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情報通信研究機構
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NICT

New Year's Greeting 2012

Producing Vigorous Research...

After the Great East Japan Earthquake left an impact on all parts of Japan, NICT kicked off its Third Medium-Term Plan. In welcoming the New Year, we asked Dr. Hideo Miyahara, President of NICT, about the path that information and telecommunications research should take based on the lessons learned from the earthquake and how NICT can contribute to society.

Dr. Hideo Miyahara,
President of National Institute of Information and Communications Technology

Reaffirming NICT's role through the unprecedented disaster

I wish all of you a Happy New Year.

Last year, Eastern Japan suffered enormous damage from the earthquake. I would like to express my heartfelt sympathy to those affected. As one of our responsibilities, NICT determines, maintains, and provides Japan Standard Time. The earthquake, however, forced us to stop operations at the Ohtakadoya-yama LF Standard Time and Frequency Transmission Station in Fukushima prefecture. We sincerely apologize for the inconvenience that this has caused its users.

We received a lot of feedback about the service during the station's downtime which made us realize once again the importance of the LF Standard Time and Frequency Transmission Station and the activities of NICT. Calls for the station's restoration came from not just the general public but also the government. However, because the station is located just 17 km away from the crippled Fukushima Daiichi Nuclear Power Plant, I was worried whether we could safely send researchers there. Despite this, the researchers firmly expressed their wishes to repair the station at any cost. Impressed by their passion and sense of mission, I finally requested that they complete the recovery work. It was a really tough decision, but I am glad that it turned out well.

In appreciation of our efforts to establish an experimental broadband satellite communications network utilizing the Wideband InterNetworking engineering test and Demonstration Satellite (WINDS), we received letters of appreciation from the Ministry of Defense and the Tokyo Fire Department. At that time, we really felt that our efforts were rewarded. On the other hand, the reality was that many people in the disaster areas still could not make phone calls. The emergency network, in retrospect, did not work very well. I feel this is something everyone in the communications industry should reflect on.

What is a disaster-resistant network?

How can we establish a disaster-resistant network that will actually work? It is not practical to upgrade the networks used daily so that they can be used in a disaster; the required investment would be excessive. It is more important to focus on promptly establishing an ad-hoc network after a disaster. In the wake of this earthquake disaster, the television reporters visited the affected areas and broadcasted high-definition images of people standing in lines for makeshift telephones. Had that communications channel like this been available to us, we could have compressed the high-definition images to half the size and used the rest of the channel for more telephone lines. What we need is a flexible system design that will serve as many people as possible.

Also needed is a system design in place according to how many terminals or phone lines will be needed based on the scale of the disaster. Without a better environment where everything is readily available in an emergency, we cannot call it a mature or safety technology. To develop such a system, it is vital to proceed with projects in a more cross-sectional way and for each researcher to always be aware of the "big picture" and where they stand in it. At NICT, a wide range of people are working on diverse research, from basics to application. Taking advantage of this environment, I hope we can promote more cross-sectional projects in the future.

Increasing sensitivity in science and technology

My belief is that innovation is made possible by the right combination of science, technology, and sensitivity. Therefore, developing your sensitivity is very important. Technology without sensitivity is like making a robot and only thinking at the end, "Ooh, that was fun!" Instead, we need to design everything we are creating from the users' viewpoint. We need to adopt a user-oriented approach, and we can even start our research by putting ourselves in the users' shoes while developing the necessary technologies.

The sensitivity I am talking about here is closely related to creating a system design from the viewpoint of the "big picture," as I mentioned above. Taking a user-oriented approach means developing a user interface with a sense of beauty. I believe beautiful things work. This is not just about beauty on the surface, but something that should work if it is beautiful from a comprehensive viewpoint (including science and technology) and appeals to your sensitivities.

Let me offer one example. NICT has developed the fastest optical transmission path. This is an amazing achievement in itself. But what matters to general users is how much more effective and energy efficient a network using the optical transmission path could be. Therefore, for example, estimating how much energy can be saved by establishing a disaster network with an optical packet and circuit integrated network is important. Otherwise, we may not be able to gain the public's understanding.

Which way should NICT go?

At present, a number of cross-sectional, collaboration projects are underway at NICT, such as the New-Generation Network R&D Project and Brain Information Communication Fusion Project. To foster an environment conducive to such research, what I'm aiming for is quite simple: to help each researcher at NICT take pride in his or herself and motivate them to want to conduct research. My goal is for as many researchers as possible to be proud of themselves and what they are doing. Then, I believe, results will follow naturally.

More than 80% of the researchers at NICT hold a doctorate. However, even with such talented human resources, NICT still has not been able to tap their full potential. What should my first priority be right now? How can I show my true abilities? The ones who best know the answers are the researchers themselves. It is essential that the executives trust them and allow them freedom instead of micromanaging.

