NICT 独立行政法人 情報通信研究機構 NEWS
National Institute of Information and Communications Technology
2011 APR No.403 4



# Launching of the Third Medium-Term Plan

We wish to extend our deepest sympathy to the people who have suffered as the result of Great East Japan Earthquake that occurred on March 11, 2011. We wish the earliest possible recovery from this unprecedented tragedy.

National Institute of Information and Communications Technology (NICT) carries on the research and development and projects promotion efforts in the information and communications technology that provides impetus for the growth and development of our nation's economy and the realization of affluent, secure, and safe society. Ever since its inauguration in 2004, we, NICT, have been engaged in the R&D activities for the development of the information and communications technology (ICT) that constitutes the basis of diversified social and economic activities. In the meantime, after completing the first medium-term objective period (2004-2005) and the second medium-term objective period (2006-2010), we have entered the third medium-term objective period (2011-2015) and started the R&D activities based on the third medium-term plan that complies with the objectives.

Information and communications technology is the comprehensive technology comprising the high quality and highly reliable networks for a wide variety of information and communications, which is destined to play a vital role as a basis for leading society to develop in stable, reliable and secure manners and guiding people to construct their common bright future. NICT will carry on the R&D efforts in collaboration with industry, academia and the administration as well as international organs with the aim of contributing to realizing such society in which various challenges can be met with appropriate and secure measures.

NICT has started to implement its R&D systems with the direction of technology advancement in the third medium-term plan by comprising the following four categories: network technologies, universal communication technologies, applied electromagnetic technologies, and advanced ICT. NICT has concurrently introduced the "collaborative projects" that should be promoted effectively and efficiently by allowing each research project to be linked across other functions.

## NICT Research Fields

### Network Technologies

Combining the systemized application of optical communications, wireless communications and network security technologies, we will strive to realize the new generation networks, which will improve and solve such issues and challenges that are already apparent in the current networks.

### Universal Communication Technologies

Toward the realization of universal communications that are truly amicable to human beings, we will endeavor to maximize the total advantages of integrating technologies dealing with sound, language, knowledge, audio and video.

### Advanced ICT

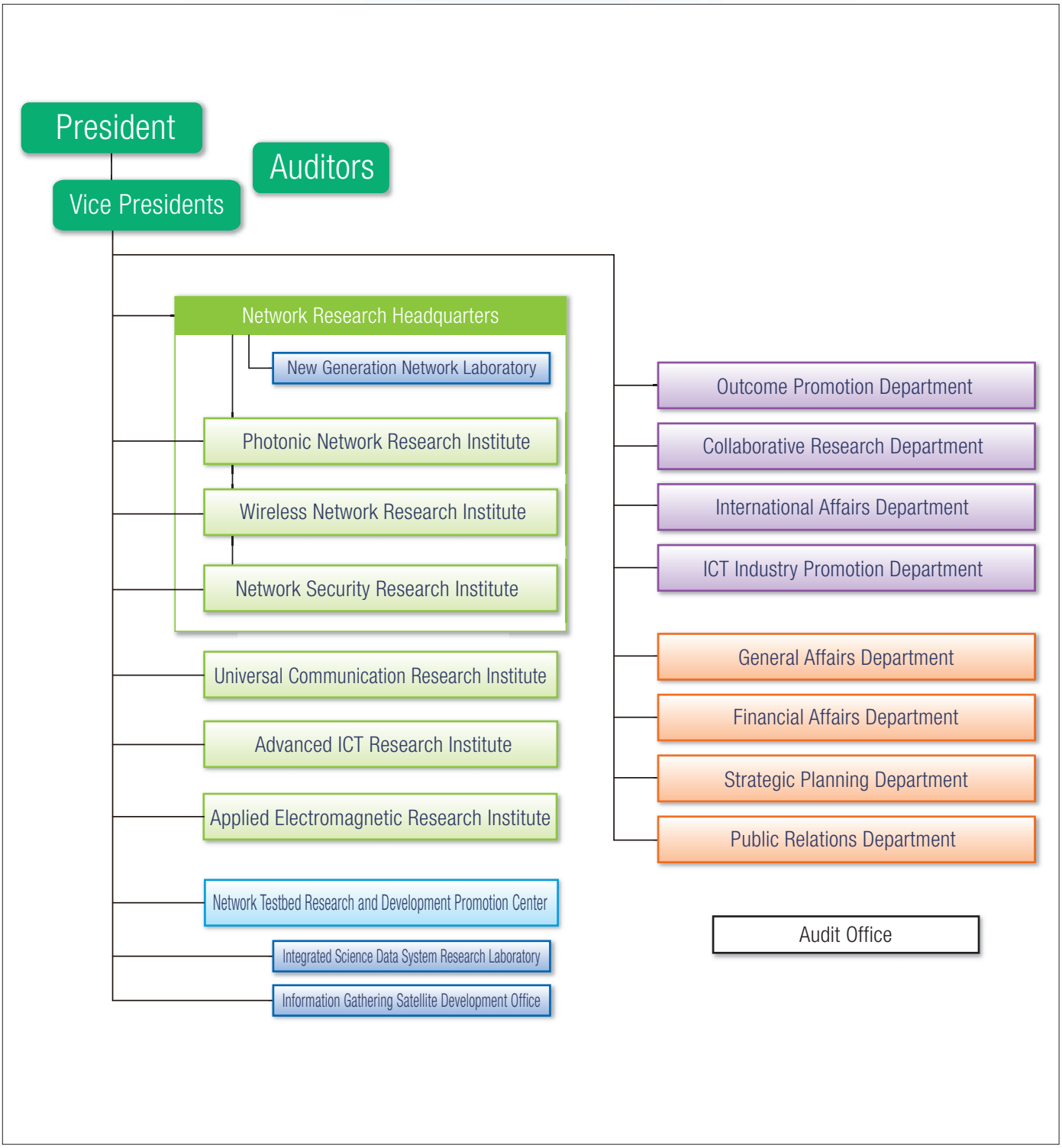
We will implement to create the novel information and communications concepts and technologies such as brain and bio ICT, nano ICT, quantum ICT, and terahertz and millimeter wave ICT, which will bring an innovation to the information and communications in the future.

