China Strategy 2015–2020
Executive Summary
Strategic Framework for Cooperation with China in Research, Science and Education
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Foreword

In recent decades, China has not only developed in terms of its economy, but also in science and research. In many fields it has caught up with the leading industry and science nations. Germany’s science and research community has a great interest in participating in these developments in China and in working with Chinese partners to find innovative solutions to today’s global challenges.

German-Chinese cooperation in research, education and innovation has especially intensified in recent years. This is partly due to the intergovernmental consultations between the two countries that have been held since 2011. As strategic partners, Germany and China work to foster research and innovation to the mutual benefit of their countries. In the context of this cooperation we have set up many successful joint projects and activities – particularly in areas such as water, climate, environment, sustainability, innovation research, life sciences, electric mobility as well as in higher education and vocational education and training.

We aim to both expand and further intensify German-Chinese cooperation in education and research. To ensure the success and the mutual benefits of future cooperation activities, we must critically analyse our previous efforts and define goals and concrete measures for further cooperation. The China Strategy of the Federal Ministry of Education and Research (Bundesministerium für Bildung und Forschung, BMBF) provides the necessary framework and paves the way for the future. I look forward to further cooperation with our partners in China.

Prof. Dr. Johanna Wanka
Federal Minister of Education and Research
1. Why a China Strategy?

In recent decades, the Chinese economy has developed more dynamically than that of any other country in the world, resulting in greater political influence, not just in Asia, but globally. After overtaking Germany in 2007 as the third-largest economy, China knocked Japan from second place in 2010. In the coming years, it might overtake the US, establishing itself as the largest economy in the world. If Gross Domestic Product (GDP) is adjusted for purchasing power parity (PPP), China has overtaken the US in 2014 already.

The combination of huge production capacity and low production costs saw China become the world’s ‘manufacturing powerhouse’ in the 1990s. In recent decades, China has transitioned from a developing country to an emerging economy – in some respects it is already an industrialised nation. Achieving the transition to an innovation nation has been the Chinese government’s declared aim since the turn of the millennium (moving from ‘made in China’ to ‘invented and designed in China’). One of the catchwords in this context is ‘indigenous innovation’. The modernisation of the innovation system is to be achieved by means of structural reforms, the forming of international partnerships and large-scale financial investment in education, research, technology and innovation.

The Chinese government set out its research policy requirements in plans such as the National Medium- and Long-Term Program for Science and Technology Development (2006–2020) and the 12th Five-Year Plan (2011–2015). These include the objective of increasing research and development (R&D) expenditure to a minimum of 2.5 percent of GDP per year in the period up to 2020. By that same deadline, only 30 percent of the technology needed is to be imported from abroad and Chinese scientists should rank among the world’s Top 5 when it comes to patents and citations.

With this ‘innovation initiative’, China wants to establish itself as a location for the development and production of high-technology products. The aim is to overcome the technology gap and become a technology leader. The associated set of measures reflects the government’s determination to transform China into an innovation-focused nation by 2020 – one that exports cutting-edge technologies and successfully competes with the world’s leading industrialised nations. Concrete measures include significantly increased
investment in science and technology (S&T), tax incentives, financial assistance in government procurement, protection of intellectual property rights (IPR) and the promotion of young scientists. China wants to develop an economy which combines the service industry with a modern manufacturing industry. Renewable energies, materials, environmental protection, biopharmaceuticals, telecommunications and internet applications are all deemed strategically important industries.

1.1 Cooperation with China brings opportunities and challenges

China’s economic and technological growth is linked to huge social challenges which German technology and expertise can help tackle:

- large-scale, continuing urbanisation (the emergence of new megacities) and the associated need to develop modern transportation systems and other infrastructures (water, waste and energy)
- a rural exodus that accompanies urbanisation (by 2025 it is expected that 70 percent of the Chinese population will live in cities – this compares with over 50 percent in 2013 and 20 percent in 1978) coupled with the social circumstances of the approximately 270 million migrant workers (who account for about one fifth of the total population)
- serious environmental pollution (air, water and soil), the risk to biodiversity and the threat of climate change due to increasing resource and energy use
- growing disparities between large cities and developed coastal regions in the east and economically backward regions, especially in the west
- an increasing imbalance between a growing urban middle-class and the mostly poorer rural population and the resulting social problems
- an ageing society (especially in rural areas)

The Chinese government has recognised that its economic and environmental policies must be adjusted if the country is to achieve ongoing economic growth and at the same time to address increasing social and economic disparities. This development offers new opportunities for German-Chinese cooperation in science, research and innovation.

