

# Science, Technology, Education and Health News from China

## Number 127 – January 2015

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### Introduction

The story of the month covers Ministry of Science and Technology announced a key reform in China's research landscape. In science and technology, China plans to build smog-dispersing labs around Beijing. The central government of China aims to streamline administration of scientific programs and encourage innovation. China is seeking to boost its soft power by developing "a new type of think tank with Chinese characteristics". Chinese scientists construct first Mycobacterium Tuberculosis proteome microarray. Europe and China are planning a joint robotic space mission for launch in 2021. The State Council, China's cabinet, issued guidance on development of cloud computing. Critics pounce on China's top science prize 2014. In education, a survey conducted by Ministry of Education demonstrates that science graduates earn most in China.

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

## Story of the Month

The Ministry of Science and Technology has announced a key reform in China's research landscape that will fundamentally change some 100 competitive research funding schemes currently being managed by nearly 40 ministries and government departments. More than 50% of the state research expenditure will be affected by the reform. The rest are stable funding to cover operational costs of academies and state key laboratories. Allocating and administering research grants will no longer be a government responsibility. Funding schemes have plunged to 5 and are to be implemented on one online portal, administered by non-governmental agencies.

The current **National Natural Science Fund** will continue to fund basic research and frontier research, and to support career development of researchers and research teams. The **National Science and Technology Major Projects**, currently managed by the Ministry of Science and Technology, Ministry of Finance and National Development and Reform Commission remain as an instrument to fund targeted research mandated by government, such as GMO product development, aviation program, space program, marine exploration program, etc, as mapped out in the 2006 – 2020 Medium and Long Term Science and Technology Development Plan<sup>2</sup>. The new **Key National Research and Development Programs** will fund market-oriented basic, applied and technological research projects in priority areas pre-assigned by the government. The program will integrate the current national high-tech development program ("863" program), national basic research program ("973" program), all international cooperation funds and various research grants managed by different ministries aiming to accelerate the "RD&D (research, development and demonstration)" cycle and to improve knowledge and technology transfer. It is not yet clear how international cooperation projects will be integrated. The new **Technological Innovation Fund** will integrate existing governmental financial schemes supporting technology startups and SME R&D activities. The fund also aims to expose SMEs to broader businesses of angel investment, venture capital and credit guarantee schemes in order to further stimulate the role of financial market in innovation. The **Infrastructure and Talent Programs** fund research facilities and provide stable supports to outstanding researchers. Existing infrastructure / equipment and talent grants managed separately by MOST and NDRC will merge to become the new program.

**An inter-ministerial board** has been created as the main coordination and decision-making body for reviewing S&T development plans, defining priorities areas for each of the funding schemes and accrediting administrators of each research funds. MOST chairs the board and coordinates between participating ministries, including Ministry of Finance, NDRC, etc. The board reports directly to the State Council.

A **National Science and Technology Management System** will serve as the portal to manage all calls, reviews, status update and final evaluation of all funding schemes. A central information system optimizes application process, improves transparency, and mitigates risks of repetitive funding and corruption. The system also promotes research integrity by enabling track-records of research misconduct. Proposal evaluation responsibilities will be outsourced to "professional, third-party organizations" on a competitive basis. The first step is to privatize existing project management organizations affiliated to MOST, e.g. the InnoFund Management Center, the High-tech Research and Development Center into such professional organizations. Future bidding will also be open to private project management firms.

A **strategy consulting and comprehensive review committee** is also established as the advisory group to the inter-ministerial board and the project management organizations. Experts from both academia and industry will sit in the committee to advise inter-ministerial board on development planning, priority-setting and administrative procedures of funding schemes. The committee also reviews proposals for very large and highly important research projects.

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<sup>2</sup> National S&T Medium and Long Term Development Plan 2006 – 2020 (in Chinese):  
<http://www.most.gov.cn/kjgh/kjghzcq/>

## News

### 1. Science graduates earn most in China: Report

*(Xinhua, 06-01-2015)*

New college graduates with degrees in science and technology services are receiving higher starting salaries than their peers in China, according to a survey by the Ministry of Education.

