Freie Universität Berlin

Humboldt-Universität zu Berlin

Technische Universität Berlin

CHARITÉ Universitätsmedizin Berlin

Berlin University Alliance

Crossing Boundaries toward an Integrated Research Environment

Excellence Strategy of the
Federal and State Governments
Universities of Excellence Funding Line
Proposal as a university consortium

Excellence Strategy of the Federal and State Governments

Universities of Excellence Funding Line

Berlin University Alliance

Crossing Boundaries toward an Integrated Research Environment

Freie Universität Berlin

Humboldt-Universität zu Berlin

Technische Universität Berlin

Charité – Universitätsmedizin Berlin

Commencement of funding 1 November 2019

Abridged online version, October 2019.

Brief profile of the consortium

<table>
<tr><th></th><th>Freie Universität Berlin</th><th>Humboldt-Universität zu Berlin</th><th>Technische Universität Berlin</th><th>Consortium</th></tr>
<tr><td>Established in (year)</td><td>1948</td><td>1810</td><td>1879</td><td>2018</td></tr>
<tr><td></td><td colspan="2">Charité – Universitätsmedizin Berlin
1710</td><td></td><td></td></tr>
<tr><td>Academic structural units</td><td>12 Academic departments:
• Biology, Chemistry, and Pharmacy
• Business and Economics
• Earth Sciences
• Education and Psychology
• History and Cultural Studies
• Law
• Mathematics and Computer Science
• Philosophy and Humanities
• Physics
• Political and Social Sciences
• Veterinary Medicine</td><td>9 Faculties:
• Arts and Humanities
• Economics and Business Administration
• Humanities and Social Sciences
• Language, Literature and Humanities
• Law
• Life Sciences
• Mathematics and Natural Sciences
• Theology</td><td>7 Faculties:
• Humanities
• Mathematics and Natural Science
• Process Sciences
• Electrical Engineering and Computer Science
• Mechanical Engineering and Transport Systems
• Planning - Building – Environment
• Economics and Management

2 Central Institutes:
• El Gouna, Egypt
• School of Education</td><td></td></tr>
<tr><td></td><td colspan="2">Charité
(joint medical faculty since 2003)</td><td></td><td></td></tr>
<tr><td></td><td>4 Central institutes:
• East European Studies
• John F. Kennedy Institute for North American Studies
• Latin American Studies
• Dahlem School of Education</td><td>5 Central institutes:
• Berlin Institute for Islamic Theology
• Institute for Catholic Theology
• Centre for British Studies
• Hermann von Helmholtz-Centre for Cultural Techniques
• Professional School of Education</td><td></td><td></td></tr>
<tr><td>Study programs (2017)</td><td>73 bachelor
102 master
3 state examination (law, pharmacy, veterinary medicine)
18 continuing education programs</td><td>58 bachelor
115 master
1 state examination (law)
1 church examination (theology)
15 continuing education programs</td><td>49 bachelor
75 master
1 state examination (food chemistry)
16 continuing education programs</td><td>182 bachelor
295 master
7 state examinations
1 church examination
58 continuing education programs</td></tr>
<tr><td></td><td colspan="2">Charité
2 bachelor
3 master
2 state examination (medicine, dentistry)
9 continuing education programs</td><td></td><td></td></tr>
</table>

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<table>
<tr>
<td>Clusters of Excellence (2019)</td>
<td>Total: 4
• MATH+ – The Berlin Mathematics Research Center
• Scripts – Contestations of the Liberal Script
• Temporal Communities – Doing Literature in a Global Perspective</td>
<td>Total: 4
• MATH+ – The Berlin Mathematics Research Center
• SCIoI – Science of Intelligence
• Matters of Activity. Image Space Material</td>
<td>Total: 3
• MATH+ – The Berlin Mathematics Research Center
• SCIoI – Science of Intelligence
• UniSysCat – Unifying Systems in Catalysis</td>
<td>Total: 7</td>
</tr>
<tr>
<td></td>
<td colspan="3">Charité
Total: 1
• NeuroCure – Comprehensive approaches to neurological and psychiatric disorders – from mechanism to interventions</td>
</tr>
<tr>
<td>Profile-forming areas

of research and/or other performance areas (teaching, transfer, research infrastructure) and areas of activity (e.g. early career support; equal opportunity; internationalization; cooperation; staff planning, recruitment and development)</td>
<td>9 Research fields:

• Biomedical Foundations
• Complex Systems
• Cultural Dynamics
• Educational Processes and Results
• Health and Quality of Life
• Human-Environmental Interactions
• In-Security – Security Research
• Materials Research
• Transregional Relations

Other profile-forming areas:

International Network University with a global network of strategic partners and liaison offices

Interdisciplinary research network pooling core competencies beyond departmental structures

Comprehensive support for junior researchers targeted for the leading academics of tomorrow</td>
<td>7 Core research areas:

• Application-Oriented Mathematics
• Image Sciences
• Integrative Life Sciences
• Integrative Natural Sciences
• Research on Law and Society
• Study of Ancient Civilizations
• Sustainability Research

Other profile-forming areas:

Knowledge, exhibition and dialogue: Sharing research findings in the public sphere

Humboldt's brightest minds: Excellent framework conditions for top-level researchers on all career stages</td>
<td>6 Key application areas:

• Materials, Design and Manufacturing
• Digital Transformation
• Energy Systems, Mobility, and Sustainable Resources
• Urban and Environmental Systems
• Optic and Photonic Systems
• Education and Human Health

Other profile-forming areas:

Transdisciplinary cooperation: joint research by academics and non-academics

Entrepreneurship: sustainable, technology-oriented start-ups

Digital transformation: research, public debate and institutional strategy on digitalization</td>
<td>12 Core research areas:

• Ancient Studies
• Application-Oriented Mathematics
• Art, Design and Cultural Heritage
• Biotechnological Advancements of Regenerative Therapies
• Catalysis, Interfaces, and Materials
• Global and Area Studies
• Global Health
• Literature and Cultural Studies
• Neuroscience
• Photonics at the Quantum Limit
• Politics and Society
• Science of Digitalization

Integrated Research Environment:

• Focusing on Grand Challenges
• Fostering Knowledge Exchange
• Advancing Research Quality and Value
• Promoting Talent
• Sharing Resources
• Diversity and Gender Equality
• Teaching and Learning
• Internationalization</td>
</tr>
<tr>
<td></td>
<td colspan="3">Charité
6 Research foci:

• Cardiovascular Research & Metabolism
• Infection, Immunology & Inflammation
• Neuroscience
• Oncology
• Rare Disease & Genetics
• Regenerative Therapies

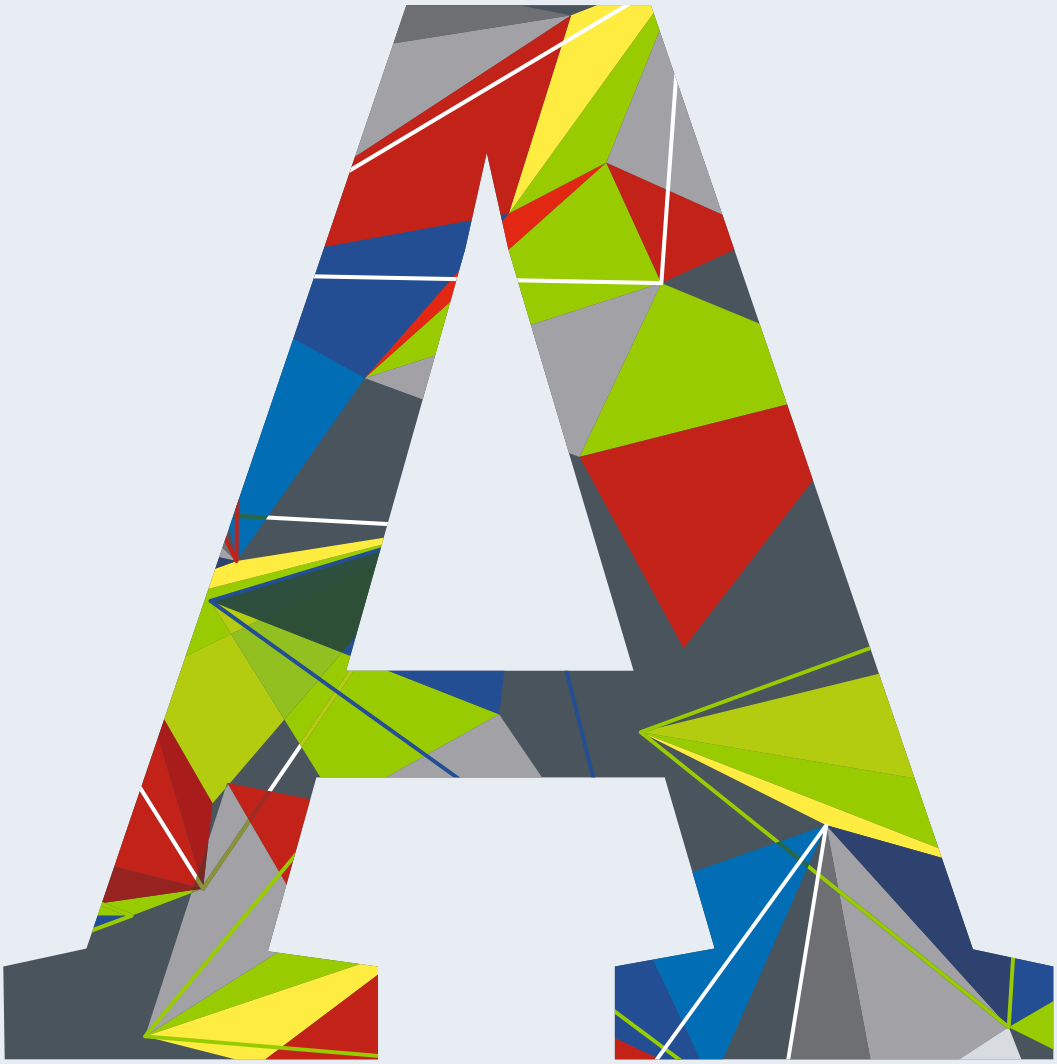
Other profile-forming areas:

Translating scientific progress in basic and applied medical research into clinical benefits for patients</td>
</tr>
</table>

Data for 2017

	Freie Universität Berlin |1	Humboldt-Universität zu Berlin |1	Technische Universität Berlin	Total
Total budget including medicine (revenues) [Dr137]	€752 million	€665 million	€520 million	€1,936 million
of which third-party funding (revenues/proceeds) [Dr1a or Dr1b]	€215 million	€193 million	€157 million	€565 million
Total budget excluding medicine (revenues) [Dr137]	€518 million	€431 million	€520 million	€1,469 million
of which third-party funding (revenues/proceeds) [Dr1a or Dr1b]	€134 million	€112 million	€157 million	€403 million
Professors [Be19]	690 FTE [Be1] 702 pers. [Be2]	616 FTE [Be1] 620 pers. [Be2]	365 FTE [Be1] 413 pers. [Be2]	1,670 FTE [Be1] 1,735 pers. [Be2]
of which male |2 of which female of which not specified [Be7]	65 % m 35 % f 0 % n.s.	69 % m 31 % f 0 % n.s.	81 % m 19 % f 0 % n.s.	
of which from other countries [Na58]	11 %	12 %	10 %	
Academic staff (excluding professors) [Be68 minus Be19 minus B18]	3,494 FTE [Be1]	3,280 FTE [Be1]	2,078 FTE [Be1]	8,852 FTE [Be1]
of which male of which female of which not specified [Be7]	52 % m 48 % f 0 % n.s.	54 % m 46 % f 0 % n.s.	71 % m 29 % f 0 % n.s.	
Doctoral students [Na46/Na38a]	4,591 pers. [Be2]	3,863 pers. [Be2]	2,941 pers. [Be2]	11,394 pers. [Be2]
of which male of which female of which not specified [Be7]	44 % m 56 % f 0 % n.s.	48 % m 52 % f 0 % n.s.	65 % m 35 % f 0 % n.s.	
of which from other countries [Na58]	33 %	33 %	30 %	
Academic support and administrative staff [Be63 plus Be28]	2,550 FTE [Be1]	2,298 FTE [Be1]	1,655 FTE [Be1]	4,886 FTE [Be1]
of which male of which female of which not specified [Be7]	30 % m 70 % f 0 % n.s.	30 % m 70 % f 0 % n.s.	43 % m 57 % f 0 % n.s.	
Students (excluding doctoral students, 1st subject in 1st course, full-time students in winter semester 2017/18)	34,318 pers. [Be2]	33,978 pers. [Be2]	32,045 pers. [Be2]	100,340 pers. [Be2]
of which male of which female of which not specified [Be7]	40 % m 60 % f 0 % n.s.	43 % m 57 % f 0 % n.s.	67 % m 33 % f 0 % n.s.	
of which foreign students	16 %	11 %	16 %	

|1 Figures from Charité, as the joint medical faculty of FU and HU Berlin, are distributed 50% between the two universities and are accordingly included in their total figures.
|2 Percentage shares for gender [Be7] and nationality [Na58] for professors relate to the number of persons [Be2].



A Text of proposal

Figures

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A.1. Summary

In February 2018, Freie Universität Berlin (FU Berlin), Humboldt-Universität zu Berlin (HU Berlin), and Technische Universität Berlin (TU Berlin) together with Charité – Universitätsmedizin Berlin (Charité) founded the Berlin University Alliance. This marks the starting point for a major joint effort toward the creation of an integrated research environment that will establish Berlin as one of Europe's leading science hubs. The Alliance will be a nucleus and a driving force in an outstanding ecosystem of universities and other research institutes, scientific collections, museums, and cultural and political institutions, together with start-ups and partners in industry. By facilitating research collaboration, career development, and knowledge exchange beyond the traditional boundaries of personal networks, institutions, and disciplines, the Alliance will strategically steer Berlin's research landscape, allowing it to emerge as a truly integrated environment. This will generate major research synergies and innovative potential, enabling the Alliance to confront large-scale and complex scientific problems of global importance.

The overall long-term strategy of the Alliance has five components: (1) developing Berlin-wide joint research agendas focusing on societal issues of global importance, (2) fostering a Berlin-centered network of research and knowledge exchange, (3) bundling Berlin expertise for assessing and developing general standards for research quality and value, (4) establishing a Berlin-wide integrated space for careers and recruitment, and (5) creating a Berlin-wide network of research services and infrastructures. All five components address issues raised in the analysis of the strengths and weaknesses of the partners.

The five Objectives defined in this proposal implement the components of the Alliance's strategy within the first seven years of funding. Three additional Cross-Cutting Themes shape the joint agenda: supporting diversity and gender equality, promoting research-based teaching and learning, and advancing strategic internationalization. Some Measures will be implemented by a new service institution planned in the form of a public corporation that will be jointly developed and governed by the partners of the Alliance. Via the Einstein Foundation, the State of Berlin will provide considerable additional funds to support the Alliance. Altogether, the Alliance is set to expand the partners' capacities to transform, develop, and sharpen their own research, services, and teaching profiles while optimizing the synergetic potential of cooperation. The Alliance's effectiveness will be demonstrated and measured by its success in pursuing the joint agenda along the five Objectives and three Cross-Cutting Themes, as well as by the extent to which both institutional structures and complementary individual profiles are strengthened.

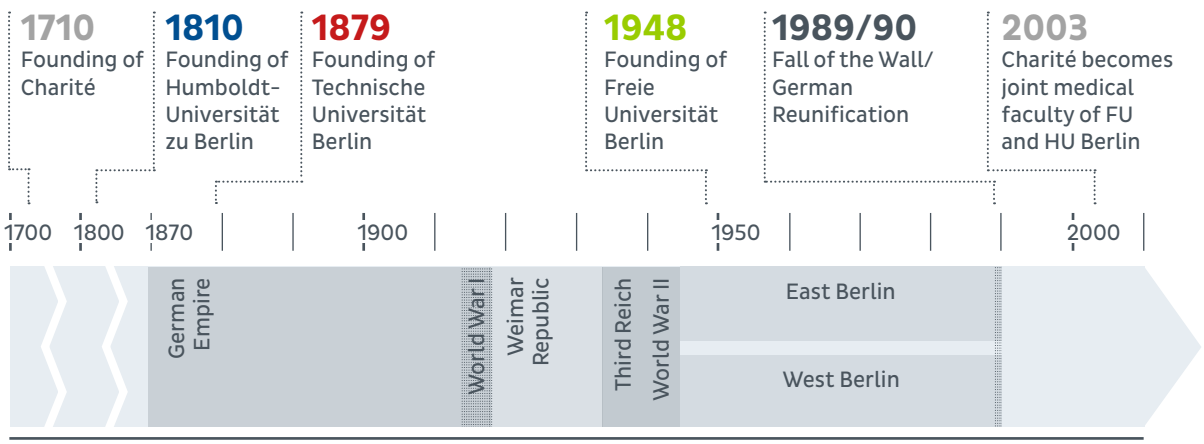
A.2. Status quo and prior achievements

The Berlin University Alliance consists of FU Berlin, HU Berlin, TU Berlin, and Charité, the joint medical faculty of FU and HU Berlin, referred to in the following as “the Alliance partners”. The Berlin University Alliance is founded in a unique setting: Nowhere else in Germany is the density of universities and other research institutes, scientific collections, museums, cultural and political institutions, and start-ups as high as in Berlin. Consequently, the Alliance partners are convinced that the potential benefit of a far-reaching collaborative culture in Berlin is unique. The Alliance will establish and steer an integrated research environment in Berlin, which will greatly expand the realm of possibilities and opportunities for each of the partners. It will have the capacity to address major scientific problems and issues of societal relevance, create novel support structures, and attract outstanding researchers in a manner far exceeding the capacities of the individual institutions. At the same time, the Alliance is designed to help the partners overcome their current weaknesses and sharpen their distinct individual profiles.

The following section introduces the Alliance partners, describes the Berlin-specific context in which the Alliance will operate, and provides a detailed summary of the current culture of collaboration in Berlin (see A.2.1., including subsections). It then turns to an analysis of the present strengths and weaknesses of the four partners both individually and in terms of current collaboration (see A.2.2. including subsections).

Each Alliance partner has its own unique tradition, and each has served as a role model for higher education at some point in its history. Research independence, integration of the humanities and the natural sciences, and the unity of research and teaching – these are the main principles upon which **Humboldt-Universität zu Berlin** was founded in 1810 (see fig. 1). This Humboldtian model of higher education, with its holistic combination of research and teaching, represents the archetype of the modern university in most parts of the world today. At present, HU Berlin is a modern full-spectrum university. In 2012, it was successful in the second round of the German Excellence Initiative, gaining the title

FIG. 1 **Historical overview**



of University of Excellence for its Institutional Strategy *Bildung durch Wissenschaft – Educating Enquiring Minds;* a strategy guided by the concepts of individuality, openness, and guidance in line with its tradition of unity of research and teaching.

Freie Universität Berlin was founded in 1948 for the sake of defending precisely these Humboldtian principles, at the time under serious threat at HU Berlin, which was situated in the city's Soviet Occupation Zone. Defending academic freedom and liberal values and introducing modern governance structures became hallmarks of FU Berlin's culture. Today, the university has twice been crowned University of Excellence, giving it a total of ten years' experience in the Excellence framework. Its strong Institutional Strategy has been reflected in the successful establishment of its identity as the *International Network University*.

The origins of **Technische Universität Berlin** date back to 1879. As one of the oldest universities of technology in Germany, the institution rapidly became a pioneer in engineering studies. Following its re-establishment in 1946, it pursued two essential goals: tying engineering to other scientific disciplines, and supporting research for civilian purposes. TU Berlin has since emerged as a national pioneer of both interdisciplinary research and partner-oriented collaboration with industry, business, politics, and civil society. Today, the university plays a central role in the Berlin academic landscape and is a major innovation-driver for Germany's capital with its vibrant start-up and high-tech networks.

The origins of **Charité – Universitätsmedizin** date back to 1710. In its current form, the institution developed from several mergers between the university hospitals and medical faculties of FU und HU Berlin. In the present proposal, Charité is thus legally represented by these two universities. In the nineteenth and early twentieth centuries, Charité was a hotbed for innovative medical research, producing several Nobel Prize winners. Today, it is not only Europe's largest university hospital, but it is also distinguished by highly innovative translational medicine from research to clinical application and back to research.

The historical importance of the Alliance partners for both the development of modern research and the emergence of the modern university is beyond dispute. They all currently enjoy a high international standing, although this is less prominent than it was in the late nineteenth and early twentieth centuries. Nevertheless, nearly thirty years after Berlin's reunification, the Berlin universities are finally in a position to fully utilize their synergies beyond the limits of the individual institutions, and to once again become academic role models at a national and international level. The formation of the Alliance has been driven by the conviction that both the future of the Alliance partners and the future of Berlin as a research location are tied to closer institutional collaboration.

A.2.1. Overall profile and starting situation

A.2.1.1. The Berlin context

The city of Berlin has undergone a major transformation since the Berlin Wall came down in 1989. Today, it is one of Europe's outstanding metropolitan areas, with a rich diversity of personal biographies, ethnicities, cultures, perspectives, and practices. It has become an international center for young people working in the cultural and creative industries and is now one of the leading start-up hubs in Europe. The city also stands for freedom and cosmopolitanism – values that academia must unwaveringly strive for. No other location in Germany offers a greater wealth of researchers, disciplines, and methodologies. This diversity has tremendous potential, which the Berlin University Alliance intends to systematically harness. The wider research landscape of the Berlin-Brandenburg region is home to a multiplicity of excellent non-university research institutes: eight institutes of the Max Planck Society, three major centers of the Helmholtz Association (plus two branch institutes), six institutes of the Fraunhofer Society, and 23 institutes of the Leibniz Association, complemented by federal research institutes (see fig. 8). Collaboration between the Alliance partners and some of these research institutes is very strong. It is characterized by mutual trust and shared interests, particularly with respect to joint professorships, joint junior research groups, collaborative research projects, and joint doctoral programs. Berlin is also home to the University of the Arts (UdK) and seven public universities of applied sciences, numerous private universities of applied sciences, and more than twenty branches and liaison offices of international universities. The high density of research and teaching institutions in the city is complemented by more than 170 museums and scientific collections, many of which have their own research departments and joint professorships with the Berlin universities. In 2009, the State of Berlin established its own foundation to promote research: the Einstein Foundation Berlin (ESB). The goal of the ESB is to promote cross-institutional top-level research projects in Berlin, and thus to increase the visibility of the city as a leading research location. In 2016, the ESB provided approximately €12 million in research funding.

Following World War II, Berlin was widely de-industrialized. Recent developments, however, are seeing a fundamental change here: Many major companies represented in the German Stock Index and other international companies have opened research departments in Berlin, benefiting from the highly qualified human resources of a young, modern, well-trained, and diverse community. Today, the city is home to the largest number of start-up companies in Germany. The diversity of people and perspectives in Berlin provides an excellent basis not only for innovative scientific dialog, but also for an open, productive exchange between university and non-university stakeholders. Berlin is the seat of the German federal government and numerous national and international interest groups, embassies, non-governmental organizations, think tanks, and charitable

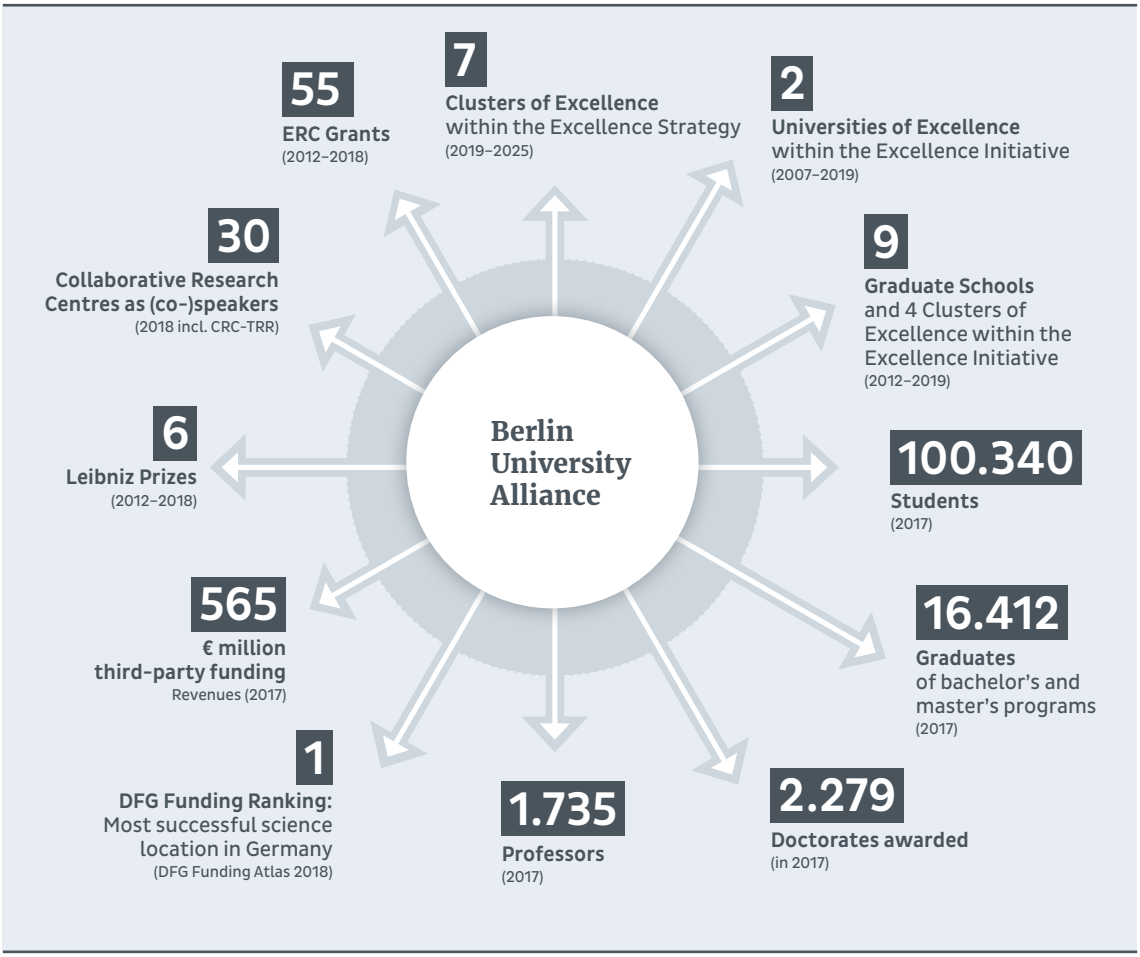
foundations. However, while the Alliance partners do engage in fruitful transdisciplinary dialog with this dynamic environment, they have yet to harness the full potential of Berlin's diverse knowledge ecosystem.

Today, Berlin can be seen as a laboratory for societal, cultural, ecological, and economic developments unfolding not only in Germany, but throughout Europe and the world. The city is a microcosm of today's (urban) challenges. To name just a few: social cohesion, postindustrial transformation and the reinvention of urban environments, adapting to the speed of digital transformation, questions of urban health, metropolitan traffic, and ecological and social sustainability. The Alliance will make use of this special metropolitan character, unique in Germany, to cross boundaries in developing cross-disciplinary, cross-institutional, and cross-sectoral exchanges and approaches that will address the challenges of the twenty-first century.

A.2.1.2. Current collaboration in the Alliance: research

Following the fall of the Berlin Wall in 1989 and German reunification in 1990, the Berlin universities faced fundamental challenges. Suddenly, there were three major universities in the unified city of Berlin: FU and TU Berlin had to discover their roles within this new triad, while HU Berlin faced the major challenge of transforming from East Berlin's elite

FIG. 2 **The Berlin University Alliance: key facts and figures**



academic institution into a modern research university. As a result, all three universities were focused internally on redefining their identities, and on mutual differentiation. The hard-fought battle for resources in the context of major financial cuts in the 1990s and the reorganization of academic structures reinforced this process. As a positive side effect, this difficult process created an awareness of the strong need for institutional advancement and a strong sense of identity. By the end of the 1990s, small steps toward cooperation were being taken, beginning with the alignment of teaching and research portfolios. It took a further ten years, however, for fierce competition to give way to stable and fruitful forms of collaboration. The collaborative process grew with the recognition that the unusual constellation formed by Berlin's major universities held unique scientific and strategic potential: that three high-performing institutions in close proximity, partly complementary, partly aligned in their range of disciplines, rich in outstanding minds, infrastructure, and ideas, together with a faculty of medicine with an international standing provided numerous opportunities for collaborative research (see fig. 2). The introduction of the Excellence Initiative in 2006/7 strongly facilitated this process.

Over the following years, and particularly from the second phase of the Excellence Initiative in 2012, the number of collaborative research projects between FU, HU, TU Berlin, and Charité grew rapidly, as did the number of proposals and projects in collaboration with non-university research institutes in the Berlin area. These increasingly intensive forms of research collaboration among the partner institutions lay the groundwork for a new, systematic form of institutional integration. The Alliance is thus a logical consequence of a process lasting three decades, leading from institutional isolation to first forms of cooperation and onward to a strong community consisting of the three universities and Charité, an Alliance now attracting attention worldwide. In international rankings, FU, HU, and TU Berlin have consistently been ranked among the TOP 10 German universities (see tab. 1). In most university rankings, Charité is not represented separately. However, it is ranked highly in medicine-based rankings, such as the German FOCUS Klinik-Ranking, in which Charité remains in first place for the fifth time in a row.

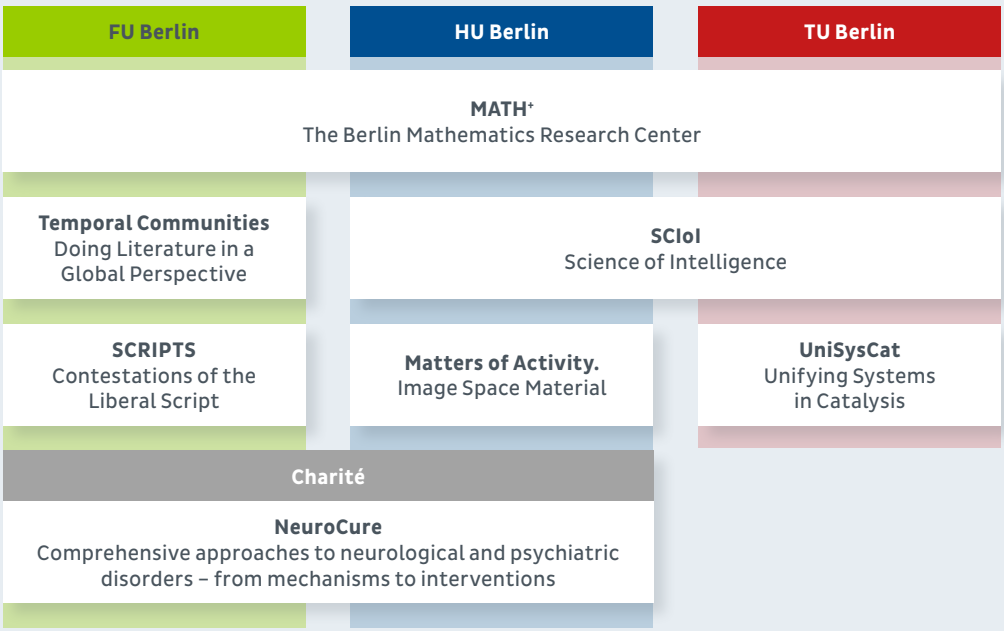
TAB. 1 **International university rankings (2018)**

	FU Berlin	HU Berlin	TU Berlin	Charité
THE World University Rankings 2018 for Germany (global)	**7** (88)	**4** (62)	**8** (92)	**13** (126)
QS Global World Ranking 2018 for Germany (global)	**6** (125)	**5** (120)	**8** (144)	51–100*

|* in medicine

As detailed above, research collaboration between the Alliance partners has reached a new qualitative and quantitative highpoint in recent years. Collaboration is based on the partners' distinctive research profiles, which have been developed through a Berlin-wide coordinated academic appointment scheme. This has reduced duplication by allocating

FIG. 3 **Clusters of Excellence in Berlin (2019–2025)**



entire disciplines to individual partner institutions, for example, and by coordinating the core research areas for planned professorships.

