Science, Technology, Education and Health News from China

Number 136 – October 2015

Please note that the previous newsletters can be downloaded from the website of the Embassy of Switzerland in China: www.eda.admin.ch/beijing.¹ To subscribe/unsubscribe or send us your comments, please write an email with the corresponding subject to marcel-walter.schneider@eda.admin.ch.

Introduction

The story of the month reports the State Council’s announcement to promote the big data industry in China. Shanghai introduces smart street lamps for public WiFi access. China schedules the construction of the world’s largest particle collider. In medical research, Chinese scientists have tested a promising Ebola vaccine and might have found a new stem cell treatment against Alzheimer. In aerospace, China has begun to develop its first wide-body jetliner. China sets up civil satellite systems for remote sensing, communications and navigation by 2020.

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Contact

Nektarios PALASKAS
Science and Technology Counsellor
Head of Science, Technology and Education Section
Embassy of Switzerland in the People’s Republic of China
Tel: +86 10 8532 8849
Email: nektarios.palaskas@eda.admin.ch
www.eda.admin.ch/beijing

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China Announces Outline to Promote Big Data Industry

The State Council has announced an Outline on Promoting Big Data Industry in September as a supplementary document to the country’s aggressive “internet +” national strategy.

For cultural and historical reasons, data and the use of data have not been a priority for China until the rise of big data industry was brought to the attention of the government. With the booming mobile internet industry, data has been carrying more values than it ever did. In this context, Chinese State Council announced this outline with the goal of driving economic transformation, increasing competitiveness of China and improving governance. The action plan maps development targets and supportive measures for key sectors which the government hopes can establish new industrial modes by integrating with Internet, including mass entrepreneurship and innovation, manufacturing, agriculture, energy, finance, public services, logistics, e-commerce, traffic, biology and artificial intelligence.

Priority will be given to establish a big data access and application instrument that ensures more effective governance mechanism, economic mechanism and social service mechanism. Plan has been made to realize inter-ministerial sharing of information before 2017. To encourage more entrepreneurship in the area of big data, the plan also includes a government information sharing platform for public access and utilization, publishing government data in the areas of credit, communication, health care, public health, employment, social security, geography, culture, education, science and technology, resources, agriculture, environment, security surveillance, finance, quality, statistics, meteorology, ocean, company supervision etc., a major step in enhancing government transparency. The government data open platform will be established before the end of 2018 and is expected to be fully functional in 2020, according to the plan. Existing government data centers and clouds will be integrated to accommodate new big data infrastructure.

The plan encourages basic research in the areas of big data through open innovation. Massive data storage and management software and hardware, big data analytic and mining, data visualization, big-data related operation systems, deep learning and machine learning are identified as the priorities. R&D programs in the priority domains will be supported by the national science and technology programs.

Addressing the shortage of skilled talents in big data, the plan urges universities to establish academic programs in the fields of data science and data engineering. Multidisciplinary talents with thorough understanding of statistical analysis, computer science, economics and management are in urgent demand.

International cooperation under the principle of win-win and equality is encouraged. Incentive policies will be made available to attract international talents in big data to come to China. Chinese companies are encouraged to work with international peers on key technologies and product research and development. Local players are also encouraged to compete internationally and gain global recognition.

In a next step, a legal and policy framework will be established to better regulate data sharing and data protection. Local government will coordinate with central government to incorporate big data industry development into their own regional development plans. Under this framework, government will be pushed to maximize data sharing as long as the risks are under control.
1. Innovation put at core of China's five-year plan

Innovation will be put at core position for China’s development in the five years from 2016, according to a communique released on Thursday following a four-day meeting of the Central Committee of the Communist Party of China (CPC). Leaders of the CPC convened in Beijing on Monday for the Fifth Plenary Session of the 18th CPC Central Committee, to discuss an economic blueprint that will set the direction for the world's second-largest economy over the next five years.

Sectors including science, technology and culture need to be made more innovative, said the communique. The government plans to encourage a system that nurtures innovation and sees better allocation of resources including labor, capital, land, technology and management. China will continue to encourage mass entrepreneurship in the hope that it will lead to new technology, the communique said.

In response to the “new normal” of the plateauing economy, the central government has announced a range of measures for emerging businesses, including financial support, supporting infrastructure and administrative assistance.

