



International Knowledge Centre  
for Engineering Sciences and Technology  
under the Auspices of UNESCO  
联合国教科文组织国际工程科技知识中心

# *Newsletter*

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International Knowledge Centre for Engineering Sciences  
and Technology under the Auspices of UNESCO



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The International Knowledge Centre for Engineering Sciences and Technology (shortened as “IKCEST”) is a category 2 centre under the auspices of the United Nations Educational, Scientific and Cultural Organization (shortened as “UNESCO”). IKCEST was established on June 2, 2014. The Chinese Academy of Engineering is responsible for the operation and management of the IKCEST.

Under the auspices of UNESCO, IKCEST is a comprehensive and international knowledge centre devoted to the engineering sciences, technology and applied technology. IKCEST aims at connecting engineering sciences and technology institutions globally, assembling various digital resources relating to engineering sciences and technology, building up a public data service platform and corresponding service environment, and coordinating the building of various professional knowledge systems, thus providing knowledge-based services at a global scale in the form of consultancies, scientific research and education for policy-makers and engineering science and technology professionals in the world, with particular reference to the developing countries.

The specific tasks and functions of IKCEST are as follows: to establish an international engineering and technology resources hub; to establish a public data service platform, and to develop the technology for mining and analyzing knowledge from big data; to cooperatively build professional knowledge service systems, and to build capacity in developing countries; to foster interdisciplinary engineering talents with big data processing ability; and to assist UNESCO to fulfill its aims and support its action plans.

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## » IKCEST News

### IKCEST delegation went on survey and study tour to U.S. and Canada

In order to better direct the development of the International Knowledge Centre for Engineering Sciences and Technology under the Auspices of the UNESCO (shortened as “IKCEST”), an expert delegation led by CAE Member Pan Yunhe had survey and study visits to the United States and Canada from 29 May to 5 June 2015, where they visited three universities (Carnegie Mellon University, Simon Fraser University, and University of Hawaii at Manoa) and one UNESCO research institute (UNESCO Institute for Statistics).

The delegation made the visits in order to learn advanced engineering data processing and management experience, publicize IKCEST’s mission, explore mechanisms of data sharing, discuss future cooperation, and create channels of cooperation and communication for IKCEST’s future development.

Through the visits, the delegation was introduced to the main activities, operating mechanism and data sources of UNESCO Institute for Statistics and got an informed understanding of the three universities’ research activities and sources of funds in engineering-related fields and their technologies and needs related to engineering data exchange and knowledge service. These

inputs shed a valuable light on big data acquisition, processing and analysis at IKCEST. During the visits, IKCEST also introduced its founding mission, gained support from the universities and UNESCO institutes, and reached agreement on cooperation with a number of organizations.

#### (I) Visit to Carnegie Mellon University (CMU)

From 31 May to 1 June 2015, the IKCEST delegation visited Carnegie Mellon University (CMU) located in Pittsburgh, Pennsylvania, USA.

CMU is an internationally prestigious private research university, with alumni including 19 Nobel laureates and 12 Turing Awards winners, ranking 22nd among universities in the United States, 57th in the QS World University Rankings (2013-2014), and 22nd in Times Higher Education World University Rankings. Its School of Computer Science is world-leading with an outstanding reputation in such fields as artificial intelligence, systems theory and programming languages.

#### Discuss IKCEST’s vision and determine schedule and agenda of IKCEST International Symposium 2015

On the afternoon of 31 May, the delegation met with CAE Foreign Member and Turing Award winner

Prof. Raj Reddy, CAE Member Pan Yunhe introduced IKCEST's founding background, development and current conditions. Prof. Reddy asked about the vision of IKCEST, i.e. what role it expects to play in 50 years.

Prof. Reddy said that IKCEST should link digital libraries, data centres and online open resources around the world, especially in UNESCO-concerned developing countries in the three continents of Asia, Africa and South America to make collected data and knowledge accessible by anyone from any place and at any time. He agreed that IKCEST is a huge undertaking and will provide resources useful for any engineer. He also suggested that IKCEST establish an engineer social network to facilitate communication among the community in addition to converging and spreading engineering knowledge.

The two sides had detailed discussions on digital property issues in connection with the construction of the centre. Both sides agreed that the centre should provide protected copyrighted as well as un-copyrighted resources. Pan said that copyrights are a very complicated issue, that countries should address the issue in their own way, and that IKCEST aims to achieve integrated full lifecycle management of knowledge from acquisition, organization and protection, with government providing subsidies to copyright holders.

The two sides also preliminarily discussed relevant issues about the IKCEST International

Symposium 2015 such as its agenda, theme, form, scale, program committee composition, speakers and chair and reached agreement on a number of issues. The symposium was preliminarily scheduled to take place on 18 November under the theme of "Digital Knowledge for Science and Engineering". Prof. Reddy also recommended five international experts in relevant fields as nominees for the Advisory Committee of IKCEST.

#### **Tour the Human Computer Interaction Institute (HCII)**

The IKCEST delegation toured the Human-Computer Interaction Institute at Carnegie Mellon University, where the institute's director Prof. Anind K. Dey had an introduction to the institute and led the delegation on a tour of the institutes' laboratories in 3D textile printing, industrial product design and cognitive testing.

