

Public Research and Innovation Funding Actors in China



STINT

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Preface

The mission of the Swedish Foundation for International Cooperation in Research and Higher Education (STINT) is to internationalise Swedish higher education and research. STINT promotes knowledge and competence development within internationalisation and invests in internationalisation projects proposed by researchers, educators and leaderships at Swedish universities.

China is now one of the world's leading science nations. The rise to prominence is due to a sustained effort by the Chinese government since the late 1970s to develop its R&D. An important contributing factor has been continuously rising levels of research funding. Research funding in China has risen rapidly due to a continued increased R&D spending as a proportion of GDP coupled with a rapidly growing GDP. As of 2017 China's R&D spending accounted for 2,1% of China's GDP, representing about 20% of the total global research spending. China's R&D investment growth remains significantly larger than that of the US and EU.

For Sweden as a science nation it is imperative to understand, interact and collaborate with the Chinese R&D and higher education system. To support this need, STINT established a bilateral mobility program with the National Natural Science Foundation of China (NSFC) in 2015. STINT also set up a China group and opened an office in China in 2018 with the aim to provide knowledge and analysis. As part of our China initiative we publish a series of reports highlighting pertinent issues in Chinese academia. Given the scale of R&D funding in China a closer look at how the Chinese research funding system is organized is merited. This report focuses on how research funding is organized at a national level as well as at provincial and city levels.

The report was originally published by the Danish Ministry of Higher Education and Science and was prepared by the Innovation Center Denmark in Shanghai and Kairos Future. One key organizational change that has taken place since the original publication is that NSFC, formerly an independent entity under the State Council, was incorporated into the Ministry of Science and Technology (MOST) as part of an extensive overhaul of government agencies in China done in the spring of 2018. In practice we have yet to see any noticeable effects of this, NSFC has to a large degree maintained its independence since the reorganization.

We republish this report for the purpose of providing an understanding of how research is funded in China. In addition to describing the funding system in China, the latter part of the report also discusses pathways to access funding for non-Chinese individual scientists as well as universities and research institutions. Numerous opportunities for individual scientists to directly access funding in China through talent programs, visiting scientist schemes and other programs are indeed available at national, provincial and local levels. This is especially true for senior scientists that have already achieved a level of distinction in their field (often referred to as ‘high-level foreign talents’). As in most countries, access to research grants typically requires affiliation at a university in China, though Chinese universities can often be quite flexible in making arrangements to ensure that such requirements are fulfilled. In this context we would like to emphasize that, if applying for such programs, transparency towards the home institution in Sweden is imperative. It is the responsibility of the individual scientist to ensure that the arrangements made are acceptable for both the home and host institution. STINT has recently published a report, ‘Responsible internationalisation: Guidelines for reflection on international academic collaboration’, which provides useful advice in this respect.

We are delighted to be able to publish this report and would like to acknowledge the Danish Ministry of Higher Education and Science, Innovation Centre Denmark and Kairos Future for the work made to prepare it as well as thank Martin Bech and Thomas Trøst Hansen, former and current Consuls for Higher Education and Science, Royal Danish Consulate General in Shanghai and Innovation Attachés, Innovation Centre Denmark (ICDK), Shanghai, as well as Tomas Larsson, General Manager, Kairos Future China for helping to arrange its republication.

Tommy Shih, Science Policy Director, STINT, and Erik Forsberg, Representative in China, STINT, are the editors of STINT’s reports on China.

Andreas Göthenberg
Executive Director, STINT

Stockholm, Sweden, August 2020

1. Introduction

This report looks into the possibilities for European researchers of getting access to research funding in China. The report is divided into five sections:

The first section introduces the report.

In section two, an overview of the entire Chinese funding apparatus is provided. This section is somewhat specialised but it presents an important backdrop for understanding how the different layers of the Chinese funding system are connected and how the provincial and local level sources position themselves vis-à-vis the national level. But if you are looking for detailed practical advice on how to approach funding sources on regional and local level, then you will find section four more helpful.

Section three, explains which research funding sources are available on different administrative levels and in different parts of China. The section provides an informative graphical representation of the different provinces' and funding sources' priorities.

The fourth section, is the most hands-on section of the report. It explains how individual researches, on the one hand, and universities and research institutes, on the other, can gain access to Chinese funding. Included in this section is also some advice on issues that should receive particular attention when pursuing funding from these provincial and local sources.

Finally, in the fifth section, a few key takeaways are listed.

In connection with the preparations for this report, we have come across several interesting and promising Sino-international collaborations that rely on or pursue regional funding. At the time of publication, we are working to gather sufficient information about these collaboration projects to turn them into cases that can exemplify how the processes have unfolded as well as give some indications about funding levels for specific projects. We plan to publish these cases on the ICDK Shanghai website and social media in the near future. Stay tuned.

1.1 Method

Information has been collected through a combination of desk research, reading of policy documents, interviews of six experts in China and Europe, and analysis of the metadata of eight million academic articles published in China during the last five years.

2. The structure of the funding apparatus

This section provides an overview of the system of decision making and resource allocation in relation to public research funding in China. The section outlines current system reform, describes relevant aspects of China's political system, and provides an overview of the organs involved in the decision-making on the national and provincial levels. A recent national plan for the development of artificial intelligence, which is currently being interpreted and implemented at lower administrative levels, is used as an example.

2.1 A system under reform

The research funding system is currently undergoing changes following a major reform known as the 'Reform of the Central Financial Science and Technology Plan Management'.¹ One aim of the reform has been to integrate and unify research plans from different governmental departments in order to avoid overlapping and use resources more efficiently.² After the reform, over one hundred national-level science, technology and innovation programs have been combined into five 'pillars':

- National Natural Science Foundation of China
- National S&T Mega Projects
- National Key R&D Program
- Technology Innovation Guidance Fund and Bases
- Bases and Talents Program

The first three 'pillars' provide research funding, while the fourth is involved in commercialisation and technology transfer. The fifth pillar supports outstanding researchers and teams through subsidies and priority for other research programs.

Apart from the integration of research plans, other goals include professionalising the funding allocation, by moving the detailed decision-making from officials to experts, and making the funding apparatus more transparent.³ Another novelty introduced through the reform is a national online platform providing information

¹ 国务院印发关于深化中央财政科技计划（专项、基金等）管理改革方案的通知 [Internet] State Council (2014, December) Available: http://www.gov.cn/zhengce/content/2015-01/12/content_9383.htm

² Challenges of S&T system reform in China [Internet] Science (2017, March) Available: <http://science.sciencemag.org/content/355/6329/1019>

³ 科技部解读深化中央财政科技计划管理改革的方案 [Internet] Ministry of Science and Technology of China (2015, January) Available: http://www.most.gov.cn/kjzc/zdkjzjcd/201501/t20150106_117286.htm

and handling funding applications for the research programs within the National S&T Mega Projects and the National Key R&D Program.⁴ Similar platforms are also being introduced on the regional level.⁵ All national-level plans financed by the central government today follow the new system, although some issues remain to be fully implemented.⁶ Provincial programs have varying timelines for implementing the reform.^{7 8}

2.2 Government and party levels

The Chinese political system is characterised by parallel but overlapping and interacting hierarchies of, on the one hand, the Chinese government and, on the other hand, the Communist Party.⁹ Apart from these, the military also has influence over a wide range of fields including research decisions.¹⁰ The government and the party both have bodies on national as well as provincial and local levels. The party committee on a certain level is guiding both government bodies on the same level¹¹ and party committees on lower levels through formulating strategies and policy documents.¹² The government, meanwhile, is in charge of concretisation and implementation of these policies. The government on each level is guided both by the government on the level directly above it, and by the party committee on the same level. The guidance between party and government bodies at different levels take several forms. Steering is often done through direct directives, but key performance indicators also play an important role in incentivising career officials.¹³