From January to September, around 3.16 million new companies were established in China, up 19.3% from a year ago, according to the latest data from the State Administration for Industry and Commerce. In this period, the high-tech sector reported 10.4-percent growth in value-added output, 4.2 percentage points higher than the figure for the whole industrial sector.


2. Smart street lamps in Shanghai offer free WiFi access

The first batch of intelligent street lampposts made their debut in Shanghai on Monday. Not only can the smart lamps adjust their brightness at different times of the night, they can also enable citizens to be better wired to the city.

Fifteen lamps, each 8 meters tall, have been erected along Dagu Road in Jing'an district. Each is equipped with a touch screen and an emergency button. By pressing the button citizens can get immediate access to the city's public service platform which in turn will coordinate the operation with different services.

Other major features include free WiFi access, information inquiry and a charger for electric cars. The features have been selected to offer a public service and safety as well as energy efficiency. The highlight of the project is that it has integrated resources from all parties to bring about cooperation between them, said Lin Tao, deputy director of the 50th Research Institute of China Electronic Technology Group Corporation.

The institute undertook the overall design of the project. According to Lin, the trial is expected to expand into other areas across the city from the first half of next year. Standards such as the structure and function of the lamps as well as locations will be set based on the outcome of the trial.

3. **China plans world's most powerful particle collider**

(China Daily, 29-10-2015)

The first phase of the project’s construction is scheduled to begin between 2020 and 2025 Chinese scientists have completed an initial conceptual design of a super-giant particle collider which will be bigger and more powerful than any particle accelerator on Earth.

"We have completed the initial conceptual design and organized international peer review recently, and the final conceptual design will be completed by the end of 2016," Wang Yifang, director of the Institute of High Energy Physics, Chinese Academy of Sciences, told China Daily in an exclusive interview. The institute has been operating major high-energy physics projects in China, such as the Beijing Electron Positron Collider and the Daya Bay Reactor Neutrino experiment.

Now scientists are proposing a more ambitious new accelerator with seven times the energy level of the Large Hadron Collider in Europe. In July 2012, the European Organization for Nuclear Research, also known as CERN, announced that it had discovered the long sought-after Higgs boson—the "God particle", regarded as the crucial link that could explain why other elementary particles have mass—on LHC.

The discovery was believed to be one of the most important in physics for decades. Scientists are hopeful that it will further explain nature and the universe we live in. While LHC is composed of 27-kilometer-long accelerator chains and detectors buried 100 meters underground at the border of Switzerland and France, scientists only managed to spot hundreds of Higgs boson particles, not enough to learn the structure and other features of the particle. With a circumference of 50 to 100 km, however, the proposed Chinese accelerator Circular Electron Positron Collider (CEPC) will generate millions of Higgs boson particles, allowing a more precise understanding.

"The technical route we chose is different from LHC. While LHC smashes together protons, it generates Higgs particles together with many other particles," Wang said. "The proposed CEPC, however, collides electrons and positrons to create an extremely clean environment that only produces Higgs particles," he said.

The Higgs boson factory is only the first step of the ambitious plan. A second-phase project named SPPC (Super Proton-Proton Collider) is also included in the design—a fully upgraded version of LHC. LHC shut down for upgrading in early 2013 and restarted in June with an almost doubled energy level of 13 TeV, a measurement of electron volts. "LHC is hitting its limits of energy level, it seems not possible to escalate the energy dramatically at the existing facility," Wang said. The proposed SPPC will be a 100 TeV proton-proton collider.

If everything moves forward as proposed, the construction of the first phase project CEPC will start between 2020 and 2025, followed by the second phase in 2040. "China brings to this entire discussion a certain level of newness. They are going to need help, but they have financial muscle and they have ambition," said Nima Arkani Hamed from the Institute for Advanced Study in the United States, who joined the force to promote CEPC in the world.

David J. Gross, a US particle physicist and 2004 Nobel Prize winner, wrote in a commentary co-signed by US theoretical physicist Edward Witten that although the cost of the project would be great, the benefits would also be great. "China would leap to a leadership position in an important frontier area of basic science," he wrote.

Gerard’t Hooft, winner of the Nobel Prize in Physics in 1999, said in an earlier interview to Doha-based broadcaster Al Jazeera that the proposed collider, if built, "will bring hundreds, probably thousands, of top class scientists with different specializations, from pure theory to experimental physics and engineering, from abroad to China".

