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Editorial

Science and Innovation developments in Japan: storming and reforming

The second phase of Prime Minister Abe's strategy for revitalisation of Japan, published at the end of last month, maintains a strong emphasis on science, technology and innovation. Japan aims to become the World's No1 innovator within 5 years (currently No.5 according to government's own measure).

As a nation, Japan spends a 3.5% of GDP to R&D of which 70% comes from the private sector. Japan is also a regional research leader. However, links between academia and industry and with national research institutes are weak. Japan's national research institutes ([AIST](#) and [NEDO](#) funded through Japan's Ministry of Economic, Trade and Industry) are now being asked to become more like Fraunhofer centres with more of a focus on developing technology seeds and initiatives to bridge between research and commercial activity.

The Ministry of Education, Culture, Sports, Science and Technology (MEXT) aims to reform and internationalise Japanese universities, to improve standards, attract talent and create a new generation with more international experience and connections. Funding for international research collaboration is increasingly being channelled at the institutional level (eg Top Global Universities Project, equivalent to £75M in 2014). Measures to increase full time positions for young foreign researchers and shake up funding for management, research grants and salaries should strengthen the university governance and open up career opportunities for researchers.

The storm over STAP cells has affected not just of RIKEN researcher Obokata and her co-authors, but clouded the reputation of Japanese research integrity. The recent S&T White paper highlights the importance of cultivating research ethics and rebuilding trust in science. A team headed by MEXT Senior Vice Minister Sakurada has been set up to give guidance to RIKEN to reform its operations. On 2 July, MEXT published a new policy to prevent research misconduct at universities and institutions and ethics education is now mandatory for students and researchers. By responding quickly and firmly the government hope to calm the storm and get back on track to create a world class research and innovation environment.

This month's newsletter takes a detailed look at robotics and ICT, two Japanese technology strengths highlighted in the revitalisation plan as key to Japan's growth ambitions.

Elizabeth Hogben, Head of Science & Innovation Japan, British Embassy Tokyo

Analysis

Robotics in Japan

Japanese Prime Minister Shinzo Abe recently announced that robots will become part of Japan's growth strategy to boost productivity and also revealed plans to stage a Robolympics alongside the Tokyo Olympics in 2020, providing an opportunity for robots from around the world to demonstrate their technical skills.



HAL® for Whole Body

Japan is considered to be one of the leading nations when it comes to robotics, especially robots for industrial use. In 2012 the number of robots used in industry in Japan was over 300,000. This is significantly higher than in the US or UK (around 198,000 and 15,000 respectively). Japanese manufacturers such as Yaskawa and FANUC also make up half the shares of the market, which according to METI and NEDO is predicted to exceed a value of 9.7 trillion yen (£57 bn).

Japanese firms were among the top 4 globally for patent applications for robotics this year, but what stood out was that a large number of their applications were for service robots. With a shrinking, aging population and labour shortage, service robots are seen as one of the ways to help Japan's economy develop and progress. The robotic suit "HAL" developed by Tsukuba University and Cyberdyne is one type of service robot that presents exciting opportunities. This year it made its memorable debut the opening ceremony of the world cup when the suit which reads nerve signals sent from the brain to the muscles enabled a paraplegic to make "the first football kick" of the tournament. It is mainly used for rehabilitation treatment of patients and is now certified for use in European hospitals as well. However, the power assistive suit is also used by farmers in Japan, and could open the way for more elderly and women to engage in physically demanding work such as construction or farming. There are still plans to develop many service robots in the future. A consortium made up of 300 Japanese businesses called the [i-RooBo](#) network forum was launched this month. Using crowdfunding by member companies, it hopes to reach the target of developing 100 types of robots by 2020 that are helpful with daily chores and tasks.

At the Fukushima Daiichi nuclear plant robots are an important part of decommissioning efforts in the reactor buildings where radiation levels are at dangerous levels. Currently robots are being created that are able to

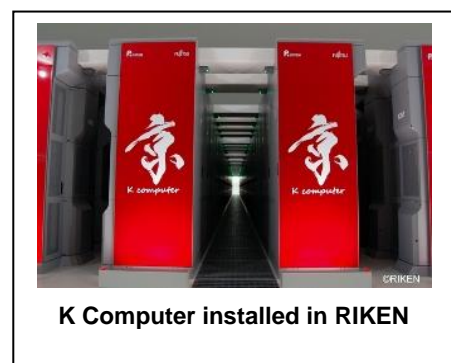
carry out advanced nuclear decommissioning tasks. A few of these include Hitachi's "Astaco-Sora" that can lift loads up to 300 kilograms, a "High-Access Survey Robot" by Honda and a 4 legged inspection robot complete with a camera by Toshiba.

