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Research for Innovation and Equity

Scanning Paper: *Research for Development Models and Approaches – Main Features*

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List of Acronyms

AESA – Alliance for Accelerating Excellence in Science in Africa
ARTS – Allocations de Rercherche pour une Thèse au Sud
ATS – Actions thématiques structurantes
BEST – Bourses d'échanges scientifiques et technologiques
BMGF – Bill and Melinda Gates Foundation
CAD – Canadian Dollar
CARI – Coalition for African Research and Innovation
CHF – Swiss Franc
CIDR-Africa – Centre for Infectious Diseases Research in Africa
DAC – Development Assistance Committee
Danida – Danish International Development Agency
DBT – Department of Biotechnology
DDS – Doctorants du Sud
DELTAS – Developing Excellence in Leadership, Training and Science
DFID – Department for International Development
EnPe – Norwegian Programme for Capacity Development in Higher Education and Research for Development within the fields of Energy and Petroleum
GBP – British Pound
GCRF – Global Challenges Research Fund
GLOBVAC – Global Health and Vaccination Research
IBSA – The India, Brazil, South Africa Dialogue Forum
IDRC – International Development Research Centre
IRD – French National Research Institute for Sustainable Development
ITEC – The Indian Technical and Economic Co-operation Programme
JEAI – Jeunes Équipes Associées à l'IRD
JICA – Japanese International Cooperation Agency
JST – Japan Science and Technology Agency
KEMRI – Kenya Medical Research Institute
LMICs – Low and Middle Income Countries
MSD – Merck Sharp & Doeme Corporation
NEPAD – New Partnership for Africa's Development Agency
NOK – Norwegian Krone
NOMA – Norad's Programme for Master Studies
Norad – Norwegian Agency for Development Cooperation
NORGLOBAL – Norway as a Global Partner
NORHED – Norwegian Programme for Capacity Development in Higher Education and Research
NRF – National Research Foundation
NUFU – Norwegian Programme for Development, Research and Education
NWO-WOTRO – Netherlands Organisation for Scientific Research (NWO), Science for Global Development (WOTRO)
ODA – Official Development Assistance
OECD – Organisation for Economic Co-Operation and Development (OECD) list of
ORSTOM – Office of Scientific and Technical Research Overseas
PEERS – Programme d'excellence pour l'enseignement et la recherche au Sud
R4D – Research for Development
r4d – Swiss Programme for Research on Global Issues for Development

SATREPS – Science and Technology Research Partnership for Sustainable Development
SDC – Swiss Agency for Development and Cooperation
SGCI – Science Granting Councils Initiative
SGDs – Sustainable Development Goals
Sida – Swedish International Development Agency
SNSF – Swiss National Science Foundation
USAID – United States Agency for International Development
USD – United States Dollar

1 INTRODUCTION

In recent years, there has been an increase in initiatives funding research looking at the needs of developing countries (R4D). These initiatives come in different sizes and use a wide variety of models. This paper aims to provide a glimpse at the variety of approaches applied in the R4D landscape. The intention is not to give a complete account of the models and approaches used, but rather, to present a range of initiatives that use different approaches.

We will start by presenting, based on a review of a wide variety of initiatives, some general observations on the R4D landscape, and highlighting some important new developments. We will then present six case studies that show different types of initiatives. The main criterion used for choosing a case is to illustrate different approaches. In particular, we present a variety of approaches with respect to:

- Research orientation (pure basic, use-inspired basic, and pure applied research; Researcher-driven and user-driven research);
- Types of research support provided (emphasis on investment in capacity to do research, research infrastructure, and underlying conditions for research);
- Leadership of research (developed-country versus developing country-led research and grantees that came from high-and low-capacity countries).

As an example of a funder of basic research, we present a case study on the Global Health programme of the Bill and Melinda Gates Foundation (BMGF). The other five case studies all focus more heavily on applied and user-driven research, and rely on a variety of approaches in that respect. The Global Challenges Research Fund (GCRF) from the United Kingdom (UK), for example, provides an illustration of a programme that is applied in nature and uses a challenge-based approach.

In terms of type of research support provided, we present a case study of the Norwegian Programme for Capacity Development in Higher Education and Research (NORHED) as an example of an initiative with a heavy emphasis on capacity-building. The French National Research Institute for Sustainable Development (IRD) and the Wellcome Trust are cases that emphasise research infrastructure. As an initiative that focuses on the underlying conditions to do research, we discuss the *Strengthening Research Ecosystems in Africa and Asia* initiative of the Wellcome Trust.

Most of the R4D initiatives are developed-country led. The NORHED and the Wellcome Trust case studies illustrate attempts to make the R4D initiatives more developing-country led. The case studies provide a wide spectrum of grantees. In some of the initiatives, the grantees can come from anywhere in the world as long as they are deemed likely to conduct excellent research (e.g. BMGF). Many initiatives require cooperation between the home countries of the funds and low-and-middle income countries (e.g. NORHED, and the Swiss Programme for Research on Global Issues for Development, called the r4d Programme). Other initiatives require grantees to come from the funds' home countries, but the projects can include cooperation with partners in other countries (e.g. GCRF).

We will also emphasise diversity among the initiatives by presenting case studies from various types of organisations. We include case studies from development organisation (the NORHED programme from the Norwegian Agency for Development Cooperation

(Norad)); foundations (BMGF and the Wellcome Trust); research councils (GCRF); institutions (IRD); and cooperation between development organisations and research councils (Swiss r4d).

This paper does not aim to present a review of the evidence on how effective the different R4D approaches are, but rather to demonstrate the diversity in the R4D landscape. We rely on the funders' own descriptions of their models, based on a scan of publically available documents and websites. We did not assess evaluations or other evidence regarding the effectiveness or impact of the programmes we present.

IDRC is very active in the R4D landscape, but as the objective of this exercise is to present diverse ideas of R4D programming to IDRC, we chose to minimise the discussion on IDRC programming in this paper.

2 GENERAL OBSERVATIONS OF THE R4D LANDSCAPE

The R4D landscape has a number of distinguishing features. Based on a general review of R4D initiatives, this paper we will examine the features of R4D initiatives with particular reference to research orientation, types of support, focal countries and leadership of research. We will ground this review by referring to specific initiatives, including the case studies presented below.

2.1 Research Orientation

There is a heavy applied emphasis in R4D initiatives. Even those funders who support more long-term, risky research typically justify their funding in terms of future applicability. Two of the major foundations, the BMGF and the Wellcome Trust, support bio-medical research that is focused on explaining complex functions with an eye to develop future health solutions. The BMGF particularly emphasises that it will not choose to support safe projects but rather "take on the really tough problems,"[1] typically requiring riskier investments. The Wellcome Trust has a long history of supporting more basic medical research in the UK, for instance, in genomics. In developing countries, the Fund supports the Human Heredity and Health in Africa (H3Africa), an initiative on genetic diversity in the African population, but most of its initiatives have a strong user-orientation to address infectious diseases or other health problems.

Some of the work of the IRD also appears to have a relatively basic orientation. For instance, IRD funded research on Bolivian glaciers aimed at examining climate and environmental conditions 18,000 years ago; the study of magmatic and volcanic processes; or the studies of the structure of matter, are all likely to have only a long-term applicability. IRD also refers heavily to applicability when discussing its research orientation.

There are some voices that argue that basic research is not for developing countries to pursue, and, for instance, criticise Africa's investment in space programmes.[2] These

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[1] BMGF (2017). Letter from Bill and Melinda Gates.
[2] Anderson, T. (2009). Launching your own satellite: The pros and cons. SciDev.Net. http://www.scidev.net/global/earth-science/feature/launching-your-own-satellite-the-pros-and-cons.html; Doyle, J. (2013). Four more African nations that get billions in aid from Britain join the

countries have such dire needs, with a high disease burden, environmental degradation, and an unstable food supply, that it is considered irresponsible for developing countries to be investing in long-term basic research. Others argue that in order to understand the challenges developing countries face, and promote further innovation, there is a need for basic science.[3] Without some investment in basic research, the chances for long-term solutions are compromised. Many emerging economies start to invest in basic research as their economies grow, partly because they see that their growth is more likely to be sustainable with a balanced research portfolio, including basic research.

The emphasis on applicability by R4D funders can also be traced to the philosophical underpinnings of development assistance. Western funders generally frame their development assistance as a moral obligation, where they must help countries in dire need. Often the assistance has an element of mutual benefit, but the principle of the assistance is founded on the obligation to help.[4] This is in contrast to development assistance from Southern countries that is founded on the principal of mutual benefits. Because of the basis in moral obligation of much development assistance, it is understandable that most R4D funders emphasise use-inspired and applied research.

