It is important to not only widen the range of people who like science and mathematics through these local and social-related activities, but also to bring them up to a level whereby they can use the knowledge and skills they have learnt in schools and act to solve the various problems in society. Furthermore, it is also necessary to make as many people as possible to be interested in being acquainted with S&T which is so closely related to our daily lives and to create a better society through making good use of S&T and controlling its risks.

In order to achieve that, it is also important to get people from different backgrounds to communicate with each other on S&T topics so that they become a familiar culture and to raise the public awareness as a whole. In the next subsection, we looked at the current situation and the future developments of "S&T Communication" which was created from this awareness of the issue.



## 2 Current Situation and Future Developments of "S&T Communication" Activities

### (1) Current Situation of S&T Communication Activities in Japan

We mentioned the low level of interest and concern among the public in S&T on the one hand, and the huge public interest in the return of the "Hayabusa" in 2010 to the extent of the publishing of many S&T (Hayabusa) news articles in the newspapers' city news section (the so-called "Hayabusa Phenomenon") on the other.

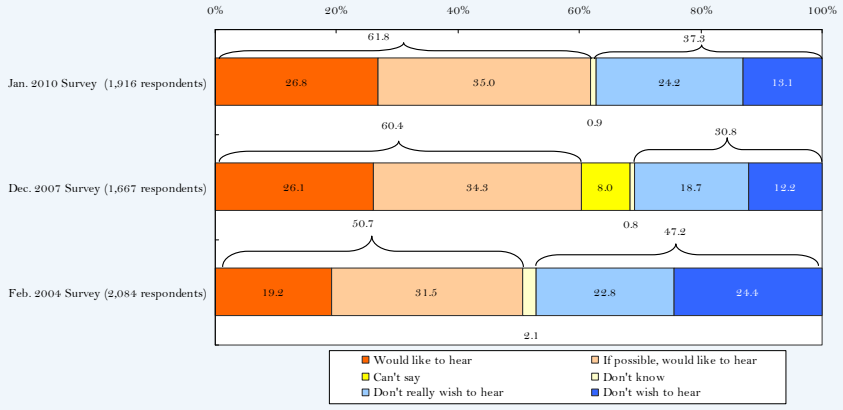
In recent years, the percentage of people who are interested in scientific topics which stimulate their intellectual curiosity and who wish to listen to scientists and technicians on topics such as environmental problems, medical technology, and food problems is growing (Figure 1-2-19).

The "Public Opinion Poll on Science and Technology and Society" conducted by the Cabinet Office, however, revealed that many people felt that there were very few opportunities to do so (Figure 1-2-20). Furthermore, the same survey also showed that "Scientists and engineers are always nearby and familiar to me." was only 23%.

Therefore, it is vital to step up S&T communication activities and create forums to link society and the Japanese public to researchers and technicians.

## Figure 1-2-19/Interest in Talks by Scientists and Engineers

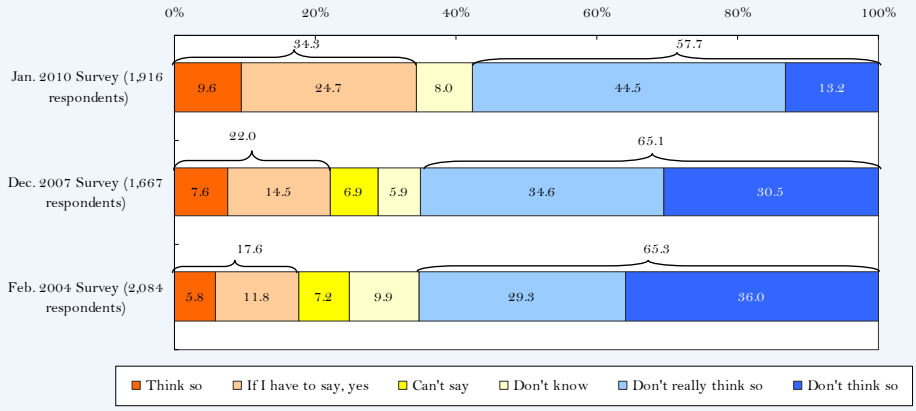
Question: Are you keen to listen to talks by scientists and engineers if there is a chance?




