communication support system. This system is not only used in the region to measure and collect flood information which it then releases on the Internet, but it also implements workshops and disaster prevention training for the residents according to the progress of the research. By acting as one with the local community and circulating the PDCA Cycle successively, it is able to accurately understand the actual situation and what residents really need, and reflect these in the construction and improvement of the system (Figure 1-3-3).

Figure 1-3-3/"Flood Risk Management Techniques" that Incorporate Local Community Needs



Source: Created by MEXT

In this way, local residents in this project are not only important members handling the risk management system, but also co-researchers who assess the research implementation plan according to the actual situation in the region. Kumamoto University is conducting projects with not only Kumamoto City, but also residents associations, and neighborhood associations in the local community to construct a disaster risk management system that the local community can operate by itself in the future.

(3) Basic Science Research Supported By Citizens

-"Nanten Project," a project supported by donations from residents (Nagoya University)-

There are also examples of people who have become direct supporters of basic science research by volunteering or directly providing financial aid after their concern and interest in a particular basic scientific research are raised through S&T communication activities.

The Department of Physics and Astrophysics, Division of Particle and Astrophysical Science, Graduate School of Science, Nagoya University (Professor Yasuo Fukui), moved the radio telescope[1], "Nanten" to the Republic of Chile in 1995 – 1996. But the relocation fee of 210 million yen did not come just from the government, but also from fundraising activities as well as donations from residents and companies (residents: 10 million yen, companies: 100 million yen).

In 2005 – 2008, with support from the Research Institute of Science and Technology for Society, Japan Science and Technology Agency, Professor Kazuhisa Todayama and others from the Graduate School of

1 A kind of astronomical telescope that receives radio waves from space by an antenna. It can capture the location of the birth of stars which visible light cannot. "Nanten" and "Nanten2" observe using wavelengths of 0.3-3 millimeters in the millimeter and submillimeter wave belts.

Information Science, Nagoya University sought to elucidate the various conditions to realize funding support for basic science research from residents, i.e., what made this project a success (Research Title: The Formation of Citizen Patronage for Basic Science). On the success factors of the project, Professor Todayama and others opined that:

1) Through good communication, citizens could acquire a level of S&T literacy that "allowed them to share intellectual curiosity with researchers, understand the workings of scientific research and not just the results, and assess whether to support the research or not on their own";
2) On the other hand, researchers have also acquired a level of communication ability that "allowed them to create a forum for interactive communication, share intellectual curiosity with the citizens, and acquire support for their own research," and therefore, the quality of interactive communication in S&T has improved.

Through these S&T communication activities, the young researchers, graduate and undergraduate students involved in this project have come to realize the importance of citizens' understanding and support in research implementation, while for researchers, they have come to strongly realize the importance of communication with citizens and the need to improve their communication ability.

The way that citizens and researchers improved the quality of communication while taking turns to change can be said to have supported the relocation of "Nanten" to Chile and the continuation of subsequent support activities. Even now, donations from the citizens are used to cover the facility operating costs for "Nanten2," the successor to "Nanten."

This example provides a good indication as to how the progress of interactive communication between society and its citizens, researchers and technicians contributes significantly to the promotion of basic science research that is not directly linked to economic profits nor industrial promotion of the regional society.

An incorporated association, The Japan Treasure Summit was set up in October 2009 with the aim of allowing the top leaders in the fields of science and the arts to spread the role and beauty of science and the arts in different forms widely, and at the same time through such activities, to create a donation culture and a social investment culture suitable for Japan in order to create a climate whereby science and the arts can be supported by society as a whole (Representative Director: Hiroshi Komiyama). The association is expected to create an environment where the whole society supports fields such as basic science as well as the arts by strengthening S&T communication.

(4) Voluntary Participation of Local Residents'in Genome Epidemiology Research

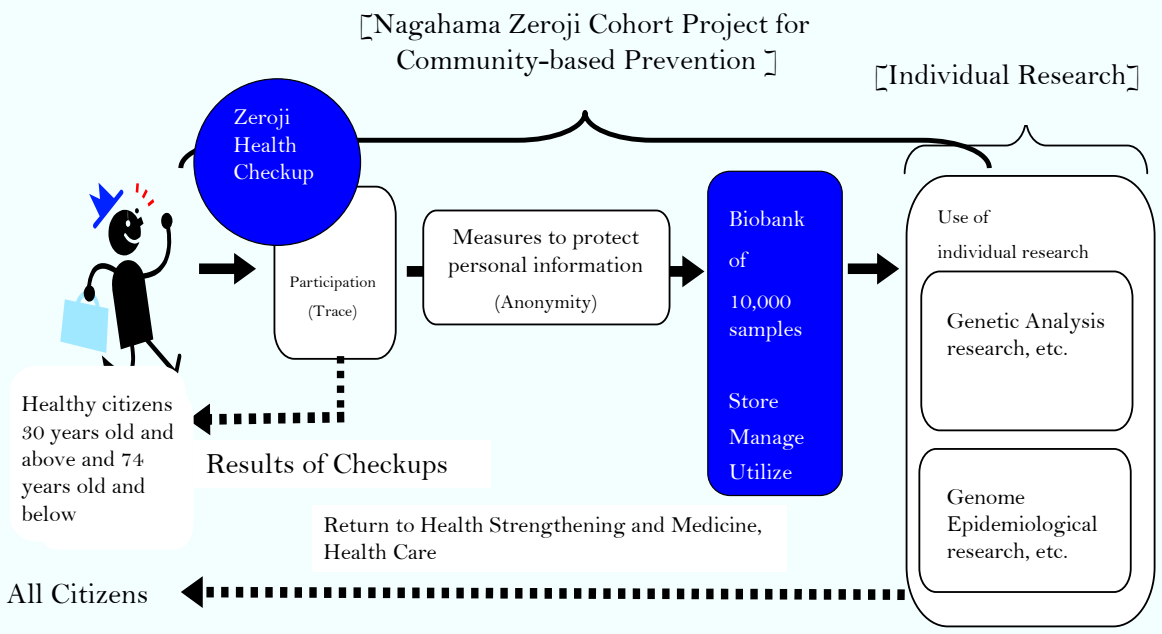
- "Nagahama Zeroji Cohort Project for Community-based Prevention" (Nagahama City, Shiga Prefecture)-

