

SCIENCE DIPLOMACY ACTION

An Incidental Serial for Rigorous Meeting Syntheses

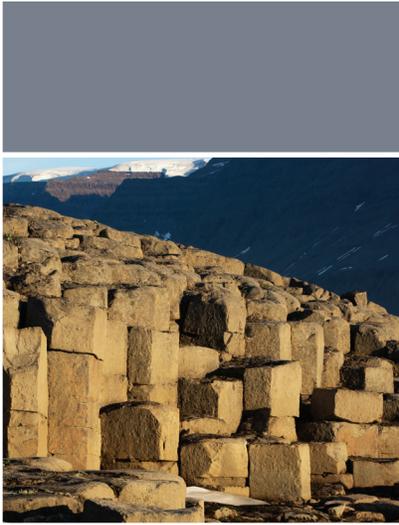
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Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries

Webinar Series Team





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Synthesis No. 6 **(31 July 2022)**

ENHANCING INTERNATIONAL SCIENTIFIC COOPERATION: ARCTIC SCIENCE AND TECHNOLOGY ADVICE WITH MINISTRIES

WEBINAR SERIES TEAM^{#&}

[#]This synthesis is produced by a team (see Appendix 1 – Co-Author List in Alphabetical Order), reflected also by the compilation of transcripts from public panel dialogues (see Appendices 2-4) among keynote presenters in three holistic (international, interdisciplinary and inclusive) webinars, funded by the Ministry of Foreign Affairs of Japan with logistics provided by the United Nations Institute for Training and Research (UNITAR) during February-March 2022.

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[&]All views expressed are personal and do not reflect the views of any organization, agency or government.

ABSTRACT

This sixth Synthesis with the *Science Diplomacy Action* serial is the product of the February-March 2022 webinar series on *Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries*, funded by the Ministry of Foreign Affairs of Japan to EvREsearch LTD with Science Diplomacy Center™ coordination and logistics provided by the United Nations Institute for Training and Research (UNITAR). These inclusive webinars began on 21 February 2022 and continued despite Russia's invasion of Ukraine on 24 February 2022, emphasizing the importance of Open Science with both allies and adversaries for our shared survival as a globally interconnected civilization. The webinar series was designed to address an inevitable question: *“What are the relationships and synergies between the Arctic Science Ministerial (ASM) process and the 2017 Agreement on Enhancing International Arctic Scientific Cooperation, both of which involve ministries and science?”* The three webinars involved keynote presentations from leaders of the International Arctic Science Committee (IASC), International Arctic Social Sciences Association (IASSA) and University of the Arctic (UArctic) as well as from ASM1 (2016), ASM2 (2018), ASM3 (2021) and ASM4 (2023 pending). Each webinar was designed further around leading questions with keynote presenters from Arctic and non-Arctic states inclusively, involving: Finland, Germany, Japan, Norway, Russian Federation, United Kingdom and United States with registered participants from 49 nations. The first webinar focused on *“What is Science”* with expert contributions from the perspectives of the natural sciences, social sciences and Indigenous knowledge. The second webinar was convened on 10 March 2022 to address: *“How Can Science Transform Data into Evidence for Informed Decisionmaking?”* The third webinar was convened on 24 March 2022, focusing on *“What International Efforts/Processes Are Needed to Facilitate Progress in Understanding the Arctic System and Its Global Impacts?”* These transdisciplinary dialogues demonstrated the importance of international cooperation and common-interest building with science diplomacy, enabling Open Science with inclusion and continuity despite global geopolitics. The webinar series originated in sight of *Science and Technology Advice with Ministries*, initially with foreign affairs, science and environment ministries but extending to ministries of defense under current world affairs. Lessons from this holistic (international, interdisciplinary and inclusive) webinar series reinforce strategies with informed decisionmaking to operate across a ‘continuum of urgencies’, short-to-long term (pandemic to climate timescales) *“for the benefit of all on Earth across generations.”*

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INTRODUCTION

Webinar Series Background:

International scientific cooperation is fundamental to the implementation of the seventeen United Nations Sustainable Development Goals (SDG),¹ involving science with decisionmaking by institutions in view of governance mechanisms and built infrastructure. The changing Arctic has increasingly important global consequences, generating strategies that involve Arctic and non-Arctic States along with Indigenous Peoples' Organizations to enhance international cooperation with science.