2.3 From strategy to implementation

Policies regarding the allocation of public research funding follow plans¹⁴

⁴ 国务院印发关于深化中央财政科技计划（专项、基金等）管理改革方案的通知 [Internet] State Council (2014, December) Available:

http://www.gov.cn/zhengce/content/2015-01/12/content_9383.htm

⁵ 《四川省人民政府关于印发四川省深化省级财政科技计划管理改革方案的通知》解读 [Internet] The People's Government of Sichuan Province (2017, February) Available: <http://www.sc.gov.cn/10462/10464/13298/13301/2017/2/11/10413792.shtml>

⁶ 科技部举行中央财政科技计划管理改革情况发布会 [Internet] The State Council Information Office of the People's Republic of China (2017, February) Available: <http://www.scio.gov.cn/xwfbh/gbwxwfbh/xwfbh/kjb/Document/1543131/1543131.htm>

⁷ 四川省人民政府关于印发四川省深化省级财政科技计划管理改革方案的通知 [Internet] Sichuan Provincial People's Government (2017, January) Available: <http://zcwj.sc.gov.cn/xxgk/NewT.aspx?i=20170208111722-900507-00-000>

⁸ 广东省人民政府关于印发深化广东省级财政科技计划（专项、基金等）管理改革实施方案的通知 [Internet] People's Government of Guangdong Province (2016, February) Available: http://zwgk.gd.gov.cn/006939748/201603/t20160314_647521.html

⁹ 政策执行的中国特色 [Internet] Academics (2013) referred by ccln.gov.cn Available:

<http://study.ccln.gov.cn/fenke/zhengzhixue/zjpwz/zgzgz/59255.shtml>

¹⁰ 国家科技体制改革和创新体系建设领导小组召开会议 [Internet] The Central People's Government of the People's Republic of China (2012, July) Available: http://www.gov.cn/ldhd/2012-07/31/content_2195192.htm

¹¹ 习近平主持中共中央政治局常务委员会会议 [Internet] Xinhuanet.com (2016, January) Available: http://news.xinhuanet.com/politics/2016-01/07/c_11117705534.htm

¹² 省委常委会：坚决维护党中央集中统一领导 高标准严要求深化作风建设 [Internet] Xinhua Daily (2017, November) Available:

http://www.zgjssw.gov.cn/yaowen/201711/t20171114_4834755.shtml

¹³ 政策执行的中国特色 [Internet] Academics (2013) referred by ccln.gov.cn Available:

<http://study.ccln.gov.cn/fenke/zhengzhixue/zjpwz/zgzgz/59255.shtml>

¹⁴ 科技部关于印发《国家科技重大专项（民口）档案管理规定》的通知（2006-2020年） [Internet] Ministry of Science and Technology of the People's Republic of China (2017, November) Available:

http://www.most.gov.cn/mostinfo/xinxifenlei/tgzc/gfxwj/gfxwj2017/201711/t20171122_136401.htm

formulated by the State Council (in Figure 1 marked ‘3’) under guidance of the Communist Party’s Central committee (‘2’)¹⁵, and are ultimately driven by strategies formulated by the party’s National Congress (‘1’).¹⁶

A recent example is the ‘Next Generation Artificial Intelligence Development Plan’, issued in July 2017, through which the State Council established artificial intelligence (AI) as a key research field. The stated objective of the plan is to ‘accelerate the strategy of the construction of an innovative nation and global power in science and technology’ (a strategy formulated by the party).¹⁷ In a first stage, significant progress is to be achieved by 2020 in areas such as swarm intelligence¹⁸ and autonomous intelligent systems. Apart from designating funds to research projects, the plan also expresses the aim of attracting leading research talents in the AI field from around the world through the ‘Recruitment Program of Global Experts’ (also known as ‘Thousand Talents’) and by other means.¹⁹ This kind of intersections between several different official plans and initiatives can be especially interesting for researchers looking for funding opportunities in China.

Plans and programs designed at the national level are often reproduced at provincial and city levels. In the case of the national AI plan, several provinces and cities have designed their own equivalents and mechanisms for funding allocation.^{20 21}(See Section 2.5.)

¹⁵ 国家中长期科学和技术发展规划纲要（2006—2020年）[Internet] State Council (2006, February) Available: http://www.most.gov.cn/mos-tinfo/xinxifenlei/glkjgh/200811/t20081129_65774.htm

¹⁶ 习近平：决胜全面建成小康社会 夺取新时代中国特色社会主义伟大胜利——在中国共产党第十九次全国代表大会上的报告 [Internet] Xinhua News Agency (2017, October) Available: http://news.xinhuanet.com/politics/19cpcnc/2017-10/27/c_1121867529.htm

¹⁷ 习近平：为建设世界科技强国而奋斗 [Internet] Xinhua News Agency (2016, May) Available: http://news.xinhuanet.com/politics/2016-05/31/c_1118965169.htm

¹⁸ Swarm intelligence a field in artificial intelligence related to collective behaviour in decentralised systems.

¹⁹ 国务院关于印发新一代人工智能发展规划的通知 [Internet] State Council (2017, July) Available:

http://www.gov.cn/zhengce/content/2017-07/20/content_5211996.htm

²⁰ 关于征求《浙江省新一代人工智能发展规划（征求意见稿）》意见的函 [Internet] Science Technology Department of Zhejiang Province (2017, September) Available: http://www.zjkjt.gov.cn/news/node01/detail0101/2017/0101_79213.htm

²¹ 上海市人民政府办公厅印发《关于本市推动新一代人工智能发展的实施意见》的通知 [Internet] Shanghai Municipal Commission of Economy and Informatization (2017, October) Available: <http://www.sheltc.gov.cn/cyfz/675566.htm>

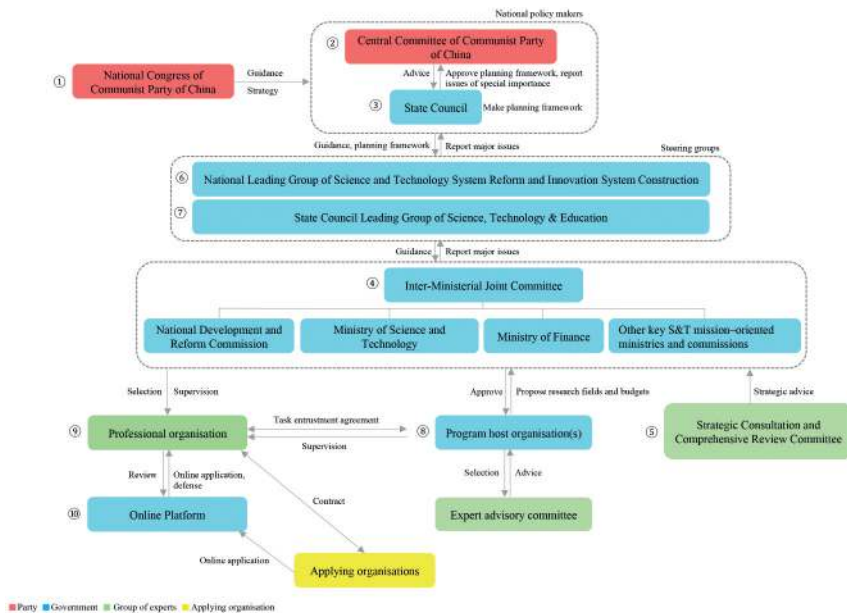


Figure 1: The funding apparatus on the national level

2.4 National level program management

The implementation of most research plans is, following the reform, on the national level organised through an inter-ministerial joint committee ('4'). The joint committee is convened by the Ministry of Science and Technology (MoST), with participation of the Ministry of Finance (MoF) and the National Development and Reform Commission (NDRC) as well as other ministries and commissions relevant for the plan in question. The joint committee is responsible for concretising the plan through setting up specific research programs.²² To assist with professional insights and strategies, an expert committee ('5': 'Strategic Consultation and Comprehensive Review Committee') is set up for the inter-ministerial committee to consult.²³

For some science plans that are considered to be of key strategic importance for the country, such as the AI plan, a steering group ('6') made up of representatives from government, party, and military is involved with the task of looking at whether adaptations of the regulatory environment are needed for carrying out the plan.²⁴ Such action is then coordinated with the State Council and in some cases also with the party's Central Committee.

