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Science, Technology and Education Section
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Science, Technology, Education and Health News from China

Number 135 – September 2015

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Introduction

The story of the month reports the latest science and technology development implementation plan of China. In research, EU and China will launch a mega-size co-funding mechanism. China launches new long march rocket with 20 satellites aboard. Tsinghua Holdings plans USD 78.4 million for tech transfer. China Issues guideline for big data promotion with Guizhou being the first pilot city. China aims to land Chang'e-4 probe on far side of moon. China set to launch "hack-proof" quantum communication network. In health, China announces stem-cell rules.

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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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¹ Please click on the blue texts to activate the hyperlinks to either email addresses or related websites.

Story of the Month

China Announces Implementation Plan to Deepen Reforms on S&T Governance

General Office of the Central Committee of CPC and the General Office of the State Council jointly announce an implementation plan to deepen reforms on science and technology governance, aiming to create more incentives for academics, inventors and investors to innovate.

Building on various guidelines concerning science and technology governance issued by the State Council and relevant ministries in 2014 – 2015, the implementation plan gives an overview of key reform areas: **private industry R&D, support high-tech startups, support academia entrepreneurship, reform research institutes and universities, new evaluation and incentive system for researchers, better tech-transfer and commercialization system, better financing environment for SMEs, further opening up industries for global participation, better management of research fund and better IPR protection.**

In the area of **international collaboration**, closer ties are expected in research and academic collaboration, global talent flow and cross-border investment on innovation. According to the plan, foreign researchers will have the possibility to join or even lead Chinese research programs. Senior management job vacancies at universities and research institutes will also be opened globally. In basic research and topics of global concern, China will initiate more large science projects and infrastructure to stimulate more collaboration with international research institutes. China plans to enter into innovation dialogue with developed countries of which industry dialogue on R&D collaboration, standard setting, IPR, cross-border M&A is a priority. To facilitate all envisioned collaboration and to attract more global talents, China will offer more flexibility on work and residence permit for qualified professionals and their families. It also encourages more joint venture HR agencies to hunt top minds globally. To encourage academic exchange, the Chinese government is also prepared to loosen its current scrutiny on researchers' business trips abroad.

Responding to Premier Li Keqiang's call for mass entrepreneurship and mass innovation, the implementation plan calls for stronger role of the **capital market** in financing innovative small and medium enterprises. China plans to set up a number of government-led investment fund to support high technology startups. Regulations and incentive policies on angel investment, VC and PE will be introduced. In addition to measures at home, **foreign direct investment in local startups** and **Chinese direct investment in innovative resources abroad** are also listed as desirable ways of collaboration. Foreign currency reserve will be mobilized to setup overseas innovation investment fund in partnership with Chinese financial institutions. Listed companies are also encouraged to invest in overseas innovative projects.

Technology transfer and commercialization is another priority of the implementation plan. Incentives for successful commercialization has been increased dramatically (from no less than 20% of the revenue to no less than 50% of the revenue) to mobilize researchers. Research institutes and universities now have full autonomy over their research accomplishments and its financial benefits which used to be considered national assets. Patents from public-funded research accomplishments that are not licensed within a certain time period will be open to the public. Research institutes and universities will be pushed to set up professional technology transfer service teams to help facilitate the transfer process.

An earlier policy document published on 7th of September by the two general offices has identified a few cities and areas as pilot zones for "comprehensive innovation reform". **Beijing-Tianjin-Hebei region, Shanghai, Guangdong Province, Anhui Province, Sichuan Province, Wuhan, Xi'an and Shenyang** have been selected.



News

1. EU and China Launch New Co-Funding Mechanism for Research and Innovation

(EU, 07-09-2015)

The high level "Joint Conference in Promoting Excellence through Enhanced EU-China Researcher's Mobility and Cooperation" promoted a new Co-funding mechanism for research and innovation. The conference was attended by European Commissioner for Research, Science and Innovation Mr. Carlos Moedas who is visiting China accompanied by Mr. Jean Pierre Bourguignon, President of the European Research Council, and Ms. Nuria Sebastian Galles, Vice President of the European Research Council.