Research and action contributions with science propel international cooperation, starting with questions (Figure 1), as highlighted with the Arctic by the 2017 *Agreement on Enhancing International Arctic Scientific Cooperation*² that entered into force in 2018, signed by Foreign Ministers of the eight Arctic states. In parallel with the 2017 Arctic Science Agreement, the Arctic Science Ministerial (ASM) process began in 2016 among Arctic and non-Arctic states with Arctic Indigenous Peoples' Organizations, involving diverse Ministries among nations (Table 1) along with many international organizations.

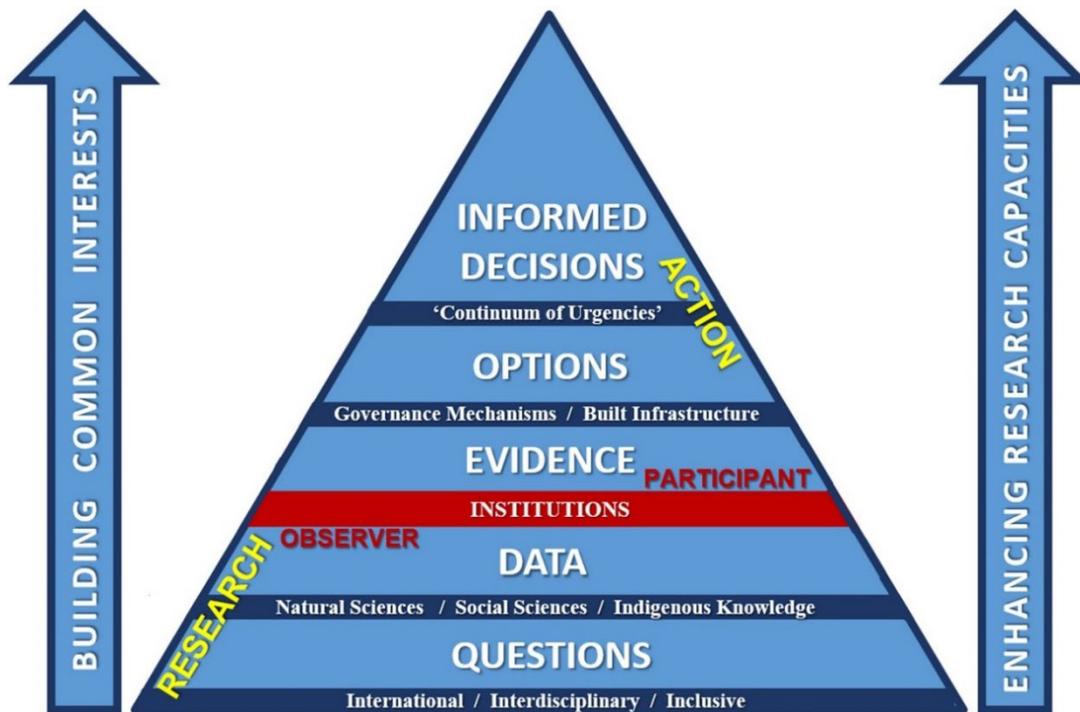


FIGURE 1: PYRAMID OF INFORMED DECISIONMAKING³ as the engine of science diplomacy, initiated with questions inclusively to reveal questions of common concern that require Open Science to address with holistic integration, building common interests short-to-long term while enhancing research capacities as a positive feedback at local-global levels “for the benefit of all on Earth across generations.” Informed decisions operate across a ‘continuum of urgencies’, as introduced during the 1st *International Dialogue on Science and Technology Advice in Foreign Ministries*⁴ in 2016.

¹ United Nations. 2015. *Transforming Our World: The 2030 Agenda for Sustainable Development*. A/RES/70/1. United Nations General Assembly, New York. (<https://sdgs.un.org/goals>).

