

CHOICE Internal report I-3

EU member state cooperation with China in ICT R&D&I:

Bilateral cooperation in ICT R&D&I

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Date: 3 November 2014

Abstract: In this report EU member states bilateral programmes of cooperation with China in ICT R&D are reviewed. Conclusions are presented followed by recommendations targeted at organisations in EU member states interested in exploring the potential for bilateral collaborative ICT R&D with Chinese organisations.

Rationale for this report: Many EU member states have substantial bilateral programmes of cooperation with China in ICT R&D. In this report many of these are reviewed in order to determine the types of activities encompassed by bilateral cooperation with a view to promoting bilateral cooperation as a way of encouraging a more balanced relationship in collaborative ICT R&D with China based on reciprocity.

Disclaimer: The views presented in this report reflect those of the document organizers and do not necessarily represent the views of the European Commission.

Introduction

On the EU side, a 2012 report of the Delegation of the European Union to China [1] identifies ICT as a priority area for cooperation with China for the following member states: Austria, Denmark, Finland, France, Germany, Lithuania, Slovenia, Spain, Sweden, and the United Kingdom. Significantly this report notes that at their 14th Summit in February 2012 the EU and China broadened their exchange in Science and Technology to innovation (I). The report [1] summarises information received from a majority of member states embassies on bilateral agreements, priorities, joint institutes/laboratories, innovation related activities, and mechanisms for cooperation. It addresses generic S&T people to people and innovation dialogues, and mobility and scholarship programmes, in detail and readers interested in these are referred directly to [1].

On the Chinese side¹, “The International S&T Cooperation Programme (ISTCP) was launched by the Ministry of Science and Technology of the People’s Republic of China (MoST) in 2001.

¹ <http://www.973.gov.cn/English/AreaCoop.aspx>

There are two sub-schemes under the ISTCP: The Special funds programme and Bilateral S&T cooperation programme between governments. ISTCP integrates resources for international cooperation under major national S&T programmes such as ‘863’ and ‘973’.”

Special funds programme

“Special funds programme serves as an umbrella scheme to 863 Programme, 973 Programme and other major national S&T programmes. Consequently, Special funds programme features the same topics called by 863 Programme, 973 Programme and other major national S&T programmes.”

“Activities/projects supported under the 2011 programme guidelines include:

Inter-governmental science and technology cooperation projects based on bilateral or multilateral agreements (not EU), promoting China's science and technology, economic and social development;

High-level international cooperation projects catering to the needs of national economic and social development and national security, in line with the policy objectives of the country's external scientific and technological cooperation, aiming to solve major scientific issues restricting China's economic and technological development;

International cooperation projects with first-class foreign research institutions universities and enterprises to carry out cooperation in research and development, attracting outstanding overseas talents and teams to work in China, promoting China's international scientific and technological cooperation base construction, and strengthening China’s capacity of indigenous innovation.”

For the Special funds programme the current programme information is available in Chinese².

Bilateral S&T cooperation programme

“Bilateral S&T cooperation programme between governments publishes calls for proposals concentrating on certain countries/regions.”

From [12]: “Bilateral cooperation is cooperation in which through parallel support arrangements each nation is committed to funding R&D performed by the joint venture partner company from its own country in accordance with its own respective laws and regulations and based on its own decisions.”

All current funding opportunities available under this scheme are listed in the Chinese language³ for Sino-Germany S&T Cooperation Projects, Sino-France S&T Cooperation Projects, Sino-UK S&T Cooperation Projects, Sino-Italy S&T Cooperation Projects and Sino-Denmark S&T Cooperation Projects. Each cooperating country has their own mechanism for parallel funding under this scheme for their nationals, for example, in the case of the UK⁴ this is handled by Research Councils UK (RCUK).

² <http://www.istcp.org.cn/index.html>

³ http://www.most.gov.cn/tztg/201109/t20110905_89483.htm

⁴ <http://www.rcuk.ac.uk/international/funding/collaboration/>

Currently China only engages in projects under the in Bilateral S&T cooperation programme with Germany, France, The United Kingdom, Italy, and Denmark. Member state participation in projects in this programme is dependent on that involvement being funded by the member state concerned.

NSFC international activities

The National Natural Science Foundation of China (NSFC) is an institution aimed at promoting and financing basic research and applied research in China which is directly affiliated to the State Council for the management of the National Natural Science Fund.

The NSFC web page on its international activities⁵ gives country by country information on its cooperation with national scientific organisations with links to the web sites of the national organisations they cooperate with. While all these web sites are in the national languages several have links to English language versions.

The bilateral ICT R&D&I cooperation with China will now be reviewed on a member state by member state basis for those member states that engage in it. The review was carried out through web search, it updates and expands the information on ICT R&D&I cooperation provided in [1]. Where applicable the extent of member states involvement in ICT R&D cooperation with China in FP7 projects is summarised so to establish the importance of their bilateral cooperation compared to their cooperation in FP7. In the following member states are addressed in alphabetical order.