Established in 1995, the HCII first consisted of three parts, i.e. psychology and cognitive science, design, as well as computer engineering and technology, and later included educational technology. It not only has in-depth research in every research area but also spans various interdisciplinary research areas, such as technology, behavior and design, with most doctoral and postdoctoral candidates having two supervisors to facilitate interdisciplinary research.

Prof. Anind K. Dey said that the success of HCII mainly lies in the close integration of behavior, design and technology. This multidisciplinary

collaboration is reflected in different stages such as laboratory mix, collaborative guidance and collaborative R&D. This approach sheds some light on the organizational structure of IKCEST which needs collaborative and cooperative innovation in different fields of engineering sciences and technology.

**Discuss IKCEST's organizational mode and CAE's journal Engineering and its special issue Smart City & Big Data**

The delegation and Prof. Reddy had a well-rounded discussion about organizational structure

and applied areas of IKCEST. Also present at this meeting were Prof. Ramayya Krishnan, Dean of School of Management Science and Information Systems, and Prof. James H. Garrett Jr., Dean of College of Engineering.

Prof. Reddy first expressed his views on the future organizational structure and operating mechanism of IKCEST. In his opinion, IKCEST needs to operate on a sustainable model and may invite leading engineering experts to share their perspectives on the significance of the digital knowledge depository. Prof. Reddy believes that it is necessary for IKCEST to set up different levels



Visit to Carnegie Mellon University (CMU)

of expert teams ranging from general-level experts to global top-notch experts to address issues at different levels. Issues that cannot be solved by any experts will be worthy of further research. Those grand challenge problems can be addressed by experts on a global scale.

During the discussion of CAE's journal Engineering, Prof. Reddy gladly agreed to serve as the guest editor-in-chief of the journal and its special issue Smart City & Big Data. In addition, he recommended two persons as foreign members of the guest editorial board of the special issue on Smart City & Big Data and invited them to join the discussion of relevant issues. Moreover, Prof. Reddy introduced relevant experience of the publication of the National Academy of Engineering (NAE) on engineering.

Afterwards, Prof. Ramayya Krishnan, Dean of School of Management Science and Information Systems, introduced the school's activities in the field of smart city. Over the past seven years, the school conducted a lot of interdisciplinary research which leveraged urban data to address issues in four key application areas, i.e.: intelligent architectures, intelligent transport, intelligent healthcare and

intelligent manpower allocation (police deployment). CAE Member Pan Yunhe also introduced to experts at the meeting China's progress in smart city development and invited Prof. Krishnan and Prof. Garrett to attend a joint meeting organized by CAE and German Academy of Science and Engineering which will take place on 26 September next year.

Finally, Yuvraj Agarwal, Assistant Professor, School of Computer Science, introduced his research team's work on intelligent building operating systems. CAE Member Pan Yunhe spoke highly of the report made by Prof. Agarwal and invited him to showcase his research achievements at the Smart City Expo, an annual event held in Ningbo, China in September, believing that many Chinese manufacturers will have interest in his research results.

## (II) Visit to UNESCO Institute for Statistics (UIS)

On 2 June 2015, the IKCEST delegation led by CAE Member Pan Yunhe visited the UNESCO Institute for Statistics in Montreal, Canada.

The UNESCO Institute for Statistics (UIS) was established in 1999 to meet the growing need for reliable and policy-relevant data. As the



Visit to UNESCO Institute for Statistics (UIS)



statistical branch of UNESCO, it serves Member States, UNESCO and the UN system, as well as a range of intergovernmental and non-governmental organizations, research institutes and universities.

The Institute produces the data and methodologies to monitor trends at national and international levels, delivering comparative data for countries at all stages of development to provide a global perspective on education, science and technology, culture, and communication.

The delegation was warmly welcomed by Programme Specialist Martin Schapper. Pan Yunhe introduced to Mr. Schapper members of the delegation, and Mr. Schapper had an introduction to UIS, including reasons why UIS collects data on science and innovation, the ways UIS' indexes help policymakers, and UIS' role.

Mr. Martin analyzed the R&D/GDP targets and progress of representative countries and regions such as Singapore, China, Qatar and the EU, and provided UIS' predictions of R&D intensity trends of these countries to demonstrate the scientific soundness of UIS' statistical methods and the effectiveness of its innovative analysis.

Mr. Martin also introduced how the institute collects and indexes data. The institute first collects input and output data and statistics of innovation systems from authoritative sources including EOP, GPO and USPTO, and then performs statistical analysis before generating the final reports. The UIS is a main UNESCO institute specializing in statistics on science, technology and innovation and a data source of the STI Global Assessment Programme and the Global Innovation Index. The UIS' activities mainly consist of four parts, i.e. data collection, methodology development, data analysis, and publication of findings. It collects data mainly

through purchase and questionnaire survey. The UIS carries out a global collection of R&D data every two years and publishes findings every other year.

