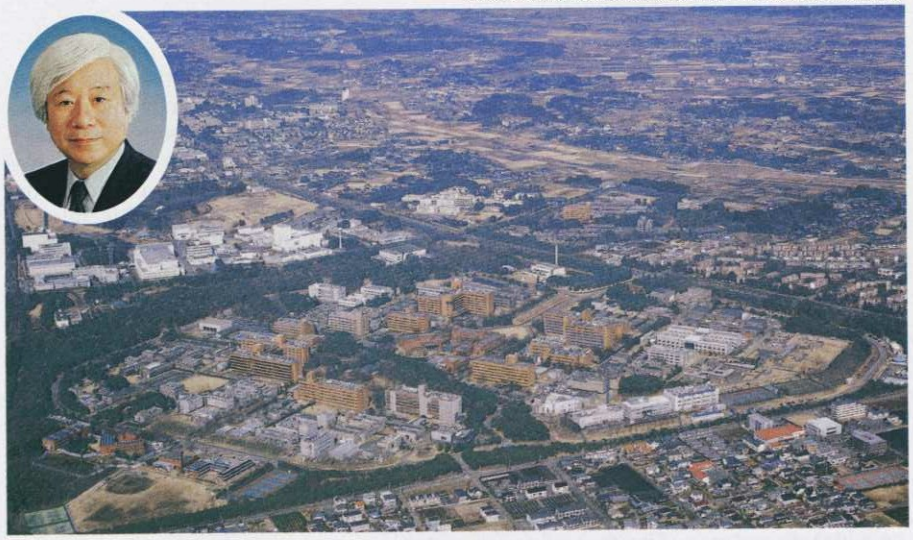
International Society and the Goals of the National Institute of Advanced Industrial Science and Technology (AIST)

By Yoshikawa Hiroyuki

Photos : National Institute of Advanced Industrial Science and Technology



AIST President Yoshikawa Hiroyuki and an overview of Tsukuba where the AIST research facilities are integrated

Industrial technology clearly contributed significantly to Japan's economic recovery and rapid growth after World War II. Industrial technology induces new investments and strongly affects not only Japan, but also all members of the international community – including Europe, America, and developing countries – and has played an important role in improving the quality and quantity of products in the world.

From the beginning of the 1990s after Japan's economic bubble burst, however, the economy entered a prolonged period of stagnation. This situation can be partly attributed to declining competitive power due to weakened industrial technology. Consequently, I believe that improving industrial technology for the sake of revitalizing the Japanese economy and contributing to international society have become the new national goals of Japan. Now that we have entered the 21st century, there are growing expectations placed on institutions and researchers working on scientific technology to resolve such global problems as the depletion of natural resources and environmental pollution, and create new industries to overcome existing industries that have reached full maturity.

Given these circumstances, the National Institute of Advanced Industrial Science and Technology (AIST) was established on April 1, to significantly strengthen and restructure research and development (R&D) in the field of industrial technology. This new research institute was created as part of the Japanese government's administrative reforms to combine 15 national research institutes engaged in industrial technology. The goals and responsibilities of this organization were clarified, and the institute was created as an independent administrative institution (which performs administrative tasks independently from the government). This new institute is Japan's largest public research organization, with nine research facilities located throughout Japan and employing some 2,400 researchers and 800 workers engaged in research-related and administrative tasks. As the first president, I intend to fulfill my assigned duties regarding this institute and improve industrial technology to provide a higher quality of life and sustainable growth for human beings.

Three Missions of the Institute

As Japan's largest public research organization, AIST creates and strengthens industrial-techno infrastructures by conducting wide-ranging research on industrial technology in the field of electronics, information, biology, environment, materials, energy, manufacturing, metrology, measuring and earth science, to help develop Japan's economy and industry, and improve the quality of life for the Japanese people. I believe that the institute has three main missions.