(http://www.chinadaily.com.cn/china/2015-10/29/content_22304147.htm)
4. **Stem cell breakthrough on mice ‘reverses Alzheimer’s’: Chinese scientists in breakthrough experiment**

(SCMP, 31-10-2015)

In a groundbreaking experiment, Chinese scientists have used human embryonic stem cells to nurse back to health mice afflicted with Alzheimer’s disease. A team in Shanghai found that by transplanting neurons derived from the cells into the rodents they could reverse their cognitive degeneration.

The breakthrough showed for the first time a practical method to rejuvenate an ageing brain with a fertilized egg, and paved the way for the eventual application of the method to human patients, the researchers said.

Alzheimer’s is a neurodegenerative disorder that affects tens of millions of people. It causes a general decline in brain activity, characterized by memory loss and difficulty in speaking, due to neuron damage in the brain. Scientists have spent decades searching for a way to reverse such neuron damage.

Previous studies have suggested Alzheimer’s involved too many types of neurons and molecular mechanisms to be treated with stem-cell therapy. Many researchers have regarded stem-cell therapy as too limited and able only to repair very specific types of neurons.

“Stem-cell treatment would offer no cure for Alzheimer’s – that was the impression of many people, including us before the experiment,” said Professor Jing Naihe, lead scientist of the study with the Shanghai Institutes for Biological Sciences, part of the Chinese Academy of Sciences.

But in a paper in Stem Cell Reports, Jing and colleagues reported “encouraging” findings. Jing’s team used proteins as “lures” to trigger the transformation of the human stem cells into neurons, then transplanted these into the rodents. About 60% of the human neurons were identified as alien and killed by the rodents’ immune systems, but the rest survived and repaired the damaged regions in their brains. Mice treated with the method were “comparable” to normal mice in performing cognitive tasks two months after the treatment, and showed steady improvement in memory tests. “These results indicate the cognitive deficiency of Alzheimer’s disease in mice can be reversed,” they added.

The cells were collected from fertilized human eggs under the guidelines of ethics authorities. “We used human embryonic stem cells because this method will eventually be used on humans. If the human neurons can get a footing and grow in the brain of a mouse, the chance is high the effect will be even better on a human host,” Jing said. “The biggest concern of this development is safety. We were afraid that the transplanted cells would mutate to other types of neurons or even cause brain tumors,” Jing said. “We have been improving the technology and making close observation of the mice for more than seven years. So far no mutation or cancerous development has been detected,” he added.

But he said it was too early to use the method on humans. “Mice are still very different from humans, so the results on mice do not guarantee the same success on human patients. Our next step is to test the method on primates. “It will probably be a long time before clinical trials can be carried out on human volunteers,” he added.

5. **Ebola vaccine tested in W. Africa**

(China Daily, 13-10-2015)

China's first homegrown vaccine against Ebola has entered its second phase in a clinical trial in Sierra Leone in West Africa, marking a breakthrough in overseas testing of Chinese-developed vaccines.

Chen Wei, a researcher at the Institute of Microbiology and Epidemiology of the Academy of Military Medical Sciences, said on Monday that dozens of volunteers recruited from among local people had been given the shots to test the vaccine's safety and effectiveness. Her team developed the vaccine against the deadly virus with partner Tianjin CanSino Biotechnology. The ongoing trial in Africa followed the first phase of testing, which was conducted in China using Chinese and African volunteers, she said.

To bring the trial to Africa, the team went through rigorous reviews of intellectual property rights, technology and ethics, and over the weekend the team was given approval by authorities in Sierra Leone to conduct the trial, Chen said. "The trial in Africa also helps China gain knowledge and useful experience for future medical cooperation in a global context," she said. She didn't give a timetable for the trial, saying that "depends on the volunteer recruitment as well." "The volunteer recruitment is still underway and is running smoothly, since the local people are friendly to Chinese," she added.

Since March last year, Ebola has infected 28,000 people and killed at least 11,300 in an outbreak mainly in West Africa, including Sierra Leone, according to the World Health Organization. It is now considered to be under control.

The vaccine is in the form of a freeze-dried powder that will be stable for at least two weeks in temperatures of up to 37 degrees Celsius. This will make it suitable for the tropical West Africa region and for large-scale production, according to a report based on a review by 17 experts, Xinhua News Agency reported.