Honing a sense of balance and freely proceed with research

Creating such an environment requires a sense of balance. Probably because Japan has long been an island country with a nearly mono-cultural population, the Japanese tend to stay on the path to the end once they have established a vector. There are such words in Japanese, such as "Tekito" and "Iikagen," which originally had positive meanings, as in "just the right balance," but today, more often than not, are used in a negative way to mean "irresponsible," "halfhearted," or "random." Forgetting moderation, the Japanese try to get everything sorted out to either 0 or 1. The digital world, however, is all about approximation, and how fine it can get. It cannot be continuous. To begin with, what is in a person's head and everything that happens in this world is analog and continuous. And yet we try to capture it in the approximate digital world, and that is why things go wrong. Sensitivity, as I said before, is the very idea of analog, right? There is no sensitivity in procedures and rules. In my view, rules are for preventing things from becoming negative, not for encouraging things to become positive. Therefore, we should keep rules to a minimum. If we can create the appropriate environment that allows researchers to freely work on their research, their research activities will be much more vigorous and robust.

Starting the New Year

This year, we will continue to promote the Third Medium-Term Plan that began last year. By enriching the environment in which researchers can conduct their research with incentives and through the R&D of information and communications technologies, we will continue to advance a R&D that can help solve many challenges, from daily life to global issues, such as the low birthrate, aging population, medical care, education, and global warming. We will also work even harder on projects that cross-functionally connect those challenges and R&D on disaster-related information and communications technologies.

Let me conclude this New Year's greeting with my sincere wish that everyone has a very happy New Year.

(Listener: Sachiko Hirota, Senior Manager, Public Relations Department)

From the keynote speech of NICT's New Vision Conference Nov. 9th, 2011

The New Generation Network Project: Its Promises and Challenges

Hisashi Kobayashi

Sherman Fairchild University Professor Emeritus of Electrical Engineering and Computer Science, Princeton University, and Senior Distinguished Researcher, NICT

Dr. Kobayashi received his M.E. degree in electrical engineering from the University of Tokyo in 1963. After working for Toshiba Corporation, he left for the United States in 1965. He received his Ph.D. degree in electrical engineering from Princeton University in 1967. From 1967 to 1982, he worked for the IBM Thomas J. Watson Research Center and served as the Founding Director of IBM Japan Science Institute (JSI) from 1982 to 1986. From 1986 to 1991, he served as the Dean of the School of Engineering and Applied Science in Princeton University and as the Sherman Fairchild University Professor in Electrical Engineering and Computer Science from 1986 to 2008. His areas of expertise include communications theory, digital signal processing, evaluation of network system performance, and application of probability theory.

What is NWGN?

The **N**ew **G**eneration **N**etwork (NWGN for short) project is a flagship project of networking research in Japan. NWGN intends to make a revolutionary jump from the current Internet. The purpose of the project is to design a new architecture and implement and verify it on a testbed in preparation for the experimental phase, which will begin around 2015.

Considering the explosive growth in network traffic today, the increasing difficulty in protecting the Internet against sophisticated cyber attacks, and the fact that most terminal devices are now smart phones, laptop PCs, sensors and other mobile devices, it is obvious that the NGN (Next Generation Network)—which is merely an extension of today's Internet—will eventually reach its limit. The NWGN project aims for a revolutionary change that will meet society's future needs.

Numerous requirements concerning network services must be taken into account in the future: Here is a list of what I consider to be most important for the NWGN.

(1) Scalability (users, things, data, traffic)
(2) Heterogeneity and diversity
(3) Reliability and resilience
(4) Security and privacy
(5) Mobility management
(6) High performance
(7) Energy and Environment
(8) Societal needs
(9) Compatibility (with today's Internet)
(10) Extensibility (for the unforeseen and unexpected)

What made the Internet successful?

It is remarkable that the TCP/IP protocol suite, a nearly four decades old architectural concept, still remains in effect. It is true that the Internet has evolved and expanded at a blazing rate in its usage and applications over the past two decades since the World Wide Web was launched, but what has made the Internet continuously grow and thrive for so long?

In the conventional telephone network, all intelligence resides within the core network. The end devices are dumb terminals with no intelligence.

