The 9th AIST Advisory Board Meeting

The National Institute of Advanced Industrial Science and Technology (AIST) convenes Advisory Board meetings, with the participation of leading intellectuals of various fields from both Japan and abroad, in order to solicit and receive advice regarding AIST research activities and all areas of operations.

The first Advisory Board meeting convened since President Chubachi's inauguration was held at the Tsukuba Headquarters on January 27, 2014. (This was the ninth such meeting held since the AIST's founding.)

At present, under President Chubachi's leadership, AIST is pursuing a variety of new initiatives and conducting studies with its sights set on the Fourth Medium-term Plan, hereinafter referred to as the fourth term.

This Advisory Board meeting, held under the main theme of "Initiatives under New President Chubachi and Activities toward the Fourth Term," featured explanations of activities that were newly undertaken this fiscal year and discussions on vital issues requiring further study toward the fourth term, followed by discussions from various perspectives.

Here is a summary of the meeting and a report of the principal comments and suggestions offered by the board members.

Table 1 The Advisory Board Members

Junichi Hamada (Chair)	President, The University of Tokyo
Hiroyoshi Kimura	Chairman (presently Honorary President), Kimura Group
Sadayuki Sakakibara	Chairman of the Board, Toray Industries, Inc.
Takashi Shoda	Representative Director and Chairman (presently Senior Corporate Adviser), Daiichi Sankyo Company Ltd.
Waichi Sekiguchi	Editorialist and industrial sector editorial member, Nikkei Inc.
Kyosuke Nagata	President, University of Tsukuba
Hajime Bada	President & CEO, JFE Holdings, Inc.
Sawako Hanyu*	President, Ochanomizu University
Ei Yamada	President & CEO, AnGes MG, Inc.
Alain Fuchs*	President, National Center for Scientific Research (CNRS), France
Makoto Hirayama	Professor, State University of New York, United States
Reimund Neugebauer*	President, Fraunhofer-Gesellschaft, Germany
Thaweesak Koanantakool	President, National Science and Technology Development Agency, Thailand
Willie E. May	Associate Director of Laboratory Programs, National Institute of Standards and Technology, USA

(* not in attendance)

Table 2 Program

January 27 (Monday), 2014

10:00	Opening Introduction of board members and AIST attendees
10:10	Opening remarks
10:20	Initiatives under New President Chubachi and Activities toward the Fourth Term (Part 1)
12:00	Lunch
12:30	Inspection of research facilities and discussion with researchers
14:30	Initiatives under New President Chubachi and Activities toward the Fourth Term (Part 2)
16:50	Closing remarks
17:00	Adjournment

Summary of the 9th Advisory Board Meeting

This Advisory Board meeting was held with the participation of 11 highly erudite board members which, with the recent addition of Dr. Kyosuke Nagata of the University of Tsukuba and Dr. Reimund Neugebauer of Fraunhofer-Gesellschaft, now numbers 14 (Table 1).

First of all, various materials concerning the principal theme from AIST of "Initiatives under New President Chubachi and Activities toward the Fourth Term" were presented, with the presentations broken into two parts. Prior to the second set of presentations, participants viewed research facilities and engaged in discussions with researchers. Afterwards, board members had the opportunity to make comments and offer suggestions.

Comments and Suggestions from Board Members

Junichi Hamada (Chair) (President, The University of Tokyo)

With regard to raising the level of recognition for AIST, it would be useful to consider what image or words might be appropriate for characterizing AIST. This is a generalization, but in the case of Germany, for example, Fraunhofer-Gesellschaft, Helmholtz-Gemeinschaft, and Max-Planck-Gesellschaft, each presents a certain, individual image, while all are leading world research institutes. As to the format in which AIST should be developed, some sort of keyword that conveys AIST's prodigious research prowess directly to industry and society is needed. Additionally, since this must not be restricted to words alone, a symbolic mechanism needs to be put in place that will make this keyword concrete.

With regard to development of the Fourth Medium-term Plan, while the content described in the present Third Medium-term Plan is very good, there is something weak about its manner of appeal. Since this may have a bearing on the state of research or the state of personnel training, it would be a good idea to create a more proactive image, perhaps including a catch phrase that conveys the actual situation.