²² 国家科技计划管理部际联席会议制度建立 [Internet] Science and Technology Daily (2015, May) Available: http://digitalpaper.stdaily.com/http_www.kjrb.com/kjrb/html/2015-05/15/content_303412.htm?div=1

²³ 中央财政科技计划(专项、基金)管理战略咨询与综合评审特邀委员会召开第一次专题会议 [Internet] Ministry of Science and Technology of the People's Republic of China (2015, August) Available: http://www.most.gov.cn/kjbgz/201508/t20150804_120952.htm

²⁴ China's Plan to 'Lead' in AI: Purpose, Prospects, and Problems [Internet] News America (2017, Aug)

Available: <https://www.newamerica.org/cybersecurity-initiative/blog/chinas-plan-lead-ai-purpose-prospects-and-problems/>

Another steering group ('7') is involved with a similar role for certain other major plans.²⁵

Each program that is set up by the inter-ministerial joint committee is led by a host organisation ('8'), which specifies research fields and budget plans. This can be the government body in charge of the field in question (often the Ministry of Science and Technology) or a government-affiliated research foundation. The host organisation proposes new research projects and project budgets to the joint committee, and also formulate the criteria that researchers or research institutes need to meet to be eligible to apply for project funds. These are approved by the joint committee following advice from the expert committee ('5').²⁶ Most grants do not specify an exact amount that can be applied, with some exceptions such as talent programs, where the amount is fixed.²⁷

The actual selection of who will receive funding is outsourced to a professional organisation or institution ('9') – typically a research institute affiliated under the State Council or one of the ministries – who review online funding applications submitted through platforms such as the 'National Science & Technology Information System Platform' ('10').²⁸ (The National Natural Science Fund uses its own online platform for applications.) The inclusion of professional organs in the funding allocation system is the primary display of the professionalisation introduced by the reform.²⁹ The review process differs from program to program, and often involve interviews with applicants.

The system described above applies to national-level research plans formulated by the State Council, and most national-level research programs are managed in line with it. There are however also a few programs that are set up and managed internally within specific ministries, and these programs have their own systems for funding applications.³⁰ An important example is the Ministry of Education's 'Humanities and Social Science Projects' (one of China's biggest research programs, as can be seen in Table 1).³¹ Yet other programs, including the 'National Social Science Fund of China' (also in Table 1), are managed in a similar way within the Communist Party.³²

²⁵ 科技部 发展改革委 财政部关于印发《国家科技重大专项（民口）管理规定》的通知 [Internet] Ministry of Science and Technology of the People's Republic of China (2017, June) Available: http://www.most.gov.cn/mostinfo/xinxifenlei/fgzc/gfxwj/gfxwj2017/201706/t20170627_133757.htm

²⁶ 科技部 财政部关于印发《国家重点研发计划管理暂行办法》的通知 [Internet] Ministry of Science and Technology of the People's Republic of China (2017, June) Available: http://www.most.gov.cn/mostinfo/xinxifenlei/fgzc/gfxwj/gfxwj2017/201706/t20170628_133796.htm

²⁷ 天津千人计划 [Internet] Recruitment Program of Global Experts Available: <http://www.1000plan.org/qrh/channel/151>

²⁸ 科技部发布《中央财政科技计划（专项、基金等）项目管理专业机构管理暂行规定》 [Internet] Ministry of Science and Technology of the People's Republic of China (2016, March) Available: http://www.most.gov.cn/kjbgz/201603/t20160318_124786.htm

²⁹ 科技部解读深化中央财政科技计划管理改革的方案 [Internet] Ministry of Science and Technology of China (2015, January) Available: http://www.most.gov.cn/kjzc/zdkjzcd/201501/t20150106_117286.htm

³⁰ 农业部办公厅关于印发《农业部基本科研业务费专项资金管理办法》的通知 [Internet] Ministry of Agriculture of the People's Republic of China (2016, December) Available: http://www.moa.gov.cn/govpublic/CWS/201612/t20161212_5404655.htm

³¹ 教育部关于印发《教育部人文社会科学项目管理办法》的通知 [Internet] Ministry of Education of the People's Republic of China (2006, May) Available: http://www.moe.gov.cn/jyb_xxgk/gk_gbgg/moe_0/moe_1443/moe_1444/tnull_20589.html#2

³² 关于印发《国家社会科学基金管理办法（修订）》的通知 [Internet] National Planning Office of Philosophy and Social Science (2013, May) Available: <http://www.npopss-cn.gov.cn/n/2013/0520/c219469-21542021.html>

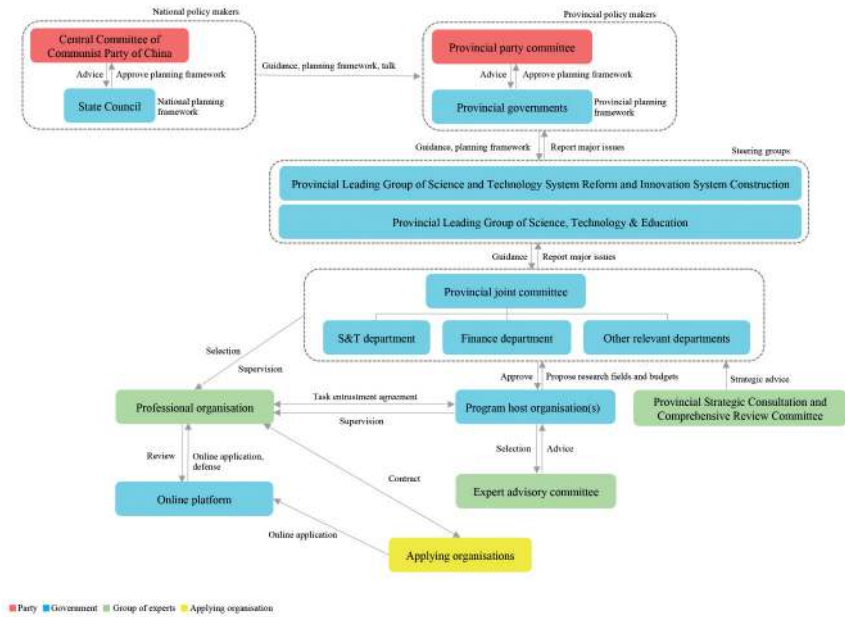


Figure 2: The typical funding apparatus on the provincial level

2.5 Provincial level program management

Different provinces and municipalities follow different timelines for implementing the new system introduced by the reform.^{33 34 35} Many today follow the new system, which is very similar to that on the national level and shown in Figure 2. The provincial party committee and the provincial government follow the policies and planning frameworks established on the national level by the Central Committee of the party and the State Council, and typically formulate their own science and technology plans in line with these. For example, the government of Zhejiang province is currently drafting a ‘Next Generation Artificial Intelligence Development Plan of Zhejiang Province’ in line with the national plan with the same name and with similar broad goals. One more specific goal is to get more than 500 key AI patents in the province.³⁶