Many large-scale joint research projects financed by external funding have emerged from the partners' culture of collaboration; most notably their Clusters of Excellence. In the Excellence Strategy, the Alliance partners have been granted funding for seven Clusters of Excellence, two of which are now in their third Excellence funding phase (*NeuroCure* and *UniSysCat*), one in its second (*Matters of Activity*), and four of which are newly established Clusters (*Temporal Communities*, *SCRIPTS*, *MATH+*, *SCIoI*). One of the Clusters (*MATH+*) is jointly hosted by FU, HU, and TU Berlin, one by FU and HU Berlin at Charité (*NeuroCure*), and one by HU and TU Berlin (*SCIoI*) (see fig. 3 and fig. 5). All Clusters without exception combine principal investigators (PIs) from at least two Alliance partners, and many combine PIs from all four partners. For the new funding period starting in 2019, Berlin has been awarded more Clusters of Excellence in the Excellence Strategy than any other city in Germany.

Another highlight of the Alliance's successful collaboration is the large number of graduate programs that have been established in recent years; programs that often cross institutional and disciplinary boundaries. Perhaps most impressive are the ten Graduate Schools funded by the Excellence Initiative since 2006, of which six were renewed in the second competition round in 2012, and eight are collaborations between at least two of the Alliance partners (see fig. 5). The success of the four newly acquired Clusters of Excellence is due in part to preliminary work done by thematically related Graduate Schools.

Looking at the performance of the Alliance partners in the Excellence competition since 2006, it becomes clear that the partners and their collaboration have turned Berlin into one of the most successful research locations in Germany.

TAB. 2 **The Alliance partners in the German Excellence Initiative/Excellence Strategy since 2006***

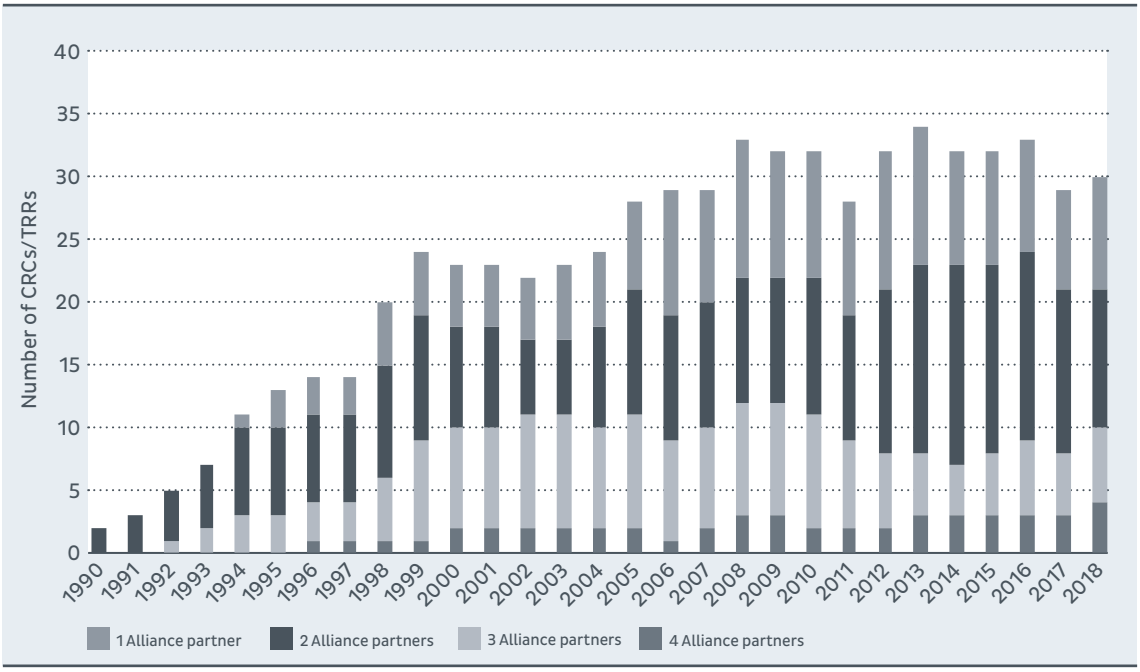
Funding line within the Excellence Initiative/ Strategy	FU Berlin	HU Berlin	TU Berlin	Charité
Graduate Schools (coordinating institution)	5	4	1	2
Clusters of Excellence	5	4	3	1
Institutional Strategy	2007–2019	2012–2019	–	–

|* Projects conducted primarily at the Charité are listed under Charité, although they were formally applied for by FU and HU Berlin.

In the same realm, the number of Collaborative Research Centres (CRCs) in Berlin, funded by the German Research Foundation (DFG), is the highest nationwide: Their total number has increased steadily and reached a peak level in the period around 2010. Collaboration between at least two Alliance partners in CRCs has been very high since the early 1990s, and collaboration in CRCs bringing together all four partners has intensified in recent years (see fig. 4). In summary, over the past twenty years, the Alliance partner institutions have continuously increased the number of prestigious, third-party funded, large-scale joint research projects in Berlin. Significantly, more and more of these projects have been jointly undertaken by two or more Alliance partners (see A.2.2.1.3.).

One particular case exemplifies the level of integration achieved in the Alliance's culture of collaboration: In a bottom-up, research-driven process that began more than twenty years ago, the field of applied mathematics has acquired a prominent profile in the city's

FIG. 4 **Collaboration between the Alliance partners in CRCs/TRRs as (co-)speaker**



research scene. With three university departments, the Berlin mathematics community has always been characterized by strong collaboration. Researchers have succeeded in obtaining external funding for major research projects (*Research Center MATHEON*, 2002–2014, *Einstein Center for Mathematics*, established 2014, Cluster of Excellence *MATH+*, established 2019, early-career support (*Berlin Mathematical School*, established 2006), and teaching (*German Centre for Mathematics Teacher Education*, established 2011, which have all resulted from joint proposals by the major Berlin universities. The collaboration agreement for *MATHEON* served as a blueprint for the model collaboration agreement issued by the DFG in the first funding round for Clusters of Excellence, and continues to provide the Berlin Alliance with invaluable practical knowledge for the cooperation upon which it is embarking. Beyond large-scale research projects, the Berlin culture of research collaboration is also characterized by a range of additional facets, including innumerable joint endeavors like small-scale research projects and publications, as well as conferences, meetings and workshops.

Another key strength of Berlin lies in the regional availability of state-of-the-art research infrastructure. University and non-university research institutes clustered on local research campuses provide a high density of major research instruments, core facilities, IT infrastructure, libraries, and collections (see A.2.2.2.3.). Moreover, the Alliance partners have proven strengths in acquiring funding for key research infrastructure. Only recently, the Joint Science Conference (Gemeinsame Wissenschaftskonferenz – GWK) approved an innovative proposal of TU Berlin and Charité for *Der Simulierte Mensch* with €34 million, a joint campus that will serve as a role model for the development of further cross-institutional and interdisciplinary research infrastructures. The *Berlin Big Data Center* established in 2014, the *Einstein Center Digital Future (ECDF)* established in 2017, and the *Weizenbaum Institute for the Networked Society* established in 2018 all provide infrastructure for exploring different aspects of the digital transformation. In order to prepare industry, science, and society for the global big data trend, the *Berlin Big Data Center* creates solutions facilitating the deep analysis of massive amounts of heterogeneous data, and trains the data scientists of tomorrow. The *ECDF* is a public-private partnership bringing together academic departments and industrial enterprises across Berlin and creating up to fifty new professorships. The *Weizenbaum Institute* investigates the impact of increasing digitalization throughout society, develops a comprehensive understanding of this impact, and offers informed strategies for use in politics and economy. These three centers, each focusing in their own way on the pressing topic of digital transformation, serve as best-practice examples of the Alliance's intensive collaboration on a set of major societal issues.

Finally, the Alliance partners regard the quality and value of research as inherent and important characteristics of their mission. They have begun to address this broad topic in

new forms of collaboration and structures (see A.2.2.1.6.). HU Berlin is in the process of establishing the *Robert K. Merton Center for Science Studies;* a facility that will extend ongoing collaboration with the German Centre for Higher Education Research and Science Studies (DZHW). Also important in this framework is the *QUEST Center for Transforming Biomedical Research,* founded recently by Charité and the Max Delbrück Center for Molecular Medicine under the aegis of the *Berlin Institute of Health* (*BIH*) with the aim of increasing the value of biomedical research.

A.2.1.3. Current collaboration in the Alliance: further areas

Current collaboration between the Alliance partners is not restricted to research. However, although systematic collaborative efforts have been initiated in a multitude of areas, they cannot yet be said to have reached the same magnitude or impact as collaboration in research.

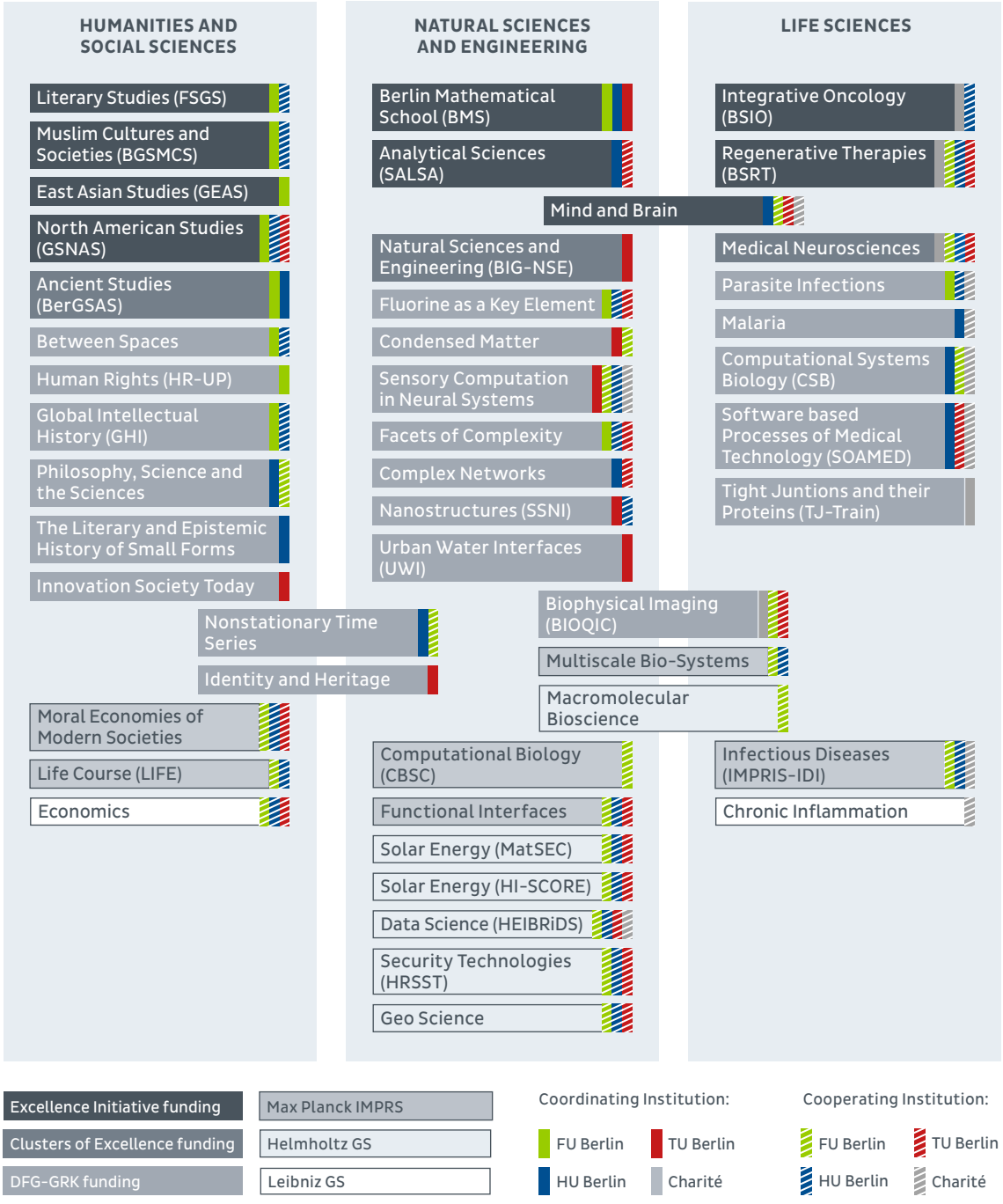
Early-career support

Early-career support has been a priority for all of the Alliance partners for many years. Structured training programs, for instance, have been established and anchored as part of doctoral training to improve the quality of the early-career support system in each institution. The umbrella organizations for early-career support *Dahlem Research School* (*DRS*) at FU Berlin and *Humboldt Graduate School* (*HGS*) at HU Berlin, both including Charité, were established in 2006; *TU-DOC*, the early-career support office at TU Berlin, was initiated in 2009. Collaboration has increased substantially over the years in joint structured doctoral programs (see fig. 5) and through a range of cross-institutional courses. Most recently, the partner institutions have closely coordinated their planning and implementation of new tenure-track procedures and guidelines (for an in-depth analysis see A.2.2.3.).

Teaching

Berlin is home to around 180,000 students – more than any other city in Germany. Of this student population, more than 100,000 attend the Alliance institutions, which are extremely attractive to talented young minds in Germany and around the world. Beyond the pull of a dynamic urban center, the source of this attraction is the synergistic spectrum of degree programs and subjects offered. While the Alliance partners strive to optimize study conditions at their own institutions, they also encourage students to take courses at the partner universities. Despite inherent administrative challenges, a small number of degree programs jointly organized by two or more Alliance partners already exist, mainly at the master's level. Students enrolled in joint degree programs must still, however, choose a "home" university (for an in-depth analysis see A.2.2.2.1.).

FIG. 5 **Most important doctoral programs in Berlin (2018)**



* For better readability, the figure uses shortened program names. These are nemed in full in the list of abbreviations.

Transfer and knowledge exchange

All partners have established their own individual science-technology transfer units (for example patent exploitation offices and start-up support units), which contribute to Berlin's economic development. All units offer a broad range of formats, including consulting services, transfer training for researchers, and incubation spaces for entrepreneurs. The units have accumulated a great deal of experience in acquiring transfer-oriented third-party funding (e.g. successful applications in the framework of the EXIST Business Start-up Grant program of the German Federal Ministry for

Economic Affairs and Energy. Joint initiatives in the areas of applied science, knowledge transfer, research-based spin-offs, and science communication have steadily increased in recent years. Synergies have been established between the partners' start-up support units, as demonstrated by the third-party funded *University Startup Factory* and the *B!gründet* network, for example. A number of projects show how the partners have started to engage with a broader concept of transfer in the sense of multidirectional knowledge exchange, for example the *Trialog*® series at TU Berlin and the upcoming *Humboldt Labor* of HU Berlin at the Humboldt Forum – the new large-scale museum project in Berlin (for an in-depth analysis see A.2.2.2.2.).

Internationalization

The strong pull of the Berlin universities for researchers and students both nationally and internationally is reflected on various levels: The four Alliance partners have the highest numbers of international master's students (23.4%) and PhD students (32.5%) in Germany. Likewise, according to the 2017 ranking of the Alexander von Humboldt Foundation, FU, HU, and TU Berlin are top addresses for visiting scholars from abroad. The Alliance partners are also all deeply embedded in international networks. International networking strategies include strategic partnerships and networks (see fig. 9), liaison offices (FU Berlin, in part jointly with TU Berlin), and a satellite campus (TU Berlin). The recently established partnership between the Alliance and the University of Oxford is an example of joint strategic action by the Alliance partners and will serve as a best-practice example for future strategic partnerships (for an in-depth analysis see A.2.2.1.5. and A.2.2.3.2.).

Equal opportunity and diversity

The Alliance partners have taken the lead in Germany in respect to equal opportunity at universities, with FU and HU Berlin heading the 2017 university equality rankings of the Centre of Excellence Women and Science, and TU Berlin employing the second highest number of female professors among the leading nine German universities of technology (TU9). Charité is ranked 6th in Germany with regard to university medical faculties. In 2004, FU, HU, and TU Berlin initiated the program *ProFiL – Professionalization of Women in Research and Teaching: Mentoring, Training, Networking* to jointly support highly qualified female scholars in attaining full professorships. Each of the Alliance partners has its own center for gender studies, all of which take an interdisciplinary approach to gender aspects in research across the disciplines. The equal opportunity structures, networks, and players within the Alliance are well organized and well connected. Diversity, on the other hand, is a topic that has only more recently come into focus, and addressing diversity as a cross-cutting theme will be a core concern within the Alliance (for an in-depth analysis see A.2.2.1.6. and A.2.2.3.3.).

Preliminary stages of joint governance

The various forms of collaboration between the Berlin universities are based on close coordination at the institutional and policy levels. For example, the presidents of Berlin's universities have been meeting at least once a month for many years, the vice-presidents meet regularly, and the deans and department heads of related disciplines coordinate joint research and teaching activities. This intensive cooperation has, among other things, been a key element in developing the coordinated academic appointment scheme essential for coordinated development planning in Berlin. In the future, current forms of coordination will be replaced in favor of a new Alliance governance structure (see A.3.3.3.).

Conclusion of A.2.1. – Institutional maturity of the Berlin University Alliance

The previous summary of the culture of collaboration among the Alliance partners has pointed to substantial strengths in both research collaboration and infrastructure. Collaboration in other areas is less well-developed, but nevertheless has great potential. Existing forms of collaboration rest on the complementary experiences, strategies, and success factors of the four partners, each of which has demonstrated individual institutional excellence on the national and international level. Through shared goals and strategies, a joint governance model, and the individual, mutually complementary strengths of the Alliance partners, the Alliance will transform the current culture of collaboration in Berlin into a new institutional force unique in Germany, and a living embodiment of the Alliance's founding concept of "crossing boundaries".

A.2.2. Analysis of strengths and weaknesses based on previous achievements and successes

The following section presents individual analyses of the four Alliance partners' strengths and weaknesses in a variety of performance areas (research, teaching, transfer, research infrastructure, excellence of researchers and framework conditions), together with analyses of strengths and weaknesses focusing on the present state of collaboration in the same areas. For all performance areas, the strengths and weaknesses of the Alliance partners were identified in a series of workshops with researchers and experts from the Alliance institutions. To ensure comparability, workshop questions were structured according to uniform categories and indicators with reference to internal and external data serving as benchmarks. The results were finalized in a second series of workshops with representatives from the management and strategy divisions of the four institutions. In addition, discussions on the synergies and added value of existing collaboration were held with researchers and administrators engaged in selected collaborative projects. In a final step, the results were used to identify the opportunities and risks of future collaboration. The analysis described in the subsections A.2.2.1.– A.2.2.3. is summarized in section A.2.3. and forms one of the foundations of the Alliance's future strategy (described in A.3.).

A.2.2.1. Organization and quality of research

A.2.2.1.1. Research performance of the Alliance partners

FU, HU, TU Berlin, and Charité consistently rank among the top-performing research universities in Germany: High revenues in third-party funding, acclaimed large-scale research projects, prestigious awards and prizes, and outstanding publications document their strong research performance.

FU, HU, and TU Berlin have roughly doubled or even more than doubled their third-party funding revenues since 2007, and Charité has increased these by approximately 50% (see tab. 3). FU and HU Berlin are the most successful in acquiring DFG funds. In national comparison[1], FU Berlin is placed fifth in the overall DFG funding ranking, first in the humanities and social sciences, and seventh in the life sciences. HU Berlin is ranked ninth overall, and second in the humanities and social sciences. Charité is the nationwide leader in DFG funding for university medical faculties. For TU Berlin, the importance of third-party funding has shifted from DFG funding to federal funding (which it has more than tripled since 2007) and funding from the European Union (EU). Nationally, TU Berlin is ranked third in federal funding and fourth in EU funding revenues (figures for 2015, based on DFG analysis). EU funding at FU, HU Berlin, and Charité has remained at a comparatively lower level. Only TU Berlin has been able to significantly increase its revenues to €20 million annually. The other partners stagnate at around €10 million a year each. While FU Berlin has seen increases in EU funding in recent years, starting from a low level of €3 million in 2007, EU funding at HU Berlin and Charité has recently declined. A further important source of external funding for both Charité and TU Berlin is industry, forming 23% and 11% of revenues, respectively, in 2017 (see fig. 6).

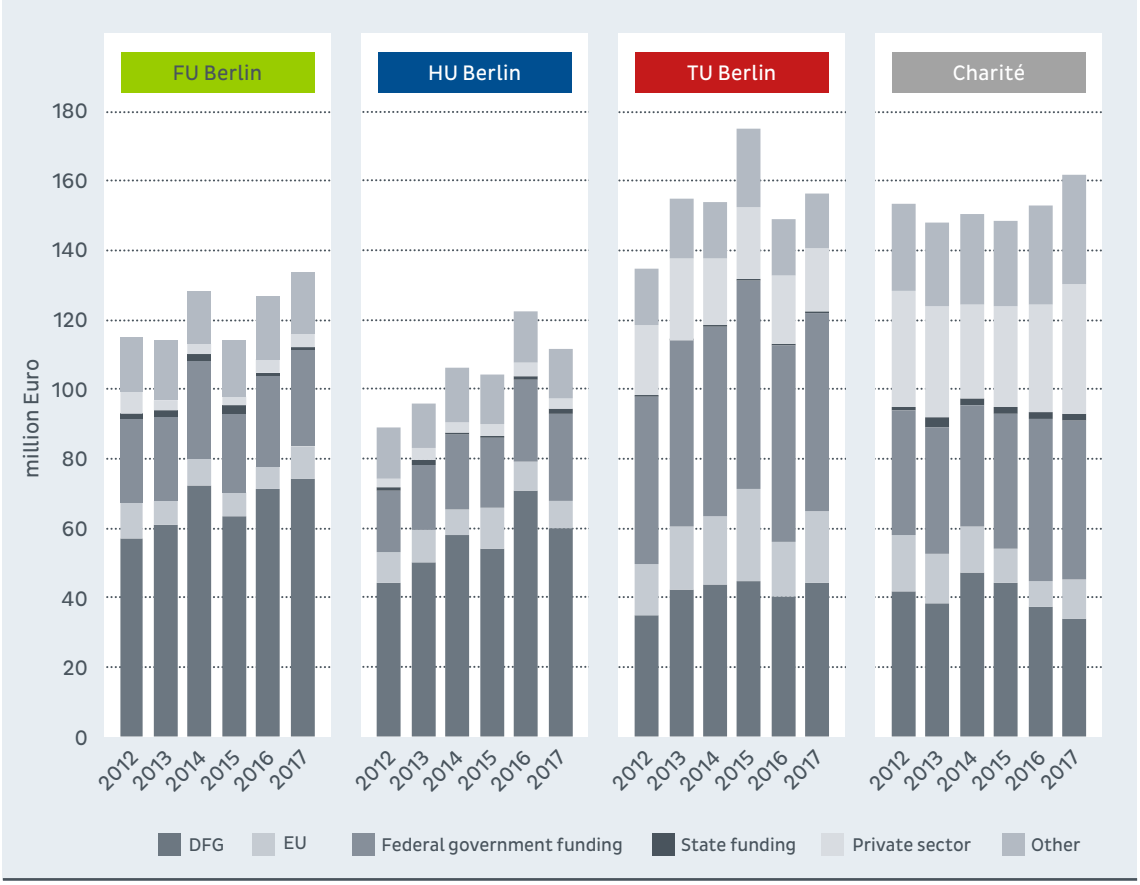
TAB. 3 **Third-party funding revenues (in € million)**

Funding body	FU Berlin			HU Berlin			TU Berlin			Charité		
	2007	2012	2017	2007	2012	2017	2007	2012	2017	2007	2012	2017
DFG	33.3	57.5	74.5	27.1	44.4	60.4	23.7	35.2	44.7	28.5	42.3	34.3
Federal govt.	8.2	24.0	27.7	10.0	17.7	25.2	17.2	48.5	57.1	22.3	35.6	45.9
EU	3.7	10.3	9.3	11.5	8.8	7.8	13.9	14.7	20.2	11.5	16.1	11.0
Total	**45.1**	**91.8**	**111.5**	**48.6**	**70.8**	**93.4**	**54.8**	**98.4**	**122.0**	**62.3**	**94.0**	**91.1**

In summary, the four Alliance partners see the need to gain better access to international funding for research and innovation, and to further expand the amount and diversification of their funds. They recognize that their success with EU research funding programs and other international funding opportunities has not yet reached its full potential. With respect to the present political crisis in Europe and in the European Union in particular, there is also a need to more actively engage in direct collaboration with other European institutions in terms of both joint teaching and research activities.

|1 Evidenced in the 2018 Funding Atlas of the German Research Foundation (DFG) for the period 2014–2016.

FIG. 6 **Third-party funding revenues**



Of course, research performance cannot and should not be measured exclusively in terms of rankings, third-party funding, impact factors, or any other numerical parameters: The originality, productivity, and societal impact of research may be best assessed by considering the research itself. The Annex presents a selection of fourty researchers who are particularly outstanding in this respect, pointing to the range of excellence within the Alliance and lists major examples of research successes and the advancement of knowledge by PIs and research collaboration within the Alliance. Section A.2.2.3. further elaborates on the excellence of the researchers at the Alliance institutions.

A.2.2.1.2. Research profiles of the Alliance partners

FU Berlin is one of the strongest and most renowned research universities in Germany. From the beginning, it has been driven by an international impetus, leading to its Institutional Strategy *Veritas – Justitia – Libertas. International Network University*, twice honored by the Excellence Initiative since 2007. The establishment and fostering of research networks with top-level institutions worldwide, together with close collaboration with partners in the region, is an integral part of the university's profile (see A.2.2.1.4., A.2.2.1.5.). Further focal points of its strategy are the promotion of early-career researchers at all stages between doctorate and professorship (see A.2.2.3.), and the development of university-wide cross-departmental platforms to promote collaborative

interdisciplinary research. Currently, the university has nine interdisciplinary research fields: transregional relations; cultural dynamics; biomedical foundations; complex systems; materials research; health and quality of life; educational processes and yields; security research; and human-environment interaction. In its Institutional Strategy, it currently has four so-called *Focus Areas*: the *Dahlem Humanities Center*, the *Center for Area Studies*, *Nanoscale Functional Materials and Systems*, and the joint *Focus Area* with Charité, *Disease in Human Aging*. These *Focus Areas* have led to substantial successes in third-party funded research. Most importantly, two of the newly funded Clusters of Excellence in literary studies and political sciences and area studies, have grown out of the *Focus Areas*.

FU Berlin has a long-standing and successful dedication to collaborative research. In addition to its three recently awarded Clusters of Excellence starting in 2019, it is currently home to nine CRCs, ranging from the natural sciences and the life sciences to the humanities and social sciences. The university is particularly strong in the social sciences and humanities: Four of the university's five Graduate Schools, all six of its DFG Research Units, and four of its six DFG Research Training Groups come from these disciplines. However, while strong at the national level, there is still room for improvement in success at the European level.

While FU Berlin can demonstrate strong achievements in fostering interdisciplinary collaboration, support for individual research is less well developed. This is reflected in an unsatisfactory number of prestigious awards held by individual researchers: Although FU Berlin has improved its performance with regards to European Research Council grants (see A.2.2.3.) over recent years, only one of its scholars has received the Leibniz Prize within the last decade, for example. FU Berlin typically selects its researchers based on how well they fit into its key research areas and groups – an approach reinforced by the university's internal research funding mechanisms. In the future, FU Berlin will need to refine and diversify its internal funding schemes and continue the process of strengthening its research profile by more strategic recruitment of top-level scholars. Promotion of equal opportunity will also continue to play a central role at FU Berlin. The university has a strong tradition of promoting gender equality and gender studies: The proportion of female professors and researchers is far above the German average (see A.2.2.3.), and the *Margherita von Brentano Center* is a central unit supporting and conducting collaborative projects in gender studies. Plans to foster diversity in a wider sense are, on the other hand, still underdeveloped.

HU Berlin is one of Germany's best performing and best-known research universities. The university's scientific profile encompasses the entire range of disciplines, focusing in particular on seven core research areas: integrative natural sciences; integrative life sciences; application-oriented mathematics; image sciences; law and society;

sustainability research; and ancient civilizations. Since its founding in 1810, the university's development has been guided by three general principles: the academic freedom of individual researchers, fruitful exchange between the humanities and the natural sciences, and the unity of research and teaching. These principles are still relevant today and form the core of HU Berlin's Institutional Strategy *Bildung durch Wissenschaft – Educating Enquiring Minds*, currently funded by the Excellence Initiative (2012–2019). Outstanding personalities such as Alexander von Humboldt, Albert Einstein, and Lise Meitner have shaped HU Berlin since the beginning. Its long-standing experience of providing support for individual researchers forms the first pillar of its research strategy: recruitment, enabling structures, and meeting the specific needs of outstanding individual researchers. This strategy has proven highly successful, as evidenced by the large number of Alexander von Humboldt Professorships and Leibniz Prizes awarded to professors of HU Berlin in recent years. However, this strategy has been increasingly challenged by difficulties in being able to offer competitive salaries, the high cost of equipment, and lack of dual-career options.

Since 2012, HU Berlin has reinforced its support for interdisciplinary research and the initiation of large-scale research projects as a second pillar of its research strategy. The university has restructured the disciplinary composition of some of its faculties, resulting in improved interdisciplinary exchange. In addition, it has implemented research structures that bridge faculties and disciplines. These include interdisciplinary centers like the *Berlin Institute for Integration and Migration Research* (*BIM*), and *Integrated Research Institutes* (*IRIs*) such as the *IRI on Transformations of Human-Environment Systems*. All of these structures serve the additional purpose of promoting collaboration with external partners and acquiring external funding. The *IRI for the Sciences Adlershof*, for example, has been instrumental in developing the *Adlershof Technology Park*, and successfully acquired third-party funding for the construction of a state-of-the-art research building in 2013. HU Berlin's recent success in the Clusters of Excellence competition confirms the second pillar of its research strategy. While these new collaborative structures have been an overall success, achievements in equally important collaborative formats, such as CRCs, have been below expectations in recent years (in 2018 HU Berlin hosts three CRCs, whereas its researchers are active in a total of 13).

HU Berlin recognizes both the importance and the enormous potential of internal career development at all career stages, including diversity and equal opportunity support. Major prior achievements include two comprehensive programs focusing on the promotion of young researchers with the *Humboldt Graduate School* at its center and the *Caroline von Humboldt Program* fostering gender equality (see A.2.2.3. for more information).