The monthly average starting salary of college graduates was 3,412 yuan (about 568 U.S. dollars) in 2014, with 68.21 percent of the surveyed students responding they were satisfied with the salary offered for their first jobs, according to Yang Xiaohui, chief researcher of the program.

The study surveyed 202,350 new graduates from 14 Chinese cities.

Among them, those who studied science and technology services earned the highest salary, or 4,674 yuan (748 U.S. dollars) a month on average. The average starting salary for economics majors was 3,908 yuan (625.3 U.S. dollars).

The report also showed that Beijing offered the highest average monthly pay for the new job seekers at 4,338 yuan (694 U.S. dollars), which was followed by 4,226 yuan (676.1 U.S. dollars) in Shanghai and 3,930 yuan (629.2 U.S. dollars) in south China's Guangdong Province.

Yang said job location, salary level and employers' reputation are the three most considered factors for new college graduates in looking for their first jobs.

China's employment situation is still "tough", said Chinese Premier Li Keqiang in his government work report delivered to the country's top legislature in March 2014.

The country is expected to see 7.49 million people graduate from college in 2015, the largest ever, a year on year increase of 3 percent. Helping them find a job will be a tremendous challenge.

In December 2014, education minister Yuan Guiren asked universities and colleges to give more consideration to employment when making admission plans.

He also urged colleges to strengthen education of students on innovation and starting a business, allowing students to suspend from school to start their own businesses.

[http://news.xinhuanet.com/english/china/2015-01/06/c\\_133900376.htm](http://news.xinhuanet.com/english/china/2015-01/06/c_133900376.htm)

### 2. China to build smog-dispersing labs around Beijing

*(China daily, 13-01-2015)*

National-level weather modification laboratories will be built in areas around Beijing, according to a plan released by the National Development and Reform Commission, China's top economic body, and the China Meteorological Administration.

The National Development Plan on Weather Modification 2014-2020 says research on aerosol, cloud, fog, precipitation and weather alteration would be conducted, Beijing News reports.

These national-level laboratories would also provide technological support in creating artificial rain to help battle China's smog problem.

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By 2020, the country would have developed sophisticated weather modification systems capable of increasing artificial rainfall and snowfall, with added water of more than 60 billion cubic meters annually.

The plan states that smog poses a huge threat to human health, transportation as well as the urban environment and greatly influences production activities, alongside the daily lives of common people.

However, one expert said that artificial rainfall is hard to achieve during bouts of heavy smog because weather conditions are relatively stable during that time.

It is also unknown how much rain would be needed to dispel smog as previous research focused on artificial rain to relieve drought conditions or increase water resources, it was added.

[http://www.chinadaily.com.cn/china/2015-01/13/content\\_19309656.htm](http://www.chinadaily.com.cn/china/2015-01/13/content_19309656.htm)

### 3. China's Quest for Global Influence - Through Think Tanks

*(The diplomat, 22-01-2015)*

China is seeking to boost its soft power by developing “a new type of think tank with Chinese characteristics,” Xinhua reported on Jan. 20, citing new guidelines from the Chinese Communist Party’s Central Committee and the State Council. The main goal is to have “several think tanks wielding major global influence” by 2020.

How do China’s think tanks rank so far? The Think Tanks and Civil Societies Program (TTCSP) at the University of Pennsylvania provides an annual ranking of over 6,500 think tanks worldwide. According to their 2013 report, the U.S. accounted for three of the top five think tanks worldwide (with the other two being located in the U.K. and Sweden) and six of the top ten. China, meanwhile, has its top-ranked think tank, the Chinese Academy of Social Sciences, ranked 20th in the world.

Overall, China has only three think tanks in the top 50 worldwide (in addition to CASS, the Chinese Institute of International Studies comes in at 36 and the China Institutes of Contemporary International Relations ranks 44th). Again, that’s the same number the U.S. has in the top five. Even when the category is restricted to “think tanks in China, India, Japan, and the Republic of Korea,” China’s CIIS and CASS lose out to the Korea Development Institute and the Japan Institute of International Affairs.