Increasingly, funders describe the contributions to the Sustainable Development Goals (SDGs) of the research they support, and they emphasise how their research agenda is aligned with meeting the SDGs. This is echoed by several organisations and programmes, including the Swiss r4d programme, and IRD. The Netherlands' NWO-WOTRO has, for example, established the Joint Sustainable Development Goals research initiative aimed at supporting research that contributes to achieving the SDGs and is aimed at benefitting the most vulnerable populations in developing countries.[5]

2.2 Types of Research Support

The R4D initiatives provide a wide range of research support. On the R4D landscape there are initiatives with two very different objectives that shape the research support they provide. On one hand, there are challenge-based funds or foundations such as the BMGF or the GRCF that harness the best available research to address developing countries' challenges. This direct research support tends to support research operations, infrastructure or networking activities carried out by global leaders in their fields, typically based in Western countries. To this end, the BMGF has stated that it is geographically neutral in its Global Health programming and does not care where good science comes from. Because of the dominance of high-income countries in most scientific fields, developing countries' researchers are involved to a lesser degree in these types of programming. Sometimes these projects, however, involve developing countries'

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space race. The Daily Mail, August 9, 2013. http://www.dailymail.co.uk/news/article-2388466/Four-MORE-African-nations-billions-aid-Britain-join-space-race.html#ixzz4tOeBTj4T
[3] Rochmyaningsih, D. The developing world needs basic research too, Nature, 2. June 2016, Vol 534, p.7.
[4] Alden, C, Alves, A.C. and Besharati, N.A. (2012). South-South Cooperation: The Case of China, Brazil and Mozambique. Unpublished manuscript, South African Institute of International Affairs (SAIIA).
[5] NOW. Joint SDG Research Initiative. https://www.nwo.nl/en/research-and-results/programmes/joint+sdg+research+initiative

researchers under the tutelage of Western researchers, and there may be clear capacity-building benefits of the research.

More typically, R4D initiatives involve developing countries' researchers by design, and a core objective is to stimulate research by developing country researchers. The NORHED programme, programming by the Wellcome Trust, and the IRD all fall into this category, as does programming from organisations such as the Danish International Development Agency (Danida) and the Swedish International Development Agency (Sida). In general, R4D programming that involves development aid organisations, as opposed to research councils, is geared towards supporting researchers in developing countries. This also applies to programming involving collaboration between development organisations and research councils, such as the Swiss r4d programme that involves a collaboration between the Swiss Agency for Development and Cooperation (SDC) and the Swiss National Science Foundation (SNSF), as well as the Science and Technology Research Partnership for Sustainable Development (SATREPS) that involves a collaboration between the Japanese International Cooperation Agency (JICA) and the Japan Science and Technology Agency (JST).

The R4D organisations support a wide range of activities beyond direct support to research activities. NORHED supports primarily capacity-building for research in higher education institutions in Southern countries, and the joint research it supports must have a clear training element. The Swiss r4d programme, however, emphasises that it does not support capacity-building but rather is geared towards joint research projects or networking. Almost all the other programmes include some capacity-building. This is the case for IRD's support, and for the Wellcome Trust which provides specific grants for graduate education and fellowships.

Research infrastructure in Southern countries is also supported by a number of initiatives. Supporting research infrastructure appears to be an integral part of IRD's support in developing countries, but other funds such as NORHED also support research infrastructure to a lesser extent, as does the Wellcome Trust. These funders' emphasis in terms of supporting research infrastructure is not always clear from their own descriptions, and further research would be needed to cast light on this question.

Most of the R4D programmes support networking activities. They provide support for North-South cooperation, with the Southern partners collaborating with researchers in the home countries of the R4D funds. These R4D funds also seem to support South-South networking and cooperation. As we will discuss below, both NORHED and the Swiss r4D frequently support South-South cooperation, often involving a Southern country with more advanced research experience working with a less-experienced country. As these funds are based in Northern countries, this constitutes trilateral North-South-South cooperation.

There are a few programmes that emphasise that they, in particular, support innovation that can be considered part of their R4D initiatives. Examples of these are Sida; the Korea International Cooperation Agency (KOICA); and the Global Development Lab of the United States Agency for International Development (USAID). These can involve providing facilities and support to test and scale up solutions that have been identified by R4D programmes, or from other sources. Sida's support for innovation emphasises innovation for inclusive development, in which it provides support to innovation systems, and processes and, on the other hand, supports research on innovation systems.

There is a growing emphasis by R4D initiatives on supporting the underlying conditions for research. The Wellcome Trust's initiative to strengthen research ecosystems in Asia and Africa is an example of such a focus. Its efforts are aimed at developing human resources to lead and manage research. Some efforts by the IRD and NORHED in providing training to Southern researchers in planning and managing research are also directed at developing human resources in this realm. So far, there are limited efforts to support these underlying conditions, and there is a scope for further efforts examining and supporting conditions that promote R4D.

2.3 Focal Countries

The R4D initiatives differ in terms of the focal countries they involve. Many of them are focused generally on low-and-middle income countries. This, for instance, applies to the GCRF, that can involve any low-and-middle income country that is listed on the Organisation for Economic Co-Operation and Development (OECD) list of Development Assistance Committee (DAC) Official Development Assistance (ODA) countries.[6] Other initiatives, such as SATREPS, also refer to DAC ODA's list for their focal countries.

Some programmes are especially focused on low-income countries. For example, the Swiss r4d is particularly geared towards lea-income countries, with a heavy emphasis on African countries in its programming. The same applies to Sida. In its Strategic Plan for Research Cooperation and Research in Development Cooperation, the Swedish Ministry for Foreign Affairs states that Sida's activities should be primarily focused on poverty reduction and promoting sustainable development in low-income countries.[7] There is a strong focus on African and Latin American countries in Sida's R4D activities, and their current work is in Bolivia, Ethiopia, Mozambique, Rwanda, Tanzania and Uganda. However, the Research Links programme, run by the Swedish Research Council, lists cooperation with any DAC ODA country as being eligible.

Some funds target only specific countries. The Newton Fund, for instance, is limited to cooperation with countries that provide matching funding. In its initial years, this included the emerging economies Brazil, China, India and South Africa, but also other middle-income countries such as Chile, Colombia, Egypt, Indonesia, Kazakhstan, Kenya, Malaysia, Mexico, Philippines, Turkey, Thailand, and Vietnam. The Wellcome Trust also limits its special initiatives to support R4D to countries in Africa and Asia.

There appear also to be historical reasons that influence funders' focal countries. The IRD, for instance, has had long-standing cooperation with Western Africa, in countries such as Senegal, Burkina Faso and Cameroon that are former French colonies. Even though the GCRF is open to any country on the DAC ODA list, the top countries it has so far focused on are all, except for China, former British colonies. While the science systems in former colonies are possibly more like those of their former colonial powers, facilitating cooperation, language is also likely to be an influential factor.

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[6] The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee's (DAC) list of Development Assistance (ODA) recipients. http://www.oecd.org/dac/stats/documentupload/DAC%20List%20of%20ODA%20Recipients%202014%20final.pdf.

[7] Ministry for Foreign Affairs, Sweden. Strategy for Research Cooperation and Research in Development Cooperation, 2015-2021

2.4 Leadership of Research

Direct support to developing countries is rare, that does not require collaboration with home countries of the funds. The principal applicants in several of these initiatives must be affiliated with eligible institutions in the home countries of these initiatives. This, for instance, applies to the NWO-WOTRO's Joint Sustainable Development Goal research initiative, the Swiss r4d programmes and the Swedish Research Links programme. What seems to be the case is that involvement by national research councils in Northern countries in the R4D initiatives reinforces developed countries' leadership in these initiatives.

Some of the R4D funds give Southern researchers the opportunity to be principal investigators. For instance, both Sida and the Wellcome Trust have a number of programmes in which the principal investigators can be from Sweden (in the case of Sida), the UK (in the case of the Wellcome Trust), or from developing countries. Also, the BMGF makes it possible for institutions from all over the world to apply for projects, including those based in developing countries. There is, however, a risk of selection bias towards Northern applications, as more experienced researchers often come from the North. Also, according to Dodson (2017), increasing demands for stringent financial and due diligence procedures make it more challenging for Southern institutions to meet the requirements and thus be in a leadership position.[8]

There are some R4D programmes that have successfully promoted Southern leadership. This is the case of the NORHED programme, which only has four projects out of 45 that are *not* led by Southern institutions.[9] In the case of Southern-led projects, the Southern partners are responsible for financial management and administration of the projects. According to Dodson (2017) this arrangement can enhance equity between the Southern and Northern partners in the cooperation.[9]

In the R4D landscape, South-South collaboration typically involves Northern partners as well and are, therefore, typically led by developed countries. While South-South cooperation in general is on the rise, and the emerging economies are promoting such cooperation, purely South-South cooperation still seems to be limited on the R4D landscape. There is more emphasis on South-South cooperation involving training that is typically not related to promoting research for development. The Indian Technical and Economic Co-operation Programme (ITEC) programme, for example, actively extends professional training through South-South cooperation, but does not seem to complement it with a research component. The IBSA (India, Brazil, South Africa) Research Mobility Fund is an exception, and has a small fund that supports research cooperation between those countries in science-intensive fields.