In the future, HU Berlin will expand its research strategy by adding knowledge exchange

as a third pillar. With structures such as the *BIM* and *Humboldt Labor*, the university plans to systematically foster exchange between top-level research and society, enriching its research output and developing into a leader concerning the third mission of universities: outreach.

TU Berlin is one of the leading universities of technology in Germany. It covers a wide range of scientific fields, from science and engineering through planning and economics to the social sciences and humanities. In its research strategy, TU Berlin emphasizes its vision as an institution devoted to knowledge-oriented and application-oriented research, to providing highly interdisciplinary solutions to societal challenges, and to developing science and technology for the benefit of society. One of the university's basic convictions is that research, teaching, and knowledge exchange need to constructively take account of complex and pressing social and technological issues and help to develop solutions wherever possible. In this context, TU Berlin attaches great importance both to freedom of research and to maintaining exclusively civil research objectives.

TU Berlin has developed six key application areas representing its scientific profile areas: materials, design and manufacturing; digital transformation; energy systems, mobility, and sustainable resources; urban and environmental systems; optic and photonic systems; and education and human health. Alongside its Clusters of Excellence, outstanding examples of these application areas at work are two EU-funded Knowledge and Innovation Communities (KICs) – *European Institute of Innovation and Technology (EIT) Digital* and *Climate KIC* – and several BMBF-funded research facilities, such as the *Mobility2Grid* research campus, the *Berlin Center for Machine Learning*, the *Berlin Big Data Center*, the *Einstein Center Digital Future* and the *BasCat Laboratory* (in cooperation with BASF.

TU Berlin attaches great importance to collaboration with non-university research institutes such as institutes of the Fraunhofer Society (see A.2.2.1.3.) and with non-academic partners. It has a longstanding relationship with Telekom AG and their *T-Labs*, which is linked to a number of endowed professorships. As of November 2018, its cooperation with Siemens AG has been further intensified through Siemens' new Industry and Science Campus Berlin (IWCB), for which three new professorships are planned by the State of Berlin. As part of the *ECDF*, TU Berlin collaborates with several industrial partners, in this way securing funding for (currently) seven professorships. Through its *Joint Programs for Female Scientists and Professionals*, five visiting professorships have been awarded to women in business (e.g. Siemens, VW, and BMW) under the BMBF Female Professorship Program.

For many years, TU Berlin has been using internal seed money to stimulate and initiate interdisciplinary collaboration and strengthen its key application areas. Efforts were not always as successful as the above-mentioned initiatives. *Innovation Centers*

aimed at setting up new interdisciplinary focus areas did not live up to expectations, their structures seemingly too rigid and administration-oriented to promote a flexible, project-oriented research approach. Thus the number of the university's CRCs has not risen as hoped. Consequently, TU Berlin is now working to optimize the relevant framework conditions through new instruments. One of these is the *TU Dialogplattform*, which makes methodological knowledge accessible for interdisciplinary collaboration and supports the development of new research ideas. *Innovation Professorships* constitute another such instrument, which were recently introduced in a university-wide competition between faculties to establish six additional, particularly innovative, interdisciplinary professorships. It will take several years to see if these new strategic approaches will succeed in increasing the quality and number of (international) collaborative research projects. Meanwhile, there are several challenges the university needs to meet: Transparent, comprehensive databases on research topics, results and infrastructural framework at TU Berlin, as well as throughout Berlin's research landscape, are still lacking; these could serve as a basis for developmental planning.

Charité is one of the largest university hospitals in Europe and has more than 300 years of experience in medicine and research. Values of humanism, evidence-based medicine, responsibility, entrepreneurship, and respect guide its mission to bring excellence in medical research to both patients and students. Charité is involved in the scientific study and treatment of all medical diseases. With its research on the (epi)genetic basis of health and disease, it forms the most important hub in Berlin for combining the life sciences and natural sciences, and has gained international recognition for innovation in combining basic and clinical research. This research follows a dedicated translational approach based on an integrational model[2] combining research, teaching, and medical care in a single institution serving the entire medical value chain. Strict commitment to quality management ensures excellence in medical research with the recently founded *QUEST Center for Transforming Biomedical Research* (see A.2.2.1.6.).

Charité has six research foci that are currently undergoing redefinition: neuroscience; regenerative therapies; infection; immunology and inflammation; cardiovascular research; and metabolism; oncology and rare diseases and genetics. Dedicated research centers further structure these focus areas, advancing and refining research in line with the principle that success in medical science depends not only on excellent basic research ("from bench to bedside"), but also on unmet clinical needs feeding questions into preclinical research ("from bedside to bench"). The establishment of the *BIH* as an integrated research space in 2013 is of major importance to Charité. In a corporate partnership with the Max Delbrück Center for Molecular Medicine, it will follow

|2 In German "Integrationsmodell": In Germany there are formally two different organizational models of university medicine. In the integrational model, the faculty of medicine (research and teaching) and the university hospital (health care) form a legal unit, whereas in the cooperation model they are legally separate.

a progressive course to foster translational research on disease. Other important collaborative structures include the *Universitäres Herzzentrum Berlin (UHZB)* together with the German Heart Center Berlin (DHZB), and the recently founded *Charité Center for Global Health*, which will serve as a platform for addressing health from an international perspective, in collaboration with partners from the public sector.

Despite Charité's recognition of and commitment to the needs of modern medicine, the implementation of suitable measures poses a major challenge. This includes topics such as digitalization and general data safety, and legal, ethical, cultural, societal, and political issues that go beyond what a medical faculty is capable of addressing alone. In addition, in the integrational model, increasing workloads from teaching and clinical responsibilities impose challenges to advancing the scientific careers of research-oriented clinicians. This necessitates support structures like the *Clinician Scientist Program* (*CSP*) developed by Charité, that is now a role model in Germany. Concerning third-party funded research, the acquisition of large research projects such as CRCs has been falling short of expectations for several years. However, Charité was recently granted further funding for two existing CRCs and two new CRCs, as well as for its Cluster of Excellence *NeuroCure* for the third time. Attracting and supporting researchers at all career stages represents one of Charité's great future challenges. Structures for career support are currently being established – for instance the *ERC Talent Office* and internal review boards for major grant applications. Other programs are aimed at supporting women on the way to a professorship. These measures have proven successful: Charité has recently shown considerable success in awards granted to younger researchers, especially ERC Starting Grants (see A.2.2.3.).

TAB. 4 **Research performance and strategy**

STRENGTHS		WEAKNESSES	
Research performance			
All	Significant increase in third-party funding since 2007	**All**	Potential to be tapped in systematic and strategically coordinated linking of major collaborative research projects, e.g. in digitalization
FU	Top positions in nationwide DFG Third-Party Funding Atlas for 2014–2016:	**FU, HU, Charité**	Acquisition of EU and other international funding not yet sufficient
FU, HU	5th in overall DFG funding	**FU, HU**	Main funding via DFG, diversification of funding necessary
TU	1st and 2nd in DFG funding for humanities and social sciences	**HU, TU, Charité**	Too few new CRC initiatives and applications
Charité	3rd in federal funding, 4th in EU funding (data for 2015)	**FU, TU, Charité**	Awards for established researchers behind expectations (see A.2.2.3.1.)
	1st in DFG funding for medicine		
HU	Recent strength in prestigious national research awards: 4 Leibniz Prizes since 2012		
Research strategy and coordination			
All	Internal research coordination has led to complementary strengths among the partners	**FU**	Support for individual research less well developed compared to other research funding instruments
FU	Particular strength in collaborative research funding schemes: hosts 9 CRCs, (co-)hosts 5 Graduate Schools (in 2018) and 3 Clusters of Excellence (as of 2019); *Focus Areas* as a successful model for internal research funding	**HU**	University-hosted CRCs behind expectations; strategy depends in part on difficult framework conditions (e.g. payment limitations)
HU	Fostering individual support for outstanding researchers has led to a strength in research awards	**TU**	Internal innovation centers have not produced an overarching effect
TU	Successful institutional collaborations in public-private partnership models to strengthen cutting-edge research with application orientation (*T-Labs, ECDF, Climate-KIC, EIT Digital, IWCB*	**Charité**	Need for redefining strategic focus areas; improvement required for personnel development plans; high clinical workload compromises research-oriented clinicians
Charité	Fostering innovation in research through close collaboration in clinical-scientific strategic fields, e.g. neurosciences (incl. optogenetics, imaging)		

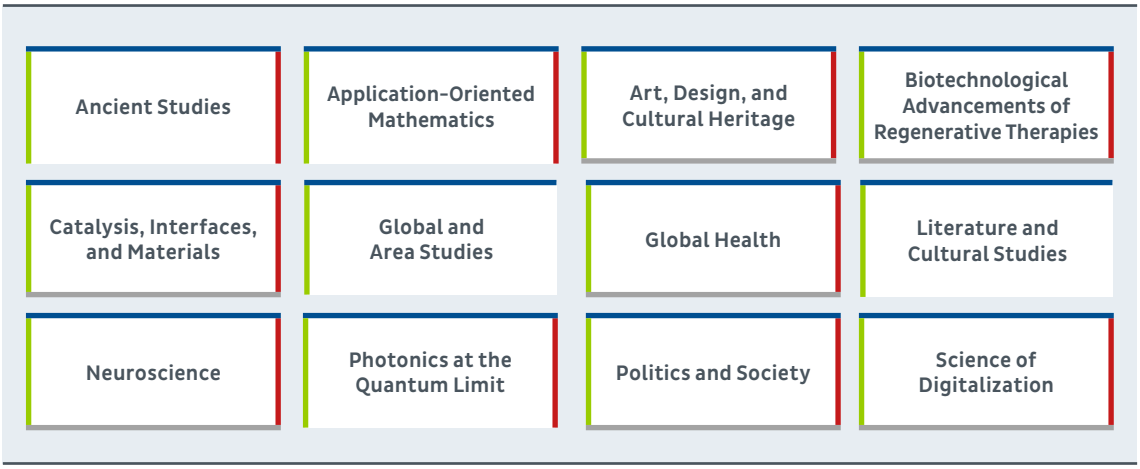
A.2.2.1.3. Research profile of the Alliance and strategic orientation of research

FU, HU, TU Berlin, and Charité have long developed a practice of mutual consultation in the planning of important research projects and the alignment of their research and teaching profiles. A joint academic appointment scheme that is regularly updated, for example, enables them to coordinate the thematic orientation of their professorships and thus to advance their individual profiles. This coordination makes it possible to align disciplines in a complementary way and to focus entire disciplines at one institution (e.g., veterinary medicine at FU Berlin, theology at HU Berlin). It furthermore enables FU and HU Berlin in particular to maintain their range of smaller, highly specialized disciplines in the area studies and humanities.

The Alliance's twelve profile-forming research areas, hereinafter "core research areas"

(see fig. 7), build on large collaborative research projects, being mostly Clusters of Excellence, CRCs, and Graduate Schools, but also federally funded research institutes such as the *Weizenbaum Institute*. Other research structures funded by the DFG, the federal government, and public-private partnerships further shape and contribute to these core research areas, as do non-university research institutes in the Berlin-Brandenburg area (Leibniz, Max Planck, Helmholtz, and Fraunhofer), and international partners. Core research areas of the Alliance are typically interdisciplinary research areas in which at least two of the partners have achieved international distinction and visibility. They represent the most distinguished and prominent research foci of the Alliance, and will be the basis of its future research strategy. The development of emerging fields is at present not carried out jointly, but remains the responsibility of the individual partners.

FIG. 7 **The Alliance's core research areas**



Joint collaborative research initiatives of two or more Alliance partners usually start at one institution and emerge in a bottom-up approach driven by individual researchers. The research division at the initiating institution offers support in the form of consultation, workshops, and seed funding. Until recently, however, targeted cross-institutional support was only provided at a relatively late stage in the process, shortly before a joint project was submitted for funding approval. In the recent competition for Clusters of Excellence, the Alliance has considerably improved upon this practice and representatives from the strategic units and research divisions of the four partners closely worked together. The executive boards of the partner institutions held joint strategy meetings to agree on their individual support for joint applications. Once a collaborative research structure is established, it thus becomes part of the individual research profiles and also of the research profile of the Alliance, and is eligible for additional internal support and funding, usually in close coordination between the participating partners. This standard process can be regarded as the nucleus of research development within the Alliance. To further advance the development of their research profiles and generate new research priorities,

the Alliance partners also make regular use of the programs offered by the Einstein Foundation. Einstein Centers, running for a period of up to six years, aim at the further thematic advancement of large cross-institutional research projects, such as Clusters of Excellence. Einstein Strategic Professorships[3] support the recruitment and appointment of top-level researchers in strategically relevant fields of research.

Together, the Alliance's twelve core research areas reflect the excellence of the partner institutions in a multitude of disciplines and topics as well as their ability to develop internationally visible research structures through collaboration. As such, they form the basis for a joint research strategy and the integrated research environment of the Alliance. Building on this foundation, the Alliance will be able to jointly address major new research questions and advance research on societal challenges.

However, collaborative research between the Alliance partners still faces some structural hurdles. In some subject areas, competition between institutions has been fierce in the past – sometimes even involving one university poaching professors from another. Although competition in academia is to a certain extent productive and desirable, it also impedes fruitful research collaboration. Furthermore, differences in administrative systems and regulations between the partners have complicated the implementation of newly established cross-institutional projects, for example in hiring personnel or setting up and using IT infrastructure. A further challenge for all partners is the availability of sufficient office and laboratory space for large collaborative projects. Disadvantages also result from insufficient financial support from the federal and state governments to update infrastructure and renovate research buildings. In this context, the development of standards and instruments to promote a joint use of infrastructure is an important step (see A.2.2.2.3.). In conclusion, the Alliance partners have reached a high level of research collaboration, allowing them to both sharpen their individual profiles and develop a joint research profile. The Alliance will expand this potential even further. The transformation of large joint projects into permanent structures remains a challenge in respect to resources and capacities.

|3 In German 'Einstein-Profil-Professuren', since 2017/2018.

TAB. 5 **Cross-institutional collaboration within the Alliance**

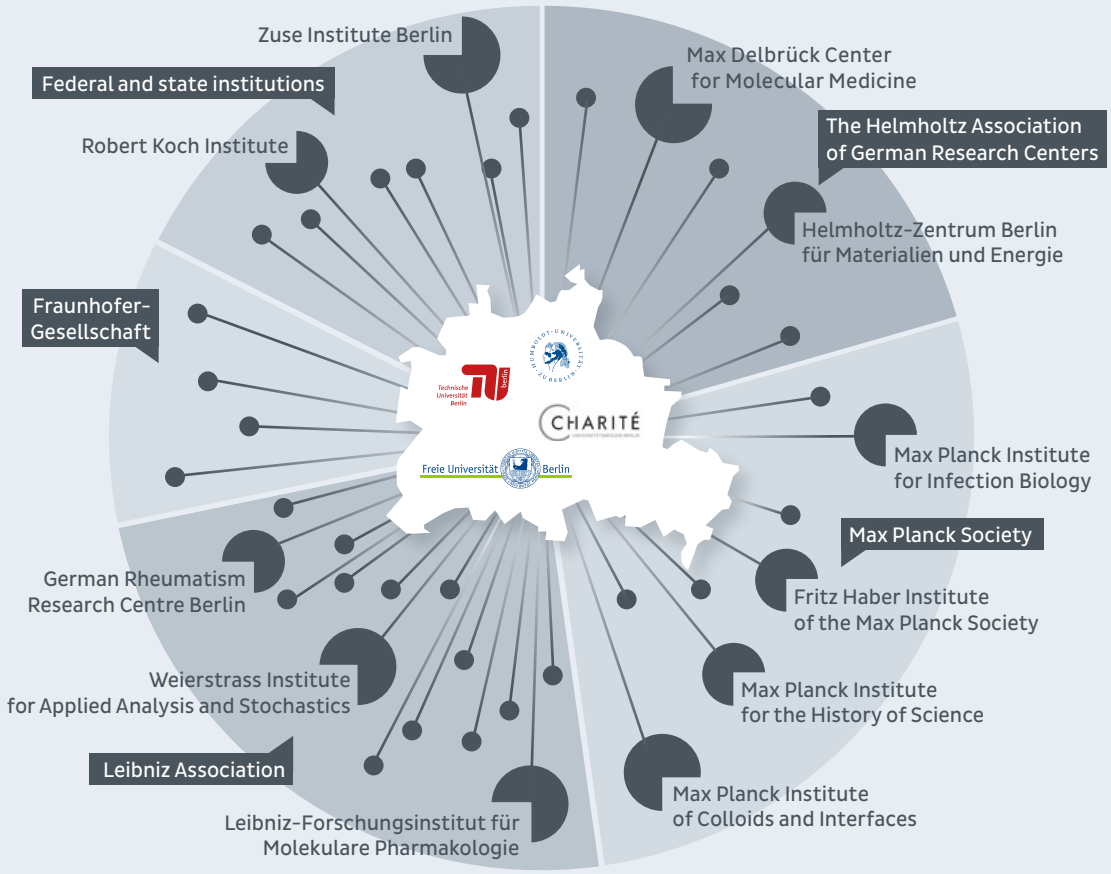
STRENGTHS		WEAKNESSES	
All	Long-standing experience in jointly realizing large collaborative research projects	**All**	Differences in administrative systems between the partners complicate the implementation of newly established joint research projects
	Core research areas of international distinction in a multitude of disciplines		Competition between some institutes, including poaching professors, still impedes fruitful research collaboration
	Joint support for Cluster of Excellence applications		Transformation of joint collaborative projects into permanent structures remains a challenge
	Berlin collaboration agreements between two or more partners as nationwide model		Potential to sharpen profiles not yet fully tapped
	Coordinated academic appointment scheme enhances individual profiles		No strategy for joint research or top-down incentives for major research questions of overarching societal significance
	Top-performing small specialized disciplines in the humanities and area studies thematically covering the entire world		
FU, HU	Top-performing small specialized disciplines in the humanities and area studies thematically covering the entire world		

A.2.2.1.4. Collaboration with non-university research institutes

Collaboration between the Alliance partners and non-university research institutes builds on historically developed, trusted, and institutionalized relationships reflected in numerous joint research projects, a high number of joint appointments, improved access to research infrastructure and core facilities, and the joint promotion of early-career researchers in graduate schools and junior research groups (see fig. 8 for a selection of the most important partners). Non-university research institutes are highly valued partners in the majority of the Alliance partners' CRCs, Clusters of Excellence, and Graduate Schools, and thus play an important role in the Alliance's core research areas (see fig. 7). Key examples include the Weierstrass Institute in application-oriented mathematics, the Berlin Social Science Center (WZB) in politics and society, and the Robert Koch Institute in global health. The Zuse Institute Berlin (ZIB) is another close collaboration partner of the Alliance partners. The ZIB's mission is to conduct research and development in the field of information technology. This has resulted in a particular focus on the areas of application-oriented mathematics and computer science. It also functions as a service provider, making its supercomputing capacity available to the Alliance and other institutions. Among the most important museum partners are the prestigious Stiftung Preußischer Kulturbesitz (SPK) with its 15 collections and four research institutions, and the Museum für Naturkunde, an integrated research museum within the Leibniz Association and one of the most important research institutions worldwide in the areas of biological and geological evolution and biodiversity. The Alliance partners also have twelve joint graduate research schools with

Max Planck, Helmholtz and Leibniz institutes in the region (see fig. 5 in A.2.1.).
Over the past decade, FU, HU, TU Berlin, and Charité have markedly increased their joint appointments with non-university research institutes, resulting in 190 joint professorships (full time equivalents, FTEs) in 2017, 72 of which at HU Berlin, 42 at TU Berlin, 41 at FU Berlin, and 35 at Charité.

FIG. 8 **Regional collaboration with non-university research institutes in large collaborative projects**



The Helmholtz Association of German Research Centers
- Max Delbrück Center for Molecular Medicine
- Helmholtz Zentrum Berlin für Materialien und Energie
- German Aerospace Center
- The Helmholtz Center Potsdam - GFZ German Research Center for Geosciences
- Helmholtz-Zentrum Geesthacht Center for Materials and Coastal Research
- German Center for Neurodegenerative Diseases

Max Planck Society
- Fritz Haber Institute of the Max Planck Society
- Max Planck Institute of Colloids and Interfaces
- Max Planck Institute for the History of Science
- Max Planck Institute for Infection Biology
- Max Planck Institute for Molecular Genetics
- Max Planck Institute for Human Development
- Max Planck Institute of Molecular Plant Physiology
- Max Planck Institute for Gravitational Physics (Albert Einstein Institute)

Leibniz Association
- Leibniz-Forschungsinstitut für Molekulare Pharmakologie
- Weierstrass Institute for Applied Analysis and Stochastics
- German Rheumatism Research Centre Berlin
- WZB Berlin Social Science Center
- German Institute of Human Nutrition Potsdam-Rehbruecke
- German Institute for Economic Research Berlin
- Max Born Institute for Nonlinear Optics and Short Pulse Spectroscopy
- Leibniz Institute for Research on Society and Space
- Museum für Naturkunde - Leibniz Institute for Evolution and Biodiversity Science
- Paul Drude Institute for Solid State Electronics
- Potsdam Institute for Climate Impact Research
- Leibniz-Zentrum Moderner Orient
- Leibniz Institute for Zoo and Wildlife Research
- Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik
- Leibniz Institute for Agricultural Engineering and Bioeconomy
- Leibniz-Institute of Freshwater Ecology and Inland Fisheries

Fraunhofer-Gesellschaft
- Fraunhofer Institute for Telecommunications, Heinrich Hertz Institute, HHI
- Fraunhofer Institute for Open Communication Systems FOKUS
- Fraunhofer Institute for Applied Polymer Research IAP
- Fraunhofer Institute for Production Systems and Design Technology IPK

Federal and state institutions
- Zuse Institute Berlin
- Robert Koch Institute
- Physikalisch-Technische Bundesanstalt
- Bundesanstalt für Materialforschung und -prüfung
- Zentrum für Literatur- und Kulturforschung
- Stiftung Preußischer Kulturbesitz
- Institute for Advanced Sustainability Studies
- Deutscher Wetterdienst

Strategies to foster collaboration with non-university research institutes have been developed by each partner individually. As a part of its Institutional Strategy within the Excellence Initiative (since 2012), FU Berlin established collaboration agreements with six key non-university research institutes in Berlin in a network now known as the *Dahlem Research Campus*, including the Max Planck Institutes for Molecular Genetics and the History of Science, and the Fritz Haber Institute, Helmholtz-Zentrum Berlin (HZB) and the Berlin Social Science Center (WZB). The joint junior research groups, joint labs and graduate schools organized between FU Berlin and these research partners have proven an exemplary format for the collaborative promotion of early-career researchers. The university's event series *Junges Wissenschaftsforum Dahlem* also promotes networking between postdoctoral researchers and junior professors from all partners of the *Dahlem Research Campus*.

Alongside its high number of joint appointments, most notably with the Museum für Naturkunde and HZB, the cooperation strategy of HU Berlin mainly focuses on joint campus development at the *Adlershof Technology Park*, e.g. with the German Aerospace Center (DLR) and the Federal Institute for Materials Research and Testing (BAM). In collaboration with HZB, HU Berlin runs several joint labs, such as the *Joint Lab for Structural Research*, and *Joint Lab on Accelerator Physics*. A further pillar of HU Berlin's cooperation strategy are prestigious joint affiliated institutes directed by senior HU professors, such as the *Institute for Educational Quality Improvement* (IQB).

Traditionally, TU Berlin has a close network with its current 26 non-university research partners, resulting in numerous joint appointments. This proximity is particularly visible at the Fraunhofer Institutes for Open Communication Systems (FOKUS), Production Systems and Design Technology (IPK), Reliability and Microintegration (IZM), and the Heinrich Hertz Institute (HHI): Their directors are simultaneously full professors at TU Berlin, and costly and complex infrastructures (e.g. cleanrooms) are operated jointly with the university (see fig. 8). These research institutes form part of the *Campus Charlottenburg* network. Complementing the instrument of joint appointments, TU Berlin is involved in various other collaborative formats such as joint labs, Leibniz ScienceCampi, and Helmholtz Research Schools like *Helmholtz Einstein International Berlin Research School in Data Science* (*HEIBRiDS*).

By collaborating with non-university research institutes, Charité follows a strategic approach to capacity-building in top-level biomedical and translational research. Joint research topics with major partners from the field of biomedicine such as the Max Planck Institute for Infection Biology and the German Rheumatism Research Center Berlin (DRFZ) have greatly supported Charité's successful applications for large-scale research projects. Together with its most important scientific partner, the Max Delbrück Center for Molecular Medicine (MDC), Charité has founded the *BIH*, which is dedicated to improving predictions in progressive diseases and developing advanced therapies for

unmet medical needs in order to improve patients' health and quality of life. In this way, the *BIH* builds on and integrates the strengths and expertise of Charité and MDC as partner institutions.

Despite excellent relationships with the non-university research institutes in Berlin, differences between the partners persist due to the superior financial resources of the non-university research institutes and their focus on research as opposed to teaching. This has led to a situation in which FU, HU, TU Berlin, and Charité have at times competed intensively for cooperation partners, weakening their position vis-à-vis the non-university research institutes. It remains a challenge to properly integrate jointly appointed professors into the universities, as they mainly work at the non-university research institutes, and to overcome the often exclusive association of their research output with the external partner. In conclusion, the potential of the dense and highly diverse Berlin research environment is still open for more systematic collaboration with non-university research institutes in terms of both complementarity and comparable strengths. Currently, collaborations are developed to tackle specific questions and problems identified by specific researchers rather than to address an overall objective. In the future, the Alliance may serve as the key to successfully shifting the relationship with non-university research institutes toward collaboration on an equal level.

TAB. 6 **Collaboration with non-university research institutes**

STRENGTHS		WEAKNESSES	
All	Dense and stable network with regional non-university research institutes; high degree of collaboration in core research areas	**All**	Potential for joint research planning in the Berlin area not sufficiently used
	High number of joint appointments (FTE) **FU** 41; **HU** 72; **TU** 42; **Charité** 35		Alliance partners mutually compete in respect to collaboration with non-university research institutes
	Access to outstanding infrastructure/ core facilities at non-university research institutes (see A.2.2.2.3.)		Output of joint research is often exclusively associated with the non-university research institutes
	Strategies to foster collaboration with non-university research institutes:		Improvement needed in the integration of jointly appointed professors into the university institutes/faculties
FU	*Dahlem Research Campus* within Institutional Strategy, especially joint junior research groups		Joint strategies for promoting young researchers could be expanded
HU	Joint campus development and joint labs at *Adlershof Technology Park* prominent affiliated institutes		Different framework conditions for collaboration with non-university research institutes at all four partners, e.g. joint appointments
TU	*Campus Charlottenburg network*		
Charité	Capacity-building in biomedical research; institutionalized collaboration in translational research together with *BIH*		

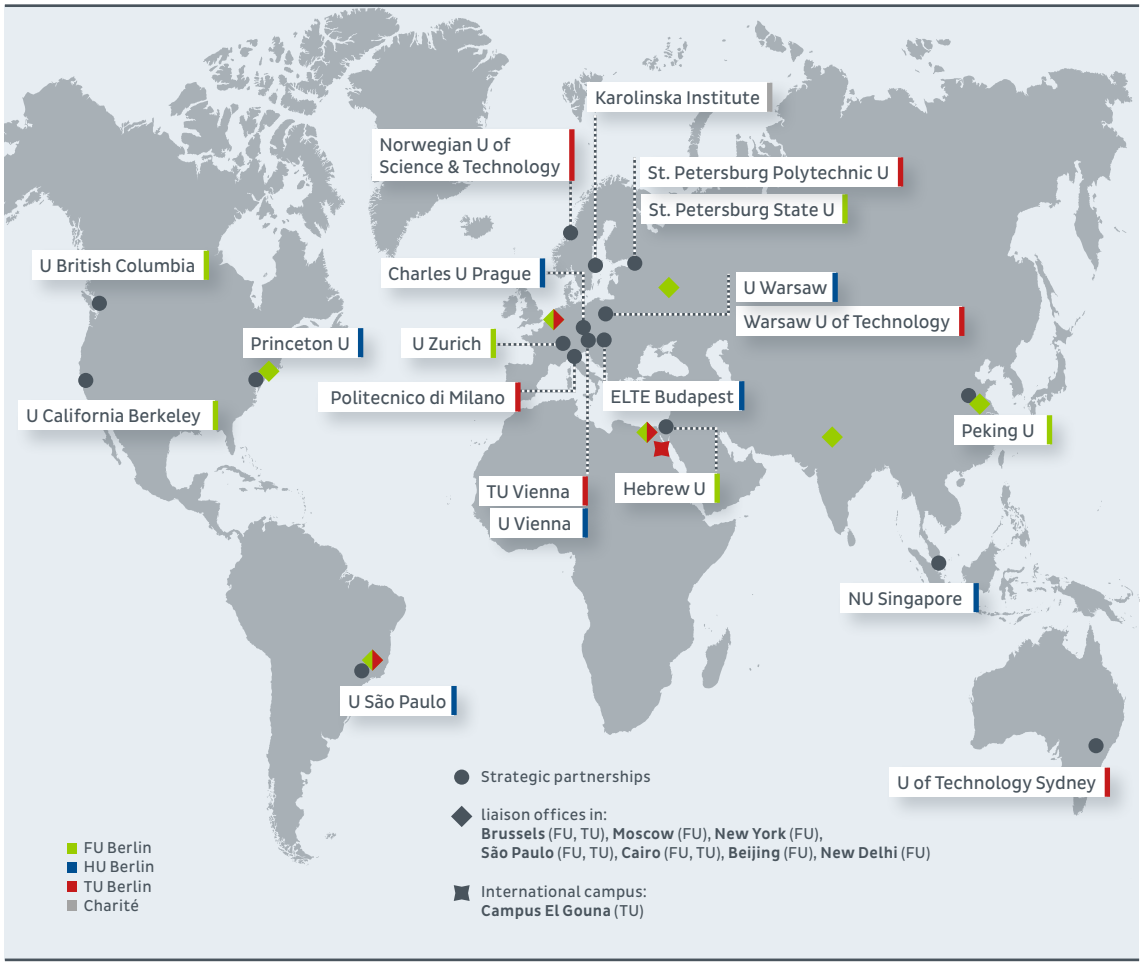
A.2.2.1.5. International cooperation

The Alliance partners have a high reputation in international research collaboration. Over the last decade, they have developed a strong international network (see fig. 9) with a

wide variety of joint research and doctoral training formats with international partners. FU and HU Berlin have achieved high standards and impact in the area of internationalization as a result of conscious, strategic priority setting within their Institutional Strategy funding in the Excellence Initiative. Both have established partnerships with leading universities around the world. As the *International Network University*, FU Berlin promotes internationality in research collaboration, teaching, and early-career support as an integral part of its profile. Seven liaison offices around the world (Beijing, Brussels, Cairo, New Delhi, New York, Moscow, São Paulo) are key foundations of the university's international network. Strategic partnerships with the Hebrew University of Jerusalem, St. Petersburg State University, the University of California, Berkeley, the University of British Columbia, the University of Zurich, and Peking University have strengthened international collaboration through joint funding for research projects and support for junior researchers (see A.2.2.3.).

