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**White Paper on the European polar research
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PUBLISHABLE SUMMARY

This White Paper provides an analysis of the ***Directory of polar research funding programmes in Europe (D4.1)*** for the purpose of assisting European funding agencies and other stakeholders to understand the landscape and cooperation potential of European polar research funding. On this basis a continued dialogue with national polar research funding agencies and operators, EC representatives and other stakeholders, EU-PolarNet 2 will work towards developing the European Polar Research Area by optimising the coordination and complementary value of European (Horizon Europe), national and global polar research funding programmes. This is also needed to effectively address the most pressing research questions identified by the international polar research community under the SCAR Horizon Scan, the IASC ICARP III process and the scientific prioritisation of polar research topics identified under the ***Set of White papers addressing priority questions in polar research and targeting funding agencies and policy makers (EU-Polar Net 1 White Papers), as well as the Integrated European Polar Research Programme***, published by EU-PolarNet 1 in 2020. After consultations and dialogue with funding agencies and stakeholders, our final goal under EU-PolarNet 2 is to provide recommendations for a ***Partnership initiative in Polar Research*** under Horizon Europe supporting the implementation and development of future European research actions.

1 The challenge –

Introduction to the diversity of European polar research funding

The European polar research funding landscape is diverse and complex. Some countries have specific polar research funding programmes managed by national agencies or Ministries, while others have established national polar research Institutes that define priorities and provide resources to carry out their national polar research programme and/or provide logistics support to its polar scientists. Funding for polar research is in many countries mainly provided through national open competitive ("blue sky") calls for curiosity driven and/or targeted research proposals. The picture is complicated by the fact that even in countries with a polar research Institute, non-polar funding agencies can also support to polar research projects, to which logistical support normally always need to be provided by national polar programmes or institutes. In Europe, the EU Framework Programmes provide significant funding for multilateral European polar research, and an impressive number of European large internationally coordinated polar projects are now grouped and coordinated under the European Polar Cluster. Also involving countries outside Europe, the Belmont Forum is an international mechanism that has provided successful funding for polar research several times under its Arctic CRAs (Collaborative Research Actions). The Nordforsk Arctic Program is an example of a regional mechanisms for co-funded polar research among the Nordic countries.

Some countries have Memoranda of Understanding (MoUs) and agreements to stimulate bilateral cooperation in polar research. Most research projects and campaigns are nationally funded according to national polar research strategies. International cooperation is normally encouraged and invited in as partners with own funding, or with costs covered ("open programmes"). Bi- or multilaterally funded projects and campaigns are not common and more difficult to set up. Since polar research also requires advanced and expensive logistics and research infrastructure designed for rough environments, joint funding of research and operations are needed for effective implementation of large international polar research initiatives. The recent Arctic transpolar ice-drift expedition MOSAiC is a successful example of a multinational endeavour that started with bottom-up science planning involving the international polar scientific community and made possible with major funding provided by Germany. The Synoptic Arctic Survey (SAS) and the Year of Polar Prediction (YOPP) are other examples of successful international cooperation in polar research building on internationally coordinated campaigns and coordination of existing national projects and programmes.

EU-PolarNet 2 will add value to European polar research by improving our general overview and understanding of the polar activities, national resources, investments, and funding structures in our countries. A strong European polar research environment requires efficient and effective national and European polar research programmes that are complementary and coordinated. By generating a better overview of the landscape and diversity of the funding strategies, structure and priorities, stronger cooperation and partnerships can be facilitated in support of large international initiatives and the establishment of a European Polar Research Area.

The **Directory of polar research funding programmes in Europe**, published by EU-PolarNet 2 in March 2022, represent our initial step to improve coordination and cooperation of national polar research funding in Europe. The directory provides an overview of the governance and funding strategies and procedures, and it is closely related to the other EU-PolarNet 2 deliverable **Catalogue of national polar research programmes and other large-scale programmes**, also published in March 2022. Both deliverables together reflect the different approach of each country to polar research, policy and funding.

The analysis of the directory describes the structure and characteristics of the funding landscape in Europe. With many examples of previous successful cooperation among European polar research funders, the need and potential for future cooperation is highlighted, also emphasising the complementary value of European (Horizon Europe), national and global polar research funding programmes. This is also required for effectively implementing and addressing the most pressing research questions identified by the international polar research community, such as under the SCAR Horizon Scan, the IASC ICARP III process, the **EU-PolarNet 1 White papers addressing priority questions in polar research** and **Integrated European Polar Research Programme**. After consultations and dialogue with national polar research funding agencies and operators, EC representatives and other stakeholders, our final goal under EU-PolarNet 2 is to provide recommendations for a **Partnership initiative in Polar Research** under Horizon Europe supporting the implementation and development of future European research actions.

The EU Framework Programmes provide significant funding for multilateral European polar research that builds on and ties together the competence of national polar communities and national research infrastructure. These capacities are independently operated and accessed based on national policies and perspectives. In order to effectively advance European Polar research and implement future European Polar research actions, more interaction, coordination and co-development of national Polar research funding programmes and strategies in Europe is required. Effective and efficient investments in future joint Polar research, observations and infrastructure, and especially the implementation of large-scale initiatives requiring European or global cooperation, will need a good understanding of the complementary value, capacity and potential of European, national, regional and global funding programmes and mechanisms. A prerequisite is a regular dialogue between funding agencies, national polar programmes and operators.