German companies have played an important role in China’s technological modernisation to date. Given the country’s size and its continued economic growth, German companies see lucrative development opportunities and are willing to set up operations and make long-term investments in China under what in some cases are rigid conditions (such as forced joint ventures with Chinese state-run enterprises and stipulations regarding the creation of production and research capacities).

To be successful in the Chinese market, foreign products and services must be adapted to meet both local consumer needs and local standards through research and development activities undertaken in China. These adapted solutions and the experience gained in their development can be used to open up other markets, especially in Asia.

But cooperation of any kind also brings challenges and risks. In China, these include the incredible pace of the country’s political, economic and social development, the great complexity in the distribution of responsibilities, the frequently low transparency in decision-making at political level and information which is in some cases insufficient or difficult to obtain.

The country’s size, the almost unmanageable number of political actors and the various levels of national, regional and local government, all of which are supplemented by parallel structures of the Communist Party, can make it difficult to initiate and conduct cooperation activities. The situation is aggravated by the fact that many in the German education and R&D sectors have only limited knowledge of modern China and are thus unable to anticipate the challenges involved in pursuing German-Chinese collaboration.

Apart from the goal of more intensive cooperation, there is also a risk of increased competition in the race for markets, technology and knowledge. The Chinese government links the gradual opening of the Chinese market with concrete requirements for foreign cooperation partners to transfer technology and know-how to China. The aim of future cooperation with China must thus be to take the prevailing conditions and requirements into account when conducting cooperation activities, and to move away...
from the paradigm of market access (solely) in return for technology transfer and towards cooperation on a level playing field.

1.2 The BMBF China Strategy as a basis for bilateral cooperation in research, science and education

In today’s globalised world, it is no longer a question of whether German science and industry should cooperate with China. Rather, it is a question of identifying appropriate objectives, thematic areas, actors and collaboration mechanisms so that such cooperation benefits Germany. Cooperation with China is necessary to jointly develop knowledge and technology, strengthen Germany as a research and innovation location, open up the Chinese market for German companies and find solutions to the great social and environmental challenges of our time. Thus, for Germany, cooperation with China is an ‘unmissable opportunity’ that has to be grasped.

As the responsible federal ministry for German research, science and education cooperation, the BMBF drafted its China Strategy to exploit the opportunities that arise from cooperation with China, setting out a systematic approach to tackling the challenges and risks involved. This country strategy is part of the Strategy of the Federal Government for the Internationalisation of Science and Research. Its guiding principle is to provide a framework within which cooperation with China focuses on the strategic interests of Germany. German science, research and industry must position themselves in such a way that they benefit to the greatest extent possible from current trends and future developments in China.

The China Strategy provides a coherent, systematic framework for the BMBF’s cooperation with China in education, research and innovation in the period 2015 to 2020. The Strategy is an important contribution to the China policy of the Federal Government. Furthermore, the China Strategy contributes to the implementation of the comprehensive strategic partnership between Germany and China agreed by Chancellor Angela Merkel and President Xi Jinping during the President’s official visit to Germany at the end of March 2014.
Quantitatively speaking, China is already one of the strongest research countries in the world. In the past fifteen years, it has increased its R&D expenditure as a share of GDP from 0.9 percent (2000) to 1.32 percent (2005) and then to 2.08 percent (2013). In 2015, R&D expenditure is expected to amount to 2.2 percent of GDP. The 2.5 percent goal for 2020 appears to be reachable. Since 2001, R&D expenditure has risen by just under 17 percent per year. In absolute terms, China could soon overtake the US as number one. In 2013, China spent some USD 336.5 billion (approximately EUR 253 billion) on R&D (this compares with USD 457 billion/EUR 344 billion in the US, and USD 101 billion/EUR 76 billion in Germany).