Hiroyoshi Kimura (Chairman (presently Honorary President), Kimura Group)

AIST has now come to provide research reports and other presentations at societies made up of medium-sized companies such as my own. However, AIST's level of recognition among small- to medium- sized companies is not so high and AIST seems to be somewhat passive in identifying needs. In terms of actions by AIST, closer interaction with small- to medium- sized companies is needed.While I realize that gathering information about the needs of such companies takes a lot of effort, AIST that has greater visibility and that is more capable of developing human relationships is needed.

Next, regarding renewable energy research, the high cost of renewable energy is an important issue for medium-sized companies, such as my own, in energy-intensive industries. If the use of such expensive energy is mandated, then energy-intensive industries will cease to be viable in Japan. Therefore, I sincerely hope you will aggressively pursue this research in terms of cost effectiveness, including studying the potential for methane hydrate.

Additionally, regarding scientific knowledge pertaining to the earthquake, every effort should be made to transmit raw data from Japan to researchers around the world. I hope that people around the world will receive this data that Japan transmits, so that the experiences of the Great East Japan Earthquake and the related nuclear reactor accidents will be put to use in the interest of global development.

As for the types of research that AIST should conduct, speaking from the standpoint of small- to medium- sized companies, efforts ought to be weighted on the side of applications. However, to gain standing as a world-class research institute, it is necessary to consider how applied research can be complemented with basic research. One thing that is currently missing from AIST is a policy viewpoint on Russia, which is a country that has done outstanding work in areas of basic research, and with which exchanging information is needed.

Lastly, with regard to human resources, small- to medium- sized companies such as my own have a hard time recruiting newly graduated PhDs. For that reason, we have our engineers publish papers, and encourage them to earn their PhDs under the tutelage of professors from their alma maters. In consideration of the "age of thinking" that is before us, it is clear that whether the ability to think exists within a company will hinge crucially on the number of PhDs that the company hosts.

For example, it should be noted that there are fewer and fewer university professors with expertise in the field of casting in recent years, and it is conceivable that eventually we may find ourselves in a situation where academic supervisors in this area disappear entirely. For that reason, I would like to see AIST become a body that can oversee the training of PhDs in small- to medium- sized manufacturing companies. Furthermore, in recent times, manufacturing by such companies in Japan has somewhat lost its luster. This is at least partially because small- to medium- sized Japanese companies have fallen behind in their use of information technology (IT). For example, while it is difficult to train engineers to fully utilize three-dimensional (3D) printing, this technology provides an opportunity, first of all, to provide thorough instruction in 3D data technology, and thus bolsters efforts to train engineers.

As for IT technology utilization, which is presently most problematic among small- to

medium- sized companies, rather than starting out with high level research projects, training engineers who can propel forward small- to medium- sized companies by providing them with technology that is more approachable and immediately useful would be appreciated.

Sadayuki Sakakibara (Chairman of the Board, Toray Industries, Inc.)

Under new President Chubachi, AIST has been undertaking cutting-edge research and technology development that meets the needs of industry and society, while addressing national issues. I strongly feel that AIST is fulfilling an important role as one of Japan's central public research institutes, and it is truly encouraging.

Among national issues, earthquake recovery is an urgent assignment, and it requires scientific knowledge and geological information. As for the major reasons why certain recovery efforts are not proceeding rapidly, there are a great many problems that stand in the way of progress, for example, a lack of scientific knowledge, a current inability to solve the problem of high radiation levels, problems related to high radiation levels in the ground, problems related to the safety of radioactive substances in waste water discarded into the ocean, and so forth.

By providing solid knowledge about how safe it truly is scientifically, agencies with responsibility can greatly speed up earthquake recovery. Accordingly, it is extremely important for AIST to responsibly transmit scientific understanding that will truly advance reconstruction from a broader standpoint than academia.

In addition, open innovation hub function of AIST can significantly promote the collaboration between industry and academia. When it comes to industry–academia collaboration, the principle of competition necessarily comes into play among private enterprises, and the manner in which this collaboration is managed becomes extremely difficult. In other words, the principle of competition may become a major obstacle to joint research. However, in the case of joint research projects with AIST, AIST acts as a hub and enterprises are able to collaborate with each other while their confidential information is carefully protected.

In particular, I am encouraged by the Tsukuba Innovation Arena and the Lithium Ion Battery Technology and Evaluation Center (LIBTEC). However, when drawing comparisons with overseas institutions such as Albany NanoTech in the United States and IMEC in Belgium, there is a strong desire in the industrial sector to see AIST grow in terms of budgeting and scale so that it can expand its areas of activity. Therefore, I strongly encourage you to look into expanding your functions and growing in scale.