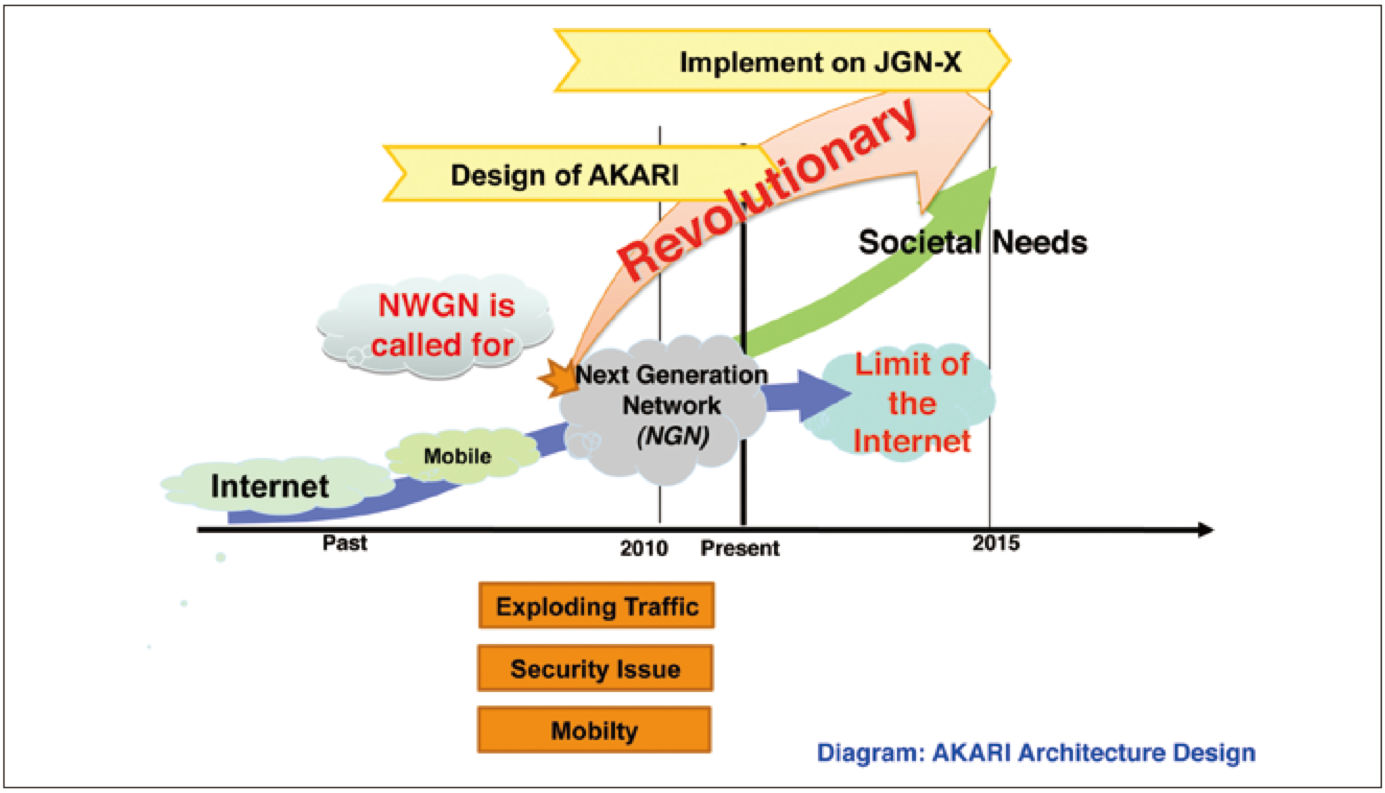
On the other hand, the design principle of TCP/IP, which serves as the Internet's foundation, is often referred to as the "End to end (E2E) design" principle. Roughly speaking, this principle says that the core network should be a dumb network, and the end points of the network should provide all functions/services that are required to support any application. Thanks to this E2E design principle, anyone can develop a new application that runs on the dumb IP network.

Such accessibility is not available in the telephone network, whose highly centralized control structure does not allow end users to access the interior network. The open nature of the Internet architecture is the main reason why the Internet won the race to multimedia services against the concerted world-wide group effort of telecommunication carriers that were developing B-ISDN (broadband integrated services digital network) with ATM (asynchronous transfer mode) fast packet switching.

Revising In-Network Processing

If we review the above list of ten requirements for future network services, the E2E design approach cannot adequately cope with many of these requirements. The E2E design would make the core network intrinsically inefficient (i.e., wastes network resources such as bandwidths), often slow (i.e., it invokes unnecessary retransmissions in case of errors that may occur in noisy links, such as radio links) and internally insecure (because a dumb network cannot protect itself from attacks).

Therefore, we should no longer adhere to the E2E principle. From now on, we need to develop technologies that enable processing within the network, such as network virtualization technology and ID/Locator split technology, in



●Why NWGN?

order to facilitate and speed up the development of enhancements and applications for the Internet.

What should be Japan's coming strategy?

How should Japan proceed with the New Generation Network project?

First, international collaborations are indispensable. As you may be aware, the number of researchers and graduate students engaged in networking research in Japan is a fraction of that of the US, or possibly smaller by a factor of ten. For example, the NSF (National Science Foundation) sponsors four FIA (Future Internet Architecture) projects and four GENI (Global Environment for Network Innovations) projects, whereas in Japan there seem to be no internationally visible efforts other than AKARI, JGN, and virtual nodes. Therefore, it is important to delve deeper into the AKARI architecture and implement it on JGN-X.

NICT aims to expand its base through cooperation with industry and universities to carry out the New-Generation Network R&D Project, including research and development of services and applications for establishing New Generation Network through the third medium-term plan. In doing so, it is absolutely critical that we keep abreast of the research by groups of FIA, GENI in the U.S. so that we can quickly incorporate their useful ideas and achievements and identify the technical domains in which we can cooperate.

Second, it is vital for Japan to play an active and leading role in international standardization efforts. In the ITU standardization activities for new generation network related technologies, it is encouraging that various organizations in Japan worked together. As a result, agreements have been reached this year on the vision documents for new generation networks, network virtualization, and energy-efficient networks.

Third, we need to think about creating a better environment to foster as many next generation researchers as possible through the New Generation Network project. Research, especially in this networking area, is a game for the young. Drs.Vinton Cerf and Robert Kahn, who are now considered the fathers of the Internet, published their seminal paper on TCP/IP protocols in 1974. Vinton Cerf was born in 1943 and Robert Kahn in 1938, which means they were 30 and 35 years old, respectively, when they published the paper. I sincerely hope that the Japanese research community will provide an exciting environment for young researchers full of energy and creativity. NICT and Japanese universities should also actively promote foreign exchange programs for graduate students. It is vital to understand the importance of research institutions constantly injecting "new blood."