Another impressive example of the rapid development of China’s R&D sector is the number of its patent applications. Since the country’s first patent law entered into force in 1985, the number of patent applications initially rose slowly, but by the end of the 1990s, it was growing dramatically. In 2014, some 928,000 patents were applied for in China (of which 127,000 were from abroad). Approximately one in four of these were approved. Of the approved patents, one in three came from outside China (70,548 out of 233,228). As regards the number of patent applications submitted under the Patent Cooperation Treaty, China overtook Germany in 2011 and ranked third behind the US and Japan in 2014 with 25,539 patents. It must, however, be noted that the growing number of patent applications is by no means an indication of their quality and innovative content. This is partly due to distorted state incentive systems (with a focus on incremental innovation and design adaptation for the Chinese market, applications for ‘junk patents’ and copyright and trademark patents rather than on invention patents). Despite the strong rise in the registration of domestic patents in recent years, China is spending almost twenty-four times more on the use of foreign IPR than it generates in revenue from Chinese IPR.

With regard to the absolute number of publications, China has caught up strongly in the past ten years, ranking second behind the US in 2014. However, in the global ranking for citation frequency (in terms of the H-Index for 1996–2013) China ranks only sixteenth on average for all fields. In areas such as materials science, chemicals and energy, the H-Index is significantly higher. In international comparison, China ranks sixth in these fields.

Investment in higher education has risen steadily in China in recent years as well. Public expenditure on higher education almost quadrupled in the period 2006 to 2012. To ensure that China’s higher education institutions join the world’s elite, various funding programmes (e.g. the 211 Program, the 985 Program) were introduced to give selected institutions the financial assistance they need to become top-class research establishments.
### Table: Research and education data of Germany and China

<table>
<thead>
<tr>
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<th>Deutschland</th>
<th>China</th>
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</thead>
<tbody>
<tr>
<td><strong>Gross domestic expenditure on R&amp;D (GERD) in local currency (2013)</strong> (A)</td>
<td>EUR 80.16 billion</td>
<td>RMB 1.18 trillion [approx. EUR 143.4 billion]</td>
</tr>
<tr>
<td><strong>GERD (PPP) (2013)</strong> (A)</td>
<td>USD 100.9 billion [approx. EUR 76.0 billion]</td>
<td>USD 336.5 billion [approx. EUR 253.43 billion]</td>
</tr>
<tr>
<td><strong>GERD as a percentage of GDP (2013)</strong> (A)</td>
<td>2.85%</td>
<td>2.08%</td>
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<tr>
<td><strong>Percentage of GERD financed by industry (2013)</strong> (A)</td>
<td>65.2%</td>
<td>74.6%</td>
</tr>
<tr>
<td><strong>Number of researchers (full-time equivalent) (2013)</strong> (A)</td>
<td>360,364</td>
<td>1,484,039</td>
</tr>
<tr>
<td><strong>Number of researchers (full-time equivalent) per million inhabitants (2013)</strong> (B)</td>
<td>4,139</td>
<td>1,020</td>
</tr>
<tr>
<td><strong>Number of R&amp;D personnel (full-time equivalent) (2013)</strong> (A)</td>
<td>603,860</td>
<td>3,532,816</td>
</tr>
<tr>
<td><strong>Triadic patent families (2013)</strong> (A)</td>
<td>5,465</td>
<td>1.785</td>
</tr>
<tr>
<td><strong>Patent registrations under the Patent Cooperation Treaty (2014)</strong> (C)</td>
<td>18,008</td>
<td>25,539</td>
</tr>
<tr>
<td><strong>Publications in the Scientific Citation Index (17.07.2015)</strong> (D)</td>
<td>2.18 million</td>
<td>3.62 million</td>
</tr>
<tr>
<td><strong>Expenditure on education (2012)</strong> (E, F)</td>
<td>EUR 178.4 billion</td>
<td>RMB 2.77 trillion [approx. EUR 330 billion]</td>
</tr>
<tr>
<td><strong>Expenditure on education as a percentage of GDP (2012)</strong> (E, F)</td>
<td>6.5%</td>
<td>4.28%</td>
</tr>
<tr>
<td><strong>Higher education institutions (2012)</strong> (E, G)</td>
<td>428</td>
<td>2,442</td>
</tr>
<tr>
<td></td>
<td>Comprising 183 universities (incl. educational, theological and art colleges) and 245 universities of applied sciences (incl. business administration colleges).</td>
<td>Of which around half offer basic four-year and half offer three-year occupation-focused studies. Only 811 institutions offer Masters programmes and postgraduate opportunities.</td>
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<tr>
<td><strong>Students (2013)</strong> (E, G)</td>
<td>2.6 million</td>
<td>31.46 million</td>
</tr>
<tr>
<td><strong>Higher education degrees (2012)</strong> (E, G)</td>
<td>413,338</td>
<td>6.8 million</td>
</tr>
<tr>
<td><strong>Students studying overseas (2012)</strong> (G)</td>
<td>German students in China: 6,200 Foreign students in China: 328,330</td>
<td>Chinese students in Germany: 23,833 Chinese students studying overseas: 399,600</td>
</tr>
</tbody>
</table>