CAE Member Pan Yunhe noted that the innovation studied by the UIS is different from that studied in China, that this innovation, though, is within the scope of innovation as defined internationally, that innovation is not the same thing as R&D, and that the innovation as used at the UIS is a very important concept conceived by management scientists which focuses on product design, process design and business model innovation and encompasses wider facets than the knowledge innovation studied at IKCEST and therefore sheds a valuable light for CAE and IKCEST. He added that the UIS' data is of great value for the construction of IKCEST and expressed the hope of making the data available at IKCEST.

Pan also introduced to the UIS the history, organization and current status of IKCEST. He invited the UIS to visit IKCEST and CAE to have a greater understanding of their activities. He suggested that as the first step of cooperation, the two organizations' websites link to each other.

### **(III) Visit to Simon Fraser University (SFU)**

On 3 June 2015, the IKCEST delegation visited the Vancouver campus of Simon Fraser University (SFU) in Canada.

Located in Canada on British Columbia's west coast and named for an early explorer, SFU opened in 1965 and comprises more than 30,000 students and approximately 6,500 faculty members in three campuses, with 130,000 graduates. A top-notch university in Canada, SFU is ranked among the top 50 universities in the world by the Times Higher Education.

The delegation first met with Prof. Norbert Hanuerland, Associate Vice President for Research at SFU, who had a general introduction to the university with a focus on its Faculty of Applied Sciences and research activities in scientific data management and big data.

Pan introduced to Prof. Hanuerland China's development in supercomputers and CAE's knowledge centre project. Prof. Pan said that China's supercomputers used to focus on distributed computing thirty years ago and has made great efforts in cloud computing in the recent ten years,

with a growing presence of companies in the efforts. The recent years have also seen a rapid rise of data centres in China, as distinguished from computing centres and cloud computing centres. IKCEST goes a step further and its goal is to establish a data centre-based knowledge centre.

Then the delegation joined a seminar attended by Nimal Rajapakse, Dean of the Faculty of Applied Sciences, Prof. Greg Mori, Prof. Jian Pei and Prof. Martin Ester at School of Computing Science, and Prof. Kamal Gupta at School of Engineering Science. After members of the IKCEST delegation



Visit to Simon Fraser University (SFU)



introduced to Canadian attendees basic information about CAE, IKCEST and College of Computer Science of Zhejiang University, CAE Member Pan Yunhe suggested that the two sides apply for grants from their respective Natural Sciences Foundation for exchange of academic visits and mutually beneficiary collaborative research projects. As for the themes of collaborative research, Prof. Pan proposed a number of issues related to digital library and knowledge centre development and smart city related issues, such as intelligent energy, intelligent transport, intelligent environment, intelligent economy and intelligent manufacturing, in which fields several colleges and departments of Zhejiang University such as Department of Energy Engineering, College of Computer Science and Technology, and College of Control Science and Engineering has active research.

After the meeting, the delegation was led by Prof. Richard Vaughan on a tour of the Vancouver campus of SFU and its Experimental Robotics Laboratory where researchers demonstrated research achievements based on automatic target detection and real-time 3D measurement such as unmanned aerial vehicle (UAV) and unmanned ground vehicle (UGV).

#### **(IV) Visit to University of Hawaii at Manoa (UHAM)**

On 29 May 2015, the IKCEST delegation visited the University of Hawaii at Manoa (UHAM) in Honolulu, Hawaii, United States.

UHAM is a leading research university in Hawaii, ranked in the top 50 public universities in research expenditures by the National Science Foundation. Founded in Manoa Valley in 1907, UHAM has approximately 19,507 students, with faculty including members of the National Academy

of Sciences, the National Academy of Engineering and the National Institute of Medicine, and is known for its pioneering research in such fields as oceanography, astronomy and Pacific Islands studies.

The delegation was warmly received at UHAM, where it was led by Prof. Peter E. Crouch, Dean of College of Engineering, and Prof. Diane Perushek, Director of Global Relations and former university librarian, on a tour of the UHAM campus.

After the tour, the delegation was introduced by Dr. Brian Taylor, Interim Vice Chancellor for Research and dean of School of Ocean & Earth Science & Technology, and Dr. R. Anderson Sutton, Vice Chancellor for Academic Affairs, to UHAM and its research in ocean exploration, especially in deep-sea exploration. Members of the IKCEST delegation briefed on the CAE, IKCEST and the College of Computer Science of Zhejiang University. The two sides discussed possibilities and details of further cooperation.

Finally, the delegation met with Dr. Reed Dasenbrock, Vice Chancellor for Academic and International Affairs. At the meeting, Prof. Pan had a detailed introduction to the background of IKCEST, saying that the centre was formerly the digital library of the CAE with its preliminary goal being to establish an international library focusing on engineering sciences and technology, but the government preferred it to be developed into a knowledge centre which collects, stores and processes data, where engineers and engineering scientists can submit questions and obtain answers, and which is not a mere knowledge search engine but a sophisticated knowledge platform integrating big data and artificial intelligence technologies. As a knowledge platform, it also facilitates communication and collaboration of

experts and professors in engineering sciences and technology. The knowledge centre has established a large expert base through which users can search experts and projects of interest. For example, if the College of Computer Science of Zhejiang University and the College of Engineering at UHAM input their expert information into the platform, it will help them identify areas of potential cooperation between the two colleges.