Funders can also promote leadership by developing countries in the R4D programmes by transferring management of the programmes to the South. As discussed below, the Wellcome Trust has now handed over the management of two major research programmes to the Alliance for Accelerating Excellence in Science in Africa (AESA): the

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[8] Dodson, J. Building Partnerships of Equals: The Role of Funders in Equitable and Effective International Development Collaborations, 2017, UK Collaborative on Development Science.
[9] Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 2015*,* page 9

Developing Excellence in Leadership, Training and Science (DELTA) programme and the H3Africa. These programmes that were initially led from the North are now managed by a Southern organisation with inputs from the Wellcome Trust.

Another example of strengthening management of research is the Science Granting Councils Initiative in Sub-Saharan Africa (SGCI).[10] It is supported jointly by IDRC, Department for International Development (DFID) in the UK, and South Africa's National Research Foundation (NRF). It is aimed at strengthening the abilities of science granting councils in 15 Sub-Saharan countries. Ultimately the goal is to support research and evidence-based policies in Sub-Saharan Africa. The objectives are to:

- "manage research
- design and monitor research programs based on the use of robust STI indicators
- support knowledge exchange with the private sector; and
- establish partnerships between Science Granting Councils and other science system actors."[11]

As more Southern-based organisations gain experience in leading and managing projects and programmes, they can play an increasing leadership role in the R4D landscape, and shape their operation to ensure it fits their priorities. With more attention placed on providing these countries with research management training and science policy capacity, Southern organisations' position in leadership roles on the R4D scene can be enhanced.

3. CASE STUDIES ON RESEARCH FOR DEVELOPMENT INITIATIVES

3.1 Case Study 1: The Norwegian Programme for Capacity Development in Higher Education and Research for Development.

General Background

The Norwegian development agency, Norad, established the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED) to strengthen the higher education sector in developing countries. Its main aim is "to strengthen capacity of higher education institutions in Low and Middle Income Countries (LMIC) to educate more and better qualified candidates, and to increase quality and quantity of research conducted by the countries' own researchers."[12] Its emphasis is both on education and research and it is designed to harness effective North-South collaboration.[13]

NORHED provides, therefore, an example of programming focused on capacity-building in R4D. In addition to NORHED, Norad supports another such programmes, EnPe under its education portfolio. EnPe provides capacity building in higher education and research

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[10] SGCI. Science Granting Council Initiative. http://sgciafrica.org/en-za/about-sgci/

[11] IDRC. International Development Research Centre. https://www.idrc.ca/en/initiative/science-granting-councils-initiative-sub-saharan-africa

[12] NORHED – Aim of NORHED, https://www.norad.no/norhed

[13] Norad. A Presentation of NORHED: The Norwegian Programme for Capacity Development in Higher Education and Research for Development.

in the energy and the petroleum sector. Most of Norad's activities do not focus on supporting R4D and Norad channels most of its R4D funding to the Norwegian Research Council where the two largest programmes are the GLOBVAC (Global Health and Vaccination Research) and NORGLOBAL (Norway as a Global Partner).[14]

The NORHED programme was launched in 2012 and fits the emphasis of the Norwegian development cooperation policy on supporting higher education and research. The rationale for NORHED is that strengthening developing countries' higher education sectors will contribute to their social, economic and environmental development. This contributes to a more skilled workforce, evidence-based decision making, and policies that enhance the sustainability of these countries. The rationale is also that increasing the focus on human rights, and on gender equality at higher-education institutions will contribute to more equal and inclusive societies. The goal of the NORHED programme is, therefore, to promote quality in higher education and research but, at the same time, to contribute to more gender equality and enhanced human rights in Southern societies.

The development of NORHED was shaped by the experience and evaluations of previous Norad programming, in particular by the Norwegian Programme for Development, Research and Education (NUFU) and by Norad's Programme for Master Studies (NOMA).[15] NORHED reflects the amalgamation of these two programmes into a single programme and an increased focus on the broader institutional environments recommended by the evaluations of NUFU and NOMA. The design of NORHED was also influenced by a broader consultation process, within Norway and internationally.

Programme Design

The NORHED programme is organised into a number of sub-programmes:

- Education and training
- Health
- Natural resource management, climate change and environment
- Democratic and economic governance
- Humanities, culture, media and communication
- Capacity development in South Sudan[16]

There are various types of activities supported by NORHED, ranging from curriculum design, student mobility, joint research, and strengthening institutions, and each project can support a number of these activities. The main activities are:

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[14] Norad. Thematic Areas. Research. https://www.norad.no/en/front/thematic-areas/higher-education-and-research/research/

[15] Norad (2009), Evaluation of the Norwegian Programme for Development, Research and Education (NUFU) and of Norad's Programme for Master Studies (NOMA). https://www.norad.no/globalassets/import-2162015-80434-am/www.norad.no-ny/filarkiv/vedlegg-til-publikasjoner/evaluation-of-the-norwegian-programme-for-development-research-and-education-nufu-and-of-norads-programme-for-master-studies-noma.pdf

[16] Norad. A Presentation of NORHED: The Norwegian Programme for Capacity Development in Higher Education and Research for Development.

1. Establishment of new education programmes

In order to strengthen the functions of Southern universities, NORHED supports the development of new education programmes in areas of need. The programme supports primarily research based graduate education programmes, both at the master's and PhD levels. Before NORHED supports the development of new programmes, a thorough needs analysis has to be carried out in the recipient countries, including an analysis of the demand for such qualifications by the labour markets. Also, the new education programmes have to pass internal review by the Southern university.

2. Revision of existing education programmes

NORHED also contributes to capacity building by strengthening existing programmes. NORHED promotes two main types of revisions. One involves increasing focus on research, incorporating new pedagogical approaches, and increasing the use of technology in course delivery, such as offering online courses or adjusting credits that are given to existing courses. The other type of revision focuses more on course content and involves incorporating emerging topics, such as climate change, including indigenous knowledge as well as gender perspectives in the new curriculum.

3. Scholarships for graduate studies

NORHED provides students with scholarship support to pursue graduate studies. The ultimate goal of the programme is to provide close to 2000 students with scholarships. The scholarship support is, however, only open to faculty and staff members at Southern universities. The rationale for limiting the NORHED scholarships to them, is that the scholarships are not intended to promote education in general, but rather to promote the quality of education offered at universities in developing countries. The scholarships are mostly focused on supporting PhD training. Care is taken to promote gender balance and around half of those supported should be females.

4. Joint research projects

NORHED supports joint research projects between Southern and Norwegian higher education institutions. They have to focus on capacity building and align with NORHED programme aims and its sub-programmes. As a result NORHED does not support stand-alone research between Norway and developing countries, which was, for example, supported by its forerunner, the NUFU programme. Rather it only supports research that builds human capacity in Southern countries. Joint supervision involving Norwegian and Southern partners is a typical arrangement for these joint research projects. There is a requirement for the research to focus on creating value to partner countries.

5. Support for research infrastructure

The NORHED programme also involves support to research infrastructure at the Southern universities. It considers research infrastructure from a wide perspective and can, for instance, support technical equipment, including science laboratory equipment, information and communication technology infrastructure, furniture and renovation of buildings and field vehicles, etc.

Programme Operation

From 2013-2015 NORHED supported a total of 45 projects and had allocated a total budget of NOK 757 000 000 (around CAD 118 million) to this.

- Education and training – eight projects[17]
- Health – eleven projects
- Natural resource management, climate change and environment – thirteen projects
- Democratic and economic governance – four projects
- Humanities, culture, media and communication – six projects
- Capacity development in South Sudan – three projects

The programme operates in at least 25 countries. It has a relatively strong focus on Africa and had, by 2015, supported projects in 12 African countries, nine countries in Asia, three in Latin America and one in the Middle East[18]. All together, 61 institutions in those countries are involved in the programme as are thirteen Norwegian institutions. The two countries that have received the highest numbers of NORHED projects are Uganda and Ethiopia.

What is also noticeable is how much Southern collaboration there is in the NORHED projects. By 2015, 65% of the projects had partners in at least two Southern countries.[19] The majority (73%) of those collaborations are within Africa. For instance, all the NORHED projects involving South Sudan involve other African countries. This allows an opportunity for knowledge flow between those countries and insights that may be better aligned with the Southern countries than learning from the North.