² Arctic Science Agreement. 2017. *Agreement on Enhancing International Arctic Scientific Cooperation*. Signed Fairbanks, Alaska, United States, 11 May 2017. Entry into Force, 23 May 2018. (<https://www.state.gov/e/oes/rls/other/2017/270809.htm>).

³ Berkman, P.A., Vylegzhanin, A.N., Young, O.R., Balton, D.A. and Øvretveit, O. (eds). 2022. *BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY*. Springer, Dordrecht. (<https://link.springer.com/book/9783030893118>).

⁴ Vienna Dialogue Team. 2017. *A Global Network of Science and Technology Advice in Foreign Ministries. Science Diplomacy Action 1:1-20*. (https://scidipl.org/wp-content/uploads/2020/11/Synthesis_1.pdf).

TABLE 1: ARCTIC SCIENCE MINISTERIAL (ASM) PROCESS INVOLVING MINISTRIES OF THE EIGHT ARCTIC STATES WITH THE SIX ARCTIC INDIGENOUS PEOPLES' ORGANIZATIONS AND NON-ARCTIC STATES INCLUSIVELY

Process	Year	Location	Host(s)	Participants	Themes
1 st ASM ¹	2016	Washington, DC (US)	United States	24 Nations and European Union (EU)	<ol style="list-style-type: none"> 1. Arctic-Science Challenges and Their Regional and Global Implications 2. Strengthening and Integrating Arctic Observations and Data-Sharing 3. Applying Expanded Scientific Understanding of the Arctic to Build Regional Resilience and to Shape Global Responses 4. Empowering Citizens through Science Technology, Engineering, and Mathematics (STEM) Education Leveraging Arctic Science
2 nd ASM ²⁻³	2018	Berlin (Germany)	Finland and Germany with EU	23 Nations and EU	<ol style="list-style-type: none"> 1. Strengthening, Integrating and Sustaining Arctic Observations, Facilitating Access to Arctic Data, and Sharing Arctic Research Infrastructure 2. Understanding Regional and Global Dynamics of Arctic Changes 3. Assessing Vulnerability and Building Resilience of Arctic Environments and Societies
3 rd ASM ⁴⁻⁶	2021	Tokyo (Japan)	Japan and Iceland	27 Nations and EU	<ol style="list-style-type: none"> 1. "Knowledge for a Sustainable Arctic" is the overall theme with sub-themes: 2. Observe the status of Arctic changes 3. Understand the local and global impacts 4. Respond to the changes based on a shared understanding 5. Strengthen these efforts through education and capacity-building for future generations
4 th ASM ⁷	2023	TBD	Russia (and France postponed)	TBD	TBD

¹ Supporting Arctic Science: A Summary of the White House Arctic Science Ministerial Meeting (September 28, 2016, Washington, DC). ([https://asm3.org/library/Files/Supporting Arctic Science 1.pdf](https://asm3.org/library/Files/Supporting_Arctic_Science_1.pdf)).

² Report of the 2nd Arctic Science Ministerial: Co-Operation In Arctic Science – Challenges and Joint Actions (26-28 October, 2018, Berlin). ([https://asm3.org/library/Files/190402_ASM2 Bericht V2 bf.pdf](https://asm3.org/library/Files/190402_ASM2_Bericht_V2_bf.pdf))

³ Joint Statement of Ministers on the Occasion of the 2nd Arctic Science Ministerial (26 October 2018, Berlin). ([https://asm3.org/library/Files/ASM2 Joint Statement.pdf](https://asm3.org/library/Files/ASM2_Joint_Statement.pdf)).

⁴ Knowledge for a Sustainable Arctic 3rd Arctic Science Ministerial Report (8–9 May 2021, Tokyo). ([https://asm3.org/library/Files/ASM3 Final Report.pdf](https://asm3.org/library/Files/ASM3_Final_Report.pdf)).

⁵ Joint Statement of Ministers on the Occasion of the 3rd Arctic Science Ministerial (9 May 2021, Tokyo) ([https://asm3.org/library/Files/ASM3 Joint Statement.pdf](https://asm3.org/library/Files/ASM3_Joint_Statement.pdf)).

