Equitable scientific cooperation worldwide

Position paper of the German Commission for UNESCO

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This position paper was developed over a period of almost two years by the Expert Committee on Science of the German Commission for UNESCO, chaired by Prof. Dr. Anna-Katharina Hornidge, primarily under the guidance of an editorial group set up for this purpose. The process has repeatedly drawn on the experience and expertise of partner countries around the world, including low- and middle-income countries. The Expert Committee on Science of the German Commission for UNESCO adopted the paper in May 2024 by a large majority, with all but one member supporting it; the Executive Board of the German Commission for UNESCO adopted the position paper on 20 June 2024.

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Executive Summary

Excellent science is a prerequisite for the environmental, social and economic transformation needed to respond to global crises. This is particularly true for low- and middle-income countries (LMICs) where research on the local impacts of global crises and possible solutions is lacking. International scientific cooperation is essential for these countries, as their own financial budgets for science are usually very small. UN agencies also have very limited funding for science. At the same time, multilaterally agreed research agendas do not influence bilateral cooperation effectively enough.

International scientific cooperation must be organised on an equitable basis. This norm is enshrined in international law and has recently been increasingly claimed. It is also being operationalised in an increasingly differentiated way at the international level; examples include the TRUST Code and the Africa Charter. German science policy and German science funding have also unequivocally recognised this norm; almost all relevant German policy papers have been calling for the norm of equity for years. Furthermore, in February 2024 the Council of the European Union endorsed the ‘Brussels Statement’ on principles and values for international cooperation in research and innovation. The Statement calls for a roadmap to establish a common understanding of principles and values for international R&I cooperation, as well as for coordination with organisations such as UNESCO, UNCSTD, OECD, International Science Council, G7, G20, Council of Europe, and other international fora.

In addition to rights-based and justice-based arguments, there are at least five other arguments in favour of the equity norm: 1. strengthening LMICs in their transformative capacity to solve problems, 2. greater efficiency, 3. strengthening rules-based global cooperation, 4. building trust and mutual understanding, and 5. better positioning in competition with other “donor” countries.

All too often, however, equity is paid lip service and is rarely implemented consistently. This position paper puts forward concrete proposals to German science funding organisations on how to operationalise this “equality of opportunity” in funding lines and calls for proposals. This applies to basic, applied and problem-oriented research in all disciplines; for reasons explained later, the focus is on problem-oriented research.

It is through such concrete proposals that this position paper hopes to make international scientific cooperation with LMICs truly equitable – moving from rhetoric to practice.

To achieve this, this position paper makes proposals at three levels.

First, on a cultural and structural level, the position paper recommends more openness to plural forms of knowledge and knowledge carriers. This includes the practice of plurality in evaluation and quality assurance, as well as structures for joint agenda-setting in the design of funding lines and calls for proposals. Another important lever for more plurality is the strengthening of partner countries and their institutions as well as their own funding structures.

Secondly, the position paper recommends that the German government and German science funding organisations take greater account of the interests of partner countries in STC or WTZ agreements and national strategies and operationalise equal scientific cooperation in funding lines and calls for proposals, for example along the lines suggested here. This should facilitate the joint formulation of applications and ensure a plurality of knowledge and knowledge carriers; extend project cycles and adapt projects more flexibly; make capacity development and institutional strengthening eligible for funding and enable or simplify the transfer of funds to partners; and, finally, enable joint project responsibility and links between partner countries. Although scientific cooperation with LMICs is regulated and organised differently in “donor” countries, many of the proposals can serve as inspiration for other countries in this group.

Thirdly, the position paper recommends enabling researchers in projects to negotiate and define equal roles and responsibilities, organising the scientific publication process in an equitable way, and rethinking science communication measures, particularly in terms of (local) effectiveness.

01
The problem

The following first part of the position paper lists various reasons that, taken together, lead to a lack of equity in scientific cooperation between Germany (and most other high-income countries, HICs) and low- and middle-income countries (LMICs). Solutions are presented in the second part below.

1.1 Summary of the problem

In the face of global crises (see Section 1.2), humanity is faced with the great and urgent task of shaping socially just transformations[1] which will ensure that future societies and their development respect planetary boundaries[2]. With the UN's 2030 Agenda[3], the global community has already agreed on a globally shared vision of a humane future that is realistically achievable on the basis of specific goals, actions and indicators. The changes that this agenda necessarily entails require political decisions at all levels, from the United Nations to the nation state to the local community, in all countries, regardless of their economic strength. To be as effective as possible, decisions must be democratically legitimised and based on the fullest and most verifiable knowledge possible.

The availability of such knowledge varies greatly around the world and is clearly correlated with the economic strength of countries[4]. However, this statement can easily be misunderstood: "availability" is not the same as "existence". In fact, a great deal of relevant knowledge exists in the population and social structures of countries of any economic strength. This also applies to types of knowledge that are particularly important for locally relevant and locally effective transformation processes. In addition to scientific knowledge and technical, institutional or social innovations, knowledge about options for local implementation and technical expertise about socially acceptable/accepted and communicable approaches to social change is helpful or even necessary for successful transformation. However, such knowledge, which is central to the social negotiation of transformations, is rarely recognised as relevant, recorded and used – it is all too often not "available"; this applies both to stakeholders in the countries concerned and to their international partners (see Section 1.7).

To identify, capture, test and develop such knowledge, science[5] and scientific institutions are needed as places to organise such processes – especially strengthened science in LMICs[6]. Science in LMICs still lags behind internationally in terms of quantity and quality, mainly due to the generally low level of investment in education and science. The low level of investment is easily explained by the higher priority given to basic needs (see Section 1.3). Despite this disadvantageous starting position, a clear professionalisation and enormous increase in quality and excellence in science has been observed in some LMICs for some time.

As will be shown below, a broad-based strengthening of science in LMICs is only possible with structural support from economically stronger countries, while at the same time strengthening the autonomy of LMICs. Such support can currently only be realistically provided through **bilateral** scientific and technological cooperation (STC, or in the German acronym WTZ)[7] (see Sections 1.4 and 1.5).

[1] In addition to the socially just, climate-stabilising transformation of entire economic and social systems, 'transformations' here also include many processes of change towards sustainable development at the local level, down to the level of individual urban districts or villages.
[2] J. Rockström et al, A safe operating space for humanity. Nature 461, 472-475 (2009) and many more sources, most recently K. Richardson et al, Earth beyond six of nine planetary boundaries. Sci. Adv.9, eadh2458 (2023).
[3] Further information on the Agenda 2030 and its SDGs can be found at https://sdgs.un.org (and many other sources).
[4] UNESCO, UNESCO Science Report: towards 2030 (2015) and UNESCO Science Report, The race against time for smarter development (2021).
[5] In line with discussions in international fora, science is always understood here as a combination of research, teaching or training and a 'third mission' (including science communication, transfer of results to business and society, policy advice or science-society-policy interface), which are mutually reinforcing.
[6] The term "developing countries" is not used in this position paper, except in quotation marks, because it suggests a path of imitation of the economic development of the former industrialised countries, which would be neither recommendable nor possible. The term "industrialised countries" is also not used because the countries referred to in this way now all have service economies in which the manufacturing sector usually accounts for only around 20 to 30 per cent of GDP. The terms "global north" and "global south" are also generally avoided, as they suggest a geographically determined economic destiny that has been empirically refuted (both Singapore and Qatar are among the top ten countries with the highest GDP per capita; the Seychelles have a higher GDP per capita than Romania; larger countries such as Ireland and South Korea have also moved from deep poverty to enormous economic success in a very short period of time). Instead, the terms "economically stronger" and "economically less strong" or "high income" and "low or middle income" are used, which emphasises the smooth transition and the dynamics of the differences – at the same time, there is still a certain dichotomy, since the GDP per capita of Chile (58th in the ranking) is more than nine times that of Haiti (153rd out of 192 countries in the ranking). The same goes for the terms "First World", "Second World" and "Third World", which are now recognised as obsolete and which suggest a value beyond geography, a value that is completely independent of economic performance.
[7] This position paper does not differentiate sharply between forms of cooperation that have emerged and are being promoted from a development policy perspective or from a science policy perspective. The principles set out here apply equally in both cases.

In view of the increasing urgency of sustainability transformations, Germany – like many other HICs – needs more and different bilateral STC. "More" means a much stronger political focus on the strategic added value of scientific cooperation with LMICs for Germany – not necessarily more funding. As explained in Section 1.8, such cooperation is by no means a matter of "philanthropy", but is also about shaping transformations in the many different local contexts worldwide in such a way that human life on Earth remains possible in the future. What is needed, therefore, is a different, higher-quality form of STC that is designed and implemented in principle and in every relevant implementation project in such a way that science in the partner countries is structurally strengthened and **all existing knowledge resources are developed, made available, mobilised and used in the best possible way**. There is a clear need for equitable international scientific cooperation.

As explained in Section 1.8, this is a consensus under international law. This consensus has recently been operationalised in a differentiated way in documents such as the **"TRUST Code. A Global Code of Conduct for Equitable Research Partnerships"**[8] (2018) and the **"Africa Charter on Transformative Research Collaborations"**[9] (2023). This means that there is already a stable, written consensus on how scientific collaboration should be organised, which can be referred to where necessary or in cases of uncertainty.

In Germany, too, the Federal Government, science funders and academia have been in agreement on the norm for many years: **almost all policy papers on German bilateral STC call for the norm of equity**. In addition, only in February 2024, all EU countries called "for strengthening diverse and equitable international R&I cooperation in a trusted, open, accessible, inclusive, participatory, non-discriminatory, and safe manner".[10]

However, such equity is rarely realised in practice. The reason for this is that the norm of equity has not yet been coherently and comprehensively translated into concrete guidelines and incentives for the organisation of scientific cooperation and its financial support. This is not due to a lack of consensus on the norms, but to an **insufficient translation of these norms into operational rules**.

This position paper works towards an actually realised norm of equity in international scientific cooperation. This position paper makes concrete proposals for the German administrative context and from the German perspective; it does not duplicate the "TRUST Code" or the "Africa Charter".

The proposals in this position paper are based on dialogue with relevant stakeholders in the German and international science (funding) landscape and their practical experiences. The aim of this paper is to structurally strengthen science in partner LMICs through truly equitable international science cooperation – and thus enable transformations in line with the 2030 Agenda.

[8] Further information on the TRUST Code can be found at www.globalcodeofconduct.org.
[9] Further information on the Africa Charter can be found at https://parc.bristol.ac.uk/africa-charter.
[10] Ministerial Conference, Brussels Statement. https://belgian-presidency.consilium.europa.eu/media/or2gptwe/ministerial-statement-2024-02-16-brussels-statement.pdf. (Feb 2024).
[11] Röling, N.G., Conceptual and Methodological Developments in Innovation. Innovation Africa: Enriching Farmers Livelihoods. (2009) and Hornidge, A.-K. et al., Transdisciplinary innovation research in Uzbekistan – One year of 'Following-the-Innovation'. Development in Practice. 21. 834-847. (2011).

1.2 Transformation requires knowledge of local impacts

Transformative knowledge must be generated and made available worldwide, as humanity is currently facing numerous global crises (also known as "multi-crises" or "poly-crises"). These crises are "global" because of their scale and because they cannot be solved by individual countries or regions alone. The crises are so large, differentiated, overlapping and urgent that the scientific system, with its existing cultures and structures, too rarely develops appropriate strategies to overcome them and initiate transformations.

This paper recognises that **each of these global crises has very different local impacts and requires very different local transformations**. The local impact of crises and the resulting transformation needs cannot be understood from a distance, but must be analysed locally in each country in a context-specific manner. This is not happening to a sufficient extent today, resulting in a "lack of local fit" of scientific findings and the solutions based on them.[11] This refers to, for example, a lack of knowledge about the impacts of climate change at appropriate spatial scales and to a scenario development that is insufficiently adapted to local socio-economic, cultural and ecological conditions.

This problem exists in all countries of the world, but the "local fit" is particularly inadequate in LMICs, where "solutions" to crises are often based on familiar but inadequate "solutions from the North"; the supposed "solutions" are no solutions at all. It is precisely in these countries that "local fit" is needed, which can only be achieved through more and – for the reasons outlined in this paper – through **joint research on the ground, through bilateral scientific cooperation**; research in which LMICs are fully involved and which incorporates local, context-specific knowledge (see Section 1.7) [12].

The highly differentiated nature of local transformation needs is most evident in the current **climate crisis**, which is progressing faster than predicted, the overwhelming evidence of which cannot be seriously disputed, and which is approaching global climate tipping points.[13] The scientific community has also identified eight other **global environmental crises** with serious consequences for the Earth system in the concept of "planetary boundaries"; in several cases the planetary boundaries have already been exceeded.[14] It has often been plausibly argued that a new geological epoch, the Anthropocene, has begun, even though the responsible International Stratigraphic Commission did not adopt the proposal in 2024.