NORHED has developed 14 indicators to measure the performance of the programme. They were developed in consultation with project partners. They range from basic indicators such as the 'Number of new and revised academic programmes'; to indicators such as the 'Relevance of education programmes and new graduates to local, national and regional needs and labour markets'; and 'Uptake/influence of NORHED-supported research in public policy.' An evaluation of the programme indicated that definitions of these indicators varied between partners, leading to poor data quality in reporting the outcomes and impacts of the programme.[20]

Almost all the projects are led by institutions in developing countries. The funding from Norad goes directly to them and they are responsible for the administration, the financial managements and all coordination of project activities. This arrangement is meant to enhance Southern ownership of the NORHED projects but also to promote sustainability by enhancing the institutional abilities in managing international projects.

The evaluation of the NORHED programme concluded that it was achieving its core objectives as it has supported the development of a number of educational programmes,

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[17] The number of projects refer to projects supported by NORHED from 2013-2015 reported by Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 2015

[18] Classification based on a list of projects in Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 2015

[19] Analysis based on a list of projects in Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 201

[20] Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 2015

and in-country capacity in higher education in many developing countries has improved.[21] It also argued that the large number of partnerships that have been established under the NORHED programme contributes to achieving the SDGs. NORHED has, further, successfully contributed to a better gender balance at many institutions in the South.

The evaluation identified factors, such as weak administrative and financial management capacity at the Southern institutions, as limiting the operation and effects of the NORHED-supported projects. It recommends a stronger focus on supporting institutional enabling factors. The intention is not only to increase the impacts of the NORHED projects but also to promote more sustainable institutional development.

Main Messages

NORHED is an attempt to make the higher education sector in developing countries more relevant to social and economic development. By focusing on addressing local needs the programme tries to orient itself to local challenges and towards sustainability. Its emphasis on gender equity and human rights also reinforces the societal implications of education and its role to contribute to a more just society.

A special feature of the NORHED programme is the arrangement of making the Southern partner responsible for the administration, financial management and coordination of the projects. This feature seems to be rather uncommon in R4D programmes, which mostly have the Northern partners responsible for administration and financing. Transferring the responsibilities to the Southern partner is an effort to promote sustainable development in the recipient countries.

A further characteristic of the NORHED programme is that it sees capacity building from a systemic perspective. The programme not only supports education and research activities, but takes a wider and more flexible approach by supporting research infrastructure and management when needed.

3.2 Case Study 2: Global Health at the Bill and Melinda Gates Foundation

General Background

The Bill and Melinda Gates Foundation is the largest private charitable foundation in the world. It started its operation in 1997 under the name William H. Gates Foundation.[22] The Global Health programming of the Bill and Melinda Gates Foundation (BMGF) is one of four themes it focuses on. The other themes are Global Development, Global Policy and Advocacy, and US programs. Global Health is the first theme the Foundation worked on when it was established. Research is an integral part of BMGF's work and while its work in Global Development has a strong research component, the bulk of the Foundation's basic research is conducted in Global Health.

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[21] Fafo Research Foundation (2017): The Norwegian Programme for Capacity Development in Higher Education and Research for Development: Results 2015
[22] BMGF. History, https://www.gatesfoundation.org/Who-We-Are/General-Information/History

According to the Foundation an underlying belief for its work is the notion that "All lives have equal value." Its mission is focused to:

- Ensure more children and young people survive and thrive
- Empower the poorest, especially women and girls, to transform their own lives
- Combat infectious diseases that particularly affect the poorest
- Inspire people to take action to change the world.[23]

Ardent efforts in promoting health and education are integral parts of the Foundation's work to achieve its mission.

Being a large, well-endowed private sector foundation, BMGF is well positioned to promote ambitious health goals such as malaria eradication.[24] The foundation follows the advice of its co-trustee, Mr. Warren Buffett, not to pursue safe projects but rather challenging, high-risk problems such as malaria eradication. It defines its position as: "We concentrate our resources in areas where we can identify significant leverage points, and we assume risks that are more challenging for others to take."[24] To meet such goals, the Foundation needs to support the development of new tools that often require long-term and patient basic research investment in high-risk areas. In health it can be decades until any return is achieved on such investments. This risk is illustrated by the fact that six out of ten drug candidates fail through clinical trials.[25] Investment in basic research is a part of the strategy, but BMGF typically combines such investment with proven lower-cost solutions to enhance its potential for success. In the case of malaria eradication, the Foundation combines its basic research, for example, towards a transmission-blocking vaccine, with such proven low-cost measures as distribution of bed nets treated with insecticide to prevent mosquitos biting people during sleep.

Programme Design

The Global Health theme is the second largest area that the Gates Foundation supports, with Global Development being the largest. In 2016 it supported USD 1.197 billion (CAD 1.490 billion) in Global Health, versus USD 2.211 billion (CAD 2.752 billion) in Global Development.

The BMGF provides support to institutions, not individuals. It places a large emphasis on partnerships, often with government organisations. As they put it: "The issues we engage in are wildly disparate, but they share the characteristics of being deeply rooted, dynamic and complex. None will be solved easily and quickly, and none will be solved though our efforts alone."[26]

Before choosing an area to work on, BMGF declares that the Foundation does a lot of consultations. "We listen, we learn so we can identify pressing problems that get too little attention. Then we consider whether we can make a meaningful difference with our

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[23] BMGF. https://www.gatesfoundation.org/

[24] BMGF. What We Do. https://www.gatesfoundation.org/What-We-Do/Global-Health/Malaria

[25] Pisano, G.P. (2006). Science Business: The Promise, the Reality, and the Future of Biotech. Harvard Business School Press.

[26] BMGF. How We Work. https://www.gatesfoundation.org/How-We-Work

influence and our investment, whether it is a grant or a contract"[27] Each division of the organisation will develop specific goals and will not provide supports outside their priority areas.

The Foundation solicits proposals in different ways, including:

- Direct solicitation – to organisations that are well suited to do the work they want;
- Discussion – where they invite one or more organisations to discuss a specific concept with them. Through this discussion the Foundation will explore their interest and capacity to do the work.
- Requests for proposals – used when they want to broaden their network or have multiple organisations work on a project. These organisations can be public or private and then the funds are directed to specific organisations.

The BMGF also regularly issues focused requests for proposal in the form of grand challenges. It started this in 2003 when the Foundation set up the Grand Challenges in Global Health, which focused on 14 major scientific challenges, related to health in developing countries. At the time, to contribute towards solving these challenges, the BMGF allocated over USD 450 million (CAD 560 million) to 44 grants involving scientists in 33 countries. Grand Challenge initiatives have, since the early 2000s, become a general feature of the work of the Foundation. Now they are not confined to its Global Health programming and are therefore simply called Grand Challenges. In 2007, the Foundation started the Grand Challenges Explorations initiative that is intended to widen the groups supported by the BMGF. Those eligible to apply for such grants are any type of organisations including non-profit organisations and private sector firms. The underlying notion is that great ideas can come from anywhere. Grand Challenges Explorations are now issued twice a year and on a wide range of topics. The initial application has been simplified to two pages in length. Successful applications then receive USD 100,000 (CAD 124,000) initial grants to prepare a full-scale application. Accepted projects can receive up to a USD 1 million (CAD 1.2 million) grant to conduct research to address the challenges.

The Foundation works in a very hands-on manner with organisations submitting proposals and works closely with successful applicants throughout the projects. To accompany Grand Challenges, the Gates Foundation set up an Ethical, Social and Cultural programme to ensure ethical conduct and increase the impacts of the projects by aligning them with social and cultural values of the relevant communities. Now this programme supports all programming at the Foundation.

Many of the Grand Challenges are co-funded by partnering organisations, often from other countries. The Grand Challenges model has been imported to a number of other countries leading to a family of Grand Challenges programming in countries such as Canada, Brazil, India, Peru and South Africa.

While the BFMG states on its website that its process of prioritisation of themes to focus on is transparent, it has been argued that its process does not prevent conflict of interest

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[27] BMGF. How We Work. https://www.gatesfoundation.org/How-We-Work

to influence their research agenda.[28] Considering that board members at the Foundation are representatives of major food and pharmaceutical companies in the world, an opaque process of prioritisation may shift the research agenda towards their priorities. Ultimately, being a private sector foundation, the BMGF is not accountable to anybody except its board, which gives it the possibility to prioritise any projects it believes are valuable.