The co-funding mechanism is established by the Ministry of Science and Technology on the Chinese side and the European Commission Directorate General for Research and Innovation on the EU side with funding resources on each side. To implement the co-funding mechanism (CFM) highlighted in the Joint Statement of the 17th EU-China Summit, building on Horizon 2020 on the EU side and relevant research and innovation programmes on the Chinese side, during the period from 2016 to 2020, the European Commission expects to continue spending over 100 million Euros per year for the benefit of Europe-based entities in joint projects under H2020 with Chinese participants. China will match corresponding resources and expects to spend 200 million RMB per year for the benefit of Chinese based entities that will participate in joint projects with European ones under Horizon 2020.

The co-funding mechanism aims to support joint research and innovation activities on topics in strategic areas of common interest and mutual benefit, such as food, agriculture, biotechnology, green transport – including aviation –, sustainable urbanization, information and communication technologies, energy, health and mobility of young researchers.

In their bilateral meeting on 7 September in Beijing, Commissioner Moedas and his Chinese counterpart Mr. Wan Gang, Minister for Science and Technology, expressed their strong commitment to the strategic importance of deepened cooperation to address global challenges. Minister Wan Gang said: "Cooperation in S&T forms a vital part of the comprehensive EU-China relationship and science and innovation fuels economic growth and social development." Commissioner Moedas stated that "the establishment of the co-funding mechanism will have a major impact on the EU-China strategic partnership, in which cooperation in research and innovation has now become a significant component."

Also during the Joint Conference, the recent agreement between the European Research Council (ERC) and the National Natural Science Foundation of China (NSFC) was discussed. This agreement, signed in the margins of the 17th EU-China Summit on 29 June 2015 in Brussels, will stimulate excellence-based, bottom-up collaboration in frontier research by facilitating that high-calibre Chinese researchers come to Europe to join ERC-funded research teams.

(<https://ec.europa.eu/research/index.cfm?pg=newsalert&year=2015&na=na-070915>)

2. China Launches New Workhorse "Long March" Rocket with 20 Micro Satellites Aboard

(SCMP, 20-09-2015)

China on September 20th (Sunday) launched a new, smaller type of rocket from its "Long March" family which will be primarily used for carrying satellites aloft, state media reported, as the country races ahead with an ambitious space programme.

The Long March 6, a newly developed carrier rocket which uses liquid propellant, took off from a launch base in Shanxi province carrying 20 "micro" satellites, Xinhua said. The white rocket, imprinted with the Chinese flag at the top, climbed into bluish-grey skies, footage aired by CCTV showed.

One official suggested the smaller rocket would make China more competitive in the lucrative market for commercial satellite launches. "We believe it will greatly boost the competitiveness of Chinese carrier rockets in the international market," Zhang Weidong, chief designer at the Shanghai Academy of Spaceflight Technology, told Xinhua. "The new model will also significantly improve our ability to access space."

China is launching its own satellites as it continues to build a home-grown navigation system, but also carries out launches for other countries and commercial companies.

The rocket was 29.3 metres high, shorter than others actively used in China's space programme, reports said. Long March 6 uses fuel composed of liquid oxygen and kerosene, which is said to be free of toxicity and pollution.

State media hailed the achievement, saying the launch marked a record for the number of satellites carried by a Chinese rocket and its first time for the "environmentally-friendly" fuel.

The small satellites would be used for "experiments" in technology and new products, CCTV said, but gave no details. China's space programme, which has potential military applications, is shrouded in secrecy.

"The separation control for 20 satellites required high accuracy, precision and reliability," Hao Yaofeng, a technician at the Taiyuan Satellite Launch Centre, told CCTV.

A 2011 policy paper issued by the State Council, or cabinet, said the Long March 6 would be capable of placing a tonne of payload into orbit at a height of 700 kilometres. State media publicly announced plans for the Long March 6 in 2009, but said at the time the first launch was scheduled for 2013.

(<http://www.scmp.com/news/china/diplomacy-defence/article/1859957/china-launches-new-workhorse-long-march-rocket-20-micro>)

3. Tsinghua Holdings Plans USD 78.4 Million Fund to Aid Tech Transfer

(*China Daily*, 11-09-2015)

Tsinghua Holdings, a technology conglomerate backed by Tsinghua University, is setting up China's first technology transfer fund with an initial investment of 500 million yuan (\$78.42 million) to foster innovation in the high-tech sector.

The fund will invest in research and development projects, including medical and electronic technology, that can transfer scientific achievements into business projects, Xu Jinghong, chairman of Tsinghua Holdings, told *China Daily* on Wednesday.