³³ 云南省财政科技计划（专项、基金等）管理改革方案 [Internet] Yunnan Provincial Science and Technology Department (2016, February) Available: <http://www.ynstc.gov.cn/ffg/201603040009.htm>

³⁴ 山西省人民政府关于印发山西省深化省级财政科技计划（专项、基金等）管理改革方案的通知 [Internet] The People's Government of Shanxi Province (2015, August) Available: http://www.shanxi.gov.cn/sxszfxgk/sxsrnzfczm/sxszfbgt/ffg_7203/szfgfxwj_7205/201508/t20150827_145752.shtml

³⁵ 江西省人民政府关于深化省级财政科技计划（专项、基金等）管理改革的实施意见 [Internet] People's Government of Jiangxi Province (2016, January) Available: http://www.jiangxi.gov.cn/zcc/zt/jr/201604/t20160411_1260018.htm

³⁶ 关于征求《浙江省新一代人工智能发展规划（征求意见稿）》意见的函 [Internet] Science Technology Department of Zhejiang Province (2017, September) Available: http://www.zjkjt.gov.cn/news/node01/detail0101/2017/0101_79213.htm

Under the provincial government, the science and technology plans are concretised in a way that is analogous to that on the national level. A joint committee of involved departments design research programs which are implemented by a host organisation and an appointed professional organisation.³⁷ Some provinces have built their own online platforms for application and program information, although several of these platforms were ‘temporarily unavailable’ at the time this report was written.

The funding allocation systems in provinces which have not yet implemented the reform differ from the described system in that they have no joint committee, no advisory committee, and no online information and application platform. In some provinces it is still government officials, rather than experts, who review funding applications. Another exception from the model described here is that, similar to the national level, some programs are set up and managed internally within a provincial government department.

³⁷ 云南省财政科技计划（专项、基金等）管理改革方案 [Internet] Yunnan Provincial Science and Technology Department (2016, February)
Available: <http://www.ynstc.gov.cn/flfg/201603040009.htm>

3. Funding sources

This section gives an overview of funding sources on national as well as lower levels, based on analysis of metadata for eight million academic articles published in China between 2012 and 2016. The metadata includes sources of funding, which have been used in the analysis together with names of authors and classification codes for the academic fields of the articles. Combining these pieces of information, we can see the numbers of unique names of authors who have received funding from different sources and in which fields – numbers that can be used as rough approximations of how much funding has been provided by the respective sources. This approach does not give any exact figures for the funds, nor does it reflect the most recent changes to the funding system, since several years often pass between funding allocation and the publication of academic papers. Funding for research projects that do not lead to any publication will also go unnoticed with the method – this might for example include funds granted by authorities for studies that are to be used as input for decision-making. Nonetheless, thanks to the comprehensiveness of the publication data, a comparison of funding sources and research fields based on publications gives an overview of the funding allocation that is not easy to obtain through other means.

The funding sources have been classified based on patterns in their names according to which administrative level they belong to; provincial and lower level sources have also been classified geographically. Using this classification together with the data on academic fields, the figures and tables in this section show which fields have received more funding on different administrative levels and in different provinces, as well as the top sources on national and provincial level.

As can be seen in Figure 3, sources on the regional level taken together provide similar levels of funding as sources on the national level (as estimated by the number of authors having received funding from them).

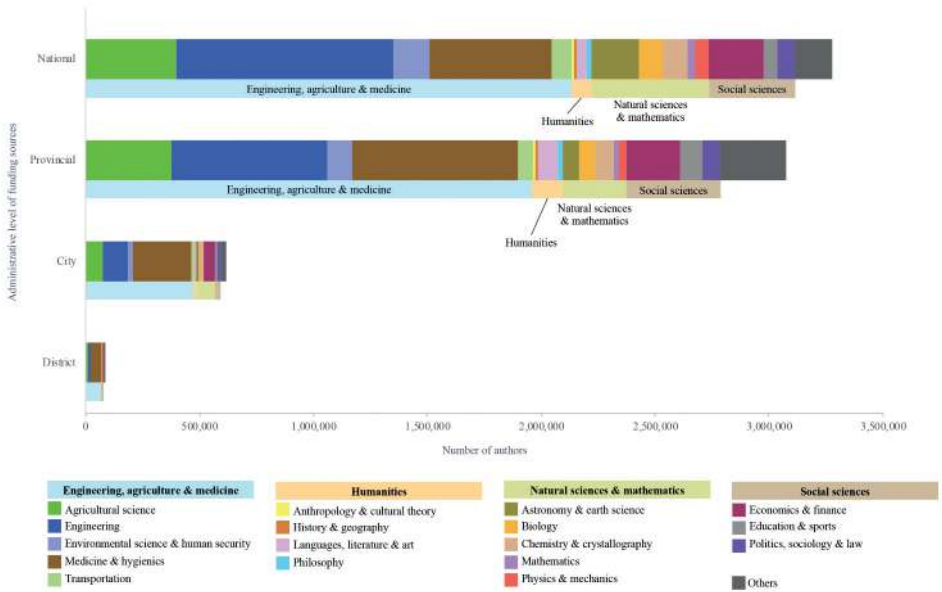


Figure 3: Funding per administrative level. The length of the bars shows the (indexed) number of authors who have received funding on each level. The fields of different colours indicate the share of number of authors having received funding in different research areas. (In reality there is some overlap between the research areas, which is not shown here.) The provincial level includes the 28 provinces and autonomous regions of Mainland China as well as the direct-controlled municipalities of Beijing, Chongqing, Shanghai, and Tianjin. The city level includes other cities. The classification of funding sources into different levels has been done based on patterns in the sources' names.

While considerably less funding comes from sources at the city and district levels, a notably high share of this funding goes to medical research (a reason being that these funding schemes are often carried out through hospitals). Figure 4 more clearly shows the shares of funding for different academic fields on each level. Apart from overrepresentation of medicine on the two lower levels, it can be seen that the national level provides higher shares of funding for engineering and astronomy, while education and language get higher shares of the provincial level funding.

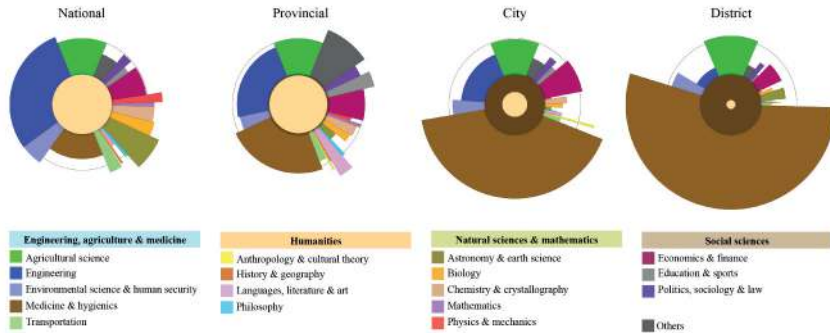


Figure 4: Shares of funding of academic fields for each administrative level. The width of the slices in each chart shows the shares of academic fields funded by sources on the respective level, while the length of the slices shows degrees of over- or underrepresentation compared to other administrative levels. The size of the light circle in the middle indicates the relative sizes of the funding available from each administrative level.