Programme Operation

The Gates Foundation provides information on the areas supported by its Global Health programme. The main areas of support are HIV, Malaria and Tuberculosis (Figure 1). Unfortunately, it does not provide a breakdown on how much basic research it supports versus more applied research, or its investment in non-research related activities, such as dissemination of bed nets to prevent malaria.
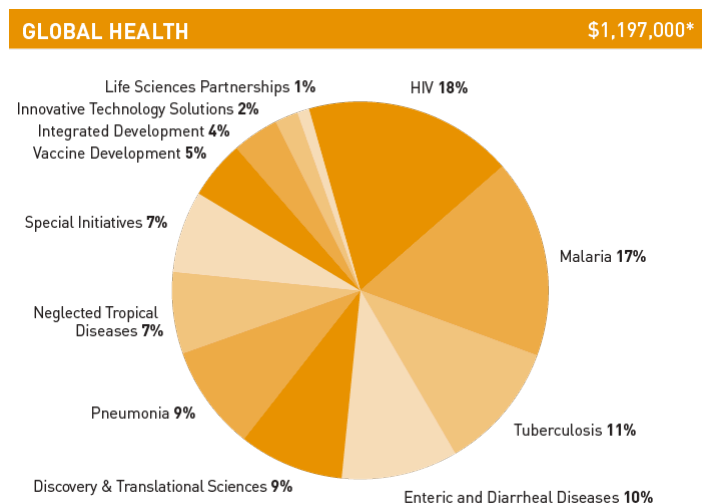

Figure 1. Investment Areas of Global Health by the Bill and Melinda Gates Foundation
Source: BMGF Annual Report 2016[29]

The Gates Foundation in general chooses priority countries to focus on, and the main criterion is to choose those in which they believe they can have the greatest impact. In Africa, the Foundation focuses on ten countries (the main ones are Ethiopia, Nigeria and South Africa, but also on Burkina Faso, the Democratic Republic of Congo, Ghana, Kenya, Senegal, Tanzania and Zambia).[30] Apart from South Africa, Nigeria and Ghana, these are all low-income countries. They also partner with organisations and individuals in other African countries, claiming to reach a total of 45 countries in Africa. They also work in India, China and the Middle East, as well in European countries.

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[28] Stuckler, D., Basu, S. and McKee, M. (2011). Global health philanthropy and institutional relationships: How should conflicts of interest be addressed? PLoS Medicine, 8, 4,

[29] BMGF. Annual Report 2016, https://www.gatesfoundation.org/Who-We-Are/Resources-and-Media/Annual-Reports/Annual-Report-2016

[30] BMGF. Africa, Focus Countries, https://www.gatesfoundation.org/Where-We-Work/Africa-Office/Focus-Countries

To examine where the grantees of Global Health grants from the BMGF come from, we took one year of BMGF grants in Global Health and classified them according to the country of the grantee institutions. It would have been better to be able to analyse grant data for a longer period, but with around 400 to 500 grants allocated each year it was not feasible to examine a longer time period within the short timeframe this paper was produced. The results of this analysis show that that the majority of grants, or 59% of the grantees, are with institutions in the US and only about 5% of its grantees come from low-income countries. About 8% come from middle-income countries, with the highest number of these grants going to institutions in South Africa, India and China. Note that those grants also include non-research related activities, so the Foundation may even support R4D activities of fewer grantees from low-and-middle income countries than indicated in Table 1.

Table 1. Breakdown of Locations of Grantees in Global Health in 2016

United States	Other High Income Countries	Middle Income Countries	Low Income Countries	The World Health Organization
59%	25%	8%	5%	3%

Source: BMGF - www.gatesfoundation.org/How-We-Work/Quick-Links/Grants-Database

Data on the Grand Challenges programmes is more easily available. According to its website, it has supported a total of 2,113 Grand Challenges grants.[31] It shows that the US has received around 42% of the Grand Challenges grants, Africa has received around 13%, low- and middle-income countries in Asia around 14%, Latin America and the Caribbean around 4% and other high-income countries around 26%. While the Gates Foundation is the largest funder of the Grand Challenges programmes, these data incudes data from other Grand Challenges programmes, such as the one in India. The inclusion of data from the wider Grand Challenges family, therefore, maximises the number of grantees from low-and-middle income countries.

Main Messages

The BMGF is a large player in the R4D landscape and is likely to be hugely influential. Considering that forming partnerships on funding initiatives, often with governmental organisations, is an integral part of its operations, it is likely that the Foundation's prioritisation process and choice of themes is widely influential around the world.

The Gates Foundation's ambitious emphasis on solving challenging problems, and its emphasis on new-to-the world solutions calls for large and patient investments in basic research. Being a private organisation, not accountable to anybody except its board, can facilitate investment in basic research. It is likely that such high-risk investments are less

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[31] Grand Challenges. https://grandchallenges.org/#/map

well-tolerated by government organisations that need to justify investments in high-risk areas to their societies.

The majority of BMGF's investment in Global Health is invested in high-income countries, with a large proportion going to institutions in the US. The objective of the programme is to invest in science that can provide solutions to health problems. Most such science is clustered in the US and in a few other high-income countries, so a skewed distribution of such investment is to be expected. The data are also limited in the sense that even though organisations in high-income countries are the main grantees, these organisations are likely to work with colleagues in low-and–middle-income countries so the direct participation of developing countries in the R4D initiates may be larger than can be gleaned from the available data.

Case Study 3: The French National Research Institute for Sustainable Development

General Background

The National Research Institute for Sustainable Development (IRD) in France, is a public research establishment under the auspices of the Ministry for Higher Education, Research and Innovation and the Ministry for Europe and Foreign Affairs. It has a long history and can trace its origins to committees overseeing education and research in France's colonies in the late 1930s.[32] For many years the institute was named ORSTOM (Office of Scientific and Technical Research Overseas), but in 1998 it was renamed to its current name. IRD has a long-standing emphasis on environmental research. It is organised into five departments:

- Health and Societies
- Ecology, Biodiversity and Continental Ecosystem Functioning
- Internal and Surface Dynamics of Continents
- Societies and Globalisation
- Ocean, climate and resources[33]

There are nine current priorities at IRD and they are organised on three strategic axes.[34] These are: the consequences of climate change, demographic trends, and globalisation. IRD lists its development pillars as:

- An equitable scientific partnership and co-publications with partners in developing countries
- Solutions which are adapted to global challenges and based on scientific evidence
- Public policies informed by scientific advances
- Citizens driving change, responsible innovations
- Specific expertise and know-how[35]

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[32] IRD – Institut de Recherche pour le Développment, History, https://en.ird.fr/the-research
[33] IRD, IRD 2016 Report: Overview of the French National Research Institute for Sustainable Development.
[34] IRD, Plan d'orientation stratégique, 2016-2013, Institut de Recherche pour le Développment
[35] IRD, Institut de Recherche pour le Développment https://en.ird.fr/the-ird/presentation

IRD emphasises multidisciplinary approaches and emphasises working in partnerships with Southern partners. On its website it states:

> "The IRD is a key French player on the international development agenda. It works based on an original model: equitable scientific partnership with developing countries, primarily those in the intertropical regions and the Mediterranean area. The IRD believes that only this model allows us to design solutions which are adapted to the challenges that humans and the planet are facing."[36]

Details are, however, lacking on how IRD supports equitable partnerships with Southern countries. While this review is not intended to be an evaluation of the evidence on the impacts of different approaches to R4D, more evidence would be useful to understand better IRD's approach to equitable partnerships.

IRD has a large operation with 30 establishments spread around the world, two in France, five in the French overseas areas (Reunion, Guyana, Martinique, New Caledonia and French Polynesia) and 23 mostly in tropical countries.[37] IRD has around 2180 researchers, engineers and technicians. Almost 37% of those work outside of France. They are French expatriates as well as local agents (16%) who have been recruited by the IRD's establishments outside of France.

Programme Design and Operation

IRD emphasises that its research themes are decided upon together with partners in Southern countries. In order to carry out the research IRD has established a global network of 65 research units focusing on particular research themes. These are called Joint Research Units (Unités Mixtes de Recherche); International Joint Research Units (Unités Mixtes de Internationales); and Joint Service Units (Unités Mixtes de Service). Most of these units research special areas of natural or physical sciences, such as Pharmaco-chemistry and Biology for Development; or the Laboratory of Oceanography and Climate; but a few are focused on humanities/social sciences, such as the Language Dynamics and Structure; and Development and Societies units. IRD commits to provide support to these research units for four years. They are composed of members based in the North and the South. IRD's support is focused on training, research and to strengthen North-South and South-South collaborations. An emphasis is also placed on providing training in obtaining funding and research management.

In addition to the research units, IRD has also some major research infrastructure for research on developing countries' needs. These include two oceanographic vessels, and satellite receiving stations.

To complement this research infrastructure, IRD has established several programmes with more targeted types of research support. They are:

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[36] IRD, Institut de Recherche pour le Développment https://en.ird.fr/the-ird/presentation
[37] IRD – Institut de Recherche pour le Développment, Join Us, Jobs and Careers, https://en.ird.fr/join-us/job-and-careers

ARTS – (Allocations de Rercherche pour une Thèse au Sud).[38] It supports the research of graduate students who are writing theses as a part of their education. The students have to be co-supervised by an IRD member.