The devastating effects of the 3/11 earthquake and tsunami has also got Japanese researchers thinking about robots that can help rescue efforts in times of disaster. Many of these rescue-bots are designed to locate and safely retrieve victims from disaster sites or reach spaces that humans aren't able to. The Japanese start-up company [Schaff](#) won the international contest held by the Defence Advanced Research Projects Agency (DARPA) last year, which tests robots on their capabilities of assisting humans in responding to natural and manmade disasters. Their winning entry is able to drive, walk on unstable terrain, climb ladders, and its claw-like hands allow it to do human-like actions such as open doors and manipulate valves with ease. Following its acquisition from Google the company has stopped sharing its future plans and details on their website but hopes are that the robot will be used for large scale commercial benefit. It has certainly set a high standard for future rescue-bot development.

We will be organising a UK-Japan scoping mission at the end of the financial year 2014 (January-March 2015), hoping to seek new collaboration opportunities between UK researchers and institutions and Japanese businesses and/or institutions. For more information, contact seiichi.asano@fco.gov.uk

World's Fastest Supercomputer: Beyond KEI

The world's fastest supercomputer is being developed by Japanese universities. Tokyo Institute of Technology (TITECH) is collaborating with Japanese ICT firms on development of a next generation supercomputer by 2016. The University of Tokyo and Tsukuba University are also jointly developing other supercomputers. The performance will exceed KEI computer, the world's fourth fastest supercomputer. The new supercomputers are expected to boost Japanese industries competitiveness through developing innovative new products from high speed data analysis. Supercomputer is used for a variety of applications, including climate research, disaster prevention and medical research.



K Computer installed in RIKEN

The performance of TITECH's supercomputer is expected to be two to three times faster than KEI computer (20 to 30 petaflops). Bids will open next spring, US and Japanese firms are expected to tender for the contract, to be delivered by June 2016. By using commodity components, the development cost is estimated at £24 million, compared with spending £647 million for KEI computer's development.

Use of the KEI computer has grown over recent years and demand for supercomputing power is increasing rapidly, particularly from industries for developing new medicine and new cars. Expanding supercomputer infrastructure at universities will provide vital computation resources for industries. Usage is charged per hour and income will help reduce the cost of university research and allow further investment in improving computation performance.

In the mean time, Japanese government plan to develop a 100 petaflops, next generation supercomputer by 2020 and competition is heating up from US and China. The universities supercomputers development will be filling gap in technology between current KEI computer and next generation, while retaining level of skills and knowledge.

SIN Japan Activities

Manufacturing and Industrial Policy:

UK-Japan Workshop & Seminar

On 19th June, SIN Japan, Institute for Manufacturing (IfM) of Cambridge University and the University of Tokyo co-organized a joint UK-Japan workshop on manufacturing and industrial policy. This was the second in a series of workshops designed to build closer links between industrialists, officials and academics involved with manufacturing in the UK and Japan.

The workshop brought together key experts from across the manufacturing field – including Professors Sir Mike Gregory (Cambridge University), Tomonari Yashiro (University of Tokyo), Hiroyuki Yoshikawa (CRDS, JST), and Takahiro Fujimoto (University of Tokyo). Senior UK and Japanese Government experts also participated, making this a landmark meeting of minds from government and academia.



Presentations united around an overarching question: how to identify, build and capture value from manufacturing. These covered themes including the convergent challenges of UK and Japanese future manufacturing policies; relationship of manufacturing and service industries; the creation of value through design; and the role of university-industry collaboration.

Discussion explored these issues in detail, and moved on to concrete next steps. Ongoing collaboration around reconceptualising manufacturing; building future manufacturing capabilities; and understanding manufacturing in a global context, were all welcomed. Sir Mike Gregory commented “We were delighted to find so many areas of common interest and agreement together with a shared enthusiasm for developing a better understanding of the changing face of global manufacturing and identifying areas for future partnership.”