Although global environmental change now dominates the list of long-term risks in the Global Risk Report[15], there are also major **social challenges**, such as poverty, hunger and malnutrition, social polarisation and inequality, demographic change and inadequate educational opportunities, or the spread of disease and other **global crises**: resource scarcity, lack of resilience of critical infrastructure, reliability of transnational supply chains, uncontrollable development of new technologies, and so on[16]. The number of countries considered fully or partially democratic has declined every year since 2015. There is a strong perception of increasing social polarisation and division in almost all countries. There is also a public debt crisis: 3.3 billion people now live in countries where interest payments on debt are higher than spending on health or education.[17] Figures released at the Sustainable Development Goals (SDG) Summit in September 2023 on the **SDGs of the 2030 Agenda**, for example, show 122 million more hungry and undernourished people than in 2019 – instead of a reduction as targeted.[18] Where progress is being made on the SDGs[19], it is often far too slow. Overall, only one-sixth of the SDG targets are 'on track', and the picture varies greatly from country to country.[20]

At the same time, with the 2030 Agenda, the international community has, for the first time, articulated a **globally agreed vision of sustainable and humane social development** that can

[12] In this position paper, a related argument cannot be explored in depth: That more scientific cooperation is also needed for the purpose of advancing transformations in Germany by involving researchers from LMICs and their diverse knowledge. This is increasingly recognised, for example, in dealing with looted cultural assets, less so in migration or diaspora processes, and even less so in processes such as climate change adaptation.
[13] Lenton, T. et al, Climate tipping points – too risky to bet against. Nature. 575. 592-595. 10. (2019).
[14] Richardson, K., et al, Earth beyond six of nine planetary boundaries. Science Advances. 9. 10. (2023).
[15] World Economic Forum, The Global Risks Report, 18th Edition. (2023).
[16] For example, AI, 3D printing, blockchain, quantum computing, cybercrime, smart dust, nanotechnologies, neurotech, and their respective application options – including military, criminal and state criminal ones.
[17] UN Global Crisis Response Group, A world of debt. (2023).
[18] United Nations, The Sustainable Development Goals Report, Special Edition. (2023).
[19] For example, SDG 4 on education, SDG 5 on gender equality or SDG 6 on drinking water and sanitation.
[20] For an up-to-date overview of the achievement of the SDGs https://dashboards.sdgindex.org/chapters.

inspire precisely such transformations. Back in the mid-1980s, when the ozone layer was being depleted, humanity demonstrated that it could quickly bring crises under control through decisive multilateral action.[21] Multilateral successes have continued more recently, such as the Global Biodiversity Framework adopted in 2022[22] or the UN Convention on the High Seas adopted in 2023[23]. Even as wars, conflicts and authoritarian-illiberal regimes put multilateralism, international law and rules-based international cooperation under strain: **The 2030 Agenda, international law, evidence-based policy and international scientific cooperation unlocking transformative knowledge are key to making the sustainability transition a reality**.

1.3 Science in LMICs

Science is a fundamentally international endeavour: science sees itself as truly "borderless" and works accordingly to fulfil its interest in expanding and deepening knowledge. Nevertheless, international scientific cooperation is the exception rather than the rule – even in times of global crisis. Worldwide, about **80% of scientific projects are carried out exclusively in one country, 15% in bilateral and 5% in multilateral cooperation**.[24] From a European perspective, this global figure may be surprising, as the share of international cooperation projects, measured in terms of publications, is actually significantly higher for European countries. Indeed, international scientific cooperation (bilateral and multilateral) also takes place mainly between high-income countries. The share of what the UN traditionally calls **"North-South cooperation"**, i.e. bilateral and multilateral scientific projects with low-income countries, **is negligible from the perspective of high-income countries: 0.6%**.[25]

The low number of such "North-South" collaborations (from the perspective of the "North", the proportion is much higher from the perspective of the "South") is, among other things, an important reason for the **small size and lower performance of science systems** in most low-income countries (in middle-income countries the situation is more differentiated and often also insufficient). An even more important reason is the low level of government funding for science in these countries. This is hardly surprising given the overall low level of government budgets and the fierce competition for these budgets, where issues of basic survival and security, infrastructure development and debt servicing understandably have to be prioritised. Investing in the future is not something that everyone can afford.

While the average public and private expenditure on research and development (R&D) in high-income countries is 2.74% of gross domestic product (GDP) in 2020, it is 1.3% in middle-income countries and only 0.2-0.5% of GDP in low-income countries.[26] The role of the private sector varies greatly from country to country, ranging from more than 80% of R&D expenditure in Thailand to less than 5% in Egypt. On average, the private sector plays a much smaller role in LMICs than in high-income countries.[27]

Overall, the **shares of the world's regions in cumulative global research expenditure vary widely**. According to the UNESCO Science Report 2021, the largest shares are accounted for by North America (27.4%), the European Union (EU) (18.7%) and East and South-East Asia (40.4%). By way of comparison, Latin American countries account for 2.7% of global research expenditure and sub-Saharan African countries only 0.4%. When purchasing power is taken into account, the situation is likely to be more favourable for LMICs.

For the sake of completeness, it should be mentioned that **insufficient and inequitable research funding is not the only problem of low scientific performance**. This applies to individual LMICs as well as to regions of the world or even to aspects of the global science system: In addition, there are restrictions on scientific freedom, instability, a lack of interdisciplinarity and excessive specialisation, a lack of focus on replication and verifiability, misaligned incentives and output orientation (including in the growth logic of the mainly private-sector-organised publishing system), deficits in research assessment (including peer review), and too much research on topics whose relevance is defined exclusively in scientific terms. The persistent structural problems also lead to deficits in science-based policy advice in these countries, which also hampers local sustainability transformation.

Particularly in some LMICs, **restrictions on academic freedom**, including threats to life and limb, imprisonment, closure of institutes or banning of researchers from practising their profession, are often the greatest challenge. Such restrictions on academic freedom exist not only, but primarily, in authoritarian states; the situation often varies dramatically depending on the discipline or specialisation. There is no question that cooperation with researchers in such countries must be approached with the utmost sensitivity, so as not to endanger the partners; after all, international cooperation can be both a protective and a risk factor. Areas such as technology and engineering and the humanities may be particularly sensitive. This position paper can only touch on this in passing – it is clear that for such countries, the proposals in this position paper will have to be weighed up particularly carefully to see whether they can improve the situation.

The **core finding remains that LMICs, their science, science organisations and science policies have too few resources** to contribute effectively to sustainability transformations. This includes a lack of resources to identify research needs, to initiate and conduct appropriate research, and to translate results into possible solutions.

[21] The Montreal Protocol, adopted in 1987, is a multilateral environmental agreement on the basis of which the signatory states undertake to significantly reduce or completely eliminate emissions of chemicals that deplete the ozone layer.
[22] Further information on the Global Biodiversity Framework can be found at https://www.cbd.int/article/cop15-final-text-kunming-montreal-gbf-221222.
[23] Further information on the Convention can be found at https://www.un.org/Depts/los/bbnj.htm.
[24] International Science Council, Unleashing Science: Delivering Missions for Sustainability. (2021) According to the UNESCO Science Report 2021, the proportion of international research projects may be slightly higher at 23.5% [UNESCO, UNESCO Science Report: the Race Against Time for Smarter Development. (2021)]. According to Aksnes, D.W. and Sivertsen, G., Global trends in international research collaboration, 1980-2021. Journal of Data and Information Science 8(2):26-42 (2023), the share of international research projects in publications is 25.7%.
[25] Aksnes, D.W. and Sivertsen, G., Global trends in international research collaboration, 1980-2021, Journal of Data and Information Science 8(2):26-42 (2023).
[26] UNESCO Institute for Statistics. Science, technology and innovation: Gross domestic expenditure on R&D (GERD), GERD as a percentage of GDP, GERD per capita and GERD per researcher. http://data.uis.unesco.org/index.aspx?queryid=74 (2022).
[27] UNESCO, "UNESCO Science Report, The race against time for smarter development" (2021).

1.4 Multilateral agencies as science funders?

Multilateral agencies are **important forums for building consensus, norms, greater impact and legitimacy**. They mediate between conflicting interests.

Multilateral agencies are **not in a position**, neither individually nor collectively, **to compensate for the lack of national research spending in LMICs**.

Not even the **European Union**, by far the largest multilateral funder of research, can do that. The EU spends tens of billions of euros a year on research in Europe. However, its funding for scientific cooperation with LMICs is much lower and insufficient to meet the needs. Nevertheless, the EU is particularly important – it remains the largest provider of multilateral funding to such third countries. It also undertakes many relevant initiatives to underpin this funding politically. Take Africa as an example: Relevant initiatives include the AU-EU High Level Policy Dialogue (HLPD) with the African Union, the resulting AU-EU Innovation Agenda, the "Africa Initiative" (with a budget of €430 million for 2023-2024), the "AU-EU Research and Innovation Partnerships", the "African Research Initiative for Scientific Excellence Pilot" (ARISE, with an EU contribution of €25 million), the second pillar of Horizon Europe (2Global Challenges and European Industrial Competitiveness) or the Marie Skłodowska-Curie Actions (MSCA). But Europe's focus is not only on Africa: In scientific cooperation with Latin America, the EU works closely with the Community of Latin American and Caribbean States (Comunidad de Estados Latinoamericanos y Caribeños, CELAC). In 2016, the EU-CELAC Joint Research Area came into force, which, in addition to concrete research cooperation, aims to reduce barriers to mobility for researchers from both regions of the world[28].

The **United Nations and the World Bank** have recognised the importance of science and research in many ways. Science and research are also mentioned in the 2030 Agenda, although the importance of basic research was not adequately reflected in it. **UNESCO** is the UN's lead agency for science. Its constitutional mandate includes the promotion of science worldwide and the transnational exchange of scientific information on the basis of freedom of science, the human right to participate in scientific progress, and the human right and ethical responsibility of science, including with regard to the protection of the foundations of life.

Unfortunately, the United Nations has **too little funding** or other incentives to support this commitment. The combined annual science funding of all UN agencies (including the World Bank, UNESCO and the UN Technology Bank for the Least Developed Countries established a few years ago[29]) is negligible, as it amounts to around USD 300 million for all regions of the world (that is, if innovation funding for business is included). UN science funding in the strict sense is even smaller, totalling a maximum of USD 100 million per year. The largest amounts come from UNESCO, the UN Food and Agriculture Organisation (FAO) and the World Bank.[30]

The picture is not changed by global **associations of research funders**, such as the Belmont Forum, which has only disbursed around USD 150 million in funding since 2017[31], and the Global Research Council (GRC), which coordinates funding organisations and has launched a pilot call in 2022/2023 (see Section 1.5), but has not yet provided any funding itself[32]. The **self-organisations of science,** such as the International Science Council and the International Council for Philosophy and Human Sciences (CIPSH) – and the dozens of global disciplinary umbrella organisations, as well as the Interacademy Partnership and the International Association of Universities (IAU) – are also negligible as funders at the global level.

Of course, LMICs have also created multilateral organisations to represent their collective interests and organise cooperation. To illustrate this, let us take a look at the **multilateral organisations on the African continent, which have undergone significant organisational development** over the last twenty years; organisational development has also been positive in other regions of the world, such as

[28] Further information on the EU-CELAC Joint Research Area can be found at https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/europe-world/international-cooperation/regional-dialogues-and-international-organisations/latin-america-and-caribbean_en.
[29] Further information on the UN Technology Bank can be found at https://www.un.org/technologybank.
[30] Landscape of STI initiatives for the SDGs (status 2017), https://sustainabledevelopment.un.org/content/documents/147462017.05.05_IATT-STI-Mapping.pdf.
[31] Belmont Forum 2022 Annual Report, http://www.belmontforum.org/wp-content/uploads/2023/05/Belmont-Forum-Annual-Report-2022_final-version.pdf.
[32] Further information on the Global Research Council can be found at https://globalresearchcouncil.org.

Latin America. In Africa, the AU has adopted a common long-term strategic framework through its Agenda 2063 'The Africa We Want', which calls for increased investment in research and development and is underpinned by flagship projects and 10-year plans. The Pan-African University is a flagship project of the AU. The AU's development agency, the New Partnership for Africa's Development (NEPAD), is also active in science policy, with projects such as the African Institute for Mathematical Sciences (AIMS) and its Next Einstein Initiative, or the African Science Technology and Innovation Indicators (ASTII). In addition to the AU, there are eight regional economic communities in Africa, some of which are also active in science policy. There are also university associations (e.g. Association of African Universities), learned societies, academy associations (Network of African Science Academies) and a pan-African science academy (The African Academy of Sciences). In addition, the multilateral Science Granting Councils Initiative (SGCI) was established in 2015 to strengthen the institutional capacities of 16 public science funding organisations in sub-Saharan Africa.

Despite all the positive developments, it should be noted that the cumulative **funding portfolios of all multilateral agencies are nowhere near sufficient to make a difference to the breadth and substance of science in LMICs**.[33]

1.5 Multilateral agencies as places for global agenda-setting?

As explained in Section 1.3, the governments of LMICs can hardly invest in science because their national budgets lack the money to do so – and at the same time, as explained in Section 1.4, all the multilateral agencies of which these countries are members have insufficient financial resources to fund science.

This section therefore examines whether LMICs can expect to succeed in **voicing their priorities in multilateral science policy fora**, in the hope that high-income countries will use their bilateral international science cooperation funds in line with multilaterally agreed agendas that include these voices.

As the UNESCO Science Report 2021 shows, this hope would not be entirely far-fetched: between 60 and 80 per cent of research in LMICs is related to the 2030 Agenda, while in high-income countries the figure is up to 40 per cent – some will be surprised to see that the latter figure is so high.[34] However, the 2030 Agenda, with its deliberately broad scope, is not specific enough to serve as a science policy agenda.

The **G20 and G7** can provide important impetus, common understanding and common goals for science policy debates.[35] Follow-up is limited to the national level and is only successful in policy areas where there is a high degree of consensus. Moreover, the interest of the member states of these governance platforms in R&D varies widely. For example, while Germany spent around 3.1% of its GDP on R&D in the year of its G7 presidency in 2022, Indonesia invested less than 0.3% of its GDP in the same year of its G20 presidency.[36]

[33] There is no universal agreement on how much money is needed. But there is a good example: the Global Fund to Fight AIDS, Tuberculosis and Malaria has made a real difference over the last twenty years. It has spent about 70 billion US dollars in 20 years. So it is certainly not too high to estimate an amount in the tens of billions (at least as much as the EU spends internally each year; according to consensus estimates, several trillion US dollars will be needed each year to achieve the SDGs).
[34] Ciarli, T., et al. Changing Directions: Steering science, technology and innovation towards the Sustainable Development Goals. University of Sussex Report. (2022) and https://www.nature.com/articles/d41586-023-02847-4.
[35] Example of a Think 7 Policy Brief: Taylor, P. et al., Research, Evidence and Learning – the Need for Global Infrastructure. IDOS: Think7 Policy Brief. (2022).
[36] World Bank Data. https://data.worldbank.org/indicator. (2023).

If convergence occurs, it will be slow. A multilateral financing policy that truly rebalances differences cannot emerge from these governance platforms with annually rotating presidencies. It needs to be anchored in a multilateral organisation with a secretariat and an implementation mandate.