### Applied Electromagnetic Technologies

We will create the novel technologies for using electromagnetic waves such as space-time standards, electromagnetic compatibility, and applied electromagnetic technologies, and also refine the technologies for various information and data services such as RF protection guidelines and environmental information.

# The New Organization of NICT

**As of April 1, 2011, NICT was reorganized as follows:**



Leading the foremost edge of network evolution to realize the new generation networks

# Photonic Network Research Institute


## Tetsuya Miyazaki

After working in KDDI R&D Laboratories Inc, Tetsuya Miyazaki joined Communications Research Laboratory (currently NICT). He has been engaged in the studies of ultrafast optical communications with all optical signal processing and the multi-level optical communication scheme. Dr. Eng.


We, the Photonic Network Research Institute, will steadily carry on the research and development of innovative network architecture and optical network hardware to realize the new generation networks by close collaboration with external organizations as well as internal institutes of NICT.

Optical fiber networks are playing an increasingly important role to support explosively growing Internet traffic demand. They are introduced to a broad scope of segments ranging from backbone networks such as optical sub-marine cables linking major locations around the globe to such access networks as optical fiber connection services and mobile phone base station networks. In current fiber optic communications networks, electrical routers based on electronic circuit processing technology are installed at nodes. These electrical routers recognize destination addresses and switch the routes of each packet in the Internet traffic flow in the electrical signal domain. On the other hand, each link between nodes comprises the wavelength division multiplexing (WDM) transmission technology, which realizes transmission of multiplexed various channel information on multiple wavelengths over a single optical fiber is used for linking nodes.

However, the approach of dealing with the ever-increasing demand for information transmission by only using existing network technologies will encounter some problems. For examples, networks will frequently suffer from bottlenecks in the face of rapidly increasing traffic, meaning traffic congestion caused by the insufficient processing speed of the electronic circuits inside the routers. In transmission links, an increased number of wavelengths will result in a lack of vacant optical bandwidth in both optical repeater amplifiers and also in transmission fiber. Consequently, the size of facilities and power consumption of networks as a whole become enormous. To create solutions for these issues will become a major challenge for sustainable development of society not only in advanced nations, but also in developing countries where population is on the increase at a rapid pace and the information infrastructure is being improved.

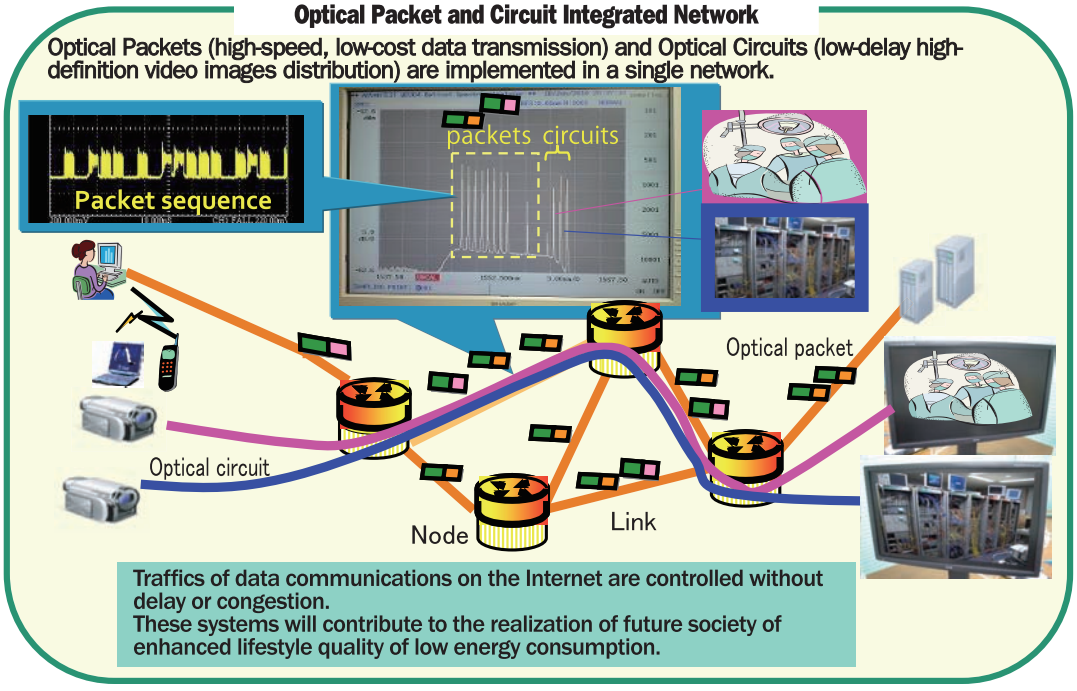
The Photonic Network Research Institute promotes research and development to realize sustainable future networks that can accommodate explosively expanding information traffic by elastically aggregating various kinds of services, such as ultra high-speed data transmission and 3-dimensional contents distribution, while seeking to suppress excessive power consumption and also maintain network availability. For this purpose, we will dedicate research and development described below.

The primary aim of the Institute's research is to establish a network architecture that can handle both optical packets and optical circuits in an integrated manner—that is, an Integrated Optical Network. This technology will realize smooth packet flow at high volume without quality degradation or data congestion on the Future Internet, and with low power consumption, thereby enabling a range of advanced network services that could not previously be delivered, such as remote medical diagnoses using high-definition video imaging. This new integrated network will contribute to improving people's quality of life and the realization of a low-energy society. Network failure problems, which can be severely disruptive for such high traffic networks, are simultaneously addressed by developing autonomic network management mechanisms.

Other areas of our research include development of the "ultimate" optical node, and an optical transmission/switching system. Optical nodes are hardware components within the Integrated Optical Network, and our aim is to create a node that exceeds the limitations of conventional resources in the photonic network physical layer. Our optical transmission/switching system will provide high-capacity transmission by using multi-core fiber and other new technologies.

A further R&D area covers the development of technology to increase the transmission speed per wavelength channel and utilization of unused optical bandwidth for wavelength multiplexing. This development also includes the ICT hardware that delivers the broadband connections in a wide range of communications, with minimum environmental impact.

Collaborating with corporations, universities, and research institutions both inside and outside Japan, the Photonic Network Research Institute will pioneer innovative information communication technology that realizes the Integrated Optical Network—the new network platform.