⁶ The ASM3 Project Database. (<https://ads.nipr.ac.jp/ASM3DB/>).

⁷ Planning for the 4th Arctic Science Ministerial has been paused because of the Ukraine invasion by Russia.

Both the ASM process (Table 1) and the 2017 Arctic Science Agreement involve national ministries, focusing specifically on science and international scientific cooperation. However, only the ASM process includes non-Arctic states, notably Japan and other nations that are observers to the Arctic Council.⁵ Building on contributions with the 3rd Arctic Science Ministerial (ASM3) co-hosted by Japan and Iceland in Tokyo in May 2021 – at the invitation of the Consulate General of Japan in Boston – this project was conceived around an inevitable question that had yet to be formally addressed:

What are the relationships and synergies between the Arctic Science Ministerial (ASM) process and the 2017 Arctic Science Agreement, both of which involve ministries and science?

⁵ Arctic Council. 2022. <https://www.arctic-council.org/> [paused until further notice due to Russia's invasion of Ukraine that began on 24 February 2022].

This question was designed to complement syntheses underway in various venues supporting the “*Science-to-Policy Process*” with ASM3 (Table 1), considering the umbrella context of enhancing international scientific cooperation, which is a positive feedback with building common interests (Figure 1).

The holistic framework of this webinar-series project extends from a 2017 policy forum in *Science*⁶ about the Arctic Science Agreement, crafted in view of propelling science diplomacy with the University of the Arctic (UArctic) and International Arctic Science Committee (IASC) as well as the International Arctic Social Sciences Association (IIASA). Together, these international Arctic science organizations contributed to keynote presentation across this webinar series on *Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries*. The three resulting webinars in February-March 2022 also follow on an earlier high-level dialogue that was convened just before the 2nd ASM in 2018, supporting implementation of the Arctic Science Agreement.⁷

Webinar Series Goal and Objectives:

The stated goal of this holistic project funded by the Ministry of Foreign Affairs of Japan was to help enhance international scientific cooperation with transdisciplinary⁸ integration of international law, ministries of nations, Indigenous peoples and science inclusively. The Arctic was applied as a global case study with science diplomacy – considering climate and other planetary challenges for humankind – “*with holistic integration, involving informed decisionmaking to balance national interests and common interests for the benefit of all on Earth across generations*” (Figure 1). The first webinar was convened on 21 February 2022, formally with three objectives for the webinar series:

Objective 1. Convene holistic dialogues to address the umbrella question (above) with subsets of questions to consider governance mechanisms and built infrastructure along with their coupling for Arctic sustainability, applying science diplomacy and its engine of informed decisionmaking (Figure 1).

Objective 2. Stimulate and share holistic perspectives on the umbrella question (above).

Objective 3. Produce a summary document that can contribute to the “*Science-to-Policy Process*,” building on contributions from ASM3 in view of the ASM process.

Following the 24 February 2022 invasion of Ukraine by Russia, the goal of this holistic webinar series was adapted, simply to maintain the inclusive dialogue as planned. Stability of the dialogue series was facilitated throughout by applying the transdisciplinary methodology of science diplomacy with its engine of informed decisionmaking, founded on questions, building common interests with questions of common concern among allies and adversaries alike (Figure 1).

Webinar Series Implementation:

This webinar-series project was funded by the Ministry of Foreign Affairs of Japan to EvREsearch LTD with Prof. Paul Arthur Berkman as the Chief Executive Officer. In addition to serving as Director of

⁶ Berkman, P.A., Kullerud, L., Pope, A., Vylegzhaniin, A.N. and Young, O.R. 2017. The Arctic Science Agreement Propels Science Diplomacy. *Science* 358:596-598 (<https://science.sciencemag.org/content/358/6363/596>).

⁷ Arctic Science Agreement Dialogue Panel. 2019 Supporting Implementation of the Arctic Science Agreement. *Science Diplomacy Action* 3:1-58. [involving Foreign Ministries of four nations with former Prime Minister of Greenland and heads of international science organizations as co-authors]. (https://scidiplo.org/wp-content/uploads/2020/11/Synthesis_3.pdf).