UNESCO is an organisation that is, or could be, suitable for these purposes. Historically, it has established some of its scientific programmes precisely for the purpose of involving LMICs in agenda setting.[37] These are primarily UNESCO's intergovernmental science programmes.[38] At some point in their history, all of these programmes have also served to build consensus around a global catalogue of research questions. However, the only UNESCO programme where this process is still carried out routinely and reliably today is the IHP, which coordinates research on the water cycle.

In addition to UNESCO, exchanges on pending research issues also take place, at least implicitly, through **other intergovernmental bodies** such as the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), as well as the scientific subsidiary bodies to global environmental agreements[39] and other UN specialised agencies with a scientific focus (notably the World Health Organization (WHO), the Food and Agriculture Organization (FAO) and the World Meteorological Organization (WMO)). Other relevant fora include the annual UN Multi-Stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals (STI Forum) and the biennial World Science Forum. Regular global assessments such as the Global Sustainable Development Report (GSDR) every three years, the Global Environment Outlook every five years, the annual Global Assessment Report on Disaster Risk Reduction, the annual World Water Development Report, the annual State of Food Security in the World Report or the annual Human Development Report also represent (implicit) forms of collective agenda-setting, as researchers from LMICs are almost always involved in the processes.

At the non-governmental level, the above-mentioned International Science Council (ISC) is engaged in global agenda-setting, e.g. some time ago with the Global Commission on Science Missions for Sustainability. It is also one of the main initiators of "Future Earth" (together with partners such as UNESCO and the Belmont Forum), which has also been successful in setting global agendas. The global organisation CIPSH does similar work for the humanities. Some of the dozens of global disciplinary umbrella organisations that make up the ISC and CIPSH are also active in this regard. These include the Global Research Council, the Interacademy Partnership and the IAU.

The concrete implementation (through research funding) of the consensus reached in these fora or institutions depends on whether these fora or institutions are supported by funding budgets (which, as explained in Section 1.4, is rarely the case) or whether other funding institutions (national, supranational or international) take up the consensus and use it as a basis, for example in their own calls for proposals. The "Sustainable Development Goals Pilot" initiated by the Global Research Council with eleven funding organisations from different countries in 2022/2023 was a promising pilot. No other examples are known.

In fact, agenda-setting can even have unintended side effects; in special cases, consensus in multilateral fora can even distract LMICs from their own priorities in scientific agenda-setting. This could be observed, for example, after the accession of Central and Eastern European countries to the EU in 2004, when institutes were set up there that were based on the priorities of the EU's 7th Research Framework Programme in a kind of "copy-paste" effort to attract European funding. Often enough, the establishment of such institutes initially cost national funding, to the detriment of established institutes dedicated to more genuinely national issues.[40]

[37] UNESCO has also been instrumental in the creation of institutions such as CERN, ICTP or TWAS, as well as global scientific organisations in the disciplines, some of which it continues to strengthen today.

[38] Such intergovernmental UNESCO programmes exist in marine sciences (Intergovernmental Oceanographic Commission, IOC), hydrology (Intergovernmental Hydrological Programme, IHP), environmental sciences (Man and the Biosphere Programme, MAB) and social sciences (Management of Social Transformations, MOST). Non-governmental UNESCO programmes exist in the earth sciences (International Geoscience and Geoparks Programme, IGGP) and in the basic natural sciences (International Basic Science Programme, IBSP).

[39] Four long-established environmental agreements have such scientific and technical subsidiary bodies: In the UN Convention on Biological Diversity, the body is called SBSTTA for short, in the UN Framework Convention on Climate Change (UNFCCC) it is called SBSTA, in the UN Convention to Combat Desertification (UNCCD) it is called CST, and in the Ramsar Convention on Wetlands it is called STRP.

[40] Several high-level participants from science policy/administration in Central and Eastern European countries expressed themselves in this way ("copy-paste") at a workshop organised by the German and Polish Commissions for UNESCO in Warsaw in 2015.

1.6 Bilateral scientific cooperation – opportunities for participation?

International cooperation is almost constitutive for science. For centuries, researchers have exchanged ideas and knowledge across borders. In recent decades, large international consortia have become the norm in most disciplines. International laboratories such as the European Organisation for Nuclear Research (CERN), the European Molecular Biology Laboratory (EMBL), the Consultative Group on International Agricultural Research (CGIAR) and the Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME) translate this idea into tangible structures. At least implicitly, they link excellence with peace-building, as do the EU's Horizon Europe funding projects. Especially in times of increasing geopolitical polarisation and conflict, scientific cooperation is becoming even more important as a bridge-builder.

Bilateral cooperation with LMICs is also increasingly and rightly understood as "normal" scientific cooperation. The number of stakeholders who continue to mistakenly believe that only "philanthropic capacity building" or "development aid" is possible in such cases is fortunately decreasing. The **innovative strength and scientific quality or excellence of research in LMICs** has been **increasing** significantly for years, **as has their international integration**; full and equitable partnerships with these countries can and should be the rule. **Remaining stereotypical prejudices regarding the lack of excellence** and experience of researchers from LMICs should be urgently overcome.

Bilateral cooperation with LMICs is also increasingly and rightly understood as "normal" scientific cooperation. Fortunately, the number of actors who still mistakenly believe that only "philanthropic capacity building" or "development aid" is possible in such cases is decreasing. **The innovative power and scientific quality or excellence of research in LMICs** has been **increasing significantly** for years, **as has their international integration**; full and equal partnerships with these countries can and should be the rule. **Remaining stereotypes about the lack of excellence and experience of researchers from LMICs should be urgently overcome**.

However, despite all the improvements in scientific excellence in LMICs and corresponding changes in the attitudes of stakeholders in high-income countries, in practice, international scientific cooperation for LMICs still often means that their territories and societies become the object of classical "**field research**".[41] In practice, researchers from high-income countries all too often carry out scientific projects in LMICs with little or no involvement of the local scientific community. There has been little progress in the discourses on 'field research' in relevant disciplines (from archaeology to geosciences to biology). There are now discourses on improving the involvement of local researchers, capacity building, community engagement, science communication, etc., which have led to some progress in these areas.

But this progress is clearly insufficient: even those "field research" projects that meet the requirements of these discourses are far too often **initiated, planned and decided upon in terms of content and organisation in high-income countries** alone. Decisions on the "research question", the disciplines to be involved, the methodology, the basic and/or practical orientation, etc. are prepared and taken in high-income countries.

The opportunity for researchers, institutions, target country governments or other local stakeholders to participate structurally and equitably in the design, planning and decision-making of 'field research' is still the rare exception and by no means the rule.

Beyond "field research", the deficits mentioned are **typical of all scientific cooperation** between countries with different economic strengths, in all disciplines, in basic, applied and problem-oriented research.[42]

[41] The "TRUST Code" cited above has as its starting point the overcoming of scientific collaborations in which research is carried out in the Global South that would not be possible in the Global North due to ethical or legal restrictions ("ethics dumping" such as consistent placebo treatments in medical trials in Africa). There are certainly individual cases of ethics dumping with German involvement, but this position paper is based on the widespread observation of structurally inadequate collaborations.

[42] The German Commission for UNESCO cannot provide any quantitative empirical evidence for this central statement of this position paper, simply because there do not appear to be any published figures. Recently, there has been a growing number of studies and articles in an increasing number of disciplines calling for a departure from previous scientific cooperation, using arguments similar to those in this position paper. However, these studies and articles do not provide concrete figures on the prevalence of particular practices. However, the above central statement of this position paper has been consistently confirmed for Germany by all researchers and representatives of science funding organisations (primarily from Germany, but also from other high-income countries) with whom we have collaborated in the preparation of this position paper.

Partners from LMICs can often **only agree to pre-defined conditions** – if they do not do so, they lose one of their few opportunities to participate in research at all, given the financial constraints of their countries (see Section 1.3). All too often, the only result of such unilaterally planned and implemented scientific collaborations is the production of publications – which are primarily attributed to researchers from high-income countries. In addition, there are many other facets of practical bilateral scientific cooperation that stand in the way of equal cooperation. Even English as a language of science is useful in international cooperation, but it is far from neutral. Rather, it perpetuates outdated patterns of thought and behaviour as well as invisible hierarchies, especially in former British colonies; the use of a 'lingua franca' by researchers can have an exclusionary effect on the inclusion of local knowledge[43].

Not all challenges require or demand changes exclusively in Germany. For example, patriarchal or **hierarchical structures in scientific institutions** in some LMICs must **first and foremost be overcome by these countries themselves**; however, cooperation partners from Germany should react sensitively to such situations in order not to exacerbate challenges and risks for female researchers, for example. One important conclusion is, for example, not to be satisfied with the "usual suspects" when looking for cooperation partners. Similarly, inter- and transdisciplinary research as well as multidimensional academic excellence are often even less common in LMICs than in Germany.

In view of these unequal organisational and structural framework conditions, many **bilateral scientific collaborations** have so **far produced too few suitable, i.e. relevant, solutions for sustainability transformations**; and where they have, they have too little legitimacy and credibility due to a lack of participation, which also stands in the way of implementing the knowledge gained.

[43] Partelow, S., et al., Tropical Marine Sciences: Knowledge Production in a Web of Path Dependencies, PLoS ONE 15(2). (2020) and Hornidge, A.-K., et al., Knowing the ocean: epistemic inquealities in patterns of science collaboration, in "Ocean governance knowledge: systems, policy foundations and thematic analyses", Cham: Springer Nature, 25-45. (2023). At the same time, it should be borne in mind that researchers from countries where English is still the dominant official or everyday language, even after the colonial era, have to prove their knowledge of English when applying for many grants in Germany.

1.7 Transformation knowledge - what does this mean?

Particularly in the case of problem-oriented research on sustainability transformations and the local effects of global crises, there is often an additional requirement for science to be successful. More than just optimising processes, a new **awareness of "knowledge" is needed** to achieve equitable international scientific cooperation. This paper brings together the categories of "epistemologies", "languages" and "concepts/theories" under the term "knowledge", in line with the Africa Charter mentioned above. This includes "traditional knowledge", which in other contexts is also referred to (with different meanings) as "indigenous knowledge" or "local knowledge".

This position paper promotes awareness of the **value of plural knowledge as science-relevant knowledge** – from its perception and recognition, through its provision, mobilisation and testing, to its use in the scientific process. **Awareness of the relevance of plural forms of knowledge is insufficient in high-income countries, but not only there**. Even in LMICs, there is often an academic 'blindness' to the bodies of knowledge that exist in their own societies.

Therefore, when initiating (especially) problem-oriented scientific cooperation, all partners must adopt a self-reflective attitude towards the recognition of **socially relevant knowledge for shaping transformation processes**[44]: it must be critically examined which knowledge is necessary, whether and where it might be available or if it still needs to be generated. A self-reflective view is needed as to whether there may be previously unknown or unconscious forms of knowledge among stakeholders who may not yet have been identified as knowledge holders, and how such knowledge can be **captured as knowledge**. Unknown and unconscious forms of knowledge often include the experiences and perspectives of women, people who do not identify in binary terms and young people. It also includes the experiences and perspectives of often marginalised groups. Mechanisms are needed to decide whether certain knowledge is **usable, verifiable and relevant in a scientific context**, who shares and records it, and how and under what conditions it is evaluated, qualified and rewarded, including with regard to criteria

such as 'suitability', 'correctness', 'publishability', 'usefulness' or 'usability'. Compelling international scientific cooperation is characterised by a broadened **perspective on knowledge and actors, based on plurality, heterogeneity and participation**.

The number and heterogeneity of people involved in research (and the plurality and heterogeneity of their knowledge) should **always be optimised in relation to the problem under investigation and the related research questions**. This is because plurality, heterogeneity, diversity and "local fit" increase the quality of the results – and thus above all their **usability** – especially in problem-oriented research. At the same time, they strengthen the fairness of knowledge exchange in accordance with the principles of **Access and Benefit Sharing (ABS)**[45] and **Collective Benefit, Authority to Control, Responsibility, Ethics (CARE)**[46].

As described above, this kind of valorisation of plural forms of knowledge is particularly important for **problem-oriented research**. This type of research in particular **must make use of all relevant and available sources of knowledge and not be limited to specific, selected knowledge systems**. In addition, the knowledge base is broadened and the global acceptance of research results and local solution potentials are increased.

However, this valorisation of plural forms of knowledge also applies to **basic research, applied research and all forms in between**, which constantly enrich each other and interact intensively. No sharp distinction is made here between different types of research, and the term 'scientific cooperation' is used throughout. The emphasis is on problem-oriented research practices only when this position paper refers to 'plural forms of knowledge'. For all forms of research, it is important to overcome the current situation in which – due to the structural framework conditions – countries such as Germany effectively set the agenda in international scientific cooperation.

1.8 Overview of arguments for equitable scientific cooperation

On the basis of the above arguments, and in line with the policy papers already mentioned, this position paper defines equitable scientific cooperation as follows:

Scientific collaboration is equitable when all participants

- make recognisable efforts to at least overcome the effects of existing imbalances in a project (e.g. imbalances in access to resources, political influence and bureaucratic power);
- make their intentions and objectives transparent at all times, especially when these change;
- participate on an equal and complementary basis in all relevant planning, decision-making, implementation and evaluation processes;
- respectfully consider the plural competences and diverse knowledge of all participants (including epistemologies, languages, concepts/theories) as a potential enrichment of science;
- recognise that they should play as many roles as possible in the mutual relationship: provider and at the same time recipient (e.g. of resources), mentor and mentee, demanding accountability and giving it, providing and receiving knowledge, etc.; and
- improve the long-term position of researchers (i.e. even after the end of the project), e.g. by strengthening institutional structures and individual capacities, and by giving equal recognition to their contribution to research performance.

[44] In this sense, transformation knowledge is understood here in a broader sense than is usual in (German-speaking) sustainability research and includes the system and orientation knowledge necessary for transformation processes. Sources, for example: CASS & ProClim, Research on Sustainability and Global Change – Knowledge-visions of economic policy by Swiss researchers. (1997) and Jahn, T., Theorie(n) der Nachhaltigkeit? Reflections on the basic understanding of a "sustainability science". in: "Perspektiven nachhaltiger Entwicklung. Theories at the crossroads. Contributions to social science sustainability research", Metropolis Verlag, 47-64. (2012).

[45] Further information on the ABS principles can be found at https://www.cbd.int/abs.