Research and development of various fundamental radio communications and wireless network technologies

# Wireless Network Research Institute


## Naoto Kadowaki

After completing a master's course at a Graduate School, Naoto Kadowaki entered the Radio Research Laboratories (current NICT) in 1986. He has been engaged in the studies of mobile satellite communication systems and broadband satellite communications networks. Ph.D. (Information Science)

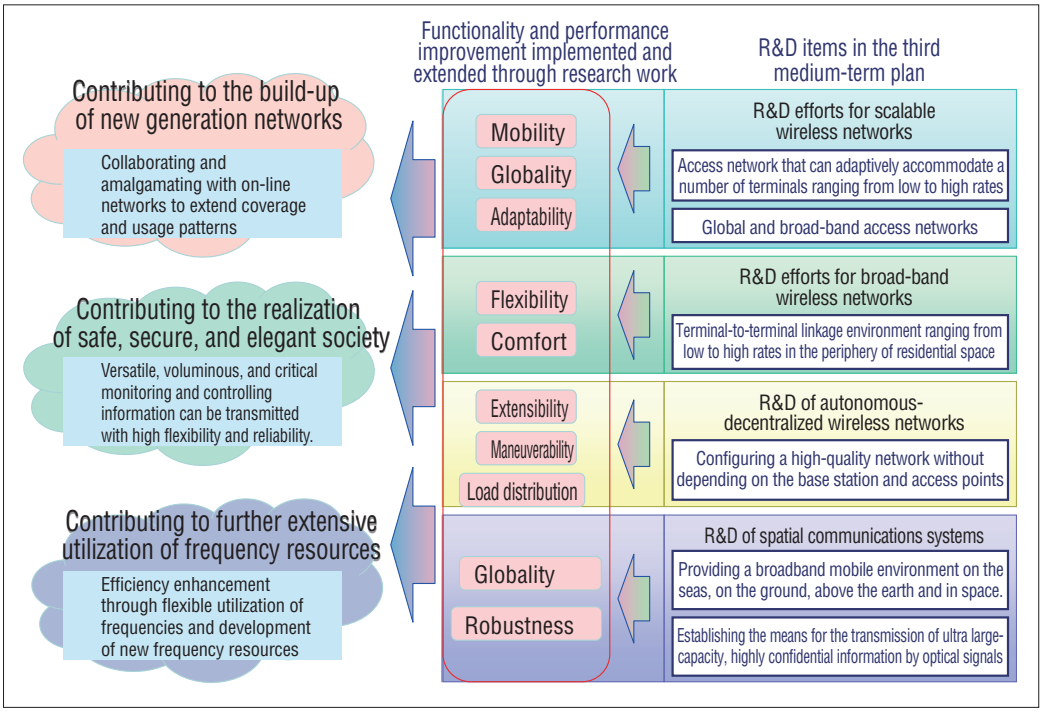

Wireless Network Research Institute has taken over the studies of the New Generation Wireless Communications Research Center, and is working on the research of the wireless communications technology that plays an important role in the new generation networks. Concurrently, the Institute endeavors to contribute to the realization of safe, secure, and elegant society and to the extensive use of frequency resources that are the source of wireless communications.

The wireless communications technology is indispensable for implementing the network connection in an area where optical fiber can hardly be installed or when the user is in a mobile situation. To satisfy a wide variety of users' needs for establishing secure network connections, the extensive coverage and usage patterns of networks are made feasible by developing and implementing such technologies as the wireless network technology that would enable a scalable type of transmission ranging from a simple low-speed terminal to a gigabit-class ultrahigh-speed system, the autonomous wireless network technology without depending on the base station and access points, and the spatial communications technology that can establish broad-band connections of any mobile devices that is operable not only on the ground, but also on the seas, above the earth, and in space. These technologies will perform significant functions in the build-up of new generation network by the collaboration and amalgamation with optical fiber networks.

The above-mentioned scalable wireless network technology can be realized by establishing technologies for integrating systems and developing platforms the integrated systemization based on the cognitive radio technology and the Smart Utility Network (SUN) technology that have so far been developed. This technology can consolidate a diversified types of information such as the natural environment, energy consumption and the radio wave usage environment, and it can contribute to organize such a system that can control energy consumption rate by feeding back analyzed data. Likewise, the autonomous wireless network technology that implements observation data collection in an area where no communications infrastructure is provided and the spatial communications technology that implements transmission of large volume observation data from observation satellites and similar object in space play important roles for environment monitoring and national land preservation as well as disaster prevention and disaster mitigation. Thus, we will promote studies on systems that will be directly involved in the build-up of safe, reliable and elegant society.

With the thriving application of mobile phones and various wireless communication systems, the difficulty in securing frequencies required for extending systems and introducing novel broad-band wireless technologies is ever on the increase. Consequently, further advanced technologies for more extensive use of frequency resources are called for. To meet the needs, we endeavor to improve the efficiency in the use of frequencies and concurrently to develop novel types of frequency resources by studying the white space communication technology with the application of cognitive radio technology (a wireless communication technology utilizing unused frequency bands in specific place and time zones) as well as traffic distribution technology through facilitating the cooperation of infrastructure-based systems/autonomous systems wireless networks and wired networks, and the R&D of applied communications technology in the terahertz band as well.

Wireless Network Research Institute consists of Smart Wireless Research Laboratory mainly studying scalable and broad-band wireless communications technologies, Dependable Wireless Research Laboratory mainly studying autonomous wireless network that is highly reliable in a variety of environments and Spatial Communication Systems Research Laboratory working on the studies of the global scale broad-band mobile communication technology using radio waves and the high reliability, ultra large-capacity transmission technology using optical signals. Thus, this Institute will strive for establishing technological results of above-mentioned R&D subjects.



Promoting R&D for the network security to provide a safe and secure ICT environment

# Network Security Research Institute


## Takahashi Yukio

In 1982, Mr. Takahashi completed the master's course of the Graduate School of Science, Division of Physics II, Kyoto University, and entered the Radio Research Laboratories Ministry of Posts and Telecommunications (currently NICT). He has been conducting studies on VLBI-based positioning, positional astronomy, Japan Standard Time and position verification. In 2008, he acquired a degree at the Graduate School of the Institute of Information Security. Ph.D. (Information Science)


With the objective of establishing such a system that allows anyone to perform safe and secure communications, Network Security Research Institute conducts R&D activities of network security by a sophisticated combination of theory and practice to protect network infrastructures against cyber attacks through enhanced utilization of the neutrality of NICT, and aim to establish a global center of excellence in network security research and development.