Small wonder, then, that Beijing is seeking to boost the international prestige of its think tanks. China has long sought soft power commensurate with its growing economic and political clout. Think tanks are important both as a measure of soft power and as a channel for increasing global influence. As the newly released CCP guidelines state, “Think tanks are an important carrier of national soft power; they are becoming an increasingly important factor in international competition and have an irreplaceable role in international relations.” Yet in China, the guidelines continue, “There are no high-end think tanks with major influence and global prestige; research results are limited; resources are not appropriately allocated and there are few prominent leading figures.”

China’s prescription encourages specialization, with the hopes that will allow more think tanks to make the transition to “high end think tanks.” The CCP is particularly interested in “strategic issues and public policies,” according to Xinhua.

Beijing also tells think tanks to increase global interactions, by inviting foreign experts to join Chinese research institutions and also by increasing international cooperation with other think tanks, including establishing branches of Chinese institutions in other countries. That’s an interesting recommendation, considering China’s disciplinary watchdog accused CASS of being “infiltrated by foreign forces” 10 June 2014. Such accusations may make other Chinese think tanks reconsider programs that call for increased

foreign exchanges. China will need to clear up its mixed messaging here before the plan can be implemented.

In remodeling its think tanks, China is not just seeking increased global influence, although that's clearly a major goal. Beijing also wants Chinese think tanks to support "the Party and government in making policy and decisions." The guidelines noted that "when looking at the modernization and development history of various countries in the present world, think tanks have played an increasingly important role in national governance." Chinese think tanks should play a similar role, the document says, in helping to advise on policy decisions. That goal will likely be helped by tentative steps being taken in China to offer government positions to academics.

At the same time, however, the guidelines were quite clear on the limits that remain on China's research institutions. "Think tanks should stick to Marxist ideology [and] follow the CCP's leadership," the guidelines insisted. Those two points will inevitably limit the scope of scholarship at Chinese think tanks, and make it unlikely that China's researchers will feel comfortable making truly bold policy recommendations. It will also, fairly or not, continue to taint the image of Chinese think tanks abroad, as Western observers have a tendency to write off Chinese scholarship as government sponsored.

[\(http://thediplomat.com/2015/01/chinas-quest-for-global-influence-through-think-tanks/\)](http://thediplomat.com/2015/01/chinas-quest-for-global-influence-through-think-tanks/)

#### 4. Chinese Scientists Construct First M. Tuberculosis Proteome Microarray

(CAS, 23-01-2015)

Tuberculosis (TB), an ancient, yet re-emerging infectious disease, is responsible for more deaths than almost all other infectious diseases, and the vaccine, drugs and diagnostic tests currently in use are limiting the effectiveness of global efforts to prevent and control TB. The BCG vaccine, the only licensed TB vaccine, has now been in use for almost one hundred years; however, it provides only limited protection. Drugs currently used to treat TB have been in use clinically for almost half a century and bacterial drug resistance is a growing problem. In addition, current methods for detecting TB are not very effective, and the detection rate is low. Suitable biomarkers, which can be used in rapid screening methods for TB are lacking.

Chinese scientists and clinical experts from the CAS Wuhan Institute of Virology, the CAS Institute of Biophysics, Shanghai Jiao Tong University, the Center for Tuberculosis Control of Guangdong Province, the CAS Institute of Hydrobiology, the Shanghai Municipal Center for Disease Control and Prevention, and TB Healthcare Biotechnology Co., Ltd., have worked together to construct the first Mycobacterium tuberculosis (MTB) proteome microarray, a powerful high-throughput experimental platform for basic research on TB, and published the results from their joint study in the journal Cell Reports<sup>1</sup> on 11th Dec., 2014.

The MTB proteome microarray includes the products of 4262 Mycobacterium tuberculosis open-reading frames and covers 95% of the proteome. It can be used for global analysis of protein-protein interactions in studies of the interactions between human immune cells and the MTB pathogen, for analysis of protein interactions with small molecules in the global discovery of drug targets, and for high-throughput analysis of serum samples in the systematic discovery of biomarkers for use in the diagnosis of tuberculosis. The MTB proteome microarray is thus a suitable tool for enabling the systematic discovery of new immunogens and biomarkers, and will likely facilitate the development of new and efficient vaccines, drugs and diagnostic technology.