HU Berlin has built its international agenda on the basis of sound strategic partnerships with Princeton University (since 2012), the National University of Singapore (since 2014), Universidade de São Paulo (since 2015), and multilateral collaboration within the *CENTRAL European Network for Teaching and Research in Academic Liaison*.

FIG. 9 **Strategic partnerships, liaison offices, and international campuses of the Alliance partners**



These partnerships are complemented by a comprehensive portfolio of measures supporting internationalization, focusing on recruitment and early-career support, the internationalization of university administration, and a central welcome service *International Scholar Services* for international researchers.

TU Berlin has placed renewed emphasis on internationalization by establishing a vice presidency for strategic development, including international relations, in 2014. It has a traditional focus on partnerships in Europe, which translates into good success rates for EU research funding. It was a founding member of the European Knowledge Innovation Communities in Climate Change and in Information and Communication Technologies. Outside Europe, TU Berlin is present in Brazil, has a strategic partnership with the University of Technology in Sydney, Australia, and a strong China focus through its unique *China Centre*. TU Berlin also has an *international campus in El Gouna*, Egypt, and is actively involved in several binational educational projects (e.g. with the Turkish-German University and the Vietnamese-German University).

At Charité, international cooperation and visibility needs further expansion, for example by better use of the potential of strategic partnerships. To further that end, Charité can rely on its close ties with leading university hospitals such as the M8 Alliance of Academic Health Centers, Universities and National Academies (M8 Alliance) with 25 partners (including Johns Hopkins University, Imperial College London, and the Karolinska Institute), and with the European Reference Network, as well as with the European University Hospital Alliance (EUHA).

The joint agreement of the Berlin University Alliance with the University of Oxford, signed in 2018, represents a major success for the Alliance and demonstrates the potential of the partners' new joint international strategy. The Oxford partnership agreement will serve as a best-practice example for future strategic international partnerships of the Alliance, capitalizing on synergies in global research collaboration that could not be achieved in the former environment of competition between the Berlin universities. Further potential still to be utilized lies in international collaboration in interdisciplinary and transdisciplinary research. This could help impart even greater impetus to research within the considerable number of "small disciplines" characterizing FU and HU Berlin in particular. Furthermore, despite the fact that the Alliance partners have numerous research links to all major world regions, there is still a clear bias toward cooperation with European and North American universities. The Alliance partners will develop a set of more truly global interactions and partnerships.

TAB. 7 **Collaboration with international partners**

	STRENGTHS		WEAKNESSES
All	Highly developed individual international research network with many joint projects Strategic partnership of the Alliance with the University of Oxford	**All**	Synergies between the Alliance partners in strategic partnerships not yet fully exploited; so far no joint structures and instruments for internationalization No joint strategy vis-à-vis European research issues Potential of comprehensive research cooperation with the Global South is still to be tapped
FU	Internationalization as strong asset within the current Institutional Strategy; Global research network: 7 *liaison offices* worldwide (2 with TU), and 6 *strategic partnerships* with top-level universities; *Maria Sibylla Merian Centre Latin America* in São Paolo		
HU	3 *strategic partnerships* with top global universities; centralized *welcome services;* strategic funds to foster international research collaboration	**TU**	Number of international research collaborations and international support for these to be increased
TU	*International Campus El Gouna*; *EIT KICs*	**Charité**	International collaboration (and thus visibility) needs to be expanded by better use of strategic partnerships
Charité	Member of international networks of leading university hospitals, e.g. M8 and EUHA		

A.2.2.1.6. Quality and value of research

The Alliance partners share an understanding of the fundamental principles of research, such as good scientific practice (reliability, permanence, and reproducibility), and of the importance of open access to research outcomes, providing relevant societal impact and outreach. Both aspects entail jointly striving for quality in research within the Alliance, resulting from rigor and transparency and ensuring robust results. While this concept of quality may be universal, it needs to be adapted to different disciplinary cultures for the purpose of operational assessment, as demonstrated by the periodical, discipline-based rating of research developed by the German Council of Science and Humanities (WR).

Advancing standards for research value is already a priority for the Alliance partners. Science studies are well established at HU Berlin, with a particular focus on quality in research. The new *Robert K. Merton Center for Science Studies* will further enhance this focus. A close collaboration partner in this area is the former Berlin Institute for Research Information and Quality Assurance – now part of the German Centre for Higher Education Research and Science Studies (DZHW), which particularly focuses on developing indicator-based evaluation methods for measuring research performance and for allocating funds. Charité runs the *QUEST Center for Transforming Biomedical Research*, part of the *BIH*, which aims to increase the value and impact of biomedical research by maximizing its quality, reproducibility, generalizability, and validity. Developing new incentive systems, indicators and metrics, assisting their implementation, evaluating these novel systems, and offering training for researchers, *QUEST* is looked upon as a role model for the systematic study of research quality.

The Alliance is commited to scientific integrity and equal opportunity in research. The Alliance partners acknowledge the principles laid down in the DFG Recommendations for Safeguarding Good Scientific Practice. Each of the partners has established procedures to encourage good scientific practice and impose sanctions in cases of research misconduct. In this respect, early-career training on research misconduct such as data manipulation, plagiarism, non-credited authorship, predatory journals, and sabotage of research by others has been established. Standards of research quality are subject to scientific debate. This is particularly true for new dimensions of research quality such as societal impact, innovation, open science, citizen science, science communication and data science, for which robust indicators have not yet been established. While the importance of transdisciplinary research has increased, the Alliance partners have not yet established quality criteria for research crossing the boundaries between science and society. Defining relevance, credibility, legitimacy, and effectiveness of transdisciplinary research remains a challenge that the Alliance will confront.

An additional challenge will be to cross-link issues of research value with further fields of research such as gender studies, in which each Alliance partner is considerably well-positioned. Centers for gender studies have been established by all partners. The *Margherita von Brentano Center* (FU Berlin), the *Centre for Transdisciplinary Gender Studies* (HU Berlin), the *Centre for Interdisciplinary Women's and Gender Studies* (TU Berlin), and the *Institute for Gender Studies in Medicine* (Charité) initiate inter- and transdisciplinary research and teaching projects, and cross-link gender expertise at and between universities. The centers also provide feedback effects from research on gender for institutional implementation. By contrast, diversity studies have yet to be systematically developed by the partner institutions. Important players here are the *Berlin Institute for Empirical Integration and Migration Research* (*BIM*) and *Center for Inclusion Research* (*ZfIB*) at HU Berlin, the latter with participation by FU and TU Berlin.

TAB. 8 **Quality in research**

	STRENGTHS		WEAKNESSES
All	Firm institutional commitment to the DFG Recommendations for Safeguarding Good Scientific Practice	**All**	Lack of comprehensive quality assurance in research, particularly beyond the research training phase
	Well-established centers for gender studies		Lack of awareness for research quality as a strategic topic at the level of institutes and departments
HU	Well-established science studies with a particular focus on research quality and underscored by the *Robert K. Merton Center for Science Studies*		Diversity not yet established as a field of research
Charité	Well-established science studies with a focus on research quality at *QUEST Center* as part of *BIH*		

Conclusion of A.2.2.1.

As argued above, according to standard indicators of research performance, all the Alliance partners have excellent track records as individual institutions, are consistently ranked among the best in Germany, and have reached considerable international visibility. A closer look at parameters such as third-party research funding and the number of CRCs indicates, however, that FU, HU, TU Berlin, and Charité may have reached a plateau in their individual research performance. Moving beyond this requires closer collaboration within the Alliance, bringing together existing strengths in order to confront complex research challenges. Research collaboration must be more strategically fostered in order to move beyond the present, somewhat limited mode of joint projects emerging mainly from the spatial and thematic proximity of researchers. Furthermore, significantly enhancing exchange and collaboration among the Alliance partners will allow for the better coordination and furthering of best-practice in research, which will ultimately benefit each institution.

A.2.2.2. Structure and quality of the other performance areas

A.2.2.2.1. Teaching

National and international students value Berlin for its breadth of study programs and lively academic network. FU, HU, TU Berlin, and Charité are very popular institutions that receive a high number of student applications (a total of 115,973 in 2017, of which 52,249 were admitted). Currently, more than 100,000 students are enrolled in the Alliance institutions, of whom 8.5% are international bachelor's students and 23.4% are international master's students. Together, the Alliance partners offer more than 180 bachelor's and nearly 300 master's programs in all academic fields, as well as a further 58 continuing education programs (see Brief profile of the consortium). For quality assurance in teaching, both HU and TU Berlin use program accreditation procedures. FU Berlin and Charité have successfully undergone system accreditation, while TU Berlin is presently undergoing this process. Continuous professionalization through systematic training of faculty members further enhances teaching quality: Measures taken include individual in-house training as well as the activities of the *Berlin Center for Higher Education (BZHL)*, which is supported by all 13 public higher education institutions in the city (see A.2.2.3.5). The complementary profiles of the partners form a dynamic basis for establishing joint study programs. Currently, they run nine joint programs at the master's level, providing students with innovative and future-oriented qualifications.[4] Nevertheless, administrative hindrances, such as individual study and examination regulations at the departmental level, prevent broader collaboration. Expansion of joint degrees and broader mutual access for students to all four institutions remain desiderata.

|4 Computational Neuroscience (HU, TU Berlin, Charité, Bernstein Center for Computational Neuroscience), Media Informatics (FU, HU, TU Berlin), Bioinformatics (FU Berlin and Charité), Global History (FU, HU Berlin), Statistics (FU, HU, TU Berlin, Charité), International Relations (FU, HU Berlin, University of Potsdam), Public Health (TU Berlin, Charité, Alice Salomon University of Applied Sciences), Polymer Science (FU, HU, TU Berlin, University of Potsdam), and European Studies (FU, TU Berlin).

All partners participate in the German Quality Pact for Teaching (since 2011) and Qualitätsoffensive Lehrerbildung[5] (since 2015/16), which support the improvement of study conditions and teaching quality at German universities. Programs and measures established in this framework focus on supporting the study entry phase, on improving study success, and on teaching qualifications. In this context, each partner has developed particular strengths: FU Berlin has created extensive e-learning support and a central digital infrastructure, including online examinations. All master's programs have been switched to blended learning. A virtual toolbox now fosters gender and diversity competence in teaching. HU Berlin has developed the *bologna.lab*, a cross-faculty teaching and learning facility that concentrates on research-based learning, interdisciplinary study formats, internationalization and self-organized flexible study opportunities. At HU Berlin, special programs address first generation students and persons with vocational qualifications. Similarly, TU Berlin has successfully implemented *MINT*^{grün}, a pioneering two-semester orientation program allowing students who have not yet selected a subject to take courses and exams in mathematics, computer science, natural sciences, and technology. This program opens up new target groups for STEM subjects, provides knowledge of working techniques and methods, and enhances diversity and equal opportunity in the university entry phase. Charité has introduced a *New Revised Medical Curriculum*, including didactic qualification and e-learning, improvement of study conditions, and expansion of IT-support. However, political framework conditions still stand in the way of significant improvements to the quality of teaching. The significant nationwide increase in student numbers during the last ten years has not been met by a permanently higher level of state funding, which would enable more professorships. The faculty-student ratio at the four Alliance partners is significantly worse than the international level, and even slightly worse than the national level.

The Alliance partners have made considerable progress in the digitalization of teaching. Model projects aim to facilitate access to teaching materials (HU Berlin's participation in the project *Open Educational Resources* (*OERinForm*)), to enhance study flexibility (FU Berlin's *German-Israeli Virtual Campus* in collaboration with the Hebrew University of Jerusalem), to encourage students to study in a self-reliant manner (Charité's *Medicine Progress Test*), and to support innovation in teaching through digital infrastructure (TU Berlin's *Online Teaching Team*). However, given high costs and rapid technological development, the Alliance partners' individual efforts have thus far been limited.

Due to the high number of exchange students (on average 2,500 per year for all four partners) and students interested in international degrees, the internationalization of study programs has made progress in terms of curricula, language, and composition of participants. This is particularly the case at the master's level, where

|5 National program to improve the quality of teacher training.

the number of programs in English is increasing. Collaborative formats with international partners, such as dual degree programs (currently around sixty among all partners), further diversify teaching formats. The partners have also created special programs for refugees, offering the opportunity to either prepare for a degree program or continue their studies. In order to strengthen diversity and equal opportunity as a cross-sectional concern, the partners strive to provide the best possible study conditions and development opportunities for all students, regardless of personal biographies and circumstances. Structural measures range from student advising and career services to supplementary professional skills courses and opportunities for work experience.

TAB. 9 **Teaching**

STRENGTHS		WEAKNESSES	
Berlin as a study location			
All	Universities in high demand from students, significant number of international students	**All**	Complementary profiles not yet exploited systematically: number of joint degrees between partners to be improved
	Wide range of subjects and possible course combinations		Administrative restrictions still prevent a broader cross-institutional collaboration in teaching
	Complementary profiles offer ideal conditions for the establishment of joint study programs (9 master's degrees so far)		Number of international degrees to be improved
Study conditions and teaching quality			
All	Successful participation in the German Quality Pact for Teaching since 2011 and 'Qualitätsoffensive Lehrerbildung' since 2015/16	**All**	Permanent funds insufficient to further raise level of teaching quality
	with a particular focus on:		Faculty-student ratio worse than national average and significantly worse than international average
FU	E-learning and digital teaching; *Toolbox Gender and Diversity in Academic Teaching*		Student drop-out rates to be decreased
HU	Research-based learning; first generation students and persons with vocational qualifications		Limited resources and technical capacities for development and production of e-learning materials and concepts
TU	Orientation program for STEM subjects *(MINT^{grün})*		
Charité	*New Revised Medical Curriculum*		
Research-based teaching			
All	Extensive opportunities for students to participate in third-party funded research projects	**All**	Lack of visibility and broader impact for research-based teaching formats
	Research-based teaching and learning formats:		Research-based teaching not yet systematically anchored in all curricula
FU	*FoL*, central *Teaching Award*		Connection between teaching and top-level research needs strengthening
HU	*Q-Program*		
TU	*project laboratories, tu projects, Gender Pro MINT*		
Charité	*New Revised Medical Curriculum*		

The extraordinary concentration of students in Berlin offers a great opportunity for attracting early-career research talent. In addition to the guidance offered in each degree program, the Alliance partners provide students with further possibilities to conduct research at an early stage. Most third-party funded research projects offer paid student assistantships of up to two or more years. To foster students' research interest and competencies, all four partners maintain specific research-based teaching and learning formats, usually including an interdisciplinary angle. At HU Berlin, the *bologna.lab* provides and supports research-based forms of teaching and learning through its *Q-Program*. FU Berlin's research-based teaching program (*FoL*) and its central *Teaching Award* have similar goals: long-lasting integration of cutting-edge research from large collaborative projects into teaching. Both *bologna.lab* and *FoL* collaborate with major third-party funded research projects and non-university research institutes and other partners. TU Berlin's long-established *project laboratories* and *tu projects* furnish students with the opportunity to work independently on interdisciplinary projects related to their regular studies. The research-based *Gender Pro MINT* program links questions of gender and diversity with topics from engineering and the natural sciences. Charité's *New Revised Medical Curriculum* includes innovative learning formats such as problem-based learning, integrating communication and teamwork to prepare students for a career as physicians and medical researchers. However, as all these programs require relatively small classes, they still lack visibility and impact. There is still significant room to enhance the connection between teaching and top-level collaborative research projects.

A.2.2.2.2. Transfer

Until recently, the Alliance partners have focused largely on the understanding of knowledge and technology transfer hitherto prevalent in Germany, which highlights technology transfer and entrepreneurialism. Only slowly have they begun to broaden their definition of transfer as referring to multi-directional knowledge exchange between research and society. Alongside their engagement in knowledge and technology transfer, FU Berlin has placed emphasis on policy advice and public humanities, while HU Berlin has focused on exhibitions, cultural communication, and curatorial practice. TU Berlin's strength has been based on transdisciplinarity and technology transfer. Charité complements the panorama through its commitment to translational medicine.

Aiming at innovation and collaboration, all four partners have developed efficient and successful structures and institutions for science-technology transfer and a broad range of formats based on their individual research strengths. Over the past fifteen years, each of the Alliance partners has established a comprehensive process ranging from creating awareness of and determining transfer potential within basic research to validating this potential and supporting the transfer process into the market via different channels. Current activities focus on the following transfer channels: contract

research for and collaboration with companies, support for inventions, patent application and exploitation, and support for academic start-ups.

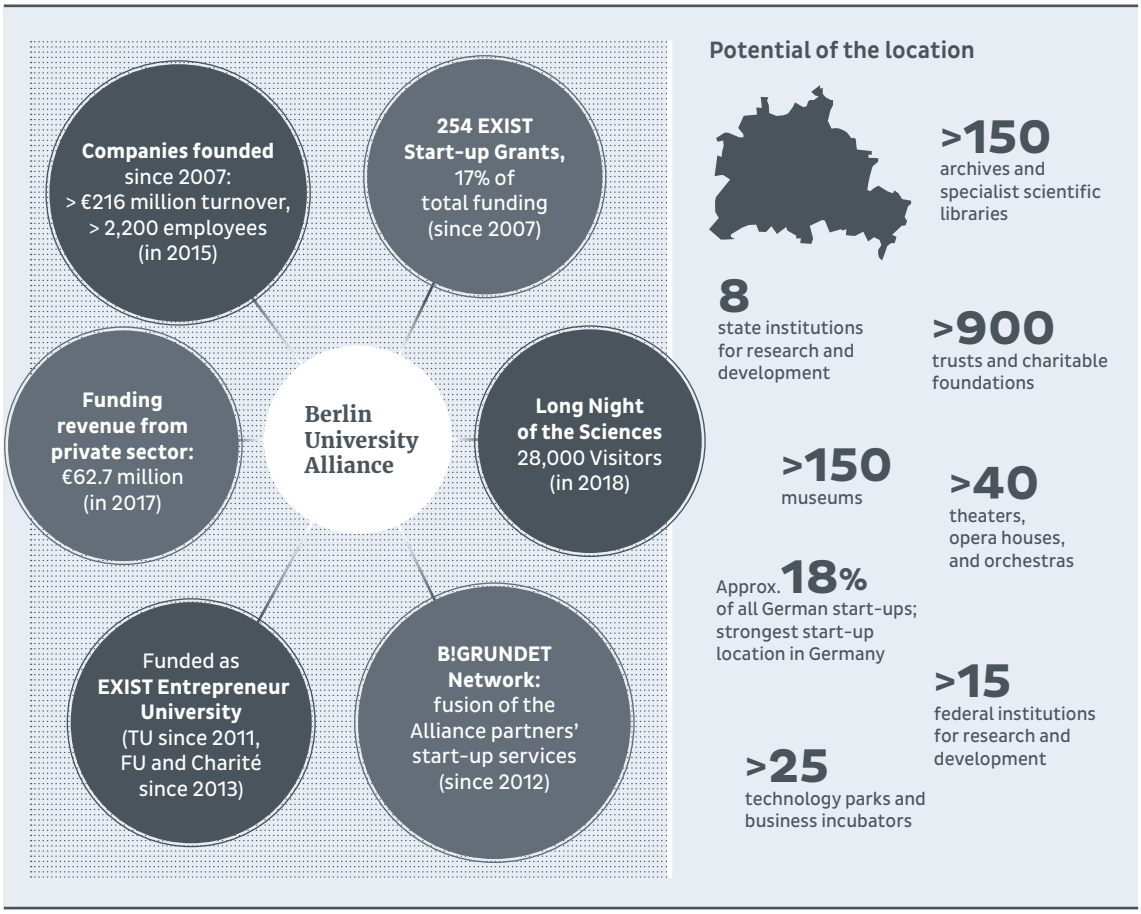
However, some Alliance partners still have an insufficient number of access points to potential transfer partners in industry and society resulting from underdeveloped network structures and a lack of overall incentives (see tab. 10).

TAB. 10 **Knowledge and technology transfer**

STRENGTHS		WEAKNESSES	
General			
All	Structurally anchored transfer units:	**All**	Lack of incentives for researchers to commit to transfer
FU	*Profund Innovation*		Contact points between top-level research and the transfer units to be increased
HU	*Humboldt Innovation*		Both entrepreneurial thinking and entrepreneurial teaching in top-level research to be strengthened
TU	*Centre for Entrepreneurship, Centre for Intellectual Property*		
Charité	*Berlin Health Innovations*		
TU	Cooperative transfer strategically anchored in the institution, combined with comprehensive approach to transfer and knowledge exchange		
Charité	Core focus on translational medicine		
Start-up and spin-off guidance			
All	High performance level in the acquisition of third-party funding for academic start-ups. Repeatedly awarded the status of EXIST Entrepreneur Universities	**All**	Insufficient contact points between academic start-ups and potential partners in society and industry
Transfer-oriented research collaboration including contract research			
All	Intensive transfer-oriented research collaboration including contract research with the public and private sector, e.g. *ECDF*	**All**	Contact points between research groups and potential partners in society and industry still improvable
FU	Strong ties in natural and life sciences to transfer partners in business and industry		Weak structures for evaluating transfer activities; alumni networks not sufficiently used to initiate transfer projects
HU	Growing level of collaboration with business and industry at Technology Park Adlershof	**FU, HU, TU**	Networking with regionally-based international companies is improvable
TU	Sound partnerships with business and industry, e.g. *BasCat*; high volume of contract research and transfer-oriented research collaboration, e.g. *Climate KIC*	**FU, HU, Charité**	Transfer mainly project-related; insufficient long-term collaboration with industry; revenue from contract research still improvable
Charité	New research space with the *BIH*, record revenues in 2017		
Patents and licenses			
All	High revenues from licenses in national comparison	**All**	Markedly low revenue from licenses in international comparison
FU, TU, Charité	Highly service-oriented institutions to manage patents and licenses	**FU, HU, Charité**	Insufficient linkage between idea generation or research results and exploitation
FU	Detailed strategy for handling and exploiting intellectual property including remuneration of individual researchers	**HU**	Patent volume and exploitation at low level
Charité	Successful patent exploitation		

Alongside a strong focus on transfer activities between research and business, the Alliance partners have grown increasingly committed to knowledge transfer aiming at information and participation. Individually, they have thus fostered a multitude of activities including professional research communication, public dialog, and curatorial projects. Here, the partners have both explained ongoing projects to society through public relations activities and pursued non-hierarchical dialog through event formats, conference series, and exhibitions. These activities benefit from the vibrant environment, public debates, and cultural production in Berlin. At the same time, the Alliance partners have not yet tapped the full potential of their unique setting in the German capital (see fig. 10).

FIG. 10 **Knowledge and technology transfer**



Activities emerging from a broader conception of transfer – a truly multidirectional process of knowledge exchange with society that engages with politics, culture, and other areas of civil society as well as the general public – have only been partially institutionally integrated by each of the partners, and not in a systematic manner. True transdisciplinarity and knowledge exchange as coordinated interplay between academic and practical knowledge has thus far been limited to individual Alliance partners and has produced a tangible but rarely visible output (see tab. 11). Efficient strategies and structures for knowledge exchange in the comprehensive sense will involve a broader network of stakeholders and also increase opportunities for knowledge and technology transfer, i.e. cultural, social, and political entrepreneurship.

TAB. 11 **Knowledge exchange with society including research communication**

STRENGTHS		WEAKNESSES	
Location-specific potential			
All	Germany's capital and the proximity to ongoing social and political debates as a strong basis for addressing aspects of societal challenges	**All**	Potential of collaboration with external partners in Berlin to address aspects of societal challenges untapped Public and political discourse not yet sufficiently taken into account
Public relations			
All	Broad-based public relations via centralized departments Strong experience in joint press work on major strategic projects, e.g. formation of the Berlin University Alliance	**All**	Insufficient resources to gain visibility in terms of international research marketing No systematic, but rather selective evaluation of communication measures Communication of topics of societal relevance is a case-by-case rather than strategic process
FU, HU	Professional placement of experts and researchers via online expert databases and active expert services		
FU	Liaison offices		
TU	Strategic social media support of events		
Public dialog, political advice, and curatorial practice			
All	Multitude of exhibitions and curatorial projects, political advice, and public events:	**All**	Public visibility of formats and structures in their function as university knowledge exchange interfaces needs to be improved Manifold uncoordinated activities of various stakeholder groups complicate visibility
FU	*Environmental Policy Research Centre, Dahlem Humanities Centre*		
HU	*BIM*, *Berlin Correspondences* (in cooperation with Gorki Theater and Foreign Office)		
TU	*Architectural Museum, Center for Research on Antisemitism*		
Charité	*Museum of Medical History*		
All	Strength in organizing and implementing large-scale public events, e.g. *Long Night of the Sciences*		
Multidirectional knowledge exchange			
TU	Special accent on knowledge exchange in the form of a transdisciplinary transfer strategy (since 2016)	**All**	Activities remain dependent on the engagement of individuals Exchange formats and platforms have not been systematically elaborated and methodologically supported Integration of top-level researchers remains to be addressed
All	First examples of truly multidirectional formats:	**FU, HU, Charité**	Knowledge exchange strategy not yet fully developed and implemented
FU	*Forschungs- und Beratungsstelle Rechtsstaatlichkeitsförderung (RSF-Hub)*		
HU	*Humboldt Labor*		
TU	*Hybrid Plattform*, *Trialog® series City in Motion*		
Charité	*Charité Global Health, World Health Summit*		

A.2.2.2.3. Research infrastructure

Research infrastructure forms the basis for top-level research and is a premise for the production of and access to new knowledge. Berlin offers an internationally competitive network of research infrastructure across a wide range of disciplines. The Alliance partners understand research infrastructure in a comprehensive manner to include large-scale equipment and instruments (including core facilities), knowledge resources (collections, libraries, archives), information and communication platforms (systems for open access information and research data management, storage clusters, research networks), and further research infrastructure (e.g. GWK research buildings[6] and spaces for academic exchange and creative thinking). The strengths and weaknesses of the individual Alliance partners regarding research infrastructure are summarized in table 12.

Particularly important for the Alliance partners is the profile-building integration of research infrastructure in connection with the planning of research areas. For example, the *BioSupraMol Core Facility* of FU Berlin has contributed to strengthening basic research in biotechnology and material sciences through the deployment of highly modern analytical devices and instruments worth circa €14 million. In addition to supporting various CRCs, the core facility, together with the *Focus Area Nanoscale Functional Materials and Systems,* made a major contribution to the acquisition of funds in 2015 for the *Supramolecular Functional Architectures at Biointerfaces (SupraFAB)* research building. Another example is HU Berlin's *Integrative Research Institute for the Sciences Adlershof* (*IRIS*: 4,500 square meters of high-tech laboratories, offices, and communication areas), which provides important contributions for the new *IRIS Hybrid Systems for Electronics, Optoelectronics and Photonics Center* (investment volume of circa €50 million). Adlershof, where both these facilities are located, is one of Germany's most modern technology parks. The strength of TU Berlin´s research infrastructure is based on high-level support features, such as the *3D LAB* and the *Center for Electron Microscopy* (*ZELMI*). With the bundling and provision of high-quality electron microscopes, *ZELMI* acts as a best-practice example for central quality management of research infrastructure with university-wide provision of services. Charité has gone one step further in the institutional development of research infrastructure. Since 2015, the establishment, administration, and evaluation of infrastructures has been centrally managed. This includes the development of quality standards and price calculations for central core facilities. Although local bundling of infrastructure is well-established, central coordination and direction as well as further engagement in the formulation of a usage strategy remains a significant desideratum for FU, HU, and TU Berlin. Extensive collaboration with non-university research institutes

|6 Research buildings funded by the Joint Science Conference (Gemeinsame Wissenschaftskonferenz – GWK).

in the Berlin area enhances the Alliance's research infrastructure. However, use of research infrastructure as a service is rendered difficult by data-protection regulations and institutional requirements, such as unresolved billing and access regulations.

Berlin is a major global center for museums and scientific collections. Nearly one hundred repositories constitute a broad resource for research and teaching, of which nearly fifty are part of HU Berlin, including the eminent *Berlin Sound Archive*. FU Berlin's *Botanical Garden and Museum* is also of special distinction: over 20,000 varieties of living plants and around 3.7 million preserved specimens make it the second largest collection of its kind in the world. Although HU Berlin indexes and digitizes its historical and current collections within the framework of the *Cabinets of Knowledge*, the collections and archives across the Alliance as a whole have so far only been partially indexed. With the Open Access Strategy for Berlin, the partners engage in increasing the development of open access and capacities for comprehensive usability of research publications and data. For example, a coordinated approach has led to the establishment of a joint repository infrastructure, facilitating repositories such as *GenderOpen*. However, increasing data-storage requirements necessitate further intensive joint efforts, the ZIB being a key partner here.

TAB. 12 **Research infrastructure**

STRENGTHS		WEAKNESSES	
General aspects and large-scale facilities			
All	High level of research infrastructure in Berlin (facilities, museums, collections)	**All**	Knowledge of and access to shared research infrastructure still limited
	Network with non-university research institutes		Administrative and financial framework conditions require flexible solutions
	Profile-shaping integration of research infrastructure:		No guarantee for long-term coverage of operational costs
FU	*Core Facility BioSupraMol*		Shared management standards (for access, certification, etc.) need improvement
HU	*IRIS Adlershof and IRIS Hybrid Systems*)	**FU, HU, TU**	Poorly coordinated strategy for development and renewal of research infrastructure
TU	*Berlin Mobile Brain/Body Imaging Lab, Center for Electron Microscopy*		
Charité	*Berlin Center for Advanced Neuroimaging* (*BCAN*)		
All	Ability to realize shared development of research infrastructure, e.g. 7 GWK research buildings, as well as joint DFG package approval of two high-performance electron microscopes for FU and Charité		
TU	Institutional funding mechanisms to support Major Research Instrumentation by DFG		
Charité	Overall research infrastructure strategy including staff equipment, centrally organized core facilities (standards for usage regulations, price calculation, evaluation)		

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Knowledge resources			
All	Well-equipped libraries with increasingly centralized collections Joint cloud-based library management system: about 1 billion scientific publications available via a single-point-of-access	**All**	Many rather small initiatives emerged in the past causing a lack of overview and systematic use of resources
All	High diversity and quality of scientific collections:		
FU	*Botanical Garden and Botanical Museum*		
HU	*Berlin Sound Archive*		
TU	*Architectural Museum*		
Charité	*Museum of Medical History*		
All	Open access archives		
FU	*Online Encyclopedia of World War I* *Open Access Database for "Degenerate Art"*		
HU	*Cabinets of Knowledge*		
HU	BMBF funded *Coordination Center for Scientific University Collections in Germany*		

Information and communication infrastructure			
All	IT infrastructure of the Zuse Institute Berlin as service structure for the Alliance partners: high performance computing system (TOP500) and highly secured data archives for long-term data preservation *Open Access Strategy of the State of Berlin* together with the Alliance partners Joint research data management: DSpace as open source solution, (e.g. *GenderOpen*); *FDMentor*: joint development of a strategy for research data management	**All**	Separate approaches do not cope with increasing data-storage requirements in the long term Many different individual IT infrastructure solutions No central systematization
Charité	*QUEST Center* to increase the value and impact of biomedical research by maximizing the quality, reproducibility, generalizability, and validity		
TU	*Service Center for Research Data and Publications* for advice and data on research projects, management of the *DepositOnce* institutional repository to secure research results		

Conclusion of A.2.2.2.