Cyber attacks are mainly caused by "malware," a collective term referring to viruses, worms, and bots that give adverse effects on networks and ICT terminals. Numerous attacks of new species of them appear every day and night. Accordingly, we will further promote the study of network security through the dual approaches of practical and effective R&D that reinforces defensive measures to alleviate the current attacker-favored network conditions, and of cutting-edge R&D based on a mid-term vision that aims at terminating the endless chasing after attackers.

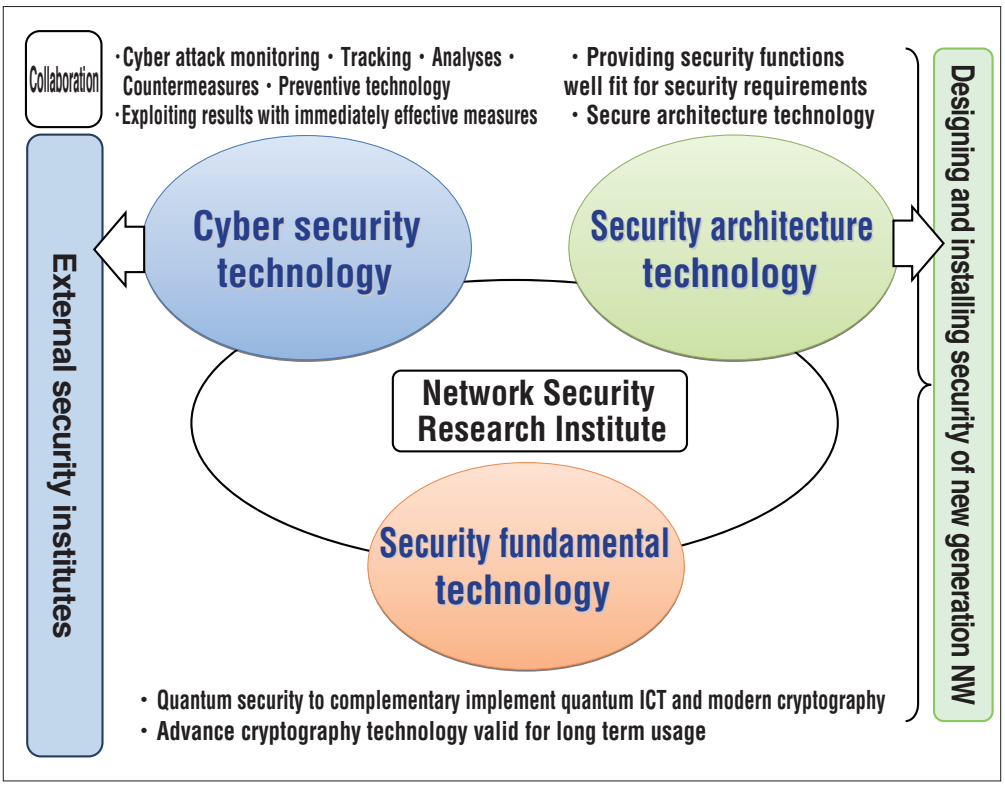
This institute will promote the study of network security by comprehensively performing the three technologies, namely, cyber security technology, security architecture technology, and security fundamental technology.

In the area of cyber security technology, we will monitor, analyze and implement appropriate countermeasures against cyber attacks in real time. Concurrently as a challenging subject, we will establish fundamental technology to prevent cyber attacks by detecting precursory signs, and providing practical and proactive defense against attackers. Likewise, against cyber attacks that occur in the service layer such as web, SNS and spam e-mail, we will promptly execute adequate monitoring, analysis and countermeasures. Moreover, we will make use of the globally largest size of malware sample data and traffic data for fostering capable people so that we can contribute to improving the potential of security technologies in Japan.

In the area of security architecture technology, we will realize flexible, secure, and continuously advanced network architecture, in correspondence with diverse network environments and service propelled by the rapid progress of cloud computing and mobile network technologies. In the diversified network environment, a uniform network quality and security such as in the Internet becomes hard to protect the network against cyber attacks, and thus safety will be insufficient. To straighten out such a situation, we will ensure security for various service environments by establishing the architecture technologies that will automatically provide the optimum security environment without causing the user to feel uneasy about the security configuration.

In the area of security fundamental technology, we will promote the development of fundamental technologies of the quantum security technology with practicability by complement implementation of modern cryptography and quantum communication, and of advanced cryptography technologies. For the quantum security, we will endeavor to establish such technique as extending distances and appropriately using modern cryptography in accordance with the extent of security. We will further ensure security by developing new cryptography technologies that can withstand long-term services with the use of digital signature, medical data, time stamp, and so on.

This institute will focus on the network security studies and carry on sustainable R&D activities by practical studies with the results immediately contributing to society and of cutting-edge studies. Moreover, we will collaborate with both domestic and overseas research institutes, and promote our R&D that will meet the needs of society and lead the world in order to perform information and communication activities with safety and security.



Creating Valuable Technologies and Systems for the Realization of Universal Communications

# Universal Communication Research Institute


## Yutaka Kidawara

Graduated from Kobe University in 1988, completed the master course at its graduate school in 1990, and obtained a Ph.D. degree (engineering) in 1999. At first, he served at Kobe Steel Ltd., and then, in 2001, entered the Communication Research Laboratories (current NICT). After completing a period of temporary transfer to the Cabinet Office, Government of Japan, he has been the Director General of the Universal Communication Research Institute of NICT since April 2011, concurrently serving as a Visiting Professor at Keihanna Joint Graduate School; specializing in studies on ubiquitous computing, content management, and information analysis technologies.


As has been set forth in the second medium-term plan, the Keihanna Research Laboratories, which was originally composed of the two research centers of NICT, namely the Knowledge Creating Communication Research Center and the Universal Media Research Center, has been reorganized into a single entity called the Universal Communication Research Institute consisting of the Planning Office and six laboratories in order to overcome the barrier of ever-diversifying communication channels.