[46] Further information on the CARE principles can be found at https://www.gida-global.org/care.

This position paper argues that science in most LMICs is reasonably excellent for equitable cooperation. Of course, this claim must be assessed on a case-by-case basis, as in the case of national science funding. This position paper also takes the view that equitable cooperation also supports the quality and excellence of science in these countries.

The central argument of this position paper for equitable international scientific cooperation is to strengthen the capacity of LMICs to **overcome global crises and their local impacts and to enable sustainability transformations**. Since the crises are global and must be solved globally in order to secure a future worth living in Germany, this is (also) in Germany's own interest.

The central argument of this position paper is in line with the "Principles of Effective International Cooperation". In 2011, donors of bilateral and multilateral development assistance[47] agreed that for development cooperation to be effective, recipient countries must have much greater ownership and a say in cooperation priorities. Although the principles set out in the **Busan Partnership** are not binding under international law, they represent a broad political consensus among all countries and development researchers. "Partnerships for development can only succeed if they are led by developing countries, implementing approaches that are tailored to country-specific situations and needs."[48]

Equitable scientific cooperation between countries of different economic strength is also a question of the **efficient and economical use of taxpayers' money**. It is much more efficient if scientific cooperation with German participation results not only in publications by German researchers, but also in problem-solving skills and a strengthened local scientific infrastructure. Understood in this way, fair international scientific cooperation is once again a matter of self-interest.

[47] They have come together in the Development Assistance Committee of the Organisation for Economic Co-operation and Development, where they work together in the so-called DAC Group.

[48] Busan Partnership for effective development cooperation. https://www.effectivecooperation.org/content/busan-partnership-outcome-document (2011; quoted here is paragraph 11.a).

[49] The BRICS countries include Brazil, Russia, India and China (the founding members), South Africa (from 2010) and, from 2024, Egypt, Ethiopia, Iran and the United Arab Emirates.

[50] See for instance the DAAD Position Paper „Foreign Science Policy for a Multipolar World" from 2022 (https://static.daad.de/media/daad_de/pdfs_nicht_barrierefrei/der-daad/daad_perspectives_science_diplomacy_for_a_multipolar_world.pdf).

Equitable scientific cooperation is also an **obligation under human rights and international law** (see box below in this section); the most substantial and modern formulation in international law can be found in the UNESCO Recommendation on Open Science of 2021 – and outside international law in the TRUST Code and the Africa Charter. The BRICS[49] Memorandum of Understanding on Cooperation in Science, Technology and Innovation ("co-generation of new knowledge") is another case in point, such calls have been made by states with any form of government.

In addition, reference is made to the **overarching principle of the 2030 Agenda** to "leave no one behind", and in particular to "enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation, and increase knowledge sharing on mutually agreed terms" (SDG 17.6). Germany, in particular, has always seen itself as a country with a special commitment to international law. Ultimately, upholding and strengthening international law is also a question of self-interest in favour of the rules-based international order.

Another argument is that genuine, i.e. not only well-intentioned but also well-implemented, cooperation is the cornerstone for **building international trust** and thus for creating and strengthening an **internationally shared system of values and references**. This is the **core idea of the United Nations**, see Article I of the UNESCO Constitution: "The purpose of the Organization is to contribute to peace and security by promoting collaboration among the nations through education, science and culture in order to further universal respect for justice, for the rule of law and for the human rights and fundamental freedoms (...)". Cooperation creates understanding of equal and different approaches in different countries and societies, of equal and different values, of equal and different priorities and needs. Such mutual understanding is central to trust and solidarity – but above all to a **functioning multilateral system**, in which countries do not just participate out of individual self-interest, but work together to find solutions to global crises.

These are also the goals of **German science diplomacy** and "foreign science policy".[50] Science diplomacy is becoming increasingly important in a context in which cooperation

between some countries is coming to a standstill and there is even a threat of new "blocs" forming. Science remains a powerful force against the formation of blocs. Scientific cooperation can maintain threads of dialogue between differently positioned states, and negotiate and shape common futures. Science diplomacy is also used to overcome restrictions on academic freedom, censorship, threats to researchers, closures of institutes or professional bans[51].

Another argument in favour of equitable international scientific cooperation is the current shift in the international order towards what is sometimes called a multipolar order. Continued constructive cooperation and solidarity in a common multilateral system is of paramount importance, and every effort must be made to avoid disintegration into competing multiple orders. However, the shifts described above mean that **LMICs are clearly gaining political influence**, as they are courted from all sides and can increasingly choose their partners – often enough they exploit strategic ambiguity and cooperate with many partners who offer themselves. It is precisely in this situation of **"partner competition"** that LMICs and their science must be presented a **convincing offer of genuine partnership** – a partnership from which these countries and their science will actually benefit.

Conclusion: In the future, international scientific cooperation activities should be organised on an equitable basis because

- they **strengthen capacities to manage global crises and their local impacts**, enable sustainability transformations, and have been recognised for years as a principle of effective international cooperation;
- they **increase the efficiency and effectiveness** of public funding for scientific cooperation;
- they are both a **consensus laid down in the 2030 Agenda and a human right** ("Everyone has the right ... to share in scientific progress and its benefits"; Universal Declaration of Human Rights, Article 27) and because they have also been **agreed in several international legal texts** that are also binding for Germany (see box);
- they **strengthen trust and an internationally shared system of values and references**;
- they **enable long-term, stable cooperation** in an international environment that is increasingly characterised by competition for partnerships.

None of these arguments is essentially philanthropic; each of them is essentially in Germany's own interests, as well as in the interests of all high-income countries engaged in international scientific cooperation.

At the same time, the proposals in this position paper are fully compatible with **academic freedom** as an individual and institutional right enshrined in the German constitution. These proposals are not intended to provide advice on the content or method of academically excellent research, or on the choice of a partner country or a particular type of research. Rather, they are aimed at making greater use of the transformation and implementation potential of science.

This position paper acknowledges the efforts of other institutions in recent years that have already made great progress in making international scientific cooperation more equitable. The German Commission for UNESCO was in early contact with the Swiss Commission for Research Partnerships with Developing Countries (KFPE), which published its "11 Principles – A Guide for Cross-Border Research Partnerships" in 2014 (www.11principles.org). It has studied the "Four Approaches to Supporting Equitable Research Partnerships" of the UK Collaborative on Development Research (UKCDR) and the "ESSENCE on Health Research" initiative, and has taken note of the work of the Canadian International Development Research Centre (IDRC) and the literature review "Insights and research into 'equitable research partnerships' from the perspective of global north institutions" by the UK Institute of Development Studies (IDS).

[51] This is particularly important given that half of the world's population will live in countries with declining scientific freedom by 2023 (https://academic-freedom-index.net) and that threats of violence, e.g. in social media, threaten to create "shrinking spaces" even in democracies. The European Union's common approach to science diplomacy was set out in the "Bonn Declaration on Freedom of Research" (2020, https://www.bmbf.de/SharedDocs/Downloads/files/_drp-efr-bonner_erklaerung_en_with-signatures_maerz_2021.pdf?__blob=publicationFile&v=2). At the same time, science diplomacy and de facto restrictions on scientific freedom also highlight the limits of cooperation, for example in security-related research areas, where there is a risk of patent abuse and unilateral knowledge extraction, or where cooperation itself threatens to increase the risk to researchers in partner countries.

International scientific cooperation (and – in some cases – capacity building in LMICs) is enshrined as a requirement of international law in the texts of the following treaties and recommendations:

- The **1982 UN Convention on the Law of the Sea**, ratified by 167 states, including since 2003 all EU Member States and the EU itself, in various of its paragraphs calls for increased research cooperation and technology transfer to enable LMICs to make progress: “States shall promote the development of the marine scientific and technological capacity of States which may need and request technical assistance in this field, particularly developing States … with a view to accelerating the social and economic development of the developing States”. (Art. 266.1, similar in Art. 266.3 and Art. 275.1). For further implementation, there are also the “Criteria and Guidelines on the Transfer of Marine Technology” (2005) adopted by UNESCO-IOC

- The **1992 UN Convention on Biological Diversity**, with 196 State Parties, provides detailed guidance on international technical and scientific cooperation in Article 18: “Each Contracting Party shall promote technical and scientific cooperation with other Contracting Parties, in particular developing countries, in implementing this Convention, inter alia, through the development and implementation of national policies. In promoting such cooperation, special attention should be given to the development and strengthening of national capabilities, by means of human resources development and institution building.” (Art. 18.2)

- In the equally binding **Nagoya Protocol to the UN Convention on Biological Diversity of 1997,** ratified by 136 states, including the EU and almost all EU Member States, Articles 22 and 23 contain clear stipulations on international research cooperation with the aim, among others, to “develop their endogenous research capabilities to add value to their own genetic resources”. (Art. 22.4.d)

- The semi-binding **2017 UNESCO Recommendation on Science and Scientific Researchers** also calls for international partnerships that enable “developing countries to build up their capacity to participate in generating and sharing scientific knowledge, the related know-how and their benefits, including identifying and countering the effects of brain drain;” (Art. 18.a)

- The non-binding **General Comment no. 25 to the UN Covenant on Economic, Social and Cultural Rights of 1966 from 2020** expresses its views on international scientific cooperation in paragraphs 77 to 79: “Developed States should contribute to the development of science and technology in developing countries, adopting measures to achieve this purpose, such as allocating development aid and funding towards building and improving scientific education, research and training in developing countries, promoting collaboration between scientific communities of developed and developing countries to meet the needs of all countries and facilitating their progress while respecting national regulations.” (Paragraph 79)

- The non-binding **UNESCO Recommendation on Open Science of 2021** calls for international scientific cooperation not as a means to promote Open Science, but “as one of the integral practices of open science and the most important driving factor for an intensive exchange of scientific knowledge and experience, as well as the paramount for the openness of science” (Art. 22.a). However, the particular value of this UNESCO Recommendation lies in the call for and promotion of “dialogue between different knowledge holders, that recognizes the richness of diverse knowledge systems and epistemologies and diversity of knowledge producers … [inter alia] to promote the inclusion of knowledge from traditionally marginalized scholars and enhance inter-relationships and complementarities between diverse epistemologies, … respect for knowledge sovereignty and governance, and the recognition of rights of knowledge holders to receive a fair and equitable share of benefits that may arise from the utilization of their knowledge” (Art. 11). In this regard, the UNESCO Recommendation refers to the CARE principles.

02
Proposals for strengthening equitable scientific cooperation

In the following, this position paper makes proposals for the organisation of the framework conditions for scientific cooperation between Germany and LMICs. Many of these proposals can also serve as inspiration for international scientific cooperation initiatives between other HICs and LMICs. The aim is to ensure that scientific projects (in all research modes, from basic research to problem-oriented research) are organised as equitably as possible from conception to the implementation of their results, have structural effects in the partner countries and incorporate as many pluralistic forms of knowledge as possible.

The German Commission for UNESCO is aware that even in the most well-intentioned and well-implemented collaborations, an **insurmountable inequality** remains due to the often considerable differences in the financial resources of the various partners. However, this does not make the effort pointless, but rather underlines the need to reduce imbalances as much as possible, especially at critical points. Real imbalances, including (but not limited to) those resulting from the different financial strength of the countries involved, are therefore not naively ignored or even concealed. They are consciously addressed and minimised as far as possible by proposing appropriate measures.

These proposals are not formulated from the bird's-eye view of international law, but against the background of experience from concrete projects of international scientific cooperation. They are formulated from the perspective of self-interest, not philanthropy. Other high-income countries, particularly in Europe and North America, are currently engaged in similar discourses – for reasons comparable to those outlined in this position paper – or have already initiated concrete processes for greater equity in international scientific cooperation[52].

On the basis of concrete project practice, the position paper aims to initiate **a new self-understanding within the German science landscape** for an "optimisation" of scientific cooperation (with a view to the goals of equity, efficiency, trust and thus problem-solving ability). This position paper **does not have as a necessary primary goal to increase the financial resources** for such scientific collaborations.

The position paper assumes that the equal participation of partners in all phases of an international science project will lead to greater mutual trust and, at the same time, to a clearer identification and pursuit of the scientific interest in knowledge, thereby improving both **bilateral and multilateral relations as well as the quality of research** and the transformative potential of the knowledge gained. The position paper therefore proposes starting points for establishing a new scientific culture and – building on such a culture – **new scientific (funding) structures**.

The following proposals define these starting points along the "life cycle" of international scientific cooperation, starting with the science policy and cultural frameworks that determine the structure, topics and objectives of international scientific cooperation. In a second step, the content of funding lines and STC (or in German WTZ) agreements[53] is addressed, followed by the organisation of the practical scientific process (from the development of the research question to the publication of the results).

The proposals on funding structures are not aimed specifically at individual institutions in the German science system – from the point of view of the German Commission for UNESCO, **all institutions have both good practices and practices that could be improved**. The position paper therefore only refers to the regulations of the Federal Ministry of Education and Research (BMBF), the German Academic Exchange Service (DAAD) or the German Research Foundation (DFG) and their funding guidelines if they already have positive practices. All science funding organisations in Germany have committed themselves to the principle of equity.

The following proposals are intended to help bring the principle of equity to life. The relevant actors in science funding in Germany are

[52] Examples: In the United Kingdom, the first criteria for equitable international research cooperation were defined in 2023 (Research in a global setting, https://t1p.de/aypjy). The Dutch Research Council presented a similar approach in 2021 (Equitable Cooperation in Science, https://www.nwo.nl/en/equitable-collaboration-in-science). In Switzerland, a catalogue of criteria was agreed as early as 2018 (A Guide for Transboundary Research Partnerships, https://t1p.de/3maw7). The Canadian government launched a corresponding process in 2022 (Best practices in equity, diversity and inclusion in research practice and design, https://www.sshrc-crsh.gc.ca/funding-financement/nfrf-fnfr/edi-eng.aspx). The European Commission's Directorate-General for Research and Innovation conducted a multilateral dialogue on principles and values in 2022/2023 (https://t1p.de/h356e), which also addressed research cooperation with LMICs.