Member state cooperation with China in ICT R&D&I

Austria

The priority areas of the bi-lateral cooperation between the Federal Ministry of Transport, Innovation and Technology (BMVIT) of the Republic of Austria and Chinese partner authorities include “Green Technology”.

A Memoranda of Understanding was signed between AustriaTech - Federal Agency for Technological Measures Ltd. and Chinese City People’s Government on cooperation in the ICT related field of “Low-Carbon-City” planning. In 2012 there were two bilateral agreements with the People’s Government of the City of Nanchang (the capital of Jiangxi Province, a prefecture-level city) and the Huangqiao (district’s) People’s Government of the City of Taixing (a county-level city in Jiangxi Province).

There was extensive cooperation between Austria and China through FP6 and FP7 projects. In FP6: Austria was involved in networking and cooperation with Chinese partners and other EU partners in 53 projects with 76 Austrian and 87 Chinese participations. In FP7 by March 2012 Austrian involvement in networking and cooperation with Chinese partners comprised 27 projects with 43 Austrian and 35 Chinese participations.

⁵ <http://www.nsf.gov.cn/publish/portal1/tab159/info24587.htm>

The Austrian Science Fund (FWF)⁶ web site provides links to the China Scholarship Council CSC-FWF Scholarship Programme that is aimed at incoming Chinese PhD students, the FWF bilateral agreement with the NSFC, and Joint Projects to support bilateral research projects with closely integrated content, however there are no current calls for Joint Projects with the NSFC.

Austria hosts The International Institute for Applied Systems Analysis (IIASA)⁷: “Founded in 1972, the IIASA conducts policy-oriented research into problems of a global nature that are too large or too complex to be solved by a single country or academic discipline. IIASA is sponsored by its National Member Organizations in Africa, Asia, Europe, Oceania and the Americas. Its research is independent and completely unconstrained by political or national self-interest.” The NSFC is China’s National Member Organization.

Belgium

Belgium has a decentralised approach to scientific co-operation with China that reflects the governance of the country and for Flanders and the French speaking community microelectronics is a priority area of cooperation which has resulted in one joint institute, the IMEC/Zhangjiang Hi-tech Park/Huali on nanoelectronics.

The Ministry of Science and Technology of the People’s Republic of China (MoST) cooperates with FWO ((Research Foundation – Flanders) and WBI (Wallonie-Bruxelles International) on research projects in microelectronics; researchers of professorial rank are eligible project funding.

The Chinese Scholarship Council (CSC) has agreements with WBI that aim at promoting and encouraging cooperation in research and higher education between university level institutions with ICT and nanoelectronics being priority areas.

FWO has an incoming mobility programme for postdocs called Pegasus.

"Platform for Innovation China-Wallonia" promotes Wallonia technological innovations in China through technology transfer partnerships as a public service.

Czech Republic

On the website of the Czech Academy of Sciences of the Czech Republic⁸ it is easy to verify that no cooperation activities with China are reported around ICT.

Denmark

In September 2007 a Memorandum of Understanding (MoU) was signed between the Danish Ministry for Science, Technology and Innovation (MSTI) and the Ministry of Science and

⁶ <http://www.fwf.ac.at/en/>

⁷ http://www.iiasa.ac.at/web/home/about/whatisiiasa/what_is_iiasa.html

⁸ <http://www.cas.cz/index.html>

Technology of the People's Republic of China (MoST) on scientific and technological cooperation. ICT is a priority area as is the related area of nanoscience and technology.

In September 2007, the Danish Ministry for Science, Technology and Innovation and the Danish Ministry for Foreign Affairs opened Innovation Center Denmark⁹ in Shanghai. Its mission is to promote Denmark as a knowledge society and facilitate cooperation between Denmark and China within R&D and innovation. It was provided with limited funding to support network activities; Denmark's first research attaché in China was stationed at Innovation Centre Denmark ([2]). The Centre offers a wide selection of services to Danish researchers and companies looking to innovate and grow in China. Through its services and initiatives it seeks to ensure a Danish business is provided with the best possible solutions if it is looking to grow in China. It works in various sectors but claims to be especially strong within ICT, Cleantech and Life Sciences

In February 2008, the Danish Ministry for Science, Technology and Innovation published a strategy for knowledge-based collaboration between Denmark and China [2]. The implementation of this strategy focusses on education and research fields where Denmark and China hold a powerful position or have a strong potential, and ICT is identified as one such field. Within this framework it is up to individual researchers and knowledge institutions in Denmark to identify relevant collaboration partners supporting the principle of researcher driven collaboration. It notable that the strategy states [2]: "Denmark is only really interesting for China when Danish knowledge institutions and innovative businesses are present with an adequate critical mass of visible competencies that are in demand in China." Furthermore, careful consideration needs to be given to the observation that [2]: "in collaborating with China it is important to ensure that the Danish effort is firmly anchored in the political system."