⁸ Arthur, M. B., Hall, D. T., & Lawrence, B. S. 1989. Chapter 1. Generating new directions in career theory: The case for a transdisciplinary approach. IN: Arthur, M. B., Hall, D. T., & Lawrence, B. S. (eds.). *HANDBOOK OF CAREER THEORY*, Cambridge University Press, Cambridge. Pp. 7-25.

the Science Diplomacy Center™ at EvREsearch LTD as well as MGIMO University in Moscow, Prof. Berkman is an Associated Fellow with the United Nations Institute for Training and Research (UNITAR) and a Faculty Associate with the Program on Negotiation at Harvard Law School along with serving as Fulbright Arctic Chair 2021-2022 awarded by the United States Department of State and Norwegian Ministry of Foreign Affairs. Importantly, the coordination team involved Dr. Jenny Baeseman, who assisted with administration of the ASM2 and ASM3 (Table 1), and Prof. Akiho Shibata, who is Professor of International Law and Director of the Polar Cooperation Research Center at Kobe University. There was additional synergy with Prof. Shibata serving as the convener and host of the 14th *Polar Law Symposium*,⁹ involving the *Policy-Law-Science Nexus in the Arctic* session that also addressed the umbrella question (above). The coordination team framed the subsets of questions (see Webinar Series Agenda below) to integrate the three webinars and engage the keynote presenters.

Essence of the webinar series was the inclusive dialogue among leaders with diverse vantages, who were inspired to build common interests with questions, promoting cooperation and preventing conflict with science as a tool of diplomacy to enhance international cooperation. In this journey, keynote presenters (see Webinar Series Agenda below) were invited by Prof. Berkman individually to develop a balanced dialogue with the webinar series, considering the six elements of inclusion (who, what, when, where, why and how) that operate across the pyramid of informed decisionmaking (Figure 1).

Passion, curiosity and hope were brought into this webinar series with next-generation leaders, triangulating education, research and leadership with lifelong learning. Three students from Japan were identified by Prof. Shibata from among institutions with the Arctic Change for Sustainability II (ArCS II)¹⁰ program, which is the “*national flagship project for Arctic research*” in Japan. Two post-doctoral researchers from Kobe University (Drs. Zia Madani and Osamu Inagaki), also representing the Japan Society for the Promotion of Science (JSPS) program, and a graduate student from Tohoku University (Mr. Jugo Sato) were joined by students in the United States, similarly engaged through Harvard University from the John F. Kennedy School of Government. The special mix of students from the Harvard Kennedy School involved a diplomat from the Ministry of Foreign Affairs of Japan in the Japan International Cooperation Agency (Mr. Teruaki Fujii) and a doctoral fellow from Russia with the Arctic Initiative at the Belfer Center for Science and International Affairs (Ms. Nadezhda Filimonova). These next-generation leaders contributed fundamentally to the planning of all three webinars along with their implementation as rapporteurs and co-authors of this report.

In assembling the team with keynote presenters to address the questions (see Webinar Series Agenda below), Prof. Berkman built on his science-diplomacy training initiatives with UNITAR, engaging this pinnacle of inclusive education in our globally-interconnected civilization. Beyond geopolitics – enabling continuity before (21 February 2022) as well as after the Ukraine invasion began (10 March 2022 and 24 March 2022) – this webinar series was hosted by the Multilateral Diplomacy Program (directed by Mr. Rabih El-Haddad) with a talented young lawyer as the key facilitator (Ms. Clara López). Each webinar was planned for 150 minutes with plenary presentations and panels that were recorded along with breakout sessions, which were unrecorded to further enable open dialogues with the audiences, who were invited and registered inclusively by UNITAR. Transcripts of the plenary panels from the three webinars¹¹ are included as appendices with this *Science Diplomacy Action* synthesis, as the anticipated project deliverable.

⁹ 14th Polar Law Symposium. 2021. *The Blue Earth, from the Poles, through the Law*. 21-23 November 2021. Polar Cooperation Research Center, Kobe University. (<https://2021polarlawsymposium.org/>).

¹⁰ Arctic Research for Sustainability II (ArCS II). (<https://www.nipr.ac.jp/arcs2/e/>).