2 The approach –

Overview of actors and funding strategies in European polar research

Starting in 2015, the EU-PolarNet 1 "coordination and support action", funded by the European Horizon 2020 framework programme, represented a European consortium of 22 research institutions from 17 countries with internationally recognised expertise in polar research and logistics. Its mission was to provide coordination to European polar research and stimulate more effective use of polar research infrastructure, as well as setting up a framework to create new alliances among European research communities. Significant effort was also invested in working out prioritised polar research actions for the European research agenda and European research in general. Building on existing networks and the mobilisation of European top-level scientific expertise and relevant stakeholder groups, the final product of EU-PolarNet 1 was the development of the [Integrated European Polar Research Programme \(EU-PolarNet 1 EPRP\)](#), the set of [EU-PolarNet White Papers](#) that identify a large variety of key research questions from different disciplinary perspectives. A [White Paper on European Polar Infrastructure Access and Interoperability](#), highlighting the most important short and long-term scientific and infrastructure needs for European polar research, was also a major deliverable.

The EU-PolarNet 1 EPRP and White Papers were the outcome of a five-year process in mobilising the European polar research community of co-designing and co-developing a future research agenda for Europe. In EU-PolarNet 2 (2020-2024), European national polar research Funding Agencies and national polar Research Operators are more actively involved in setting up a venue for information sharing on opportunities of joint polar research funding and logistics. An important new task is to secure the legacy of EU-PolarNet by working out the organisational, financial and legal basis for the establishment of a **European Polar Coordination Office (EPCO)**, a sustained platform for cooperation under the European Polar Research Area.

The [Directory of European polar research funding programmes](#) has been developed on the basis of a survey that was sent out to the whole EU-PolarNet 2 consortium. The survey was coordinated with the collection of information also for the "sister deliverable", the [Catalogue of national polar research programmes and other large-scale programmes](#). Significant effort was invested in extracting relevant information for the Directory and the Catalogue. Each member of EU-PolarNet 2 was responsible for collecting the relevant information from their own country. Finally, information on European funding structure, governance, strategies and opportunities for each member country was put together and categorised under the following 4 headings:

- Polar research funding organisations and governance
- Polar research strategies and coordination
- Polar research funding and application procedures
- Substantial International research cooperation

The Directory presents the different approach of each country to polar policy and research funding and gives the European countries an opportunity to gain better insight in each other's procedures. A high number of hyperlinks to the relevant actors, strategies and also to funding instruments and opportunities can be used to help intensify the collaborations. The directory gives a fair overview of the contemporary situation, however the level of detail on especially the international and bi-lateral cooperation is not comprehensive. Such information is variable and best known and used by the national funding institutions and communities themselves.

3 The landscape – Analysis of structure and organisation of European polar research funding

The landscape of polar research funding programmes and funding streams in Europe is diverse. The organisation and structure reflect the size of economies, the role of polar research in the national research agendas, the scientific focus and potential of the research communities, the political system and governance of research funding, geography and much more. Although international cooperation is promoted generally, the "openness" and access rules for international participation varies. Priority to polar research is also differently valued and influenced by historic traditions. Scientific activity and presence in Antarctica are a fundamental part of the Antarctic Treaty system. Research contributions in the Arctic also legitimates a voice for members and observers of the Arctic Council in discussing international actions and needs that address climate change, sustainable development and safe operations in the Arctic. Thus, polar research by its very nature is also supporting other policy areas such as foreign and environmental policy. This is evident in the many Arctic strategies published by the EU and a large number of European countries, as well as large economies also outside Europe, in which the major part emphasise climate change, sustainable development and international research cooperation. The science diplomacy role of polar research as a peace-keeping activity is clear.

3.1 Polar research funding organisations and governance

The organisation and structure of polar research funding in EU-PolarNet 2 member countries varies with governance level, type and number of funding organisations, and the presence of dedicated polar programmes or national polar institutes and operators. Most countries perform research in both polar areas, with a few countries only active in the Antarctic or the Arctic.

3.1.1 Funding organisation and type

The funding organisations involved in European polar research are Ministries, Agencies, Academies, Foundations and Science funds. Some countries also provide funding through their national polar institutes, and philanthropic/private foundations play a significant role in a few countries. They have different roles in funding basic science, applied science, innovation, direct funding to national polar research institutes or programmes, funding indirectly to universities or institute sector. Most of the

countries have several funding organisations on different levels that provide direct or indirect funding for polar research. National funding Agencies play an important role in countries like Estonia, Iceland, The Netherlands, Turkey, Sweden, United Kingdom, Belgium, Switzerland, Faroe Islands, Italy, Finland, Norway, France and Denmark & Greenland. Ministries for research and higher education are more directly involved in Spain, the Czech Republic, Poland, Italy, Germany and Bulgaria. Bulgaria and Austria refer to their national Science Fund as an important source, while Austria is the only country with their National Academy of Sciences issuing calls for polar research funding.

Germany, Portugal, Belgium and Switzerland have national foundations providing polar research funding. France and Switzerland also provide competitive funding through national polar research institutes. In Italy, competitive funding is provided through national polar research programmes for Antarctica (PNRA) and the Arctic (PRA), with dedicated funding through the national agency CNR. Polar research funded by private foundations and philanthropic organisations are significant in Sweden, Finland, Denmark-Greenland and the Faroe Islands, the UK and Switzerland. In the Netherlands, funding for polar research is channelled through the Dutch Research Council (NWO) with roughly equal direct and stable funding from ministries to the Netherlands Polar Programme (NPP) and variable funding of polar research through other funding instruments based on open competition.