In collaboration with the National Natural Science Foundation of China (NSFC), the Danish National Research Foundation (DNRF) established a joint program that funds Danish-Chinese research centers¹⁰. This programme began in 2005 and, since 2008, has given rise to 10 Danish-Chinese research centers; under the program the DNRF offers 10-15 mil. DKK to a Danish research center over a period of three years and their Chinese counterparts are supported by the NSFC. It is possible for Centers' funding to be extended into a second funding period. The DNRF expects to spend up to 140 mil. DKK on the programme.

The DNRF provides a list of current Danish-Chinese research centres¹¹. Of these three are essentially ICT focussed:

- The Danish-Chinese Center for the Theory of Interactive Computation, partners: Aarhus University and ITCS, Tsinghua University, funded 2011-14.
- The Danish-Chinese Center for IDEA4CPS: Foundations for Cyber-Physical Systems, partners Aalborg University and East China Normal University, funded 2011-14.

⁹ <http://kina.um.dk/en/about-us/danish-representations-in-china/innovation-center-shanghai/>

¹⁰ <http://dg.dk/en/internationalization/danish-chinese-research-centers/>

¹¹ <http://dg.dk/en/internationalization/danish-chinese-research-centers/list-of-research-centers/>

- Danish-Chinese Center for Applications of Algebraic Geometry in Coding Theory and Cryptography, partners DTU Mathematics and East China Normal University, funded 2011-14.

Finland

An important basis for S&T Finland-China cooperation is the Science and Technology Cooperation Agreement between the two countries. Cooperation under this agreement is administered by the Ministry of Employment and the Economy of Finland (MEE) and Ministry of Science and Technology of the People's Republic of China (MoST). In 2011 a Memorandum of Understanding on Nanotechnology cooperation was signed.

As of March 2012 there was one Finland-China joint initiative the China-Finland ICT Alliance between Tivit Ltd. and Shanghai Research Center for Wireless Communications (WICO).

In Finland the main framework for bilateral cooperation in ICT is the China-Finland ICT Alliance. This initiative was originally set up to meet the cooperation needs of ICT-focused Finnish research institutes and companies. However, going forward for the alliance to align with Finland's national strategy for cooperation in R&D&I with China its focus has been broadened beyond traditional ICT to multilevel and multi-linked applications supported by ICT in those areas where Finland has globally recognised capabilities. Consequently, [3]: "The main objective of the China-Finland ICT Alliance is to advance an efficient and business-oriented cooperation between China and Finland in ICT and ICT enabled applications and services in society and industry."

Recent Finnish government initiatives such as [4] have been directed towards enabling a move towards ICT enabled applications and services.

Cooperation through the China-Finland ICT Alliance commenced in the following mutually agreed thematic areas [3]: Future Wireless (Connection), Future Wireless Networking and Core Network, and Future (Ubiquitous) Services. As of September 2012 there had been no joint Finland-China calls for research funding in these areas under this framework. Related research funding decisions were being made separately by MoST on the Chinese side and by Tekes on the Finnish side. First stage projects have produced a number of joint publications and standards proposals. Going forward the most important feature of this work is that it has established cooperation and exchanges that can be exploited when seeking to extend the joint work to new themes involving considerable industry and business oriented elements. To appreciate the significance of this it is important to note that on the Finnish side the cooperation to date has essentially been university led. Even though within the EU it is widely recognised that Finnish industry and academia are very well connected, within Finland it is acknowledged by policy makers that a systematic approach is needed to develop ICT R&D cooperation with China into large scale business relationships [3].

The following lessons learned through the work of the China-Finland ICT Alliance have been fed through to policy makers in Finland [3]:

- “At the university level, cooperation has traditionally stemmed from the individual initiatives of professors, researchers and research teams. University cooperation has naturally developed to the direction where links are also becoming established at institutional levels, the university-university level. This cooperation layer has proved to be a practical way for opening up international R&D&I cooperation.”
- “At the (large) company level, international research cooperation among companies has been almost non-existing as they carry out their R&D activities independently due to IPR, financial, administrative and other relevant issues. Chinese companies have been even more “closed” with their R&D cooperation model and this appears to apply also to their collaboration with local Chinese universities. The large multi-national companies have had some research activities with top-class Chinese universities facilitated typically by their local China-based R&D centres. SMEs, on the other hand, have so far been very marginally involved in this cooperation due to the lack of resources and skills for international R&D even though they could substantially benefit from such cooperation.”