Implementing universal communications definitely requires the utilization of a wide variety of information. While there is a tremendous amount of information available on the Internet, no decisive methodology has so far been developed to make good use of that amount of information. For Japanese people to get higher quality of information, they have to handle other scopes of information that is described in languages other than Japanese, and thus such a technology that translates a foreign language to Japanese as well as information analysis and knowledge processing technologies for analyzing web contents are indispensably called for. Further, in order to handle information in remote places without any stress, the technology for ultra-realistic information reproduction is likewise essential. At this Institute, we endeavor to create technologies each having unique, novel value as well as practical systems by further developing the world's top level technologies that have been developed at the Keihanna Research Laboratories in accordance with the second medium-term plan.

Specifically, we will implement a new information services platform called knowledge/language grid by utilizing the new generation network to make good use of the multilingual voice translation system, information analysis technology, and ultra-realistic communications technology. Furthermore, we will collect 4 billion or more pages of website information relevant to Asian nations that will play important roles in the progress of industry and the stability of society in Japan and store it on the knowledge/language grid. We will crawl Web pages to generate large-size, advanced information assets that will serve as knowledge resources for various information services, we will attempt to implement the Asian information hub to offer information services by using the "knowledge" extracted from the Internet as illustrated by using information analysis technology in Fig. 2. Building up these information services platform will facilitate the implementation of such an information system that will allow venture companies without expertise of languages and knowledge processing to make use of the "knowledge" on the Internet, which is obtained by means of advanced knowledge processing technology, in an interface with overwhelming sensation of ultra-reality, and thus our advanced technologies will be used as practicable technologies for applications in society. We will realize the electronic holography with 5-inch-diagonal and a viewing zone angle of 20 degrees and the medical application of the Multisensory Interaction System.

To support joint studies and development efforts with the objective of allowing these results to penetrate society, we have established the Advanced Language Information Forum (ALAGIN) and the Ultra-Realistic Communications Forum (URCF) to promote the collaboration of industry, academia, and the administration sectors. We will accelerate not only the sophistication of elemental technology, but also its penetration in society to become the international COE research base in the area of universal communications.

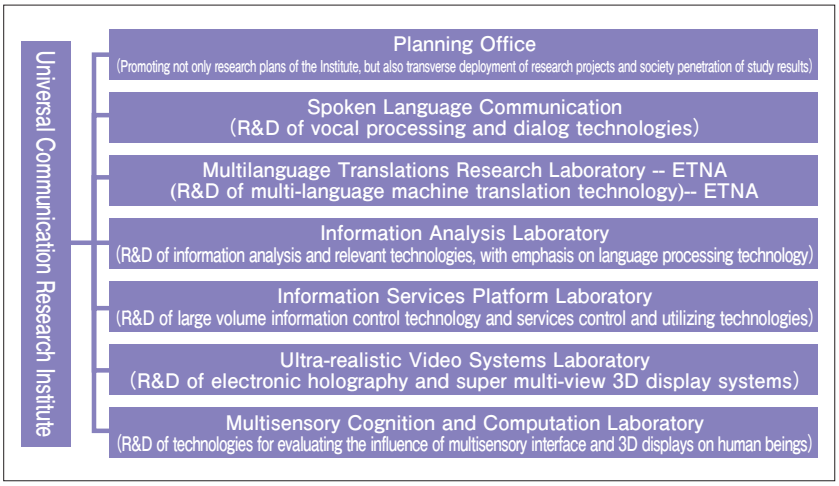



**Figure 1●Organization of the Universal Communication Research Institute**

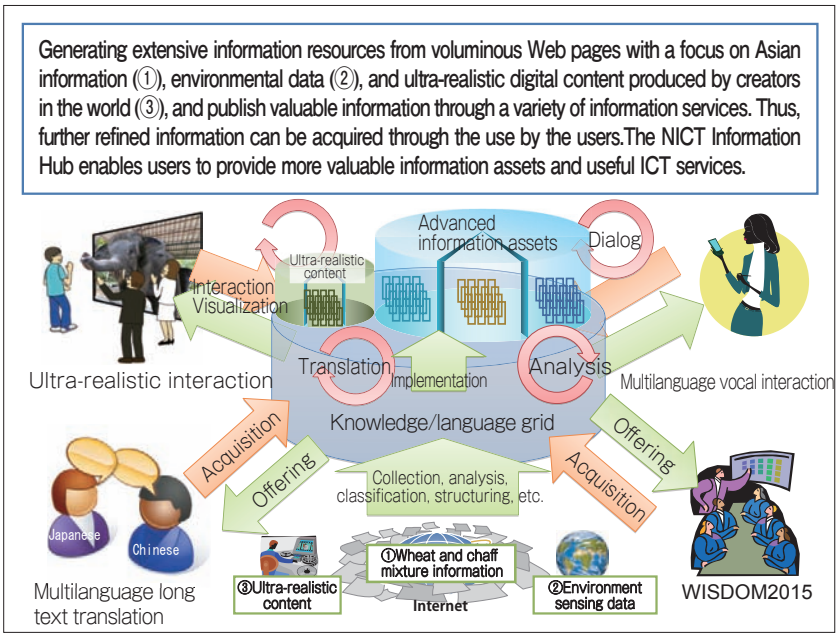



**Figure 2●Offering information services through the Asian information hub**

## Through studying quantum, nano and bio technologies, we will establish leading-edge technologies for the benefit of society

# Advanced ICT Research Institute


**Kazuhiro Oiwa**

After completing a doctorate course at the Graduate School of the University of Tokyo, initially served as a lecturer at the Department of Medicine, Teikyo University, and then entered the Communications Research Laboratory (current NICT) in 1993. Since then, he has been engaged in the R&D of single molecule measurement and structural analysis of protein motors and molecular communications technology. Professor at University of Hyogo, Graduate School, Joint-Appointment. Ph.D. in Biology. Won the 23rd Osaka Science Prize.