3.1.2 Governance

All polar research funding is anchored in Governmental strategies and the economic priorities of Ministries. Several countries have Science/Technology and/or Research Councils or national High-level Committees that are tasked to provide strategic direction and recommendations for research policy and funding. There may be different lines of governance for logistics and operations as for the research. Poland has, for example, recently put together a High Level inter-Ministerial body for the National Polar Policy. Norway has long had an Inter-ministerial Committee for Polar Affairs and has a Portfolio Board for Climate and Polar Research to govern polar research under the Research Council, but the Norwegian Polar Institute is governed by priorities set by the Ministry of Environment and Climate. The Netherlands has a Programme Committee with representatives of the Dutch Research Council and Ministries to guide its National Polar Program. Spain has a Polar Committee, Italy a National Scientific Commission for Antarctica and an Arctic Science Committee, and Iceland a Science and Technology Policy Council. In France planning of research funding by the National Funding Agency is set by specialised programming committees gathering representatives of the Ministry of Research and Higher Education, major public research institutions, universities and private research bodies. Science direction and priorities are for many countries decided by the funding agency boards that also may include scientists.

3.1.3 Polar programmes

Most of the countries fund polar research indirectly through open programmes and bottom-up research initiatives under the different disciplinary domains. Some countries coordinate their polar research through national polar programmes or based on national polar research institutes or

logistics operators being responsible for carrying out their annual Antarctic or Arctic campaigns. A dedicated polar programme is to be opened in France in the context of the Priority Equipment and Research Programmes initiative. The definition and activity programme of a national "polar programme" is not clear and varies among the countries. Approximately half of the countries do have a polar programme, most of which have major focus in the Antarctic. Some countries organise their Antarctic activities in dedicated national Antarctic programmes, like Italy, Finland, Spain, Norway, Turkey. Some do also have dedicated Arctic programmes, like Iceland, Italy and Norway. However, most countries provide funding for Arctic research through bottom-up open and competitive programmes not specifically devoted to polar research. **Differences between Arctic and Antarctic funding mechanisms also derive from the intrinsic differences in the necessary logistic load.**



Gabriel de Castilla station at Deception Island. Credits: MICINN

3.1.4 Arctic/Antarctic focus, national institutes and operators

The existence of "polar programmes" are also closely related to the establishment of national polar institutes or logistics operators. Most countries organise their polar activity through a national polar research institute or logistics operator, especially for their Antarctic research portfolio, such as the Swedish Polar Research Secretariat (SPRS), the French Polar Institute Paul-Emile Victor (IPEV), the Norwegian Polar Research Institute (NPI), the German Alfred Wegener Institute (AWI), the Bulgarian Antarctic Institute (BAI), the polar research institutes of Turkey, Switzerland and Austria, the British Antarctic Survey (BAS).

Some countries organise their polar research through secretariats/programmes at Ministry, Agency, institute or university level, such as the Spanish Polar Program organised by MICINN, the Portuguese Polar Program managed by the Instituto de Geografia e Ordenamento do Território of the Univ. of Lisbon (IGOT), the Finnish National Antarctic Research Programme (FINNARP) organised by the Finnish Meteorological Institute (FMI), and the Belgian Polar Secretariat (BPS) under BELSPO. In Italy, an Antarctic research programme is organised by MUR (Ministero Università e Ricerca), while the Arctic programme is organised under the CNR (Consiglio Nazionale delle Ricerche).

Most countries contribute to polar research in both polar areas. A few countries like Turkey and Bulgaria, partly also Spain and Belgium, are primarily involved in Antarctic research. Iceland, Denmark, Greenland and the Faroe Islands are primarily in the Arctic, while Austria and Switzerland naturally also focus on remote high-altitude regions as basis for their involvement in both polar areas.

3.2 Polar research strategies and coordination

Many European countries have put together research strategies related to polar areas which emphasise the importance of international cooperation. The strategies are anchored at different levels from Governmental (Strategies and White Papers), Agency (research strategies highlighting polar research), to Institute level (research priorities). Depending on the size of the polar research communities some countries have national networks or bodies tasked to provide a certain amount of coordination to their national polar research activities.

3.2.1 Polar strategies and research policies

Many Governments in Europe, as well as outside Europe, have during the past years, like the European Commission, published their own **Arctic strategies**. Examples of Arctic and Antarctic governmental strategies are the Arctic Policy of Iceland, the Norwegian Arctic Strategy and Governmental White Papers on the Norwegian interests and policy in the Antarctic and the Bouvet Island, Finland's Strategy for Arctic Policy and Antarctic Research Strategy, the German Arctic Policy Guidelines, the Danish Kingdom's Strategy for the Arctic (under revision for 2021-2030), the Italian Strategy for the Arctic, the Guidelines for a Spanish Polar Strategy, Sweden's Strategy for the Arctic region, the Netherlands Polar Strategy, and the Polar Policy of Poland. France will soon have an inter-ministerial committee, under the responsibility of the Prime Minister, in charge of supervising the recently published national Polar Strategy. A few countries are about to develop their Arctic strategies.

Polar research strategies are worked out at Ministry and Agency level. Examples of governmental strategies that specifically focus on research needs are the National Polar Science Programme in Turkey, the Norwegian High North Strategy, the Greenland Research Strategy (under development), the German Research Agenda - Polar Regions in Transition (BMBF), Netherlands Polar Programme (NPP), the Polish Polar Research - green and white paper, and the scientific priorities of the Italian

scientific commission for Antarctica. Bulgaria highlights polar research in their National Roadmap for Scientific Infrastructure. In the Nordic countries, the Sami parliament also influence the science priorities in the Arctic, with the Swedish Sami National Associations policy for research and project cooperation as a good example. Specific polar research strategies/policies are published by research agencies in Turkey, Norway, Germany, France, Switzerland and Poland, as well as in Portugal (in preparation).