The first mission is to conduct research over a wide spectrum to promote innovation in harmony with various branches for creating new international industries and strengthening industrial technology. I believe that maintaining and strengthening international industrial technology and creating new industries are essential for sustaining economic and industrial vitality. To achieve breakthroughs in industrial technology in support of the aforementioned tasks, I concur with the viewpoint that it is essential for us to have a wide spectrum of research for new technological seeds and the verification of new possibilities, and to compete together with the various branches. We must actively pursue these goals.

The second mission is to create an environment for the required research on energy and environmental technologies. Long-term energy supplies, energy conservation technology and environmentally-friendly technologies are very important issues to be resolved to ensure Japan's future survival. The rel-

atively long lead-time required and high risk posed make it difficult for private companies to make short-term profits, therefore public organizations must help resolve these issues. Our institute will work hard in conjunction with the Japanese government to address these very important issues.

The third mission is to work on strengthening the intellectual infrastructure. Japan is now promoting and making adjustments for strengthening the intellectual infrastructure. To contribute toward this end, we will work from a standpoint of neutrality, fairness and reliability to strengthen and provide various intellectual infrastructures and the basic technology required. Specifically, we will work hard on measurement standards, geological surveys, the supply and adjustment of standard materials, the revision of industrial standards, the acquisition of various analysis/evaluation know-how, and the creation of databases.

Points on forming an organization

To strongly promote research activities related to industrial technology, I believe that we need an organizing ability to comprehensively promote research activities in a variety of ways, based on a strategic choice of research topics, a distribution of research resources and close cooperation and harmony among researchers. We have reorganized our institute based on the following six points, which will allow us to better perform our three main missions.

1) Mobility and Openness

We established a flat organization for quick decision making and a mobile research system, and allowed the president to pursue top-down management with authority transferred to the heads of research units. In order to make the best use of research potential in the business-academic-political sectors, establishing open management of research facilities for the organic cooperation with outside researchers is realized.

2) Creativity and Harmony

This point refers to pursuing a system beyond vertical structures such as fields and sectors, and basing on dynamic harmony and cooperation among researchers with different technological backgrounds. Synthetic and competitive research based on creativity will also be promoted.

3) Reliability and Continuity

AIST aims to contribute to ongoing industrial and social growth, and to maintain and improve the quality of people's lives, thereby realizing the acquisition and provision of technology and information that are widely trusted by business sectors and the people.

4) Active Publicizing of Research Results

AIST is responsible for the continuous distribution and publicizing of world-class research results as a pioneer in technological development. We will actively promote the release and standardization of such results. We will also precisely monitor, analyze and publish trends in industrial/scientific technology at home and abroad, and will help create intellectual property for all humankind as well as expand intellectual space.

5) Networking of R&D Facilities

With research facilities integrated in Tsukuba, Ibaraki Prefecture, and unique research bases located in each regional block, we have formed a close technology development network among the private, academic and government sectors. Through this network, we accumulate research and technological potentials, and through a transfer of technology we improve the overall level of industrial technology employed in Japan. We fully intend to assume the proud position of one of the world's leading research organizations through strategic construction of global research bases and networks.

6) Contribution to Government Policy Planning

Working closely with related administrative organizations including the Ministry of Economy, Trade and Industry (METI), we contribute to the policy planning of industrial technology and other policies which require scientific backing based on advanced technological knowledge and wide-ranging networks.

Structure of AIST

The following chart shows the new structure of the institute, which is based on the six points above. (see Organization Chart on page 39) The new structure can be broadly divided into two segments. On the one hand we have the research units, where the main body of R&D is conducted. On the other hand we have research support and administration departments which serve as a liaison with outside research organizations by providing an interface function for effective and efficient R&D.

To precisely cope with the specifics of study topics, the mission of a study, and the multiple phases of a study, the following five study units are flexibly positioned in the research centers.

1) Research Centers

With a limited term of three to seven years, researchers will focus on their strategic topics which have a clearly defined mission and could have a strong impact on the academic world, industry and society. To achieve our objectives, the provision of research sources including budget, personnel and space for the research centers will be given priority. Research centers are composed of dozens of personnel including outside researchers from business and the academic world and postdoctoral fellows. We will employ top-down management in which the heads of the centers have full authority. Top research leaders recruited from leading universities and the business sector in Japan and abroad head 12 of the 23 centers.