The Advanced ICT Research Institute consisting of five laboratories (including the Terahertz and Millimeter wave ICT, Quantum ICT, Nano ICT, Bio ICT, and Brain ICT Laboratories), each of which has numerous scientific achievements, is on its consistent way to the state of perfection for generating technological seeds to cause breakthrough in information and communications technology, allowing them to sprout, and to become saplings that can penetrate society. In a business strategy book[(*)] it is said that "The leap forward to become a great company ... resembles turning a huge and heavy flywheel in one direction. Although it turns slowly at the outset, the persistent turning will build up inertia and phases in to a breakthrough stage." This passage can be applied to the mode of research and development. When initiating fundamental research, such an outcome of returning to society cannot be expected in a short period of time. However, the actual power of R&D results of long-term accumulation will bring competitive superiority to the organization and will even give it the potential for responding to changes. Current projects being developed at the Advanced ICT Research Institute include the R&D of terahertz and millimeter wave technology that are penetrating society with by involving the Photonic Devices Laboratory and the long-term trial operation of quantum cryptography and communications started by the Tokyo QKD Network. In the current medium-term plan, we endeavor to turn out many more technologies to society by the lead of these organizations.

In the R&D of terahertz band that is an undeveloped frequency band in the border of light and electromagnetic wave, the Terahertz and Millimeter Wave ICT Laboratory is now taking part in the leading studies of Japan. We attempt to develop the application technologies in the terahertz region by promoting the organic collaboration with the terahertz studies within NICT, specifically, the low-noise, high-sensitivity NbN-SIS, HEB electromagnetic wave receiver, the global environment measuring superconductance sub-millimeter wave rim-emitting sounder, and the terahertz wave non-destructive test.

The Quantum ICT Laboratory is boosting the Quantum Cryptography and Communications technology in addition to the quantum information and communication technology that enables the large volume data communications that is pioneering the border of present information and communications technologies. In the long-term trial operation of "Tokyo QKD Network" that can transmit video images through the Quantum Cryptography and Communications, the Quantum ICT Laboratory takes leadership of the "all Japan" system. While the Quantum Cryptography and Communications require the high-sensitivity, high-speed Super Conducting Single Photon Detector (SSPD) for detecting the arrival of photons, it is the Nano ICT Laboratory that has worked on the devices development through systems implementation to complete the SSPD which has the world's highest capabilities exceeding the performance of conventional avalanche photo-diodes. Thus, the R&D of Quantum Cryptography and Communications is carried out in a consistent process including the unique devices development, systems implementation, and operation, and it will play the role as the flagship of this Institute.

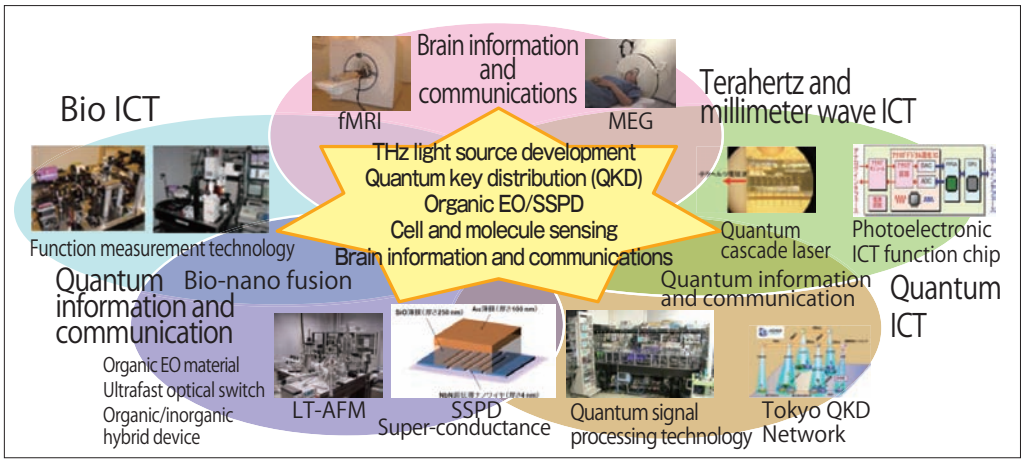
Concurrently, the Nano ICT Laboratory has successfully developed organic molecular EO materials that can significantly suppress the energy consumption even under a high-speed drive. We are about to implement the organic EO devices by reinforcing the collaborative efforts both internally and with outside enterprises. Moreover, we have verified the slow light emission in the devices created by preparing hybrids of organic materials and photonic crystals. In the region of super-conductance studies, the development of Single Flux Quantum Devices is under way, and thus we will further foster these studies as sprouting results that will turn out to be optical buffers and optical memories with low energy consumption.

A number of study results introduced by top class international journals have been spotlighting the presence of the Bio ICT Laboratory. This Laboratory that has so far continually announced important results in the fields of cell biology and biophysics will further brush up these studies and boost the R&D projects toward their application. In collaboration with the Nano ICT Laboratory, this Laboratory will attempt to deploy its study efforts for the sensors and signal processing technologies by utilizing its research resources in molecular communications.

The Brain ICT Laboratory will promote the brain function study, which will occupy one of the important positions in the ICT field in the future, by pursuing the fusion with the information and communications technology. On the understanding that the human brain takes the initiative for senders as well as receivers of information, it is essential for us to be versed in the details of information processing mechanism of the brain in order to conduct communications between human beings with comfort and efficiency. This Laboratory with expertise in non-invasive measurement is known for its unique approach of boosting the brain function study by effectively utilizing the functional magnetic resonance imaging method and magnetoencephalography (MEG). R&D activities on the human brain normally require a long period of time. In the ICT field, we believe that it should be carried on with the NICT serving as the core organization.

We, the Advanced ICT Research Institute with a high R&D potential accumulated so far, has started toward the achievement of the third medium-term plan aimed at applying results for the benefit of society.

*:James Collins, "Visionary Company 2", translated by Yoichi Yamaoka, Nikkei Business Publications, Inc.




From the embryonic studies in the leading-edge ICT field to the commercial R&D stage

## Endeavoring to resolve problems ranging from atomic to interplanetary space scales by using electromagnetic measurement technology

# Applied Electromagnetic Research Institute


**Toshio Iguchi**

After completing his Ph. D. and serving as a researcher at a private company, Dr. Iguchi entered the Radio Research Laboratory (current NICT) in 1985. He has been engaged in remote sensing research, including the development of an ocean radar and rain retrieval algorithms for the precipitation radar aboard the Tropical Rainfall Measuring Mission satellite.