Lastly, I would like to emphasize that keeping Japan globally competitive in the ICT field in the future requires an environment, culture, and national strategy that allows innovative applications and new business to be borne and fostered. We should ask ourselves why Apple, Amazon.com, Google, eBay and many other such companies were started in the U.S., and why Japan and Europe have failed to create comparable companies.

Additional lecture details and the presentation slides are available at http://www.HisashiKobayashi.com.

Biologically Inspired Paradigm Shift in Information Communications Technology

Toshio Yanagida

Graduate School of Frontier Bioscience, Osaka University Special Research Promotion Group Professor
NICT Distinguished Researcher, Director of Center for Information and Neural Networks (CiNet)

After graduating from the Faculty of Electrical Engineering in Engineering Science at Osaka University, Dr. Yanagida left the doctoral course at the Graduate School of Engineering Science (same institution). Later, after serving as a professor in the Department of Bionics in the Faculty of Engineering Science, as a professor in the Department of Physiology and Biosignaling in the Faculty of Medicine, and as a Dean Graduate School of Frontier Biosciences at Osaka University, he took up his present post in 2010. Since 2011, he has served as the director of the RIKEN Quantitative Biology Center. His area of expertise is biophysics. His main areas of research are single molecule imaging, operating principle of a living organism's molecule machine, and the dynamism of the brain's memory.

Information Systems and Energy

With the recent significant growth and development of information and communications technology (ICT), computers have made a big leap forward in performance. The volume of data that can be handled is also rapidly increasing. This progress is indeed a wonderful thing, but at the same time, creating various challenges.

One challenge is energy consumption. Take, for example, a super computer and an information network, both of which consume extremely large amounts of power. Even if we make them more energy efficient by tweaking their electronic circuits and hardware, one analysis estimates that, in 20 to 30 years, they may consume 50% of the total electricity generated. This is a very serious problem that must be resolved.

Another challenge is the limits of strict control as complexity increases. Social activities involving humans are particularly overwhelmingly complex. Once the complexity exceeds a certain level, it will be extremely difficult to strictly control the activities.

Complex but Super Energy Efficient and Robust Living Organisms

Living organisms can appear very complex when compared with an artificial system or a network, but how about in terms of energy consumption and robustness?

The IBM's Deep Blue supercomputer once held a close match with a world chess champion. During this match, the supercomputer consumed 50,000 watts of energy, while the human chess champion used only enough energy required for thinking.

We have developed a technology to measure the temperature rise in the brain with an accuracy of 0.1°C. Using this technology, we measured the temperature change during human thinking, and it was revealed that a human consumes only 1 watt of energy. The cerebrum has 14 billion neurons and tens of trillions of synaptic couplings. If we could control the couplings using "0" and "1," the number of combinations would be 10 to the 15 trillionth power. A supercomputer calculating all these combinations would consume an extravagantly large amount of electricity. Yet surprisingly, living organisms need just 1 watt to control such complex brain activities.

Biologically Inspired Information and Communications Technology

If we can figure out the mechanism of the brain, which can control an extremely complex system at energy levels that are incredibly lower than that of a computer, and robustly deal with unexpected changes in the environment, we may be able to simultaneously solve issues such as energy consumption and complexity.

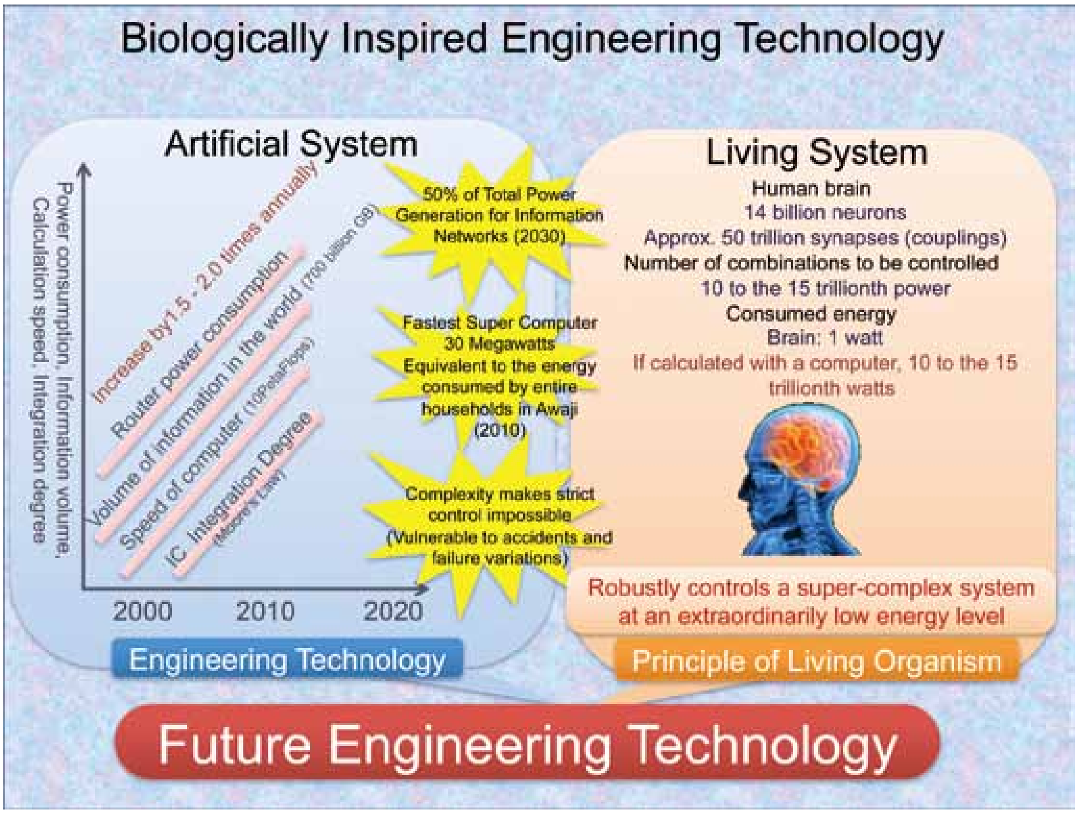
You may imagine that the components of a living organism, which run the extremely complex brain using only 1 watt of energy, must have extraordinary accuracy. But, neurons in the brain actually operate on the millisecond time scale, which means the processing speed is one million times slower than that of a computer operating on the nanosecond time scale.