2) Research Institutes

In contrast to the top-down management employed at the research centers, the research institutes are positioned as

research organizations for developing technological potential with a certain degree of continuity for mid to long-term ranges involving research topics that are basically chosen from bottom-up ideas from individual researchers.

Given the broader coverage of research at the institutes, we will develop new technological ideas through innovative research. Thus, we will be able to develop new technological seeds and mobilize research in response to outside requirements. As such, we aim to play a role in creating new primal topics.

Research institutes have the following three indexes:

1. Clear correspondence to social needs
2. Developing new fields of technology by integrating different fields
3. Fully using the potential of the organization by combining technological familiarity

There are currently 22 research institutes staffed by 50 to 100 in-house members and some outside researchers.

3) Special Divisions

A research faction has been tentatively established at the AIST Kansai with the aim of working flexibly with existing local industry and research sectors in conducting diversely phased research ranging from the basics to the practical-use levels.

We fully expect greater coordination among public research organizations, the private sector and academia to result from this venture.

4) Research Initiatives

Research laboratories are positioned as mobile organizations to be established according to themes with high fusion in different fields and themes directed toward urgent administrative needs. Consequently, laboratories will be established on demand at any time.

5) Collaborative Research Teams

Research institutes for cooperation are to be established to respond to the need for regional cooperation and technological exchange among the business, academic and government sectors. These research institutes are also mobile and time-limited organizations to be established on demand.

In addition, we have formed the following five departments to make AIST have autonomous structures which will enable us to conduct more efficient research in response to various requests within Japan and overseas.

1. Planning Headquarters for making mid to long-term corporate strategies
2. Collaboration Department responsible for promoting research cooperation with outside organizations
3. Technology Information Department for analyzing trends in cutting-edge technology and R&D, and proposing strategies for Japan's industrial technology
4. International Affairs Department responsible for promoting cooperation with foreign research organizations
5. Public Relations Department responsible for distributing and publicizing research results

In addition to the five departments above, the Evaluation Division has been established to provide feedback to organization management through strict evaluation of the direction and achievements of research by outside experts. Thus, we will be able to clarify our role as a public research organization and respond to social needs.

Activities using Independent Administrative Organization System

As mentioned at the beginning of this paper, AIST was established in April this year as an independent administrative organization to handle administrative tasks independently from the national organizations as part of the Japanese government's administrative reforms.

Independent administrative institutions are not subject to the various restrictions usually imposed by governmental organizations such as the number of researchers and other members, organizational structure, accounting and asset management. By fully utilizing this advantage, we will construct a favorable environment that is open to everyone, including those from foreign countries. We will manage this organization as a mobile and flexible research organizational structure.