Taking a closer look at the provincial level, clear differences can be seen in both levels of funding and focus areas of different provinces. As can be seen on the map of China in Figure 5, Guangdong and Jiangsu are the provinces that have provided funding to most authors. This is not surprising, as these two provinces have had the highest research investments for some years – with Guangdong surpassing Jiangsu as the top-spending province in 2016.³⁸ The rose charts surrounding the map show that some research areas are more commonly funded in some provinces than in others. To mention a few examples that can be seen in Figure 5, Guangdong has a very strong focus on medicine and Shaanxi has a strong focus on engineering, while Hebei provides an above-average share of its funding to anthropology and Heilongjiang provides an above-average share to languages. The combination of information about funding levels and shares of research areas can be used by researchers as a guide for which provinces to look for funding sources in. When aiming to apply for province-level sources, these are also the provinces where one should be looking for local partners for collaboration. (See section 4 for further discussion about joint funding applications.)

³⁸ 2016年全国科技经费投入统计公报 [Internet] National Bureau of Statistics of the People's Republic of China (2017, October) Available: http://www.stats.gov.cn/tjsj/zxfb/201710/t20171009_1540386.html

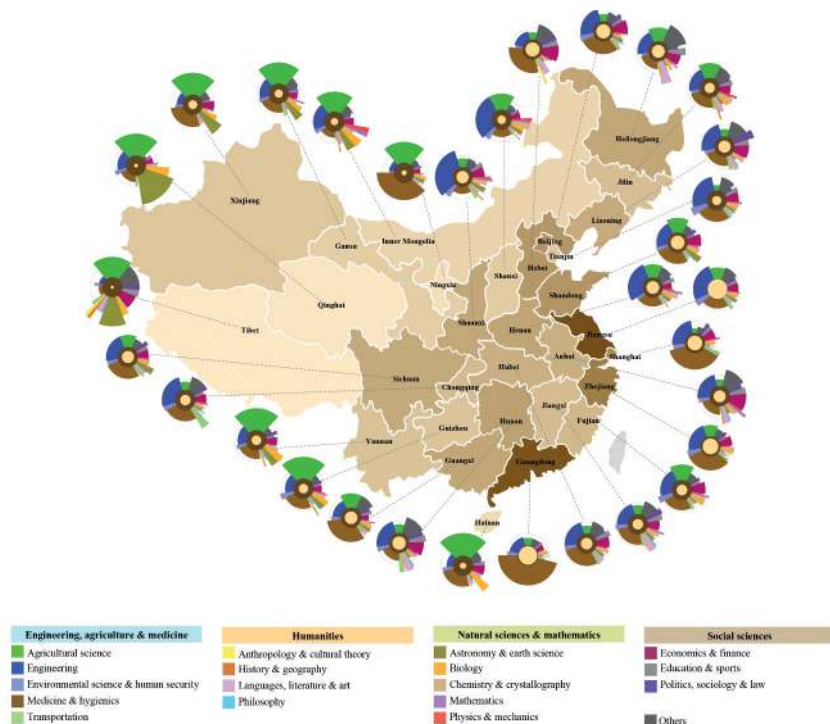


Figure 5: **Funding per province.** The colour of each province, autonomous region and centrally controlled municipality indicates how many authors have received funding from sources there. (A darker colour means a higher number of authors.) Sources on provincial, city, and district levels are included. (No data for Hong Kong, Macau, or Taiwan.) The rose charts show the shares of academic fields, based on the number of authors who have received funding for articles in each field. The width of the slices in each chart shows the shares of academic fields funded by sources in the respective province, while the slices' length shows degrees of over- or underrepresentation.

Looking at the national level, Table 1 on page 18, shows the national-level funding sources with most research funds (again based on the number of authors having received funding from the source). At the top we see the National Natural Science Fund, which is the biggest funding source by far and is similar in size to the other sources on the list combined. It is controlled by the National Natural Science Foundation, which is directly affiliated to the State Council. Three of its programs that specifically target international cooperation, and which European researchers can apply for directly, are the 'Key International Joint Research Projects', the 'Joint Research and Exchange Projects', and the 'Research Fellowship for International Young Scientists'.

Other programs, that target applicants based in Mainland China, are however also open to China-based affiliates of European research institutes and to European researchers who work in China.³⁹

Several programs on the list (marked with asterisks) have during the course of the last few years been merged into the new ‘National Key R&D Program’, which was established following the science and technology reform mentioned in Section 1.⁴⁰

However, the international participation within these two programs remains rather low, with a participation rate of between 0.2% and 0.6% foreign researchers in projects funded by the National Natural Science Fund and only 2 out of 2 288 projects funded by the National Key R&D Program being led by a foreign principal investigator (PI).⁴¹

The ‘National S&T Mega Projects’ is currently being replaced by the ‘2030 Innovation Mega Projects’, key projects that include the areas of artificial intelligence, aircraft engines and gas turbines, brain sciences and smart power grids – in line with China’s 13th five-year plan.⁴²

Among the top province-level sources across China, listed in Table 2, provincial equivalents of the National Natural Science Fund dominate. The different provincial-level natural science foundations are all tied to the national one, but their funds come from the provincial governments and the focus areas differ between them. All taken together, the funding from provincial natural science funds equal one third of the funding from the National Natural Science Fund. When applying for funding on the provincial level, one should be aware that these tend to have stricter eligibility criteria and that it is usually more difficult to find information about them. Applying jointly with a local partner is therefore especially helpful for province-level sources. (See section 4.)

³⁹ 2017 项目指南 [Internet] National Natural Science Foundation of China (2016, December) Available: <http://www.nsf.gov.cn/nsfc/cen/xmzn/2017xmzn/index.html>

⁴⁰ 我国将整合形成国家重点研发计划 [Internet] Science and Technology Daily (2015, January)

Available: http://digitalpaper.stdaily.com/http_www.kjrb.com/kjrb/html/2015-01/08/content_289242.htm?div=1

⁴¹ Advance EU Access to Financial Incentives for Innovation in China. Seminar in Shanghai (2017, 14th December)

⁴² 国务院关于印发“十三五”国家科技创新规划的通知 [Internet] State Council (2016, July)

Available: http://www.gov.cn/zhengce/content/2016-08/08/content_5098072.htm

No.	English name	Chinese name	Area distribution
1	National Natural Science Fund of China	国家自然科学基金	
2	National Basic Research Program of China (Program 973) *	“973”国家重点基础研究发展计划项目	
3	National Key Technology R&D Program *	国家科技支撑计划	
4	Fundamental Research Funds for Central Universities	中央高校基本科研业务费专项	
5	National High-tech R&D Program of China (863 Plan) *	“863”国家高技术研究发展计划项目	
6	National Social Science Fund of China	国家社会科学基金	
7	Humanities and Social Science Projects of Ministry of Education	教育部人文社会科学研究项目	
8	National S&T Mega Projects **	国家科技重大专项	
9	Special Scientific Research Fund of Public Welfare Profession *	公益性行业科研专项	
10	China Postdoctoral Science Foundation	中国博士后科学基金	
11	State Key Laboratory Fund	国家重点实验室基金	
12	National Training Program of Innovation and Entrepreneurship for Undergraduates	国家大学生创新创业训练计划项目	
13	Special Fund for Modern Agricultural Industrial Technology System	现代农业产业技术体系建设专项	
14	Doctoral Fund of Ministry of Education of China	博士点基金	
15	Program for New Century Excellent Talents in University of Ministry of Education	教育部新世纪优秀人才支持计划	
16	Special Scientific Research Fund of Agricultural Public Welfare Profession *	公益性行业(农业)科研专项	
17	Project Supported by China Geological Survey	中国地质调查局项目	
18	Central Public-interest Scientific Institution Basal Research Fund	中央级公益性科研院所基本科研业务费专项	
19	Major Science and Technology Program for Water Pollution Control and Treatment	国家水体污染控制与治理科技重大专项	
20	Aeronautical Science Foundation	航空基金	