When it comes to memory capacity, even those who have an incredibly good memory only hold the capacity equivalent to one or two DVD disks. Therefore, a human being's memory capacity is astonishingly small compared to that of a computer.

When you combine all the components of a living organism, each of which seems to be nothing special, you get a highly sophisticated system: a human. In the process of unraveling the mystery, we may find the door that leads to new innovation.

How do the components of a living organism—molecules, cells, and brain—work, and how does the mechanism differ from an artificial machine?

Let's look at a molecule first. A typical one is a molecule motor called myosin, which are found in muscles. At the molecular level, the muscles contract through the actions of actin and myosin where the muscle fibers slide across each other. Using a pioneering technology that we developed, we examined how myosin actually works in the muscle and how it uses energy. We discovered that actin and myosin are not interacting in a fixed, inflexible way like a gear, but are actually fluctuating. The fluctuating motion is noise, where energy is not used, or rather thermal motion. Since these fluctuating molecules comprise a system, the muscle is very flexible and adaptable to any changes in the environment. In a muscle consisting of numerous elements, it would be impossible to strictly control the individual elements. Therefore, the strategy taken by the living organism is to not control them, but simply keep the elements flexible and let them fluctuate, as the research suggests.



●Biologically Inspired Engineering technology

The elements of a living organism actively take advantage of thermal fluctuation. This is where a living organism is completely different from an artificial machine. A computer puts enormous energy into reducing fluctuation (noise) in order to raise the reliability of the signals, whereas living organisms utilize it. They do this using almost no energy. Noise is a negative factor for an artificial machine. If a machine has noise, its operation becomes haphazard and unreliable. This very aspect of haphazard or unreliable operation, however, is the essence of living organisms and the root of their flexibility. By combining fluctuating elements, we get an amazingly flexible system.

The Brain also Utilizes Fluctuation

Dr. Tsutomu Murata of NICT used ambiguous figures to investigate how perceptual consciousness and inspiration occur in the brain. He drew a graph of the amount of time that took the subjects to percept an ambiguous figure. The formula for the search time turned out to be similar to the formula for chemical reaction speed, the Arrhenius equation. A chemical reaction occurs when the state of a molecule fluctuates and exceeds a certain energy barrier. The higher the temperature, the more a molecule fluctuates, increasing the probability of leaping the barrier and achieving a quicker chemical reaction. The very same thing happens in the brain. An energy barrier must be overcome to reach an understanding, and to leap the barrier, the state of a molecule must be fluctuating. There is a constant that can be called perception temperature, and a person with a higher temperature fluctuates greatly and leaps the barrier sooner, can percept and reach an answer sooner.

So, how can we reach an answer when looking at an imperfect picture? Those who reached an answer sooner had many parts of their brains activated and the activities were randomly fluctuating. You can never tell what the brain is doing just by observing the many fluctuating parts of the brain, but the brain actually is undergoing a very important process: searching for various possibilities through fluctuation. When the top-down information, such as memory and experience, bias the random fluctuation, selection will occur, and if it is found consistent with a previous memory, inspiration results. This is the same process by which myosin fluctuates and searches for its coupling. The brain, molecules, and cells—all seem to have some common mechanism.

There is a phenomenon called change blindness that explains our inability to notice things that change slowly, even when we think we are watching them very carefully. We think we are watching the whole picture, but actually we aren't. We are watching only key points, but with pattern recognition, we feel we are watching it all.

When you look at the atomic level, molecule motors and proteins are a system with numerous degrees of freedom. Looking at the inside of a cell, the molecule network is highly complex. At the neuron level, the brain is also extraordinarily complex. When you think about it, a living organism's system has a staggering number of degrees of freedom at each level. If it tries to control all the components strictly, even a single cell would require a huge amount of energy. A cell instead keeps the degrees of freedom to the minimum and only operates a small number of key components. Therefore, the steady state of a living organism's system appears to be very complex, but the number of factors actually in operation is small—just a handful. So, you may ask why they have such a huge number of degrees of freedom. Perhaps this allows them to respond to sudden changes in the environment.

There are several examples that have applied this principle, such as robot control and routing control of a network. In a search using fluctuation, few calculations are conducted, so we can reduce the number of calculations to 1/3,000 to 1/1,000, that of current methods. If it is put to practical use, the future energy problems can possibly be solved immediately.