**Sources:**
- (A) OECD Main STI Indicators
- (B) World Bank World Development Indicators 2015
- (C) World Intellectual Property Organization: Infographics 2014
- (D) SCImago Country Ranking
- (E) BMBF database
- (F) Ministry of Education of the People’s Republic of China (MoE): Report on government spending on education in 2012 (in Chinese only)
- (G) German Academic Exchange Service (DAAD): Economy, politics and higher education in the People’s Republic of China (in German only)

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China’s scientific base is equally without comparison: according to official statistics, in 2013 some 32 million Chinese were enrolled in higher education institutions and around seven million obtained a higher education degree. There is also a large pool of Chinese who are currently studying or researching abroad. At the moment almost 400,000 Chinese are studying at higher education institutions outside China. In 2012, Chinese students made up the largest share (22 percent) of all international students in OECD countries. In 2014, just over 10 percent of all foreign students in Germany were from China (30,511 out of 301,350), making them by far the largest group.

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1 This includes students in two and three-year vocational training courses and those studying online. The number of students who meet the German definition of students in higher education (studying four-year foundation [Bachelor] programmes, Masters and PhD students) was 16.7 million.
3. Current status of the BMBF’s cooperation with China

The Federal Republic of Germany and the People’s Republic of China established diplomatic relations in 1972. The basis for research cooperation between the two countries is provided by the *Intergovernmental Agreement on Scientific and Technological Cooperation* of 9 October 1978. Since 1980, the Joint S&T Commission has met regularly with the Chinese Ministry of Science and Technology (MoST) to agree joint projects and measures, and to discuss the framework conditions for cooperation. The work of the S&T Commission is supported by thematic Steering Committees (for example, environmental technologies/environment, geosciences, marine and polar research) which are responsible for the planning of cooperation activities for their respective areas.

In the education sector, regular consultations have been held with the Chinese Ministry of Education (MoE) since 2004 in the form of a *Strategy Dialogue on Education Policy* (which replaced the Strategy Dialogue on Higher Education Policy in 2009). In addition since 2011, regular meetings have been held by the Steering Group of the German-Chinese Alliance for Vocational Education and Training.

The first phase of German-Chinese cooperation in research and education in the 1980s primarily involved general exchange of information and experience, the organisation of events and mutual visits by specialist delegations to establish diplomatic relations (science diplomacy) and explore cooperation potential. This was followed in the 1990s by increasingly intensive project-based collaboration and cooperation between research institutes, for example through the establishment of joint partner groups and young scientist groups. The topics addressed were dominated by basic research in the natural sciences, as well as applied research in energy, raw materials and biotechnology. Since the turn of the millennium, project-based collaboration has further intensified and joint education institutions and courses of study have been established. Since 2011, the BMBF has supported the MoE by providing advice on the introduction of a new vocational education and training structure.

Cooperation further intensified in subsequent years in the form of *German-Chinese intergovernmental consultations* which, following those in 2011 and 2012, were held for the third time in October 2014. China is
one of the few countries with which Germany conducts intergovernmental consultations. Since 2011, the BMBF and its Chinese partner ministries have signed thirteen joint declarations, including ten during intergovernmental consultations.

The BMBF’s cooperation with China currently focuses on activities in innovation research, clean water and environmental technologies, life sciences, marine and polar research, electric mobility, LED technologies, higher education, vocational education and training, and the exchange of students and scientists.

China is the country on which the BMBF expends the most funds for cooperation activities. From 2002 to 2013, BMBF funding for bilateral cooperation with China increased three-fold, from nearly EUR 7 million to approximately EUR 21 million. Of this amount, in 2013, more than half was spent on measures involving the areas of climate, environment and sustainability, followed by activities related to cooperation in vocational education and training, bioeconomy and biotechnology, the humanities and social sciences, and electric mobility.