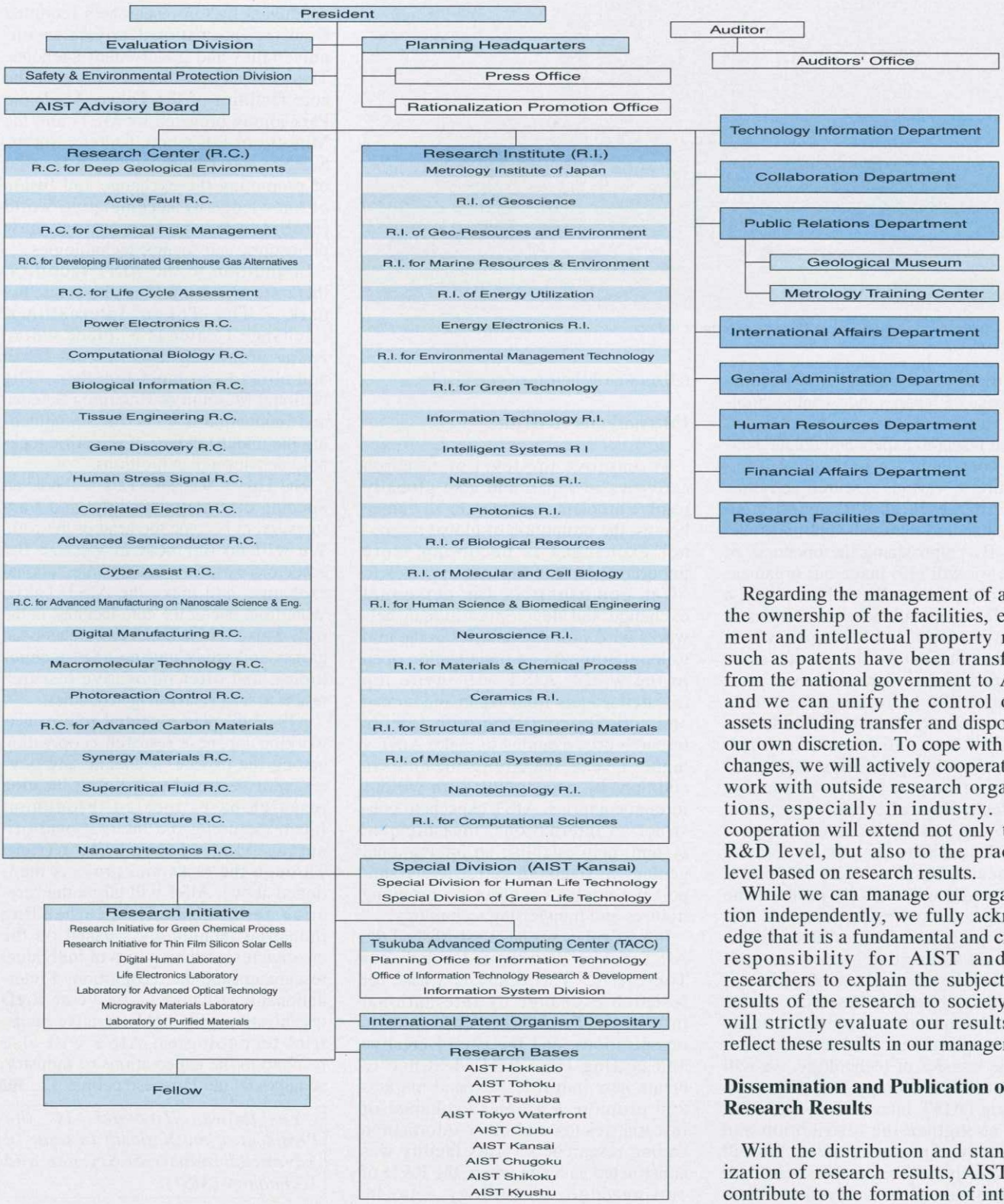
First, as an independent administrative institution, we are free from the governmental organizational structure control. As a result, we are now able to shuffle or abolish our organizational structure more flexibly than before. By fully utilizing this advantage, we will develop our research activities with full mobilization. This development includes the dynamic allocation of 2,400 researchers to such important fields as life science, information technology and environmental research, and according to research progress, allocating the appropriate personnel to research units on demand. Moreover, we will establish research units to promote new interdisciplinary research fields.

To make this organization more comfortable to work in and attract young talented personnel, we will take various measures such as contracted employment for fixed periods and introducing a new, performance-based wage system. As an organization open to the world, we will manage our organization as a higher-level research facility by inviting leading researchers from Japan and abroad. In addition, we will create a new framework of R&D systems intended for Japan by taking reciprocal approaches among research organizations, companies and universities, and promoting mobilization of the labor market and more efficient research.

Also as an independent administrative institution, we are free from accounting controls and are not subject to national property laws. Consequently, we can use our own accounting method including a flexible contract system (such as multi-year contracts) coordinate research with industry, and introduce simplified administrative procedures.