As the overview of additional performance areas has shown, the Alliance partners complement each other in their expertise while also each having their own individual areas of focus. With respect to teaching, they cover a broad range of didactic tasks. Here, stronger coordination of individual institutional potential is required to further exploit complementary structures. Digital formats must be strengthened and opportunities to learn professional skills enhanced. Section A.3. thus argues that the Alliance must approach teaching as a cross-cutting theme, renewable by digital infrastructure, new course formats, and investments in transdisciplinary explorative learning.

In the performance area of transfer, the partners have traditionally focused on knowledge exchange and technology transfer, and have only recently begun to branch out into a broader understanding and practice of knowledge exchange with society. Spin-offs and transfer-oriented research collaborations have so far been driven by all partners in a networked yet individual approach; the Alliance recognizes the need for shared progress in public dialog, political advice, and curatorial practice. Since missing synergetic structures and strategies have prevented an active or reactive transfer-related response to major global challenges, for example, the Alliance will establish multi-directional knowledge exchange as one of its central objectives as outlined in section A.3. Research infrastructure has been developed in a needs-based manner and gradually updated, but information on the infrastructure's availability and the extent of its utilization requires central coordination in the Alliance. As expounded in section A.3., the Alliance will found a shared resource center as a single entry-point to research infrastructure that will provide a firm basis for pursuing a joint development strategy.

A.2.2.3. Excellence of researchers and framework conditions

A.2.2.3.1. Excellence of researchers

FU, HU, and TU Berlin including Charité are home to a great many internationally renowned researchers. This section will present short profiles of selected researchers. The number of awards received by scholars at the Alliance institutions is testimony to their achievements. FU and TU Berlin have each hosted four ERC Advanced Grant holders since 2012, while researchers from HU Berlin have notably received four Gottfried Wilhelm Leibniz Prizes. FU Berlin boasts the highest number of ERC Starting Grants (12) within the Alliance, whereby Charité is also notably strong with nine. The three universities are equally strong in terms of junior research groups funded by the Emmy Noether Program and the BMBF.

TAB. 13 **Awards and prizes since 2012** |*

(not including Humboldt Professorships)	FU Berlin	HU Berlin	TU Berlin	Charité
Leibniz Prizes	1	4	1	–
ERC Advanced Grants	4	2	4	1
ERC Consolidator Grants	5	3	3	1
ERC Starting Grants	12	6	5	9
Heisenberg Professorships	2	2	2	4
Emmy Noether Junior Research Groups	10	9	7	5
BMBF Junior Research Groups	6	6	7	2
Freigeist Fellowships	3	3	1	1

|* Awards starting 1.1.2012. For Alexander von Humboldt Professorships see A.2.2.3.2.

Research excellence within the Berlin University Alliance is also reflected in the many successful applications for Clusters of Excellence, Graduate Schools, CRCs, and Einstein Centers, decisively shaping its core research areas. The high level of third-party funding, especially from the DFG, is also testimony to researcher excellence (see A.2.2.1.). They benefit from Berlin's exceptional density of high-performing research institutions, enabling the high degree of interdisciplinary and cross-institutional collaboration that this proposal has emphasized. This is also the case for the numerous non-university research institutes in the Berlin area, with whom the researchers of the four Alliance partners collaborative intensively in joint research projects, joint graduate programs, and junior research groups, through joint appointments, and shared infrastructure (see A.2.2.1.4.).

Beatrice Gründler is a renowned scholar of Arabic studies who joined FU Berlin from Yale University. She explores Arabic writing and book culture and classical Arabic literature in its socio-historical context, and as a link between Asia and Europe. In 2017 she was awarded the Gottfried Wilhelm Leibniz Prize for her innovative methods, analytical virtuosity, and philological precision.

The attractiveness of the Berlin academic environment is also reflected in international networks and collaboration. The present ranking of the Alexander von Humboldt Foundation shows that between 2012 and 2016, FU and HU Berlin were the German universities most frequently visited by top-level researchers from abroad. TU Berlin is likewise highly ranked in this respect (7th place). The strengths of the partners' international networks is also reflected in the many projects financed by funding raised jointly with partners from abroad – for example international research training groups, research networks funded by the German Academic Exchange Service (DAAD), and research centers, as well as in joint publications. An analysis of publications by researchers at the Alliance universities shows that, of the publications registered in the SCOPUS database for 2016, an average of 50% were co-authored with colleagues from international partner universities.

In order to support researchers in developing new joint collaborative projects, FU, HU, and TU Berlin together with Charité have tried and tested services at their disposal (see A.2.2.1.3.). By contrast, systematic support for individual research activity is less extensive. Support services for ERC grants have been markedly improved in recent years. In respect to other external prizes and awards, however, there is still potential for improvement (see A.2.2.1.2.). The Alliance partners also face the challenge of balancing time for intensive research with teaching commitments and administrative responsibilities.

A.2.2.3.2. Recruitment and onboarding

Berlin is a highly desirable destination for researchers and students from Germany and abroad. Of the PhD students in the Berlin University Alliance, 32% come from abroad – well above the 24% German average. The case is similar for research assistants with non-German citizenship (19% vs. 14% national average).[7] Graduate Schools and Clusters of

Excellence provide important impetus to the successful recruitment of promising early-career researchers. Openings are announced internationally and awarded competitively. FU and TU Berlin have special recruitment programs for early-career researchers from abroad (see tab. 14). Liaison offices under the aegis of FU Berlin in New York, Sao Paolo, Beijing, Delhi, Moscow, Cairo and Brussels (the latter two jointly run with TU Berlin) contribute to successful recruitment from abroad.

Klaus-Robert Müller is a pioneer of machine learning at TU Berlin and develops solutions for brain-computer interface, neural networks, artificial intelligence and big data. He was awarded the Vodafone Innovation Award in 2017 and the Berlin Science Prize in 2014. Müller is the director of a competence center on machine learning and co-director of the *Berlin Big Data Center.*

Of the Alliance's professors, 10% are non-German citizens. Although this is above the German average of 7%,[8] the Alliance partners believe that they have not yet sufficiently drawn on the potential for such appointments. The challenge here is partly due to individual institutional regulations and partly to state regulations. In any event, greater proactive recruitment of international professors by each of the partner institutions is possible and necessary. At TU Berlin, a new recruitment office has been recently established; likewise at Charité (*Office for Recruitment and Onboarding* with the *BIH*). At FU and HU Berlin, the responsibility for the process rests with the offices of the presidents. Appointments are subject to quality control by the State of Berlin, following legal standards. For candidates from abroad, however, the process often seems tedious and non-transparent. Furthermore, the Berlin universities have a rather limited financial range to negotiate professorial salaries in both international and national comparison[9]. In addition, the state-determined legal specification of a nine-hour weekly teaching load represents a special challenge for professors from abroad, as does the high student-professor ratio (see A.2.2.2.1.). Dual-career services and the internationalization of university administration have been continuously improved over the last few years, but often do not meet the expectation of scholars from abroad. That said, the recruitment of Alexander von Humboldt professorships is a strong example of the city's high potential: HU Berlin has been particularly successful with four appointments (2010, 2011, 2015, 2018), and there have been two each at TU Berlin (2009, 2014) and FU Berlin (2009, 2018).

The Alexander von Humboldt Professor **Sharon Macdonald** is a leading social anthropologist with a special focus on cultural heritage and museum studies. Under her direction, HU Berlin, the Stiftung Preußischer Kulturbesitz and the Museum für Naturkunde Berlin founded the Centre for Anthropological Research on Museums and Heritage in 2015.

|7 For Germany-wide average in Winter semester 2016/17 see Federal Statistical Office of Germany; for the Alliance see: Leistungsberichte der Berliner Hochschulen 2016.
|8 Ibid.
|9 Nationally this involves both the relatively low basic salaries and the spending framework determining benefits.

TAB. 14 **Recruitment and onboarding**

STRENGTHS		WEAKNESSES	
Recruitment			
All	Leading Germany-wide in percentage of international doctoral students and research assistants	**All**	Number of international appointments too low measured in terms of location-based potential Processes for proactive recruitment of professors still insufficient in scope and effectiveness Appointment procedures perceived as tedious and non-transparent Dual career activities insufficient
FU	Measures for recruitment of international doctoral and postdoctoral researchers in the Institutional Strategy: joint programs with China and Israel; model EU-COFUND program for international postdocs; liaison offices in 7 locations worldwide		
TU	EU-COFUND program for international female postdoctoral researchers; *Joint Professorship Program* for female professors from industry		
HU	Recruitment of four Alexander von Humboldt professors (2010–2018)		
Onboarding			
HU	*International Scholar Services* as a central service unit for onboarding	**All**	Insufficient information about the German research system for international researchers; English-language administration services to be improved
		FU, TU, Charité	Welcome services for international researchers, but no central service unit

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A.2.2.3.3. Support for equal opportunity and diversity

The State of Berlin and the Alliance partners can look back on long-term successes in strategic support for equal opportunity. The Berlin Program to Promote Equal Opportunity for Women in Research and Teaching (established in 2001) and the *Program for Professionalization for Women in Research and Teaching* (*ProFiL*; since 2014) have both been successful in establishing concepts and measures for appointing more women to professorships. A joint equal-opportunity strategy has been in place since the introduction of the General Gender Equality Standards in 2014. The three universities have also successfully participated in the BMBF Female Professors Program. Furthermore, each of the partners has their own instruments for promoting equal opportunity. The chief emphasis has been placed on fellowship programs for female PhD candidates and postdocs together with training and networking services. Beyond this, HU Berlin also supports outstanding female professors with the annually awarded *Caroline von Humboldt Prize* (see tab. 15).

In the Germany-wide Center of Excellence Women and Science (CEWS) Gender Equality Ranking for 2017, the State of Berlin was ranked highest, with FU and HU Berlin leading the table nationally. At FU Berlin, 35% of

Stephanie Reich runs a unique laboratory to tailor and study nanomaterials. Joining FU Berlin from the Massachusetts Institute of Technology (MIT), she has made seminal contributions to the science of carbon nanomaterials and ultra-sensitive spectroscopy. Her research has won her both an ERC Starting Grant (2008) and an ERC Consolidator Grant (2018).

all professorships are held by female researchers, at HU Berlin 32% (in 2015). TU Berlin documents 17% female professors (in 2015), the second highest ranking among the nine leading German Universities of Technology (TU9). With 20% female professors in 2015, Charité exceeded the average rate for medical faculties in Germany (16%). FU Berlin has received six Total E-Quality Science awards (most recently in 2017, including a Diversity Certification), TU Berlin four (most recently in 2018, also including a Diversity Certification). All Alliance partners strongly believe in promoting the compatibility of career and family, and offer advice and support through their family services and arranging child-care placements, parent-child spaces, and emergency child-care. All partners have been audited for and certified as Family-Friendly Universities.

The Alliance partners are nevertheless strongly aware of the need to continue their efforts to facilitate the paths of highly qualified female researchers to professorships and other high-level positions. Alongside the continuation of their successful equal-opportunity measures, the partners recognize the need to place emphasis on promoting diversity in the Alliance research environment and ensuring that researchers are recruited and supported regardless of gender, sexual orientation, origins, cultural and religious affiliation, skin color, age, or physical ability. Special development of expertise and sensitization within the Alliance will become increasingly important. The partners will pool and develop their expertise in gender equality and diversity in order to unleash synergy effects and set national standards for developing diversity in higher education.

TAB. 15 **Support for equal opportunity and diversity**

STRENGTHS		WEAKNESSES	
All	Leading Germany-wide in percentage of female professors and in equal opportunity (CEWS Ranking placement; Total E-Quality Award); Many support measures for female researchers: *ProFiL program*	**All**	Different success rates in increasing the number of female academics across the various subjects Equal opportunity does not yet prevail despite the many programs installed to achieve this Insufficient placement in programs to advance female scholars due to high demand *ProFiL program* only available in German and thus not available to international researchers As of yet, no systematic general strategy for diversity promotion Equal opportunity and diversity expertise of all university members still has room for improvement
FU	*Dahlem Research Mentoring (DREAM)* for female doctoral students; gender monitoring is part of central administration		
HU	*Caroline von Humboldt Program, including Caroline von Humboldt Prize; Women in Natural Sciences Adlershof (WiNS)* for early-career researchers		
TU	*ProMotion* program for female doctoral students; EU-COFUND program for international female postdoctoral researchers; gender monitoring by central administration		
Charité	*Rahel Hirsch habilitation fellowships; Lydia Rabinowitsch program for reentry into research*; *Johanna Quandt professorships* (with *BIH*)		

A.2.2.3.4. Staff development and support for career paths in research

Staff development and career support for researchers are of central importance to all the Alliance partners. The Graduate Schools founded between 2007 and 2012 facilitated the introduction of structured doctoral programs as an alternative to the individual doctorate supervised by a single professor – the traditional German path toward a PhD. These programs are mostly interdisciplinary and have high quality standards. FU and HU Berlin both installed umbrella organizations for structured doctoral programs in 2006. The *DRS* and *HGS*, respectively, are in charge of central quality assurance for the doctoral phase, while also functioning as strategic centers for early-career researchers up until the postdoctoral phase. They offer a wide range of advisory services together with training and qualification courses for both academic and non-academic careers (see A.2.2.3.5.).

Myfanwy Evans is a rising star at TU Berlin's Institute of Mathematics. The Australian scientist leads an Emmy Noether Research Group to develop new directions in interdisciplinary science by contributing to the interface between mathematics and physics. In 2017, she won the Berlin Science Prize in the junior category for her research in geometry and the entanglement of 3D objects in soft matter physics.

There are now 29 structured doctoral programs at both FU und HU Berlin, in which approximately 20% of PhD students at the two universities are enrolled. The introduction of structured programs has profited from DFG Research Training Groups, joint graduate schools with non-university research institutes (Max Planck, Helmholtz, and Leibniz), and the development of doctoral programs as part of DFG-funded CRCs by FU, HU, TU Berlin, and Charité alike. In 2009, TU Berlin established the *TU-DOC Office* as a central contact point for its PhD students and postdocs. At Charité, the *Promotionskolleg* attends to this task. In total, TU Berlin offers 14 structured doctoral programs, and works with non-university research institutes and international partners in eleven more such programs. Charité offers six doctoral programs. In addition, it has established a structured environment for all doctoral students through an individualized qualification program.

TAB. 16 **Support for career paths in research: PhD**

STRENGTHS		WEAKNESSES	
All	High quality standards through structured PhD programs (Graduate Schools and Research Training Groups)	**All**	Structured doctoral programs not available for all subjects Possibilities offered by Alliance partners for the doctoral phase exist largely in parallel; there is still insufficient use of synergy
FU, HU	Central quality assurance through the *DRS* and *HGS* for structured PhD programs; qualification for academic and non-academic careers		
Charité	Structured environment established for all doctoral students	**FU, HU, TU**	Standards for structured doctoral programs not established university-wide

In Germany, as in many other countries, academic careers are characterized by a low level of job security: There are few permanent academic positions for a large number of early-career researchers. The Alliance partners have taken various measures to

Benjamin Judkewitz is a professor of bio imaging and neurophotonics at Charité with a research focus at the interface of biology, physics and engineering science. Using the latest insights from photonics, he specializes in overcoming the limitations of optical microscopy in biological tissue. In 2016, he received both the prestigious Alfried Krupp Prize and an ERC Starting Grant for his research.

offer their researchers better planning options. In their Institutional Strategies within the Excellence Initiative, FU and HU Berlin both established *career path models* to ease the transitions between different career stages. FU Berlin focuses on the postdoctoral phase, with one-year and two-year fellowships to retain and further qualify the best researchers, while also attracting new international talent. The university also funds junior research groups and temporary professorships with high innovation potential, partly together with non-university research institutes. HU Berlin has devoted special attention to transitions from master's to doctoral studies and to the post-doctoral phase. Female researchers receive additional support through the *Caroline von Humboldt Program*. At TU Berlin, funding measures to support early-career researchers in starting independent projects are part of the internal research funding program. In 2018, TU Berlin adopted a policy fostering multiple career paths and transitions at all career stages within and outside the academic system. Charité offers research fellowships for both PhD candidates and postdocs in medicine and health. Furthermore, Charité's *Clinician Scientist Program* connects structured specialized medical training with sufficient free space for clinical and basic research. All partners see the need for more orientation during the postdoc phase, including alternative career options (see A.2.2.3.5.).

Difficulties in the transition from the postdoctoral phase to a professorship are common in Germany. There are no permanent academic positions other than professorships. In addition, governmental regulations leave few options for creating new fixed professorships beyond those already agreed on. Temporary professorships have thus been instituted for the sake of retaining talented researchers. Among the Alliance partners, FU Berlin has one of the highest numbers of temporary junior professorships in Germany (92 in 2017)[10]. HU Berlin had 44 temporary junior professorships in 2017.

Peter Hegemann is a professor of experimental biophysics at HU Berlin who specializes in light-gated ion-channels proteins in microalgae. He is one of the founders of optogenetics as a research field, which has enormous impact and application potential for neurobiological research and beyond. In 2013, he was awarded the Gottfried Wilhelm Leibniz Prize for his research.

The past several years have seen a development of junior professorships toward a tenure-track model in Germany, and increasingly so in Berlin. TU Berlin established a tenure-track program in 2008, HU Berlin in 2013, and FU Berlin in 2017. Inspired by the Tenure-Track Program of the German Federal Ministry of Education and Research (BMBF), the partners commit to significantly increasing their tenured professorships. In 2017, HU Berlin was successful in the first round of the BMBF program. FU, TU Berlin, and Charité will compete again in the second funding round in 2019. FU Berlin will replace its practice of junior professorship

|10 Nevertheless with good results: An internal evaluation has indicated that of all junior professors at FU Berlin in 2015, 73% achieved professorships, including 24% at FU Berlin itself.

appointments with a tenure-track model. Quality assurance for tenure-track procedures will be highly important for all Alliance partners. To this end, the three partner universities will establish a joint board where the heads of their individual tenure-track committees meet regularly to coordinate their policies and regulations.

TAB. 17 **Support for career paths in research: post-PhD**

STRENGTHS		WEAKNESSES	
Postdoctoral Phase			
FU, HU	*Career path models* within the Excellence Initiative with a focus on difficult transitional phases between academic career stages prior to professorship	**All**	Insufficient measures for recruiting and keeping top-level postdoctoral researchers in the transitional to professorship Loss of ERC Starting and Consolidator grantees because of lack of permanent positions Insufficient selectivity results in a high number of postdoctoral researchers without realistic prospects for staying in academia
Charité	*Clinician Scientist Program* is Germany-wide role model in medicine		
Tenure Track			
HU	Funding within the BMBF Tenure Track Program since 2018 as *Humboldt Talent Track* program	**All**	Until now, little experience in implementing the tenure-track process

A.2.2.3.5. Training and advisory services

Christine Heim is director of the Charité Institute of Medical Psychology and professor at Pennsylvania State University. She directs a federally funded research program on developmental programming of disease. Her impact is reflected in over 20,000 published citations. She has received multiple honors and awards, and is a member of the Berlin-Brandenburg Academy of Sciences.

The Alliance partners offer a broad and highly differentiated portfolio of training and advisory services, ranging from teaching and knowledge transfer, applying for third-party funding, and use of digital systems to communication skills, career planning and coaching. Other career paths outside academia play an increasingly important role, for example through advanced training in management, business, and entrepreneurship. Such courses are organized partly by the Alliance's early-career centers, for example by the *DRS* at FU Berlin and the *HGS* at HU Berlin, and partly by their centers for entrepreneurship. At its *Biomedical Innovation Academy*, Charité offers support and incentives for basic and clinical researchers in translational medicine and business. With *SUPPORT for Teaching* and *bologna.lab*, FU and HU Berlin, respectively, also have their own structures for teaching qualification. Furthermore, all Alliance partners jointly run the *Berlin Center for Higher Education* (*BZHL*). In addition, all partners are in the process of modifying and developing their leadership training and qualification courses for professors.

TAB. 18 **Training and advisory services**

STRENGTHS		WEAKNESSES	
All	Many training and advisory services for researchers:	**All**	Advanced training services distributed among many players, thus partly non-transparent and not always sufficiently known
FU	*DRS* for PhD students and postdoctoral researchers; *Dahlem Leadership Academy* for professors; *SUPPORT for Teaching* program		Relatively few advanced training services for academic staff in a leadership role; potential insufficiently used
HU	*HGS* for doctoral students; *Center for Continuing Education; Leadership Program* for researchers; *bologna.lab* for teaching qualifications		
TU	*TU-DOC* with services for doctoral and postdoctoral researchers; *Center for Continuing Education; Leadership Program* for professors		
Charité	*BIH Biomedical Innovation Academy*		
All	*Berlin Center for Higher Education*		

A.2.3. Summary and conclusions

With the founding of the Berlin University Alliance, FU, HU, TU Berlin, and Charité are indeed aiming high: The four institutions' long-term goal is nothing less than to turn Berlin into an integrated research environment. By crossing boundaries of personal networks, institutions, and disciplines, the Alliance will be the nucleus and driving force in an outstanding ecosystem of universities and other research institutes, scientific collections, museums, cultural and political institutions, and start-ups and industry partners.

The formation of the Berlin University Alliance has been given impetus by three main driving factors explored and discussed in the present section A.2. of the proposal. First, the Alliance partners are convinced that the potential in Berlin for a far-reaching collaborative culture is unique in Germany. Second, they believe that the Alliance will greatly expand the realm of possibilities and opportunities for its individual partners. And third, the four partners are convinced that the Alliance will substantially strengthen, focus, and strategically align the individual partner institutions.

The Berlin-specific context of the Alliance, as laid out in section A.2.1.1., corroborates these convictions. Section A.2.1.2. has detailed the present culture of collaboration in Berlin. And finally, section A.2.2. and subsections have given a detailed description of the strengths and weaknesses of the four Alliance partners both individually and in the framework of current collaboration. The overall analysis of strengths and weaknesses has revealed eight fields of action that form the basis of the long-term strategy for the present proposal's first seven-year funding period (see A.3.): research, research quality, early-career support, teaching, knowledge and technology transfer and knowledge exchange, research infrastructure, equal opportunity and diversity, and internationalization.

The following table presents the strengths and weaknesses in these eight fields of action aggregated on the Alliance level. For example, regarding research, the Alliance partners have reached an excellent level of collaboration, excelling in attracting many large collaborative third-party projects with principal investigators from different disciplines and different institutions. At the same time, however, the acquisition of major joint funding is currently not based on a strategy for joint research, but often driven by bottom-up processes emerging from a single institution. It is important to note that many of the identified weaknesses result from the fact that the four partner institutions have pursued separate and different strategic objectives thus far, and that these weaknesses can therefore be considered opportunities for the Alliance.

TAB. 19 **Strengths and weaknesses of the Alliance**

Area of activity	STRENGTHS	WEAKNESSES
Research (addressed in A.3.1.1.)	Strong research performance regarding third-party funding, large-scale research projects, awards and prizes Highest number of Clusters of Excellence (7 in 2019), Graduate Schools (9 in 2018) and CRCs/TRRs (30 in 2018) nationwide Complementary research profiles Strong culture of collaboration: long-term experience in joint collaborative research projects, coordinated professorial appointment scheme, high number of joint professorships with non-university research institutes Good practice in institutional collaboration beyond the boundaries of individual disciplines and institutes (e.g. *Focus Areas, IRIs*)	No strategy for joint research and no top-down incentives for major research questions, e.g. of overarching societal significance Acquisition of EU-funding and other international funds not yet sufficient Still some administrative hurdles in implementation of joint research projects Potential for joint research planning with external partners in the Berlin area not sufficiently used
Research quality (addressed in A.3.1.3.)	Initiatives in meta-research with broad disciplinary variety and promotion of research quality as inherent criteria for top-level research (*QUEST Center for Transforming Biomedical Research at BIH, Robert K. Merton Center for Science Studies* at HU Berlin) Experience and expertise in research values and research ethics (offices for good scientific practice, graduate schools, ethical review boards, etc.)	Research quality still underrepresented as criterion in research evaluation and appointments Missing incentives for creation of research value Thus far no joint strategy for promoting research quality in science and society
Career support (addressed in A.3.1.4.)	Comprehensive career support at all career stages strategically installed within the Excellence-funded Institutional Strategies of FU and HU Berlin High quality standards through structured PhD programs Many training and advisory services for researchers at various career stages	Potential of cross-institutional collaboration to recruit and support researchers not yet tapped Parallel structures with common goals and similar results Vulnerable transition phase from postdoc to professorship not sufficiently supported

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Teaching (addressed in A.3.1.7.)	Wide range of subjects with over 500 degree programs and in high demand by students (over 100,000 students in total, of whom 23.4% international master's students) Complementary profiles offer ideal conditions for joint study programs (9 master's degrees so far) Commitment to research-based teaching and learning formats	Complementary profiles not yet exploited systematically: cross-institutional collaboration to be improved Limited resources and technical capacities for e-teaching and learning Research-based teaching not yet systematically anchored in all curricula
Knowledge and technology transfer; knowledge exchange (addressed in A.3.1.2.)	Technology transfer offices with significant successes (EXIST Entrepreneur Universities) Good collaborative and project-based work relationship, e.g. third-party funded *University Startup Factory* and the *B!gründet* network or in organizing and implementing large-scale public events, e.g. *Long Night of the Sciences*	No systematic Berlin-wide conception of knowledge exchange in a broad sense, including politics, civil society, and culture
Research infrastructure (addressed in A.3.1.5.)	Regional availability of internationally competitive research infrastructure at university and non-university research institutes and other external partners High density of research infrastructure at local technology parks and research campuses Good practice in joint applications for cutting-edge research infrastructure	Very limited overview of infrastructure across different sites No Berlin-wide agreement regarding access to and usage of infrastructure No joint strategy for acquiring major research instrumentation
Equal opportunity and diversity (addressed in A.3.1.6.)	Leading Germany-wide in percentage of female professors and in equal opportunity (CEWS Ranking placement; Total E-Quality Award) Cross-institutional gender equality networks are well organized and connected	Promotion of diversity and diversity studies still in its infancy Insufficient capacities in programs to advance female scholars
Internationalization (addressed in A.3.1.8.)	High attractiveness for international scholars (leading positions in Humboldt and DAAD rankings) Leading Germany-wide in percentage of international doctoral students and research assistants Pioneering role in the establishment of international liaison offices and strategic partnerships with world-class universities	High potential for international recruitment not fully exploited, especially for appointments Synergies between the partners in strategic partnerships not yet fully exploited

A.3. Plans and potential

A.3.1. Strategy and objectives

Long-term strategy of the Alliance

During the last three decades, fierce competition between FU, HU, TU Berlin, and Charité has developed into a process of constructive criticism, friendly competition, and ultimately very productive forms of collaboration (see A.2.). The most recent form of collaboration has been driven forward by the recognition that the constellation of academic institutions in Berlin holds unique research and strategic potential, and that three high-performing universities in close proximity, including a medical faculty of international renown, provide a multitude of opportunities to pursue collaborative research. The resulting increase in joint applications for research funding from the German Research Foundation (DFG) and other sources has led to an impressive number of very successful Clusters of Excellence, Collaborative Research Centres, Graduate Schools, national research centers, and research campuses in which principal investigators (PIs) from several institutions work together. In the most recent competition round of the Excellence Strategy, this culminated in seven approved Clusters of Excellence for Berlin in 2018. The still growing collaboration between the Berlin institutions is testimony to the partners' strong commitment to crossing traditional boundaries between institutions and disciplines. The logical and yet courageous next step has been to institutionalize this strong culture of collaboration by forming the Berlin University Alliance in February 2018.

The Alliance's **vision and overarching aim** is to turn Berlin into an integrated research environment and one of Europe's leading science hubs. In the Alliance, the partners see a nucleus and driving force of a prominent Berlin ecosystem of universities and non-university research institutes, scientific collections, museums, cultural and political institutions, start-ups, and industry. By facilitating research collaboration, career development, and knowledge exchange across the traditional boundaries of personal networks, institutions, and disciplines, the Alliance will strategically steer Berlin's research landscape, developing it into a truly integrated environment. The Alliance's long-term vision with its opportunity to establish a new collaborative role model is unique, and constitutes a challenge that can only realistically be met in a location in which several major universities co-exist in such a rich and vibrant research ecosystem.

The collaboration between FU, HU, TU Berlin, and Charité will generate formidable synergies and innovation potential – the basis for Berlin's development into an internationally leading research location. Working together, the Alliance partners can optimally address major scientific problems and issues of societal relevance, create novel administrative structures, attract outstanding researchers, and enhance diversity and gender equality in a manner far superior to the possibilities the institutions possess individually. For example, the growing need to confront large-scale and complex scientific

problems of global importance, such as the twenty global issues formulated by the United Nations, cannot possibly be met by a single institution with its limited capacities, personnel and resources. Doing so requires the integrated efforts of many different stakeholders.

The Alliance partners likewise believe that such a dynamic collaboration will, inversely, have a high impact on each of the partner institutions and greatly augment their international visibility. Each partner is convinced that an inclusive and non-discriminatory environment is of vital importance to generating knowledge, facilitating innovation, and maintaining top-level scholarship in general. To this end, the Alliance strives to create an integrated research environment in which research and teaching are pursued with the greatest freedom of thought and without prejudice. In general, the Alliance partners will expand their capacities to transform, develop and sharpen research foci and optimize teaching and service structures. The partners' distinctiveness and the diversity of academic cultures and research foci informing their work is a pre-condition for the Alliance's success.

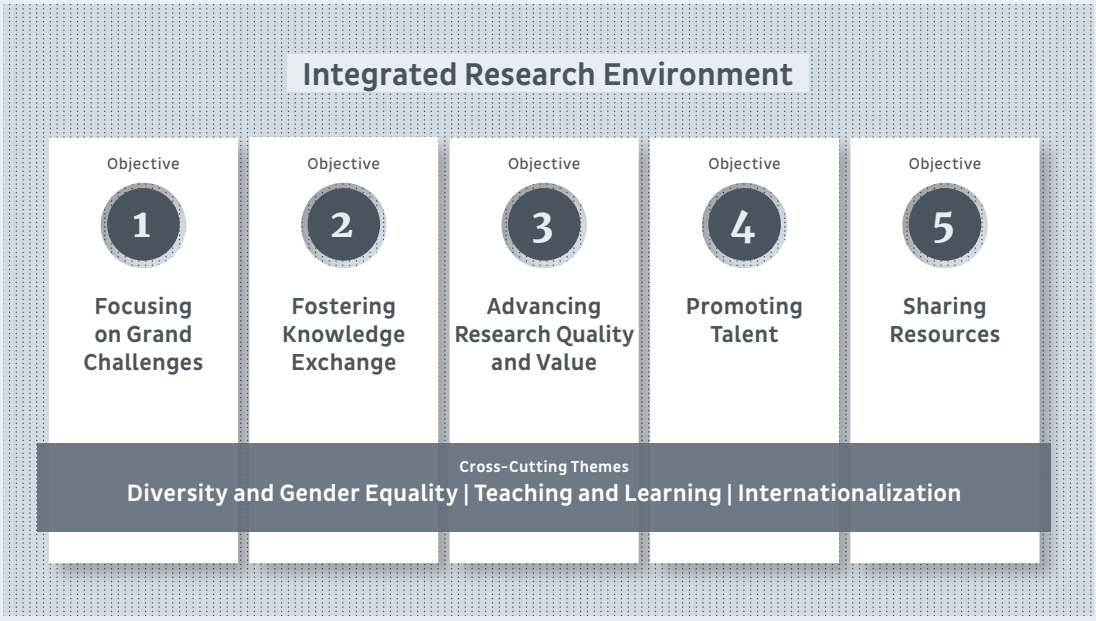
The **overall long-term strategy** for realizing the Alliance's vision consists of five components: (1) developing Berlin-wide joint research agendas focusing on societal issues of global importance, (2) fostering a Berlin-centered network of research and knowledge exchange, (3) bundling Berlin expertise for assessing and developing general standards for research quality and value, (4) establishing a Berlin-wide integrated space for careers and recruitment, and (5) creating a Berlin-wide network of research services and infrastructures. The **five Objectives** of the proposal will implement and operationalize this long-term strategy and its components in the first seven years of funding, and will be at the center of the Alliance's activities. These five Objectives are: **(1) Focusing on Grand Challenges**, **(2) Fostering Knowledge Exchange**, **(3) Advancing Research Quality and Value**, **(4) Promoting Talent**, and **(5) Sharing Resources**.