Report on Keihanna Information and Communications Research Expo 2011 —Link it to the Future!—

●The venue for the keynote lecture, almost full

The Universal Communication Research Institute, NICT, held the Keihanna Information and Communications Research Expo 2011 from Thursday, November 10 to Saturday, November 12, 2011, as a community-based joint event in cooperation with the information and communications related institutions at Keihanna Science City located in a border area of Kyoto, Osaka, and Nara prefectures. During the three days, more than 2,300 people visited the venue for a variety of lectures and exhibitions. The event is intended to publicize the research outcomes of information and communications technologies and promote mutual cooperation between the institutions concerned.

On the first day, Michitaka Hirose, Professor at the Graduate School of Information Science and Technology, The University of Tokyo, and R&D advisor at the Universal Communication Research Institute at NICT, gave a keynote lecture entitled "Ultra-realistic Media and Society". He said: "The word 'Ultra' in ultra-realistic media implies not just a further enhancement of the sense of reality but also more accurate information exchanges over distance and time. How can we pass on to future generations what happened in the Great East Japan Earthquake, or anything in our head, including knowledge and experiences? If it is an object (thing), we can keep it in a museum, but how can we communicate information (events) as vividly as if we had firsthand experience? To do this, it is vital to come up with a system that maximizes advantages both of a human and a machine, respectively. Sometimes people say that even sophisticated technologies tend to be useless in real life, but I believe that if we thoroughly analyze the situations in which they are used, and create ingenious systems that strike a balance between the roles of a human and those of a machine, we will be able to make those technologies truly useful." He also suggested that, for the elderly and the physically challenged, we can make the most of the person's strong points while letting the machine support their weak points. He also spoke of how we can combine the excellent abilities and knowledge of many people to virtually integrate and utilize them. The intriguing lecture indeed gave us food for thought.

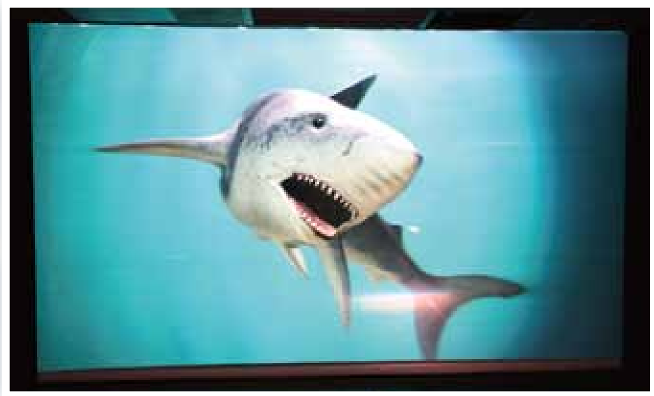
Ultra-realistic technologies, or virtual reality technologies, serve as a bridge between a human and a machine. That role will become increasingly important in the future.

In FY2011, a new 5-year plan, the Medium-Term Objective/Medium-Term Plan, was launched at NICT. At the national level, new strategies based on The 4th Science and Technology Basic Plan (FY2011–FY2015) were launched. The basic plan was revised in response to the Great East Japan Earthquake in March, 2011 to put more emphasis on reconstruction and revival from the disaster, the promotion of green- and life-innovations, and so on.

Early deployment of advanced science technology to the society is also expected. To demonstrate ways that information and communications technologies can address those challenges, especially from the viewpoint of relevant institutions in Keihanna Science City, we gave the following four lectures.

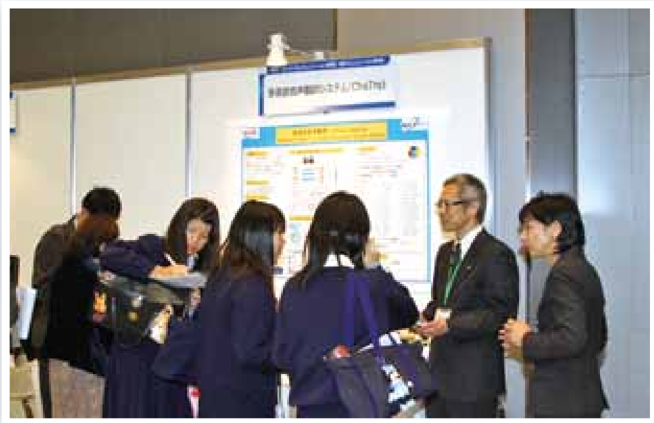
(1) Developing cutting-edge information and communications technology
~ Early deployment of research outcomes ~
(2) LIfe innovations using information and communications technology
~ Enhancing the quality of life ~

●Michitaka Hirose giving keynote lecture



●200-inch glasses-free 3D image
The young visitors exclaimed, "That is so cool!"

●Panel discussion at the 1st session



●Multilingual speech translation system (ChaTra)
All ears for to hear the explanations

(3) Green innovations using information and communications technology
~ Improving the efficiency of energy use ~
(4) Preventing disasters and mitigating their damage using information and communications technology

At the 1st session, discussions were held between the lecturer and the audience. Each institution has been proactively expanding their business based on the outcomes from many years of research. ATR-LT gave a demonstration of an e-learning system that helps distinguish the English sounds of "L" and "R", an outcome of their voice research. This made a particular impression on high school students in the audience.