At a meeting in Berlin at the end of March 2014, Chancellor Angela Merkel and President Xi Jinping announced a ‘mutually beneficial innovation partnership’ to enhance cooperation in the fields of urbanisation and industrialisation, transportation, electric mobility, energy, clean water and resource efficiency. The details were announced in the inter-ministerial framework of action for German-Chinese cooperation ‘Shaping innovation together!’ at the third German-Chinese intergovernmental consultations on 10 October 2014 in Berlin.
4. Strategic goals, guiding principles and points for consideration

In its further cooperation with China in research, science and education, the BMBF focuses on the following strategic goals and guiding principles that form an action-focused framework for future cooperation.

4.1 Goals – What would we like to achieve by cooperation?

In international cooperation, the BMBF’s overarching strategic goal is to strengthen German science and research. Regarding the cooperation with China, three of the four target areas of the Strategy of the Federal Government for the Internationalisation of Science and Research of 2008 are of particular importance: strengthening research cooperation with global leaders, exploiting international innovation potential and assuming international responsibility in mastering global challenges. The training of skilled workers can be seen as an additional target area.

In its future China policy, the BMBF will:
- support German stakeholders in science, research and industry in their cooperation activities with China (research value creation), in establishing innovation partnerships and in opening up markets and business sectors (industrial value creation)
- improve German students’ and scientists’ access to top Chinese higher education and research institutions in a targeted move to enhance both scientific expertise and intercultural skills – this also applies to joint research and learning with Chinese partners in Germany
- promote the internationalisation of teaching and research at German higher education institutions through strategically designed and structured cooperation activities of German and Chinese higher education institutions
- create a broader, publicly accessible knowledge base on the Chinese education, research and innovation system and on China in general to foster greater China expertise in Germany
4. STRATEGIC GOALS, GUIDING PRINCIPLES AND POINTS FOR CONSIDERATION

• work to achieve favourable conditions for China-related engagement of German science, research and industry (both in Germany and especially in China)
• work with Chinese partners to master global challenges and support sustainable, resource-efficient, environment-friendly and socially acceptable development

These goals will guide the BMBF’s future cooperation with China at policy-level in the knowledge triangle of education, research and innovation (including German research institutes, funding and intermediary organisations, higher education institutions, [vocational] education providers, and industry).

4.2 Guiding principles – How do we want to cooperate?

The BMBF bases its future cooperation with China on the following guiding principles, which are designed to secure the long-term success of international cooperation activities and to ensure that the expectations of both sides are met:

• **Representation of own interests while taking account of mutual added value:** in cooperating with China, the interests of German higher education institutions, non-university research institutes, and companies must be actively represented. However, bilateral cooperation can only be successful if there are measurable benefits when compared to non-cooperation. In international research collaborations, this mutual added value is created in particular when the activities of the partners complement one another.

• **Continuity and reliability:** successful cooperation must be shaped by continuity and reliability on both sides. These do not necessarily come about by themselves, but must instead be developed through personal contacts. Trust and an understanding of cultural differences form the basis for long-term collaboration.

• **Transparency and openness:** cooperation must be based on the greatest possible transparency and openness on both sides. This includes exchanging the background information needed to develop and implement joint activities, transparency in how research results come about and unhindered access to relevant research data and markets. When conducting joint funding programmes for research cooperation, openness is necessary regarding the application and selection processes, the evaluation procedure and funding decisions.

• **Involvement of relevant stakeholders on both sides:** for a results-based, sustainable cooperation, all relevant actors must be involved and their standpoints considered. On the German side, this means bringing all the necessary stakeholders together, especially in industry and applications-related areas. Existing platforms such as the National Platform for Electric Mobility and the National Platform for Industry 4.0 bring experts from industry, science, government, the trade unions and industry associations together for strategic dialogue and can be used in opinion-forming regarding cooperation with China. On the Chinese side, depending on the topics involved and where otherwise appropriate, the BMBF aims to involve additional ministries and institutions (alongside the BMBF’s usual partners, the MoST and MoE) as well as relevant actors at provincial and local level.