The company, with total assets of about 170 billion yuan by June, plans to accelerate cooperation with global technology giants, including Facebook Inc, to expand its overseas presence.

"We are considering various cooperation models like equity investment, joint development of projects or undertaking their business in the Chinese market," said Xu. He told *China Daily* last month that the company plans to invest at least 30 billion yuan for developing mobile chip technology. "Mergers and acquisitions will help strengthen our technology research capabilities. But that is not what we are looking for. We want to enhance technology research after the M&A process or even develop independent research and development capabilities."

Xu shared his views after he joined a conversation with Premier Li Keqiang at the Annual Meeting of New Champions, hosted by the World Economic Forum in Dalian, Liaoning province.



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"I have confidence that China will see stable and healthy growth in the next few years, with high-tech industries seeing even faster development," said Xu.

During the first six months, when the country's economic growth slowed to 7 percent from 7.4 percent in 2014, Tsinghua Holdings' profit increased 50 percent year-on-year. Its total assets rose to 170 billion yuan during the period under review, from 140 billion yuan in 2014.

"Innovation will help companies adapt to the economic 'new normal' and achieve smooth transition," Xu said.

The company is also planning to establish business incubators in South Korea, to support new startups and accelerate technology cooperation with local firms. It manages two business incubators—Tpark and Innospring, in Silicon Valley, the United States.

The company also cooperates with Spanish telecom giant Telefonica SA on high-tech development.

"The deepening global economic integration is expected to get a further fillip with the development of Internet technologies. It is an ideal environment for the company to expand in the international markets," said Xu.

Tsinghua Holdings, a State-owned company funded by Tsinghua University, has a registered capital of 2 billion yuan. It controls shares of listed companies including Tongfang Co Ltd, Chengzhi Shareholding Co Ltd and Unispelendour Co Ltd.

(http://www.chinadaily.com.cn/business/2015-09/11/content_21842440.htm)

4. China Issues Guideline for Big Data Promotion, Guizhou as First Pilot Zone

(Xinhua, 05-09-2015)

The State Council, China's cabinet, has issued guidelines to boost the development of big data, an official statement said on September 5th.

The action framework for promoting big data, ratified by Premier Li Keqiang, aims to forge a new model for social governance in the coming five to 10 years, highlighting accurate management and multi-dimensional cooperation.

It stipulates that a trans-departmental data sharing platform should be formed by the end of 2017 and a unified platform for governmental data should be established before the end of 2018, which allows citizens to get access to public data resources including credit, transport, public health, employment, culture, education, science, agriculture, finance and weather service.

China should accelerate the opening and sharing of government data to promote the integration of resources and improve governance, boost industrial innovation and foster new business patterns to support economic restructuring.

To this end, the government will set up an overall coordination mechanism for big data development and application, speed up the establishment of relevant rules, and encourage cooperation between the government, enterprises and institutions, according to the statement.

China aimed to cultivate a batch of international competitive brands in big data industry, 10 world leading enterprises and 500 firms focused on big data application, service and manufacturing.

On September 18, China launched its first big data pilot zone in the southwestern province of Guizhou.



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The mountainous Guizhou Province, one of the least developed regions in China, has become a pioneer in China's big data development due to a moderate climate, sufficient power supply and good network infrastructure.

Guizhou's visibility has been rising in China's big data scene as a number of heavyweight mobile network operators, including China Telecom, China Unicom and China Mobile, as well as Internet giants, including Alibaba and Tencent, have moved into the province's Gui'an New District since 2013 to establish cloud computing bases and big data centers.

As a pilot zone, Guizhou will build Guizhou on the Cloud, a platform for provincial government data to be pooled, shared and exchanged. The platform will cover data from city- and county-level governments by the end of next year, said Chen Gang, Party secretary of Guiyang City, the provincial capital.

"Oriental Cloud," an application that collects information on satellite remote sensing, topography and weather through cloud services to forecast precipitation and optimize reservoir operations, is expected to be used by nearly half of China's water conservancy facilities, according to Yu Linmei, an executive of Guizhou East Century Technology Co. Ltd.

"Governments are most capable of data integration," said Wang Jiangping, deputy provincial governor, adding that building Guizhou on the Cloud will start with integration of government data and then spread to private data.

