Draft discussion paper

"Science Diplomacy"

"Science diplomacy" is a phenomena of the international relations in the era of the scientific and technological progress exposing science as the major force of the modern social and economic development. It is often defined as one of the key tools of cooperation among the states and regions to solve complex international problems through scientific research and relying on a science advice.

The above phenomena has been quite thoroughly studied in the report published in 2010 by the Royal Society in a cooperation with the American Association for the Advancement of Science (AAAS), where three types of science diplomacy were defined: science in diplomacy, science for diplomacy, and diplomacy for science.[1] Since then a lot has been told and discussed at different forums and in many articles and publications on the subject with different emphasizes made depending on who are involved in the discussion – researchers, diplomats, journalists or public figures. Now, the issue is being put before the heads of the research funding agencies (HORCs in general) who are collaborating in the frames of the Global Research Council, which requires special vision and approaches.

The countries represented by the GRC member organizations mostly have strong but somewhat different traditions in science. Furthermore, the relationships between their science and policy communities have evolved in different contexts and with different histories. But the science-policy nexus is of increasing importance for both national and international development. The GRC member organizations recognize the importance of mutual learnings at this interface, both for their own benefit as well as for other research councils that follow in the GRC established traditions.

The GRC Moscow meeting is expected to focus on the Science Diplomacy theme with some general framing of interaction between science and policy, foreign policy in particular. The bulk of the discussion could be framed around two different dimensions of the science-policy nexus, so as to explore some general issues of how coordinated promotion of international collaborative research can be used to enhance the international policy generation process and meet interests of regional and global cooperation.

1. The science of science diplomacy

There is a growing need to explore the "science of science diplomacy" – i.e. how it is carried out and what works. Creating the right conditions for scientific evidence to inform large multilateral negotiations to best effect is a key challenge for the scientists and diplomats of the 21st century. The discussion could highlight a number of established international fora which have made a major contribution to science diplomacy. These may include:

- The Pugwash Conferences which bring together Western and former Soviet and now Russian scientists to address the threat of nuclear weapons
- The Dartmouth Conferences which represent the longest continuous bilateral dialogue between Soviet and now Russian scientists with their US counterparts
- The Organization for the Prohibition of Chemical Weapons (OPCW), informed by a scientific advisory board made up of 25 independent experts from the OPCW member states
- The Biological and Toxin Weapons Convention (BTWC), which has been led by the Royal Society of London, the national academies of the US and Poland
- The Inter Academy Partnership (the network of the worlds's science academies

Recent advances in some fields – e.g. neuropsychology – can provide insights into how people process information, make decisions, interpret history, perceive others, and accept or reject advice and/or evidence. People have cognitive biases which can affect their judgement, and these biases differ across cultures. There have been concerns raised that the growth of 'fake news', fueled by social media, has served to reinforce these biases.[2]

A number of mechanisms can be highlighted which serve to ensure that foreign policy is informed by the latest scientific evidence. One of these is through networks. Some governments have a network of scientific advisers or advisory boards across a range of ministries and departments, including the foreign office. The small but growing number of countries (the UK, US, Japan, New Zealand, even Senegal) have a scientific adviser attached to their foreign ministries. There a diverse range of different cultures, systems and traditions among the countries of the World and these are often reflected in different systems of scientific advice.

There might be merit in working with foreign affairs think tanks to see them draw more widely on the latest science and research, and to encourage them to cooperate on common research projects. There has been a growth in these organizations around the world, from the Royal United Services Institute and Chatham House established in the UK in the early 20th century to those in the Asia-Pacific region and in Russia without saying about many different think tanks in the USA.

2. Global science diplomacy for multilateralism

The promotion of international bilateral and multilateral science collaborations benefits the diplomatic ties through building trust and understanding not only at personal but also at institutional level, and by developing long-term relationships based on common goals. Bringing the efforts together under a common banner sustains the impact, and furthermore provides a framework under which project synergies might be realized. With many diverse partners abroad each of the GRC member organization stands out as an unique national soft power, and all together under the GRC umbrella they pretend to be an impressive global player able to lead, in the future, to greater multilateral opportunities. The GRC community not only has the potential to play a significant role in addressing global problems but that it can act as a multilateral structure fit for this purpose.