Note: In the January 2010 survey, "Can't say" was not available.
Source: Cabinet Office "Public Opinion Poll on Science and Technology and Society" (January 2010 Survey)

## Figure 1-2-20/Opportunities to Deepen Interest in and Understanding of S&T

Question: Do you think that there are adequate opportunities to deepen your interest in and understanding of S&T?




Notes: 1. In the January 2010 survey, "Scientists and technicians have been explaining S&T in easy-to-understand ways in places such as science museums, museums, research institutions, seminars and science cafés, and the TV, Internet, newspapers and magazines have also been providing S&T programs and articles to the Japanese public. Do you think that opportunities such as these to deepen your interest in and understanding of S&T are adequate?" was asked.
2. In the January 2010 survey, "Can't say" was not available.
Source: Cabinet Office "Public Opinion Poll on Science and Technology and Society" (January 2010 Survey)

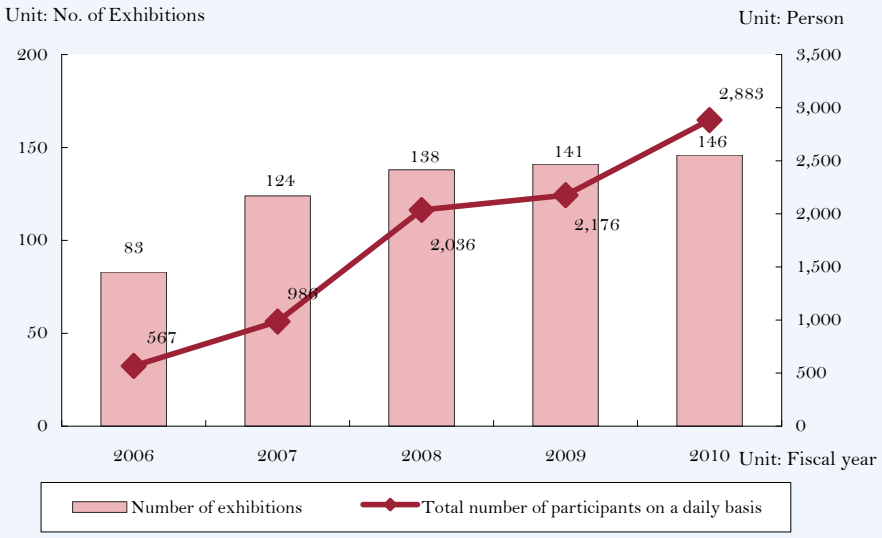
### 1) Forum to Think about Relation between S&T and Society

In 2006, the "Science Agora" (Agora means "open space") started as a forum for people of different backgrounds to feel familiar with S&T and think about its link to society by taking part in various events and exchanging ideas. The number of participants per day and exhibitors keep increasing annually (Figure 1-2-21) and in the "Science Agora 2010," there were a total of 146 exhibitors and more than 5,800 participants. In the 2010 forum, there were various activities and exhibitions showcasing the joys of

science and Japan's S&T policies under the theme "Science Forum Linking to the Future," such as "Science Oogiri Battle," "Junior and Senior High School Students' Agora Jack! - Let's Enjoy Science," "Science Dialog - World of Science as Told by World Researchers," "How to Cook Science," "Large-scale Research Funding – Thinking about involvement of the public and scientists," "Relationship between Science and Technology Administration and the Public." These events were conducted in various forms such as symposiums, workshops, science shows, science fairs, science cafés, booths, experiments, handicrafts. The participants were a variety of people such as elementary to high school students, undergraduate and graduate students, teachers from elementary schools to universities, researchers, technicians, public administrators, politicians and whole families. In addition, according to the questionnaire conducted in 2010, first-timers accounted for 85% of the participants, indicating that "Science Agora" is expanding. People who have "High" or "Somewhat High" interest and concern about nature and S&T accounted for 82%. One of the future issues is to find a way to increase the number of participants, especially those with lower interest.