Speaking of further cooperation with UHAM,

Prof. Pan put forward four suggestions. First, the two sides can cooperate on projects through the platform of IKCEST. Secondly, UHAM and Zhejiang University Library can exchange visits on joint development of the digital library. Thirdly, more efforts can be made to further expand and enhance student exchange between the two universities, including summer exchange and 3+1 bachelor's to master's programs. Fourthly, UHAM and CAE may explore cooperation in smart city development.



Visit to University of Hawaii at Manoa (UHAM)



Through the study visits with intensive dialogues and field tours, the delegation got an informed understanding of the research status and strength of Carnegie Mellon University, Simon Fraser University and University of Hawaii at Manoa in engineering, big data & analytics, digital library and smart city. CMU has achieved fruitful results in smart city research with many successful application cases which shed a valuable light on smart city development in China. SFU has attained great achievements in computer science and human-machine interaction, with which there is a huge potential of cooperation in big data technology. UHAM has a unique strength in oceanology and boasts a rich amount of ocean research data. Their respective strengths and resources are all valuable to IKCEST. Through exchanges with these world-leading universities, IKCEST can explore cooperation opportunities, enrich its knowledge base, and expand its international influence.

The visit to UNESCO Institute for Statistics (UIS) familiarized the delegation with the institute's main activities, operating model, funding sources and organizational structure, laying a good foundation

for subsequent data cooperation and exchange of visits between the two organizations. As a branch of UNESCO, the UIS prepare research reports based on all kinds of basic data and statistics to provide advice for policymakers. Its research findings are widely adopted and recognized by international organizations including UNESCO. Active cooperation and communication with similar organizations is helpful for IKCEST to promote sharing of data and research results and the construction of its international engineering knowledge platform.

Through preliminary discussions with foreign CAE Member and Turing Award winner Prof. Raj Reddy, the delegation determined the schedule and agenda of the 2015 IKCEST Symposium. The discussions between the delegation and Prof. Reddy about the development positioning of IKCEST in the coming 50 years have important implications for IKCEST's future development, especially as related to its data acquisition, operation model and international cooperation, and have further clarified the contents of IKCEST's subsequent activities.

## ISTIC Governing Board Chairman visited IKCEST

On July 11, 2015, Dato' Ir. Lee Yee Cheong, Chairman of the Governing Board of the International Science, Technology and Innovation Centre for South-South Cooperation under the Auspices of UNESCO (ISTIC), paid a visit to the headquarters of the International Knowledge Centre for Engineering Sciences and Technology (IKCEST).

Dato' Ir. Lee Yee Cheong was received by Madam Chen Zuoning, Vice President of the Chinese Academy of Engineering (CAE) and Governing Board Chairperson of the IKCEST, Wu Guokai, Deputy Secretary-General of CAE, Yi Jian, Deputy Director-elect of IKCEST, and staff members of relevant CAE departments.

Yi Jian first briefly introduced the missions and development status of IKCEST. Then the two sides had friendly discussions and expressed interest in future cooperation, especially in strengthening training of engineering sciences and technology personnel in developing countries. The two sides mentioned the Regional Workshop of UNESCO Natural Sciences Related Centres and Chairs in Asia and the Pacific held in Kuala Lumpur in Malaysia in late May and expressed hopes to strengthen cooperation among UNESCO natural sciences related centres and contribute to the Post-2015 Development Agenda.



ISTIC Governing Board Chairman visited IKCEST

## NDRC ICC experts visited IKCEST

On July 13, 2015, a group of experts headed by Liu Feng, expert of the Expert Panel and Secretary-General of the Think Tank Foundation, International Cooperation Center (ICC) of the National Development and Reform Commission (NDRC), paid a visit to the International Knowledge Centre for Engineering Sciences and Technology (IKCEST), and had a meeting with Yi Jian, Deputy Director-elect of IKCEST, Pan Gang, Liu Chang and Fu Zhijie from the IKCEST secretariat.

Yi Jian introduced the background of

establishment, missions, development status and long-term planning of IKCEST to the expert group headed by Liu Feng. Liu expressed his affirmation of the missions of IKCEST and put forward suggestions for its development, including strengthening project construction, cooperation with local governments and collaborative innovation to serve regional economic development and the national strategy of “One Belt, One Road”. Both sides expressed desire for future cooperation.



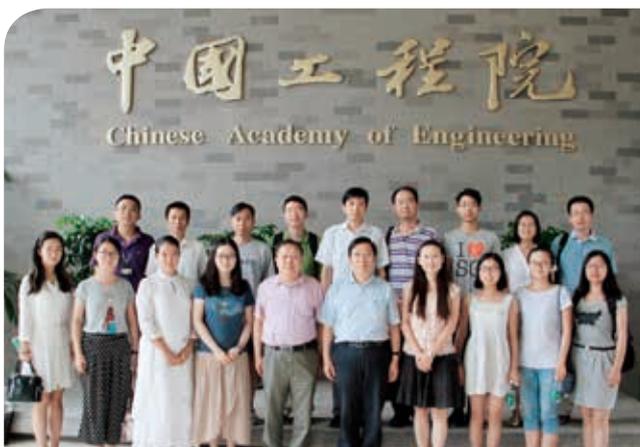
NDRC ICC experts visited IKCEST

## BKL-DPVRCH delegation visited IKCEST

On 15 July 2015, a delegation from Beijing Key Laboratory of Digital Preservation and Virtual Reality for Cultural Heritage (BKL-DPVRCH) led by Prof. Zhou Mingquan paid a survey and study tour to the headquarters of the International Knowledge Centre for Engineering Sciences and Technology (IKCEST) and was met with by IKCEST officers including Yi Jian, Deputy Director-elect of IKCEST, Pan Gang, Gao Xiang, Liu Chang and Fu Zhijie from the IKCEST secretariat.