Lastly, I would like to comment on the private use of AIST's research facilities. The private use rate is not so high, because of the shortage of technicians to manage and operate AIST's internal facilities. In that regard, training and expanding the number of research assistants, even as you continue working to add more researchers, is vital for making AIST's research still more robust and effective.

Takashi Shoda (Representative Director and Chairman (presently Senior Corporate Adviser), Daiichi Sankyo Company Ltd.)

First of all, with regard to the level of recognition for AIST, while I myself have of course known the name AIST for some time, it was not until I actually became a member of the Advisory Board that I acquired any real sense of the nature of its activities. Because AIST has been gaining attention in various venues, such as being awarded the Cabinet's Annual Merit Awards for Industry-Academia-Government Collaboration, it has perhaps become well known among persons in certain areas of research. However, I imagine that there are still areas where it is not very well known. Accordingly, while it will be necessary for AIST to further expand activities with those companies with which it already maintains close ties, I feel that the extent to which AIST develops new forms of collaboration with companies and academic institutions will become an important milestone in relation to name-recognition.

Additionally, with regard to AIST's Leading Engine program for Accelerating Drug Discovery (LEAD program), amid the present discussion of the Japan Medical Research and Development Organization by the country's Headquarters to promote Healthcare and Medical Strategy, I would like to see thorough discussions about potential applications of AIST's platform and technology, so that AIST's programs can be coordinated with the country's medical research and development strategy.

With respect to the manner joint research is conducted with companies and how to attract the serious interest of large corporations, I think that the approach will vary greatly depending on whether it takes place in a pre-competitive stage or in a competitive stage. For example, AIST participates in a number of technology research associations and I feel that these activities are in a pre-competitive stage. I believe that these technology research associations are extremely important, and that, utilizing these technology research associations to carry out joint research and to closely collaborate with their participants in the pre-competitive stage is always indispensable. However, only later on, when they reach a competitive stage, serious interest of large corporations will be elicited. I think that this would be the natural progression. I also think that, when setting forth the concept of joint research, it is necessary to organize things in such a stepwise fashion, and to carefully consider the sort of collaboration that will be most conducive to promoting the actual implementation in society.

Waichi Sekiguchi (Editorialist and industrial sector editorial member, Nikkei Inc.)

I think that the initiatives taken under President Chubachi to raise the level of recognition for AIST have been most appropriate, and that in the future they will need to be further strengthened. However, I feel that the issue is not simply whether AIST is known, but the level of recognition in the sense of companies that see AIST as a partner with which they can achieve things. I feel that, up to now, along with the pattern established since the time of the former Agency of Industrial Science and Technology, there has been a sort of barrier having to do with a high threshold, and the perception of a certain arbitrariness. Accordingly, raising the level of recognition will entail making efforts to remove this barrier.

In the future, I think that companies will need to cooperate in various areas, particularly in the fields of information and communication, and energy, in order to achieve standardization. However, because it is difficult for private companies to do this on their own, there needs to be an official body that can serve as an intermediary; this is where AIST has an important role to play. I believe it is necessary for AIST to demonstrate a presence as a forum for open innovation.

With regard to "plan, do, check, act" (PDCA), while this cycle is important in each subject of research, I think that PDCA in the research subjects of AIST as a whole is necessary. In other words, the reorganization of AIST's portfolio of research subjects should be flexible. This is because, while sticking with a plan that has been formulated is important, I think that it is also necessary to have the perspective that, under certain instances, you might decide to switch to a different area, or to work out a different approach by combining one subject with another. As a member of the evaluation committee for one of AIST's research institutes, the committee is evaluating whether the budget is being used appropriately, and whether appropriate results are being obtained within the scope of the institute. However, I do not feel that comparisons with other AIST units and evaluation of whether each subject ought to be pursued are being done. For example, when it comes to the area of big data or data science, Japan, having only just gotten started in these areas, is still virtually at the starting line. Therefore, I feel that these are areas that AIST might well pursue, and believe that there may be a need for a system that allows dynamic adjustments to be made, so that AIST can take up new areas as priority items while keeping work in areas where results have already been achieved.