The sharing, exchange and use of big data also leads to concerns about protection of intellectual property and privacy, said Wang.

Guizhou was the first provincial-level region in the country to pass a regulation on information infrastructure construction in May 2014. It will explore legislation on big data in the future, said Wang.

(http://www.chinadaily.com.cn/china/2015-09/06/content_21792891.htm)
And (http://www.chinadailyasia.com/nation/2015-09/18/content_15318965.html)

5. China Aims to Land Chang'e-4 Probe on Far Side of Moon

(CAS, 09-09-2015)

China is planning to be the first country to land a lunar probe on the far side of the moon, a Chinese lunar probe scientist said on September 9th.

The mission will be carried out by Chang'e-4, a backup probe for Chang'e-3, and is slated to be launched before 2020, said Zou Yongliao from the moon exploration department under the Chinese Academy of Sciences at a deep-space exploration forum Tuesday.

Zou said government organs have ordered experts to assess the plan over the past 12 plus months. "China will be the first to complete the task if it is successful."

The State Administration of Science, Technology and Industry for National Defense announced earlier this year that Chang'e-4 will be launched before 2020.

The far side of the moon, or "dark side of the moon" as it is more commonly called, is never visible to Earth because of gravitational forces. According to Zou, the far side of the moon has a clean electromagnetic environment, which provides an ideal field for low frequency radio study. "If we can place a frequency spectrograph on the far side, we can fill a void."

Zou said Chang'e-4 is very similar to Chang'e-3 in structure but can handle more payload. It will be used to study the geological conditions of the dark side of the moon.



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China plans to launch its Chang'e-5 lunar probe around 2017 to finish the last chapter in China's three-step (orbiting, landing and return) moon exploration program.

Li Chunlai, one of the main designers of the lunar probe ground application system, said Chang'e-5 will achieve several breakthroughs, including automatic sampling, ascending from the moon without a launch site and an unmanned docking 400,000 kilometers above the lunar surface.

Chang'e-5 will also have a new launch site and launch rockets, said Li.

Chang'e-3 landed on the moon in 2013, making China the third country after the Soviet Union and the United States to soft land a spacecraft on lunar soil. (Xinhua)

(http://english.cas.cn/newsroom/news/201509/t20150909_152152.shtml)

6. China Announces Stem-cell Rules

(Nature, 31-08-2015)

Chinese stem-cell scientists have welcomed long-awaited measures that, state media claim, will rein in rogue use of stem cells in clinics while allowing research.

The measures — announced on 21 August by China's National Health and Family Planning Commission through state media — offer a straightforward path towards clinical studies, researchers told *Nature*. But some also warn that the measures do not have the teeth needed to stop clinics offering unproven and unapproved treatments.

For years, clinics around China have been ignoring government regulations and warnings from the scientific community, offering desperate patients costly and, according to experts, probably ineffective treatments. These were often labelled as clinical trials as a cover to charge patients. Other countries have experienced similar problems.

In January 2012, the government took stock of the situation. It implemented a ban on unapproved stem-cell therapies and a temporary moratorium on new clinical trials, promising to establish a clear framework for future trials. Since then, however, many rogue stem-cell clinics have continued to operate, while stem-cell scientists with valid research agendas have waited for a way to move forward.

Many scientists have been itching to get started.

Qi Zhou, a stem-cell and cloning scientist at the Chinese Academy of Sciences (CAS) Institute of Zoology in Beijing, has been waiting for the guidelines so he can move his research from animal models to humans. In unpublished work, his team has already implanted dopamine-producing neurons derived from stem cells into monkeys that have been chemically induced to show symptoms similar to those of Parkinson's disease. The monkeys have shown some improvement, and he now hopes to try the treatment on humans. "I think it's time, time to start doing some clinical research," he says.

Jianwu Dai, a regenerative-medicine specialist at the CAS Institute of Genetics and Developmental Biology in Beijing, hopes to implant a small collagen scaffold seeded with stem cells into humans to try to repair spinal-cord injuries. His team has treated some 25 people using the scaffold seeded with mononuclear cells, a type of blood cell taken from bone marrow, and Dai says he has seen some improvements. But he thinks that neural stem cells derived from embryonic stem cells will deliver better results.