To highlight the above issue, a table giving the projects under the China-Finland ICT Alliance which were on-going in September 2012 is provided, the project partners are listed in the table taken from [3].

Chinese Project	Partners	B.	Finnish Project	Partners	B.
<i>Key Technology Research for Future Wireless Connection</i>	WICO, ZTE, POTEVIO, Datong Mobile, Tsinghua Univ, Southeast University, Beijing University of Posts and Telecommunications (BUPT), University of Electronic Science and Technology of China (UESTC), Tongji University, Beijing Jiaotong University (NJTU), Jushiri Technologies, Inc, etc	1,1 ME	NETS 2020 and JADE	Oulu University/CWC, Aalto University, Nokia, VTT	2 ME
<i>Research on Future Ubiquitous Services and Applications</i>	SIMIT, Huawei, WICO, DTmobile, ZTE, institute of Acoustics, Shanghai Jiaotong University, University of Science and Technology of China (USTC), Zhejiang Univ, BUPT, Huazhong Univ of S&T, Southwest Jiaotong Univ, Xiao'an Jiaotong Univ, Xidian Univ, Tsinghua Univ, etc	1,1 ME	Ubiserve	Aalto University, Tampere University of Technology, Jyväskylä University	1,2 ME
<i>R&D of Future Wireless Networking and Core Network</i>	Beijing University of Posts and Telecommunications (BUPT), DTmobile, BJ Starpoint Inc, WiCo, Southeast Univ, Chongqing Univ of Posts and telecommunication, Huazhong Univ of S&T, Xian Jiaotong Univ etc	0,2 ME	Energy and Cost Efficiency for Wireless Access	Aalto University, Tampere University of Technology + companies	1,4 ME

This situation could be perceived to be the result of Finnish ICT R&D&I operating outside of a European ICT Pole of Excellence (EIPE), see [5] for more information on EIPE, and this led Tekes the Finnish Funding Agency for Technology and Innovation, the main public funding organisation for R&D in Finland, to develop a cross sector model of clustering.

The website of the Academy of Finland¹² indicates the main focus of its recent activity with China has been in comparative law.

¹² <http://www.aka.fi/en-GB/A/>

France

France and China decided in the last joint committee meeting (Paris, 30 May 2011) to reinforce their S&T cooperation on topics which included ICT and smart cities. A bilateral workshop was organized for each topic to identify detailed cooperation perspectives and plan actions on the period 2011 - 2014.

French joint institutes with China are ‘bottom-up’ initiatives. The France-China joint laboratories related to ICT are: The Sino-French laboratory for computer science, automation and applied mathematics, The Sino-French institute for engineering education and research – IEER (Guangzhou), The Mechatronics laboratory: methods, models and crafts – M3M (Xi’an), and the Cooperation platform “Complexcity” in Shanghai (UTSEUS).

The French Embassy organises meetings involving French companies involved in R&D&I in Shanghai, Beijing and Guangzhou (Clubs R&D).

COOPOL Innovation is a program established in 2008 by the Service of Science and Technology (SST) of the French Embassy in China after the signature in 2007 of an agreement between the French competitiveness clusters and the Chinese science parks. As such it is an interesting initiative in support of clustering. Its goal is to facilitate the cooperation between French innovative small and medium sized enterprises (SMEs) of the competitiveness clusters and their research partners with their Chinese counterparts. The program has two parts: 1) An exploration mission of one week organized by the SST, for two persons (one from the SME, one from the partner research institution), to meet potential collaborators, both academics and industrials; 2) A subvention to a R&D collaborative project. This program has been made to support R&D projects and not only commercial projects.

France’s *Agence nationale de la recherche* (ANR) and the National Natural Science Foundation of China (NSFC) have one call for proposals each year to support new Sino-French projects. Its priorities for 2012 were on ICT and Green and Sustainable Chemistry.

Germany

First intergovernmental consultations between Germany and China were held in June 2011 between the Ministry of Education and Research (BMBF), Germany, and MoST. Information and communication technologies are a priority theme of cooperation for BMBF.

The main German initiatives in Information and Communication technologies are Joint Institutes: The Sino-German Joint Laboratory of Software Integration Technologies (SIGSIT) in Beijing is a joint institute by Fraunhofer society and CAS. The institute develops next generation software integration technologies in innovative solutions and the Sino-German Joint Institutes for Information and Communication: The Sino-German Joint Software Institute (JSI) in Beijing and the German-Sino Mobile Communication Institute (MCI) in Berlin perform joint Chinese-German research activities. The collaboration is supported by MoST, and BMBF, Germany.

In the area of eco-cities two cooperative projects with Chinese partners were funded by the BMBF “The Sustainable Development of the Megacities of Tomorrow” initiative. The Hefei

project: Metrasys - Mega Region Transport Systems for China focussed on analysing the current planning processes for the city development and transportation and to implement up-to-date traffic management systems.