¹¹ Video recordings of the plenary sessions from the three webinars (21 February 2022; 10 March 2022; and 24 March 22) have been archived and can be accessed from the UNITAR platform: (<https://unitar.org/sustainable-development-goals/multilateral-diplomacy/our-portfolio/enhancing-international-scientific-cooperation-arctic-science-and-technology-advice-ministries>).

Emphasizing holistic contributions of the high-level leaders (see Webinar Series Agenda below), significance of their continuous dialogues to enhance international Arctic scientific cooperation was elevated with the Ukraine invasion, demonstrating the arena of common-interest building (Figure 1) that is essential for humanity to survive beyond this period of self-interested geopolitics when conflict resolution prevails. As memorialized unexpectedly in an invited Correspondence published in *Nature*¹² on 28 April 2022 (included as an appendix), this webinar-series project highlights local-global responsibilities to protect as well as enhance Open Science¹³ “for the benefit of all on Earth across generations” (Figure 1).

¹² Berkman, P.A., Baeseman, J. and Shibata, A. 2022. Arctic science diplomacy maintains Russia co-operation. *Nature* 604:625. (<https://www.nature.com/articles/d41586-022-01105-3>).

¹³ UNESCO. 2021. *Recommendation on Open Science*. Adopted by the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) among 193 nations. (<https://en.unesco.org/science-sustainable-future/open-science/recommendation>).

WEBINAR SERIES AGENDA

ENHANCING INTERNATIONAL SCIENTIFIC COOPERATION: ARCTIC SCIENCE AND TECHNOLOGY ADVICE WITH MINISTRIES¹⁴

WEBINAR 1: WHAT IS ARCTIC SCIENCE?

21 FEBRUARY 2022 – 13:00-15:30 GMT

- ❖ How do natural sciences, social sciences and Indigenous knowledge ‘fit together’ and enhance each other?
- ❖ How is science facilitated/conducted? Who is needed to do ‘the science’?
- ❖ Is international cooperation needed? If so, to what degree?
 - [Mr. Henry Burgess](#) – Head, UK Arctic Office, Vice-President, International Arctic Science Committee (IASC).
 - [Dr. Kirsi Latola](#) – Vice-President Networks, University of the Arctic (UArctic), Finland; former Chair and current member of the European Polar Board.
 - [Prof. Andrey Petrov](#) – Professor, University of Northern Iowa, US; Past President, International Arctic Social Sciences Association (IASSA).
 - [Hon. Mikhail Pogodaev](#) – Vice-minister for Arctic Development and Indigenous Peoples Affairs of the Sakha Republic; Special Envoy of the Russian Chairmanship in the Arctic Council on Indigenous Peoples and Regional Cooperation; Former Chair of the World Reindeer Herders Association; Former Executive Director of the Northern Forum.

WEBINAR 2: HOW CAN SCIENCE TRANSFORM DATA INTO EVIDENCE FOR INFORMED DECISIONMAKING?

MARCH 10, 2022 – 13:00-15:30 GMT

- ❖ How are the decisions on what priorities are to be addressed made?
- ❖ Who are the decisionmakers?
- ❖ What evidence is needed and how is that evidence defined?
 - [Prof. Larry Hinzman](#) – Executive Director, Interagency Arctic Research Policy Committee (IARPC); Assistant Director for Polar Sciences, Office of Science and Technology Policy (OSTP), Executive Office of the President, The White House; President, International Arctic Science Committee (IASC).
 - [Prof. Anne Husebekk](#) – Professor and Former Rector, UiT | The Arctic University of Norway; Vice-President for Freedom and Responsibility in Science, International Science Council.
 - [Dr. Volker Rachold](#) – Head of the German Arctic Office, Germany; Co-Host 2nd Arctic Science Ministerial (ASM2).

¹⁴ WEBINAR-SERIES PORTAL. United Nations Institute for Training and Research (UNITAR). (<https://unitar.org/sustainable-development-goals/multilateral-diplomacy/our-portfolio/enhancing-international-scientific-cooperation-arctic-science-and-technology-advice-ministries>).