The new measures outline requirements for such studies, including obtaining patients' informed consent and using clinical-grade stem cells that have been approved by an independent body. They say that stem-cell clinical studies can be carried out only at authorized hospitals, and they forbid the hospitals from charging recipients or advertising. Researchers who want to do pilot studies, such as Zhou and Dai, will



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need to register with the health ministry with documentation showing that there are sufficient animal studies to support trials in humans and that they are using certified cell lines verified by independent evaluation.

The penalties for breaking the rules are not yet clear, although a senior health-ministry official has pledged to use them to clean up the stem-cell field in China.

Zhou does worry that rogue clinics will continue to offer completely untested treatments. "Some hospitals, some companies won't care. They do what they want," he says.

Douglas Sipp, who researches stem-cell policy at the RIKEN Center for Developmental Biology in Kobe, Japan, says that the mechanism laid out for clinical studies looks pretty similar to those in other countries, and more rigorous than some. But he worries that the measures might not apply to military hospitals, or to private clinics affiliated with military hospitals, which have in the past fallen outside health-ministry jurisdiction in China.

"In principle, I applaud any efforts to rein in practice of predatory clinics that take advantage of patients. But the fact that these new rules do not appear to have penalties leaves open the question of how effective they will be," says Sipp. "I have seen China crack down on stem-cell clinics at least twice in the past, and the results were inconclusive."

(<http://www.nature.com/news/china-announces-stem-cell-rules-1.18252>)

7. China Set to Launch "Hack Proof" Quantum Communications Network

(Xinhua, 31-08-2015)

China is set to complete the installation of the world's longest quantum communication network stretching 2,000km (1,240miles) from Beijing to Shanghai by 2016, say scientists leading the project. Quantum communications technology is considered to be "unhackable" and allows data to be transferred at the speed of light.

By 2030, the Chinese network would be extended worldwide, the *South China Morning Post* reported. It would make the country the first major power to publish a detailed schedule to put the technology into extensive, large-scale use.

The development of quantum communications technology has accelerated in the last five years. The technology works by two people sharing a message which is encrypted by a secret key made up of quantum particles, such as polarized photons. If a third person tries to intercept the photons by copying the secret key as it travels through the network, then the eavesdropper will be revealed by virtue of the laws of quantum mechanics – which dictate that the act of interfering with the network affects the behaviour of the key in an unpredictable manner.

If all goes to schedule, China would be the first country to put a quantum communications satellite in orbit, said Wang Jianyu, deputy director of the China Academy of Science's (CAS) Shanghai branch. At a recent conference on quantum science in Shanghai, Wang said scientists from CAS and other institutions have completed major research and development tasks for launching the satellite equipped with quantum communications gear, *South China Morning Post* said.

The potential success of the satellite was confirmed by China's leading quantum communications scientist, Pan Jianwei, a CAS academic who is also a professor of quantum physics at the University of Science and Technology of China (USTC) in Hefei, in the eastern province of Anhui. Pan said researchers reported significant progress on systems development after conducting experiments at a test center in the northwest of China.

The satellite would be used to transmit encoded data through a method called quantum key distribution (QKD), which relies on cryptographic keys transmitted via light pulse signals. QKD is said to be nearly impossible to hack, since any attempted eavesdropping would change the quantum states and thus could be quickly detected by dataflow monitors.

It's likely the technology initially will be used to transmit sensitive diplomatic, government policy and military information. Future applications could include secure transmissions of personal and financial data, Xinhua reported.

Governments in Europe, Japan and Canada are about to launch their own quantum communication satellite projects and a private company in the US has been seeking funding from the federal government with a proposal for a 10,000km network linking major cities. The Beijing to Shanghai project was launched last year. Although the Chinese government has not revealed the projects budget, scientists told state media that the construction cost would be ¥100m (£10.17m) for every 10,000 users, according to the South China Morning Post. (International Business Times)

(<http://www.scmp.com/news/china/article/1631479/china-launch-hack-proof-quantum-communication-network-2016?page=all>)

(Collaborating Opportunities)

Venture Leaders China

Date: October 20 – 30

Place: Beijing, Shanghai, Shenzhen

Contact: swissnex China

Global Pitchfest

Date: October 26

Place: Shanghai

Contact: swissnex China

All Swiss University Alumni Gathering

Date: October

Place: Beijing, Shanghai

Contact: swissnex China