


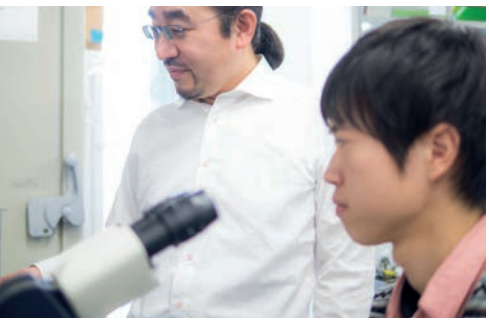

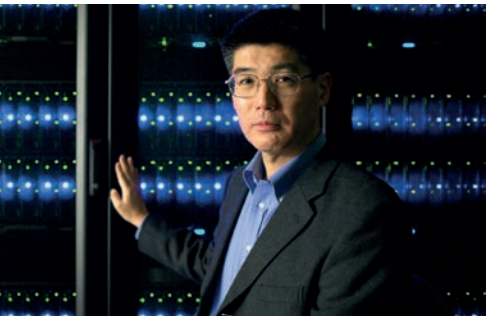

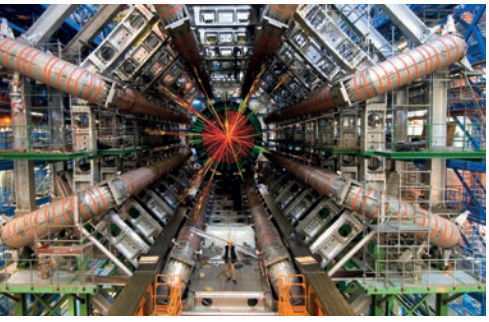

The University of Tokyo

# Collaboration: the key to competitiveness

**The University of Tokyo's new president has a global vision that builds on a long history of accomplishment by inspired researchers. The joint awarding of the 2015 Nobel Prize for Physics to Takaaki Kajita, Director of the university's Institute for Cosmic Ray Research, is just the latest manifestation of the university's enthusiasm for science.**

Makoto Gonokami, who took over as president of the University of Tokyo in April, has a new vision for Japan's premier university.

The university is a place where the creativity of Japan melds with global trends. Steady economic growth and peace have provided a supportive backdrop for outstanding research results that are highly regarded all around the world. Kajita's Nobel Prize for the discovery of neutrino oscillations shows just how profitable support from the university can be.

Gonokami wants to reinforce and intensify the university's mission. He wants to encourage researchers to pursue original ideas and provide the flexibility and the research environment needed to do so. He wants the university to be a place where the boundaries between nations, cultures, generations and academic disciplines are lowered. Only then, he believes, will academic researchers acquire the broad vision needed to tackle issues such as the depletion of natural resources, environmental damage, energy security, infectious disease and Japan's declining birthrate.

Gonokami plans to make the university a "global base for knowledge collaboration" that cultivates a new class of "knowledge professionals." One of his key initiatives is a Graduate School of International Excellence, which will blend the sciences and humanities. The graduate school will create a flexible environment in which to pursue interdisciplinary careers.

"I would particularly like students who have their hearts set on learning and young researchers to experience the excitement and joy of knowledge," says Gonokami.

Gonokami also plans to enhance internationalization by creating a more flexible system to bring in more visiting lecturers, researchers and students from around the globe. This will build on ongoing internationalization efforts.

To lower barriers between academia, industry and government with a view to capitalize on the fruits of scientific research, Gonokami is promoting collaborative research with industry that benefits society, the establishment of venture companies and a reorganization of the university's intellectual property management system.

One example of such barrier-breaking collaborative initiatives is PeptiDream, formed in 2006 by Hiroaki Suga as an outlet for his pioneering peptide research. PeptiDream's success grew from an artificial ribozyme that can produce peptides with the potential to act as drugs. The system can even introduce amino acids that are not present in naturally occurring proteins to the peptides. This ability enables peptides with better pharmacological and chemical properties to be created. Crucially, the system is fast, efficient and cheap, pumping out trillions of peptides a week

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and providing drug companies with hundreds of potential targets.