In FP7 Germany was among the EU-Member States with the highest number of projects with Chinese participation.

There exists an Eco-platform for Sino-German collaboration in the Qingdao's Sino-German Eco-Park¹³: “an example of the city's efforts to use German experience for its sustainable development. The park was built under an agreement between top leaders of both nations. When completed, the 11.6 square km eco-friendly industrial park is expected to host 60,000 people. The park's design uses German concepts and energy conservation, smart power grids and efficient irrigation have been created with the help of German companies.” Reflecting German excellence, in particular in advanced manufacturing, the core industries of the park are energy saving, new energy and advanced equipment manufacturing. Although not focused on ICT the work of this park highlights the Chinese preference for R&D cooperation with poles of global excellence in areas of key national interest. It also highlights the degree to which this preference results in highly targeted bilateral cooperation reinforcing the message of [6] that the transfer of ‘best practices’ in collaboration is far from straightforward.

The German research foundation *Deutsche Forschungsgemeinschaft* (DFG)¹⁴ website reports activities with China but nothing specific to ICT.

Greece

The website Greece's National Hellenic Research Foundation¹⁵ does not appear to mention activities with China.

Ireland

The Science Foundation of Ireland¹⁶ website reports significant cooperation activities with China. In particular, a 2013 Science and Innovation Cooperation¹⁷ which involved up to one million euro of funding up to € 1 million of funding over 12 months by the Irish Government to advance science and innovation cooperation between Ireland and China, a significant level of matching funding from China had already been obtained or pledged. The funding will focus on a number of thematic areas of co-operation priorities including Nanotechnology and ICT and Health. The International Strategic Collaboration Programme: China (ISCP China) aims to build research capacity between Irish and Chinese universities and knowledge-intensive

¹³ http://www.chinadaily.com.cn/m/qingdao/2014-05/09/content_17495935.htm

¹⁴ <http://www.dfg.de/en/index.jsp>

¹⁵ <http://www.eie.gr/index-en.html>

¹⁶ <http://www.sfi.ie/>

¹⁷ <http://www.sfi.ie/news-resources/press-releases/science-and-innovation-cooperation-between-ireland-and-china-to-receive-significant-funding.html>

industries in the strategically important areas including ICT¹⁸ which is a universities driven collaboration.

Italy

The English language brochure that can be downloaded from the website of *Consiglio Nazionale delle Ricerche*¹⁹ (The National Research Council, Italy) makes no mention of China. However, it is important to note that Italy does have very extensive collaboration with China through the Sino-Italian Cooperation Program for Environmental Protection (SICP)²⁰ and that this does have implications for ICT R&D&I.

From²¹: In October 2007 a ten-story C-shaped green building was unveiled on the Tsinghua University campus—the Sino-Italian Ecological and Energy Efficient Building (SIEEB) – that houses not only Tsinghua University’s Department of Environment and Technology but is a center for teaching, experiments, research and Sino-Italian environmental technology exchanges as well as a model for future Chinese eco-building construction. In September 2010, SICP hosted a series of international workshops at the Shanghai World Expo’s Italian Pavilion that highlighted eco-friendly technologies, climate change and sustainable development, as well as progress in the Sino-Italian environmental and energy cooperation over the past decade.

The SIEEB green building project is just one of the many environmental cooperation initiatives between Italy and China cooperation which have since expanded to many other government departments, universities, research institutes and enterprises. The focus of SICP is primarily high-level technical cooperation to create on-the-ground initiatives with Chinese national institutions and municipal authorities. To facilitate projects, a Joint Program Management Office was established in Beijing coordinated by the Italian Trade Commission. Bilateral work on energy and environment tends to be technology focused and takes a three-pronged approach: pilot projects; cooperative research programs; and capacity building exercises. More than 200 projects have been carried out by the two partners and their affiliates in a wide variety of areas. The total value of on-going and past projects is over \$438 million, nearly half of which was co-financed by the Italian Ministry for the Environment, Land and Sea (IMELS) and multilateral funds. Italy was also responsible for the first international cooperation project for earthquake reconstruction in Gansu Province.

The Urban Energy Planning for Sustainable Development (ENP) initiative was charged with identifying and evaluating optimal solutions for Chinese municipalities to reduce CO2 emissions and to improve integrated environmental quality in the long run. The project began by selecting three second and third-tier municipalities: Jinan, Suzhou, and Taiyuan, which represented a cross-section of energy efficiency challenges in industry, building, and transportation sectors. A complete energy characterization of the selected municipalities was

¹⁸ <http://iscpchina.ie/>

¹⁹ <http://www.cnr.it/sitocnr/Englishversion/Englishversion.html>

²⁰ <http://www.sinoitaenvironment.org>

²¹ <http://www.wilsoncenter.org/publication/ces-11-pp-216-238>

set up to gather the fundamental information of the main energy consumption sectors and possible energy efficiency improvements. The methodologies and outcomes for energy efficiency in these municipalities was disseminated through an English- language publication and an online “energy portal” that guided users through energy assessment steps. This portal is a significant example of ICT as an enabling technology.