3.2.2 Geographic orientation of the strategies

Austria, Belgium, the Czech Republic, Estonia, Portugal, Switzerland and the UK do not have polar strategies at the moment but provide funding on the basis of open competitive programmes. The polar strategy of Iceland focusses solely on the Arctic. The same is probably true for Denmark, Greenland and the Faroe Islands, but these are under development/revision and not finalised. Spain, Bulgaria and Turkey focus solely on the Antarctic. As for Italy, a policy strategy has been developed for the Arctic, with research strategies elaborated on a three-year basis for both polar areas. Of the 21 countries that are represented in EU-PolarNet 2, 5 are members of the Arctic Council. These are Norway, Denmark, Finland, Iceland and Sweden.

3.2.3 National coordination and international cooperation

Almost all countries have established national networks and services to coordinate their polar research and research community, some of which also have roles in assisting funding procedures.

The Faroe Islands has established a new Strategic Council on R&I, in Germany the Projektträger Jülich provides advice and assistance to the BMBF in their provision of funding, in the Netherlands the Polar Program (NPP) coordinates research funding for both polar regions, BELSPO in Belgium coordinates the federal consultation in R&D, and in UK the Arctic Office is tasked to support UK research in the High North. In Norway the coordination of RCN funding towards polar research is made by its Portfolio Boards, but there is no overall coordination of all polar research funding that also includes funding directly from Ministries to Governmental institutes or the University sector. In France, a Polar Task Force is currently being established with the goal of coordinating the research strategy in the polar regions across disciplines and research institutions.

For those countries that have established national polar programmes and polar institutes, these are also often appointed to perform national coordination. The Spanish Polar Committee is both involved in setting priority for the funded projects as well as assisting in providing logistics support. Other examples of coordination and logistics support are the Swedish Polar Research Secretariat, the Polish Polar Consortium (PPC) and National Committee on Polar Research (CPR PAS), the Forum for Arctic Research in Denmark and Greenland, and the coordination that is performed under the Italian Arctic and Antarctic national programmes by the CNR and ENEA research agencies. Norway does not have a national coordination function for its large polar research community, but several institutional polar networks, national research infrastructures and large polar programmes/projects contribute to coordination. The Norwegian Polar Institute (NPI) coordinates all Norwegian research and logistics

activities in Antarctica. British Antarctic Survey (BAS), the French Polar Institute Paul-Emile Victor (IPEV), and Alfred Wegener Institute (AWI) in Germany have similar roles.

National coordination of polar research is also important for those countries that do not possess own national research facilities or other shared research infrastructure in the polar areas. The Portuguese Polar Program (PROPOLAR) and the Swiss Polar Institute (SPI) are examples that oversee their polar research funding and manage many bilateral collaboration agreements that allow Portuguese and Swiss researchers access to Arctic and Antarctic logistics in international cooperation projects.

3.3 Polar research Funding and application procedures

Polar research funding in the European countries is provided under dedicated national polar programmes, open competitive programmes not specifically addressing polar research, as well as a mixture of both, with regular annual or intermittent calls.

3.3.1 *Competitive versus dedicated polar programmes*

All countries support polar research as part of their overall competitive research agenda. In addition, many countries also have dedicated polar funding programmes like Turkey, The Netherlands, Bulgaria, Germany, Italy, Switzerland and Norway. In the case of Turkey and Bulgaria, most of their polar research is supported under their dedicated polar programme. For the Netherlands both streams of funding are equally balanced with approximately 50% of polar funding provided from the Netherlands Polar Programme.

3.3.2 *Access policy and international cooperation*

Most of the funding opportunities provided under the competitive research agenda are open to international cooperation. In Denmark and Greenland, Poland and Norway the funding is fully open and can also provide funding for the international partners. The Netherlands is also open using the "Money-follows-cooperation" principle.

Several countries also cover the logistics costs of international partners in their own polar projects, like for example in Italy. The same is true for Belgium which cover the logistics cost of their international partners. Spain has implemented a "reciprocity principle" giving same rights to partners in EU-projects (i.e. covering also costs for logistics). Germany, Bulgaria, France and the UK provide access to their logistics capacities for international partners cooperating with national users, at their own cost. Portugal operates an annual flight from Chile to Antarctica, providing transportation to partner programs. Specific access rules are normally implemented for jointly funded international projects and campaigns that use national research infrastructure, logistics and platforms.

3.3.3 Call for proposals and frequency

Apart from the regular and often annual open competitive calls for proposals, there are many examples of dedicated calls addressing polar research. The Netherlands opened a call in 2021 addressing research into the impacts and governance of Antarctic Tourism. Italy has calls for Arctic and Antarctica that can also include specific lines for using old data sets, sample banks and visits to foreign stations. The Faroe Islands has calls addressing marine research in the North Atlantic Ocean, and Norway has annual calls for polar research open to Norwegian researchers and their international partners addressing climate, ecosystems and sustainable development. Iceland has regular calls for polar research under the Icelandic Research fund. Some national polar institutions in Portugal and Poland do also have some funding for small polar research projects.