Figure 1-2-21/Trends of Daily Participants and Number of Exhibitors in "Science Agora"

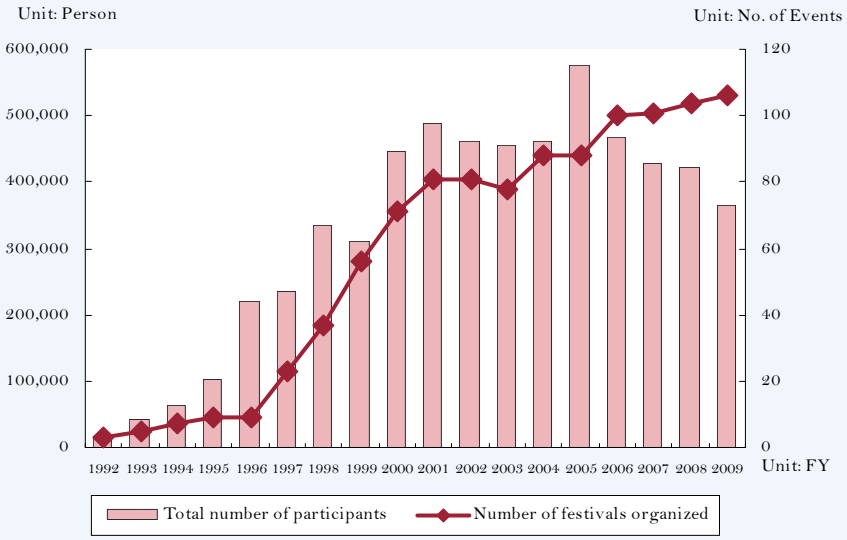



Source: Created by MEXT based on data provided by the National Institute of Science and Technology Policy

2) Science Festivals

Every year, the "Youngsters' Science Festival" is held in various parts of Japan. It is an event which exhibits various experiments and handicrafts effectively, and provides opportunities for participants to experience the joys of science. In 1992, the event was first held in Tokyo, Osaka and Nagoya, and since then, with the nation-wide event held in Tokyo as the main event, it has expanded to various parts in Japan. 364,000 people were involved in more than 100 places in 2009. While the number of local events has been increasing recently, nation-wide events have seen a decline in numbers, leading to a drop in the total number of participants (Figure 1-2-22).

Figure 1-2-22/Number of "Youngsters' Science Festival" Organized and Number of Participants




Note: A booth was set up in "The 2005 World Exposition (Expo.2005 Aichi Japan)" for the nation-wide event in 2005.
Source: Created by MEXT based on data provided by the Science and Technology Educational Department, Japan Science Foundation, , organizers of the "Youngsters' Science Festival"

Local "Youngsters' Science Festivals" are held to showcase the uniqueness of each region, and in particular, the festival in Kumamoto is worth mentioning for being the largest local event with the highest number of participants, a total of 35,000 over two days in 2009. While credit has to go to the publicity efforts of the local TV station which was one of the co-organizers, it was more due to the construction of an ideal role-sharing structure and a partnership relationship by schools, the TV station, and local businesses who aim for the promotion of science education as a whole region. Specifically, the Festival Committee, made up mainly of personnel from schools, decided on contents such as the theme of exhibition and experiments, and the experiment demonstrations, while the TV station managed the publicity, setting up of the location, direction, planning and execution, and finances (donation drives for support funds). Furthermore, companies who donated support funds are asked to display exhibits explaining "How basic scientific principles are actually applied in industrial technology." Through this, companies can contribute to the development of future talents as well as increase their name value and improve their company image.

There were two other science festivals targeting families and adults started in 2009, apart from the family-oriented science festivals.