The workshop will prepare a formal summary report of the proceedings in a format suitable for wide public dissemination as a foundation for future activities. Please contact seiko.oya@fco.gov.uk if you are interested.

Other News

Facial recognition technology to be tested in Fukushima for 2020 Olympics

IT services provider, Accenture Japan, and the University of Aizu in Fukushima Prefecture plan to launch IT services test that could be used for the 2020 Tokyo Olympic Games. These include use of face and hand recognition technologies for admission to venues and public transportation, and automatic language translation services. The tests due to launch later this year are estimated to cost more than 30 billion yen (\$291 million) in total over five years, with one-third of the money coming from the national government. Five government bodies, including the Ministry of Internal Affairs and Communications and the Ministry of Economy, Trade and Industry, will provide support, such as subsidies. The project has been designated by the Cabinet Office as a model case for regional development. (26 June 2014 / Nikkei Asian Review: <http://asia.nikkei.com/Tech-Science/Tech/Facial-recognition-tech-to-be-tested-in-Fukushima-for-2020-Olympics>)

Japan's pioneering Arctic shipping effort

Mitsui O.S.K. Lines will help transport Siberian natural gas to Asia and Europe, plying the first regular shipping route in the Arctic Ocean. Starting in 2018, the Japanese company will deliver liquefied natural gas produced on Russia's Yamal Peninsula by a joint venture of companies in Russia and France. Mitsui will spend 100 billion yen (\$973 million) on three icebreaker tankers especially for the project.

Receding sea ice has unlocked the possibility of long-distance shipping through the Arctic Ocean for icebreakers in the summer months. But only experimental attempts have been made to exploit it thus far. The Northern Sea route can shorten the journey between Japan and Europe to 30 days, about 10 days faster than the southern route through the Suez Canal. (9 July 2014 / Nikkei Asian Review:

<http://asia.nikkei.com/Business/Companies/Mitsui-O.S.K.-to-join-pioneering-Arctic-shipping-effort>)

First Image Data from Advanced Land Observation Satellite "DAICHI-2" (ALOS-2)

JAXA acquired images from the PALSAR-2 aboard the "DAICHI-2" (ALOS-2). The DAICHI-2 was launched on May 24, 2014, and it is currently under initial functional verification. The images were captured during the verification stage. The DAICHI-2's observation data is expected to contribute to understanding damages from a disaster, monitoring deforestation, and more efficiently understanding farming areas. JAXA plans to start offering images to the general public in late November.



Image taken by DAICHI ©JAXA

(27 June 2014 / JAXA HP: <http://global.jaxa.jp/news/2014/#news2667>)

Research Funding Opportunities

BBSRC David Phillips Scholarship

For scientists who have demonstrated high potential and who wish to establish themselves as independent researchers. All nationalities are eligible and strong background of biotechnology and biological sciences is needed. Calls open in July.

For more details: <http://www.bbsrc.ac.uk/funding/fellowships/david-phillips.aspx>

Forthcoming Events

Celebration of 10 years of UK-Japan young scientist achievement

Clifton Scientific Trust will be holding an event at the British Embassy on 11 August to showcase their UK-Japan Young Scientist Workshop Programme. The Programme has been running with senior high school students in Britain and Japan since 2001, offering a life changing experience. Students are immersed in a new culture, have the chance to work on their own hands-on science projects, mentored by world class scientists. The Clifton Scientific Trust are hoping to attract financial support to continue and expand the programme by raising the profile of the programme in Japan and its educational significance in both countries.

The event will be attended by students and high school representatives, government officials of MEXT and JST, as well as potential future funders from private sector. Current sponsors including Rolls Royce and Barclays will be joined by senior executives with an interest in science and technology education and outreach.

For more information on the programme see the article in [Acumen magazine](#) or visit the programme website www.clifton-scientific.org/uk-japan.html

JSPS Summer Programme

On 19 August 2014, the British Embassy Tokyo and British Council will co-host a reception at the Ambassador's Residence for UK researchers in Japan for the JSPS Summer Programme, to learn about their experiences as foreign researchers in Japan. The JSPS programme offers opportunities for young pre- and post-doctoral researchers from North America and Europe to receive an orientation on Japanese culture and research systems and to pursue research under the guidance of host researchers at Japanese universities and research institutes over a period of two months during the summer.

Applications for 2015 will open in the autumn:

<http://www.britishcouncil.jp/en/programmes/higher-education/support-researchers>

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