Lithuania

Mobile operator Omnitel, University of Vilnius (Lithuania) and China's Huawei Technologies established a joint research laboratory in autumn 2011 which focuses on speech recognition, cloud computing, and other issues.

Lithuania's NORTHTOWN technology park signed a cooperation agreement with the EU Innovation Center Chengdu EUPIC and Chengdu high-tech industrial park. The main cooperation fields include IT. The main objectives of this cooperation are active communication, cooperation in innovation, trade and investment and other bilateral cooperation.

The Netherlands

The Netherlands has two Sino-Dutch Joint Institutes related to ICT which are the Joint Initiative on Internet of Things, the Dutch partner is IMEC HOLST Center and the Chinese partner is SIMIT, and the TU Delft Beijing Research Centre Delft University of Technology, the Dutch partner is TU Delft and the Chinese partner is the CAS Institute of Semiconductors.

The Netherlands Organization for Scientific Research (NWO)²² website provides links to the Hé Programme of Innovation Cooperation (PoIC) Sino-Dutch partnership in research and innovation 2013²³ . Crucially funded projects will include industry as proposals for projects must include at least four parties: one Chinese industry partner; one Dutch industry partner; a Chinese academic research institution, and a Dutch academic research institution. Within The Netherlands, the research themes to be addressed have to fit the ICT Roadmap of the Topsector High Tech Systems and Materials (HTSM) or the Chemistry Innovation Contract of the Topsector Chemistry. For China the International Science and Technology Programme (ISTCP) provides the policy context. For 2012-13 priorities included LED and Semiconductors.

The Netherlands Organization for Applied Scientific Research (TNO)²⁴ website contains some interesting links to Sino-Dutch research activities though these do not appear to be NSFC funded including the September 2012 partnership agreement between TNO and Beijing Building Technology Development Company (BBTDC) to extend TNO's Urban Strategy

²² <http://www.nwo.nl/en>

²³ <http://www.nwo.nl/en/documents/cw/cooperation-china---ha-programme-of-innovation---call-for-proposals>

²⁴ <https://www.tno.nl/index.cfm?Taal=2>

software in China for more environmental variables and to use it for the “Haidian District”²⁵ megaproject in Beijing.²⁶ Also of interest is the AGT International partnership of November 2011 with Yellow River Conservancy Commission (YRCC) of the People’s Republic of China to implement the first milestone in a long-term program surrounding the AGT International Flood Early Warning System (FEWS) in the Yellow River’s local environment.

Slovenia

Slovenian and Chinese researchers jointly collaborated in at least 3 projects in 7th Framework programme for RTD in the domain of ICT.

The Research and Innovation Strategy of Slovenia 2011-2020 [7] directly addresses ICT under establishment of capacities in support of research and development. This is about securing the budget for the development and maintenance of the e-Infrastructure needed to make use of emerging distributed forms of research activity so there is a focus on high performance computing and innovation in knowledge-based services which enhance innovation in a horizontal manner. Therefore although Slovenia has identified ICT as a priority area it is not a priority in the sense of a commitment to dedicated ICT R&D.

Spain

A Spain-China Joint declaration on industrial, technological cooperation, and cooperation in the fields of telecommunication and Information Society was signed in 2002. However, as of 2012, none of the priority fields for this Spain China cooperation were focussed directly on ICT R&D and only two clearly have the potential to involve significant ICT related R&D: 1) Climate change and environmental sciences, low carbon emission industries and the new energy vehicles, 2) LED technologies; Reducing carbon emissions encompasses sustainable electrical power generation which to be fully exploited normally requires the use of smart grid technologies. LED technologies can be relevant to ICT R&D because the high switching rates of LEDs are useful in advanced communications technology.

As an aside it is interesting that one of the Spain-China priority areas of cooperation is: Human resources, fostering the training of R&D experts, the return to their home country of famous scientists of Chinese origin and the attraction of foreign experts. This explicitly addresses China’s concern about the brain drain it experienced in previous decades.

In FP6 Spain cooperated with China in 79 projects, 29 of which were related to information society technologies.

Since 2012, to the knowledge of the organisers of this document, the main Spain-China ICT related initiative of note in the context ICT R&D took place on 9 April 2014, the ICO

²⁵ North West part of Beijing city where Z-park High Tech Park, Tsinghua University, and Beijing University are located. (Z - Zhong Guan Cun)

²⁶

https://www.tno.nl/content.cfm?context=overtno&content=persbericht&laag1=37&item_id=201209140039&Tal=2

Foundation and Casa Asia organised conference on the Evolution of ICT and its role in Chinese society: e-commerce and digital governance²⁷, the objective of which was to present the evolution of e-commerce and digital governance.