At the 2nd session, life innovations, lectures were given about fundamental robotic technologies for supporting daily life in our aging society, a medical image storage system, and the contributions of ultra-realistic communications technology. These institutions have been individually researching and developing the fundamental technologies, but the lectures convinced us that each of the technologies is sure to be a key to future systems.

Through the 3rd session about green innovations, we learned about the Keihanna eco-city project, as well as about a computer architecture that will enable both higher performance and lower power consumption, and an approach toward a more environment-conscious society using various sensors. Those lectures taught us that information and communications technologies are being used everywhere to develop green innovations.

At the 4th session, the Seika Town Firefighting Head Office, based in this city, reported on how information flows at the scene of a fire or medical emergency, and the relief efforts provided by the Kyoto chapter of the Emergency Firefighting Support Team in the aftermath of the Great East Japan Earthquake. NICT's relief efforts after the Great East Japan Earthquake utilized the research outcomes of the Applied Electromagnetic Research Institute and the Wireless Network Research Institute, so we spoke about our observations of the earth surface using the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2), our setting up of a broadband network using Wideband InterNetworking engineering test and Demonstration Satellite (WINDS), and establishing internet connections in shelters in the disaster area using cognitive wireless routers, which can accommodate different wireless systems.

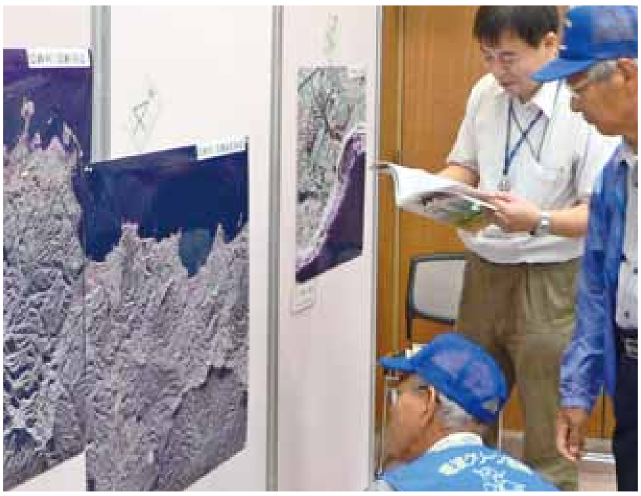
Along with those lectures, we exhibited a 200 inch glasses-free 3D image and other materials. We received feedback, especially from the young and high school students, who said, "I was amazed at Japan's technologies," "It was really interesting...I wish I had more time," and so on. This has renewed our resolve to make the subjects even more attractive to students who are at their most inquisitive stage of life and will lead Japan in the future.

Report on NICT Okinawa Open House 2011

The Okinawa Electromagnetic Technology Center was opened to the public on Wednesday, November 23, 2011, which is Labor Thanksgiving Day in Japan. During the opening event, we introduced the research underway at the Okinawa Center and provided a tour of the facility. We also showed images taken immediately after the Great East Japan Earthquake using the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2). We also showed images of places in Okinawa and areas around Onna-son, where the Okinawa Center is located. We also held education programs on the earth's environment using the four-dimensional digital globe, Dagik Earth (which displays data on a world map projected onto a big sphere), displayed the Okinawa Office of Telecommunications' radio-monitoring car, and held a workshop on electronics crafting. Favored by good weather, the event provided visitors with a great opportunity to enjoy a variety of topics.

●**Facility Tour**
Explaining how to measure precipitation using the special tipping-bucket rain recorder

●**Dagik Earth**
Information about the earth's environment is projected onto the big spherical screen. The system can be freely operated with a home game controller



●**Showed images of areas around Onna-son taken with the Polarimetric and Interferometric Airborne Synthetic Aperture Radar System (Pi-SAR2)**

●**Workshop on electronics crafting provided by the Okinawa Office of Telecommunications: "Let's make a radio work."**

Prize Winners

Prize Winner ● **Sun Chen** / Expert Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

◎Date：2011/4/22

◎Name of Prize：

IEEE Standards Association Award (as Leadership)

◎Details of Prize：

In recognition of contributions to the development of IEEE Standard 1900.6TM-2011

◎Name of Awarding Organization：

IEEE Standards Association

◎Comments by the Winner：

I feel very lucky to have had the opportunity to participate in the development of an industrial standard after joining NICT. During the past three years I have gratefully served as the technical editor of the IEEE 1900.6 standard. It is my great honor to receive this award from the IEEE Standards Association. I would like to express my sincere gratitude to the members of the Smart Wireless Lab. I wouldn't have achieved this without their support. The IEEE 1900.6 standard defines the interfaces and data structures required to exchange spectrum sensing-related information in order to increase interoperability between sensors and clients developed by different manufacturers. I hope this standard will be widely adopted by the industry and play an important role in future wireless communication systems.