At the meeting, the delegation first watched a video which gave a comprehensive overview to IKCEST, including its background, mission, development status and long-term plan. Then members of the delegation made a presentation on BKL-DPVRCH's achievements in virtual reality applications with reference to China's cultural

heritage. Prof. Zhou expressed the laboratory's hope of deepening cooperation with IKCEST by including the laboratory's digital Chinese cultural resources in its knowledge platform. Yi Jian said that the inclusion of knowledge on Chinese culture in the knowledge platform of IKCEST, a UNESCO Category 2 centre, will expand the knowledge resources of the platform, and that the inclusion can be achieved by connecting BKL-DPVRCH's digital assets on Chinese cultural heritage and related virtual reality applications to IKCEST's website, adding that it can play a role in introducing the Chinese culture to the world by leveraging the "Belt and Road" initiative. Prof. Zhou said that BKL-DPVRCH will comprehensively implement the knowledge inclusion in accordance with IKCEST's requirements.



BKL-DPVRCH delegation visited IKCEST

## Preparatory meeting for IKCEST International Training Workshop 2015 held in Hangzhou

On 29 July 2015, a preparatory meeting for the 2015 international training workshop of the International Knowledge Centre for Engineering Sciences and Technology under the Auspices of UNESCO (shortened as “IKCEST”) was held in Zhejiang University, Hangzhou, Zhejiang Province.

The meeting was attended by Pan Gang, Liu Chang and other staff from the IKCEST Secretariat, Cao Xuejun, head of the platform development team of IKCEST, Assoc. Prof. Chen Ling and Assoc. Prof. Shao Jian on the IKCEST research team from College of Computer Science of Zhejiang University, and other relevant personnel.

The IKCEST Secretariat first introduced the preparatory work and preliminary plan of the IKCEST International Training Workshop 2015 including duration, location, scope and format of training, course arrangement, trainees and scale, expected results, expenditure and budget. Attendees had exhaustive and thorough discussions on various aspects of the preliminary plan and agreed the following agreements:

The training workshop, named “IKCEST International Training Workshop 2015”, is scheduled to take place from 3 to 9 December 2015 in a format which combines lectures, discussions and technical visits under the theme of “Big Data Technology Application and Knowledge Service”;

IKCEST Director-elect Zhong Zhihua or Deputy Director-elect Yi Jian, together with Hans Dencker Thulstrup, Programme Specialist for Natural Sciences of the UNESCO Beijing Office, will be invited to address the opening of the training workshop;

The training courses will be jointly given by experts from the IKCEST platform development team, the IKCEST research team from the College of Computer Science of Zhejiang University, as well as sub-centres of IKCEST, with contents including introduction of IKCEST, big data technology development, current status and vision of IKCEST, cloud storage, and applications of big data in various specialized fields. Classes will be followed by discussion and communication on related issues and a questionnaire survey to get further understanding of attendees’ needs and potential fields of cooperation. Training materials will be compiled into a textbook for use in subsequent training sessions;

Organizers should take safety as a major priority and take into accounts the dining and living habits of trainees, such as those of Muslim trainees;

The IKCEST Secretariat will discuss more details of the training plan (including schedule, contents and budget) and the enrollment notice will be released by the end of August.



Preparatory meeting for IKCEST International Training Workshop 2015 held in Hangzhou

## IKCEST delegation paid work visit to UNESCO Headquarters

From Sept. 28 to Oct. 2, 2015, the IKCEST Secretariat sent its delegation to Paris, France to pay a work visit to UNESCO Headquarters, in a hope to have a further understanding of the concrete requirements and needs of UNESCO on the construction of IKCEST. Meanwhile, the team met with China's permanent delegation to UNESCO.

### (I) Meeting with China's Permanent Delegation to UNESCO

On the afternoon of Sept. 29 local time, at office of China's permanent delegation to UNESCO, team members of the IKCEST were warmly received by China's Permanent Delegate to UNESCO, Ambassador Zhang Xiuqin and First Secretary Mr. Yi Zhijun.

In six aspects, the IKCEST team reported to Ambassador Zhang Xiuqin and First Secretary Yi Zhijun:

1) Building organizational structure. IKCEST has formed its Governing Board, Advisory Committee

and Secretariat, etc, whose personnel has been selected and respective functions been defined.

2) Formulating directive documents. With the focus on the centre's main goals and tasks, IKCEST has formulated its Charter, Rules of Procedure of Governing Board, Mid-Term Strategic Plan, and Biennial Work Plan to guide the centre's future development.