I think that, while the change to viewing things in terms of "green technology" or "life technology" is very good, I would also like to suggest that rather than thinking in terms of organizations or the supply side, you become able to reorganize from the perspective of the demand side.

When considering ventures in terms of raising the AIST recognition level, if one or two AIST's ventures became famous, I think AIST's current situation would be completely different. Therefore, while understanding that supporting ventures is not AIST's primary mission, it still might be necessary to create a system that channels more energy in that direction.

Considerable efforts have been put into addressing the matter of diversity and I would like to commend you highly for your hard work in that regard. Regarding the target goal of increasing the number of female researchers to 15 % of the total or higher, it appears that good results have been achieved thus far. Going forward, while continuing these efforts, I urge you to raise your sights even higher so that, rather than focusing solely on numbers, you consider creating a path for qualified female candidates to enter positions of management.

Regarding career paths of PhDs, this is an issue Japan as a whole needs to address much more seriously. More specifically, while AIST's research results achieved by accepting post-doctoral fellows are worthy of high praise, AIST must not become a post-doctoral fellow collection pan. I think that most of post-doctoral fellows who have joined AIST to date see this institution as their ultimate employment destination. However, going forward, rather than encouraging them to make AIST their final goal, you should motivate them to view their time here as a step in a process, with the ultimate goal of joining a foreign corporation or overseas university, entering a Japanese company or research institute, or joining a university faculty. Another important step is encouraging independence by starting ventures.

Thus, it is necessary to create these next steps, to build a cycle so that those who are able and willing to enter can do so, and those wishing to depart can leave. In other words, while entrance strategies seem to have been emphasized up until now, I would like to see you give some thought as to exit strategies as well.

Kyosuke Nagata (President, University of Tsukuba)

It is necessary for AIST to make major changes possibly by organization structure reform or decisions about the direction of research through budget allocation. However, various units or research fields of AIST have existed for a long time, and the efforts of these traditional areas are utilized, for example in dealing with the present Fukushima geological problems. Thus, it is not a matter of simply deciding where to scrap. While continuing to conduct basic research with minimum budgeting, it could be important to give thought on how to use remaining funds in a different manner.

In that sense, the establishment of the Fukushima Renewable Energy Research Institute, which was accomplished with great speed, is wonderful. This is a project undertaken in response to the voices of society, the country, and the region – all of whom have been striving for a way out of the present predicament. The institute is also an organization established by gathering people

from so many different fields within AIST.

While AIST is politically neutral, taking on issues that beset the world and Japan is something that ought to be actively pursued. This is the reason for the basic research at AIST. However, while carrying out research in various areas and considering the measures that are presently required, AIST must also assess the needs of society and then apply its strongest efforts to those areas where there is a good match.

Only in this way will a means of introducing AIST-led industry initiatives appear. There are already instances where AIST is assisting with projects that companies want to pursue, and no doubt this will continue in the future. Thus, the way that I suggested would be the reason why AIST is AIST. When I consider the difference between AIST and companies and universities, AIST's strength is not limited to its political neutrality, so that efforts should be made to play a leading role in crafting directions for the flow of the country's budget.

Hajime Bada (President & CEO, JFE Holdings, Inc.)

The two themes of raising the level of recognition and better responding to the needs of industry and society can be thought of as two sides of the same coin. Regarding the first point, because any measure of change in future recognition levels must be based on the extent to which AIST is recognized at present, I suggest conducting a survey using a professional polling organization. In terms of the type of survey, rather than simply taking a recognition poll, it will be necessary to make a solid assessment of the expectations that people in various fields have for AIST.

While there will be considerable variance in the results between different research areas, and between research institutes and companies, it is important to recognize these diverse needs. Having various people actually observe, listen to, and become acquainted with the researchers is the fastest way to improve recognition levels. Inviting representatives of companies, educational institutions, research institutes, newspapers and other media, and technology analysts to an event – held perhaps once a year – to introduce AIST's results and exchange information would be one suggestion.

The second point concerns governance. While already making strides in this area, for a research body, an important part of opening technology through open innovation is to staunch the outflow of technical know-how.

My third point concerns joint research with companies. The amount of expenditures on research and development (R&D) per joint research project with companies is currently low. Indeed, the total of three billion yen per year in R&D funds that is contributed by companies is small when compared to overall corporate R&D spending, or to the amounts provided to universities for contract research. Thus, while more effort on the part of companies is necessary, it would also be desirable to see spending amounts of a magnitude higher. Since AIST is a national institute, it has the option of taking on R&D from more of a high-risk-high-return, long-term view that companies cannot afford.