<p>Engineering, agriculture & medicine</p> <ul style="list-style-type: none"> ■ Agricultural science ■ Engineering ■ Environmental science & human security ■ Medicine & hygienics ■ Transportation 	<p>Humanities</p> <ul style="list-style-type: none"> ■ Anthropology & cultural theory ■ History & geography ■ Languages, literature & art ■ Philosophy 	<p>Natural sciences & mathematics</p> <ul style="list-style-type: none"> ■ Astronomy & earth science ■ Biology ■ Chemistry & crystallography ■ Mathematics ■ Physics & mechanics 	<p>Social sciences</p> <ul style="list-style-type: none"> ■ Economics & finance ■ Education & sports ■ Politics, sociology & law ■ Others
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* Programs merged into the 'National Key R&D Program'

** Replaced by the '2030 Innovation Mega Projects'

Table 1: Top 20 national funding sources, ranked by the number of (primarily Chinese) authors having received funding.

No.	English name	Chinese name	Area distribution
1	Natural Science Fund of Jiangsu Province	江苏省自然科学基金	
2	Research Projects of Science and Technology Department of Guangdong Province	广东省科技计划	
3	Natural Science Fund of Guangdong Province	广东省自然科学基金	
4	Natural Science Fund of Shandong Province	山东省自然科学基金	
5	Natural Science Fund of Zhejiang Province	浙江省自然科学基金	
6	Priority Academic Program Development of Jiangsu Higher Education Institutions	江苏省高校优势学科建设工程	
7	Natural Science Fund of Guangxi Province	广西自然科学基金	
8	Natural Science Fund of Beijing	北京市自然科学基金	
9	Natural Science Fund of Hebei Province	河北省自然科学基金	
10	Natural Science Fund of Fujian Province	福建省自然科学基金	
11	Natural Science Fund of Hubei Province	湖北省自然科学基金	
12	Natural Science Fund of Shaanxi Province	陕西省自然科学基金	
13	Natural Science Fund of Hunan Province	湖南省自然科学基金	
14	Research Projects of Education Department of Hunan Province	湖南省教育厅科研项目	
15	Research Projects of Education Department of Heilongjiang Province	黑龙江省教育厅科研项目	
16	Research Projects of Science and Technology Department of Hunan Province	湖南省科技厅科技计划项目	
17	Natural Science Fund of Jiangsu Higher Education Institutions	江苏省高校自然科学基金	
18	Natural Science Fund of Anhui Province	安徽省自然科学基金	
19	Natural Science Fund of Heilongjiang Province	黑龙江省自然科学基金	
20	Medical Scientific Research Fund of Guangdong Province	广东省医学科研基金	

Engineering, agriculture & medicine	Humanities	Natural sciences & mathematics	Social sciences
Agricultural science	Anthropology & cultural theory	Astronomy & earth science	Economics & finance
Engineering	History & geography	Biology	Education & sports
Environmental science & human security	Languages, literature & art	Chemistry & crystallography	Politics, sociology & law
Medicine & hygienics	Philosophy	Mathematics	Others
Transportation		Physics & mechanics	

Table 2: Top 20 province-level funding sources, ranked by the number of (primarily Chinese) authors having received funding.

Figure 6 below shows the shares of different types of funding sources, among which government departments and government-controlled foundations dominate.

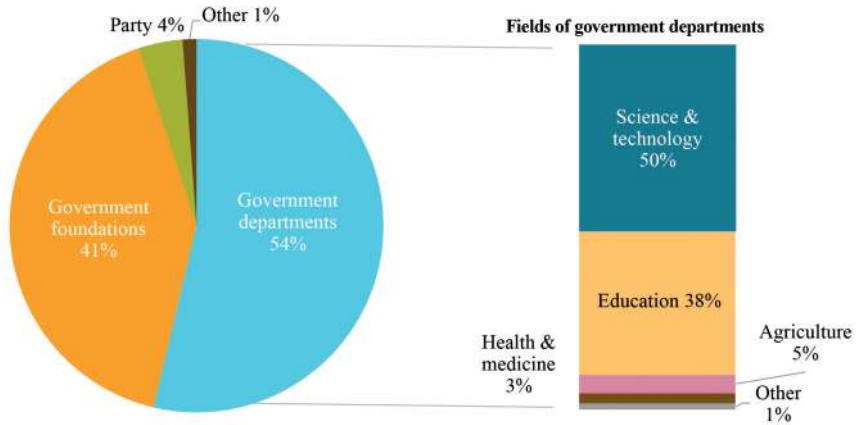


Table 6: **Types of funding sources.** Based on a separate analysis of the top 300 sources. Government departments include ministries and other departments both at national and lower administrative levels, and have been classified according to which field they are responsible for.

4. Paths to access funding

The paths for accessing funding in China are slightly different for, on the one hand, individual researchers or groups of individual researchers in Europe and, on the other hand, European research institutes, universities, and centres at universities:

- *Individual researchers* can apply directly for research funding only if they are employed by a (Chinese, foreign, or joint) university or research institute that is established in China. If they are not, they can apply in collaboration with Chinese researchers, universities or research institutes.
- *Universities and research institutes* need to apply jointly together with a local Chinese university or research institute, through either a partnership or a joint centre.
- Universities and research institutes that have already established a centre within China can apply for funding directly.

Figure 7 and Figure 8 illustrate different paths to access research funding in China.



Figure 7: Paths to Chinese research funding for European individual researchers.

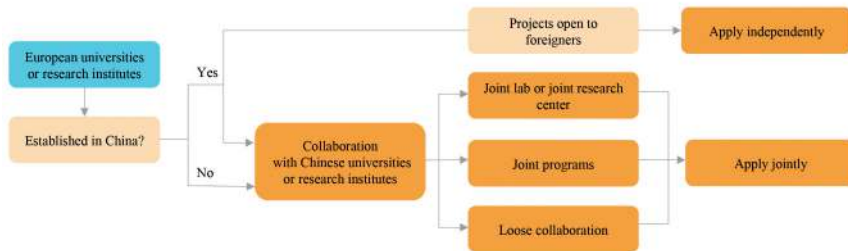


Figure 8: Paths to Chinese research funding for European research institutes.

4.1 Requirements and restrictions

Many restrictions are still in place, despite the stated goal of opening up the system to foreign talents and research institutions. On the one hand, foreign research centres are expressly encouraged to participate in science and technology programs, and reforms of residence permit regulations mean that it should become easier for foreign researchers.⁴³ On the other hand, various regulations still restrict which organisations and individuals are eligible to apply for research funding. Some funds are completely out of reach for researchers who are not Chinese citizens, something which is the case for several social science and humanities funds controlled by the Communist Party. This is however not the case for the ‘National Social Science Fund of China’ – one of the most important social science funds on the national level – which explicitly allows non-Chinese to apply jointly with Chinese researchers.⁴⁴ Requirements for similar funds can differ considerably between one province and another. For example, the ‘Philosophy and Social Science Planning Program’ of Guangdong province only allows funding for research projects in which all participating researchers are Chinese citizens working in that province.⁴⁵ The program with the same name in Anhui province is slightly stricter, only allowing participants with household registration in Anhui⁴⁶ while the ‘Social Science Fund’ of Jiangsu province, in contrast, allows foreign researchers to be part of the application.