One of them is the "International Science Festival in Hakodate" held annually in summer in Hakodate City, Hokkaido for nine days under the slogan "Science to be Culture." In the inaugural festival in 2009, which was themed "Thinking about the Environment from Hakodate," 8,500 people attended the festival held from Aug 22nd to 30th in five places in three regions in Hakodate City. In 2010, the number increased to 11,000 when the festival was held from Aug 21st to 29th with the theme "Thinking about the Future of Food from Hakodate."

The other is the "Tokyo International Science Festival," which started in 2009, in the Year of the International Year of Astronomy 2009, the 200th anniversary of the birth of Darwin, and 150 years from the publication of "On the Origin of Species." This science festival aims to spread the culture of enjoying science to everyone, from adults to children, and to the region, and to create a community of "science-loving citizens." These activities produce "Towns of Science Culture" as tourism resources, improve the communication between the public and companies, universities, research institutions and schools, and help to activate the lives, culture and businesses of the region. This festival, held mainly in Mitaka City, Tokyo, can thus be said to be a good example of community development with science.



### [Column 8] Mitaka City, city with the National Astronomical Observatory of Japan – Community Development with Science!

Mitaka City has many animation-contents production offices and research and educational institutions such as the National Astronomical Observatory of Japan (NAOJ). Its citizens have long possessed the "potential to nurture science culture and science and technology." Using this advantage, the city has been cooperating with the NAOJ to redevelop the city under the project "City and People Development Using Science and Technology and Science Culture," by creating a production base for high value-added visual contents, implementing local events with science themes, and nurturing talents involved in the promotion of science culture. For example, with the cooperation of the NAOJ, Mitaka City established the "Mitaka Picture Book House in the Astronomical Observatory Forest" in 2009. Using the wide spaces and facilities in the NAOJ, this project provides opportunities for children to enjoy picture books and learn more about nature and science. Through this, Mitaka City hopes to nurture children's intellectual curiosity and sensitivities, and contribute to the creation of a local culture where children can grow fully.

Children listening attentively at the "House of Stars and Forests and Picture Books" Photo: NAOJ

The NAOJ, the main player in this "Community Development with Science" project, is deeply involved in the execution of the "Tokyo International Science Festival" as a co-organizer, and in cooperation with the NPO Mitaka Network University, has also been organizing a science café "Astronomy Pub" for citizens to enjoy conversations on science over drinks since autumn 2005. In addition, it also supported Mitaka Network University in its seminar for the citizens, "Stars Sommelier Mitaka, Training Course for Star Gazing Adjunct Guides" (held in 2007), working hand in hand with the local community in "Community and People Development Using Science and Technology" projects.

### 3) Communication Activities between Research Institutions and Society and the Public

There are examples of universities and public research institutions actively carrying out communication activities (outreach activities) with society and the public. For example, Earthquake Research Institute, The University of Tokyo, set up the Outreach Promotion Office (renamed the Outreach and Public Relations Office in 2010) in order to carry out outreach activities systematically and effectively. With S&T communication techniques, it conducts publicity efforts geared toward the public through promotion and enlightenment activities such as open seminars, and through its website and publications. In addition, it conducts specialized education activities for disaster prevention personnel and the media, cooperation activities with ministries and local government involved in disaster prevention, and promotion activities for

the transfer of technology. In particular, it is unique in that its outreach activities are for a wide range of and many types of people, from children to adults and the media. Furthermore, as there is a need to send out accurate information as quickly as possible in case of a disaster such as an earthquake, the Institute also encourages frequent communication between earthquake researchers and the media, and holds monthly informal gatherings for the media.

Besides the above, the Institute for Integrated Cell-Material Sciences (iCeMs), Kyoto University, and the Institute for the Physics and Mathematics of the Universe (IPMU), The University of Tokyo, both World Premier International (WPI) research centers, also conduct active outreach activities. Other public research institutions also conduct many varieties of outreach activities, such as the National Institute of Polar Research of the Research Organization of Information and Systems' "Teachers Dispatch to the Antarctic Program" (2009~), the National Institute of Advanced Industrial Science and Technology's "YouTube AIST Channel" and Riken's "Riken Navi."