[53] Bilateral agreements between Germany and selected partner countries to agree on the framework conditions for scientific and technological cooperation.

invited to discuss and, where appropriate, operationalise the following proposals for the development of equitable collaborative partnerships. In fact, some German science funding organisations had already started such processes of self-reflection before the work on this position paper began.

2.1 Shaping the political and cultural framework conditions for science funding

The starting point for the following four initial proposals for a new, equitable scientific cooperation is an examination of the actual practice of international scientific cooperation in Germany today, focusing on the existing political and cultural framework. Based on this analysis, the following four proposals identify potential for improvement with regard to concrete structures, rules, criteria and practices in science. The aim is, firstly, to achieve greater cultural sensitivity for greater equity in international scientific cooperation in the short term and, secondly, to bring about a broad change in mentality in the medium to long term.

Proposal 1: Joint agenda setting for funding lines / calls for proposals

Compared to other countries, Germany provides relatively high funding for scientific cooperation with LMICs. All formats in which Germany is already involved in joint agenda-setting are therefore to be welcomed, be it in UN organisations, the G7 or G20, the Belmont Forum and the Global Research Council, the ISC, academy networks, and so on.

For example, Germany worked closely with the African Union in agenda-setting on the funding requirements (largely defined in Africa) for the Pan-African University. Specifically, Germany has committed to focus on water and energy and the site of Tlemcen, Algeria. Germany has also established regional competence centres for climate change and adapted land use (Southern African Science Service Centre for Climate Change and Adaptive Land Management, SASSCAL; and West African Science Service Centre on Climate Change and Adapted Land Use, WASCAL) in close coordination with the governments of West and Southern African countries. Germany has also supported and practised joint agenda-setting in projects such as AIMS or the DAAD-funded Africa Centres of Expertise.

In the case of such “lighthouse projects”, i.e. major funding initiatives, especially those initiated at government level, **joint agenda-setting is already well established**, especially when they lead to new and large-scale infrastructure.

The principle of **joint agenda setting (in advance) seems to be less clearly established for small funding lines and calls for proposals**. Calls for proposals and funding guidelines regularly state that coordination has taken place within the German government and/or with other German partners; however, calls for proposals rarely contain information on whether an exchange has taken place with the partner countries, or at least whether multilateral agreements have been used as a guideline in the call for proposals. The objection that an entire target region such as Central Asia or Southern Africa is at stake and that no individual partner country should be favoured is understandable at first glance; however, in almost all target regions there are alliances of states that can represent the interests of their members in a concerted manner[54] (see also Section 1.4). Another objection, that such calls for proposals do not specify topics and methods, is also inconclusive, as such openness is rarely given.

It is therefore urgently recommended that **partner LMICs should be involved in the agenda-setting process in an appropriate manner, i.e. in the development of problems/research topics, suitable methods and framework conditions**[55], even in the run-up to regular, small-scale calls for proposals. This participation should be as equitable as possible, i.e. with as few rigid guidelines as possible from the German side. Alternatively, it can take place through international alliances and, in the absence of such alliances, through reference to multilateral agreements (the specific design of funding lines and calls for proposals is discussed in much more detail in Proposal 7 below), or through the input of well-connected senior experts from African partner organisations, as the DFG does.

[54] A recent good example is the ‘EU-Africa Innovation Agenda’ launched by the African Union (AU) and the EU in summer 2023 (more at https://t1p.de/7c0xm). The Agenda sets out joint research objectives and themes and was developed jointly through a participatory process of digital and physical consultations and events. Based on the Agenda, the African Research Universities Alliance (ARUA) and the Guild of European Research-intensive Universities have established 20 Clusters of Excellence, in which the research objectives and themes of the Agenda are being worked on in co-lead teams with partners from Europe and Africa.

[55] In the Netherlands, for example, such joint agenda setting is gaining ground and is already standard practice in some funding contexts, particularly with African partner countries.

Proposal 2: Strengthening scientific institutions and funding structures in partner countries

As explained in Section 1.3, countries around the world invest very differently in R&D; sub-Saharan Africa, for example, recently accounted for only 0.4 % of total world R&D investment (share not adjusted for purchasing power). These imbalances are not recent, but have existed for decades. As a result, the science landscape in many LMICs is not institutionally robust. This is true at almost all levels, from the lack of dedicated science funding organisations to (few) universities whose graduates are often inadequately prepared for the local labour market or for working in science. While there are also internationally excellent and visible research institutes, these are often internationally funded institutes, such as the CGIAR, which are too often poorly linked to national science infrastructures.

As mentioned in Proposal 1, Germany has been specifically involved in several lighthouse projects for the development of scientific infrastructure in Africa in recent years (Pan-African University, WASCAL, SASSCAL, DAAD-funded Africa Centres of Expertise, AIMS, etc.). In the BMBF's Internationalisation Strategy 2017, they are referred to as "structure-building collaborations". Germany has also invested heavily in research networks for health innovations in sub-Saharan Africa, in the Maria Sibylla Merian International Centres and in (binational) universities (Jordan, Turkey, Egypt, Oman, Mongolia, Kazakhstan, Vietnam) or, for example, supported the multilaterally funded synchrotron laboratory SESAME in Jordan.

It is also essential to strengthen science funding structures, which are potentially not only sources of funding but also gatekeepers for quality and relevance. For example, the Science Granting Councils Initiative, launched by the UK, Canada and South Africa in 2015 and supported by the DFG from 2019 and later by Norway, brings together science funding organisations from 17 sub-Saharan African countries.

Strengthened institutions and expertise in the partner countries also benefit international scientific cooperation with Germany and other countries. They make it easier for partner countries to identify and formulate their own research needs. They become genuine counterparts for institutions from high-income countries which recognise local conditions and interests and help to take them into account in research design. **Germany should therefore continue to provide targeted and long-term support for such large-scale initiatives to develop scientific institutions and expertise in partner countries**. Direct core funding of scientific institutions is crucial to improving the quality of research and teaching in partner countries in the long term and to strengthening ownership. In addition, such initiatives should always consider long-term perspectives for institutional security after the end of German financial support.

In addition to such large-scale projects, the **(partial) funding of research funding institutions or instruments** should also be considered as an option, depending on the structures in the respective partner country; of course, this presupposes that the partner country can present convincing research and education strategies, that there are established structures for cooperation and that the risk of corruption is low. Such funding institutions or instruments would send a strong signal of trust and reduce administrative transaction costs on the German side.

Support to partner countries is also important for **"soft infrastructure"**, e.g. for establishing or strengthening ethics committees (at institute or national level), for open science practices or for research integrity.

In addition, institutional strengthening of partners should at least be allowed/enabled in all scientific collaborations that are smaller in terms of financial volume, e.g. those initiated through calls for proposals. Institutional strengthening is more than just 'capacity development', which is usually understood as training partners in certain scientific and methodological practices or in soft skills such as proposal writing. Institutional strengthening also means providing laboratories with equipment and technology or libraries with literature. It also means, where appropriate, measures such as the establishment of graduate schools. Institutional strengthening also includes promoting the third mission, quality management, good leadership, career planning, strengthening diversity and the position of women scientists. Such measures can also counter brain drain and thus contribute to building stable and crisis-resistant states and societies.

This does not mean institutionally replicating the German or European understanding of science. Research institutes and universities in partner LMICs should be organised as best as possible according to local needs and practices. Therefore, "institutional strengthening" of a (for example) Latin American university does not necessarily mean following the model of a European university. The aim must be to ensure that local research institutes and universities are best placed to respond to local societal needs, in particular the need for transformation to build local resilience to global crises, and to recognise and effectively integrate local knowledge resources and knowledge holders.

Proposal 3: Plurality of knowledge and knowledge holders for knowledge creation

Plurality of knowledge and knowledge carriers is not a regularly discussed topic in many scientific disciplines. Criteria and standards for knowledge and truth that are valid across disciplines and generations may have been refuted by scientific theory, but they still exist to some extent in practice. And irritatingly, especially in cooperation with economically weaker countries, some basic assumptions and frameworks often seem to be shaped by a European-Anglo-American understanding of science from the mid-20th century[56]. This understanding has many merits, but it does not do justice to the actual epistemic, inter- and transdisciplinary and methodological diversity of today's science. In particular, it ignores important views of partners from LMICs.

In terms of the theory of science, the current state of knowledge is that **the criteria and standards of knowledge are constantly evolving across disciplines and generations**; the assumption of a timeless and universally definable "scientificity" is not correct; instead, the continuous development not only of empirical and theoretical knowledge, but also of the standards of science itself is an essential part of science. Science is constantly questioning its basic assumptions, both in terms of content and methodology, and it is in such times of upheaval that science makes its greatest progress. Thomas S. Kuhn coined the term "paradigm shifts"[57] in this context. Interdisciplinary collaboration therefore requires constant dialogue, negotiation and adaptation of what can and should be achieved in terms of shared "knowledge".

This is all the more true for problem-oriented research, which usually requires the **research mode of transdisciplinarity**, i.e. cooperation with non-scientific stakeholders and knowledge holders. Transdisciplinarity is not limited to problem-oriented research, but can also be the appropriate research mode for other

[56] This refers primarily to the logical positivist and empiricist understanding of science, which reduced science to observation and formal logic. The concept of scientific 'excellence' is problematic when the achievements of different types of work, including disciplinary work, are reduced to a single, possibly purely quantitative, measure of the output of scientific work, possibly based on a single indicator such as publication output.

[57] Thomas S. Kuhn. The structure of scientific revolutions. 2nd edition, Suhrkamp. (2009).

forms of research. “Citizen science increasingly involves lay people in the production of knowledge. Real-world laboratories, in which approaches to socio-ecological transformation are tested, developed and applied in a participatory way, are increasingly accepted and widely used.

What is ‘knowledge’ and who can possess, create or transmit knowledge? There are sometimes different views depending on the disciplinary or national and international discourse on scientific knowledge[58]. When methods, results and actions developed or achieved in high-income countries are to be implemented in low-income countries, the effectiveness of implementation is greatly enhanced by the transdisciplinary involvement and participation of partners from these countries. This is particularly true for transformative research on global environmental crises.

Dialogues in science on the heterogeneity of scientific cultures should be intensified, especially with regard to the design of international scientific cooperation and in direct exchanges with LMICs and at multilateral and international level. But even beyond the focus of this paper on modes of international scientific cooperation, the understanding of what knowledge and science are should be constantly reviewed and further developed[59].

There should also be a critical discussion of what it actually means to cooperate with “the” science of LMICs. **High-income countries are often only aware of a part of the scientific community in the partner countries**, namely those researchers who are already closely connected to countries such as Germany through previous experience abroad and co-authorship, and who are familiar with the scientific culture, rules and traditions of countries such as Germany. Open calls for matchmaking, which already take place today, counteract exclusion beyond the representatives of such an often relatively small group (with regard to collaborations, review panels, committees, etc.). In particular, young researchers and researchers without international experience become visible behind the group of the “usual suspects” – such other researchers often have different methodological and content-related perspectives to offer.

During the development of this position paper, the concept of **‘indigenous knowledge’** was also discussed, as is often the case in current multilateral forums. However, indigeneity is a self-describing attribute of knowledge that plays a rather minor role in surprisingly many LMICs, e.g. many countries in Africa, and their scientific systems. This position paper therefore works primarily with the concept of **‘local knowledge’** – i.e. the contextually relevant knowledge of knowledge holders, regardless of which (possibly marginalised) population group they belong to[60]. This paper uses this terminology in the full awareness that socially marginalised groups (which vary from society to society and may include women) have special knowledge, experiences and perspectives that may be sui generis for these groups and not necessarily the result of individual and collective experiences of violence, discrimination and exclusion[61].

As a conclusion to this third proposal, this position paper **recommends dialogues to overcome systemic obstacles in German (or European-Anglo-American) scientific cultures in order to improve the conditions for mutual learning (between countries with different income levels)**. Such dialogues should be designed as an ongoing process. Researchers should not primarily pursue “internal” dialogues within high-income countries, but consciously engage in a structured **cross-border dialogue** with researchers from LMICs. Science in countries such as Germany can learn from partner countries[62]. The aim should be a better understanding of (scientifically) legitimate forms of knowledge and knowledge holders – both in Germany and in international scientific cooperation. Such dialogues should also find their way into the education and training of researchers.

[58] Among other things, reference should be made to the discourses that have been taking place internationally and in Germany for some years now, which oppose all “Western science” as “(neo-)colonial” – this position paper deliberately does not adopt any of the positions represented in these discourses.

[59] For example, how can experimentally generated knowledge be scientifically valorised together with traditional knowledge? What methods can help to validate and capture local or traditional knowledge? Critical discussion also helps to avoid false conclusions: This position paper rejects oversimplified accusations of “neo-colonialism” of any science, as well as individual attempts to level the differences between knowledge and opinion, or between science and esotericism, disinformation, para- and pseudoscience.

[60] In multilateral fora, the term ‘indigenous and local knowledge’ (ILK) seems to have prevailed as a collective term until recently, while terms such as ‘traditional knowledge’ (TK) are still widely used. Recently, there have been some very intense discussions about deliberately separating the discourses on indigenous peoples and on local communities, and thus on indigenous and local knowledge. This paper deliberately does not take a position in this debate and subsumes under the term ‘local knowledge’ all forms of contextualised, localised deep knowledge, including indigenous and traditional knowledge.

[61] The concept of ‘local knowledge’ encompasses that of ‘indigenous knowledge’, but it is admittedly overlooked that indigenous knowledge is often particularly marginalised knowledge. This position paper is committed to overcoming the marginalisation of knowledge – but above all to increasing the relevance and implementation potential of knowledge through local contextualisation. This applies to all local knowledge, but a particular experience of marginalisation is unlikely to increase the relevance of knowledge.

Proposal 4: Plurality in assessment and quality assurance

When selecting scientific projects, scientific quality must always be the top priority. In basic research in particular, depending on the context, this may mean that the transdisciplinary inclusion of pluralistic bodies of knowledge is of little or no relevance. The situation is often different in applied or problem-oriented research projects: **the recognition and inclusion of pluralistic bodies of knowledge and knowledge holders** (Proposal 3) is sometimes eminently important for the successful generation of knowledge. This statement is not particularly surprising in Germany. **What is still lacking, however, is a general consensus on how to operationalise this in assessment and quality assurance in international scientific cooperation**. How can it be determined whether the bodies of knowledge involved in the specific research context are “appropriately plural” according to the problem situation and are or have been evaluated for science using appropriate methods?