WEBINAR 3: WHAT INTERNATIONAL EFFORTS/PROCESSES ARE NEEDED TO FACILITATE PROGRESS IN UNDERSTANDING THE ARCTIC SYSTEM AND ITS GLOBAL IMPACTS?

MARCH 24, 2022 – 13:00-15:30 GMT

- ❖ What are the mechanisms that exist?
- ❖ Are these mechanisms adequate?
- ❖ How could enhanced science cooperation impact other areas of international relations?
 - [Dr. Andrey Bryksenkov](#) – Deputy Director, Russian State Hydrometeorological University; Co-Host 4th Arctic Science Ministerial (ASM4).
 - [Dr. Hiroyuki Enomoto](#) – Vice Director-General, National Institute for Polar Research, Japan; Co-chair 3rd Arctic Science Ministerial (ASM3) Science Advisory Board, Japan; Vice-President, International Arctic Science Committee (IASC).
 - [Hon. Fran Ulmer](#) – Former Lt. Governor, Alaska; Former Chair, US Arctic Research Commission; Senior Fellow, Arctic Initiative, Belfer Center, Harvard Kennedy School.
 - [Amb. Anton Vasiliev](#) – Russia's Senior Arctic Official 2008-2014; Ambassador to the Republic of Iceland 2014-2020; Deputy Director, Russian Hydrometeorological University.

RAPPORTEUR SYNTHÈSES

Webinar 1 (21 February 2022)

1. Main Question: *What is Arctic science?*

In the rapidly changing Arctic environment caused by climate change, Arctic science has become increasingly important. The holistic approach with international, interdisciplinary, and inclusive cooperation is necessary for the Arctic that needs to balance national interests and common interests. At the same time, there are emerging challenges relating to Arctic science such as how to collaborate with Arctic, non-Arctic regions, and Indigenous Peoples. Against this backdrop, the keynote speakers and participants of Webinar 1 discussed how to address these challenges.

2. Sub-question 1: *How do natural sciences, social sciences and Indigenous knowledge ‘fit together’ and enhance each other?*

The participants discussed how to improve the collaboration between scientists and Indigenous Peoples under this question. An important observation is that the combination of scientific knowledge and Indigenous knowledge gives us new and enhanced knowledge. To achieve this, scientists and Indigenous Peoples need to work together with trust, respect and humility recognizing that no knowledge system is perfect. In this respect, the *Canada-Inuit Nunangat-United Kingdom Arctic Research Programme*¹⁵ is particularly notable where funding applications are reviewed by both scientists and Indigenous communities. It is also important to share lessons with non-Arctic regions including the Asia-Pacific region and to develop ethical principles and guidelines such as *Ottawa Traditional Knowledge Principles*.¹⁶ Moreover, there is an important issue of how to resolve differences of views between scientific knowledge and Indigenous knowledge, for example regarding the number of whales in their conservation context. In other words, it is necessary to consider how to strike a balance between conservation science and traditional livelihoods of Indigenous Peoples.

3. Sub-question 2: *How is science facilitated/conducted? Who is needed to do ‘the science’?*

Many issues relating to research funding were raised under this question. One such issue is how to make it easier for small institutions and Indigenous communities to have access to funding, given their limited capacity. One option is that the University of the Arctic (UARctic) and their thematic networks can help small institutions. Another practical issue is that scientists have difficulty in building trust with Indigenous communities before submission of a funding application. Regarding the actors of science, the Arctic Council has played an important role to elevate Indigenous knowledge. The ASM process (Table 1) also provides opportunities for non-Arctic States to share their experiences and capacities. In addition, there is increasing recognition of the importance of social sciences and humanities as well as the business-sector in Arctic science and Arctic research, more inclusively.

¹⁵ *Canada-Inuit Nunangat-United Kingdom Arctic Research Programme*. (<https://frq.gouv.qc.ca/en/program/canada-inuit-nunangat-united-kingdom-arctic-research-programme/>).

¹⁶ Indigenous Peoples’ Secretariat. 2015. *Ottawa Traditional Knowledge Principles*. Arctic Council, Ottawa. (<https://www.arcticpeoples.com/knowledge#indigenous-knowledge>).