• **Coherence with activities at national and EU level:** the China-specific activities conducted by various German stakeholders (ministries at federal and Land [state] level) should complement each other in a meaningful way. To ensure that this is the case, regular exchange of institutions, and experience must be guaranteed. At the same time there is also a need to shape the development of China-focused activities at EU level (policy initiatives such as under the Strategy Forum for International S&T Cooperation [SFIC], calls for proposals under Horizon 2020, etc.) and with other international organisations (OECD and UNESCO).

• **Research integrity and good scientific practice:** in all types of research cooperation, all stakeholders (at policymaking and institutional level, such as research institutes and funding organisations, and individual scientists) must follow the basic principles and rules of good scientific practice. This involves, for example, research work in general, scientific publications and authorship, mentoring and support of young researchers, and also the
evaluation and selection criteria and processes, and expert evaluation activities. Both German and international stakeholders have published recommendations and codes of conduct for good scientific practice.

4.3 Points for consideration regarding future cooperation with China in research and education

4.3.1 Cooperation in research and innovation

- Research collaborations between German higher education institutions, research institutes and companies with Chinese partners make sense when German research and science is strengthened and/or innovation potential and new markets for German industry are opened up. Access to excellent research infrastructures and unique research locations are also good reasons to enter into cooperation activities.

- To ensure that cooperation activities with China are successful, a good knowledge is needed of the most important political and administrative conditions relevant for cooperation (applicable laws and regulations, such as those on IPR), the relevant research and science policy stipulations and the key stakeholders in China. Framework conditions which can be defined by the project partners themselves should ideally be clarified and agreed prior to commencing collaboration.

- Research collaborations are possible in fields ranging from joint basic research (e.g. in marine and polar research or geosciences) to application and industry-focused collaboration in the form of pilot plants and demonstration projects which have been adapted to meet Chinese needs (e.g. environmental technology and waste water treatment).

- It is expected that in the next ten to fifteen years, China will be among the world’s leaders in many key technologies (and in some technologies it already is). It is thus important to closely monitor developments in these fields. Research collaborations serve this purpose well and should be conducted in areas where knowledge of the Chinese market can be acquired, German research and science can benefit from China’s current expertise, capacities and infrastructures, and innovation potentials and markets can be opened up for German industry.

- Where technology and services are concerned, cooperation activities along the value chain make sense – for example, with Chinese users or final customers and in implementing projects at application level to find local solutions.

- In the case of cooperation in applied research, the aim should be to give German industry the greatest possible access to the Chinese market and, ideally, unrestricted use of German technology in China. Cooperation activities which require disclosure of critical knowledge of basic technologies or (forced) technology transfer should be approached with caution.

- When entering a cooperation partnership or collaborating in certain research areas, it makes sense to first engage in pre-competitive research collaboration as a means by which to build trust and establish cooperation mechanisms.

- One promising area of focus in German-Chinese cooperation involves joining forces to tackle China’s megatrends and/or global challenges – such as environment, climate, urbanisation, energy, mobility, health, migration and demographic change. These are all issues which the Chinese government plans to address with long-term policies and measures. German research and industry are leading in many of these areas, meaning that promising opportunities for cooperation exist. China also serves as a testing ground for the development of experimental trials with new technologies, especially regarding the environment and urbanisation.

- Federal ministries and industry associations should closely coordinate their activities where industry-relevant and applications-related issues are involved. To ensure coordinated activity when approaching Chinese partners, existing and newly created national platforms could be used and, where appropriate, expanded to include a China component (for example, the National Platform for Electric Mobility and the National Platform for Industry 4.0). Coordination processes between German industry and Chinese institutions should be supported by policy measures where necessary.

- In the design and implementation of research cooperation activities, all relevant Chinese stakeholders
(policymakers at national, regional and local level, research institutes and higher education institutions) should be involved to ensure successful and sustainable cooperation.

- Topics in which a greater influence can be achieved in a coordinated approach (in areas such as IT security, standardisation and certification, and IPR) should be addressed on a European and international level.
- The development and implementation of joint calls for proposals for research projects can help in achieving a better understanding of the Chinese research and research funding system. This includes jointly defined framework conditions, e.g. regarding the application process, evaluation and selection criteria and project administration.