According some views expressed on the so-called multilateralism in the global science diplomacy, the world today deals with the global policy actions grounded in participation of different governance actors including those performing and promoting international collaborations in research. "We are thus on the brink of a new era in multilateralism; one in which states have rolled out a global agenda with measurable goals, and in which state have agreed on involving the S&T community in both achieving and monitoring global goals."[3] It's obvious that performing the necessary research is not sufficient in itself. Results need to be translated and disseminated based on consensus with the policy makers, a time-consuming endeavor for which GRC member organizations seem competent and suitable. It's worth remembering that by funding research the GRC member organizations not only collectively influence the multilateral system, they also largely influence, somewhere even control national S&T systems through their research funding policy.

3. Growing diversity of science diplomacy

There are multiple dimensions to science diplomacy. The traditional and utilitarian framing refers to its above mentioned three types. But alternative framing may be more useful for a discussion at the GRC forum. There is science diplomacy that has the goal of advancing global interests, there is science diplomacy needed to address bilateral or multilateral interests, and there is science diplomacy which has considerable value in advancing national interests. Some of the obvious places for science diplomacy when framed in this context include:

<u>Science diplomacy and global challenges</u>

- Common and global challenges (sustainable development goals, climate change)

- Ungoverned spaces (e.g. Antarctic, outer space, deep oceans)

- Transnational resource and environmental management

<u>Science diplomacy infrastructure</u>

- Standards and definitions
- Dealing with new technologies
- Shared technical services
- Multinational infrastructural science projects

<u>Science diplomacy for national interest</u>

- To project national voice/influence/soft power/reputation
- To inform overseas development assistance
- Economic and trade related
- Security matters
- Access to knowhow, knowledge to develop domestic science, technology and innovation (STI)

The discussion will explore examples to illustrate these different dimensions and ways in which science diplomacy can be further developed. Multinational infrastructural research projects deserve special attention. Jointly Governed by scientists and policymakers from multiple countries, they enable cooperation not just on the scientific research but also on the shared challenges of building, funding, managing and running the infrastructure associated with it. These projcts include just a few:

CREMLIN (Connecting Russian and European Measures for Large Scale Research Infrastructures), which is designed to improve and strengthen the relations and networks between European and Russian research infrastructures;

ITER ("The Way" in Latin), which brings together 35 nations to build the world's largest Tokamak fusion reactor;

FAIR, a cooperative venture between the Russian Federal Agency for Atomic Energy and the Helmholtz Association in Germany on nuclear science

XFEL (the European X-ray Free Electron Laser), which will generate extremely intense X-ray flashes to be used by researchers from all over the world;

ESRF (the European Synchrotron Radiation Facility), the world's most intense X-ray source, backed by 22 partner countries;

E-ELT (the European Extremely Large Telescope), the astronomical observatory under construction in Chile by the European Space Agency order.

4. **Research prioritization**

No single country can do everything in science. Governments always will have limited resources to commit to public investments in science research. Governments can also influence the extent to which the private sector invests in science. There are a variety of intervention logics that need to be considered. These include:

- The balance between discovery, applied research and development
- The balance between mission-led and investigator-led research, and between large group versus individual research
- The emerging challenge of interdisciplinary research
- The need to consider how new entrants to the research system are assessed
- The need to consider how to evaluate the quality of research produced by different countries and/or initiatives
- The need to stimulate innovative and potentially disruptive research
- The balance of investment in people versus infrastructure versus institutions
- The balance between short term versus long term research

- Should research be focused in areas of identified national strength, and/or where there is the potential to be globally strong, and if so how are these identified?

5. <u>New technologies and social license: reflection in science diplomacy</u>

The pace of technological innovations is escalating. Much is disruptive and its uptake or otherwise depends on social license, which in turn depends on many considerations: understanding of the science, trust in the science, perceptions of risk and precaution, potential benefits and costs, reasons for integrating innovations into the foreign policy enterprise. There are also very strong components based on belief, culture and social factors. This can lead to very diverse responses to technological innovation – as illustrated by different views on genetically modified foods, where some countries have given its social license and others have not, which in turn is reflected in their foreign policy settings.