3) Holding international symposium. As co-sponsor with the Resources and Reserves Evaluation Center under the Ministry of Land Resources, State Commission of Ukraine on Mineral Resources and CNPC Research Institute of Petroleum Exploration and Development, IKCEST jointly held China-Ukraine Workshop on Resources Classification: Status, Mapping and Application on June 1-3 in Beijing; IKCEST will hold IKCEST International Symposium 2015 on November 17, with a focus on latest advance in big data and information technology.



Meeting with China's Permanent Delegation to UNESCO



4) Organizing international training workshop. IKCEST jointly held international training workshop on “Karst Landscape, Geopark, Natural Heritage, Environmental Geology Mapping And Data Mining”, in collaboration with other Category 2 centres; IKCEST will hold IKCEST International Training Workshop 2015 on “Big Data Technology Application and Knowledge Service” in early December.

5) Carrying out International exchange and cooperation. IKCEST has visited a number of UNESCO Categories 1 and 2 centres in Iran, UAE and France since its establishment, as well as relevant research institutes and universities, and attended international conferences including the 6th Session of UNECE Expert Group on Resource Classification, organized by the Committee on Sustainable Energy and the Expert Group on Resource Classification (EGRC) under the United Nations Economic Commission for Europe (UNECE), and the Regional Workshop of UNESCO Natural Sciences Related Centres and Chairs in Asia and the Pacific, etc.

6) Aggregating resource and building platform. The preliminary construction of the platform (<http://www.ikcest.org>) has been completed. The online functions now cover information release, data aggregation, information navigation, and general search. By fair exchange and aggregation of information on international engineering science and technology, navigation of international data resource and general search engine are both established to build a bridge for resource, information and knowledge sharing. Meanwhile, featured and innovative specialized knowledge service applications will be displayed, to gradually provide basic information and knowledge service to global personnel of engineering science and technology as well as teachers and students of all types of educational institutions.

Ambassador Zhang Xiuqin offered full recognition

of the progress of IKCEST in the past year. She expressed her appreciation of the centre's ethos of fulfilling the international mission of UNESCO by providing services through information technology. The ambassador hoped IKCEST heighten its international awareness through cooperation with other Category 2 centres via IT services during the course of actual construction. She said the Permanent Delegation will give its full support to IKCEST in its future work.

The ambassador said she was very pleased to know IKCEST had formed its international team of experts (the Governing Board and Advisory Committee). The team not only has CAE Members, but also first-rate experts from various parts of the world. The Permanent Delegation will introduce IKCEST to the respective countries of foreign experts, trying to win their support for IKCEST.

## **(II) Delivering work report to UNESCO Headquarters**

On the afternoon of Sept. 30 local time, the IKCEST team delivered a report to UNESCO Headquarters on the construction of IKCEST. Those present at the meeting included Ms. Flavia Schlegel, Assistant Director-General of Natural Sciences Sector, Mr. Han Qunli, Director of Division SC/EES of Natural Sciences Sector, Dr. Osman Benchikh, Chief of Section PCB/ICB of Natural Sciences Sector, Ms. Rovani Sigamoney, Assistant Programme Specialist of Natural Sciences Sector, Mr. Anil Mishra, Programme Specialist of Natural Sciences Sector, Mr. Alexandros K. Makarigakis, Programme Specialist of Natural Sciences Sector, Ms. Dlouhy Gifty, Assistant Executive Office of Natural Sciences Sector, Lebreton Magalie, Assistant Programme Specialist of Natural Sciences Sector, Mr. Adubra Edem, Chief of Section ED/TLC/TEFAS of Education Sector, Ms. Hu Xianhong, Assistant Programme Specialist of Communication and Information Sector and Mr. Gomez Duran, Assistant Programme

Specialist of Culture Sector.

#### **Speech by the Assistant Director-General**

The UNESCO Assistant Director-General Ms. Flavia Schlegel first made a speech, who fully confirmed the significance of the work visit of the IKCEST delegation. China has made well-known, enormous achievements in the field of engineering and the Knowledge Centre is very important to the UNESCO, said she. This time, UNESCO attached great importance to the visit of IKCEST, asking sector heads and experts involving natural science, education, culture, communication and information to listen to the report on the progress of IKCEST. By understanding the technology and service of the Knowledge Centre, UNESCO could engage it in important activities and programs of the organization.

As pointed out by Ms. Flavia Schlegel, UNESCO has already recognized the role of engineering sciences and technology as major driving force of social, economic and human kind development. Strengthening knowledge and infrastructure of whole society is the key to innovation. It is also the key factor in addressing global issues and challenges like poverty, global engineering resources shortage, global declining participation of young people (esp. women) in engineering, and intelligence shortage of developing countries. She believed that the IKCEST would remain committed to fulfilling its goals, hoping it will achieve outstanding results in its later efforts.

#### **Report by the IKCEST team**

As an international, comprehensive centre of data assembling and knowledge services of engineering sciences and applied technologies under the auspices of UNESCO, IKCEST is committed to providing personnel of engineering sciences and technology of all countries, developing

countries in particular, with knowledge services including consulting, research and education, among other things, said Mr. Yi Jian, head of the team. This will be realized through making effective use of means of information resources, providing training relating to data processing and analysis, preserving and publicizing major cultural relics and strengthening international exchange and cooperation. With such goal of construction, the construction of IKCEST is a long-term task. In the past year, on the one hand, the Centre was engaged in basic data assembling and platform functions development, providing knowledge services; on the other hand, IKCEST honored its commitments as required by UNESCO in conducting academic exchanges and personnel training, advancing the capacity development of developing countries.