For those countries that do not have dedicated calls, some calls target research questions that are of high relevance for polar areas, like in the UK. This is also extensively true for the Norwegian research agenda. Norway and Iceland also provide a certain amount of funding for polar research to the economic growing regions in Europe under the EEA-grants, according to their partnership agreement (EEA) with the EU.

3.3.4 Funding for logistics support, centres and networks

Many national polar programmes issue annual calls for logistics support to polar research. Examples are the call under the Portuguese polar programme (PROPOLAR) and competitive calls under the French polar institute (IPEV). Turkey has national project calls for polar expeditions. In Spain all the research infrastructures are coordinated by the Spanish Polar Committee (SPC) and access is granted by an Access Committee. Many non-polar institutions or agencies support polar research through access to the research infrastructure they operate, like for example French vessels and aircrafts etc. provided by IFREMER, CNRS, CNES and MeteoFrance. In Italy logistical support is assured to all research activities that are included in the Antarctic and Arctic programmes.

In the Netherlands and Portugal, important national polar networking is funded with the annual organisation of a Polar Symposium organised by NPP and the PROPOLAR. Norway organises annual national networking events for Norwegian research in the Antarctic and has also a call for young scientists to stimulate more networking among young polar scientists. In Iceland, the Icelandic Arctic Cooperation Network is important, whereas one example of various forms of research support in Finland is the Arctic Researchers Network at the University of Oulu. In France, the National Committee for Antarctic and Arctic Research (CNFRA) supports networking and communication among polar, including early career scientists.

International networking and exchange are stimulated by the German Academic Exchange service (DAAD) that also may involve polar research. Norway organises the International Conference on Svalbard research every second year, serving as an important networking event for the Svalbard international research community. Italy has a specific PhD exchange programme that is also relevant for polar research and networking. For all countries, their national research infrastructure, observing

platforms and polar facilities represent capacities that also represent effective coordinating and networking functions.



Ny Alesund Fjord. Photo: C. Barbante

3.3.5 Geographic focus and campaigns

In the Arctic, significant coordination and cooperation can more easily be achieved among those countries that have permanent or campaign-based research activities there. This is true especially for Germany, Czech Republic, Italy, Norway, Poland, the Netherlands, the UK and Sweden, and partly also for Spain. The co-location of research in Svalbard benefits from the joint coordination made possible under flagship programmes and joint research infrastructure and facilities. Sweden, Norway and Germany also emphasise research in the Polar Ocean, Denmark and Greenland are naturally focusing on Greenland and its adjacent areas, while the Faroe Islands focusing on the North Atlantic Gateway to the Arctic.

In Antarctica, the main foci are the Antarctic Peninsula, for those countries having research facilities there, and Dronning Maud Land (DML). Many countries also give priority to research in the Southern Ocean, like France around its sub-Antarctic territories and Norway around Bouvet Island and outside DML. Italy and France have inland research facilities in East Antarctica.

3.4 Polar research funding instruments / Substantial International research cooperation

The most important funding instrument for European polar research cooperation is the European framework programmes and now Horizon Europe. However, the amount of funding spent under the national polar research agendas is much higher. A Partnership initiative¹ in polar research that can also mobilise some of the national European programmes, would significantly enhance European potential to implement large-scale initiatives addressing global polar challenges. Other funding instruments for international research cooperation are bilateral initiatives and agreements, the Belmont Forum and networks/joint initiatives under the EU.

3.4.1 National instruments in support of international cooperation

Support to stimulate more active participation in the EU Framework programmes exist in some countries. Some examples are the support provided by the Italian APRE (Agency for the promotion of European research) to identify funding opportunities, the "RES-EU" and "MVO" funding under the Research Council of Norway (RCN) to mobilise and provide additional support to research proposals and consortia, and the ANR funded MERSEI programme in France that provides support to set up European or international scientific networks in preparation of European and international calls.

The German Academic Exchange Service (DAAD) provides funding for international exchange both the national outward grants and international visitor grants, not specifically addressing polar research. In Norway, significant funding is offered to Norwegian and international researchers to stimulate cooperation in Svalbard. These are the Svalbard Science Forum Arctic Field Grants and Svalbard Strategic Grants.

3.4.2 Bilateral and regional cooperation and funding

Most countries have a number of bilateral cooperation agreements and MoUs with other countries, both among European countries themselves and with countries outside Europe. The EU-PolarNet 2 survey is not extensive in this respect, however, the indicated agreements state the following most important collaboration structures to countries outside Europe²:

- Collaboration with South America (Chile, Argentina, Brazil, Peru): Belgium, Estonia, Finland, Italy, Poland and Portugal.
- Collaboration with Asian countries (China, Japan, India, South Korea): Belgium, Czech Republic, Estonia, Finland, Iceland, Italy, Norway, Portugal, Denmark and Turkey.
- Collaboration with Australia: France, Italy, Switzerland.
- Collaboration with Russia: Estonia, Finland, Norway, Poland, Germany and Sweden (temporary frozen).

¹ A preparation of a possible Partnership Initiative on Polar research under Horizon Europe is the final deliverable of Work Package 4 under EU-PolarNet 2 (D4.9 Recommendations for a Partnership initiative on Polar Research).

² These are examples involving unique cooperations which are especially highlighted by the partners. The list is not extensive.

- Collaboration with North America: Czech Republic, Faroe Islands, Finland, Italy, Norway, Portugal, Switzerland and Sweden.