The pace of disruptive innovation will challenge not only the science society and science-policy nexus but international relations and its regulation as well. Some likely challenges include those of gene editing, meiotic gene drive and synthetic biology. But beyond the life sciences, developments in artificial intelligence, machine-learning and the Internet of Things may confront traditional senses of personal autonomy and social structures, and enhance updating of the international rules and regulations. The potential of disruptive technologies, such as autonomous vehicles and geo-engineering, to concern society also needs considerations. Social license requires early engagement between innovators and society, and yet there difficulties, in part as much arising in the private sector, and in part because the discussion is hard, as it is largely a discussion about difficult concepts like risk, and precaution. Trusted science advice and science communication is needed.

6. The changing nature of science diplomacy

Science diplomacy takes place in a changing world, characterized by major political developments (e.g. Britain's exit from the European Union, president Trump' program of radical changes in the US foreign policy) and major scientific advances.

A critical component of today's interconnected global science system is the physical infrastructure that underpins it. A network of optical fibers around the

world carries 95% of all digital data at a rate of 100 terabits (10^{12} bits) per second, and has underpinned a rapid expansion of global data. IBM estimated that over 90% of all data generated in human history has been produced within the last 5 years.

Data has played an important role in international negotiations. The 1987 Montreal Protocol was the culmination of a major international effort to reduce the production and consumption of ozone depleting substances in order to reduce their abundance in the atmosphere, and thereby protect the earth's fragile ozone layer. Without the scientific data clearly demonstrating the damage to the ozone layer, there may not have been a political response.

The 'big data' revolution now affects almost every area of life. Public and private datasets are increasingly being acknowledged as assets in international trade, which previously centered around goods and services. This has considerable implications for science and diplomacy.

Data standards are crucial – databases need to be able to 'talk to' each other. Ensuring that this happens can be time-consuming but can lead to tools of immense capacity. Data can also beheld privately and be inaccessible, which could lead to diplomatic issues, and also opens up major questions on global public interest in that data. At the same time, research funders are increasingly developing policies to ensure openness of data.

The growth of data and predominance of information technology also presents risks. The recent cyber attack which cause major disruption to the UK's National Health Service – which also affected the Russian Ministry of the Interior – are prime examples. Digital systems and infrastructure are transforming the world, and robust cybersecurity is essential in order to realize the benefits they promise.

Increasing data availability has underpinned rapid advances in machine learning, a branch of artificial intelligence that allows computer systems to learn directly from examples, data and experience. Machine learning can provide more accurate analysis that spots patterns within the data – for example the quality of weather forecasting has improved greatly in recent years. This goes to the heart of one of the most fundamental aspects of science - namely the ability to detect patterns in nature. The Bank of Russia has used machine learning to identify unlicensed money lenders. Machine learning has helped to inform complex

multilateral negotiations. For example, the Mekong River flows through six countries and is a highly complex and interlinked system, with significant variations in hydrology, rainfall, topography and climate. The multi-nation Mekong River Commission is using machine learning to gradually build up a more precise model of river flow, which is superseding the previous arrangement by which individual countries relied on their own models.

Other emerging technologies worth being discussed are in the life sciences, such as the gene editing technique and rapidly advancing field of synthetic biology, which is enabling the design and engineering of biologically based parts, novel devices and systems.

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The above issues all reflect different components of the science diplomacy, and will be influenced by the different experience, histories and traditions of countries and regions represented by the GRC member organizations. But there are considerable opportunities to learn from exploring these issues for the benefit of a cooperation inside the GRC and its role of a global player in the present day's Science Diplomacy.

Endnotes

1. Royal Society and AAAS, "New Frontiers in Science Diplomacy" (London: Royal Society, 2010)
2. See http://www.nature.com/news/how-facebook-fake-news-and-friends-are-warping-your-memory=1.21596
3. Luk Van Langenhove, "Global science diplomacy for Multilateralism 2.0" in Science Diplomacy, a quarterly publication from the AAAS Center for Science Diplomacy, December 2016, p.19