Each Objective focuses on a different component of the Alliance's long-term strategy, while simultaneously addressing weaknesses and opportunities identified in A.2. Table 19 (see A.2.3.) shows that all of the main issues identified in A.2. are taken into account. Each Objective will be pursued via specific Measures (see A.3.2.1.– A.3.2.5.), and will serve as a yardstick for measuring the success of the Alliance. While constituting an achievement in its own right, meeting Objectives 1 through 5 will also be an important step in realizing the Alliance's vision of establishing an integrated research environment that is unique in the world.

In addition to these five Objectives, the Alliance will place a strong emphasis on **three Cross-Cutting Themes (CCTs)** that will be especially important in achieving the Alliance's Objectives: supporting **Diversity and Gender Equality,** promoting research-based **Teaching and Learning,** and advancing strategic **Internationalization** (see A.3.2.6. – A.3.2.8.). For example, the Alliance's work on Grand Challenges will continuously be reflected and put to discussion in research-based teaching. At the same time, work

on Grand Challenge topics will depend on strong international collaboration, in particular through the Alliance's strategic partnerships, and will contribute to its international visibility. The Alliance's main aim is supported by many non-university research institutes and other external partners in Berlin, which have expressed strong interest in actively participating in the Alliance's activities.

FIG. 11 **The five Objectives and three Cross-Cutting Themes of the proposal**



A.3.1.1. Objective 1: Focusing on Grand Challenges

As a first major step toward achieving the Alliance's vision of creating an integrated research environment, Objective 1 entails developing **Berlin-wide joint research agendas** for tackling major global issues (i.e. Grand Challenges) of high interest and importance for both the research community and society.

The Alliance understands Grand Challenges as complex problems involving a broad range of interrelated phenomena from different realms of society and a large variety of disciplines and stakeholders. These problems are typified by manifold constituent topics, high levels of complexity and thus interdependency, and a plurality of possible solutions. They are not limited by geographic or political borders, and it is difficult to specify their precise current and target states[1].

By bundling research groups, competencies, and resources, the Alliance will jointly develop and establish Grand Challenge Initiatives, thus raising its research impact to a new level. Through this process, Berlin-based researchers (Objective 4) will be able to optimally contribute to addressing research questions of societal issues that would be impossible to meaningfully address by a single discipline or institution. In other words, highly significant research progress that also captures the public's imagination is only

|1 See position paper "Grand Societal Challenges as a Topic for Science Policy", German Council of Science and Humanities, 2015.

possible by combining the expertise of many researchers, disciplines, and both academic and non-academic institutions. Crossing boundaries between personal and institutional networks and integrating non-university research institutes and non-academic partners will allow the Alliance to advance its research profile and strengthen the innovative capacity of research in Berlin (Objective 2). In line with what has been said above, many non-university research institutes have expressed willingness to contribute to the Alliance's Grand Challenge Initiatives. The first such Initiative will be Social Cohesion.

Grand Challenge Initiatives require strategic alignment, coordinated efforts, and ample resources. The Alliance plans to introduce two main Measures to achieve Objective 1: Flexible Exploration Projects and an Office for Grand Challenge Initiatives will support new variable and tailored formats for research networks and projects. In addition, the Initiatives will receive substantial funding for project development within Einstein Research Units and for high-profile professorships financed by the State of Berlin via its Einstein Foundation Berlin.

A.3.1.2. Objective 2: Fostering Knowledge Exchange

The Alliance's second Objective is to turn Berlin into a research location in which knowledge exchange with society has replaced the traditional one-dimensional understanding of knowledge transfer. The Alliance defines knowledge exchange as **a multidirectional process in which academic ideas and research results are directed outward and external perspectives and experiences then fed back into research**. The Alliance acknowledges an explicit responsibility to render achievements in research, development, and teaching visible and accessible to the general public. In turn, the process of knowledge exchange will systematically draw on society as both a reservoir of inspiration and a driving force for top-level research, in particular for developing new Grand Challenge Initiatives (Objective 1). The Alliance strives to convey and make its findings available and valuable to society, helping to rebuild trust in the academic world. It will reach out to non-academic partners, overcoming boundaries between academia on the one hand, and industry, politics, culture, and other areas of society on the other.

The Alliance partners collaborate in many ways with established businesses and with Berlin's dynamic start-up scene through technology transfer, publications, licenses and patents. The Alliance also engages in close exchange with a multitude of cultural institutions, Berlin's creative scene, museums, and developing structures such as the *Humboldt Forum* and the *Dahlem Museum Research Campus*. The *Humboldt Forum* will be a major contemporary institution for cultural knowledge exchange, situated in Berlin's historical center. Within this, the *Humboldt Labor* will serve the Alliance as a prominent platform for presenting their research to a broader, more diverse public. To the same end, the Alliance will expand the activities on the joint campus of TU Berlin and Europe's ıargesт arт scnooı, the Berlin University of the Arts.

Along with being the seat of the federal and state governments, Berlin is home to numerous embassies, internationally renowned political foundations, and advisory bodies. The Alliance will use its proximity to the federal and state ministries to help shape future funding schemes appropriate to the Alliance's research program. In addition, the Alliance's comprehensive range of academic fields serves as a unique basis to offer evidence-based advice to help shape German and international policymaking. In this respect, collaboration with strategic international partners such as UC Berkeley, Princeton University, and the University of São Paulo, will be of enormous benefit. This is also the case for the University of Oxford, the Alliance's first international partner, which has a great deal of experience with government consulting (CCT Internationalization).

The Alliance's knowledge exchange strategy will build on the favorable conditions offered by the Berlin metropolitan area. In this setting, the strategy offers potential for inspiring both researchers and non-academic actors in an open and continuous way. With a major European metropolis as their laboratory, the Alliance partners have the opportunity to move past traditional disciplinary boundaries, developing a new model for exchange between academia and society.

A.3.1.3. Objective 3: Advancing Research Quality and Value

Excellence in research today is as strongly informed by standards of methodology and by social responsibility as it is by the cutting-edge research process itself or by disruptive innovation. For the Alliance, ensuring research quality means finding a balance between innovation and originality on the one hand, and standards and responsibility on the other. Debates about the societal impact of science, the digitalization of research, the (non-)reproducibility of results, and about the presence of outright academic fraud, have raised serious questions regarding the quality assurance of research processes, their documentation, and the accessibility of data and publications. For this reason, the Alliance will approach ensuring and advancing research quality processes, their documentation, reflection, and data accessibility as an inherent element of research excellence. Fostering research quality thus means identifying shared measures, metrics, and standards on the one hand, while building, imparting, implementing, testing, and revising these measures through participatory and deliberative processes with relevant stakeholders on the other hand.

Addressing wide-ranging research questions of societal importance (Objective 1), for example, requires diverse forms of expertise, robust results, and a trusted communication and feedback culture in academia and beyond (Objective 2). The Berlin Alliance partners will pursue a joint agenda for **developing and promoting the value, quality, integrity, and credibility of research**. The main goal will be to create strategic focus areas within the Alliance in respect to quality, including joint best-practice examples and policies for approaching research questions, processes, and results, leading to new incentives and funding options. This process will be fueled by the immense variety of joint disciplines

within the Alliance, hence a critical mass of diverse knowledge and input. Eventually, this will form a firm basis for addressing quality in research from a uniquely comprehensive perspective. Here, measuring, advancing, and teaching common research values, together with promoting openness and transparency, value-based ethics, and value-based research incentives, will increase overall research benefit.

A.3.1.4. Objective 4: Promoting Talent

The success of the Alliance will critically depend on excellent minds. Identifying, attracting, retaining, and supporting outstanding researchers at all career stages will be of prime importance in forming a Berlin-wide integrated research environment. Objective 4 builds on the Alliance partners' considerable expertise in this area, making it possible to establish new, dynamic, collaborative forms of recruitment, and fostering talent. The partners are convinced that the comprehensive promotion of research careers should no longer be seen as the responsibility of individual institutions, since careers in research develop within an increasingly complex system of national and global networks, requiring competencies that cannot possibly be acquired at a single institution. By creating a **joint integrated space for careers and recruitment**, the Alliance seeks to catalyze a qualitative leap: to see Berlin become a dynamic center for national and international research careers and attract outstanding researchers at all career stages. Within the integrated career space, researchers will profit from a joint comprehensive portfolio of exchange and qualification programs, and from support and advisory structures tailored to individual needs. By joining one of the Alliance partners, researchers will also be able to advance in a career space extending to international and non-university research partners. The Alliance will focus in particular on promoting horizontal career advancement, making integral use of the Berlin area's diverse and dynamic environment beyond academia.

Each of the Alliance partners has already taken significant steps to systematically promote early-career talent (see A.2.2.3.). FU and HU Berlin have both developed comprehensive career support at all career stages within their Institutional Strategies in the Excellence Initiative. TU Berlin and Charité have also each established policies and measures to strengthen research careers. This has resulted in four individual career support systems that aim at similar goals, but were developed mostly within each partner's individual profile. The Alliance partners intend to better harness their potential in this respect, joining forces to build a harmonized environment for structured doctoral training and a harmonized career support system.

All four Alliance partners face similar challenges in respect to recruitment procedures. Given the inadequate numbers of international professors, the partners are convinced they are not yet sufficiently making use of the potential to attract the brightest minds from around the world and create a diverse faculty. At the same time, they have had difficulties in advancing their most promising postdoctoral researchers to permanent professorships.

In response to this problem, the partners have begun to establish more attractive, internationally competitive career paths by introducing tenure-track systems at all four institutions. The Tenure-Track Program funded by the federal and state governments represents an important step toward achieving this goal.

A.3.1.5. Objective 5: Sharing Resources

Access to high-quality infrastructure is an important competitive factor for excellent research, as well as for attracting talented researchers and funding. The Alliance understands infrastructure in manifold ways: large-scale equipment (including core facilities), knowledge resources (collections, libraries, archives), information and communication platforms (e.g. systems for open access and research data management), and research buildings (mainly GWK research buildings according to Art. 91b GG). Eventually, pooling the Alliance partners' resources will have an effect on many levels, all supporting the formation of an integrated research environment.

The Berlin area offers internationally competitive research infrastructure over a wide range of disciplines, and its museums and related collections have set global standards. To make best use of this potential, the Alliance partners will systematically expand and strengthen mutual planning and use of both resources and services. In addition, each Alliance partner will introduce particularly successful services for joint use. Combining tools, data, services from various disciplines, and best practices for targeting increasingly complex and multidimensional research questions will be a path to future success (Objective 1).

Objective 5 comprises two complementary goals: (1) to systematically expand the mutual use of and create **Berlin-wide access to research infrastructure and services**, and (2) to build, nurture and support **cross-institutional research communities clustered around top-level infrastructure**. These communities will be instrumental in achieving the Alliance's vision of turning Berlin into an integrated research environment because of their strong interdisciplinary nature, creating collaboration through mutual interests.

A Shared Resources Center (SOURCE) will coordinate resource-sharing activities within the Alliance. As a single point of entry for researchers, SOURCE will provide services for resource usage ranging from large-scale equipment to data-management support, from open access publishing to complex IT services. Through SOURCE, researchers will have access to infrastructure across the Alliance. Furthermore, joint standards and policies will enhance knowledge exchange for academic purposes (Objective 2).

The Alliance's community-building activities related to infrastructure start from a number of existing cross-institutional clusters around top-level core facilities such as cutting-edge imaging and high-performance computing (HPC) resources. In a first step, the Alliance will integrate the Zuse Institute Berlin (ZIB) – Berlin's hub of the computing-centered research community, operating tier-2 HPC infrastructure.

A.3.1.6. – A.3.1.8. Cross-Cutting Themes

In addition to the five Objectives, the Alliance has identified three Cross-Cutting Themes (CCTs) as central fields of action: **Diversity and Gender Equality**, **Teaching and Learning**, and **Internationalization**. Each of these CCTs is of central political and strategic importance for achieving the Alliance's five main Objectives. Each will thus also be highly relevant to the quality and attractiveness of the integrated research environment aimed for by the Berlin University Alliance.

CCT Diversity and Gender Equality

Diversity is inherent to the founding ethos and vision of the Alliance – a consortium of universities with distinct individual identities brought together to harness the rich diversity of the metropolitan capital and knowledge ecosystem that is Berlin. It is also an integral aspect of the Alliance's main Objectives in Promoting Talent, Research Quality, and Focusing on Grand Challenges, which can all only be truly achieved in a research environment that also integrates the diversity of minds and perspectives that result from a diversity of biographies. Addressing a weakness indicated in A.2., the partners will thus systematically develop and implement a strategy for the **joint advancement of diversity and diversity studies**. This strategy will focus on attracting the brightest minds regardless of ethnicity and religion, social background, gender, sexual orientation and physical ability to contribute to Alliance research by combatting discriminatory structures and processes and establishing diversity as a core institutional and scholarly concern. By way of a new competence network for evidence-based diversity policies and measures, the Alliance aims to set a precedent for German universities, taking diversity development to the same national standard-setting level that the partners have already taken gender equality.

While the focus of this CCT is on diversity, the Alliance partners will also use the opportunity to address a further weakness identified in A.2. By widening access to their most successful and desirable joint program to support female scholars on the way to a professorship, *ProFiL*, the partners will continue their joint efforts to strengthen gender equality and close remaining gender gaps at the most senior academic levels.

CCT Teaching and Learning

Teaching is a fundamental overarching priority for the Alliance closely intertwined with all five Objectives. Based on prior achievements and existing cooperation in teaching, the Alliance strives to unlock its joint potential by better exploiting disciplinary complementarity, digital infrastructure, and specialisms. The long-term aim is to ensure student access to and participation in the Alliance's integrated research environment. During the first funding period, the partners will thus work on their performance with regard to three current challenges (see A.2.2.2.1.). They intend to **more systematically use their complementary teaching profiles, extend capacities in digital teaching,**

and integrate research-based teaching into all curricula. Grand Challenge Initiatives (Objective 1) will lead to new joint master's programs and seminars, and students will have the opportunity to take courses on science communication (Objective 2) and research quality and value (Objective 3). Furthermore, as part of Objective 4 to promote talent, students will receive better preparation for research careers through extended research-based teaching possibilities. Finally, SOURCE (Objective 5) will support the further digitalization of teaching and learning.

As a result of these Measures, students will actively participate in the Alliance's integrated research environment, gaining broader access to the courses offered by all four partners, profiting from tailor-made training courses emerging from research and knowledge exchange activities, and playing an integral role in ongoing top-level research projects.

CCT Internationalization

One of the existing strengths of the Alliance is internationalization, and it intends to leverage this strength for future development and planning. In the past, each of the Alliance partners has built its own portfolio of strategies for internationalization (see A.2.2.1.5.). Building on prior achievements, the Alliance will now design and implement a **joint internationalization strategy** focused on three core initiatives: a Berlin Center for Global Engagement to initiate new networks with partners in emerging research regions, a network of joint strategic partnerships with leading universities worldwide, and a joint global advancement strategy for engagement with the EU and with major foundations in countries outside of Germany.

Each of the Alliance's five Objectives relies intrinsically on international input, inspiration, and resources. The future success of the Alliance with regard to focusing on Grand Challenges (Objective 1), for instance, will depend on the partners' ability to conceptualize their own research in a global context and seek input within an internationally diverse environment. The effectiveness of efforts to attract talent (Objective 4) will necessarily rely on successfully strengthening Berlin's global academic visibility. The proposed focus on knowledge exchange (Objective 2) will leverage new potential from outside the academic community. The Berlin academic community is connected in many ways with diverse stakeholder communities in its environment, but if Berlin wishes to develop truly new and transformative practices, it will need to seek inspiration from good practice around the world. International input will also play a key role in advancing research quality and value (Objective 3), expanding the horizons of perceptions and ideas, and helping to develop a new vision of Berlin's place and role in the global research community.

The strategy-forming process

Transforming Berlin into an integrated research and teaching environment is a goal that researchers and students have cherished for more than a decade. It has been manifest, for instance, in the quest to share research infrastructure beyond institutional boundaries, in the quest to ease career transitions between institutions, and in the quest for joint expertise where the means of single universities were insufficient for tackling large, long-term collaborative research projects – those exceeding the scale of Collaborative Research Centres (CRCs). While the idea of bringing together universities, non-university research institutes, and further partners was already present in the conscience of many, outside stimulus by the Excellence Strategy gave the idea the necessary momentum.

The Alliance partners' decision to prepare a joint proposal within the Excellence Strategy rather than individual proposals was a very deliberate one and was strongly influenced by two main considerations. First, the joint proposal can draw on the unique potential of many strong stakeholders in the same city and thus address issues and structures themselves requiring a shared approach – a process that would also be of significant benefit to the individual institutions. Second, the partners are convinced that developing their joint activities will give impetus to dynamic processes of self-renewal, again on the level of both the Alliance and that of the four individual institutions.

The final strategic decision of FU, HU, TU Berlin, and Charité to submit a joint proposal was prepared and taken by the universities' presidents and the chief executive officer (CEO), with the full support of the chairs of their boards of trustees and the State of Berlin. In making this directional decision, the presidents and the CEO were able to rely on strong mutual trust that developed over regular meetings during the past fifteen years. Based on the conviction that it would be crucial to involve members of all institutions, a representative selection of university stakeholders was brought together composed of distinguished senior faculty, early-career researchers, and administrative staff from all participating institutions. Over 200 persons were consulted and involved at different stages of the process. This included a number of workshops on particular topics and discussions concerning the general approach to be taken in the application. The entire application process was directed by the presidents and the CEO, who met at least once per month from 2016 onward to set the agenda and establish the next steps to be taken.

Both within and across the Alliance institutions, existing and newly established internal advisory boards accompanied the application process. The boards read and discussed parts of the proposal in various stages of completion, offering critical feedback. The universities' various bodies, committees, and faculties were likewise regularly involved in this process through reports by the presidents and the CEO, with the opportunity for discussion and debate during regular and extraordinary meetings. Each of the Alliance partners has received the formal support of their academic senates for the final version of the proposal. The State of Berlin fully supports the proposal through substantial funds and other support measures that would take effect upon the success of the present proposal.

A.3.2. Planned measures and anticipated effects

A.3.2.1. Measures for Objective 1: Focusing on Grand Challenges

Steering Committee: *Rainer Haag (FU Berlin), Jan Plefka (HU Berlin), Martina Löw (TU Berlin), and Christian Drosten (Charité)**

** Valid upon proposal submission on 12/10/2018.*

Grand Challenge Initiatives (GCIs) will represent a thematic umbrella for the development of research agendas within the Alliance (for a definition of Grand Challenges see A.3.1.1.). Determining suitable Grand Challenge topics is based on strengths within the Alliance's research profile and the potential arising from their anchoring in Berlin's integrated research environment. In the course of this proposal's initial funding period, the Alliance intends to introduce three **GCIs**. The first will be Social Cohesion, the second may be developed by connecting the core research areas global health and global and area studies, (see fig. 7), and the third will be developed in the period approaching transition to the second funding phase.

The decision to start with a focus on Social Cohesion was made by the Alliance Board of Directors and was based on an analysis of both societal relevance and the Alliance's existing strengths and innovation potential, especially in its core research areas (see fig. 7), together with the Alliance partners' individual research profiles (see A.2.2.1.2.). The decision was strongly supported by the Alliance's International Sounding Board. Each **GCI** will be led by a group of experts representing relevant research areas.

Social cohesion has increasingly come under pressure in many societies around the world in recent years. The topic is related to issues of democracy, diversity, cultural heritage, migration, conflict and confrontation, social and economic transformation, eurocentrism vs. globalization, sharing resources, digital spaces, resilience, and health. These fields have a strong standing in the Berlin academic and non-academic communities.

Global health is an evolving field centered on many challenges tied to health and disease that go beyond the realms of national borders. Rising demand for scientific and technological innovation requiring holistic approaches has made global health a strategic priority in various arenas, including politics. Berlin's diverse research landscape can provide unique and fertile ground for tackling global health questions across various organizations and disciplines. A particularly fruitful exchange can be expected through a dialog with global and area studies.

The Berlin University Alliance has established a strong scientific presence in the research area of digital transformation, supported by a large number of highly successful grant applications (e.g. *Einstein Center for Digital Future*, *Weizenbaum Institute for the Networked Society*, *Berlin Big Data Center*; see A.2.2.1.3.). In many ways, digital transformation can be viewed as a precursor and as a highly successful example for the Alliance's **GCIs**. Consequently, some of the Measures described below have been derived from, and tested in, the context of digital transformation.

Each **GCI** will run through three phases. In the preparation phase, **GCI** topics will be discussed in a series of multi-stakeholder workshops (**Research Forum**, Objective 2) and evaluated by a group of academic and non-academic stakeholders (from politics, culture, NGOs, and industry, utilizing academic and non-academic criteria), leading to the development of subtopics and potential projects. In the main development phase, **GCIs** will be supported using the Measures described below and accompanied by the ongoing **Research Forum** and **Science Communication measures** (Objective 2). Funding will be provided by the Alliance and the Einstein Foundation Berlin, and will increasingly be replaced by funding from external sources such as the DFG, other federal and state funding agencies, and the EU. In the consolidation phase, a **GCI** will be supported solely by third-party funding in order to free up Alliance funds for the next **GCI**.

Measure	Description	Goals
M.1.0. Office for Grand Challenge Initiatives	Central service unit to administratively coordinate GCIs; supports internal and external networking to acquire external funding and consolidate successful research projects	Increasing the sustainability of GCI platforms, structures, and themes; setting agendas
M.1.1. Exploration Projects	Serve project development within a GCI and provide flexible funds (seed funding) for up to three years	Initiating GCI projects and networks; supporting inter- and transdisciplinary approaches; enabling cross-institutional collaboration; involving non-university researchers
M.1.2. Einstein Research Units	New program of the Einstein Foundation Berlin to fund cross-institutional and cross-disciplinary research units advancing GCIs	Increasing the sustainability of GCI projects, structurally anchoring GCI projects and networks within the Alliance, developing novel inter- and transdisciplinary research foci
M.1.3. Einstein Strategic Professorships	Funding by the Einstein Foundation Berlin to support appointments of strategic importance in the Alliance	Supporting recruitment of high-profile researchers; driving inter- and transdisciplinary research of the Alliance

M.1.1. Exploration Projects

The funding line **Exploration Projects** will provide seed funding for the development of novel projects and research networks addressing questions within the thematic scope of a **GCI**. The funding line will be announced through calls for research proposals; funded teams must include researchers from at least two Alliance partners, and external partners can be co-applicants. The funds are flexible and will be provided for up to three years and for various formats as long as they bear relation to preliminary work and collaboration:

1. PIs from existing research structures or consortia that focus on similar but as yet unlinked research areas may apply to form overarching research networks in the framework of a **GCI**.

2. Groups of individual researchers may form research nuclei for novel interdisciplinary or transdisciplinary high-risk projects.
3. Interdisciplinary science fairs within the thematic scope of a **GCI** may be funded as regular networking events to connect junior researchers and other innovators, developing novel ideas and pitching them for seed funding.

M.1.2. Einstein Research Units

While the funding line **Exploration Projects** focuses on the development of novel topics, **GCI** projects and networks, the funding line **Einstein Research Units** aims at supporting large-scale cross-institutional and cross-disciplinary research projects advancing the **GCI**. **Einstein Research Units** will be funded by the Einstein Foundation Berlin. The goal is to anchor large **GCI** research projects in university structures, to establish novel, internationally competitive and inter-/transdisciplinary research foci for the long term, and to develop new approaches to particular aspects of a Grand Challenge. The suggested funding period of **Einstein Research Units** is three plus two years, with a mid-term evaluation after the first three years. This also yields time to prepare stable structures and apply for additional or permanent funding. The format of the **Einstein Research Units** is based on best-practice examples from the Institutional Strategies of FU and HU Berlin within the Excellence Initiative (i.e. *Focus Areas* and *Integrated Research Institutes*, see A.2.2.1.).

M.1.3. Einstein Strategic Professorships

Financially supported by the Einstein Foundation, **Einstein Strategic Professorships** will enable the Alliance partners to hire high-profile international researchers. **Einstein Strategic Professors** can be hired in an area in which the Alliance has achieved international impact or hopes to do so (for instance in a Grand Challenge area). They are expected to collaborate closely with researchers across institutions and disciplines.

M.1.0. Office for Grand Challenge Initiatives

The Alliance will establish an **Office for Grand Challenge Initiatives** as the central service unit for coordinating **GCIs** and developing sustainable structures. The Office's tasks include (1) administering the **Exploration Projects** program, (2) networking within a **GCI**, i.e. among established research networks, nuclei, and successfully pitched projects, as well as with participating non-university research institutes, (3) acquiring third-party funds in areas not yet systematically covered by the Alliance's research divisions (especially public-private partnerships and collaboration with private foundations) in order to establish larger research structures and novel ways of organizing research collaboration within the thematic scope of a **GCI**, (4) setting the agenda for **GCI** topics in politics and society, and (5) consolidating **GCI** work of long-term relevance within

the Alliance in close collaboration with relevant administrative divisions of the Alliance partners, for example by turning limited-term positions into permanent professorships and establishing new courses of study and permanent doctoral programs.

Additionally, the Alliance partners will use funds to further develop and sharpen their individual research profiles by continuing initiatives from the partners' Excellence and research strategies. These Measures will strongly support the pursuit of collaborative **GCIs**. Measures from other Alliance Objectives and funding sources will provide additional support to **GCIs**. Well-funded **Joint Berlin Professorships** and **Junior Research Groups** (Objective 4) will allow the Alliance to recruit high-potential researchers and strengthen research areas within a **GCI**. **Research Forums** accompanying the **GCIs** will reinforce the transdisciplinary approach and incorporate research questions into a wider societal context, and a portfolio of **multi-channel communication measures** will ensure dissemination of research progress (both Objective 2).

Expected long-term effects and synergies

GCIs will contribute to the establishment of agile cross-institutional platforms that systematically stimulate and expand otherwise unlikely exchanges between researchers of diverse backgrounds and expertise. **GCIs** will lead to active collaboration within the Alliance and beyond, strengthening collaboration with partners from industry, business, politics, and culture (Objective 2). A considerable improvement in research performance is expected, as new synergies are created and the research potential available in Berlin is exploited in a systematic way. This will have a particularly positive effect on the recruitment of top-level researchers and the promotion of early-career researchers (Objective 4).

In the long term, each Alliance partner will increase its competitiveness and visibility. The collaboration fostered through **GCIs** will open up new topics and research opportunities, ultimately creating novel core research areas for the Alliance. It is expected that each of the partners will be able to further increase its third-party funding revenue and, in the long term, enhance its reputation through new strong **GCIs**. Finally, **GCIs** will substantially contribute to enhancing collaboration between universities and non-university research institutes and other partners in Berlin and generate findings of importance to both academia and society.

A.3.2.2. Measures for Objective 2: Fostering Knowledge Exchange

Steering Committee: *Thomas Risse (FU Berlin), Wolfgang Schäffner (HU Berlin), Christine Ahrend (TU Berlin), and Dietmar Schmitz (Charité)**

** Valid upon proposal submission on 12/10/2018.*

Replacing the current tendency in Berlin toward linear transmission of knowledge from academia to society, the Alliance will involve the public as a reservoir of inspiration, which

will serve as a driving force behind top-level research to a far greater extent than is presently the case. At the same time, the Alliance views it as a special responsibility to make its politically, socially, and culturally relevant achievements in research and teaching heard and used. Such knowledge exchange involves launching joint research initiatives and promoting the discussion and dissemination of research results and their implications. By bringing together their strengths in research, sharing their ideas regarding knowledge exchange, discussing their experiences of existing funding programs, and consolidating their contacts within national and international politics, cultural institutions, in large and small companies, and other areas of society, the Alliance partners are aiming for an essential qualitative and quantitative advance in this crucial exchange process.

The Alliance will focus on five aspects of knowledge exchange in particular: (1) making information on research achievements available to the public in a transparent way, (2) creating structures that are open to participation and multidirectional, dialogic inclusion of all members of society in research culture and scholarly debates, (3) strengthening collaboration and partnership with society, culture, industry, and politics, (4) supporting transdisciplinarity as a link between academic and practical knowledge, and (5) promoting innovation through targeted services for the transfer of research results to practice. Three Measures will serve this Objective: setting up an **Expertise and Knowledge Exchange Office**, promoting **Science Communication**, and conducting **Research Forums**, for example on topics related to the **Grand Challenge Initiatives** (Objective 1).

Measure	Description	Goals
M.2.0. Expertise and Knowledge Exchange Office	Platform for policymaking and external services; one-stop office for inquiries from the public	Increasing knowledge exchange activities in all disciplines
M.2.1. Science Communication	A triad of innovative Measures focusing on (1) interactive events, (2) new media, and (3) professional communication training for researchers	Creating public awareness of academic research, professionalizing science communication
M.2.2. Research Forums	Transdisciplinary working groups consisting of researchers and experts from non-academic contexts who jointly explore a thematic field related to top-level research, e. g. within Grand Challenge Initiatives	Framing transdisciplinary collaboration; adding value to research

M.2.0. Expertise and Knowledge Exchange Office

The Office will serve as a motor for promoting and systematically developing knowledge exchange within the Alliance. Researchers repeatedly emphasize the enormous productivity of flexible formats to generate new ideas. The **Expertise and Knowledge Exchange Office** will support the setting up of such formats in order to trigger joint innovation processes between researchers and experts from other sectors.

The Office will be responsible for tasks related to policymaking and will provide services

on behalf of cutting-edge research, teaching, and cultural education. It will function as a one-stop office for inquiries from the public, the political sphere, and the media, providing access to the Alliance's expertise and transfer activities. In addition, it will assist the Alliance's network of partners in presenting their research to a larger, more diverse public, and organizing knowledge exchange events, for example in the *Humboldt Forum*, thereby fostering long-term dialog on ongoing societal problems and potential solutions with representatives of the academic community, Berlin's world of art and culture, the business sector, and civil society. The Office will direct external inquiries regarding research profiles and the Alliance's core competencies to specialists. The Alliance will set up a fellowship program in collaboration with the Stiftung Preußischer Kulturbesitz. Researchers and experts for knowledge exchange will be invited as international visiting fellows and will be able to explore and design knowledge exchange formats in the *Humboldt Forum*. It will also organize flexible knowledge exchange workshops, for example relating to **Grand Challenge Initiatives** (Objective 1) with local or federal politicians and other experts. This will generate new requests for cooperation with national or international partners (CCT Internationalization). In addition, the Office will establish and maintain a knowledge exchange database together with **SOURCE** (Objective 5), which will document relevant exchange activities, best practices, and initiative-producing exchange, and make it available to the public. It will be overseen by an advisory committee of researchers responsible for the analysis, development, and quality assurance of knowledge exchange activities. The Office will thus be an incubator for contact between academia and society.