The mission of the ICO Foundation²⁸ is to support and contribute to the development of society by promoting culture and knowledge in Art, Education, Self-employment and Entrepreneurship, Studies and Publications, Forums and Debates. With an annual budget of approximately €2.5 million, it operates mainly in Spain, but has strong international ties, particularly with China and Germany.

Casa Asia²⁹ aims to strengthen the knowledge and dialogue on Asia in Spain by supporting activities and projects that contribute to a better understanding between Asian and Spanish societies and promote the development of relations between them.

ICO Foundation and Casa Asia are patrons of the Spain China Council Foundation³⁰, a private non-profit organization whose purpose is to promote the growth of bilateral relations between Spain and China by promoting activities that encourage cultural exchange and trade between Spain and China.

Finally, and more importantly the existence of the The Hispano-Chinese Bilateral Technology Cooperation Program (Chineka) and its potential as a source of funding for bilateral ICT R&D&I should be noted. Chineka³¹: “promotes international technological cooperation between Spain and China institutions through projects led by companies with the aim of boosting the competitiveness of Spanish and Chinese companies to encourage and support the implementation of projects technological units, oriented to development and / or adaptation of new products, processes or services intended for international markets.” Crucially, projects may be in any technical area and the participation of public research organizations within consortia is allowed.

Sweden

On 16 February 2012 the Swedish Government adopted a new strategy on research and innovation cooperation with China [8]. It is stated in [9] that: “the strategy aims to increase and deepen the collaboration with China, identifies areas of priority and tasks Government Agencies with implementing different parts of the objectives.” However, what the report says about relations with China is really a declaration of intent to facilitate export and internationalisation among small and medium-sized enterprises. Interestingly it does note that in China: “Within information and communications technology, for example, the development

²⁷ <http://www.spain-china-foundation.org/es/noticia/casa-asia-y-fundacion-ico-organizan-una-conferencia-sobre-las-tic-en-china>

²⁸

http://www.fundacionico.es/fileadmin/user_upload/FUNDACION/PRESENTACION_FUNDACION_ICO_EN_G_mayo14.pdf

²⁹ <http://www.casaasia.es/>

³⁰ <http://www.spain-china-foundation.org/es/fundacion>

³¹ <http://www.cdti.es/index.asp?MP=7&MS=563&MN=3&TR=C&IDR=101>

of certain new functions and areas of application is moving quicker than in other more wealthy countries.”

In terms of cooperation this strategy is starting to deliver tangible results. For example, the Sweden in China - Trade & Promotion newsletter of April 2014³² reports that: “the (Swedish) Consulate General in Shanghai, together with a number of partners, has organized a week of urbanization-themed seminars and workshops under the title of Smart Urban Living - Sino-Swedish Solutions for Cities on the Move. The objective of this week of events is to be a platform for meetings and discussions on the challenges and opportunities of urbanization and create awareness about Swedish solutions, expertise and technology. In addition to a number of seminars, challenges and events on the topic of urbanization.”

Related to the above, on 23 September 2014 Business Sweden in cooperation with the Consulate of Sweden in China led a delegation in Shanghai on the topic future elderly care and solutions for homecare. The overall objective of the delegation was to build a Chinese - Swedish platform for experience exchange³³. .

United Kingdom

Research Councils UK (RCUK) have agreed a number of joint calls on research, with the Natural Science Foundation of China and Chinese Academy of Sciences. The Research Councils had a joint call with the Natural Science Foundation of China on Smart Grids (£3m and matched NSFC effort). This formed part of a series of calls for collaborative research and forms part of an ongoing collaborative programme with China. Discussions on future activity included the internet of things.

Details of the RCUKs current calls for funding for UK-China collaborative research is available on the RCUK China website³⁴. RCUK will coordinate the delivery of multidisciplinary research in the priority area of Digital economy³⁵. The funding is for multidisciplinary research.

By way of examples of excellent UK-China collaborative projects funded by RCUK, the RCUK website provides case studies including one on R&D on (B)4G Wireless Mobile Communications³⁶. The aim of the project was to promote systematic, long-term, and sustainable collaboration between the UK and China in the R&D of 4G and beyond 4G (B4G) wireless mobile communication systems and may provide insights into how to achieve sustainable EU-China collaboration. The collaboration consortiums include 10 UK universities, one UK company, and 6 Chinese universities with 7 Chinese companies.

The UK-China Science Bridge funded by RCUK is a strategic alliance between Queen’s University Belfast and leading universities and industrial partners in both China and the UK³⁷.