Norway has specific funding for research cooperation with China, India and Russia that include polar research focus. The Nordic countries are all members of the Nordic Council NordForsk programme which has regularly published calls for Arctic research. An example is the Responsible Development of the Arctic: Opportunities and Challenges – Pathways to Action call. Another example is the Interreg Programme involving northern Finland, Sweden, Norway and Russia. France has developed bilateral polar research cooperation tools with Canada through, e.g., the Joint International Laboratories or cooperation agreement for access to the national research fleets.

3.4.3 Belmont Forum and other international funding instruments

Belmont Forum has proved itself to be a very useful funding instrument for international Arctic research cooperation also involving economies outside Europe. Two Arctic joint Collaborative Research Actions (CRAs) have been carried out with various participation by the Belmont Forum members. In Europe the following countries are members: Austria, EU, France, Germany, Italy, The Netherlands, Norway, Sweden, Turkey and the UK. The Collaborative Research Actions (CRA) Arctic I (Arctic Observing and Research for Sustainability) and Arctic II (Resilience in Rapidly Changing Arctic Systems) were successful with participation from France, Germany, Iceland, Italy, Denmark, Iceland, The Netherlands, Sweden and Norway in collaboration with Canada, China, India, Japan, Russia and the US.

3.4.4 Participation in European supported networks and initiatives

Several countries report participation in the European co-funded Joint Programming Initiatives JPI-Oceans and JPI-Climate. These are Austria, Belgium, France, Germany, Italy, the Netherlands, Sweden, Norway, Portugal and some more. The BioDivERsA ERA-Net is also important for Austria, Belgium and Norway and is now further developed into a Partnership (Bodiversa+) coordinated by Belgium (BELSPO). Other European ERA-NETs are also relevant for polar research cooperation, like for example the ERA4CS or ERA Planet.

European Partnerships is becoming very important under Horizon Europe. The "co-funded" partnerships bring the European Commission, research funders and other public authorities in Europe together in joint programmes to reduce the fragmentation of the research and innovation landscape. There are 49 Partnership candidates initially selected, among those partnerships related to climate, ocean and sustainable blue economy that may also be of relevance for polar research challenges, and with a variable geometry of participation from European member and associated states.

3.4.5 Membership in international cooperation and coordination bodies

The International Arctic Science Committee (IASC), the European Polar Board (EPB) and the Scientific Committee on Antarctic Research (SCAR) are all important venues that contribute to various aspects of coordination and exchange of scientific activities as well as joint funding of research and logistics. Most European countries are members of these organisations. A few countries are also actively contributing to the scientific coordination and assessment work under the Arctic Council working groups. Their contribution to international scientific coordination and identification of the most pressing polar research questions of global relevance significantly influence also the scientific agenda of European polar research funding priorities.

4 The opportunity - Needs and recommendations for polar-funding agencies

4.1 The next steps - Goals for the optimisation of European polar research funding

It is evident that the polar activity programmes in each country and the structure of their international cooperation is influenced by many factors. Although most countries pursue scientific challenges that are internationally recognised, polar research in each country fundamentally depends also on how the national strategies and national knowledge needs are formulated and what national capacities and infrastructure can deliver. The potential for more effective cooperation and efficient use of national investments and resources also depends on geography and historic priorities and how national capacities and infrastructure match and fit together among the countries.

There are many examples of successful **multilateral joint funding/operations/actions** in European polar research which can be used as models for future cooperation. This is also true for joint initiatives with countries outside Europe. Some experiences from bilateral initiatives under national polar research programmes are also potential candidates to stimulate actions that can be expanded to a multilateral domain.

A few examples of bi- or multilateral cooperation that are highlighted by the EU-PolarNet 2 community, is given in the Annex. These are also examples of specific qualities of national polar research programmes that can stimulate more effective international coordination, low-hanging fruits, best practice, or easily achievable joint cooperation as candidates for dialogue, are initiatives related to open access, open programmes, open data and research infrastructure, joint coordinated campaigns, instruments such as Belmont forum, Nordforsk, lead agency agreements and MoUs.

4.2 Some recommendations for future dialogue, joint actions and networking

An important objective of EU-PolarNet 2 is to support the development of the European Polar Research Area by networking with national polar research funding agencies and bodies. Suitable

venues are selected to discuss with national agencies and the EC the landscape and cooperation potential of polar research funding in Europe³. The basis for the initial discussion will be our presentation of the Directory and the White Paper analysis. The dialogues may also invite other stakeholders like representatives of major polar operators in Europe, other EU institutions and members of mechanisms such as the Belmont Forum.

A core task of EU-PolarNet2 is to mobilise the European polar research community to help identify critical future research needs for the polar regions (Work Package (WP) 3). The prioritisation process will be guided by involving relevant stakeholders in Europe representing important user communities in the public and private domains (WP2). The process will identify joint polar research, observational and infrastructure activities, as well as large-scale initiatives requiring European or global cooperation. EU-PolarNet 2 (WP4) will consider how these actions and investment needs can most effectively and efficiently be made possible under EU, national, regional or global funding programmes⁴.