Individual aspects are discussed and partly implemented. For example, it is recognised that **diversity in peer review panels and review boards always improves the quality of scientific selection processes** – but this primarily refers to “intra-scientific diversity”. Even in the design of more inclusive calls for proposals and anti-bias measures, the focus is primarily on intra-scientific diversity in ex-ante evaluation (project selection panels) and ex-post evaluation (evaluation panels).

So far, however, there has been little discussion in Germany about the fact that scientific quality (and, depending on the practical orientation, other quality aspects as well) should be reviewed in problem-oriented, transdisciplinary scientific processes. Such processes require researchers with disciplinary roots, but also reviewers experienced in transdisciplinary work and possibly also non-scientific stakeholders. Particularly in international science projects with LMICs, **reviewers with expertise in cooperation as well as transdisciplinary and local expertise** should be consulted (sometimes referred to

[62] The discovery of the Omikron variant demonstrated the value of effective research networking: The collaboration between bioinformatician Professor Tulio de Oliveira from South Africa and virologist Dr Sikhulile Moyo from Botswana was instrumental in responding quickly to the dynamics of the pandemic.

as Extended Expert Review[63]). In these cases, formative, programme-accompanying evaluation is also an option[64].

The operationalisation of plurality in peer review and quality assurance (especially in international science contexts) **should be done together with relevant stakeholders from LMICs**. Joint definition work strengthens mutual accountability. The latter is the central prerequisite for truly equal cooperation in cross-border scientific practice.

The development of **new, flexible, but above all (for other forms of knowledge) open standards for the evaluation and quality assurance of international science projects** is recommended. This can be achieved through formats closely linked to the dialogues proposed in Proposal 3.

Proposal 5: Make global agenda setting more effective

As outlined in Section 1.5, most intergovernmental multilateral organisations, as well as alliances of states such as the G7 and the G20, have the explicit purpose, in addition to coordination and standard-setting, of **jointly agreeing on "common agendas"**. These serve to pool resources and competencies in tackling important supranational tasks, to make action more effective, to tackle challenges at the right scale, and to solve problems faster and better overall. This also applies to science policy – intergovernmental organisations and alliances with a science and research mandate regularly set research agendas. In fact, even organisations without a research mandate do so, as science and research are often needed across policy areas to solve problems. While some agenda setting is more selective and unstructured, sometimes in response to a current need, agenda setting is more often the balanced outcome of a structured and participatory process. As already described in 1.5, UNESCO in particular has a number of institutions, such as the Intergovernmental Hydrological Programme, which are even used primarily for agenda setting with the explicit participation of LMICs.

However, the implementation of such common agendas often falls **far short of expectations**.

There is an urgent **need for high-income countries to prioritise such multilaterally agreed research agendas for actual implementation** (especially where such agendas have actually been developed in a structured and participatory manner). They should either work to ensure that the relevant multilateral organisations/networks are provided with their own science funding budgets – or, where this is not appropriate, for example because of the nature or performance of the organisation/network, align themselves with these agendas through their national science funding organisations.

This **also applies to Germany** in the G7 and G20, in UNESCO and in all other forums.

[63] Extended expert review' refers to a peer review process in which relevant non-academic experts (e.g. from practice, policy or civil society) are consulted alongside researchers. The term 'Extended Peer Review' is more commonly used, although this primarily refers to the assessment of scientific articles. This position paper considers different stages in the life cycle of a scientific (collaborative) project (not only publications as end products), which is why the broader term 'Extended Expert Review' is used here (see Guimarães Pereira, Â. & Funtowicz, S., Quality Assurance by Extended Peer Review: Tools to Inform Debates, Dialogues & Deliberations. TATuP 14. 74-79. (2005)).

[64] In addition, there is experience of diversity-sensitive selection, such as the inclusive design of calls for proposals and anti-bias measures in the evaluation process (criteria-based selection, anti-bias training), including specific gender perspectives.

2.2 Organisation of STC agreements, strategies, funding lines and alternative forms of international science funding[65]

On the basis of Section 2.1 and its proposals for political and cultural framework conditions for equitable international scientific cooperation, the following section formulates four proposals for the **concrete design of relevant funding lines and the content of bilateral "Scientific and Technological Cooperation" (STC or as German acronym WTZ) agreements**. In addition, the section presents approaches to international science funding that do not necessarily involve a state or state-affiliated partner on the side of the LMICs, and which can therefore keep open a corridor for scientific cooperation in autocratic or fragile states, for example.

Some of Germany's current STC agreements with partner countries are decades old and thus date from a time when international cooperation was much less the norm than it is today. Before the fall of the Berlin Wall, the Federal Republic of Germany apparently initiated such agreements also with the aim of consolidating political alliances with the (then) so-called "Third World" and therefore sought partners with the most favourable conditions possible, as is increasingly on the agenda again today. Even though such old STC agreements already mention equitable cooperation, they do not characterise what they mean by this practice. With regard to STC agreements, it should be emphasised that this position paper does not make a sharp distinction between cooperation that has arisen from a development policy perspective and cooperation that has arisen from a science policy perspective. The principles outlined here apply to both.

It should be stressed again that equal scientific cooperation does not mean that all conditions of cooperation must or could automatically be the same for all partners. **Some asymmetries are unproblematic or even useful**, e.g. more partners in the country/countries of research focus. However, asymmetries that prevent equitable work on common research questions should be overcome and require changes in the short, medium and long term. Asymmetries that cannot be overcome in the short term need to be identified and addressed sensibly and without paternalism.

[65] Examples of bilateral and multilateral science funding programmes include the 'Long-term Europe-Africa Partnership on Renewable Energy' (LEAP-RE), the 'Long-term EU-Africa Partnership in Sustainable Agriculture' (LEAP-AGRI) and the 'European and Developing Countries Clinical Trials Partnership' (EDCTP).

Proposal 6: STC agreements: Equal consideration of partner countries' interests

STC agreements are an important basis for bilateral scientific cooperation between Germany and (but not only) less economically powerful partner countries – as is also the case in most other HICs. The content and structure of Germany's around 50 STC agreements are very similar: they define cooperation priorities, sometimes focusing on specific disciplines, followed by very general basic rules (e.g. on how to deal with imports, exports or patents). Although STC agreements are not development cooperation instruments, they contain clauses that are also used in a development context.

Details of specific scientific cooperation projects are not regulated in STC agreements but in individual agreements based on them (e.g. with regard to funding; content and scope of projects; use of results; insurance, health and safety issues). The same applies to the modalities of the initiation phase of scientific cooperation projects, e.g. issues related to the definition of the research interest and the objectives of the projects, which are also not regulated in the STC agreements themselves. There are also no guidelines on how to deal with local or traditional knowledge and its holders in partner countries.

This position paper suggests that when concluding new STC agreements, the German government should explicitly include rules in these agreements that enable the partner country to participate more fully and as equitably as possible in the content development, management and implementation of scientific cooperation projects. If existing STC agreements are to be revised, it is recommended that such rules be included.

For example, the following clauses could be included in future STC agreements:

- The contracting Parties shall work on the basis of equity and mutual respect.
- The contracting Parties jointly decide on the formats and bodies for project selection.
- Each Party shall ensure that it does not explicitly or implicitly limit the ability of the other Party to effectively fulfil their joint responsibilities in cooperation, and in particular to fully express and translate into appropriate funding principles and guidelines its priorities regarding STI cooperation themes and instruments, in particular as they arise from country-specific needs and challenges.
- If or as long as there are significant differences in economic performance between the Parties, cooperation should also contribute to overcoming these differences by building and strengthening institutional and human capacities in STI and by addressing research priorities based on country-specific needs and challenges. The Parties agree that in such cases it remains a joint responsibility to ensure, through appropriate monitoring and evaluation, that STI cooperation reduces disparities and does not have the unintended side-effect of widening them.
- Each Party shall endeavour to ensure that, when funds are allocated to institutions of the other Party, such allocations can be made directly, without going through institutions in its own country.
- Each Party shall, within its sphere of influence, ensure the protection of local, traditional and indigenous knowledge and, where appropriate and consistent with such protection, ensure that such knowledge is integrated and used in scientific cooperation in accordance with the CARE Principles.
- The Parties shall endeavour to achieve joint project management for all implementation projects under this Agreement.
- The Parties shall ensure the open availability of publications and data (in accordance with the conditions and restrictions of the UNESCO Recommendation on Open Science) resulting from joint scientific projects.

Proposal 7: Consideration of partner countries' concerns and inter-ministerial coherence in national strategies

As explained above, STC agreements (especially the more recent ones) and in particular many funding lines already allow for the equitable design of international science projects – they simply provide too few binding or concrete incentives and guidelines for all international science projects to be actually equitably designed in practice. However, bilateral STC agreements are only one type of important basic texts. In addition, there are **national strategies as a second basis for international science projects**.

There are strategies that Germany has set for itself, some of which are global in scope (e.g. the Internationalisation Strategy of the BMBF), some of which relate to a specific world region (e.g. for Africa: BMBF Africa Strategy, BMZ Africa Strategy, Africa Policy Guidelines of the Federal Government of Germany), and some of which are thematic strategies with considerable international implications, such as the National Hydrogen Strategy.

These strategies tend to be strongly committed to the principle of equity. As it is the most recent strategy with a very clear statement, the following is quoted from the Africa Strategy of the German Federal Ministry for Economic Cooperation and Development (BMZ), published at the beginning of 2023: "The BMZ thus advocates that the voices of African states and the AU are heard appropriately within multilateral fora. African priorities, initiatives and institutions form the foundations for cooperation. (…) [The BMZ] wants to avoid patronising partner states and engages critically with its own understanding of what constitutes good development." From the perspective of this position paper, there is nothing to add to these formulations at this general level.

Experience shows, however, that **such general formulations are not sufficient**, because they all too rarely lead to the basic norms being adequately implemented in the operationalisation of strategies, e.g. in calls for proposals. And this is crucial, because even more frequently than in bilateral STC agreements, the funding guidelines of the Federal Government and other German science funding organisations, which are generally open to actors from third or partner countries, are based on such strategies.

The German government is therefore encouraged to **operationalise more clearly in its strategy papers what is actually meant by norms or principles such as "respect and reciprocity" and how cooperation characterised by "respect and reciprocity" could or should function.** In addition to the points cited above, the BMZ Africa strategy operationalises the goal of an "organisational culture of diversity and [the] promotion of diversity among employees" – a goal that is very much to be welcomed – and the orientation towards the AU's catalogue of goals: "The BMZ supports the development goals set by the African Union and its member states with structural policy approaches." The latter has been good practice since the Busan Partnership – but has not yet been well received, especially in scientific cooperation.

The German government is therefore encouraged to **operationalise more clearly in its strategy papers what is actually meant by norms or principles such as "respect and reciprocity" and how cooperation characterised by "respect and reciprocity" could or should function**. In addition to the points mentioned above, the BMZ's Africa strategy operationalises the goal of a "culture that values diversity (…) and champions diversity among the workforce" – a very welcome goal – and the orientation towards the AU's catalogue of goals: "The BMZ provides structural support for the development goals that the African Union and its member states have set themselves". The latter has been good practice since the Busan Partnership – but has not yet been well received, especially in the area of scientific cooperation.

Such strategy documents are therefore a valuable opportunity to hear from and recognise international partners, even if they can never request to do be heard.

National strategy documents should therefore at least refer to landmark agreements adopted by international partners, as the BMZ's Strategy for Africa does by referring to the AU's Agenda 2063 and the AU's 'Science, Technology and Innovation Strategy for Africa 2024'. The **objectives and interests set out in these agreements should be analysed and taken into account** as far as possible, also when operationalising national strategies.

Such a serious consideration and operationalisation of partner countries' concerns in national

strategy documents can become a key instrument of German Foreign Science Policy and effective Science Diplomacy to strengthen trust in Germany. In view of the increasing international competition for cooperation with middle- and low-income countries and their science, this approach can also be a real argument in favour of cooperation with Germany (see also Section 1.8).

The core element of equitable international scientific cooperation must continue **to enable cooperation in both directions**. At present, most strategy papers and the programmes based on them aim to ensure that research topics or researchers from Germany influence the discourse on research topics and scientific structures in middle and low-income countries. Decisive **efforts are also needed to anchor the perspectives of people from partner countries more firmly in scientific discourses and structures in Germany**.[66]

In addition, international partners are calling for **Germany to adopt a more coherent approach to the strategic goals of international science policy in the sense of a clearly defined inter-ministerial (whole-of-government) approach**. At least from an external perspective, it is repeatedly reported that the strategies, programmes and funding lines of various ministries are perceived as having divergent objectives. At the same time, the German government's most recent report on international cooperation in education, science and research 2021-2022, entitled "Global challenges, joint solutions", clearly shows how well the approaches of the Federal Foreign Office (AA), the BMBF and the BMZ complement each other[67]. **This joint strategic orientation should be better communicated to the outside world, while at the same time strengthening interdepartmental cooperation**[68].

Proposal 8: New forms of scientific cooperation beyond public partners and bilateral cooperation

Human rights, including the scientific freedom of researchers and their institutions, are under increasing pressure worldwide, which is why UNESCO has recently launched a new programme on the subject[69]. With the Philipp Schwartz Initiative, the Hilde Domin Programme and many decentralised contributions, Germany has already shown considerable commitment to the human rights of researchers in its international scientific cooperation. Through further measures of institutional cooperation, Germany can also help to ensure that the "shrinking spaces" of freedom do not disappear completely.

Firstly, in the case of states that restrict scientific freedom, Germany could more frequently **implement cooperation and funding programmes via intergovernmental multilateral "intermediaries" such as the UN organisations and/or, for Africa, the African Union or regional economic communities such as the Economic Community of West African States (ECOWAS; similar for other regions of the world), or at least initiate the corresponding discourses that are necessary for such "intermediaries" to be able to perform such a task**. The EU has only recently entered into such a cooperation with the AU, with both partners having previously negotiated the content guidelines together with researchers in an open process. In the past, the BMBF has also repeatedly used UNESCO as an "intermediary" in its cooperation with individual authoritarian states. Such forms of cooperation can help to maintain links with the scientific community in countries with which bilateral intergovernmental cooperation is not possible.