⁴³ 中共中央办公厅 国务院办公厅印发《深化科技体制改革实施方案》 [Internet] Ministry of Science and Technology of the People's Republic of China (2015, September) Available: http://www.most.gov.cn/kjbgz/201509/t20150925_121771.htm

⁴⁴ 关于印发《国家社会科学基金管理办法（修订）》的通知 [Internet] National Planning Office of Philosophy and Social Science (2013, May) Available: <http://www.npops-cn.gov.cn/n/2013/0520/c219469-21542021.html>

⁴⁵ 广东省哲学社会科学规划项目管理办法 [Internet] Philosophy and Social Science Planning Office of Guangdong Province (2016, September) Available: http://www.gdpplgopss.gov.cn/zcwj/xmgblf/201607/t20160720_782556.htm

⁴⁶ 安徽省哲学社会科学规划项目管理办法 [Internet] Philosophy and Social Science Planning Office of Anhui Province (2014, October) Available: <http://www.ahshkx.com/system/2014/10/21/010249060.shtml>⁴⁴ Advance EU Access to Financial Incentives for Innovation in China.

The National Natural Science Foundation requires applying principle investigators to be affiliated to a university or other institution that is registered by the foundation as a ‘supporting institution’, which is to examine and approve the applications before submission. In terms of application language, the foundation is now one of few that accept applications written in English.⁴⁷

Age restrictions apply to talent programs targeting young researchers, and are often different for male and female applicants. The National Natural Science Foundation’s ‘Fund for Young Scholars’ is for example open to men up to 35 and women up to 40.⁴⁸

Main applicants need to be established in China for almost all programs. This means that a research institute applying for funding – or at least one of the institutes of a joint application – needs to be registered as a legal entity in China and be conducting research from within the country. Most provincial and city-level programs are similarly restricted to applicants established in the province or city in question. Individuals applying for grants from programs for foreign talents are in most cases required both to be employed by a university or research institute in China and to spend a minimum time period in China each year. For example, the ‘Recruitment Program of Global Experts’ (also known as ‘Thousand Talents’) requires grantees to be in China no less than nine months per year while holding the grant.⁴⁹

A way of getting around most restrictions is to apply jointly with researchers or research institutions within China, and let a Chinese partner take on the role of main applicant. European universities and research institutes wanting to apply for funding on their own need to first get officially established in China, for example through opening a research centre in the country. An example of a foreign university that has done this is the University of Sydney, Australia, which opened a centre in Suzhou in 2016.⁵⁰

⁴⁷ 国家自然科学基金外国青年学者研究基金项目管理办法 [Internet] National Natural Science Foundation of China (2015, January) Available: <http://nsfc.gov.cn/publish/portal2/tab189/info47769.htm>

⁴⁸ 青年科学基金项目 [Internet] National Natural Science Foundation of China (2017) Available:

<http://www.nsf.gov.cn/nsfc/cen/xmzn/2017xmzn/05/index.html>

⁴⁹ 千人计划 [Internet] Recruitment Program of Global Experts Available: <http://www.1000plan.org/qrjh/section/2?m=rcrd>

⁵⁰ 悉尼大学中国中心落户苏州 [Internet] China Economic Net (2016, November) Available:

http://intl.ce.cn/specials/zxgjzh/201611/11/t20161111_17733608.shtml

It should however be noted that only a small number of programs – notably including the ‘National Key R&D Program’ – explicitly allow foreign research institutes and universities established in China as main applicants or foreign researchers as principal investigators.⁵¹ The degree of openness towards foreigners of the National Key R&D Programs varies, however, with medical areas often being among the more open.⁵² Most other programs are neither explicitly open nor explicitly closed to non-Chinese applicants.

Restrictions on what expenses research funds can be used for have been loosened following a new policy in 2016⁵³, and are now more in line with international standards. It has notably become easier to cover personnel costs, something which used to be tightly restricted.

Once you have received some funding in China it becomes easier to get more. One German researcher, for example, was qualified for a research grant from the National Natural Science Foundation thanks to first having been awarded a fellowship from the Chinese Academy of Science.⁵⁴ One of the interviewees mentioned that having been awarded by the Thousand Talents Program had opened many doors, both for funding and otherwise.⁵⁵ Such awards are not least useful if applying for funding to commercialise research.

4.2 Why and when collaboration is needed

Joint application is the most viable route to receiving research funding in most cases, not least because of formal eligibility criteria restricting which institutions or individuals can be main applicants. (See Section 4.1.) Applying together with a Chinese partner can also help greatly in navigating funding systems that newcomers easily find opaque.

Main applicants need to be established in the area where the funding source is located in the case of provincial and local-level funding. It is therefore important to find partners in the area where adequate funding sources are available.

⁵¹ 科技部 财政部关于印发《国家重点研发计划管理暂行办法》的通知 [Internet] Ministry of Science and Technology of the People's Republic of China (2017, June) Available: http://www.most.gov.cn/mostinfo/xinxfenlei/fzgc/gfxwj/gfxwj2017/201706/t20170628_133796.htm

⁵² Advance EU Access to Financial Incentives for Innovation in China. Seminar in Shanghai (2017, 14th December)

⁵³ 中共中央办公厅 国务院办公厅印发《关于进一步完善中央财政科研项目资金管理等政策的若干意见》 [Internet] Xinhua News Agency (2016, July) Available: http://news.xinhuanet.com/politics/2016-07/31/c_1119311230.htm

⁵⁴ ACCESS4.EU [Internet] Available: <http://www.access4.eu/China/1028.php>

⁵⁵ Erik Forsberg, Associate professor of Photonics of Zhejiang University (Interview 2017, 29th November)

A Chinese partner is moreover likely to have better knowledge of what opportunities exist – including knowledge of opportunities that is difficult to access through public channels. This becomes more important when applying for provincial-level than for national-level sources. While attempts have been made on the national level to make information about funding sources accessible and transparent, requirements for provincial programs tend to be less transparent and seldom have any information available in other languages than Chinese.

People within Chinese academia often have access to advance information of coming funding opportunities – information that is shared through informal networks before it has been officially announced. Getting access to such information through local partners can be invaluable, as application periods tend to be very short. One interviewee mentioned an instance when they were given only one week to submit materials for a second round of a funding program.⁵⁶

Know-how regarding the application process is another point in which a Chinese partner can be a crucial resource. This is partly a question of language: applications need to be written in Chinese for many national-level and virtually all provincial-level sources. Apart from mastering Chinese, experienced Chinese researchers are also likely to have insights regarding what should be highlighted and what formulations might improve the chances of a successful application.

4.3 How to establish a collaboration

Identify an appropriate geographic area with strong local institutions within your area of specialisation. As seen in Figure 5, different provinces have different profiles when it comes to research funding. For example, a medical research institute may want to aim for accessing funding in Guangdong province, because of the strong focus on medicine there. Note, however, that provincial and city-level research funding can be harder to access for basic research compared to applied research and commercialisation projects.

Find a specific institution with a matching profile. Apart from the research profile,

⁵⁶ Erik Forsberg, Associate professor of Photonics of Zhejiang University (Interview 2017, 29th November)

the reputation and ranking of the Chinese university will also affect the possibilities of entering into a collaboration, as universities in China as well as Europe tend to be reluctant to enter into partnerships with universities ranked lower than they themselves. The same logic applies on the individual level, as Chinese researchers prefer working with peers at the same academic level.