China is the third country to put an Ebola vaccine into clinical trials following the United States and Canada. The Chinese drug has obvious advantages compared with the other vaccines in the clinical phase, the report said. The other vaccines are based on a gene type from the 1976 outbreak and are in liquid form and must be stored at minus 80 degrees Celsius, it added.

(http://www.chinadaily.com.cn/china/2015-10/13/content_22168435.htm)

6. **COMAC developing wide-body jetliner**

(China Daily, 27-10-2015)

China has begun to develop its C929 wide-body jetliner as its predecessor, the C919 narrow-body airliner, is about to make its first test flight, according to aviation industry insiders.

Commercial Aircraft Corp of China, developer of the nation's large civil aircraft, is working on key technologies that will be used on the C929, Wang Jian, chairman of AVIC Electromechanical Systems Co, a subsidiary of Aviation Industry Corp of China, said at an industry forum on civil aircraft electromechanical systems that concluded on Friday in Nanjing, Jiangsu province.

Wang did not specify what those technologies were but said the aircraft will be capable of carrying more than 300 passengers. Earlier reports had said that the C929 will be equipped with domestically developed engines and aims to compete with the Boeing 777, the world's largest wide-body, twin-engine jetliner.

Wang's remarks were echoed by Alan Jones, president and CEO of Aviage Systems, a joint venture of General Electric and Aviation Industry Corp of China that provides avionics systems for the C919 project. "COMAC has invited my company to take part in the bidding for the C929's avionics equipment, and I..."
believe that will be very competitive bidding. Most of the top-tier manufacturers of avionics systems will be eyeing a contract," he said.

COMAC is expected to distribute a request for proposals for the C929 project to suppliers in 2016 and then sign a letter of intent with its chosen partners in 2017, Jones said. COMAC is currently preparing for the first test flight of the C919, set for the third quarter of next year, though it's also possible that the test will be postponed to 2017 because of technical uncertainties, Wang said.

Launched in 2008, the C919 project is China's attempt to break the Airbus-Boeing duopoly. The plane is set to compete against the Airbus A320, the Boeing 737 and Russia's Irkut MS-21. It will be able to carry up to 168 passengers and will have a maximum range of about 5,500 kilometers, according to COMAC.

The first prototype of the C919, to be used for test flights, will roll off the assembly line on Nov 2 at COMAC's Shanghai factory, Wang said. It will take months of static testing on the ground before it will be tested in flight.

(http://www.chinadaily.com.cn/china/2015-10/27/content_22292478.htm)

7. **China to set up civil satellite systems by 2020**

(China Daily, 29-10-2015)

China aims to finish building satellite systems for remote sensing, communications and navigation before 2020, a national plan showed Thursday. The three satellite systems should be able to provide continuous and stable service, according to the plan for long-term development of civil space infrastructure posted on the website of the National Development and Reform Commission, the top economic planner.

In the next decade, China will build civil space infrastructure featuring cutting-edge technology, independent development and control, and reasonable distribution and global coverage, the plan said. The three systems should meet demands for different industries and regions to support China's modernization drive, ensure national security and improve people's lives, it said. Through the combined use of satellites from different systems or constellations, the country should be able to provide diversified, high-quality and reliable services to different industries.

For remote-sensing satellite systems, the priority should be on development of land, ocean and atmospheric observation satellites with seven different satellite constellations, the plan showed. The system will meet the demands of various fields, including monitoring land and ocean resources, environmental protection, disaster relief, traffic, agriculture and weather forecasts. The communications satellite system will be used for broadband Internet, mobile telecommunications and live television broadcasts.

China will improve the service capabilities of its Beidou Navigation Satellite System, a domestic alternative to U.S.-operated GPS, the plan added. By 2020, China will set up a complete Beidou system consisting of 35 satellites, which will provide global coverage with positioning accuracy of less than 10 meters and timing accuracy of 20 nanoseconds.

The country will also improve research to catch up with world-class technology and promote the use of domestic satellite systems.

(http://www.chinadaily.com.cn/china/2015-10/29/content_22311915.htm)
**Collaboration Opportunities**

**Big Data for Smart Ideas – swissnexDay’15**
Date: December 15
Place: Shanghai
Contact: swissnex China

**St. Gallen Symposium – Beijing Reception**
Date: December 9
Place: Beijing
Contact: swissnex China