The Applied Electromagnetic Research Institute has started its services with five laboratories: Remote Sensing Fundamentals Laboratory, Radiowave Remote Sensing Laboratory, Space Weather and Environment Informatics Laboratory, Space-Time Standards Laboratory, and Electromagnetic Compatibility Laboratory. The planned subjects of these five laboratories encompass a vast range, from atomic to interplanetary space scales, and their mode of contribution to practical applications is widely diversified. While the Institute as a whole has the common denominator called "electromagnetic wave measurement", the term has two connotations; that is, to measure electromagnetic waves and to measure something by utilizing electromagnetic waves. Furthermore, the latter act of measuring something by using electromagnetic waves has the following two aspects: One is research on making good use of electromagnetic waves by fully understanding the characteristics of electromagnetic waves themselves. This requires the technology for generating and receiving electromagnetic waves and the knowledge about their propagation, scattering, and absorption, and thus it involves studies mainly with engineering aspects such as the development of radars and receivers. The other is the scientific study of subjects that are to be measured. If the subject is a weather phenomenon such as clouds or rain, it has the aspect of meteorology, and if it is a live body, it will have the aspect of biology. At this Institute, I would like to create such an environment in which both engineering and scientific researchers will cooperatively endeavor to resolve problems and realize the best possible results.

The following briefly describes the respective objectives of the five laboratories:

### Remote Sensing Fundamentals Laboratory

For the realization of high-precision global observation technology that determines the state of the atmosphere and makes the diagnosis of global environment changes such as global warming, the Laboratory will work on the R&D of remote sensing technology for collecting data on the atmosphere composition and its circulation by using high frequency electromagnetic waves (optical, terahertz and millimeter waves).

### Radiowave Remote Sensing Laboratory

The Laboratory will establish leading-edge radar systems implementing technologies such as a next generation Doppler radar that enables determination of the 3D distribution of rainfalls in a short period of time and satellite-borne radars, and concurrently carry on the R&D on fundamental technologies of high performance and highly functional data-acquisition and processing based on the verification of the above-mentioned findings. The Laboratory will also validate the performance of the high-resolution air-borne SAR (synthetic aperture radar) with a resolution of 30 cm in various applications, and concurrently carry on leading R&D activities such as velocity measuring technology for terrestrial as well as marine mobile objects toward the progressive development of observation methods.

### Space Weather and Environment Informatics Laboratory

In the field of environmental information technologies in the human activity sphere including interplanetary space, the Laboratory will integrate the observing/sensing technologies and numerical computing technology into systems to be implemented mainly in Asian and Oceania areas for comprehensively performing the observation, collection, control, analysis, and distribution of international and various space and global environment data, and establish the informatics technology for processing the thus obtained large-volume data on the computer clouds.

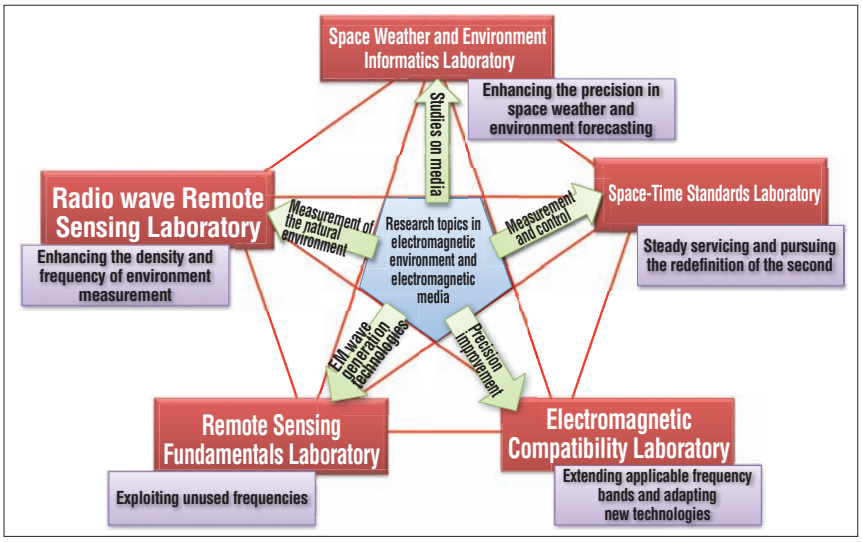
### Space-Time Standards Laboratory

Through the R&D of the Japan Standard Time generation and improving its distribution services as well as the R&D of the next generation space-time standards application technology, the Laboratory will provide the nation with a reliable and precise space-time reference/time and frequency standard. It will also promote the R&D of optical frequency standards and the next generation space-time measuring technology, thereby contributing to the redefinition of the second and to the implementation of comprehensive space-time standards.

### Electromagnetic Compatibility Laboratory

While further diversification and sophistication of radiowave applications as well as the rapid development of energy-saving equipment, the Laboratory will promote R&D relevant to electromagnetic compatibility measuring technologies in order to allow information and communications devices and communication systems to operate without being affected by electromagnetic wave interference and thus capable of being used with reassurance and safety with regard to human bodies. Moreover, the Laboratory will conduct the test and calibration services of wireless devices, thereby contributing to the secure maintenance of the electromagnetic environment.

One activity which is being emphasized in the recent reorganization is the deployment or utilization of study results. The research subjects covered by this Institute are broadly diversified ranging from newly sprouted studies that have the potential of substantial growth in the future to those in a stage very close to practical applications. The type approval test service of the Electromagnetic Compatibility Laboratory, the generation and distribution of Japan Standard Time, and the frequency calibration service pertaining to the Space-Time Standards Laboratory as well as the space weather forecasting of the Space Weather and Environment Informatics Laboratory are actually operated as public services. On the other hand, the exploitation of the terahertz band that would be the last unused frequency band is indeed one of the subjects that are expected for future development. We will aggressively promote development for practical applications, thereby allowing this organization to be such an Institute that will carefully nurture each sprout to maturity and realize its potential of bearing fruit in the future.