4.3.2 Cooperation in higher education and vocational education and training

- Structural cooperation in which sustainable, institutionalised and non-personal structures of collaboration are established is a good way to increase the number of German students and scientists in China and thus foster China expertise. Cooperation in higher education should thus place greater focus on joint study programmes, dual degrees and PhD opportunities (including the recognition of qualifications and skills acquired at Chinese higher education institutions) and, where trust has already been built up in cooperation, on the establishment of joint institutes.
- When seeking cooperation partners, German higher education institutions should look to China’s top institutions. In doing so, they should however consider the level of excellence in the respective discipline as many of China’s ‘second tier’ higher education institutions demonstrate excellence in selected research fields.
- The German-Chinese cooperation in vocational education and training which has been established in recent years is aimed at fostering the training of skilled workers needed, for example, by German companies operating in China. Also, German expertise is to be used to create the structures needed to provide vocational education and training in a dual system and to develop and implement national standards for vocational education and training.
5. Activity areas and future cooperation measures

For future cooperation with China, the China Strategy identifies nine activity areas which comprise thirty-five measures that should be implemented in the next years.

5.1 Creating a better China expertise in Germany

- Measure 1: Promoting innovative approaches for expanding China expertise at German higher education institutions
- Measure 2: Promoting long-term study and research stays in China
- Measure 3: Establishing a China-focused monitoring system tailored to the needs of stakeholders in science and research

5.2 Building sustainable cooperation structures and researcher networks

- Measure 4: Promoting structural strategic cooperation activities in higher education
- Measure 5: Intensifying activities of the Sino-German College for Applied Sciences
- Measure 6: Promoting sustainable research cooperation between German and Chinese higher education institutions and research institutes
- Measure 7: Establishing an alumni network
5.3 Networking German stakeholders and designing policy dialogues

→ Measure 8: Intensifying exchange with German research, funding and intermediary institutions, higher education institutions and other ministries

→ Measure 9: Designing the bilateral policy dialogue mechanisms in education, science, research and innovation

→ Measure 10: Participating in European and international bodies and initiatives relating to education and research cooperation with China

5.4 Optimising conditions for German science and research engagement in China

→ Measure 11: Intensifying the dialogue with China on framework conditions for research and education cooperation

5.5 Promoting key technologies

→ Measure 13: Further developing the Sino-German Strategic Platform for Electric Mobility

→ Measure 14: Implementing R&D projects for LED technology use

→ Measure 15: Exploring opportunities for an innovation partnership between China’s and Germany’s digital industries

5.6 Promoting the life sciences

→ Measure 16: Implementing a pilot project to promote industry-led collaboration projects on biomaterials using the ‘2+2 model’

→ Measure 17: Continuing the funding programme ‘Bioeconomy International’
5.7 Mastering global environmental challenges

- Measure 18: Supporting German industry in distributing innovative environmental/water technologies adapted to Chinese needs
- Measure 19: Continuing the bilateral Research and Innovation Programm ‘Clean Water’ (CLIENT/FONA3 Framework Programme) in cooperation with MoST
- Measure 20: Supporting Chinese participation in the BMBF Science Year ‘City of the Future’
- Measure 21: Setting-up a call for proposals on ‘Sustainable Urban Regions’ which is also open to Chinese-German consortia
- Measure 22: Promoting exchange of young German and Chinese researchers and students in the field of renewable energies
- Measure 23: Implementing scientific accompanying research on the impacts of large-scale energy infrastructure projects on environment and nature
- Measure 24: Acquiring more knowledge on the status of renewable energy research in China
- Measure 25: Preparing a status report on the strengths and weaknesses of Chinese climate research to identify potential areas for future cooperation
- Measure 26: Continuing the long-standing, intensive marine and polar research cooperation with the State Oceanic Administration
- Measure 27: Intensifying cooperation in natural disaster and georisk research, and the development of monitoring and early-warning systems

5.8 Promoting the humanities and social sciences

- Measure 28: Promoting social science cooperation with China in broader-based project funding lines
- Measure 29: Establishing an International Centre for Advanced Studies in the Humanities and Social Sciences in China

5.9 Intensifying cooperation in vocational education and training

- Measure 30: Intensifying cooperation in quality assurance
- Measure 31: Developing regional partnerships in cooperation on vocational education and training
- Measure 32: Providing assistance in the implementation of dual structures via the VETnet project
- Measure 33: Networking German stakeholders via an integrated project and alumni database
- Measure 34: Establishing sustainable cooperation between the Federal Institute for Vocational Education and Training and Chinese partners
- Measure 35: Promoting the export of German services in vocational education and training