It will develop in the future applications more close to requirements of UNESCO Headquarters and member states, continuing its exploration of content and manner of in-depth services and promoting together the realization of UNESCO's goals in engineering and education, etc. Meanwhile, regarding data sharing and specialized knowledge services, IKCEST will strengthen cooperation with the community of engineering sciences and technology of developing countries, making long-term contributions to the development of the world's engineering sciences and technology.

Next, the team played a video program introducing progress of IKCEST in the past year, covering data assembling, portal construction, featured service, and international cooperation.

Ms. Liu Chang, Director of the International Cooperation Division of IKCEST, made a presentation on progress in organizational structure establishment, direction documents formulation, organization of international symposia and international technical training, as well as international cooperation. Also,

Ms. Liu elaborated on the future work plan of IKCEST.

IKCEST platform team leader, Mr. Cao Xuejun, introduced construction of the platform and demonstrated its functions, including unified search, IKCEST activities/events release, UNESCO Category 2 centre information assembling, among others. Also, he explained the featured services available at the moment, such as land surface coverage system, experts search, and Chinese culture display.

IKCEST technical expert, Prof. Wu Fei, gave a presentation on technical outlook of IKCEST, introducing featured apps like theme evolution, in-depth Q&A, and image and text generation in terms of big data, in-depth study, and natural language

processing, apart from describing the R&D of knowledge computation engine under way in IKCEST.

#### Feedback of UNESCO officials and experts

The attending UNESCO officials and experts showed great interest in the report of the delegation, unanimously agreeing that through one year of construction efforts, IKCEST has made significant progress. While feeling confident about the future development of the Centre, the attending officials and experts also offered some suggestions for its future endeavors:

1) The construction of IKCEST should be oriented to UNESCO's concerns in global development, like the major programs of UN disaster risk reduction



Delivering work report to UNESCO Headquarters

(DRR) and biological diversity. So the possible future efforts of IKCEST may be made regarding how to employ technologies concerning image recognition, natural language interpretation and data mining to provide services in disease prevention, disaster forewarning and animal and plants recognition.

2) IKCEST can add links of the UNESCO Category 2 centres to its platform and through assortment and classification of information release of Category 2 centres, form a window to UNESCO Category 2 centres. Thus, IKCEST can integrate the progress of all activities of Category 2 centres to submit to UNESCO an annual report of all aspects of Category 2 centres as featured services of IKCEST.

3) The construction of IKCEST can be combined with the on-going Open Education Resources (OER) programs of UNESCO. During the course of construction, IKCEST can link itself with resources of other Category 2 centres to create global resources oriented to the needs of developing countries, providing services to teachers in developing countries.

All the attending officials and experts expressed their faith that IKCEST would grow into a vibrant Category 2 centre. With the sectors of Natural Science, Education, Culture, Communication and Information, UNESCO will continue to provide strong support to IKCEST in its forthcoming construction efforts.

## IKCEST popularized science knowledge among young people

In order to accommodate the Campaign on “Teenagers Go into the Chinese Academy of Engineering (CAE)” launched by the CAE, the International Knowledge Centre for Engineering Sciences and Technology (IKCEST) was open to youngsters on July 20 and 22, August 11 and 12, September 11 respectively, in order to introduce the concepts of building the centre and popularize related science knowledge.



"Teenagers Go into the Chinese Academy of Engineering" campaign - visiting IKCEST Headquarter



## »» CKCEST News

The China Knowledge Centre for Engineering Sciences and Technology (CKCEST) is a significant part of and vital support for the International Knowledge Centre for Engineering Sciences and Technology (IKCEST).

### Seminar on purchase of digital resources plan for CKCEST held in Beijing

On June 26, the Project Management Office and the Resource Group held a seminar on CKCEST's digital resource purchase plan at China Metallurgical Information and Standardization Institute. The seminar concluded that four questions, i.e. who will use, how to use, what to purchase, and how to purchase, for the digital resource purchase plan should be answered. It is necessary to have a wide survey of mature digital resources at home and abroad before putting forward purchase proposals and requirements. The project group will revise the plan for the second seminar scheduled to be held in mid or late July.

### Seminar on 2016-2018 field planning of CKCEST held in Beijing

On July 26, the seminar on 2016-2018 field planning of CKCEST was held in the Medical Library of the Chinese Academy of Medical Sciences. The project team preliminarily proposed 12 new fields and functional sub-centres based on quantitative and qualitative analysis. Experts attending the seminar had discussions on the project outcomes of CKCEST and put forward suggestions on identification of key fields and advantageous organizations. The seminar also determined the subsequent work plan and preliminarily decided to hold an outcome debriefing in mid or late July.