BEST – (Bourses d'échanges scientifiques et technologiques).[39] The programme provides support to Southern researchers who want to acquire a specific skill to advance their careers.

DDS – (Doctorants du Sud).[40] It provides support to doctoral students from developing countries who are engaging in research. IRD implements this programme on behalf of Cirad (Centre de coopération internationale en recherché agronomique pour le développement), which is an independent public establishment working in agricultural research for development.

JEAI (Jeunes Équipes Associées à l'IRD).[41] The programme promotes and strengthens new research teams in developing countries that have partnerships with IRD research units.

PEERS (Programme d'excellence pour l'enseignement et la recherche au Sud).[42] Supports joint research between two high level researchers, one from a developing country, the other from France or another European country. While it is uncertain if this approach has been successful, the objective is to strengthen and increase the visibility of research in developing countries.

ATS (Actions thématiques structurantes).[43] The programme supports the development efforts of Southern scientific communities, their attempts to enhance their autonomy and international recognition and to develop North-South and South-South cooperation.

Main Messages

The IRD seem to differ from the other R4D initiatives in terms of its emphasis on supporting research infrastructure, in the form of research units and the major research infrastructure, as a core strategy. Most of the programmes IRD has set up are geared towards supporting activities of the research units. This targets IRD's support to areas to which it provides research infrastructure support, which mostly involve natural sciences. IRD focuses heavily on environmental sciences and highlights the contributions IRD can make to reaching the SDGs.[44] While the focus of IRD seem applied in nature, it also

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[38] IRD, Allocations de Rercherche pour une Thèse au Sud, https://en.ird.fr/partnerships/capacity-building/specific-programs/arts-program
[39] IRD, Bourses d'échanges scientifiques et technologiques,
https://en.ird.fr/partnerships/capacity-building/specific-programs/best-program
[40] IRD, Doctorants du Sud, https://en.ird.fr/partnerships/capacity-building/specific-programs/dds-program
[41] IRD, Jeunes Équipes Associées à l'IRD, https://en.ird.fr/partnerships/capacity-building/specific-programs/jeai-program
[42] IRD, Programme d'excellence pour l'enseignement et la recherche au Sud,
https://en.ird.fr/partnerships/capacity-building/specific-programs/peers-program
[43] IRD, Actions thématiques structurantes, https://en.ird.fr/partnerships/capacity-building/specific-programs/ats-program
[44] IRD, IRD 2016 Report: Overview of the French National Research Institute for Sustainable Development.

supports research that typically has a more basic research component, such as its research in physics.

IRD provides a wide range of support, ranging from individually-oriented capacity building, to more systems-oriented support. On its website there is a heavy emphasis on collaboration with Southern researchers and their involvement in the research activities.

IRD has a long history and is an offspring of colonial institutions supporting science. The Institute emphasises the importance of Southern influences in the research agenda setting and the development of autonomous Southern research communities. More details on how the Institute works in incorporating Southern input would be useful.

Case Study 4: Swiss Programme for Research on Global Issues for Development: The r4d Programme

General Background

The Swiss Agency for Development and Cooperation (SDC) and the Swiss National Science Foundation (SNSF) have joined forces and established the Swiss Programme for Research on Global Issues for Development, also called the r4d programme. The rationale for the programme is that it is important to mobilise the scientific community in order to deal with economic, environmental and societal risks that thwart development in Southern countries. The expertise and creativity of researchers have to be harnessed to understand better what are the causes of the challenges faced by these countries and to develop innovative strategies to address them. In order to come up with evidence-based solutions science and research can contribute and systemic and integrated approaches are called for.

Supporting research has been a relatively small part of SDC, which funds a wide range of activities: from humanitarian aid, development cooperation, to cooperation with Eastern Europe.[45] SDC has, however, supported the National Centre of Competence in Research programme for over 12 years where researchers worked on a wide range of themes, including poverty, health, regional development and governance.[46] It also has supported the Research Fellow Partnership Programme for Agriculture, Forestry and Natural Resources from 2006 to 2015. In 2010 SDC reoriented its research policy with an explicit emphasis of harnessing science to reduce poverty and global risk in Africa, Asia and Latin America. A reference to research to reduce poverty and global risk were then added as primary aims in SDC's ODA financed research. The r4d programme is a result of this reorientation and ODA funding that before was allocated to thematically and geographically open-ended field of North-South research is now channelled through the r4d programme. The r4d programme has therefore become SDC's flagship programme in supporting research for development.

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[45] SDS (2017). Swiss International Cooperation: Annual Report 2016.
https://www.eda.admin.ch/dam/deza/en/documents/publikationen/Jahresberichte/DEZA_Jahresbericht_2016_inkl_Statistik_EN.pdf
[46] SDS (2017) Research Concept, 2017-201,
https://www.eda.admin.ch/content/dam/deza/en/documents/publikationen/Diverses/Forschungskonzept-160216_EN.pdf

The r4d programme is intended to support inter- and transdisciplinary research cooperation between researchers in Switzerland and researchers in Africa, Asia and Latin America. It was established in 2012 and will run until 2022. The aim of the programme is to "provide politicians and civil society with scientific knowledge and practical solutions in order to tackle global problems."[47] Its focus is on the needs of the least-developed countries and only projects that include partners from least-developed countries are eligible. The objectives of the r4d programme are:

- To generate scientific knowledge and research-based solutions for reducing poverty and global risks in least developed, low- and middle income countries;
- To offer national and international stakeholders methods and options for finding integrated, holistic approaches to solving problems;
- To enhance scientific skills and know-how in dealing with the complexity of global problems for the benefit of societies in developing and emerging economies.[48]

The programme uses the DAC list of ODA recipients to classify countries into Group 1 (least developed countries) and Group 2 (other countries listed as DAC ODA recipients). There is a strict requirement that at least 40% of the funding of each project has to go to researchers in Group 1 countries. If this requirement is not met, the project does not meet the eligibility criteria. The funding is allocated to the Swiss researchers, who distribute the funding to their partners. A higher percentage of the funds than 40% often flows to the Group 1 partners. For example, when post docs supported by the projects are not based in Switzerland, a higher percentage of the funding can go to the Group 1 countries. Some projects allocate up to 75% to the Group 1 countries. The projects can also include partners from Group 2 countries, such as from the emerging economies. In those cases, at least 40% of the funding still has to go to the Group 1 partners. The funding that goes to the Group 2 countries is then accounted for as a part of the 60% that goes to the Swiss researchers.

Programme Design

The r4d programme is organised in five thematic areas. These areas are all strategic priorities of SDC. They all involve applied research. The areas are:

- Social conflicts: How can conflicts be resolved in the context of weak public institutions?
- Employment: What is required in order to bring more people into employment?
- Food security: How can innovation in agriculture be promoted and food supply systems be rendered more resilient?
- Ecosystems: How can ecosystems be managed so that they are able to meet the existing needs?
- Public health: Which financing mechanisms are the most suitable for public health system?[49]

In addition the programme organises calls with thematically open research.

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[47]SDS and SNSF. r4d programme,
http://www.r4d.ch/SiteCollectionDocuments/SNF_r4D_Brochure_EN_Button.pdf
[48] r4d programme. Portrait, Objectives. http://www.r4d.ch/r4d-programme/portrait
[49] SDS and SNSF. r4d programme,
http://www.r4d.ch/SiteCollectionDocuments/SNF_r4D_Brochure_EN_Button.pdf

The projects must involve collaboration between Swiss researchers and researchers from Africa, Asia or Latin America. The co-operations need to be interdisciplinary, following the belief that interdisciplinary knowledge is required to address challenges on these continents. There is an expectation for stakeholders in the research to be involved from the beginning of the projects, i.e. for the projects to be transdisciplinary.

Programme Operation

Together SDC and SNSF are providing a budget of CHF 97.6 million to the programme (around CAD 124 million). It has supported 46 projects, involving more than 240 grantees in 45 countries.[50] A total of 63 projects are listed involving African countries.[51] Ghana has the most projects supported by the programme of any Southern country. In comparison, a total of 27 projects are supported in Asia and 15 in Latin America. There is a heavy emphasis on supported projects involving South-South cooperation with around 63% of listed projects involving two or more developing countries.[52] Many of the projects involve collaboration within Africa, but there is also some cooperation between the continents and, for example, 9% of projects involve collaboration between Africa, Asia and Latin America.

SDC and SNSF have set up an r4d Steering Committee and r4d Programme Management (at SNSF) for managing the programme in terms of strategies and general operations. The programme has set up a separate review panel for each thematic area, which evaluates the applications and monitors their operations. The final funding decisions are made by SNSF. When selecting which projects to support, scientific quality is considered equal to relevance to development. The review panels have from 22 to 50% of the panel members coming from Southern countries and the rest of the members coming from Switzerland or other European countries.