Research Scheme Diagram of the Applied Electromagnetic Research Institute

# Introduction of Centers and Departments

**Shinji Shimojo,**
Director

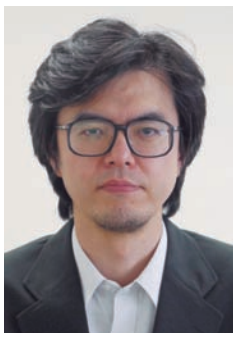
## Network Testbed Research and Development Promotion Center

This Center accelerates the use of JGN-X and StarBED3 by universities, private enterprises, research institutes, municipalities, and others, provides the collaboration with major domestic research organs and some overseas research organs as well as the "New Generation Network Promotion Forum", promotes various research activities with the use of JGN-X and StarBED3, and reviews strategies relative to the further development of the Testbed Network.
Additionally, by using JGN-X and StarBED3, this Center boosts the R&D activities for the realization and deployment of New Generation Network and attempts to disseminate the study results. Further, the Center promotes ambitious R&D activities by collaborating with external researchers, introduction of R&D schemes chosen among public, and establishment of research organization by closely cooperating with the Network Operation Center.

## New Generation Network Laboratory

**Nozomu Nishinaga,**
Director

The New Generation Network Laboratory systemizes elemental technologies being developed at the research institutes within the NICT organization, and carries on R&D efforts by collaborating with external organizations in accordance with the schemes for joint studies and commissioned research projects. The core of them is the New Generation Network R&D Project. The New Generation Network R&D Project is operated mainly by this Laboratory across organizations. It aims at the realization of new generation networks. Results of this project will be performed on the test bed operated by the Network Testbed Research and Development Promotion Center, and will contribute to the implementation of new generation networks. This Laboratory calls for the cooperation of researchers not only of NICT but also of those in the industry and academy sectors, and pursues strategies to implement new generation networks in Japan by collaborating with both domestic and overseas organizations, particularly with the New Generation Network Promotion Forum.



**Yasuhiro Murayama,**
Director

## Integrated Science Data System Research Laboratory

NICT carries on the R&D of such leading-edge technologies as sensing data pertaining to electromagnetic wave measurement and higher processing of network data. Applying and utilizing these data and processing technologies require the collaboration with domestic and foreign organizations and the R&D of data systems. As the internationally cooperative activities, the World Data Systems (WDS) has been developed under the auspices of the International Council for Science (ICSU) consisting of science councils and academies of each country. NICT has been conducting ionosphere-related activities of World Data Center (WDC). It will further promote R&D efforts for the scientific data systems intended for the international application and utilization of NICT technologies along with promoting the core project of WDS.

**Kazumasa Taira,**
Executive Director

## Outcome Promotion Department

This Department has been newly established with the aim to return the maximum possible outcomes of NICT's R&D efforts to society, proposing effectively utilization of ICT developed through our research and development, as well as creating useful ICT systems in corporation with industries. In the third medium-term plan, the function for implementing technology transfers such as licensing intellectual property rights has been changed to conduct within NICT. This department appropriately meets social needs and constantly connects researchers and society, which has NICT contribute to the development of ICT more than ever.

## Collaborative Research Department

To reinforce our nation's international competitiveness in the ICT field, this Department will become a hub for gathering the research potential of industry and academia, strategically promote R&D activities in accordance with the multifaceted R&D scheme of commissioned studies and joint studies, and contribute to improve the research potential through exchanging researchers.

In conducting commissioned studies and joint studies, we will lead these advanced R&D projects, focusing on such creative subjects as new generation networks, brain information and communications by cooperating with industry, academia, and government.
Concurrently, we will respond timely to social issues and accelerate the outcome deployment, thereby contributing to the steady growth of our nation's ICT R&D capabilities and the creation of research outcome that can be returned to society.

**Hiromu Monma,**
Executive Director

**Masahiko Fujimoto,**
Executive Director

## International Affairs Department

With the progress of globalization in economy and society, the international strategy has been seen more important for the R&D of ICT as well as the deployment of their outcomes than ever. We will advance the international collaboration in R&D projects of NICT and the deployment of the results, and support the international joint studies in industry and academia as well as exchange researchers, thereby promoting the globalization of our nation's ICT R&D environment. Concurrently, we will perform effective approaches on the international standardization that would become an extremely important factor in the commercialization and international deployment of study outcomes by collaborating with the related industries. Through both globalization of the R&D environment and promotion of international standardization, we will contribute to the reinforcement of international competitiveness in the field of ICT in Japan.

## ICT Industry Promotion Department

In the ICT field that serves as a platform for civil life and economic activities, we will offer commercialization assistance such as business matching opportunities to ICT ventures that would create new information and communications services. We will also provide the financial support for the build-up of information and communications infrastructure that facilitates the implementation and utilization of innovative and diversified information and communications to enhance and upgrade them.

Further, to improve the information barrier-free environment for availing information and communication services, we will support the R&D activities and the efforts of developing and offering services for elderly people as well as those who are challenged.

Moreover, in order to strengthen the industrial and technological capabilities of the ICT field, build-up intellectual properties, and create new businesses, we will promote the R&D of fundamental technologies in the private sector.

Through these activities, ICT Industry Promotion Department will contribute to the activation of our nation's industry as well as the realization of the reassuring, safe, and affluent lives.

**Daisuke Kitabayashi,**
Executive Director

# NICT Charter
## (Establishment date: April 1, 2011)

Humanity has achieved progress as it has deepened its mutual understanding and shared its wisdom, overcoming barriers due to national, regional, ethnic, generational, and other differences. Communication is the most critical activity in human society, and information and communications technology (ICT) is the basis of that communication. ICT is also the infrastructure that supports humanity's advanced intellectual and economic activities.

The National Institute of Information and Communications Technology (NICT) promotes the full spectrum of research and development in ICT from basic to applied research with an integrated perspective, and thus promotes the advancement of Japan as an intellectual nation that leads the international community. Moreover, NICT forms close ties with the academic and business communities in Japan as well as with research institutes overseas and returns its R&D findings to society in a broad range of fields. In this way, NICT contributes to the creation of lifestyles that are affluent and safe, a society that is full of intellectual creativity and dynamism, and a world that values harmony and peace.

The new logotype is to be used as of April 1.

[Correction, with our apologies] The serial number for the previous issue was given as "2011 MAR No.401," which was a typographic error and should have been "2011 MAR No.402." The readers are kindly asked to accept our apologies and the correction.

NICT NEWS No.403, April 2011 ISSN 1349-3531

Published by
Public Relations Department,
National Institute of Information and Communications Technology
<NICT NEWS URL> http://www.nict.go.jp/news/nict-news.html
Editorial Cooperation: Japan Space Forum

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