The Graduate School of Medicine, Kyoto University and Nagahama City, Shiga Prefecture have jointly embarked on a genome epidemiological research ("Nagahama Zeroji [1] Cohort [2] Project for Community-based Prevention") with the aim to promote the health of residents and contribute to medical

1 A coined word meaning the promotion of preventive medicine to improve lifestyle habits by tailoring it to an individual's genetic makeup, and is one step ahead of "Primary Prevention" which promotes preventive medicine through the improvement of lifestyle habits.
2 A long-term tracing survey on the lifestyle, occurrence of diseases, etc. of each person in a specific group or region that aims to clarify the relationship between the causes and results (cause and effect relationship) of diseases and health.

R&D. Specifically, with the cooperation of 10,000 residents, the project conducted detailed health checkups to collect biological samples, and then stored the blood, urine and health information from these samples to create a Nagahama version of the Biobank and carry out epidemiological research, including genome analysis (Figure 1-3-4).

Figure 1-3-4/Overview of Nagahama Zeroji Cohort Project for Community-based Prevention



Source: Provided by Nagahama City, Shiga Prefecture

Normally, when universities implement genome epidemiological research, they are the ones who will ask for biological samples from the volunteers, but in this project, the citizens wondered if they could "make use of this project to strengthen the health of residents in the region" and so started the NPO Zeroji Health Strengthening Club. They organized "Health Strengthening Gatherings," and "Health Festivals" to garner support for the research.

Furthermore, Nagahama City established the "Nagahama Rules Committee" made up of bioethics and legal specialists, researchers, medical professionals and selected citizen representatives, and enacted a set of "Nagahama Rules" which include the enactment of new regulations, so that Nagahama citizens can safely pursue genome epidemiological research without having to worry about their personal information being abused. The main feature of the "Nagahama Rules" is the establishment of the "Nagahama Zeroji Cohort Project for Community-based Prevention Evaluation Committee" by Nagahama City, which involves citizen representatives to look into bioethical issues, besides the ethics committees in the universities. In this way, citizens can reflect their opinions in the research and also play more than the passive role of

providers of biological samples.

In this way, this project where Kyoto University, Nagahama City and its citizens share responsibility and work in cooperation with each other while respecting each other's position to conduct the most advanced genome epidemiological research can be called an example of S&T governance functioning appropriately.

[Column 12] Active Participation from Citizens - the Key to "Nagahama Zeroji Cohort Project for Community-based Prevention (Nagahama Project)"

Five years have passed since Kyoto University first brought this epidemiology survey to Nagahama City and finally at the end of November 2010, it achieved its initial target of participation by 10,000 citizens.

Nagahama City is a regional city situated to the north of the Lake Biwa with a population of approximately 120,000. Resident movement is not significant and as a result the city is suitable for a large-group trace survey (cohort research) over a long period of time. It is also a city known for its active citizenry as the citizens carried out various activities such as organizing the 1000 blood donor campaign and volunteered as health promotion staff. The existence of two base hospitals (Nagahama City Hospital and Nagahama Red Cross Hospital) and the proximity to Kyoto were also factors contributing to its selection as a city for the survey.

Nevetherless, the journey had not always been smooth sailing. When getting 10,000 people to participate, president of the Zeroji Club, Mr. Nobuaki Tsujii, and his colleagues went out of their way to visit the residents association bodies and neighborhood associations, etc. to personally speak to the citizens. In addition to the conferences and Science Cafés organized by Kyoto University, citizen representatives also talked about the genome epidemiological research in their own words to other citizens, to raise their awareness of the research. Reminiscing on how he garnered support, Mr. Tsujii reminds that he appealed to the public by saying, "This project is only significant if it carries on for more than 10 years, 30 or even 50 years. The understanding and cooperation from the citizens is therefore vital. If it is something from the top (government officers or business executives, etc.), it may not last long. Therefore, it is important to appeal to the citizens slowly and steadily, even if it is more time-consuming." It looks like these types of grass roots civic activism have paid off. Along the way, some arguments ensued in the "Nagahama Rules Committee" but they managed to overcome the problems with strong support from the citizens. Nagahama's effort is significant because through these discussions, it became the first city in Japan to enact a set of original regulations for citizens to safely implement a scheme to make good use of the biological samples collected and improve citizens' health.

The regional efforts we have seen so far have just gotten under way, but in all of them, local residents have voluntarily involved themselves in various S&T activities to accomplish their targets, standing on the same platform as researchers in the research institutions such as universities and public research institutions along the way. In the future, it is hoped that similar examples will take place in various places, with researchers and engineers working with society and the public to get involved in S&T activities to accomplish not just national targets but also global ones.