

# REACHING FOR GREATER HEIGHTS

**TOHOKU UNIVERSITY** aims to be ranked among the world's top 30 institutions, and create an education model that others will aspire to follow.

**For more than a century,** Tohoku University has been synonymous with the best in Japanese education, and its research labs have produced some of the world's most innovative technologies. Last June, it became one of only three institutions to be conferred the title of Designated National University by the Japanese government. "Being selected is an honour," says Tohoku University president, Susumu Satomi. "It is both an acknowledgement of our past success and a show of confidence in our future advances in research and education."

With the structural reforms that result from the new status, the university plans to further strengthen its research capabilities, internationalize its teaching curriculum and implement more outreach programmes to enhance its global competitiveness.

## Boosting research in four key areas

Tohoku University plans to advance four areas in which it already excels — materials science, spintronics, next-generation medicine and disaster science. These are all based on interdisciplinary research and are being pursued

with the ultimate goal of realizing practical applications.

The four areas will form the components of a Core Research Cluster, which will include the Advanced Institute for Materials Research (AIMR), the Center for Innovative Integrated Electronic Systems (CIES), the Tohoku Medical Megabank Organization (ToMMo) and the International Research Institute of Disaster Science (IRIDeS).

Building on Tohoku University's long and prestigious history in materials science, AIMR is conducting unique interdisciplinary studies by using mathematics to inform research into materials. Among other things, researchers at the institute are seeking new ways to create innovative materials for high-efficiency energy conversion and storage.

"There is always a keen interest from industry to develop and produce new materials," says AIMR Director Motoko Kotani. "Our new status will give us more options to find the best channels to distribute our findings."

CIES is working in spintronics, a technology that exploits both the spin and charge of electrons to create innovative devices. It is pioneering so-called spin-centered science by investigating high-performance, ultralow-

power large-scale integration devices for conventional information processing as well as artificial intelligence.

Hideo Ohno, who takes over the reins from Satomi as university president in spring 2018, has been instrumental in developing this field during his tenure as director of the Research Institute of Electrical Communication (RIEC). "We have already been developing cutting-edge nonvolatile memory technology, but we are now able to further promote industry collaborations to commercialize our research achievements," he says. "Increased international recruitment of researchers at RIEC and at the university's other institutes will make it easier for us to develop global human resources and networks."

Masayuki Yamamoto, ToMMo's executive director, concurs. "Due to the interdisciplinary and cross-departmental nature of our work, the new status will give us additional opportunities to collaborate with global institutions. Through these partnerships, we can further develop personalized healthcare and medicine."

ToMMo is developing next-generation medicine and

is one of the few institutes in the world completing a large-scale, three-generation cohort study in cooperation with local communities. Its work combines genome medicine, life science, information science, data science and artificial intelligence technology.

Set up in the aftermath of the Great East Japan Earthquake of 2011, IRIDeS brings together experts from both the natural and social sciences in order to better understand why natural disasters occur and how to mitigate their effects. Researchers there too see great benefit in global collaboration.

"We have managed to establish a collaborative project with private-public organizations and other universities, to develop a new resilient city model integrated with important proactive research activities," says IRIDeS Director Fumihiko Imamura. "Creating a disaster resilient culture worldwide is our ultimate goal."

## Creating a virtuous cycle

To promote collaboration opportunities, the university will initiate the Advanced Graduate School and the Organization for Advanced Studies (OAS). While the OAS will initially focus on the four priority fields, there are plans to expand.



Aerial view of the Aobayama campus and the city of Sendai.



Cyber-enhanced dogs are used for search and rescue at disaster sites.



The four heads of the research areas in the Core Research Cluster (from left to right: Masayuki Yamamoto, Motoko Kotani, Hideo Ohno and Fumihiko Imamura).

"In addition to these four main areas, we will also establish the International Research Cluster with five more areas: cosmic physics, environmental and Earth science, machine science, data science and Japanese studies," says Satomi. The university aims to create a dynamic cycle that has three stages: boosting funding through the development

and commercialization of innovations that benefit society; using this funding to enhance fundamental research and education at the university; and then using this fundamental research to develop new innovations of social benefit.

The new status will facilitate attracting corporations on to campus and will help with the first stage of this cycle.

"The new Designated National University status will give us more independence to develop ties with third parties and establish other sources of income, which we will use to further improve our capabilities in research and education," says Ohno. "This cycle will be beneficial to both the university, and local and global communities." ■



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