Also, AIST should make efforts to coordinate applied research that combines a wide range of areas – beyond what any single company could undertake – and thus attract attention from many different enterprises.

To attract companies, the basic approach would be to obtain patents that may be expected to yield world-class leading-edge practical applications in the future, which would later be transferred to private enterprises.

My fourth point concerns human resources. I am concerned about the decline in foreign researcher hires. In companies, generally speaking, there is a growing need to employ talented people from other countries, particularly those who have studied in Japan. More efforts should be made to hire people from abroad and, simultaneously, to increase the outward movement of people to other countries.

Ei Yamada (President & CEO, AnGes MG, Inc.)

Concerning the specialized field that my company is involved in, my impression is that the LEAD project has an extraordinarily large impact. I always say that the success rate for drug discovery is the same as that of making a hole-in-one. In other words, it is that dauntingly low. Information on the genome emerged in 2000, led by efforts in the United States, and Japan has been keeping pace since then, and expectations have been for a drug discovery success rate better than one in 20,000. Later, I was extremely encouraged by the news of how AIST spent more than 10 years developing a method whereby it has become possible to increase the success rate through inclusion of a sugar chain factor.

AIST's LEAD project is world-class, and I heard earlier that it has the world's highest sensitivity in detecting sugar chains. However, with regard to recognition levels, this will eventually come down to whether this method gains currency globally. An improved level of recognition will truly hinge on the extent to which AIST's present resources can be evolved.

Next, with regard to human resources, speaking based on my experience, senior staff are extremely valuable in various areas. In the United States, my company is now conducting a clinical trial with a project leader that is 75 years old. This might seem surprising, but based on his prior experience and due to his unique way of thinking, he is truly without peer. In Japan, as well, we had a 75-year-old person complete a project. These examples speak to the need for viewing seniors as major assets.

In addition, the activities of women in our field are also impressive. In particular, women seem to have the highly meticulous disposition required for work in the area of cell systems, such as induced pluripotent stem (iPS) cells. Speaking generally, men tend to give up in the middle of something, whereas women have the tenacity to work tenaciously at something until they achieve success. I see this as an example utilizing women's aptitudes. In this light, identifying tasks where men and women excel respectively would lead to a new type of role division in each research field.

The work involving sugar chains was carried out over an extremely lengthy period, making this a research subject that could not be undertaken by an ordinary person. Frankly speaking, it would be beyond anyone but a highly eccentric individual. This might sound a little odd, but by eccentric I mean someone with outstanding abilities who possesses a perspective or outlook that is significantly different from others. Put in a positive way, this is foresight or vision, and those possessing such perspectives are, on the whole, eccentric. Accordingly, I feel that the hiring of such flexible individuals is important.

There is one person in my company who is an eccentric, but when difficulty arises, that person is the one most likely to solve any problem he tackles. My apologies for straying into such specifics, but these are important points to bear in mind when considering human resources.

Makoto Hirayama (Professor, State University of New York, United States)

Concerning the roadmap of Strategic AIST integrated R&D program (STAR), it does not contain what the goal is to be achieved, by when, and what will be the next step. Therefore, I wonder how you are going to determine your whereabouts on the roadmap.

I think you need to create a culture where you set clear goals and state how you are going to evaluate whether these goals are achieved or not. At my university, especially perhaps because it is part of the American culture, we are always asked by when something is to be done, and when it is not achieved, what will be the next step.

With regard to human resource training, there are a few things I would like to say. I have been in America for 11years now, and during that time many Japanese researchers have visited me. Their ability technologically and in their specialized field is just as good as any researcher. With some, I spend a few hours on a one-to-one basis in discussion, or some stay over 2 years at my laboratory doing research. Their problem, if any, is not their research ability or their technological knowledge but their personal manner.

There are quite a number of good researchers who do not know how to speak. Thinking of why they are the way they are, I realize that the fault does not lie with them alone. Being in their 30s, they have been influenced by their family background, school environment including university, and most of all, by their work environment. Perhaps, now there lacks a culture in Japan to say no to what should not be done.