Traditional networking through participation in conferences and the like is, not surprisingly, important for establishing new contacts. In China, it also tends to help more than elsewhere to get to know people at high levels, as a lot of decision-making is done top-down rather than being peer-driven. One interviewee, the chancellor of a Swedish university with seven partner universities in China, emphasised the importance of continuously maintaining relations with the Chinese partner universities. By having appointed a responsible faculty member for each partnership, the university has been able to resolve issues that have arisen.⁵⁷

Highlight prominent researchers and achievements. When European universities manage to initiate collaboration with Chinese universities that are higher ranked than themselves, it is often because they have individual professors that do well in global rankings. The university represented by one of the interviewees was invited to run a computer engineering course at Zhejiang University, one of China's best universities, because it had among its faculty a leading professor in the field. The interviewee recommended to always include the highest-ranking professors in meetings with potential partners in China.⁵⁸ Attracting leading global talents is a priority of Chinese universities, and they have funds to make it possible. Another interviewee, who is associate professor at Zhejiang University, said foreign professors there are often employed centrally by the university rather than by the respective faculty, as is the case for their Chinese colleagues.⁵⁹

Any previous Chinese awards or experience of research and collaborations in China should be emphasised when looking for new opportunities. Having a track record in the country increases the likelihood that Chinese researchers and institutions will be interested in collaborating, and also significantly increases the chances that funding applications will be successful.

⁵⁷ Anders Hedenstierna, Chancellor of Blekinge Institute of Technology (Interview 2017, 5th December)

⁵⁸ Anders Hedenstierna, Chancellor of Blekinge Institute of Technology (Interview 2017, 5th December)

⁵⁹ Erik Forsberg, Associate professor of Photonics of Zhejiang University (Interview 2017, 29th November)

Get support as high up as possible. In planning a joint research centre with a Chinese partner, one interviewee said that securing the support from the province governor was crucial in accessing province-level funding.⁶⁰ This was, in turn, possible through a high-level delegation to the province, led by the political leader of the region where the university is located. Additional anecdotal evidence suggests that stalled processes can suddenly start moving as a result of high-level visits.

4.3.1 Understand the agendas of potential partners

Figuring out ‘what’s in it for them’ and understanding how to make the collaboration help the potential partner deliver on its agenda are important keys to successful collaboration. One interviewee recounted the discussion about a joint electromobility⁶¹ research centre with Kunming University of Science and Technology, a collaboration that fit well into Yunnan province’s priority of environmental sustainability and goal of becoming an electromobility testbed.⁶² Tapping into existing programs and priorities is much easier than accessing funding for a project without a policy foundation.

Chinese universities have recently become more interested in sending faculty members abroad as part of a ‘train the trainer’ scheme. According to one of our interviewees, there is a top-down drive for securing foreign know-how and transferring knowledge from overseas through scholar exchanges.⁶³ Making such possibilities part of the agreement could be a ‘selling point’ for achieving collaboration.

4.3.2 Decide the extent of the collaboration

1. *Dedicating a physical laboratory to a joint research centre may be considered*, as having a physical space helps to strengthen the credibility of institutions in China more than it does in Europe. For instance, Zhejiang University has a new international campus, where each building represents a collaboration with one leading overseas university.⁶⁴ On the other hand, funding a joint centre does not necessarily have to involve having a dedicated building, as a ‘centre’ can also take a more virtual form.
2. *A joint research program* without any physical location can be an option for institutions that are not ready for the commitment needed to establish and run a joint centre. Such a program can involve exchanges of both researchers and students.

⁶⁰ Anders Hedenstierna, Chancellor of Blekinge Institute of Technology (Interview 2017, 5th December)

⁶¹ ‘Electromobility’ refers to technology and systems for electric vehicles.

⁶² Anders Hedenstierna, Chancellor of Blekinge Institute of Technology (Interview 2017, 5th December)

⁶³ Anders Hedenstierna, Chancellor of Blekinge Institute of Technology (Interview 2017, 5th December)

⁶⁴ 浙大国际联合学院（海宁国际校区）全面启用 [Internet] Zhejiang University (2017, October)

Available: <http://www.zju.edu.cn/2017/1022/c577a680396/page.htm>

3. *Looser collaboration on a project-basis* is a third option, which might be a good starting point for European research institutes without previous experience of joint research with Chinese partners.
4. *For individual researchers looking for research funding in China*, employment at a Chinese university or research institute will open more opportunities for funding, as it is a requirement of many funding programs. Similar long-term sustainability challenges as those that joint research centres face are also experienced by individual researchers. Some European researchers decide to move back to Europe after a working for 3-5 years in China, after discovering that making an academic career in China is a lot more challenging than what it may initially seem.⁶⁵
5. *Combine long-term and short-term thinking*. In order to make collaboration sustainable in the long run, it is important that it continuously provides value to all involved parties. Even when the strategy is long-term, value needs to be demonstrated in the short term as stake-holders such as university leadership and government officials tend to move on to new positions more often than in Europe. High-level state employees are appointed by the powerful Organisation Department in Beijing and moved around between provinces and institutions.

⁶⁵ Andrea Střelcová, Former Director of EURAXESS China (Interview 2017, 1st December)

4.4 EU–China collaborations

To improve the conditions for European researchers in China and verify to what extent European and Chinese applicants are on equal footing when applying for funding in China, the European Commission in mid-2016 initiated a project known as ‘Advance EU Access to Financial Incentives for Innovation in China’. A document presenting its findings is soon to be published at the time this report is written, and will include a guide for European researchers on how to access funding from the Chinese national-level research funding programs.⁶⁶

Apart from the Chinese funding programs, there are also European-Chinese partnerships that provide research funding opportunities. An example of this is a so-called co-funding mechanism which has been introduced within the Horizon2020 program and will support joint projects between European and Chinese universities. More information on this can be found through the Commission’s website.⁶⁷

European funding programs should also not be neglected. Programs of the European Union and its member countries that are of relevance to European researchers in China have been listed in a guide published by Euraxess.⁶⁸

⁶⁶ Advance EU Access to Financial Incentives for Innovation in China (Press release) [Internet] Delegation of the European Union to China (2017, 14th December) Available: https://eeas.europa.eu/delegations/china/37362/node/37362_vi

⁶⁷ Horizon2020 China Country Page [Internet] European Commission (2017, December)

Available: http://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020_localsupp_china_en.pdf

⁶⁸ Funding Guide – Researchers’ Mobility and Collaboration between Europe and China [Internet] Euraxess (2015)

Available: https://euraxess.ec.europa.eu/sites/default/files/news/final_2015_funding_guide.pdf

5. Key takeaways

1. *Collaboration with a local partner in China* is important for individual researchers as well as to universities and research institutes...
...for formal reasons, as most programs for research funding require that the main applicant is established in China or in a specific province.
...for practical reasons, as a local partner can be a great help for accessing information of opportunities as well in the application processes.
2. *A significant share of the research funds in China is found at the provincial level*, and a lot of the provincial funds are concentrated to a few provinces – most notably Guangdong and Jiangsu.
 - Provincial as well as city-level funding is most relevant for applied research and for commercialisation projects. For basic research, there are more funding opportunities on the national level.
 - Provinces differ in how they distribute funding between different academic fields, and application requirements are also different from province to province.
 - Partnerships for joint applications should be built in the provinces where one is looking for funding.

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Stiftelsen för internationalisering av
högre utbildning och forskning

The Swedish Foundation for International
Cooperation in Research and Higher Education

Wallingatan 2, SE-111 60 Stockholm, Sweden
Telephone +46 8 671 19 90. Fax +46 8 671 19 99
info@stint.se www.stint.se