Main Messages

The r4d programme is an applied-oriented programme involving North-South research on the challenges of developing countries. It is the result of a reorientation of SDC's research for development programming and an attempt to make it more streamlined towards reducing poverty and global risks.

The programme is heavily focused on the least-developed countries, and only projects involving partners from the least developed countries are eligible to be funded under the programme. In addition at least 40% of the funding of each project needs to be allocated to the partners from the least-developed countries.

Its themes of r4d have a relatively heavy emphasis on social science research but also involve areas such as agriculture and health. It has a strong emphasis on supporting North-South-South cooperation and can therefore encourage knowledge flow involving both the North and between Southern countries.

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[50] As of February, 2017. Swiss Programme for Research on Global Issues for Development (r4d programme), http://www.r4d.ch/r4d-programme
[51] Note projects often involve more than one country and are then counted multiple times at r4d website.
[52] Based on analysis of listed projects on r4d website.

Case Study 5: The Global Challenges Research Fund

General Background

The Global Challenges Research Fund (GCRF) is a new initiative organised by the UK government. The government announced in November 2015 that it would allocate GBP 1.5 billion (around CAD 2.5 billion) of ODA between 2016-2021 to a challenge-based fund that would create innovative solutions to developing countries' problems based on UK science. The underlying notion for the fund is that global development problems are so complex that they need multidisciplinary research input of the highest calibre to address them. The aim of the fund is to "ensure UK science takes the lead in addressing the problems faced by developing countries."[53] It intends to promote excellent research that has impacts and substantially increases research capacity in the UK and in developing countries. The guiding principle for the Fund is "that the UK's development spending will meet our moral obligation to the world's poorest and also support our national interest."[54] Apart from being a vehicle to deliver UK aid strategy, the GCRF is also intended to contribute to global efforts in reaching the SDGs.[55]

The objectives of GCRF are to:

- Promote challenge-led disciplinary and interdisciplinary research, including the participation of researchers who may not previously have considered the applicability of their work to development issues.
- Strengthen capacity for research, innovation and knowledge exchange in the UK and developing countries through partnership with excellent UK research and researchers.
- Provide an agile response to emergencies where there is an urgent research need."[56]

The programme requires that the supported projects are targeting global challenges in developing countries, but does not require cooperation between UK researchers with researchers in Southern countries. It does, however, view such cooperation positively as it does for any other partnerships with other bilateral or multilateral partners that will help the Fund deliver its mandate.

Programme Design

The GCRF is delivered and managed by seven delivery partners: Research Councils UK, Higher Education Funding Council for England, Scottish Funding Council, Higher Education Funding Council for Wales, Department for Education Northern Ireland, Academy of Medical Sciences, Royal Society, British Academy, Royal Academy of

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[53] http://dera.ioe.ac.uk/25657/1/bis-16-160-allocation-science-research-funding-2016-17-2019-20.pdf

[54]https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/478834/ODA_strategy_final_web_0905.pdf

[55] UK Strategy for the Global Challenges Research Fund (GCRF), June 2017.

[56] UK Strategy for the Global Challenges Research Fund (GCRF), June 2017.

Engineering and UK Space Agency. A Strategic Advisory Group has been established to coordinate the actions of the delivery partners. The current members of the group all come from the UK, mostly from the university sector.

Through input from various sources including the GCRF's Strategic Advisory Group, the stakeholders community, town-hall meetings and online calls, the GCRF has identified a number of challenge areas it want to channel research into:

- Equitable access to sustainable development
    - Secure and resilient food systems supported by sustainable marine resources and agriculture
    - Sustainable health and well being
    - Inclusive and equitable quality education
    - Clean air, water and sanitation
    - Affordable, reliable, sustainable energy
- Sustainable economies and societies
    - Sustainable livelihoods supported by strong foundations for inclusive growth and innovation
    - Resilience and action on short-term environmental shocks and long-term environmental change
    - Sustainable cities and communities
    - Sustainable production and consumption of materials and other resources
- Human rights, good governance and social justice
    - Understand and respond effectively to forces displacement and multiple refugee crises
    - Reduce conflict and promote peace, justice and humanitarian action
    - Reduce poverty and inequality, including gender inequalities.

The way these challenges are framed highlight that a wide range of social science, humanities and natural science disciplinary knowledge is required to address them. They also underline research that is needed in the long-term to address the SDGs.

Programme Operation

The primary objective of all the GCRF projects is that they should aim at promoting economic development and welfare in developing countries, and be compliant with ODA requirements. The projects should further be problem- and solution-focused, and preference is given to projects in which the Southern partners (both researchers and policy makers) have played leading roles in defining the problems to research and approaches to use. The projects need to include inter-disciplinarity in an integrated way. Another criteria for GCRF projects is that they reflect research excellence and are likely to have impacts.

The GCRF projects have a wide geographic focus, and can involve any countries on the OECD DAC list, eligible to receive development assistance. The GCRF differs from the Newton Fund, another UK R4D fund, as the Newton Fund is confined to cooperation with a limited number of mostly middle-income countries. The latter fund also requires matching funding from local sources, whereas the GCRF does not.

After only around one year in operation GCRF has already announced 35 calls for proposals for a wide range of activities including research, research capacity-building, networking and uptake and impacts of research.[57] By the end of 2016, the Fund had allocated 474 awards, invested GBP 112 million (about CAD 185 million) and involved 50 partner countries.[58] There is no available data on the levels and patterns of collaboration with developing countries, but the top five countries of focus mapped on its website are South Africa (53 projects), Kenya (43 projects), Uganda (39 projects), India (38 projects) and China (22 projects).[59]

Main Messages

GCRF constitutes an ambitious fund with a core objective to harness UK research excellence to address developing countries' challenges. In a short time, GCRF has been able to organise a relatively high number of calls and support close to 500 research projects that support research of relevance to at least 50 developing countries. GCRF is aligned with the SDGs and is intended to be an contributor to meeting them.

Compared to the Newton Fund, the GCRF can have more widespread influences in developing countries, as it is not confined to a limited number of mostly middle-income countries and does not require matching funds. Considering that the GCRF involves many delivery partners, it has the potential to offer highly coordinated research on global challenges, and presents an approach to reduce overlap between different delivery partners. While the GCRF states that it gives preference to projects in which researchers and policy-makers from developing countries have played leading roles in defining the problems and approaches to use, there is a lack of data on how much the Fund so far has involved developing countries in the planning and the research.

Compared to other programmes on the R4D landscape, there seems to be more overt emphasis for the Fund to promote capacity-building in the UK in the form of enhancing the ability of UK scientists to address developing countries' challenges. A specific goal of the fund, therefore, seems to be for the UK to become a leading player in the R4D landscape addressing developing countries' challenges.

Case Study 6: Strengthening Research Ecosystems in Africa and Asia at the Wellcome Trust

General Background

The Wellcome Trust was established in 1936 in the United Kingdom by the philanthropist Sir Henry Wellcome. Its goal was "the advancement of medical and scientific research to improve mankind's wellbeing."[60] Its website states that the Trust works to improve health by funding great ideas.[61] Biomedical science and population health are two of its main focal areas. The Wellcome Trust also lists product development and applied research; humanities and social science; and public engagement and creative industries as its

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[57] Research Council UK. GCRF. http://www.rcuk.ac.uk/funding/gcrf/
[58] GCSR: Investing in world-class research for international development, RCUK The First Year.
[59] GCRF. GCRF Awarded Projects http://www.rcuk.ac.uk/funding/gcrf/gcrfawardedprojects/
[60] Wellcome Trust, History of Wellcome, https://wellcome.ac.uk/about-us/history-wellcome
[61] Wellcome Trust, https://wellcome.ac.uk/

areas of emphasis, but the Wellcome Trust's support in these areas is tied to health development. Wellcome, thus, takes a wide perspective on what supporting health development entails.

The Wellcome Trust is a global charitable foundation, described as both politically and financially independent. In 2016, the Center for Philanthropic Studies in the Netherlands ranked the Wellcome Trust as the second largest grant-maker globally,[62] with the BMGF the largest. Its current grant portfolio contains 3,506 grants that are worth GBP 3.9 billion (about CAD 6.4 billion). According to its latest Annual Report, it allocated GBP 992.3 million (about CAD 1.6 billion) in the 2015-2016 financial year to charitable expenditure.[63]

The Trust funds research in more than 100 countries, with 14% (GBP 524 million, CAD 870 million) of its current grant portfolio supporting research in low-and-middle income countries.[64] The trust's main focus is in Africa and Asia with the top developing countries to receive support from it being: Kenya, India, Vietnam, Malawi, South Africa and Thailand.

Wellcome uses various modalities in its funding. It provides direct support to research programmes in developing countries in its Asia Africa programmes that are listed in Table 2.