³² <http://www.ichuguo.org/swinchina/swinchina102.html>

³³ <http://www.business-sweden.se/en/about-us/Seminars-and-events/EventsSeminars/Elderly-Care-Delegation-to-China/>

³⁴ <http://www.rcuk.ac.uk/international/offices/china/>

³⁵ <http://www.rcuk.ac.uk/research/xrcprogrammes/>

³⁶ <http://www.rcuk.ac.uk/international/Offices/china/case/MobileCommunications/>

³⁷ <http://www.qub.ac.uk/sites/sciencebridge/>

The project is intended to accelerate the deployment of research knowledge, deepen and strengthen current research links and contribute to wealth generation in both the UK and China through dedicated technology transfer in the following fields: Sustainable energy and associated control techniques and Sustainable built environment. Associated research clusters at Queen's include the Intelligent Systems & Control research Group (ISAC). The project is funded collaboratively by RCUK and Queen's University Belfast to an amount of £2.3 million. A report on its activities is available on web site of Queen's University Belfast³⁸

Conclusions

The importance to some member states of FP7 collaborative projects as a mechanism for ICT R&D collaboration with China is apparent. For Spain, Austria and Slovenia they have been the main mechanism for collaboration and they were a significant part of Germany's overall collaborative activities. Chinese involvement in FP7 was funded by the EU thus raising concerns over reciprocity.

Bilateral cooperation guarantees reciprocity because it is cooperation in which each nation is committed to funding R&D performed by the joint venture partner company from its own country. Each cooperating country has their own mechanism for parallel funding under this scheme.

Joint Institutes play a very important role in some member states bilateral collaboration in ICT R&D with China. The following member states known to have Joint Institutes with Chinese partners; Belgium, Germany, France, Lithuania, and the Netherlands; an overview of Joint Institutes (Laboratories) in China is provided in [10].

Relatively few member states have funded distinct bilateral ICT R&D collaborative projects with China: Belgium, Germany, France, Finland, and UK.

Currently relatively few member states are interested in dedicated ICT R&D collaboration with China. Of those that have identified ICT as a strategic interest in S&T research collaboration at least 2 are not interested in specific ICT R&D collaboration as such but see ICT as a key horizontal enabler.

The National Natural Science Foundation of China (NSFC) has bilateral cooperation with a number of member states national scientific organisations and provides links to their web sites which reveal that both Ireland and the Netherlands have important strategic ICT R&D collaborative projects with China.

Eco-cities related ICT R&D bilateral cooperation activity with China has been undertaken by Germany and the United Kingdom. This is an area of interest for Austria and Sweden. Related to this, Italy's major vehicle for S&T R&D&I collaboration with China appears to be the bilateral Sino-Italian Cooperation Program for Environmental Protection (SICP), ICT contributes to this program as an enabler.

³⁸ www.qub.ac.uk/sites/sciencebridge/ScienceBridgeReport/

RCUK funded projects are examples of bilateral collaborative ICT R&D projects with China that have industrial as well as academic participants on both sides. Some explicitly seek to establish sustainable collaboration outside of RCUK funding.

Recommendations

The International S&T Cooperation Programme (ISTCP) of the Ministry of Science and Technology of the People's Republic of China (MoST) engages with Europe at the bilateral or multilateral level not the EU level. The ISTCP funds projects with foreign research institutions universities and enterprises to carry out cooperation in R&D:

- attracting outstanding overseas talents and teams to work in China, promoting China's international scientific and technological cooperation base construction
- strengthening China's capacity of indigenous innovation

The Chinese preference for R&D&I cooperation with poles of global excellence in areas of key national interest results in highly targeted bilateral cooperation a consequence of which is that the transfer of 'best practices' in bilateral cooperation is far from straightforward. What is clear is that the Chinese will only engage in cooperation with centres of internationally significant expertise. Furthermore, bilateral ICT R&D cooperation with China cannot be pursued outside of considerations of innovation so in this context the target of cooperation must be international excellence in ICT R&D&I.

The Danish strategy for knowledge-based collaboration between Denmark and China [2] gives voice to an impression gained of the way other nation's bilateral collaborative activities with China have been initiated: in collaborating with China it is important to ensure that the effort is firmly anchored in the Chinese political system.

Smaller member states seeking to initiate bilateral cooperation activities in ICT R&D&I with China are encouraged to follow the example of Lithuania and identify any internationally significant ICT industry players with a strong business link to a major Chinese ICT industry player and where such a link exists then provide high level political support at the national level for developing long term strategic company to company collaboration.

For some EU member state organisations with internationally significant expertise interested in pursuing bilateral ICT R&D&I collaboration with Chinese organisations this report provides links to national agencies which are the first point of contact for exploring what is possible.

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