There are already several future initiatives that will require international cooperation and coordination, based on proposals from the polar research community under SCAR, IASC, EU-PolarNet, WMO and global programmes. Some examples of large-scale polar initiatives that are candidates for international co-funding and coordination are initiatives within or related to the

- International Polar Year (IPY) 2032-33
- Synoptic Antarctic Survey (SAS) - Antarctica
- Decade of Ocean Sciences – Arctic and Antarctic
- Southern Ocean Observing System, Sustaining Arctic Observing Network
- European Mission to Restore our Ocean and Waters
- European Mission Adaptation to Climate Change

The final goal of the dialogue under EU-PolarNet is to achieve effective implementation of the priority actions by demonstrating how complementary actions and the sharing of roles and responsibilities between national and European programmes can be achieved. This will be further reinforced with the preparation of recommendations for a possible Partnership Initiative in Polar Research under Horizon Europe (***D4.9 Recommendations for a Partnership initiative on Polar Research***). **A Partnership initiative in polar research can, if supported by several European countries with significant polar programmes, be an important implementation instrument of future European and Global polar actions.** A continued regular exchange will also be supported by the European Polar Board (EPB) in developing the European Polar Coordination Office (EPCO), that may also host a continued and more formal cooperation and networking process among European polar research funders.

³ EU-PolarNet is delivering a series of dialogue meetings and webinars to engage with polar funders, described in the deliverable **D4.3 Plan for dialogue and networking with national funding agencies and the EU**.

⁴ The EU-PolarNet deliverable **D4.7 Summary of priority actions for which investments from Horizon Europe and national programmes have added value** will connect identified bottom-up research priorities with opportunities available under Horizon Europe as well as bi- or multilateral funding instruments.

5 Annex –

Some bi- or multilateral cooperation highlighted by the EU-PolarNet 2 community

Regional: *NordForsk* is an organisation under the Nordic Council of Ministers (the main forum for official Nordic co-operation) which funds, facilitates and strengthens research cooperation and research infrastructure in the Nordic countries. Together with its stakeholders, comprised of Nordic national research councils, universities, and other research funding-bodies, they work to identify common Nordic research priorities. The overall goal of the organisation is to create Nordic value to its funded projects (e.g. building critical expertise at the Nordic level) and make the Nordic region to become a world leader in research and innovation. A relevant successful example of polar relevance is **the joint Nordic initiative to generate new, cross-disciplinary knowledge on Arctic research** through the *Responsible Development of the Arctic – Opportunities and Challenges – Pathways to Action* programme, established to generate new insights into the challenges and new opportunities confronting the Arctic region. The programme is cross-disciplinary, and incorporates three thematic priority areas:

- Drivers of Change - Interactions and Impacts
- Arctic Resource Development in a Global Context
- Waters, Ecologies and Life Environments

The programme budget was approximately 116 million NOK and were co-funded by NordForsk, the Swedish Research Council, the Research Council of Norway, Academy of Finland, Danish Ministry for Higher Education and Science, the Icelandic Research Council and the Nordic Council of Ministers. Four Nordic Centres of Excellence in Arctic research were launched in 2016, where researchers could work in an environment with a common research agenda, management, and budget. The four centres focused on resource extraction and sustainable communities, reindeer husbandry in a globalising North, Arctic climate predictions, and pathways to resilient communities, climate change effects and infectious diseases respectively.

Global: The **Belmont Forum** is a world-wide partnership of funding organisations, intergovernmental organisations, international science councils and regional consortia committed to the advancement of environmental change research. It is comprised of 29 funding agencies across six continents and has supported over 1.000 international scientists and stakeholders. According to its external evaluation report from 2020, the impact of the Belmont Forum can be seen through significant scientific contributions, through generating new collaborations across actors, disciplines, and countries, and through fostering networks between researchers. The funding instrument CRA (Collaborative Research Actions) procedures have been efficient with the CRA Arctic I (in 2014) and Arctic II (in 2019) as successful polar examples that can also be repeated. The projects funded under the first CRA on Arctic Observing and Research for Sustainability (Arctic I) had participation from France, Germany, Iceland, Italy and Norway in collaboration with Canada, China, India, Japan, Russia and the US. The followed up CRA on Resilience in a Rapidly Changing Arctic (Arctic II) had participation from Denmark, France, Iceland, The Netherlands, Sweden and Norway in collaboration with Canada, Japan, Russia and the US. An important requirement is that the selected projects need

to have support/priority by at least three of the funders supporting the call. Thus, not all countries participating the joint calls receive projects for funding.

Bilateral: An example of **bilateral joint funding** is the recent call for Chinese-Norwegian collaboration projects within climate systems in 2021. The call is based on a MOU between the Research Council of Norway (RCN) and the Ministry of Science and Technology (MoST) in China. Both climate and polar research are important focus areas in the MOU, and the call was an appropriate tool to realise the good intentions of the MOU. After thorough discussions two separate calls were issued, one in China and one in Norway, in line with each country's routines and regulations. Norwegian researchers applied to RCN for their share of the joint project, while Chinese researchers applied to MoST. The proposal submission deadline was as similar as possible in the two countries, and the announced amount of money was about the same size. After regular application processing and prioritisation procedures in each country, 8 (of 29) projects were selected for funding. The work with this bilateral call and the application assessment process was made easy and smooth by the fact that the involved people knew each other and there was already some trust in the group.

Another example is an agreement between South Korea and Denmark on cooperation on research and development of polar regions. Under the agreement, the two countries will launch joint projects in the Arctic and Antarctic regions, and share infrastructure, including bases, icebreaking boats and drones.

Belgium and Peru have set up a **bilateral research collaboration** in Antarctica. In the frame of this MoU Belgian researchers participated/will participate in the 2019-2020 and 2022-2023 Peruvian Antarctica campaigns. These expeditions result in sample/data sharing, faster processing of samples via analyse-sharing, co-publications and training. Since 2009, through a **bilateral research collaboration** with the National Institute of Polar Research (NIRP) in Japan, Belgian scientists have carried out meteorite searches in the Sør-Rondane region of Antarctica near the Belgian station Princess Elisabeth, yielding more than 1200 new meteorites, that are shared equally for research and curation between the two countries.