Table 2. The Wellcome Trust's Asia and Africa Programmes

Name	Country	Focal Areas
KEMRI-Wellcome Trust	Kenya	Respiratory diseases; malnutrition, Reproductive health; and HIV/AIDS
Malawi-Liverpool Wellcome Trust Clinical Research Programme	Malawi	HIV, malaria and TB
The Africa Health Research Institute	South Africa	Interdisciplinary research on HIV, malaria and TB
Mahidol Oxford Tropical Research Unit	Thailand and Laos	Tropical diseases
Oxford University Clinical Research Unit	Vietnam	Infectious diseases

The trust also provides support to a number of major co-funded initiatives in developing countries (Table 3).

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[62] Third Sector. http://www.thirdsector.co.uk/wellcome-trust-second-biggest-grant-maker-world-again/fundraising/article/1419326
[63] Wellcome Trust, Annual Report and Financial Statements 2016.
[64] Wellcome Trust, Managing a grant, Places we fund. https://wellcome.ac.uk/funding/managing-grant/grant-funding-data-2015-2016

Table 3. The Wellcome Trust's Major Initiatives in Developing Countries

Initiative	Collaborating organisations	Focal areas
Alliance for Accelerating Excellence in Science in Africa (AESA)	New Partnership for Africa's Development Agency (NEPAD); the Bill and Melinda Gates Foundation; and the UK Department for International Development (DFID)	Health research relevant to Africa; Mentorship and collaborations in science, with policymakers and through public engagement.
Developing Excellence in Leadership and Training in Africa (DELTA)	DFID	Research and training programmes in health related fields
The Wellcome Trust/DBT India Alliance	Department of Biotechnology, Government of India	Future scientific leaders in Indian biomedical science
Wellcome Trust Centres for Global Health Research	A total of five centers representing partnerships between UK universities and partners in developing countries	Career development for individual researchers to help institutions to develop their expertise in global health
MSD-Wellcome Trust Hilleman Laboratories, based in India	Merck Sharp & Doeme Corp	Affordable vaccines, to combat disease in low-income countries.
Human Heredity and Health in Africa initiative (H3Africa)	The National Institutes of Health, USA	Studying the genomics of common diseases in Africa
Wellcome Centre for Infectious Diseases Research in Africa (CIDRI-Africa)		Infectious diseases related to poverty, with a particular focus on TB and HIV

While the Wellcome Trust provides generous support to more basic-oriented research in general and was, for instance, one of the key funders of the Human Genome Project, in developing countries its support is more applied in nature, and often involves support for clinical research. The exception to this is the H3Africa initiative, listed above, that studies genetic diversity in health and disease in the African population with possible long-term applicability.

There is also a heavy emphasis on capacity-building in Wellcome's support in developing countries, which is reflected in many of the major initiatives listed in Table 2. In addition to funding centres and major initiatives, the Wellcome Trust provides support through 47 schemes that support individuals, teams, resources, and seed ideas and

include a number of training awards. Individuals, groups and organisations in developing countries are eligible to apply for support through a large number of these schemes, sometimes through collaboration with researchers in the UK.

Programme Design

The Wellcome Trust provides an example of support for the underlying conditions for research for development with its *Strengthening Research Ecosystems in Africa and Asia*, one of its four priority areas. The other priorities are: Vaccines; Drug-resistant infections; and Our Planet, Our Health. In order to enhance the impacts of research in Africa and Asia, the Wellcome Trust supports the development of research systems on these continents. The premise of the initiative is that systemic attributes, such as a lack of leadership and research management, are holding back research in African and Asian countries. The research ecosystem prioritisation is partly informed by a previous evaluation on the African Institutions Initiative[65] and the DELTAS Learning Research Programme.[66]

In order to strengthen research ecosystems in Africa and Asia, the Wellcome Trust is following a three-pronged approach.

1. Building a resilient future for research
To do this, Wellcome continues to support strong researchers from Africa and Asia through its centres and major initiatives. It, however, supplements this with new initiatives. This work is still at an early stage, but one such initiative is the Coalition for African Research and Innovation (CARI) that the Trust is establishing together with AESA, NEPAD, and the BMGF. The vision of CARI is to build a platform within Africa where stakeholders can work together to promote a coordinated research and development community on the continent that is well-funded and innovative. It will focus on encouraging dialogue and concerted actions among African countries, and attempt to increase resources for science and technology on the continent.

2. Investing in research leaders
In addition to the support the Wellcome Trust provides through its schemes and other modalities, the Trust is working with its partners on defining the particular skills that research leaders in Africa and Asia need in order to influence policy, inspire new generations of researchers, and build well-functioning research systems. When this initial work is completed, the plan is to develop training courses together with their partners that are tailored to the specific needs of the continents. Another aspect of their investment in research leaders is to establish programmes that make it easier for researchers to move between countries in Africa and Asia. Many global health challenges need concerted efforts within regions and continents, and it is important that systemic attributes of the research ecosystems do not hinder knowledge flow and cooperation.

3. Better research management support
In Africa and Asia, the research management support at research institutions is often weak or non-existent, which ultimately undermines research efforts. To strengthen

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[65] RAND (2014). The African Institutions Initiative: Insights from the First Four Years.
[66] LSTM (2017) DELTAS Research Learning Programme.

management systems, the Wellcome Trust is working with its partners, including AESA and the Wellcome Trust/DBT India Alliance, to develop systemic and coordinated approaches for supporting research managers and the research systems at institutions. With AESA, the Trust is also developing a set of standards for the financial management of grants at African institutions.

The goal of the *Strengthening Research Ecosystems in Africa and Asia* is to encourage research for health to be led, to a larger extent, by Africa and Asia and that countries within these two continents take charge of their own research agenda. It, therefore, is an example of strategies to increase leadership by developing countries in R4D. Further attempts to promote this were announced in late 2016, when the Wellcome Trust declared that it was handing over two major research programmes to AESA, the DELTA programme and H3Africa. AESA will now manage these programmes with inputs from their funders.

The Wellcome Trust has set up an Advisory Panel for the *Strengthening Research Ecosystems in Africa and Asia* priority, chaired by Her Excellency Ameenah Gurib-Fakim, the President of Mauritius. Its team in International Operations and Partnerships oversees the operation of the priority.

Main Messages

The Wellcome Trust has an integrated strategy in Asia and Africa. It has set up large programmes of research in Asia and Africa, and major co-funded initiatives, which it then uses to meet its new priorities on these continents. By doing so it brings different groups together.

The Wellcome Trust's strategy in the *Strengthening Research Ecosystems in Africa and Asia* is to draw attention to the importance of the ecosystem area by defining it as a priority area. They highlight the importance of systemic development when promoting R4D and communicate their commitment in this area.

The Wellcome Trust does not emphasise new programming in this priority area and has so far not organised a single call for proposals in support of its development. The Trust has, however used existing funding modalities, including existing major initiatives to promote this priority area. The new programming the fund has done so far is to establish CARI, which Wellcome did in collaboration with other organisations. Handing over programming to AESA is also an innovative strategy to promote research ecosystems in Africa, which Wellcome managed to do without spending extra money or losing total control.

3. CONCLUSION

This review of research for development has shown that there is considerable variety in the approaches and models used to support the initiatives. There are many different types of players involved, including development organisations, funding councils, foundations, and institutions, and they work in diverse ways and towards different objectives. Some are solely focused on addressing challenges in developing countries, whereas others are involved in strengthening abilities so that developing countries can

address their own problems. In descriptions of the R4D programmes there are also frequent references to their potential contributions to meeting the SDGs.

This review has also discussed a number of initiatives that involve forming domestic and international partnerships in R4D initiatives. The partnerships are formed both to fund and carry out the research. These can play various roles. Partnerships are formed in order to harness specialised knowledge needed to address challenges in developing countries, and in order to gather the resources needed to push this agenda. Partnerships are also formed to ensure that the R4D efforts are well aligned with the needs of developing countries, and to extend capacity in dealing with local challenges in these countries. One model of partnership we observed in some of the R4D initiatives is trilateral North-South-South collaboration. Developing strategies to harness partnerships, both domestic and international seem, therefore, to be on the agenda of R4D funders.

Lastly, this review has highlighted cases that involve systems thinking in the R4D landscape. This includes, for example, supporting the underlying conditions for research, and integrating capacity-building and research in systemic ways. In those cases, supporting R4D, therefore, does not simply involve allocating funding towards research activities, but also involves paying attention to what systemic features are likely to enhance the success and impacts of the research. Another illustration of systems thinking we observed were cases in which funders have started to integrate their different programmes to better meet their objectives. New programming does not always have to involve new funding streams, but can involve building bridges between parts of organisations to work in a coherent way towards a goal. The intention with such integrated approaches is to harness research effectively for development and enhance the ability to address future challenges.