It is good to train researchers as potential human resources, however we, as adults, also need to teach manners to those who lack them. If we do not do this, the young generation will not grow. This is what I would like to communicate to the young people of Japan, as well as to those of my generation and a little younger.

Thaweesak Koanantakool (President, National Science and Technology Development Agency, Thailand)

The key issue, number one, on the ways of industry collaboration is very interesting. I can see that you have catered the government's strategy into medium-term goals, and then a medium-term plan of AIST. We can see that there is a cascading of many national challenges into the research program of AIST, for example, you have come up with projects related to disaster recovery, nuclear waste, renewable energy, resurrecting the green innovation, and ageing society.

My first point of interest is, when you link up the government policy, the AIST enterprises, and the AIST researchers together, do you have any problems or difficulties in aligning enterprises' problems and goals with those of the government, and at least with those researchers in AIST? Have there been any difficulties in alignment? For example, in certain areas where you have a problem with a lack of researchers? Or, in the area that you have core competency but there seems to be a lack of interest in the private sector? Is there anything of a mismatch that you encounter during execution?

My second point of interest is about the way that you recognize or reward researchers and link up their success or career path with the goals of AIST. How do you get around this? Which kind of strategy that you use to align researchers' career path with what AIST would like to achieve.

Willie E. May (Associate Director of Laboratory Programs, National Institute of Standards and Technology, USA)

NIST and AIST are very similar organizations, and if I or my boss went to a small liberal arts university in the United States and asked that question, we might get a very similar answer. We would not be very disturbed at that that, because we realize, as has been alluded to, that you really need to structure your message for the audience you are speaking to. There is one audience that you have for, say the general public, and another audience that you would have to industry. You would also have a slightly different message to your legislators or the people who provide the funding for you.

I am basically in agreement with the

thematic areas that you have identified to focus on, but what is not clear to me is a clear articulation of the difference between the role and the work that AIST does in these areas versus what a world-class university would do, or the private sector. That is, if you are trying to message to your government, or at least to your funding agencies, or to the public, what is the clear unique benefit that AIST is providing, distinguished from a university or a private company.

You probably do this, but it has not been obvious in the things that I have seen, and that is an emphasis on the quality of research output and clearly articulating their impact on innovation and quality of life so that there is a value statement. In terms of metrics, there are many things that you can count. There is stuff that we count at NIST because we can count them. I am not sure if they are the best things to count, but one of the things that we count is that, at NIST, we have roughly 3000 federal employees, about 1800 of those are scientists and engineers. We have an additional 2800 people who work on our campus every day that are not NIST employees. Those are the people from industry, from other government agencies, from academia, or other foreign laboratories that come and work on problems with us because they value the research we do and they are interested. To us, that is always a valuable metric; the fact that we are working on areas that are sufficiently relevant that other people want to come and spend their resources to work on them with us.

Let me also commend you on the idea of establishing the user facilities. I think you will find that that is a very good way to relate to your industry. For example, back when the US government shut down a few months ago, we got a few comments from people that our website was down and people could not access to many of our Standard Reference Data outputs, such as our Chemistry WebBook. However, the greatest concern that we heard was from industry who were denied access to our User Facilities, (NIST Center on Neutron Research and Center for Nanoscale Science and Technology) While very important, it takes a while for the results of our more basic research to be missed. But being denied access to our User Facilities has an immediate impact.

Both very large and smaller companies use our facilities on a day-to-day basis, you might ask why IBM would want to use a NIST facility. You might wonder why very large multi national companies would find

it very useful to use our facilities when they could certainly afford to purchase the tools that we have. It would be because we have a business model where we make sure we have the latest tools in there for them to use. So for a company like for example IBM, who might be trying to develop a new memory device, and would need to have access to a tool that costs, say, $5-6M, they do not have to go out and buy that until they come and demonstrate that actually the technology they are trying to develop will work, and this is the tool that they need. Then they can go back and do that investment.

I was not suggesting that all of AIST be a user facility. I was just suggesting that, for example, for NIST we have seven laboratory entities and two of those are user facilities. Of course, they conduct their own intramural research program, but they also open their facilities up to proposal-based research from industry, the private sector, and academia.

I think the notion of you having user facility that is open to the public you will find to be very valuable to you.

President Ryoji Chubachi

I would like to sincerely thank each of you for taking the time to participate in these discussions over many hours. I also appreciate your insightful views.