Secondly, in scientific cooperation with authoritarian and/or fragile states, **Germany should make use of the possibilities offered by subordinate authorities and local, national or international non-governmental organisations as intermediaries**. There are no standardised procedures, as the situation varies greatly from country to country. For example, in some countries it may be appropriate and politically acceptable to work with a government-funded body, e.g. the national research funding agency, rather than the research ministry itself. In other countries, however, cooperation may only be successful if it is carried out with the researchers themselves (if this does not jeopardise their safety). On the German side, such an approach requires a more flexible legal framework for international science funding, including, if necessary, a higher share of overhead costs.

With regard to multilateral organisations as "intermediaries", there is a further demand, particularly in the case of UNESCO: Section 1.5 explained that **multilateral organisations are – or could be – a place for joint agenda-setting** if the instruments available for this were used consistently. To this end, Germany should work in all organisations, convention bodies and intergovernmental bodies to ensure that all approaches to joint agenda-setting are expanded and brought to life.

Proposal 9: Appropriate formulation of funding lines and calls for proposals

STC agreements and national strategies (Proposals 5 and 6) cannot be updated at will. However, this is not necessary, as the existing basic texts usually already provide sufficient legitimacy to anchor rules and criteria that enable more equal international scientific cooperation in funding lines and calls for proposals.

Key starting points are the templates used by ministries (and their subordinate authorities, project management agencies and upstream organisations) for funding lines and calls for proposals, grant agreements and other legal texts.

This position paper recommends a critical review and, if necessary, revision of the rules and criteria for the design, selection, evaluation and implementation of international science projects that are contained in the templates of the ministries (and their associated organisations). This concerns both the question of whether such rules and criteria are included in the funding lines and the extent to which they are binding. Are these more or less voluntary "add-ons" or does the consideration of the goal of equal opportunities in research proposals with international participation significantly change the assessment of these rules and criteria?

In general, funding lines and calls for proposals should take **greater account of the concerns of partner countries**. To this end, appropriate coordination with partner countries should take place and the results and outcomes achieved should be recognised in the funding lines. General references to the 2030 Agenda, the AU Agenda 2063, etc. and/or to STC agreements and/or federal strategies in funding lines and calls for proposals are not sufficiently convincing to legitimise funding activities from the perspective of partner countries (see Proposals 3 and 6).

This paper explicitly does not take the position that all members of an international research project can or should be treated equally in all respects. Contextualised research requires, first and foremost, **complementary roles** in which all participants are not on the same level in terms of their contributions (in terms of responsibility, expertise, etc.), but rather

[66] Mentoring programmes, in which senior researchers from low-income countries participate in the training of young researchers from high-income countries, are one possible measure. Funding opportunities for researchers from LMICs to conduct research in and about high-income countries (both field research and theory development) should also be expanded.

[67] This is particularly evident on pages 29 ff, which deal with the joint shaping of the global scientific landscape with emerging economies and developing countries (https://www.bmbf.de/SharedDocs/Downloads/de/2023/bericht-internationale-kooperation.pdf?__blob=publicationFile&v=5).

[68] Belgium offers an interesting model of structurally agreed cooperation between development and research ministries in cooperation with economically weaker countries.

[69] Further information on the new UNESCO programme can be found at https://www.unesco.org/en/articles/promotion-scientific-freedom-and-safety-scientists-new-programme-and-call-action.

complement each other in the best possible way. It is also completely unrealistic (and would also have detrimental side effects), for example, to want to apply German salaries to all employees of an international research project. This would create completely wrong incentives in the partner countries. **However, all conditions concerning intellectual property rights, safety and integrity of project staff should be non-negotiable**. The same conditions must be ensured here, e.g. with regard to insurance for those involved in field research.

In particular, the expected benefit of the knowledge to be gained for the partner country(ies) needs to be taken more into account when drawing up funding lines. This is all the more important as in most cases the actual research will be carried out in these countries. However, 'taking greater account' of the benefits for the partner country and its priorities never means that this is the only criterion: Partnerships are always about bringing together the respective interests and benefit definitions of two or more partners.

The following sub-proposals are possible "operationalisations" of Proposal 9 for reviewing and revising funding lines (and should be read in addition to Proposal 1).

Proposal 9.1: Enable joint formulation of the application

In addition to the joint agenda-setting for the formulation of funding lines suggested in Proposal 1, the **joint agenda-setting of the future research partners in the development of concrete project proposals** is probably the most important building block for the success of the collaboration. The research interest, the research question(s) and the implementation structure, including the project budget, should be developed jointly as far as possible. In order to achieve this, **time and financial resources are needed** for match-making activities in funding lines **before detailed, binding applications are prepared**[70].

Fortunately, two-stage application procedures are no longer an exception (in some cases there are already "three-stage" procedures, where "match-making" and then an initiation phase are funded before the actual project – this is very much welcomed in this position paper and should in no way be restricted by the fact that the word "two-stage" is used below). The first phase of initiation, especially in international collaborations, is intended to allow partner consortia to find each other and to harmonise their respective interests and objectives. This two-stage approach, especially if sufficient time and resources are allocated to the first stage, strengthens the equality of partners and should be used in all funding lines/tenders (or corresponding templates).

However, two-stage procedures are not a panacea, especially if too many preliminary specifications are required in the initial applications that cannot be revised later. It is therefore important that in two-stage procedures the **first stage of the procedure is designed to be sufficiently sensitive and that subsequent changes to key variables remain possible**.

In the first, or at the latest in the second phase of the application, it is necessary to **jointly define the research interest, the resulting problems and research questions**, and the rough structure of the project. If successful, this will ensure the ownership of the project partners from the outset and, ultimately, the likelihood of high-quality project outcomes that are effective and useful in practice. The additional financial and organisational effort is worthwhile and represents a valuable investment in the sustainability and effectiveness of international scientific cooperation.

In practice, there are time and financial limits to this requirement. In the case of transdisciplinary work, for example, it is difficult or impossible to engage in dialogue with all local stakeholders and relevant knowledge holders at this early stage, even in two-stage projects. **Funding lines should therefore allow for the flexibility to continue or intensify this exchange even after the project has been approved** and, if necessary, to adjust the original research design – especially in the case of transdisciplinary work. Depending on the research area and research question, an initial exchange with local groups and/or their preliminary integration into the project consortium should also be planned at this early stage (as is usually the case for many research activities in the Amazon region in Brazil, for example).

Proposal 9.2: Ensure plurality of knowledge/knowledge holders

In Proposal 3, this position paper has already suggested processes for self-reflection in German science on the plurality of knowledge and knowledge holders. However, such processes are needed not only in science as a whole, but also in most individual projects of international scientific cooperation. For this reason, it makes sense to provide appropriate incentives and guidelines to promote equal cooperation and plurality. The focus should be on positive incentives and the reduction of cumbersome guidelines in funding lines and calls for proposals. Only where absolutely necessary should equal cooperation be promoted in the sense of restrictions.

Firstly, the funding guidelines (or templates) should be reviewed to see whether, depending on the context, it makes sense to make them **more open to different forms of knowledge** and, where appropriate, more cross-compatible with other disciplines than the one specifically intended.

Second, funding lines (or templates) should be revised so that they (depending on the research topic) **structurally encourage applicants to engage in meaningful and appropriate plurality and provide enabling frameworks and incentives**. They should encourage maximum flexibility in the knowledge, knowledge holders, methods and theories used in international scientific processes, for example by involving local communities in the co-design of the scientific project and its overall implementation. They should also encourage the inclusion of knowledge, experiences and perspectives from marginalised groups. Funding lines should also encourage research partners to engage in regular processes of exchange and reflection on the plurality of knowledge that may be needed, available or to be drawn upon, and its holders. The appropriate plurality of the research approach, in particular the question of how local knowledge is considered, should also be included as a criterion in the evaluation of research proposals. It goes without saying that researchers and institutions in the partner country must be involved in the research project.

In order to focus on the conceptual content of the application and explicitly not on the names of specific researchers or institutions, **anonymous application procedures** can be helpful,

[70] A current good example is the match-making activities between the Netherlands and African partner countries in the EU project European & Developing Countries Clinical Trials Partnership (EDCTP). As the research activities take place in Africa, the research questions were proposed by the African partners, with the Dutch partners mostly playing a supporting role.

especially in the case of mobility funding. This can also avoid (unintentional) discrimination and increase the chances of young researchers as well as of plural knowledge and its carriers.

Understandable language and access are important issues when working with local communities. Concrete solutions include using **simpler language** in dialogue with these groups and/or additional **resources to translate key information** about the project and scientific publications into local languages (as the Netherlands does, for example, when communicating with indigenous communities in South America).

Proposal 9.3: Equal conditions for the safety and integrity of all project staff

Funding lines should be reviewed and, if necessary, adjusted to ensure that they provide a level playing field for the safety and integrity of project staff. Currently, for example, researchers in the field may enjoy different insurance cover depending on whether they are from Germany or a partner country, to the detriment of researchers from the low-income partner country. Such unequal treatment may be legally necessary from the point of view of funding organisations, but it has a fatal external effect on the internal dynamics of research teams, which is why the legal basis of funding lines should be reviewed and, if necessary, changed.

Proposal 9.4: Enable longer project cycles

Short funding periods and project terms for the treatment of often complex research questions lead to high time pressure and few opportunities for the effective development of trust between project partners. They are therefore the main obstacles to plurality and participation in international science projects.

Significant time is required to identify, contact, inform and gain the confidence of relevant knowledge holders to share their knowledge – more than is foreseen in most funding lines. This applies both to the early stages of scientific projects (i.e. the initiation phase in stages 1 and 2 of a two-stage procedure and, in particular, the early implementation phase) and to the actual implementation of the research work. In almost all contexts, two or three years is too short for transdisciplinary problem-oriented research, but also for many projects in other research modes. **Against this background, the project duration of funding lines should be extended**, if necessary significantly, depending on the context. The risk of insufficient quality in longer-term research projects can be countered by interim evaluations.

The Swedish development agency Sida, which also funds international science projects, has already significantly extended the duration of projects, and a similar approach is being discussed in the UK. There are also efforts within the European Commission to extend the duration of EU-funded research projects.

Proposal 9.5: Make science projects more flexible

Many funding lines make it a condition for funding that the theoretical and practical research approach, as well as all measures for disseminating the knowledge to be gained (e.g. through publications or events), are defined in detail and usually quite bindingly at a very early stage, i.e. when the application is submitted. If changes are possible at all, they require a (possibly burdensome) bureaucratic act. However, this very strict pre-determination is often not helpful or realistic in terms of a pluralistic and integrative research design, in which – as already described – a problem identified in the real world first has to be captured and understood from different perspectives before solution options can be developed. **In order for research projects to generate relevant implementation knowledge, they should therefore also be able to be adapted more flexibly during their execution**.

Proposal 9.6: Make capacity development and institutional strengthening eligible for funding

In order to strengthen the long-term impact of international scientific cooperation projects, **funding should also be made available for measures to develop scientific capacities, for the implementation of training programmes and for the structural and institutional strengthening of all partners** (this should be understood as a follow-up to Proposal 2). Current funding lines often provide for this possibility only to a very limited extent.

German researchers themselves may also need capacity development, e.g. courses in intercultural communication. Deficits in the practice of such communication are obvious and, to a certain extent, unavoidable due to the cultural diversity in the partner countries. Furthermore, as will become clear in the following Section 2.3. on the practical scientific process, questions of data governance are high on the agenda for researchers from Germany as well as from low-income partner countries. Capacity development for data collection and the application of open data and open access standards (especially when openness collides with indigenous claims to data ownership) are further topics on which there is usually a need for further training at the level of individual projects, as is the strengthening of research integrity procedures.

Institutional capacities in the partner country can be strengthened at two levels. First**, certain funding restrictions, such as the usually limited eligibility of project-related material resources and equipment, should be critically reviewed** (including ensuring that these items remain productively available to the partner country's scientific community after the end of the project). Experience from Japan has shown that such long-term provision of (cutting-edge) technology can significantly increase the motivation of researchers as well as the quality of research results in the preceding project. Increased eligibility for funding of material resources and equipment strengthens institutional relations between partners from Germany and LMICs.

Second, institutional structures in partner countries can be strengthened by **making it easier for smaller research institutes in low-income countries to participate in open calls**. At present, they often fail because of the formal criteria.

Cross-funding between financial titles should also be made more flexible beyond the 20% rate common in many funding organisations, as the DFG has made possible even between personnel and material titles. The International Development Research Centre (IDRC), Canada's central funding and research agency for international scientific cooperation, has taken an even bigger step towards greater flexibility. There, part of the funding is held back for spontaneously arising challenges (so-called flexible funds).

Proposal 9.7: Allow transfer of funds to project partners

Some funding lines (and grant notification based on them) already **allow for the transfer of project funds to partners in LMICs**. For example, it is possible to transfer (part of) the project administration or – beyond the traditional content-related orientation of funding lines – to set up research hubs or alumni organisations with largely autonomous fund management. However, such a transfer of funds is the exception rather than the rule for three reasons.

Firstly, many funding lines do not provide for such a transfer at all, or only to a limited extent. Partners from LMICs can currently only receive a maximum of 30% of the total project funding, even if the entire project is carried out in these partner countries. This rule reinforces the perception of an "extractive" model of science and also effectively pushes researchers from LMICs to be perceived as "data collectors". One option would be to include a **general authorisation to transfer funds** in each funding decision. Since the transfer of funds to third parties is always associated with high liability risks for the German funding recipient, **direct funding of non-European partner institutions** would be all the more desirable – after a necessary basic decision by the German legislator – especially if significant funding amounts are involved[71]. If the current transfer model is to be retained, the **quantitative restrictions on the proportion of funds that can be transferred should be lifted or at least made more flexible**.