M.2.1. Science Communication

The actions of the Alliance in **Science Communication** will create innovative formats for interaction with the public, establishing new standards for reciprocal dialog between academia and society, and generating optimal awareness of topics related to academic research. The digital age has created a complex, multi-directional, and recursive system of interactions often based on social media – a system in which many different societal actors share the goal of expanding and deepening knowledge. Consequently, the Alliance aims at enhancing participation in the research process, increasing the credibility of research results, and furthering open access to research findings (Objective 3). To this end, the Alliance's **Science Communication measures** will focus on interactive events, on the use of new media, and on research communication training for scholars at all career stages. Through both the targeted availability of advanced training in science communication and documentation of good communication practice, researchers within the Alliance will learn to more effectively introduce ideas emerging from top-level research to the non-academic public, catalyzing discussion and debate. Notably in this respect, the *Humboldt Forum* will function as a prominent platform, where four million visitors are expected annually. The *Humboldt Labor* will provide the Alliance with a space to present the research and findings

of major collaborative projects like the Clusters of Excellence to a diverse public. Curated by HU Berlin, it will allow for innovative formats of experimentation and interaction, and create new standards for knowledge exchange between research and society.

Another of the Alliance's **Science Communication** measures will be the **Berlin Year of Research**, a dialog on research results designed to give impetus to public debate. Highlights will include established formats such as the *Long Night of the Sciences* and the Berlin Science Week, as well as new formats like an annual **Societal Impact Congress**, enhanced by experimental use of digital media.

M.2.2. Research Forums

Research Forums will offer a framework for discursive collaboration between selected researchers within the Alliance and actors from politics, culture, business and industry, and other areas of society. Here, participants with diverse backgrounds will be brought together for a two-and-a-half-year period, with researchers and experts from non-academic contexts jointly exploring a thematic field related to top-level research in Berlin using inter- and transdisciplinary approaches. The Forums will unfold in regular working groups moderated by specialized coaches and digital dialog formats, the aim being to move research past traditional disciplinary categorizations. The first twelve months will involve preparing the project with participating stakeholders, developing foundations, formulating goals, and detailing the working program. An additional twelve months will be reserved for the concrete realization of the project, with six months remaining for follow-up and for assuring the accessibility of all project results to the stakeholders.

The topics addressed will be both interdisciplinary and cutting-edge, and may yield sub-topics within the **GCIs** (Objective 1). Because of their transdisciplinary approach, the **Research Forums** are ideally suited to generate new ideas and move past existing pathways of knowledge transfer. The networks generated in the Forums will provide a foundation for transparent and critical dialog, and for open discussions on the implications of research with key partners from non-academic societal spheres.

Expected long-term effects and synergies

Based upon the three Measures outlined above, the joint strategy for knowledge exchange is expected to have a major impact on the Alliance partners and on the Alliance as a whole. New joint projects with experts from the non-academic world will result in new research and publications. On a meta level, the Alliance will gain knowledge regarding how best to frame such collaborations, including inspiration for future projects or issues of concern to politicians based on broad expertise in all fields of research in Berlin and represented by the Alliance. The outlined approach further promises an increase in knowledge and technology transfer projects, in patents, and in third-party funding. Joint efforts will allow for a more powerful and comprehensive interaction between universities

and society. A long-term goal of the Alliance is to see Berlin develop as the German center of knowledge exchange, moving well past established pathways.

A.3.2.3. Measures for Objective 3: Advancing Research Quality and Value

Steering Committee: *Beatrice Gründler (FU Berlin), Martin Reinhart (HU Berlin), Manfred Hauswirth (TU Berlin), and Ulrich Dirnagl (Charité)**

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Berlin has a long history of focusing on research quality through organization (for instance Humboldt's model of a modern research and teaching university in 1810), governance (for instance the review system of the Zentralblatt für Mathematik und ihre Grenzgebiete in 1931), and policy (for instance the 2003 Declaration on Open Access to Knowledge in the Sciences and Humanities). More recent initiatives for advancing research quality include the founding of the *QUEST Center for Transforming Biomedical Research* (Charité and *Berlin Institute of Health*) in 2017, activities in the newly granted Clusters of Excellence (such as the *Value and Open Science* program in *NeuroCure*), and the founding of the *Robert K. Merton Center for Science Studies*, focused on interdisciplinary and collaborative efforts toward quality assurance, in 2018. Building on the considerable experience and expertise of the offices for good scientific practice and graduate schools, as well as the partners' ethical review boards and quality management, the Alliance will cross boundaries to link existing initiatives in Berlin. With a critical mass in the diverse research disciplines, the Alliance has a unique chance to combine efforts for open and responsible research and to make these efforts visible in a way that engages relevant local stakeholders while also translating to national and international levels.

The research enterprise remains a very protracted process and is increasingly fraught with ethical issues and debates concerning the (non-)robustness of results and the societal impact of science. The immense proliferation of research outputs and increasing methodological complexity and the size of data sets greatly complicates the synthesis, evaluation, and sharing of high-quality evidence. Outside the realm of academic research, a tendency toward skepticism regarding the trustworthiness of scientific evidence is visible, as demonstrated dramatically in climate change denial and anti-vaccination campaigns, for example. In this context, research quality is presently not just a multifaceted, in part methodological issue within the academic world, but is also tied to a range of extra-academic publics. Through the Alliance's close collaboration with various stakeholders from both within and beyond the research sector, the Berlin integrated research environment will serve as a laboratory in which the spectrum of challenges to research quality can be studied, new ideas developed, and Measures tested.

Measure	Description	Goals
M.3.0. Center for Open and Responsible Research (CORe)	Coordinates implementation process for value-based research governance	Fostering research quality and regaining trust in science
M.3.1. Research and Reflection on Research Quality (R3Q)	Provides a nucleus for meta-research	Developing evidence-based incentives and parameters based on meta-research
M.3.2. Berlin OpenX Initiative	Develops and supports research openness	Establishing a culture for and promoting value of open science

M.3.0. Center for Open and Responsible Research (CORe)

The Alliance will create a **Center for Open and Responsible Research (CORe)** that will structure and coordinate an implementation process for value-based research governance elements and policies. The Center will collaborate closely with the institutions and commissions that determine the rules and regulations for academic degrees.

CORe will be a point of research quality reference for all major research initiatives and projects within the integrated Berlin research environment. It will provide support in handling questionable research practices and conflicts regarding research ethics. **CORe** will work closely with the Alliance's Quality Management Unit responsible for external evaluation (see A.3.4.). For this purpose, it will collect and analyze information on ongoing activities and collaboration in research quality, and the impact of both within the integrated research environment, thus providing a monitoring infrastructure for the Alliance. This will be complemented by value-based parameters for the targets of Objective 1, while respecting the diversity of the various disciplines comprising the sciences and humanities. Alongside adapting governance, value-based evaluation criteria, and value-based incentives, the Alliance intends to make vigorous efforts toward optimizing teaching and training on research quality: Courses will be offered to students as part of the Measures in CCT Teaching and Learning. Suitable training will be implemented via the **Berlin Graduate Studies Support** and the **Berlin Leadership Academy** (both Objective 4). The *QUEST Center* at the *BIH* and the *Robert K. Merton Center for Science Studies* at HU Berlin will coordinate initial activities on the basis of available expertise in science studies and meta-research.

CORe will draw on leading international experts from academia as well as industry, politics, and culture for independent advice. In this framework, the Alliance will collaborate closely with international partners (for example the University of Oxford, the Hebrew University of Jerusalem, the University of California, Berkeley, and the University of Singapore) to draw on broader international views and experience in the global field of research quality.

M.3.1. Research and Reflection on Research Quality (R3Q)

In order to identify and develop opportunities for improving research practice, generate evidence for potential interventions, and develop responsible metrics and policies to incentivize optimal research practices, the Alliance will foster **Research and Reflection on Research Quality (R3Q)**. This Measure will provide a nucleus for researchers already involved in meta-research. This includes Alliance researchers who have thus far worked within individual disciplines, as well as other German and international researchers, so as to include perspectives and benchmarks from a broader and international perspective. **R3Q** will undertake explorative meta-research aimed both at identifying responsible metrics and dimensions of research quality (Research), and at critically evaluating findings implemented by **CORe** (Reflection). With the multitude and diversity of research fields and groups and its proximity to public stakeholders, the Alliance is ideally positioned to cross boundaries and establish such a laboratory for testing forms of intervention in a real-life academic environment.

In close collaboration with **CORe**, the Alliance will develop prototypes for testing on a regional level before making use of them as examples in both a German and international context. Such prototypes will include testing responsible indicators, incentives, and metrics to complement the current system for rewarding researchers (including the hiring process) (Objective 4), evaluating research projects (proposals), and publishing highly valuable negative results (publications). In the same way, such prototypes can consist of the systematic inclusion of facets of gender and diversity (CCT Diversity and Gender Equality) in research projects and evaluation of the extent to which such parameters influence the research process and generate new findings.

M.3.2. Berlin OpenX Initiative

On the one hand, the **OpenX Initiative** will develop and support incentives for research openness and transparency, in particular open science, open access publication, open review formats, and open data. On the other hand, it will help to develop an error culture (Fehlerkultur) that values openness – based on a dialog spanning the Alliance's full research and teaching spectrum – extending from the natural and life sciences through engineering to the social sciences and humanities.

Transparency is key to research quality. The Berlin University Alliance agenda will not only support the visibility and accessibility of its research results, but also strongly encourage openness in the research process. Building on the historical responsibility of Berlin research stemming from the 2003 Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities, the Alliance plans to provide best-practice examples, with special emphasis on the quality of the review processes in traditional formats as well as in innovative formats such as open review. The value of both successful and unsuccessful research depends crucially on the availability and accessibility of research data according

to the FAIR principles (findable, accessible, interoperable, reusable). This is not only a question of transparency, but also of data quality and maintenance in a rapidly changing digital environment. The **OpenX Initiative** will provide studies and support for this, in coordination with the Measures in Objective 5.

Expected long-term effects and synergies

The challenge of increasing research value, promoting an error culture, and fostering societal acceptance has been taken up by many institutions around the world. The uniqueness of the Alliance's approach lies in its diversity and shared institutional goals, and the presence of a strong foundation for top-level research. In the course of advancing research value, the Alliance intends to establish a process of cross-fertilization and synergies between different research cultures and communities as well as between the Alliance and public stakeholders. The Berlin research area will provide an experimental space for developing and testing measures for research quality in a regional setting and setting standards both within Germany and internationally.

By implementing these Measures, the Alliance partners intend to form a diverse network and increase the general acceptance of the initiatives, a positive outcome being heavily dependent on the research community's self-driven support. It is expected that the innovative metrics strived for will have a positive impact on the quality and success of research within the Alliance institutions, including the quality and reception of open access publications, review processes, board activities, and personnel hiring (Objective 4).

Objective 3 thus aims to secure and increase research quality and value across all disciplines, with acute awareness of differences in research practices across disciplinary cultures. The Alliance will make use of the Berlin research area as a laboratory, where challenges to research quality can be studied, new ideas developed, and measures tested. On the one hand, this will lead to new support measures and incentives, further advancing a paradigm shift in research and establishing quality as an inherent criterion for top-level research. On the other hand, assurance of and access to robust research results will lay the groundwork for trusted communication with various stakeholder groups – the basis, in turn, for success in other Objectives (for example Objectives 1 and 2).

A.3.2.4. Measures for Objective 4: Promoting Talent

Steering Committee: *Klaus Hoffmann-Holland (FU Berlin), Peter A. Frensch (HU Berlin), Angela Ittel (TU Berlin), and Achim Kramer (Charité)**

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The success of the Alliance will depend on the success of its partners in attracting, retaining, and supporting the most outstanding researchers at all career stages. The long-term strategy underlying Objective 4 is thus to create a shared, integrated space for careers and recruitment by establishing internationally competitive career development

options. To this end, the Alliance partners will jointly develop a harmonized environment for doctoral training by establishing a **Berlin Graduate Studies Support** program and a joint career support system. In the first funding phase of the present proposal, the Alliance will focus on supporting and advancing postdoctoral careers for the sake of promoting the most promising researchers, recruiting early-career talent for professorships, and increasing diversity among professorial appointments. Recruitment in all Measures will be sure to take account of diversity and gender equality considerations. **Recruitment Services** will optimize recruitment standards and processes, and a jointly run academy for advanced researchers and administrators will foster leadership.

Measures	Description	Goals
M.4.1. Berlin Graduate Studies Support	Sharing professional qualification courses and harmonizing quality standards for all PhD students in the Alliance. Advancing excellent PhD graduates to postdoctoral positions through transition fellowships	Creating a harmonized environment for doctoral training; promoting and keeping the best PhD students
M.4.2. Postdoctoral Career Development		
Career Development Awards	Funding for research stays within the Alliance or at an external partner institution (including non-academic institutions); applicants may choose between a classic research stay and a research-based knowledge exchange project	Increasing mobility within the Alliance and its network; promoting horizontal career development
Berlin Junior Research Groups	Joint Junior Research Groups forming a bridge between at least two Alliance partners, with optional co-financing by non-university research institutes	Attracting and retaining outstanding postdoctoral researchers; strengthening the research agenda of the Alliance
M.4.3. Joint Berlin Professorships	Jointly financed and well-endowed tenure-track professorships (W2) for highly skilled researchers offering them internationally competitive packages	Attracting highly skilled researchers; increasing international recruitment; strengthening the Alliance's research agenda
M.4.4. Berlin Recruitment Services	Monitoring of recruitment in the Alliance; optimizing standards for recruitment and appointment processes; developing new tools such as a joint recruiting portal and a joint recruiting week	Increasing international attractiveness and visibility; improving recruitment procedures to increase international appointments
Dual Career Funds	Funds to support high-level recruitment	Attracting and retaining top-level researchers
M.4.5. Berlin Leadership Academy	Leadership Academy for advanced researchers, full professors, and senior administrative staff	Professionalizing leadership; creating a joint leadership culture

M.4.1. Berlin Graduate Studies Support

Structured doctoral programs have been introduced at all Alliance partner institutions beginning in 2007 and have been especially promoted through the *DRS* at FU Berlin and *HGS* at HU Berlin. Currently, approximately 20% of PhD students are enrolled in structured programs (A.2.2.3.4.). In the first funding period of this proposal, the Alliance partners will harmonize doctoral training, making available to all PhD students the advantages that doctoral students in structured programs have always enjoyed. For example, discipline-specific as well as general courses and advisory services will be implemented with the aim of supporting all PhD students in their academic and professional careers. In addition, the most promising PhD candidates will be offered Transition Fellowships to ease them into their first post-doctoral projects. The Alliance will also harmonize quality standards (Objective 3) for doctoral training across the partner institutions and departments, synchronizing complaint processes and support procedures in cases of conflict between advisors and advisees.

The *DRS* and *HGS* are good examples of comprehensive early-career support at two of the Alliance partner institutions. While FU und HU Berlin will continue these structures they developed in the Excellence Initiative, TU Berlin and Charité will further develop their own early-career support systems. Thus initiatives to pursue Objective 4 will not only be developed by the Alliance, but will also support the partners' individual institutional development and sharpen their profiles.

M.4.2. Postdoctoral Career Development

The Alliance will offer annual **Career Development Awards** to outstanding early postdoctoral researchers. Awardees may spend time either at one of the other Alliance institutions or at one of the Alliance's collaboration partners, with the option of either undertaking research or developing a knowledge exchange project. **Career Development Awards** will have a duration of up to six months and aim to advance the work of postdoctoral researchers while also expanding their professional networks. At the same time, the awards will increase mobility between the Alliance institutions, offering horizontal career advancement in the framework of research and knowledge exchange.

In addition, the Alliance will implement **Berlin Junior Research Groups** focused on highly qualified postdoctoral researchers who have gained substantial international experience. The topics of these Groups will be selected to fit research fields of strategic relevance for at least two Alliance partners (e.g. core research areas of the Alliance) and may also contribute to exploring Grand Challenges (Objective 1). Junior Research Group leaders will benefit from Berlin's extremely dense research networks, each Group being formally associated with at least two Alliance partners. Non-university research institutes will be invited to collaborate with the Groups, for instance through additional PhD positions.

M.4.3. Joint Berlin Professorships

The **Joint Berlin Professorships** are aimed at postdoctoral researchers with outstanding professional qualifications who are ready to take the next career step toward a full professorship. To recruit the best minds from around the world, any two of the four Alliance partners will be able to join forces and offer a well-endowed and internationally competitive tenure-track professorship (W2 level). These professorships will be appointed on the basis of strategic interest to both partners and their fit with the Alliance's research profile. Collaboration with non-university research institutes is possible. Furthermore, all professors at the Alliance institutions whose work is tied to a Grand Challenge topic will be eligible for funding to cover a doctoral or postdoctoral research assistantship.

M.4.4. Berlin Recruitment Services

Berlin Recruitment Services will facilitate and monitor all of the Alliance's major recruitment efforts. Together with **DiGENet** (CCT Diversity and Gender Equality) and **CORe** (Objective 3), standards for recruitment will be reviewed and optimized with a focus on diversity and gender bias as well as on indicators for academic staff selection and professorial appointments. To foster proactive recruitment and provide adequate services, particularly for international applicants, a joint recruitment portal will be created, job postings will be announced at all four Alliance partner institutions, and applicants will be provided with all necessary information on residence regulations, social security, and the retirement system. In addition, international scouting for "rising stars" will be supported and an international Berlin Recruiting Week developed, allowing outstanding postdoctoral researchers to familiarize themselves with the Alliance for the sake of initiating a longer research stay.

To support high-level recruitment and strategic appointments in profile-forming research areas of the Alliance such as Clusters of Excellence, the Einstein Foundation Berlin will provide extra support in the form of a **Dual Career Fund**.

M.4.5. Berlin Leadership Academy

The Alliance will establish a **Berlin Leadership Academy** to develop and implement a shared vision of leadership and research management. As a service provider and networking platform, the Academy will strengthen the Alliance's central figures (i.e. professors, senior researchers, deans, and senior administrative staff). By bringing together researchers from all four partner institutions, it will foster effective collaboration and governance within the Alliance, and create visibility within and beyond it. The Excellence in Leadership program will align the existing leadership development programs of the four partners into a common leadership development platform that provides easy access for all members of the Alliance in senior positions. The program will focus on developing skills necessary for professional, cohesive, and standardized

research management. The development of the new Academy will profit from the expertise of the *Dahlem Leadership Academy* developed at FU Berlin in the framework of their Excellence Initiative, as well as from leadership training courses offered by the three other partners.

Expected long-term effects and synergies

The Measures described will all contribute to developing a joint integrated space for careers and recruitment in Berlin – a process that will also feed back into each Alliance institution. The integrated career space including non-university research institutes and non-academic institutions will substantially expand the international attractiveness of the Alliance and increase and deepen collaboration in Berlin. Early-career researchers in particular will profit from the many development opportunities created by the four Alliance partners' close collaboration. By the same token, the Alliance will profit from attracting the brightest minds to Berlin. Finally, fostering a shared understanding of leadership and research management within the Alliance will create a foundation for even more successful collaboration and governance within the Alliance.

A.3.2.5. Measures for Objective 5: Sharing Resources

Steering Committee: *Stephanie Reich (FU Berlin), Stefan Hecht (HU Berlin), Sebastian Möller (TU Berlin), and Britta Eickholt (Charité)**

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Various factors render it essential for the Alliance to share research infrastructure and services: increased economic capacity, aligned management of ever-more complex and varied services and infrastructure including open science requirements and opportunities, and improved competitiveness in the quest for research funds, to name just a few. However, sharing resources requires additional administrative efforts. Researchers, particularly in highly competitive research communities, need both efficient services and low-barrier access, and are quickly impeded by administrative hurdles. Objective 5 thus combines two aims: first, systematically developing and expanding mutual use of research infrastructure in Berlin, creating an integrated network of shared research services and infrastructures; and second, supporting and strengthening the research communities clustered around top-level infrastructure. The Measures supporting Objective 5 will thus combine efficient coordination of resource sharing and supporting activities with a community-centered focus on developing a backbone of top-level infrastructure and services, including knowledge providers and related best-practice cases.

This network of activities will enable the Alliance to act efficiently regarding coordinated investments, (joint) allocation of funds, and enhanced scientific collaboration across disciplines.

Measure	Description	Goals
M.5.0. Shared Resources Center (SOURCE)	Coordination of resource-sharing activities, selection and implementation processes, and evaluation of usage	Providing point of access to shared resources and services in the Alliance
M.5.1. Research Infrastructure-related Community Building	Access to and joint usage of top-level research infrastructure and community-centric services	Fostering interdisciplinary research communities around cutting-edge research infrastructure; increasing economic ability; improving competitiveness for research funds and applications for major research instrumentation in the framework of Art. 91b GG

M.5.0. Shared Resources Center (SOURCE)

SOURCE will coordinate the complex research infrastructure and information services offered by the four Alliance partners. This coordination will involve bottom-up and top-down processes that consider researchers' needs for specific resources and related knowledge and services, as well as their implementation within the Alliance's strategy. As an integrative platform, **SOURCE** will allow each Alliance partner to strengthen its specific profile while aggregating individual services and avoiding parallel structures, to identify strategic needs, develop new cost models, and foster joint initiatives. These initiatives will include, among other things, procurement of cutting-edge technologies and joint proposals for major research instrumentation in the framework of Art. 91b GG.

SOURCE will be responsible for coordination, project management, and community support. It will expedite the convergence of IT strategies among the Alliance partners and promote further project development. This will be supported by automatized processes as far as possible. Information on core facilities, research profiles, services, IT resources, and so forth, will be aligned across the Alliance, accompanied by taxonomic considerations, disambiguation, and standardization of existing interfaces. This will make the best of these easily accessible and bookable to researchers. In the future, in-depth analytics may also evaluate the utilization of services to provide an overview of the current state of research infrastructure, together with analytical insights into user acceptance of services, in order to ensure agile adaption.

Besides resource management, **SOURCE** will support the spread of open science as an upcoming academic standard with a focus on open services in particular (Objective 3). Qualification courses on data management, open research, and research infrastructures, for example, will be offered in order to further leverage quality and awareness of data handling (Objective 4).

M.5.1. Research Infrastructure-related Community Building

The Alliance's **infrastructure-related community building** activities will provide researchers with low-barrier access and a pool of knowledge and research services,

the basic aim being seamless collaboration between researchers and service providers. Community building is understood as a long-term process that begins with existing cross-institutional communities clustered around core facilities. The impact of this process will be manifest on various levels involving knowledge sharing, best-practice models, research-driven joint strategies for infrastructure procurement and upgrading, and the formation of lasting and trusted relations between institutions, disciplines, and research and service personnel. Efficient research infrastructure attracts researchers with similar needs and plans, and can thus form nuclei of the integrated research environment beyond the structures of disciplinary orientation and organization. Initial activities will thus be focused on communities clustered around particular resources like unique collections, cutting-edge imaging, and high-performance computing (HPC) facilities.

In a first step, the Alliance will integrate the Zuse Institute Berlin (ZIB), the hub of Berlin's computing-centered research community, operating tier-2 HPC infrastructure. Shared resources will be arranged according to type, including services, core facilities, collections, electronic lab notebook repositories, and publishing (with a special focus on open access publications), to name just a few. The scaling effect of resources for the Alliance will be significant.

In order to support the selection and promotion of the best resources for research within the Alliance, the quality seal BAAS (Berlin Alliance Approved Service) will be given to selected resources after careful evaluation. This is intended both to guarantee high quality levels and to trigger friendly competitiveness regarding the quality of the resources provided, thus ensuring that the resources available are of the highest possible standard. Users will be encouraged to actively participate in evaluating resources. This can be envisioned along the lines of a peer evaluation-based shared economy.

For users, opening up their own research infrastructure to **SOURCE** will bring several advantages: New financial models for infrastructure acquisition, utilization, and maintenance will constitute a major reason for joining. Furthermore, the process will advance community building, thus providing access to new collaborative partners, projects, and expertise, and to high-level, cost-intensive resources that have been unavailable until now. This latter development will in turn lead to a better load factor, and thus to more efficient resource utilization within the Alliance over time. In order to facilitate peer-evaluation, only those who actively make their resources available to the community will have access to the growing shared infrastructure.

With the diversity of existing and continuously upgraded resources in the Alliance, **SOURCE** will benefit every researcher in the long term, while simultaneously strengthening values of transparency, sharing, data management, and open science. Eventually, open structures and shared services are likely to become standard practice at other universities in Germany. In the future, non-university research institutes will be able to join **SOURCE**. Based on a research-friendly approach, this resource sharing

will also contribute to Berlin's global image, which, together with excellence in research, technology, and services, will make the Alliance an attractive partner for major international projects. Direct impact of this nature is expected when hiring both early-career talent and established researchers of international renown, with the Alliance providing fertile ground for cutting-edge research (Objective 4).

Furthermore, with over one hundred collections at the partner institutions, the Alliance possesses a rich variety of historical and modern cultural artefacts, not all of which are accessible or even known to researchers or the public. **SOURCE** will disseminate the content of these collections, making them readily available – increasingly in digital form – to researchers and interested laypersons as part of a broader effort to offer both sectors open access to knowledge (Objectives 2 and 3).

Expected long-term effects and synergies

Pooling resources within the Alliance will not only catalyze research synergy, but can also easily be extended to other areas, all contributing to an integrated research environment that moves beyond pure research.

It is expected that the Measures outlined will positively impact key performance indicators such as the number of joint infrastructure projects, lower costs arising from new financial models, and scientific output, for example in terms of publications based on shared resources. Registration and maintenance of the BAAS quality seal is meant to serve as a form of peer evaluation for infrastructure and thus to assure high quality standards across various types of Alliance resources.

Developing **SOURCE** will contribute to overcoming limited knowledge of existing resources within the Alliance (see A.2.2.2.3.), helping to make the Alliance highly attractive to researchers in the Berlin area and beyond. Furthermore, the Center will increase economic capacity and more effectively harmonize future investments in infrastructure, for example within the Major Research Instrumentation Programme of the DFG.

A.3.2.6. Measures for CCT Diversity and Gender Equality

Steering Committee: *Martin Lücke (FU Berlin), Ulrike Vedder (HU Berlin), Sabine Hark (TU Berlin), and Christine Sers (Charité)**

** Valid upon proposal submission on 12/10/201.*

Berlin is unique in its history and culture, featuring not only research studies, but also strong engagement and political movements toward gender equality and diversity. This foregrounds gender and diversity within the Berlin research community, but also serves as a strong impetus for research. As detailed in A.2.2.1.6., gender studies in Berlin is well organized and established at the inter- and transdisciplinary gender research centers at each Alliance institution, and HU Berlin is also home to research centers focusing on aspects of diversity studies. Moreover, there is a strong network of women's

representatives working together throughout the Alliance, and the Alliance partners can look back on long-term successes in promoting equal opportunity at all career stages (see A.2.2.3.3.). Nevertheless, equal opportunity is not yet a reality across all disciplines and career stages. Moreover, a general strategy for promoting diversity as a research area and a field of action is still being developed, and needs further attention from all four institutions.

The Alliance partners will pool and expand their expertise in diversity and gender research and policies. They will organize the transfer of research results into their institutional policies and into local, national, and transnational administration and governments, and foster relevant exchange with society in Berlin. The long-term effects will be to extend the leading position of the Alliance partners in gender equality to the field of diversity policy, and to establish sustainable diversity-related standards within the Alliance that are also internationally competitive.

Measure	Description	Goals
M.6.1. Diversity and Gender Equality Network (DiGENet)	Policy network to identify discriminatory, exclusionary structures and processes, and develop and implement effective countermeasures, supported by three new institutional meta-research projects	Establishing internationally competitive diversity-related standards within the Alliance; understanding institutional and systemic barriers to equal opportunities, derive and implement effective measures and policy recommendations
M.6.2. Professionalization of Women in Research and Teaching	Extension of the *ProFiL* program for female academics on the path to a full professorship	Academic career development for women with diverse backgrounds; increasing diversity of participants; further internationalization and diversity orientation

M.6.1. Diversity and Gender Equality Network

A **Diversity and Gender Equality Network (DiGENet)** will bundle existing expertise in diversity research and policy at the Alliance universities. The Network will include a broad range of players ranging from scholars in gender and diversity studies to experts and practitioners in diversity and equality issues. **DiGENet** will draw on the partners' expertise in gender equality policy to research and evaluate existing gender equality measures, the goal being evidence-based organizational development in the areas of diversity and gender equality. The network will formulate innovative standards and catalyze cultural change toward a diverse and gender-sensitive research environment in the long term.

Moreover, it will establish a network of diversity studies researchers from the Alliance, intensify academic exchange in the field, collaborate with existing gender studies centers at the Berlin universities, and promote the visibility of diversity and gender studies.

DiGENet will also foster knowledge exchange with the public, with policymakers, and with other academic institutions. To this end, it will participate in developing and organizing

exchange formats to promote dialog with multiple target groups (Objective 2). In particular, the Network will actively integrate diversity and gender research within a diversity and gender **Research Forum** in the framework of Objective 2.

DiGENet will provide a key impetus to counteracting discrimination at universities throughout Germany and internationally. By bringing together gender equality and diversity, emphasizing practice, and through its double aim of organizational and long-term structural change, **DiGENet** will break new ground in both of these arenas.

More specifically, three new initiatives will be dedicated to the following areas, each of which is of central interest and relevance for the Alliance (in particular Objective 3) and supported by the many different research perspectives within **DiGENet**:

(1) A project on Institutional Meta-Research (toward "fixing the institution") will focus on a comparative impact analysis of gender equality measures and practice-oriented research on discriminatory structures and practices at the affiliated universities: Designing and implementing diversity policies involves taking stock of existing gender equality measures and evaluating their transferability to the field of diversity. The knowledge gained in this way will be used to implement new diversity policies and further develop gender equality policies.

(2) A project on Science Meta-Research (toward "fixing the system") will generate knowledge on exclusionary norms and practices in science and scholarship by investigating the extent to which historically evolved practices of knowledge generation and quality assurance have affected the diversity of perspectives and methods in different disciplinary fields.

(3) A Sociological Qualitative Gender and Diversity Research project will help to expand and deepen quantitative gender and diversity monitoring by the Alliance partners, using qualitative and participatory methods. This will provide a basis for reflection on research and methodology, and further develop the collection and evaluation of diversity and gender-relevant data. Accompanying research will support this process by considering questions of research ethics and methodological innovation. This is particularly important for taking into account the multidimensional and intersectional character of diversity. It will simultaneously provide impetus for further developing diversity and gender monitoring at the Alliance partner institutions.

The unique selling points of this meta-research are its explicit focus on diversity and gender equality in higher education and research, and its practical focus on the evidence-based creation of gender equality and diversity policy. The projects may be supported by postdoctoral or doctoral positions, junior professorships, and junior research groups. In addition, **DiGENet** provides for an annual visiting professorship.