I would like to address a number of the opinions that have been expressed. First, in connection with raising the level of recognition for AIST, with regard to the recognition index, we are considering a variety of indicators, such as number of patent applications and the impact factor of published papers. I would like to consider dividing level of recognition into two groups: recognition among amateurs (ordinary citizens), and among professionals.

I think that I would like to carry out a level of recognition survey along the lines proposed by Mr. Bada.

Regarding AIST's image, when explaining AIST's activities, rather than explaining individual areas, we will use the term image or keywords when making an overall explanation of AIST, and then explain those activities using the Strategic AIST integrated R&D Program (STAR) as an example. It is extremely difficult to express what will have an impact on society by explaining individual areas of research. In response to setting a deadline that was voiced, I would like time to prepare an answer.

With regard to responding to the needs of industry and society, the current utilization of AIST by global corporations in Japan and around the world seems to be low compared with utilization by small- to medium-sized companies. In terms of numbers, of course, utilization by large corporations is higher, but the reality is that large Japanese corporations often follow a policy of self-sufficiency. Accordingly, this is an area where we need to work on in order to make further inroads. I, myself, am involved in doing business with the top managers of major corporations, but more communication is necessary.

Toward small- to medium- sized companies, we are now reaching out using AIST's Full-fledged Research Workshops, but since these activities are limited to small- to medium- sized companies with which AIST already has ties, I would like to see us develop new relationships by reaching out to companies that we have not yet approached.

Regarding user facilities, rather than blindly responding to requests from the government or industry, we need to clearly define and promote the value of our available facilities. This is something that I want to clarify in AIST's mission statement.

With regard to research at the Fukushima Renewable Energy Research Institute, I would like to express my gratitude for

the extremely robust support backed with expectations. This research institute is invested with the aspirations of the people of the stricken prefectures, of Japan, and of the entire world. I would like to see everyone unite in working to respond to these aspirations and unerringly fulfilling our role.

I am also very encouraged by the comment about the need to transmit information based on scientific knowledge and evidence. It is clear that scientists cannot respond to the overall needs of society merely by acting within the bounds of their present capabilities. The world is watching us; therefore, we must continue striving to move forward while maintaining a sense of tension.

With regard to strengthening governance, we are now in the process of studying and identifying any risks to which AIST could be exposed. As part of this, regarding the outflow of technical know-how, the problem of how to match the activities of a global research institute tackling open innovation with the national interests of Japan is both crucial and extremely difficult. However, I would like to resolve this matter in a way that incorporates constructing systems.

I am keenly aware of the issues surrounding management of the regional research bases. Overall coordination is handled by the Research and Innovation Promotion Headquarters, but there are some areas where it is unclear whether something falls within the scope of work handled by the regional base director or by the research unit. I fully recognize the importance of this issue and will study ways of making improvements.

Toward AIST's fourth term, we have begun studying the character of the research that AIST ought to pursue. The fourth-term science and technology basic plan is characterized by a problem-solving format in which an integrated approach is taken, proceeding from basic research on through to applications. At the same time, there is a sense of apprehension from industry that problem-solving innovation will be emphasized at the expense of basic research.

However, as has been pointed out by members of this advisory board, while recognizing the importance of basic research, we are looking at the present orientation, which leans toward the application side, as appropriate. In addition, the work of fusing research together in ways that overcome disciplinary boundaries and brings out the full potential will be an issue taken up during the fourth term.

In their joint projects with AIST, private enterprises are cautious of overlapping with other companies. Therefore, with view to alleviating such concerns and forming collaborative ties, I believe that we need to make efforts to further improve communication.

With regard to technological research associations, we are now making efforts to ensure that no conflicts emerge in either the pre-competitive or competitive stages. For example, we have created a material evaluation platform in which we evaluate meterials of both manufacturer A and manufacturer B using a standard protocol, and then provide feedback. This gives both manufacturers the opportunity to hone their skills. However, it is necessary to carefully monitor the manner and extent to which companies are making use of this approach. While I am not yet confident about the degree to which companies presently provide us with topics that are truly crucial for their own future, I do expect that companies will increasingly provide subjects that are of a high degree of importance to their enterprises.