## CKCEST annual operation and maintenance service training 2015 held in Beijing

On June 29, the CKCEST annual operation and maintenance service training 2015 was held at the Chinese Academy of Engineering, attended by a total of 35 operation and maintenance personnel of the Project Management Office and the various sub-centres. The training introduced the CKCEST online knowledge service platform launched in June, clarified requirements of customer service with actual examples, and familiarized the trainees with the functions of the CKCEST website, to help further improve the competence and efficiency of the operation and maintenance personnel.

## First phase of IKCEST system platform construction accepted

The Knowledge Centre project office has completed the acceptance of the first phase of IKCEST system construction between June 24 and July 3, 2015. The system has built a new website [www.ikcest.org](http://www.ikcest.org), which supports information publication and search online display of video clips, sitemap navigation of UNESCO category 2 centres and major academies of engineering, and link exchange of related institutions at foreign countries.

## CKCEST Geographic Resource and Map Information Project delegation visited UNESCO

On July 5-7, 2015, a delegation of the Institute of Geographic Sciences and National Resources Research under the Chinese Academy of Sciences, a partner of the CKCEST Geographic Resource and Map Information Knowledge Service System, paid a visit to UNESCO Headquarters, where the delegation had a meeting with Mr. Han Qunli, Director of the Executive Office of the Natural Sciences Sector and secretary of Man and the Biosphere (MAB) Programme, UNESCO, and introduced relevant progress of



CKCEST. The two sides communicated and reached a preliminary consensus on a series of cooperation topics including information sharing of the MAB Programme, biosphere monitoring in the context of climate change, and international training.

## Seminar on sub-centre development plan and metadata standards held in Beijing

CKCEST held a meeting on July 18, 2015 at the Agricultural Information Institute, Chinese Academy of Agricultural Sciences (CAAS) to discuss the plan for building CKCEST sub-centres and deliberate on metadata standards. A couple of experts attended the meeting, including Cai Zhiyong from China National Chemical Information Centre, Mao Yiming from China Iron & Steel Research Institute Group, Li Chunmeng from China Metallurgical Information and Standardization Institute, Wang Juanle from the Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, and Jiao Yi from the Electronic Technology Information Research Institute, Ministry of Industry and Information Technology. Zhao Ruixue, director of the Agricultural Information Institute, CAAS, and Dr. Kou Yuantao and Dr. Xian Guojian made separate briefings, and the experts held intensive discussions after that. Based on the experts' suggestions, the sub-centre construction plan was renamed to "guide to sub-centre construction". The next discussions are scheduled for mid-September.

## Seminar on intellectual property, asset and archive management held in Beijing

The second and the third symposium on intellectual property, asset and archive management were held on July 22 and July 31, 2015, respectively, at the Chinese Academy of Engineering. The meetings focused on problems regarding the management of intellectual property, asset and archive that CKCEST has to deal with. CKCEST solicited opinions from professionals in the legal and finance practice as well as engineers and technology experts and drafted three tentative documents - CKCEST Intellectual Property Management Methods, CKCEST Asset Management Methods, and CKCEST Archive Management Methods.

## »» Top News for Big Data Era

### State Council releases Action Plan for Big Data Development

The State Council released the Action Plan for Big Data Development (the “Action Plan”) on September 5. The Action Plan laid out goals regarding big data development and application China will have to achieve in the next five to ten years. As the first national initiative on big data, the Action Plan aims to expedite the development and application of big data and make China a stronger powerhouse. The Action Plan proposes to advance 10 big data projects from three aspects of government big data, big data industry and big data security system.

Source: Beijing Youth Daily

### Microsoft launches new big data and analytics suite

At the recent Microsoft World Wide Partner Conference in Orlando, Microsoft announced Cortana Analytics Suite, a new package of machine learning, big data and analytics. The package integrates with Microsoft’s cloud-based machine learning tool Azure ML, data visualization tool Power BI and the enterprise data sharing and data storage service Azure Data Catalog which was announced one week before that. Through the suite, Microsoft delivers a series of solutions including recommendation engine and production prediction empowered by a range of technologies including facial and voice recognition.

Source: TechCrunch China



## Government cannot fall behind in big data age

The big data age means two things for the government: lead and promote the development of the big data industry on the one hand and build a government big data system to achieve openness and sharing of relevant government data resources on the other hand. The government should leverage big data to improve policymaking and administration; foster big data thinking to embrace the big data age; strengthen top-down design and formulate a big data development strategy; and promote legislation on sharing of government data resources to ensure big data security.

Source: People's Daily

## T11 Global Mobile Data Summit opened in Beijing

T11 Global Mobile Data Summit opened in Beijing on September 11. The summit, hosted by TalkingData, China's largest independent big data service platform, was themed on the cross-border integration of mobile data. Participants discussed the future direction and trend of mobile data and shared the experience TalkingData has collected over the four years in the application of mobile data. Data specialists and analysts held extensive and intensive discussions and exchanges to jointly advance the application and development of the big data industry.

Source: [www.china.com.cn](http://www.china.com.cn)

# »» Terms on Big Data

## Advanced search

Advanced search is a refined search of the results by screening certain words (such as topic, author, keyword and abstract). Advanced search generally includes multi-field search and Boolean logic search. Enabling advanced search should be one of the basic requirements for the CKCEST's sub-centres.



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