As the relationship between S&T and society deepens, however, it is difficult to respond to the needs of the society and the public just through communication activities at the individual researcher and institution level. More and more, the Science Council of Japan, which aims to promote the development and achievements of science, and other academic associations need to increase their outreach activities and activities to cultivate S&T literacy. For example, the Science Council of Japan organizes public symposiums and civic seminars with academic associations. The Japanese Society of Plant Physiologists has a well-received section "Everybody's Open Space – Questions Corner" on its website, which targets elementary to senior high school students and the public by getting experts to answer their questions on the shapes and functions of plants and problems they cannot solve even after looking up books.

## [Column 9] "Conveying the Latest Science and Technology – Roles and Issues for Scientists" – An Interview with Professor Hitoshi Murayama

Professor Hitoshi Maruyama, a leading space science researcher and Director of the Institute for the Physics and Mathematics of the Universe at The University of Tokyo is known as a scientist who actively conducts outreach activities by holding seminars, etc. to explain his own research in an easy-to-understand way for the public.

At the symposium at the Science Agora held on November 20 2011, Professor Murayama gave a speech on his attitudes and opinions about carrying out outreach activities.

Photo: Hitoshi Murayama, Director of the Institute for the Physics and Mathematics of the Universe of the University of Tokyo

"As researchers are not professionals in conducting outreach activities, we can be forgiven for not being eloquent, but we should be careful not to lose ourselves in the details and make our speeches too difficult for people to understand.

The way we talk is also crucial. For example, it is important to show concern by saying, "This may be a revision to people who are familiar with the topic," or "This may be a little difficult, but it gets easier later," and also to reciprocate by accepting as many questions as possible. We should never talk down to the audience when answering their questions, however.

For my research in the USA, funds come from the National Science Foundation and each time I applied for funding, I had to specify what type of outreach activities I was conducting. For example, it was enough to say that you had been giving advice to senior high school teachers on the type of the most advanced science topics they could set as homework for their students, or going to high schools to do the maintenance for the experiment equipments. At the end of the research, we had to record the results of the outreach activities in a report. This was mandatory for almost all research fund applications, regardless of the amount.

In the outreach activities in the USA, there is a strong feeling among the audience that if the contents of the speech were difficult to understand, it was because the speaker made it so. It is the responsibility and job of the speaker to make the contents easy for the audience. Even students are no exception. In a way, this is easy to understand, but also difficult for the speaker.

As researchers, we fully understand where our own research stands in the field of our research. In other words, we can see the whole picture. This is very important, as understanding only an extracted portion of things, and understanding things as they stand within the whole picture is very different. This also affects our ability to convey our message. It's natural to want to focus on our own research in our presentations, but we must also talk about the background of our research, and what other researchers are doing. If we don't, we can't make the audience understand why we are doing the research and our presentations would then be meaningless.

Furthermore, it is also important to give inside stories such as the hardships you had to overcome, the competitions, the disappointments, and the excitements along the way. Research is the accumulation of all these, you try your best even though 99% of your effort almost always amount to nothing. Human nature and research activity, the passion behind your research, these are things that only researchers can convey.

You feel happy simply when people who are interested tell you that it was "interesting", and it is also a good chance to ask yourself again why you are doing this research and to reconfirm its significance.

So to summarize why researchers conduct outreach activities, 1) to return the results of our research, which is supported by taxes, to the tax payers, 2) at the same time, by fulfilling our responsibility to explain to the public, to gain support for our research funds from them, and 3) lastly, to simply let society know the joys of research. This is just like saying "This music was wonderful" to our friends when we hear a piece of good music. For me, 3) is the most important reason why I conduct outreach and S&T communication activities. In fact, I strongly believe that without this feeling, I would not be able to do it."