EEA and Norway Grants are Iceland, Liechtenstein and Norway's contributions to a green, competitive and inclusive Europe, mandated by their EEA agreement with the European Union. The donor states Iceland, Liechtenstein and Norway contribute according to their GDP. Utilisation of funds for bilateral collaboration or within the cohesion contribution/EEA grants contributes to climate change and polar research. The objective of the EEA and Norway Grants is to reduce social and economic disparities in Europe and strengthen bilateral relations between the Donor States and the Beneficiary States. Memoranda of Understanding (MoUs) are the framework agreements with each beneficiary country on how the funding will be implemented within that country in the given grant period. The agreement includes details on the country allocation, which programmes are to be funded, and the management set-up including information on cooperation with the donor countries.

Lead Agency process: The **Lead Agency process** is open to bi-lateral collaboration in which researchers in two partner countries can submit a joint research proposal to either of the two

national funding organisations. In the case for Switzerland, which has signed a Lead Agency agreement with 4 countries/regions (France, State of Sao Paulo, South Africa and Province of South Tyrol), project funding/applications follows the rules for subprojects in each country. The additional coordination with the partner organisation means that the evaluation usually takes longer than for regular projects. The Lead Agency process does not support trilateral applications, but researchers from third countries can be project partners. No more than 20% of the Swiss budget can be allocated for project partners, but the salaries of personnel employed by the partners are not covered.

Joint Programming Initiatives: The JPI Oceans and JPI Climate are examples of "**Joint Programming Initiatives**" co-funded by the European Commission under the framework programme Horizon 2020. As for the JPI Oceans, this multilateral cooperation is now organised as a pan-European intergovernmental platform supporting long-term collaboration in research and innovation for sustainably healthy and productive seas and oceans. It is open to all EU member and Associated states who invest in marine and maritime research. Priority setting for its joint strategy framework and **Joint Actions** is governed by the member states' national strategies and priorities in marine and maritime issues. Several joint calls are announced based on variable geometry support from the members. Currently there are calls related to aquatic pollutants, marine and maritime technologies, climate science for oceans, blue bioeconomy and more.

European Partnerships is the new tool used under Horizon Europe that brings together co-funding from the European Commission, national public agencies and/or private partners in addressing European and global challenges through concerted research and innovation initiatives. Partnerships is a key implementation tool for research actions under Horizon Europe. There are 49 Partnership candidates initially selected under Horizon Europe, among those partnerships related to climate, ocean and sustainable blue economy that may also be of relevance for polar research challenges, and with a variable geometry of participation from European member and Associated states.

Public-private partnerships: The **Antarctic Circumnavigation** is a good example that brought together 22 projects in 2016-2017. The campaign was coordinated by 1 institute (Swiss Polar Institute), with 6 other national programmes as advisors (from UK, Austria, Russia, South Africa, France and Norway). Funding resulted from a mix of philanthropic funding and public funds. The impact has been large with currently over 60 peer-reviewed scientific publications and more than 100 openly available datasets in international repositories.

Logistics and campaigns: The Arctic ice-drift expedition **MOSAiC (Multidisciplinary drifting Observatory for the Study of Arctic Climate)**, led by Germany (Alfred Wegener Institute), was a large multinational polar campaign involving hundreds of researchers from 20 countries on a single polar research platform, the German icebreaker Polarstern. The campaign was made possible by a German governmental funding decision that covered the major cost of the logistics and operations. International cooperation and access to the platform was offered with reasonable and reduced cost for births etc. MOSAiC is an example of a jointly funded scientific campaign, governed by a science plan and directed by an international scientific steering committee, with a huge contribution for the core basic logistics platform funded by the host country Germany.

The **Norwegian N-Ice2015** campaign is another example, among many others, of nationally funded logistics (research vessel, research infrastructures, stations) offering access at reduced or no cost to the internationally mixed science teams, at project level or under a common science plan. **ARICE** is a European funded project offering transnational access to a fleet of icebreakers. **INTERACT** is a similar project offering transnational access to terrestrial field stations in the Arctic over several years. The Swedish Polar Research Secretariate (SPRS) has a history of co-funding expeditions with **icebreaker Oden** in international collaboration. It has been possible to pay for the “berth fee” for Oden for some researchers, to split the cost and fund a part of the expedition (e.g. 50%) and to charter IB Oden for a full expedition where SPRS supply logistic and operational support. This system is to be continued and potentially enlarged with countries that do not own an icebreaker themselves.

SAS – Synoptic Arctic Survey is an example of a bottom-up, researcher driven, initiative aiming at collecting empirical data in the Arctic Ocean. SAS depends on coordinated observations in time and space from research vessels, governed by a joint science plan and an internationally composed scientific steering committee. The main aim is to generate a baseline comprehensive dataset that allow for a complete characterisation and future tracking of Arctic climate and environmental processes. SAS is an international bottom-up initiative involving institutes and owners for polar programmes and vessels, bringing together relevant countries with polar interests, not involving direct funding decisions by agencies. In a similar way, the **GoNorth - Geosciences in the Northern Arctic initiative** is a campaign-based research initiative for the exploration of the Arctic Ocean initiated by institutional collaboration. GoNorth implements collaborative research cruises with international partners on a step-by-step basis, starting in the coastal areas north of Svalbard, before gradually moving northward. Coordination and use of research vessels are at the core of the activity with ice-breakers vital for the northernmost areas.