In studies to demonstrate typical applications of the proteome microarray, PknG, a protein kinase, and c-di-GMP, a small molecule that is a ubiquitous second messenger in bacteria, were found to interact with many previously unreported protein binding partners. Results indicated that both PknG phosphorylation and c-di-GMP are involved in the regulation of the MTB rhamnose synthesis pathway, an important pathway in cell wall biosynthesis. In addition, analysis of serum samples using the proteome microarray

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identified a panel of 14 biomarkers than can effectively distinguish between patients with active TB and those who have recovered from the disease, and thus has potential as an index for monitoring treatment outcome.

This collaborative study took five years to complete and was supported by grants from the Key Project Specialized for Infectious Diseases of the Chinese Ministry of Health, the Chinese Academy of Sciences, the National High Technology Research and Development Program of China, and the National Natural Science Foundation of China.

([http://english.cas.cn/newsroom/research\\_news/201501/t20150123\\_135645.shtml](http://english.cas.cn/newsroom/research_news/201501/t20150123_135645.shtml))

## 5. Europe, China issue call for joint science mission

*(Spaceflight Now, 24-01-2015)*

Europe and China are planning a joint robotic space mission for launch in 2021, and officials are asking scientists to propose projects aimed at research in astronomy, exploring the solar system, or investigations in fundamental physics.

The European Space Agency and the Chinese Academy of Sciences released a joint call for mission proposals Jan 19 after crafting an outline for a cooperative space project during two workshops held in China and Denmark last year.

The mission must aim to be ready for launch in 2021, and proposals are due March 16. Officials plan to select a proposal for study in late 2015, with final approval for full development expected in 2017.

The mission can pursue any subject in space science except for exploration of the moon or Mars, which are covered in a different division of ESA's science program, according to Fabio Favata, head of the space agency's science planning and community coordination office.

European and Chinese researchers presented plans at joint workshops last year for missions in astronomy, solar physics, space weather and gravitational science.

The mission will have some restrictions, according to the solicitation posted on ESA's website.

Each proposal must have signed by principal investigators from China and an ESA member state, and the spacecraft's scientific payload has to be jointly developed by European and Chinese teams.

The spacecraft should weigh less than 300 kilograms — about 660 pounds — and should be designed for a two- or three-year mission. The satellite's science payload should come in at less than 60 kilograms, or 132 pounds.

ESA and China are also prohibiting the use of sensitive U.S.-made spacecraft components that fall under export control restrictions. The U.S. government restricts some high-tech equipment deemed to have military utility from launching on Chinese rockets.

The mission is considered a "small-class" project by ESA. Such missions have a cost cap of around 50 million euros, or \$56 million, in ESA's budget.

China is expected to contribute a similar level of funding to the mission.

The call for proposals does not specify whether the spacecraft should be manufactured in Europe or China. The mission could launch on a European Vega booster, a Soyuz rocket, or China's Long March 2C or Long March 2D launcher.

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In a time when U.S. cooperation with China on space projects is outlawed, ESA has sought closer ties to Chinese space program.

Europe and China developed and launched two satellites in 2003 and 2004 for the Double Star mission, the first collaborative scientific project between the space agencies. Double Star measured processes in Earth's magnetosphere and monitored magnetic bubble's response to fluctuations in solar activity. ESA and China are also evaluating the possibility of sending a European astronaut to China's space station once it is assembled in Earth orbit.

(<http://spaceflightnow.com/2015/01/24/europe-china-issue-call-for-joint-science-mission/>)

## 6. China to boost cloud computing

(Xinhua, 31-01-2015)

The State Council, China's cabinet, issued guidance on Jan 30 on development of cloud computing. China intends to markedly boost cloud-computing capacity by 2017, developing an Internet power by 2020, with cloud computing as its backbone. Synthesized development of cloud computing, mobile Internet, the Internet of things and Internet financing will cultivate new businesses.