(Continued on page 39)

AIST Organization Chart



Regarding the management of assets, the ownership of the facilities, equipment and intellectual property rights such as patents have been transferred from the national government to AIST, and we can unify the control of all assets including transfer and disposal at our own discretion. To cope with these changes, we will actively cooperate and work with outside research organizations, especially in industry. This cooperation will extend not only to the R&D level, but also to the practical level based on research results.

While we can manage our organization independently, we fully acknowledge that it is a fundamental and crucial responsibility for AIST and our researchers to explain the subjects and results of the research to society. We will strictly evaluate our results and reflect these results in our management.

Dissemination and Publication of Research Results

With the distribution and standardization of research results, AIST will contribute to the formation of intellec-

Photo : National Institute of Advanced Industrial Science and Technology

The newly established AIST Tokyo Waterfront, one of the core facilities of the Tokyo Academic Park near Tokyo Bay

tual property and expansion of intellectual space of Japan's industrial technology. To achieve these goals, AIST will publish research papers and create databases containing the intellectual infrastructure of various research activities including research data, geological maps, standard materials and personnel data. By emphasizing the openness of AIST, we will also make our organization a place for intellectual creativity, a place for cooperation between industry and academia, and a site where research potential for the private, academic and government sectors is concentrated. By performing these tasks and as a pioneer in industrial technology, AIST hopes to become a world-class research organization capable of offering research results by making new technological breakthroughs and developing new fields of technology.

AIST considers the outside transfer of research results a very important mission and will actively promote the distribution of our research results. For this purpose, we will construct an organizational structure to support management and the practical use of intellectual property based on research results, and subsequently submit strategic patent applications. Moreover, regarding the transfer of technology, we will use outside technology licensing organization (AIST innovations) and radically strengthen the distribution and publication of research results. We will also actively help researchers start their own businesses through venture capitalization of their research results.

International Activities

To improve the level of research activities in Japan and also globally resolve problems common to all human beings, the promotion of global personnel exchanges is becoming more important. In fact, Japan is expected to offer opportunities for personnel exchange and developing human networks with various countries in the mid to long term. As an organization open to the world, AIST will invite top research leaders from Japan and abroad and actively cooperate with foreign research organizations to make AIST a higher-level research organization. In addition, by cooperating with various foreign countries, AIST expects to construct an international measurement system, help establish an international geological standard, and actively support developing countries by receiving trainees and transferring technology.

In particular, we have established the AIST Tokyo Waterfront located near Tokyo Bay. This center is a base for research exchange by international industry, academia and public organizations, and the site of creative and cutting-edge R&D destined to create new industries, expand markets and promote a greater exchange of research results and other information among researchers. This facility was constructed as a site where the R&D of cutting-edge technology can be conducted by top researchers recruited from the international private sector, universities and government agencies. This center is positioned as one of the core facilities of the Tokyo Academic Park jointly prepared by METI and the Ministry of Education, Culture, Sports, Science and Technology with the aim of promoting the exchange and fusion of knowledge by accumulating world intelligence, and creating new philosophy and science technologies.

In addition to the AIST facilities, there are two centers in the academic park. The Tokyo International Exchange Center is a place where young promising leaders from Japan and abroad can meet together. The National Museum of Emerging Science and Innovation is a site for strengthening the understanding of scientific technologies through exhibitions.

The Tokyo Academic Park will hold an opening ceremony this July, and I am supposed to become the head of the park. We will do our best to vitalize the academic park as a site for international exchange, and make the AIST Tokyo Waterfront one of the core facilities in the park where international researchers can gather and study cutting-edge technologies, and offer innovative research results to Japan and foreign countries.

AIST will play a central role in networking Japanese research cooperation among the private, academic and government sectors by utilizing its nine research bases located throughout Japan including the international-oriented AIST Tokyo Waterfront. Through the tasks and projects mentioned above, AIST will target the "creative research body spearheading industrial technology," based on the creative research activities of individual researchers and the recognition of international contributions. As a core R&D organization with highly creative industrial technologies, AIST will also respond to the expectations of industry, society and the Japanese people. JJTI

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