Secondly, many actors in partner countries fail to comply with the very complex requirements of German administrative law on project management and financial administration. The reasons for these requirements are generally plausible; indeed, corruption is more prevalent in the countries relevant to this position paper than in Germany. Nevertheless, scientific cooperation is about building trust – and this is not fostered by extensive, detailed specifications in funding lines and grant notifications, for which the partners practically always lack the understanding that German administrators assume. The rules laid down in the General and the Special Ancillary Provisions (of German Federal Government's grant notifications) (ANBest; BNBest), which accompany every grant notification, are responses to German realities that are often simply not understood or relevant abroad. If the current basic transfer model is to be retained and the proportion of funds that can be transferred increased or at least made more flexible, **the ANBest and BNBest rules for the administration and use of funds should be simplified (including the removal of requirements that are irrelevant abroad) and made more flexible. The possibility of delegating control tasks to partner organisations should also be urgently examined**.

The third obstacle is the concern of funding organisations that a more flexible and simpler transfer of funds could violate administrative law, in particular the requirements of the German Federal Audit Office. **This makes it all the more important to conduct a legal review of such flexibilisation**, including the "clean-up" of ANBest and BNBest of requirements that are irrelevant abroad – while central requirements for preventing corruption are not up for discussion. This also requires a fundamental decision on the part of the granting and legislative authorities.

It is important that research managers, legal advisors and internal/compliance auditors of research institutions that receive funding can inform themselves about the scope that actually exists for the transfer of funds. For this reason, relevant **advisory and educational services, such as those offered by the DAAD, should be expanded**.

[71] In the case of financial transfers based on §44 of the German Federal Budget Code (Bundeshaushaltsordnung, BHO), liability risks must be covered as part of the project budget by setting aside reserves (e.g. 10 % of the amount to be transferred) for unforeseen events and the development of audit capacities (in the applicant institution itself or through contract auditors).

Proposal 9.8: Enable equal project responsibility, budget rights and budget obligations

A simplified, more flexible and larger transfer of funds to project partners should also be accompanied by an **extension of their budgetary rights and obligations** (e.g. regarding the eligibility of material resources and equipment, as discussed in 9.6). In addition, the modalities of the funding lines should also be reviewed with regard to other relevant criteria for **equal project and budget responsibility**: Do the criteria allow or prevent equal project responsibility (e.g. by requiring a German partner to be the main applicant or by not including researchers from the partner country in the team of authors of project publications)? Are the (German) implementation rules for such equal status at all practicable (also in terms of their administrative complexity)? How can obstacles to mobility for project partners from low-income countries that impede important personal exchanges be minimised (e.g. by facilitating applications for travel funds and (re)introducing research visas)?

Proposal 9.9: Facilitate links between partner countries

The DAAD's Sur-Place/Third Country Scholarships enable young researchers to pursue postgraduate studies at universities in their home countries or at institutions in their continent that are particularly qualified in their field. Such scholarships send a particularly **strong signal to the governments of the partner countries that Germany does not support the brain drain and has confidence in the academic quality** of the institutions in the partner countries. In addition, these scholarships help the countries of a particular region of the world to become more visible to each other as centres of science. Such scholarships stand for trust, above all trust in the future of the partner countries as centres of science.

Such **mechanisms for involving other countries in the partner country's region (or beyond) should be used more intensively by German funding institutions**. For example, where appropriate, it would make sense to open up research projects dealing with issues in East Africa to include researchers from West Africa or even South Asia and to finance the corresponding mobility and research services.

Proposal 9.10: More training for equitable project organisation

The above-mentioned proposals convey an understanding of scientific cooperation that is not yet widespread in Germany. Accordingly, appropriate initial and, above all, continuing training is needed. **Researchers and administrative staff should be provided with the necessary skills to participate appropriately in the application procedures for scientific projects in line with the above proposals**. Existing programmes for the joint development of project proposals, such as the proposal writing workshops offered by the DFG, should be expanded. In addition, research institutions should actively encourage their staff to participate in related training programmes.

2.3 Organisation of the practical scientific process

The lack of equality in international scientific cooperation between Germany and LMICs is not only due to the cultural and political frame-work conditions in Germany (Section 2.1.) or the design of STC agreements, strategies and funding lines (Section 2.2.).

While Section 2.2 is primarily aimed at funding agencies and offers proposals on how to deal with agreements, strategies and funding lines, it is of course also **up to the researchers themselves to shape the research project in an equitable way**.

Only if researchers do actually live up to the proposals presented in this position paper, equality in international scientific cooperation will be achieved.

As outlined in Proposal 9.10, **education and training** are needed to communicate the added value of equitable international scientific cooperation to researchers.

In many cases, however, an important additional dimension of the implementation practice of research projects is the **avoidance of unintended consequences**. Based on the experience of specific projects, this position paper identifies three key aspects for more equity in the implementation practice of international research projects.

Proposal 10: Organise and maintain equal roles, responsibilities and modes of cooperation

Real equality in international scientific cooperation can become an important argument in favour of Germany as a partner in the increasing "competition" for the best scientific partners from LMICs. If German researchers "live" equality, this is also an important argument for them in the "competition" for the best scientific partners from these countries.

Roles, responsibilities and forms of cooperation between researchers in projects between Germany and LMICs should therefore be clearly and equally defined, and monitoring of implementation should be established. The **negotiation process and the written specification of these points** should also take place at an early stage and with the representative involvement of all project participants (the written result of this process is referred to in various ways, e.g. as a memorandum of understanding, terms of reference, stakeholder agreement or cooperation agreement). Many countries, including Germany, have already had good experience with such agreements, but the incentives for their widespread use are too low. **In addition to a clear definition of roles and responsibilities, modes of cooperation should also be established at this stage** (e.g. with regard to common standards for the collection, storage and use of research data or joint authorship). This approach strengthens mutual trust at an early stage of the project and subsequently makes it easier for project partners to focus on the scientific research interest. More on the specific content in the following Proposals 11 and 12.

Adherence to such agreements must be regularly monitored during the course of the project. It is crucial that this monitoring is carried out in an equitable manner and that the researchers from Germany do not see themselves in the controlling role and the researchers from the partner countries exclusively in the controlled role. The greater flexibility of the rules proposed in this position paper implies more monitoring tasks; it is therefore all the more important to handle monitoring carefully and sensitively, so that the equality of the partnership (as an unintended consequence) does not deteriorate.

It is suggested that researchers from all countries involved in a project already define monitoring and all related tasks and roles in their MoUs and ToRs. For practical implementation, despite all the advantages of digital communication, it is strongly recommended that **joint monitoring be carried out in the context of face-to-face meetings** explicitly dedicated to this topic, e.g. as a separate event in the margins of research conferences, for which sufficient time is planned. Joint monitoring regularly leads to discussions about divergent perceptions, possibly about conflicts of values and roles, and to implicit or explicit criticism. Criticism needs space, time and trust if it is to lead to improvement and resolution rather than conflict.

Some internationally active scientific institutions have set up **complaints committees** to which project staff (or research participants) can turn (anonymously) if necessary in order to ensure equal cooperation structures in scientific projects.

Proposal 11: Equal rights in the scientific publication process

In the scientific community, the publication of research results is often equated with the success of researchers and therefore has a significant influence on their career development. This makes appropriate **co-authorship by all researchers involved** a key requirement for ensuring equal international scientific cooperation – and at the same time an issue that can hardly be regulated by funding lines but falls within the responsibility of the researchers themselves.

Sufficient time is needed to discuss the realisation and implementation of joint authorship. Different scientific disciplines and countries have different traditions about who should be named in a list of authors and in what order. As these traditions are often deeply rooted, the issue of authorship may not even be recognised as a potential problem, and unfair solutions become an unintended side effect. Some of these authorship traditions are disadvantageous to junior researchers, others to other partners involved. Some senior researchers may be used to being named first. **Agreeing on a common practice in international, inter- and transdisciplinary projects is an excellent opportunity for "new traditions" that give inclusive visibility to all relevant stakeholders**.

Mandatory co-(main) authorship by researchers from LMICs is sometimes required. In practice, researchers from LMICs – as well as contributors from local groups – are often only thanked but not listed as co-authors. An inclusive negotiated approach to this issue should also be included in the project collaboration agreement (Proposal 10). Such agreements should also address the issue of **coordinated and harmonised standards for data collection, processing, storage and sharing as a possible prerequisite for equal research and thus publication output**. Data sharing also requires bi-directional access to research data infrastructures.

The choice of publishers and journals should also be a matter of joint discussion, with plenty of time for this. Above all, **free access to the research results should be ensured** (open access, possibly preprints). Publishing in the journal with the highest impact factor may not be the best choice for everyone involved. When and how (and by which authors) results from projects can be published in non-scientific journals is an important question that should be agreed upon as early as possible. Authorship should in any case be appropriately (and in certain cases possibly symbolically) honoured: This also applies to project reports, expert opinions, studies, presentations, policy advice and other documents produced alongside the main scientific outputs. However, extended Open Access standards for project publications (Gold Open Access) are often associated with high fees, which is often an insurmountable hurdle, especially for (young) researchers in LMICs. In the best case scenario, Diamond Open Access is chosen as the publication standard or additional funding is made available for Gold Open Access. Alternatively, at least an attempt should be made to achieve Green Open Access.

The **contributions of local knowledge holders and research assistants** should also be recognised as much as possible, possibly even as co-authors. In Canada and Australia, for example, there are specific frameworks for research with indigenous people.

Proposal 12: Targeted strengthening of science communication

Responsible science communication is an integral part of the science system. However, science projects often provide little time and financial resources for the effective use of the knowledge generated. This is particularly problematic for international science projects that aim to generate transformative knowledge to address major global challenges. Virtually every funding agency welcomes science communication activities out of self-interest[72], but there is often not enough money or time **to prepare and disseminate the knowledge gained in a way that is appropriate for the target audience and thus to put it into practice**.[73] It was only in March 2024 that the German coalition parties agreed to strengthen science communication, in part by systematically anchoring it in the BMBF's research funding[74].

Researchers themselves should also focus (more) on the practical dissemination of knowledge from the outset of project planning. Funding lines can support this by, for example, supporting the **training of researchers to prepare project results in a more appropriate way for the target audience** (e.g. in the form of recommendations for action for policy makers). Today's science communication is characterised by a wide variety of perspectives, approaches, ideas and tools, according to the perspectives formulated by the German expert group #FactoryWisskomm for the BMBF in 2019. Science communication in this current sense therefore not only conveys the results and methods of science, but also has the obligation to translate social problems and issues into the scientific system and to enter into a dialogue with society.

International science cooperation should also be seen as an opportunity to experiment with new forms of science communication that understand the potential implementers of new knowledge both as communication partners and as a target group. Stakeholders who might stand in the way of the implementation of new knowledge because their interests might be negatively affected should also be consciously considered as a target group for science communication. As is usual in science communication, clear and differentiated dissemination goals should be defined, including where results should be published and in which language(s), in order to ensure that the knowledge gained is implemented (also with local communities that may be directly affected). Another important factor to increase the implementation potential of results is to make them freely available according to open access standards, wherever possible.

[72] It is clear that the debate on alternative channels, strategies and formats for scientific cooperation is far more complex than the examples presented here. However, it is neither possible nor necessary to cover the subject exhaustively in this position paper.

[73] With regard to the monitoring of international science projects, new quantitative and qualitative criteria for measuring the long-term impact of the knowledge gained must also be developed and implemented (approaches by SIDA, DAAD and IDRC are considered good examples).

[74] Further information on the new funding approach can be found at https://www.bundestag.de/presse/hib/kurzmeldungen-993278.

List of abbreviations

AA	Federal Foreign Office (of Germany)
ABS	Access and Benefit Sharing
AIMS	African Institute for Mathematical Sciences
ANBest	General ancillary provisions (of German Federal Government's grant notifications)
ARISE	African Research Initiative for Scientific Excellence
ARUA	African Research Universities Alliance
ASTII	African Science Technology and Innovation Indicators
AU	African Union
BHO	Federal Budget Code
BMBF	Federal Ministry of Education and Research (of Germany)
BMZ	Federal Ministry for Economic Cooperation and Development (of Germany)
BNBest	Special ancillary provisions (of German Federal Government's grant notifications)
CARE	Collective Benefit, Authority to Control, Responsibility (The CARE Principles for Indigenous Data Governance were adopted by the International Indigenous Data Sovereignty Interest Group in 2019)
CELAC	Community of Latin American and Caribbean States (Comunidad de Estados Latinoamericanos y Caribeños)
CERN	European Organisation for Nuclear Research
CGIAR	Consultative Group on International Agricultural Research
CIPSH	International Council for Philosophy and Human Sciences
DAAD	German Academic Exchange Service
DAC	Development Assistance Committee of the OECD (Organisation for Economic Cooperation and Development)
DFG	German Research Foundation
ECOWAS	Economic Community of West African States
EDCTP	European & Developing Countries Clinical Trials Partnership
EMBL	European Molecular Biology Laboratory
EU	European Union
FAO	Food and Agriculture Organisation (of the UN)
GDP	Gross Domestic Product
GRC	Global Research Council
HICs	High-income countries
HLPD	AU-EU High Level Policy Dialogue
IAU	International Association of Universities
IDS	Institute of Development Studies (of the UK)
IGGP	International Geoscience and Geoparks Programme (of UNESCO)
IHP	Intergovernmental Hydrological Programme (of UNESCO)
ILK	Indigenous and Local Knowledge
IOC	Intergovernmental Oceanographic Commission (of UNESCO)
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
ISC	International Science Council
KFPE	Swiss Commission for Research Partnerships with Developing Countries
LEAP-AGRI	Long-term EU-Africa Partnership in Sustainable Agriculture
LEAP-RE	Long term EU-Africa Partnership on Renewable Energy
MSCA	Marie Skłodowska-Curie Actions (of the European Union)
NEPAD	New Partnership for Africa's Development
R&D	Research and Development
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
SDG	Sustainable Development Goals (of the UN 2030 Agenda)
SESAME	Synchrotron-light for Experimental Science and Applications in the Middle East
SGCI	Science Granting Councils Initiative
STC	Scientific and Technological Cooperation
STI Forum	UN Multi-stakeholder Forum on Science, Technology and Innovation for the Sustainable Development Goals
TK	Traditional Knowledge
WASCAL	West African Science Service Centre on Climate Change and Adapted Land Use
WMO	World Meteorological Organisation

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