Breakthroughs are needed on cloud computing and big data. The government will support upgrades of existing e-government systems with cloud computing, and will procure more services from the private sector.

Big data research and development was also highlighted. Demonstration projects will apply big data in disease prevention and control, disaster prevention, social security and e-government. Authorities will support industry through tax policies, law and regulations, and will encourage investment in cloud computing start-ups.

China's cloud computing market is expected to be worth 37.2 billion yuan (6 billion U.S. dollars) in 2017 as demand for the service grows, the China Securities Journal reported in May 2014

([http://news.xinhuanet.com/english/china/2015-01/30/c\\_133959095.htm](http://news.xinhuanet.com/english/china/2015-01/30/c_133959095.htm))

## 7. Critics pounce on China's top science prize

(Science, 02-02-2015)

Controversy has erupted over China's highest science prize for 2014. Critics are blasting the winning project, on network computing, as not innovative and undeserving.

On 9 January, the State First-Class Natural Science Award went to Zhang Yaoyue, a computer scientist and member of the prestigious Chinese Academy of Engineering, and his team. The 200,000 yuan (\$32,000) annual prize is considered prestigious because it is awarded sparingly: Nine times in the past 15 years there have been no winners. The government has said that it is better to have no winners than to award the prize to undeserving work.

That's why many scientists are fuming over the selection of Zhang's "transparent computing" research for the 2014 award. Zhang's work is "too engineering-oriented and too ordinary" to warrant the top science prize, and the award has drawn "a barrage of criticism" from China's information technology community, says Liu Yang, a computer engineer who builds and hosts websites. Liu was the first to question the merit of Zhang's work on ScienceNet.cn; he wrote in a blog post (later deleted by censors) that Zhang's work "at most is an application of some open-source software." Many people share Liu's view. Wang Xiaoping, a computer scientist at Tongji University in Shanghai, wrote in a blog post that Zhang's work is "a far cry" from the standard required for winning the science award.

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In an interview in Science and Technology Daily, the mouthpiece of China's science ministry, which oversees the nation's science prizes, Zhang describes his work as a "meta-operating system" that allows operating systems to be run on any hardware. The breakthrough, he says, lies in "separating computing from storage and making software independent of hardware." He gave a link to a video demonstrating "transparent computing" on personal computers, tablets, and smart phones. Comments posted at that site say that Zhang's model is no different from a remote desktop—a software tool that allows users to access another device on a network with the local device serving as a desktop of the remote computer—or from a network computer, a diskless device made by some U.S. companies in the late 1990s that depends on other devices on a network to store software and data. Zhang did not respond to an e-mail request for comment.

For years, many in China's scientific community have criticized the selection process for S&T prizes as too political. The process involves researchers submitting their own work to ministries, agencies, and provincial governments, which then nominate submissions for awards. Before being appointed president of Central South University in Changsha in 2011, Zhang had served for more than a decade as an official at the education ministry, which nominated his work for the award. An anonymous comment on ScienceNet.cn put it this way: Zhang's "transparent computing is so transparent that it's like the emperor's new clothes."

China's professional computer society, the China Computer Federation (CCF), seemed to disagree with the selection of Zhang's work for the top science award. On 21 January, CCF posted an appeal on its website, calling on the government to stop meddling in science awards. The statement was replaced 2 days later with a notice saying that the appeal was not related to last year's science awards and was removed "in order not to mislead the public."

(<http://news.sciencemag.org/asiapacific/2015/02/critics-pounce-china-s-top-science-prize>)

### **(Collaborating Opportunities)**

#### **Call for demonstrations and projects:**

##### **Swiss Week 2015**

Deadline: March 1<sup>st</sup> 2015

Place: Shanghai

Contact: [info@swissnexchina.org](mailto:info@swissnexchina.org)

#### **Call for participants: APAIE 2015**

Date: March 23<sup>rd</sup> – 26<sup>th</sup> 2015

Place: Beijing

Contact:

[michael-simon.waser@eda.admin.ch](mailto:michael-simon.waser@eda.admin.ch)