The technology, which took twelve years to develop, required another four years to be accepted by industry. "At the beginning, no one thought macrocyclic peptides could be drug candidates," Suga says. Now, PeptiDream counts most major multinational pharmaceutical companies on its list of partners, including AstraZeneca, Novartis, GSK and Lilly. And despite having a mere 35 staff, it is valued at US$1.5 billion.

Support from the university was crucial. It provided space in an incubation centre and the university technology-transfer office provided all the legal support needed, enabling Suga to maintain a cutting-edge laboratory. "Visitors from other countries say, 'Wow, you can do anything you want here,'" he says. An influx of talented researchers from overseas and within Japan provided the necessary interdisciplinary talent.

The key, however, is the original idea. "This is a unique technology — no one else can make that kind of molecule." Suga says. "Once people see it, they are convinced."

Suga dreams that one of his peptides will become a blockbuster drug. "I want to help patients. I want to meet unmet medical needs," he says. PeptiDream's peptides are in 20 drug pipelines, a figure that makes most pharmaceutical or biotechnology companies envious. "There are infinite possibilities to develop a new class of drugs. Non-druggable targets can become druggable," he says.

Creating the company allowed Suga to straddle the border between academia and industry, remaining "relaxed and open-minded" enough to follow his curiosity towards its next discovery.

Crossing another kind of boundary, Shoji Asai's research on the Higgs boson showed how well The University of Tokyo researchers, through collaboration and competition, are playing critical roles in the biggest scientific findings of the day. Asai's team found three of the decay channels of the Higgs boson — channels through which the fleeting elementary particle was identified. The discovery was the "most exciting moment of my career," says Asai, "and one I will treasure."

Asai's team was competing with groups from other countries before eventually producing the most reliable and sensitive method for identifying the Higgs boson. "We had to fight hard to establish these methods," he says.

At the same time, the team depended on international collaboration. The ATLAS detector used in the experiments has 150 million sensors and required the work of 3,000 scientists from around the world to create and operate it. "Without this collaboration, there would not have been a Higgs boson discovery," Asai says.

The international project opened a window into the elementary particle as well as a window to the world for many scientists. More foreign researchers and graduate students have been coming to Japan, while Japanese with doctorates from the University of Tokyo "are spreading all over the world," says Asai.

Aside from the generous funding and facilities, the university's willingness to let him work freely has been essential, says Asai. Now, he will follow his next goal and ultimate dream — to build on the Higgs boson work to discover supersymmetry, something that could explain elusive dark matter.

The University of Tokyo has also been leading efforts, with the support of the government, to reform the research system in Japan so that more such discoveries are possible.

For example, a government-appointed international evaluation committee found that the university's Kavli Institute for the Physics and Mathematics of the Universe (IPMU) has "led the way toward organizational reform of Japanese education" with its establishment of full faculty positions, a merit-based salary system and other management approaches rarely found in Japan. The committee recommended renewing the Kavli-IPMU's five-year term noting that it had exceeded expectations. The centre can pursue research into the state of the Universe a trillion years into the future using Japan's Hawaii-based Subaru telescope and investigate the tiny Universe prior to the Big Bang using the LiteBIRD satellite. The Kavli-IPMU's success has proved that coming to Japan can be career boosting, says Institute Director Hitoshi Murayama.

Professor Makoto Gonokami, the president of the University of Tokyo

In addition, the Ministry of Education, Culture, Sports, Science and Technology in Japan selected the university's proposal of a Top Global University Project. The project will create collaborations that extend from research to education with strategically selected universities overseas. By cultivating "mobility, excellence and diversity," the goal is to produce intellectual leaders with global outlooks. At the same time, the University of Tokyo will continue overhauling its own education system to become a role model for other Japanese universities. "I want students to use their experience as a source of intellectual nourishment that reinforces the willingness to develop themselves," says Gonokami.

THE UNIVERSITY OF TOKYO

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