While AIST has IT groups, in reality it is difficult for IT to produce results unless it is combined with another group, such as drug discovery or transportation. With its base technology as its foundation, applications are built on top. From among AIST's six research areas, IT will be situated as a horizontal platform alongside such areas as geology, and metrology and measurement science, with applied fields such as environment and energy, and life sciences vertically integrated to these fields. In the future, I hope to maximize innovation by taking advantage of this novel vertical and horizontal integration, which I hope to establish during the fourth term, and which will entail the reorganization of our research units.

I believe that various questions are bound to arise in the course of following the PDCA cycle. "Is the organization system designed to fully reach its goal?", "Is there adequate funding?", "Do we have appropriate human resources"? I refer to these issues as the capability gap. Even with appropriate goal setting, we must, at all costs, avoid situations where we face capability gaps. For that reason, I am directing people to establish clear feasibility. In order to avoid situations where views or concerns are expressed but not followed up on, we need to thoroughly carry out the D (do), and then follow up with the C (check) parts of the PDCA cycle. I also hope to make further improvements on this basis.

Next, with regard to human resources, I completely agree that training researchers in terms of their overall character is important. In addition, the point about not being overly concerned about age is extremely encouraging, and we will carefully discuss the most appropriate approach to adopt during the fourth term.

With regard to technology succession, because universities like to try new things and are not mirrors of industrial organizations, there may be instances where difficulties arise in collaborating with industry partners. In that connection, at the Materials Fiesta in Sendai (temporary name) to be held in July, AIST will be joining forces with people from universities in Sendai, various companies, and representatives of the assembly industry which belongs to the final production process. In this fiesta, we plan to stress the importance of training human resources and of industry. Of course, one event alone will not be sufficient, so I plan to take every opportunity that arises to promote communication between the world of industry and the worlds of education and academia.

Lastly, I feel that this day of discussions by the Advisory Board members is an invaluable asset for AIST. I would like to take this opportunity to again express my appreciation to Prof. Hamada, who has served as the chair, and to all members of the board for sharing their earnest and constructive views.

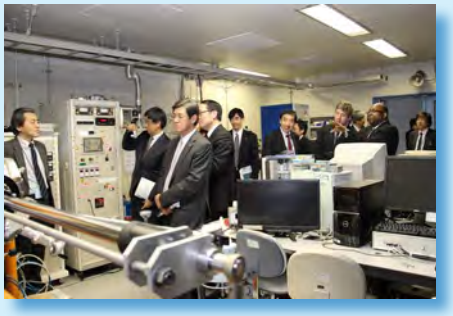
I intend to fully reflect your opinions in our daily operations, and in the fourth term, and look forward to your continued guidance and support.

Thank you all very much.

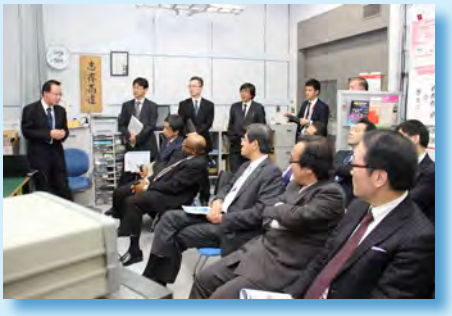
Inspection of research facilities was conducted in two groups

Inspections were conducted of six research projects, including projects of the STAR program, which is a new AIST initiative.

Course A



"Superlattice phase-change memories"
Nanoelectronics Research Institute



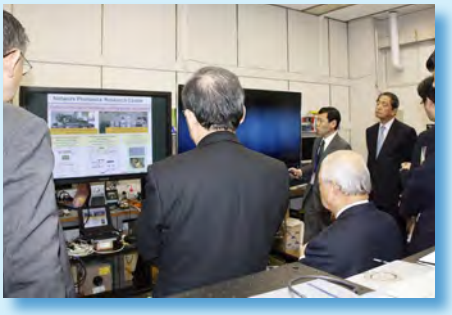
"Structural material diagnosis technology utilizing optical fiber sensors and digital cameras"
Research Institute of Instrumentation Frontier

"Development of technology to speed up drug discovery through use of sugar chains"
Research Center for Medical Glycoscience

Course B

"Drug discovery for treating neglected tropical diseases (NTD): International contributions through open innovation"
Biomedical Research Institute

"Hydrogeological structure and underground water system in the vicinity of the Fukushima Daiichi Nuclear Plant"
Institute of Geology and Geoinformation,
Institute for Geo-Resources and Environment



"Dynamic Optical Path Network"
Network Photonics Research Center