M.6.2. Professionalization of Women in Research and Teaching

The ***Professionalization of Women in Research and Teaching: Mentoring – Training – Networking*** **(*ProFiL*)** program of FU, HU, and TU Berlin has been supporting female academics on the path to a full professorship since 2004. Due to the attractiveness of the program, the demand regularly exceeds the number of available places (see A.2.2.3.2.). At the same time, the number of international postdoctoral researchers at Berlin universities with only limited knowledge of German has grown considerably, and with it the demand of this target group for an English language ***ProFiL*** program. While also opening up the program to the fourth Alliance partner Charité, the Alliance is thus committed to enlarging the program with additional places, developing an English-language version, and internationalizing the program's advertising and admission procedures. This will give non-German-speaking female scholars from abroad access to the program and simultaneously contribute to the sustainable implementation of the Alliance's internationalization strategy (CCT Internationalization). In addition to preparing the target group for the responsibilities of a professorship, the English-language program will be geared to their needs concerning navigating the German higher education and research system, including, for example, career paths and staff structures, career planning, appointment procedures, science management and policy, and applying for third-party funding. Excellent female scholars with diverse backgrounds will be particularly encouraged to apply to the program.

A.3.2.7. Measures for CCT Teaching and Learning

Steering Committee: *Hauke Heekeren (FU Berlin), Eva Inés Obergfell (HU Berlin), Hans-Ulrich Heiß (TU Berlin), and Joachim Spranger (Charité)**

** Valid upon proposal submission on 12/10/201.*

The Alliance considers **Teaching and Learning** a crucial Cross-Cutting Theme, not only because it is relevant to all five of its Objectives, but also because it bridges the often distinct areas of top-level research and study and connects world-class researchers with the world of students. The long-term effects and synergies of the Measures described below will enable students to gain broader access to courses at all four partner institutions, to profit from tailor-made training courses emerging from activities in research, knowledge exchange, and research quality, and to get actively involved in research projects in the context of the **Grand Challenge Initiatives**.

The Alliance will implement two sets of Measures. The first set aims to substantially extend and develop joint study courses as part of the Alliance's integrated research environment. The second set aims to create joint support programs for the advancement of students with a particular interest in research, thus strengthening the link between top-level research and teaching.

Measure	Description	Goals
M.7.1. Berlin University Alliance Joint Courses and Programs	Extension and mutual opening of existing joint courses and development of new joint programs (master's degrees, digital teaching, knowledge exchange, research quality)	Allowing students maximum benefit from the Alliance's activities; training students in highly relevant fields of research
M.7.2. Berlin Student Research Opportunities Program[x] (StuROP[x])	A joint program based on existing research-based courses at the partner institutions; development of new joint courses with a focus on research crossing disciplinary boundaries (e.g. concerning Grand Challenges)	Strengthening the link between top-level research and teaching; preparing students for research careers

M.7.1. Berlin University Alliance Joint Courses and Programs

In the first funding phase, the Alliance will successively expand its range of joint courses. It will establish further **joint interdisciplinary master's programs** between two or three Alliance partners, enabling students to benefit from the complementarity of the disciplines and the wealth of knowledge in the Alliance and to prepare them for highly skilled academic and non-academic positions. Future master's programs may arise from the Alliance's core research areas (see fig. 7) or be developed in the course of **Grand Challenge Initiatives** (Objective 1). At the same time, the Alliance will create more opportunities for students enrolled at one of the three Alliance universities to attend courses at the other partner institutions, and have their credit points recognized at their home institution.

Furthermore, the Alliance will create more digital teaching and learning possibilities. Based on existing courses at the four partner institutions (see A.2.2.2.2.), the Alliance will expand both the scope and the quality of digital teaching and learning. Concepts will include video-based teaching, blended learning, tools for mobile teaching and learning, and further formats aimed at didactically innovative and spatially flexible courses. The central units for digital resources at the four partner institutions will jointly support the further development and expansion of the technical infrastructure required for this purpose. The **SOURCE** Center (Objective 5) will assist them in a feasibility study.

Finally, each of the Alliance partners will reciprocally open and expand its additional course choices for bachelor's students: A joint curriculum will enable them to use their elective credits (up to 20 ECTS) to expand their knowledge beyond their particular subjects of study, taking in current topics drawn from the Alliance's five Objectives. Courses will be offered in connection with Grand Challenges (Objective 1), Knowledge Exchange (Objective 2), and Research Quality and Value (Objective 3). Classes linked to Knowledge Exchange may cover science communication and entrepreneurial skills, while those related to Research Quality and Value may deal with research standards, ethics, and integrity. The consistent aim will be encouraging interested students to gain insight into projects pursued within the Alliance and to develop additional interdisciplinary skills and competences.

M.7.2. Berlin Student Research Opportunities Program[x] (StuROP[x])

Building on its existing strengths and experiences in research-based learning, the Alliance will create a joint **Berlin Student Research Opportunities Program[x] (StuROP[x])**. The program aims to increase student interest in research careers and prepare them for a PhD, thus enhancing the recruitment of future researchers (Objective 4) while at the same time promoting fruitful interaction between top-level research and teaching. Collaborating with **SOURCE**, **StuROP[x]** will build a central online information platform that details all existing research-based courses for bachelor's and master's students within the Alliance (Objective 5). In addition, **StuROP[x]** will introduce two formats allowing participation in interdisciplinary research, for example on Grand Challenges (Objective 1): **X-Tutorials** are research projects initiated, designed, and conducted by students under the auspices of a university professor. **X-Student Research Groups** enable teams of students to engage in ongoing research-projects supervised by junior faculty. An annual **Berlin Student Conference** will provide students with the opportunity to present the research they have developed within **StuROP[x]** to a wider community of students and researchers and the interested public, with the best presentation receiving an **Audience Award**.

A.3.2.8. Measures for CCT: Internationalization

Steering Committee: *Verena Blechinger-Talcott (FU Berlin), Britta Baron (HU Berlin), Ulrike Hillemann-Delaney (TU Berlin), and Friedemann Paul (Charité)**

** Valid upon proposal submission on 12/10/201*

The Alliance proposes an international strategy that consists of three core Measures: a **Berlin Center for Global Engagement**, a **Joint Partnership Strategy**, and a **Global Advancement Strategy**. The main rationale for the Alliance – that mutual gain for all Berlin partners is derived from collaboration and alignment – will be strategically expanded to include synergies in international partner relationships.

Measure	Description	Goals
M.8.1. Berlin Center for Global Engagement (BCGE)	Initiate new research connections with partners in emerging science regions, create a Berlin-wide platform for global expertise, and act as an advisory unit for the Alliance in science diplomacy	Increasing number of research partnerships and successful projects with the Global South; enhancing the Alliance's reputation as a hub of global and region-specific expertise, positioning the Alliance globally as a center for science diplomacy and academic freedom
M.8.2. Joint Partnership Strategy	A network of joint strategic partnerships with leading universities worldwide	Providing world-class research opportunities through collaborative formats, increasing number and impact of international co-publications; supporting the strategic quality of the Alliance through benchmarking with top research institutions

M.8.3. **Global Advancement Strategy**	Engagement with the EU through a joint liaison office in Brussels and with major foundations, multilateral organizations, and public funding organizations in countries outside of Germany	Increasing the number of successful research applications; engaging strategically with the European framework for research and learning

M.8.1. Berlin Center for Global Engagement (BCGE)

The Alliance will collaborate systematically with emerging regions of research in the Global South in order to (a) strengthen the credibility of the Alliance partners as responsible and recognized institutions of excellence whose outreach and institutional culture are truly global, (b) enhance the scholarly reach and recognition of Berlin as a global center of area studies expertise, and (c) develop and disseminate new insights into the ethical, political, and cultural challenges of scholarly interaction with academic partners worldwide. The establishment of the **Berlin Center for Global Engagement (BCGE)** expects major long-term effects, including a significant increase in the number of structured research projects in collaboration with institutional partners in emerging research regions, and reputational gain for Berlin in respect to global expertise and science diplomacy in the widest sense. The **BCGE** plans to develop three key operations:

A **One World Research Program** will aim to enhance scholarly interaction with partners of academic excellence located in the Global South through a fellowship program and an international cooperation fund. A **Global Expertise Platform** providing information, insight, and analysis for any country or region of the world will bring together input from academic and non-academic sources in Berlin and draw on the rich and diverse tradition of area studies in an approach synchronized with the pertinent Berlin institutions. Finally, the **BCGE** will provide leadership on science diplomacy for Berlin, for Germany, and for a broader international environment. The Center will conduct research and offer opportunities for multi-stakeholder dialog on issues relating to academic freedom, scholarly integrity, plagiarism, and the protection of intellectual property for example. The Alliance partners will also strengthen their commitment to hosting refugee students and scholars.

M.8.2. Joint Partnership Strategy

It is the aim of the Alliance to develop and cultivate a select number of strategic partnerships with top research institutions worldwide: The Alliance's new partnership with the University of Oxford (see A.2.2.1.5.) has thus far been at the forefront in respect to designing and implementing collaborative processes and creating a governance structure to effectively manage a multi-partner relationship. The Alliance will set up a **Berlin House in Oxford.** The Alliance partners recently signed a second joint cooperation agreement with the University of Melbourne. With the National University of Singapore and the University of California, Berkeley, strategic partners of HU and FU Berlin, respectively, negotiations are

progressing well. In the future, the Alliance will particularly look at building relationships with leading universities from emerging countries of interest for research and scholarship. The Alliance expects research collaboration with its strategic partners to have significant long-term effects in terms of strengthening its **Grand Challenges Initiatives** (Objective 1) and furnishing opportunities to learn from advanced practices of knowledge exchange (Objective 2). The Alliance partners will also work with colleagues at the strategic partner universities to explore good-practice models and compare the Alliance agenda with alternative approaches in regard to advancing research quality (Objective 3). Steady communication with the strategic partners will impact talent attraction by opening up special access to academic opportunities at the other institutions and through shared postdoctoral positions (Objective 4). In respect to overall outcomes, the Alliance anticipates that the strategic partnerships will lead to a significant increase in collaborative international publications, to developing a broad range of institutionalized forms of collaboration such as binational research groups and joint doctoral programs, and to improved access to global funding sources for research and scholarship. The Alliance's strategic partnerships bundle and complement branches of the international networks of the individual partners, which will be further developed and supported by the Alliance.

M.8.3. Global Advancement Strategy

The Alliance will develop an agenda for collaborative advancement activities at a global level. The focus of these efforts will be on the European Commission. Building on the experience of the existing offices of FU and TU Berlin, a joint **EU Office in Brussels** will provide Alliance scholars with better access to and integration in EU-focused international research networks. The **Brussels Office** will also serve to highlight the Alliance partners' commitment to the goals and values of the EU and will act as a mechanism to build programs and initiatives to strengthen the Alliance's European identity.

The Alliance's **Global Advancement Strategy** will also look into larger-scale research funding opportunities from private foundations, corporations, and other public funding organizations around the world. The growing number of national and international foundations with a presence in Berlin, including new offices of the Wellcome Trust, the Gates Foundation, and the Open Society Foundation, for example, offer many possibilities for joint activities. Likewise, the Alliance will make systematic use of the German Centres for Sciences and Innovation in Moscow, New York, New Delhi, São Paulo and Tokyo to promote the attractiveness of the Berlin research landscape internationally, especially with a view to identifying and connecting with new funding sources. In terms of long-term effects, the Alliance not only expects a significant increase in EU and international third-party funding, but also aspires to build a better understanding of the role played by globally relevant trends in shaping innovative content and processes for globally relevant research, especially that addressing global Grand Challenges.

A.3.2.9. Institutional Strategies and Strategic Funds

By virtue of the Institutional Strategies *International Network University* at FU Berlin and *Educating Enquiring Minds. Individuality – Openness – Guidance* at HU Berlin funded within the Excellence Initiative since 2006 and 2012, respectively, FU and HU Berlin have established specific structures and networks and strengthened framework conditions and funding opportunities for research, early-career support, internationalization, equal opportunity, and research-based teaching, which has had a tremendous impact on the universities' overall achievements. Similarly, TU Berlin has undergone a strategy planning process for its own institutional strategy 2013–2020, which is currently being renewed. Charité is in the process of assessing and restructuring its research strategy.

Evaluations of the core measures and structures of all four partners' strategies show them to have been very successful, thus they will be continued on the basis of regular funding from the universities' budgets (see A.2.). These prior achievements are valuable prerequisites for the Alliance agenda outlined in this proposal.

The University Allowances awarded to the Alliance partners for the seven Clusters of Excellence starting in January 2019 have been assigned to topics relating to the institutional strategies of all the partners. In particular, they are tailored to the Measures described in this Alliance proposal, allowing them to be pursued further should the University Allowances be absorbed into the Alliance funding from November 2019.

The Alliance budget reserves €1.4 million per year for strategic development measures that support the aim and Objectives of the Alliance and sharpen the individual profiles of the Alliance partners at the same time.

A.3.3. Governance and management structures

To govern a major cooperation between institutions that remain independent and maintain their individual character is a challenging task. An appropriate form of governance must not only support the cooperation's productivity, but also have a simultaneously stabilizing and renewing effect on the Alliance and its member institutions. The success of the Alliance's activities needs to be continuously ensured and cooperation between the partners safeguarded, particularly when this entails reconciling different interests. Consequently, choosing a form of governance that safeguards productivity, stability, and innovation is a crucial factor of the Berlin University Alliance.

A.3.3.1. Principles of governance

The four Alliance partners have agreed on a number of crucial governance principles:

(1) Constant renewal through innovative structures: For the first time, Excellence Strategy funding may be for the long term. The Alliance takes this into account by implementing

innovative structural solutions that ensure continuous renewal over time.

(2) Form follows function: The organizational form the Alliance will rely on to support cooperation will not be all-encompassing. Rather, tailor-made structural solutions will be found that meet the specific requirements of the Alliance.

(3) Research perspective is key: The design of the Alliance's governance must serve the researchers' perspectives and involve them in decision-making processes at the highest levels.

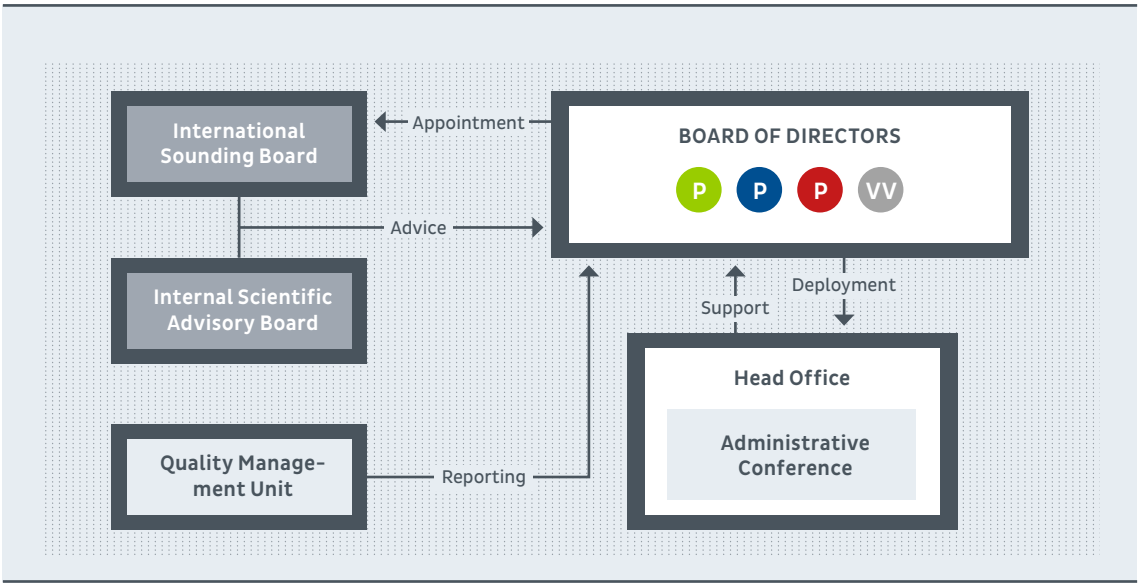
To maintain these three guiding principles, the Alliance commits to continuously monitoring, adjusting, and further developing its structural solutions.

A.3.3.2. Strategic management

The formal framework of the Alliance will be signed and in place by the time the formal work of the Alliance commences. It will take the form of a cooperation agreement between the three universities, represented by their presidents, and Charité, represented by its chief executive officer. These four representatives also form the **Alliance Board of Directors** (see fig. 12). The Board is responsible for all major decisions within the Alliance. Decisions by the **Board of Directors** that need the individual Alliance partners' approval (e.g. financial and human resources commitments) will be submitted to the academic senates and/or the boards of trustees of the four partners whenever this is required by the rules and regulations of the individual partner institutions.

The **Board of Directors** is supported by the vice-presidents and financial directors of the partner institutions, who serve as deputies of the university presidents and the chief executive officer of Charité. One of the four members of the **Board of Directors** serves as the Alliance spokesperson, representing the Alliance both internally and externally. The role of spokesperson rotates every two years among the Board members. The **Board of**

FIG. 12 **Strategic management of the Alliance**



Directors decides on the strategic development of the Alliance, the implementation of new and modification of existing measures, and the status of contracts and cooperation agreements. In addition, the Board decides on the acceptance of additional partners and associate members and partners into the Alliance, as well as on managerial positions. In close cooperation with the vice-presidents and financial directors, the Board rules on key aspects of the Alliance's finance management and budgets. It approves the Alliance's expenditure plan, supervises the annual budgets, and authorizes the reports on expenditure of the Alliance's funds.

The partners have commissioned FU Berlin to centrally administer the funds from the program line Universities of Excellence. These funds will be allocated as Berlin state resources and will as such be absorbed into the universities' regular institutional budgets. FU Berlin will forward the funds received to the Alliance partners according to annual budget plans. It will also use these funds to establish the necessary personnel structure.

A.3.3.3. Advisory bodies

In line with the guiding principle that research perspective is a key element of its operations, and for purposes of quality control and support, the **Board of Directors** relies on two advisory bodies: the **Internal Scientific Advisory Board** and the **International Sounding Board**.

To guarantee consultation with the partner institutions' most outstanding researchers and to encourage a high level of engagement from within the institutions, each of the Alliance's Objectives and Cross-Cutting Themes (see A.3.1.) will have a **Steering Committee** at its helm consisting of a small group of scientists (usually four, one from each partner institution). One member of each of these **Steering Committees** together with further outstanding individuals from within the Alliance (for example the coordinators of the Clusters of Excellence) will form the **Internal Scientific Advisory Board**. This will meet at least twice a year to consult with the **Board of Directors** on matters of planning, implementation, development, and evaluation.

The **International Sounding Board** is formed by at most 15 external experts with extensive experience in science management and research organization at academic and non-academic institutions. The Board will be supported by a **Quality Management Unit** (**QMU**). The **QMU's** primary objective is to ensure the quality management of the Alliance through rigorous monitoring, controlling, and evaluation of target achievement. It will report directly to the **Board of Directors**, thus assuring up-to-date information for decision-making.

The governance and management structures described above are a sign of the Alliance partners' determination to shape and develop the Berlin integrated research environment in a rigorous and systematic way, and reflect a commitment to a sustainable, binding, and joint strategic management.

A.3.3.4. Head Office and administrative units

The **Alliance Head Office** will be set up as a lean structure and single-source management service. In particular, it will monitor the Measures described in A.3.2. and ensure their progress toward the goals set as our Objectives. The State of Berlin will provide space for the **Alliance Head Office** at the Robert Koch Forum (approx. 800m^2).

For most of the Objectives and Cross-Cutting Themes, the Alliance will set up additional administrative units (labelled M.x.0 in Section A.3.2.) that will take up specific functions for the planning and administration of the specific Measures. For example, with regard to Objective 1 (see A.3.2.1., Focusing on Grand Challenges), the **Office for Grand Challenge Initiatives** (M.1.0.) will organize project calls, evaluation, and decision support for both **Exploration Projects** (M.1.1.) based on the structure of the respective Grand Challenge prepared via **Research Forums** (M.2.2.). Together with the **Steering Committee** members and administrative units of the Measures, the **Alliance Head Office** will meet regularly in administrative conferences to assess progress and ensure implementation and coherence of the Alliance's Measures and Objectives.

A.3.3.5. Collaboration Platform

As a more efficient, stable, and formal setting for the handling of collaboration projects, as for example in Measures M.1.1. and M.1.2., the four partners plan to establish a **Collaboration Platform** in the legal form of a joint public corporation as their subsidiary. The **Collaboration Platform's** legal construction and institutional design follows the principle of equidistance from the four Alliance institutions, thus preventing institutional bias. The **Collaboration Platform** has two main functions:

a) Supporting excellent researchers beyond institutional boundaries

Individuals within the Alliance institutions (such as researchers working on joint Alliance projects and staff supporting implementation of joint infrastructure) may, for a specified period of time, become secondary members of the **Collaboration Platform** and will thereby also become temporary secondary members of all parent organizations (Alliance partner institutions) of the **Collaboration Platform**. This will enable use of infrastructure and services at all the Alliance partner institutions. Secondary membership will be assigned by the **Board of Directors** upon request and will be restricted to the use of infrastructure and services. The **Collaboration Platform** may also grant temporary secondary membership to extramural researchers, (i.e. those from non-university research institutes). At a future stage of the Alliance's development, such positions may be granted based on reciprocity.

b) Sharing resources and providing new joint services within the Alliance

The **Collaboration Platform** will provide new joint services for all individuals who are members or associates of the Alliance to the extent that this appears appropriate. In

particular, the services of the **Shared Resources Center (SOURCE)** (Objective 5) will be easily and smoothly organized on the Platform.

The **Collaboration Platform** will not perform research on its own, but rather will be a framework for coordinating, organizing, supporting, driving, and facilitating the implementation of the various Measures described above. The core feature of the Platform is the joint membership described above; a tool that reciprocally opens up the Alliance institutions for individuals needing the support of institutions other than their own.

In line with the second guiding principle that form follows function, and in its capacity as a subsidiary, the **Collaboration Platform** will be fully controlled by its four parent institutions via the **Alliance Board of Directors**. A defining feature of the **Collaboration Platform** is that it does not carry out tasks that were previously the individual responsibility of an Alliance partner. Instead, the Platform will focus on novel tasks arising from the cross-institutional nature of the Alliance's Objectives and Measures.

The **Collaboration Platform** is not responsible for servicing all of the Measures described in A.3.2. Where close relations to the individual institutions are decisive, as, for instance, in individual matters of doctoral studies, these tasks naturally continue to be managed individually within the four partner institutions. In turn, projects that are more economically oriented, such as the **Berlin Leadership Academy** (M.4.5.), will be managed separately.

In line with the general dictum of "form follows function," two complementary principles are thus applied in this context: the best possible use of short distance where appropriate on the one hand, while taking a step away from one's familiar perspective to fulfil tasks crossing institutional boundaries on the other.

More generally, the four criteria for allocating tasks to the **Collaboration Platform** are as follows: (1) they must be novel tasks, (2) they must be tasks that are consistent with the goals formulated by the Alliance, (3) they must be tasks that could not (or should not) be tackled by one institution alone, and (4) they must be tasks that are not institutionally biased. The Alliance partners are convinced that it is only on this basis that a coherent strategy formation and a gain in implementation speed can unfold. Strategies will be developed that are directed toward the best possible results for the Alliance, rather than toward the interests of any one institution.

Establishing the **Collaboration Platform** will require a formal act of legislation by the State of Berlin. The Berlin Government has pledged to begin legislative procedures once a funding decision has been reached on the present proposal.

A.3.3.6. Further structures

The Zuse Institute Berlin (ZIB), an internationally renowned research institute for scientific computing, is an important asset for the Alliance, not just in view of Grand Challenge research (Objective 1), but also as an infrastructure provider in the framework of **SOURCE** (M 5.0.). ZIB currently has the legal status of a public-law institution that is

owned, controlled, and financed by the State of Berlin. On occasion of the formation of the Alliance, the State of Berlin plans to transfer control of ZIB to the Alliance partners. This requires a modification of the law governing the status of ZIB, a process initiated in November 2018.

As a further legal structure, the partners plan to establish the **Berlin Leadership Academy** (M.4.5.) in the legal form of a nonprofit limited liability company. This will be prepared in due course as it does not require legislative action, but can be decided by the Alliance partners alone.

A.3.4. Monitoring for quality assurance and success monitoring

With the Berlin University Alliance, the four partners are creating the driving nucleus for an integrated Berlin-wide research environment in which the universities cross traditional boundaries to collaborate closely on multiple levels; not just with each other, but also with the city's wealth of institutions in the academic, cultural, political, and industry spheres. All Alliance Measures are designed to cross boundaries in specific fields of action according to the five Objectives and three Cross-Cutting Themes. While the Measures will change the nature of collaboration on an intermediate scale, in the long run they will jointly contribute to a new collaborative level by making full use of the entire potential of each partner's capabilities with long-term effects for science and society.

A.3.4.1. Principles of quality assurance

Quality assurance and success monitoring in the Alliance is based on the following principles:

(1) Quality assurance is integrated into the Alliance governance on an institutional basis. For this purpose, the Alliance will create a nonpartisan **Quality Management Unit (QMU)** as an interface between the strategic and the operative level to bundle and coordinate the quality management activities of the Alliance (see A.3.3.).

(2) Quality assurance is a management matter, thus the **QMU** will report directly to the **Board of Directors**. Evaluation and monitoring reports serve as a basis for decisions regarding the (dis)continuation and redirection of Objectives, Measures, and management structures.

(3) Quality assurance is designed to cater to scientific purposes, combining a variety of qualitative and quantitative approaches, applying state-of-the-art standards, and testing innovative concepts in collaboration with **CORe** (see A.3.2.3.).

TAB. 20 **Impact and anticipated results of the Objectives and Cross-Cutting Themes**

	Impact Long-term effects for the Berlin integrated research environment and society				Anticipated results
		CCT Diversity & Gender Equality	CCT Teaching & Learning	CCT Internationalization	
Obj. 1 Focusing on Grand Challenges	Research profile of international visibility with overarching Berlin-wide core research areas, especially topics of societal relevance			Reputation as a hub of global and regional expertise; top-level research opportunities through collaboration with world-class universities and emerging science regions	• At least one new research focus area for the Alliance per GCI based on Clusters of Excellence or new project formats • Increase in the number and impact of joint publications and third-party funding projects between the Alliance partners and with regional and international partners
Obj. 2 Fostering Knowledge Exchange	Full exploitation of the immense potential of knowledge exchange in Berlin to the benefit of both cutting-edge research and society		Education and training for students in fields of high current and future societal relevance pertaining to GCIs, knowledge exchange, and research quality	Positioning the Berlin Alliance globally as a knowledge center for science diplomacy and academic freedom	• Increase in knowledge exchange activities in all disciplines • A comprehensive understanding of knowledge exchange, firmly anchored in the Alliance partners and applied in research and teaching
Obj. 3 Advancing Research Quality and Value	Building a nucleus for structures and a network for a holistic approach toward quality in research; developing robust, responsible metrics and policies that incentivize optimal research practices and conditions	A diverse and gender-sensitive research environment; strong institutional culture of diversity that values, attracts and supports all scholars regardless of gender, ethnic background, religion, sexuality, or physical ability			• Development, testing, and international exchange of value-based parameters, evaluation criteria, and incentives respecting disciplinary differences and diversity of people and their impact on cutting-edge research and renewal
Obj. 4 Promoting Talent	Integrated space for career and recruitment to attract and promote talented researchers at all career stages; internationally recognized research location for promoting academic talent and leadership			Globally strengthening the Berlin academic brand and improving standards for networking and accessibility to resources and the living environment for international scholars in the city	• Establishment and practice of similar standards and policies for research careers and recruitment for all career stages at all Alliance partners • Increase in the number of international faculty and in the diversity of academic and non-academic staff in general at all Alliance partners
Obj. 5 Sharing Resources	Berlin-wide network of research service structures and a shared community thus enhancing the competitiveness and openness of the Berlin integrated research environment				• Improved investment planning and development of best practices in shared infrastructure, resources, and services

A.3.4.2. Operative and strategic elements of quality assurance

Defining and verifying effectiveness and achievement levels for Measures and Objectives is challenging, as this process is based on normative a priori assumptions and the measurement of complex and multilayered phenomena, and as effects and results may only play out over the course of years. The Alliance distinguishes between short-term performance and long-term achievements to determine the success of its Measures, Objectives, and Cross-Cutting Themes. Under these conditions, operative reporting and controlling and strategic monitoring and evaluation serve as the core elements of the Alliance's feedback mechanisms. Controlling and reporting of the various Measures will be conducted on an ongoing basis. It includes, for example, structured, qualitative progress reports by project managers and surveys of basic key figures and output data including financial data. For the first seven-year funding period, comprehensive evaluation and cross-project analysis will be assisted by an evaluation and monitoring plan developed in coordination with the **Alliance Board of Directors**. The plan will take into account requirements stipulated by the Alliance's funding bodies (e.g. reporting requirements) and will be subject to regular review and, where necessary, revision.

Evaluation projects with external expertise primarily serve to monitor the success of the Alliance's five Objectives and the interaction between them in creating an integrated, Berlin-wide research environment. Regarding Objectives 1, 2 and 3 for example, responsible research on Grand Challenges means addressing research quality and knowledge exchange across the whole research process, from the initial research idea to its scientific and societal impact. It is thus important to find and implement responsible measures, metrics, and evaluation standards while continuously building, implementing, and revising these measures through participation and deliberation with relevant stakeholders to find and balance values and goals for research quality. In order to meet this demand, the Alliance will establish feedback processes between the **QMU** and **CORe**, which coordinates the implementation of value-based parameters from meta-research. The Alliance will thus critically reflect upon long-standing metrics to monitor and measure the success of research. Aiming to increase both the value of research for society and public understanding and trust, the Alliance must rely on performance indicators and evaluation methods that may diverge from established paths, making use, for example, of alternative open sources and advanced bibliometric indicators. These will form the basis of a monitoring and evaluation infrastructure that will enable the **Alliance Board of Directors** to make evidence-based decisions concerning the establishment, continuation, or termination of Objectives and Measures.

In terms of data management in the Alliance, the partners have taken initial steps to link up their existing data management systems for the purposes of the Data Annex to the present proposal. They will now systematically proceed further in this direction, developing a research information system for the Alliance that complies with the standards of the

Core Data Set on Research Activities by the German Council of Science and Humanities and ensures benchmarking and interoperability between existing systems.

TAB. 21 **Quality assurance tasks and actors**

Reporting and Controlling	Head Office: coordination and controlling of program progress, handling of program reports	**Coordination**	Quality Management Unit (QMU): interface for all quality management activities, support for operative reporting, coordination of strategic monitoring and evaluation reports, support for boards for quality assurance purposes, dissemination of evaluation results
	University controlling and monitoring units: construction and provision of a data management system for the Alliance		
Monitoring and Evaluation	CORe: coordination of development of new research evaluation standards and alternative instruments, provision of data for external evaluations		
	External and internal scientific experts: undertake comprehensive evaluation projects		
Consultation	Advisory bodies: provide advice on evaluation and monitoring and recommendations based on evaluation results		
Decision-making	Board of Directors: responsible for decisions on the (dis)continuation or revision of Measures in accordance with the Objectives and overarching strategy		