Prize Winner ● **Yohannes Alemseged Demessie** / Expert Researcher, Smart Wireless Laboratory, Wireless Network Research Institute

◎Date：2011/4/22

◎Name of Prize：

IEEE Standards Association Award (as Contributor)

◎Details of Prize：

In recognition of contributions to the development of IEEE Standard 1900.6TM-2011

◎Name of Awarding Organization：

IEEE Standards Association

◎Comments by the Winner：

I am very pleased to share my sincere gratitude to all the NICT colleagues who have worked hard and made the IEEE 1900.6 standard published successfully. I also appreciate the magnificent role played by my company NICT to involve me in such honorable international telecommunications industry standard development activity. I have gained substantial experience and deep insight in the process and development of technical standards. I am also proud on the overall achievements gained by NICT in the international arena in bringing high quality research outcomes for the success of standards. The IEEE 1900.6 standard is the first IEEE standard in its kind to supplement the fast growing innovative technology of cognitive radio by defining interface between spectrum sensors and their clients. I am confident that the IEEE 1900.6 standard becomes the building block and foundation of the future spectrum sensing based white space radio technology in particular and dynamic spectrum access radios at large.

Prize Winner ● **Masugi Inoue** / Planning Manager, Strategic Planning Office, Strategic Planning Department

◎Date：2011/6/8

◎Name of Prize：

Letter of Appreciation by IEEE COMMUNICATIONS SOCIETY

◎Details of Prize：

In recognition of contributions as Co-chair for Next Generation Network and Internet Symposium at the IEEE International Conference on Communications (ICC 2011)

◎Name of Awarding Organization：

IEEE Communications Society

◎Comments by the Winner：

The IEEE's ICC2011, a flagship international conference in the communications field, was held in Kyoto in June 2011 with strong support from many of the people and organizations engaged in the Japanese communications industry. Although there was some impact from the earthquake, the event ended successfully. To be honest, serving as chair of the symposium for almost a year was really hard for me— arranging dozens of referees and presiding over sessions during the conference—but it was truly a memorable and valuable experience being involved in organizing a conference. It gives me great pleasure to receive this letter of appreciation.

Prize Winner ● **Morio Toyoshima** / Director, Space Communication Systems Laboratory, Wireless Network Research Institute

◎Date：2011/7/1

◎Name of Prize：

Letter of Appreciation

◎Details of Prize：

In recognition of the great efforts and contributions to organizing and managing the 54th Space Science Technology Conference

◎Name of Awarding Organization：

Japan Society for Aeronautical and Space Sciences

◎Comments by the Winner：

The 54th Space Science Technology Conference by the Japan Society for Aeronautical and Space Sciences was held at Shizuoka Granship from November 17 to November 19, 2010. As an organizer, I was involved in the management of the academic conference. The conference has grown to become the biggest space-related event in Japan, welcoming over 800 participants to this year's conference. This gave me a great opportunity to learn how to organize a meeting and how difficult such a task is. It is a true honor for me to receive this letter of appreciation, and I would like to extend my deep gratitude, especially to Shinichi Kimura, Chairman of the executive committee of the 54th Space Science Technology Conference, along with everyone else concerned.

Received Letter of Appreciation from the Chief of Staff of the Japan Air Self-Defense Force at the Ministry of Defense

—For the activities of WINDS in the relief efforts after the Great East Japan Earthquake —

On Friday, November 18, 2011, NICT received a letter of appreciation for the support that NICT provided for relief activities after the Great East Japan Earthquake. The letter was received from the Chief of Staff of the Japan Air Self-Defense Force at the Ministry of Defense.

The Wireless Network Research Institute, NICT, has been working on utilizing communications satellites in a large-scale disaster using the Wideband InterNetworking engineering test and Demonstration Satellite (WINDS). WINDS is still at the experiment stage, but in the wake of the Great East Japan Earthquake, we put the relief efforts before all else and did everything we could.

In response to the request for assistance from the Air Staff Office, we transported a VSAT (transportable small earth station) and other equipment to Matsushima Air Base (Higashi-matsushima City, Miyagi) and Iruma Air Base (Iruma City, Saitama) on Sunday, March 20, 2011. We quickly sent our staff to restore communications at Matsushima Air Base, which was affected by the earthquake, and set up a broadband network between the Matsushima Air Base and Iruma Air Base using WINDS as early as evening of that day. The temporary communications network allowed us to convey the damage situations and send between both locations a large amount of image data showing the damage, thereby contributing to smoother information sharing.

The letter of appreciation was given to NICT in recognition of activities that greatly helped to facilitate operations at Matsushima Air Base, a hub for the emergency dispatching efforts of the Japan Air Self-Defense Force.

We would like to extend our sincerest sympathy to those affected and wish for the earliest recovery from the disaster.

●Received a letter of appreciation from the Chief of Staff of the Japan Air Self-Defense Force at the Ministry of Defense
(Left: Shigeru Iwasaki, Chief of Staff, Japan Air Self-Defense Force,
Right: Hiroshi Kumagai, NICT Vice President)

●The shield of appreciation granted by Ministry of Defense

【FYI】Established a makeshift broadband communications network using Wideband InterNetworking engineering test and Demonstration Satellite (WINDS) in the area affected by the Great East Japan Earthquake (Matsushima Air Base)
［April 1, 2011］
http://www.nict.go.jp/info/topics/announce110401.html

Information for Readers

The next issue will take a close look at the mechanism behind the brain and the kind of technology used by the prototyping and development laboratory for cutting-edge research on superconducting devices.

■ **Correction:** There was a typo in an article posted in December issue.
We apologize for the error and would like to correct it here.The name of the author on p. 8, NICT NEWS, No. 411, December issue:
【Error】山口 修二　【Correction】山口 修治 (Typo in Chinese character)

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