4. Sub-question 3: *Is international cooperation needed? If so, to what degree?*

Participants identified the various issues or areas that particularly need international cooperation. One such area is the collaboration of Indigenous Peoples with co-production in the scientific process from developing ideas to funding procedures to research activities and analyses. Another issue is how to provide funding opportunities for small institutions including Indigenous entities. Providing educational opportunities for Indigenous youth is also an area in need of more cooperation. Investing in young people is a key in trust-building and knowledge co-production. In addition, it is important to enhance cooperation with non-Arctic States to share their practice and experience.

5. Concluding Observations

At the final plenary session of Webinar 1 (see Appendix 2), Dr. Kirsi Latola remarked: “*What I realized in this webinar is that we can certainly learn from each other from Asian Pacific and other countries.*” With UNITAR’s facilitation, Webinar 1 was held in an inclusive manner, involving registrants from 49 countries (see Participant Demographics and Feedback) with participants from Arctic states and Indigenous communities as well as many non-Arctic states who would be new to the Arctic Council or the ASM process (Table 1). Webinar 1 itself demonstrated that inclusiveness is a key element for enhancing international Arctic scientific cooperation.

Webinar 2 (10 March 2022)

1. Main Question: *How can science transform data into evidence for informed decisionmaking?*

Science is essentially important for building common interests. In reality, there are several challenges between science and policymaking. For example, there are differences of priorities among stakeholders. Also, we often see communication gaps between scientists and policymakers. In such situations, as discussed with the distinguished keynote presenters and participants from across more than forty nations, there is need to optimize available data and information by operating short-to-long term.

2. Sub-question 1: *How are the decisions on what priorities are to be addressed made?*

To decide the priorities, it is indispensable to have dialogue among scientists and policymakers/decisionmakers. Throughout the dialogue, questions were raised about what and how advice should be introduced with decisionmakers. It was recognized that the identification of the most urgent priorities always requires discussions among the affected individuals/groups to reach common levels of understanding, because no one has complete knowledge of all challenges, opportunities, and solutions.

3. Sub-question 2: *Who are the decisionmakers?*

The main decisionmakers seem to be politicians, noting their abilities to understand science or to address questions about change differs greatly. Political parties also often have ideologies that may set scientific questions aside. Other than politicians, scientists are decisionmakers too. While there is a risk that scientists can become activists, scientists are responsible for correction if there is something wrong, particularly in the context of climate change that can affect not only the Arctic but also the other parts of the world. At the same time, inputs from other stakeholders (including Indigenous peoples, academia, United Nations, non-governmental organizations, media and the private sector) have influences on political

decisions. Various channels of bringing local needs to national and global levels could be created or enhanced to understand difficulties from residents' perspectives.

4. Sub-question 3: *What evidence is needed and how is that evidence defined?*

Generally, evidence becomes an appropriate basis for assessing priorities. In this sense, evidence is composed from academic or Indigenous knowledge as well as personal observations. In some cases, witness testimony can exert tremendous influence, especially to raise emotional responses. Indigenous knowledge also is highly valuable to identify the questions that will generate necessary and sufficient evidence (Figure 1) to produce informed decisions, recognizing natural and social sciences have significant challenges to operate with cultural respect. In addition, it is essential for scientific evidence to be communicated in an understandable way with decisionmakers engaged from the stage of questions onward. Training scientists, especially young scientists, with skills and capacities to communicate with decisionmakers is necessary for the next decades ahead.

5. Concluding Observations

This 2nd webinar was held, unexpectedly after the war in Ukraine began. In this uncharted situation, it became more important than ever to think about evidence for informed decisionmaking (Figure 1) to promote cooperation as well as prevent conflict with Open Science, facilitating inclusive dialogues. The resulting peace, stability, balance and resilience will come from Indigenous knowledge as well as natural and social sciences, enhancing international cooperation together. Holistic opportunities among next-generation leaders are especially important to protect – as with the Association of Polar Early Career Scientists (APECS)¹⁷ that was co-founded by Dr. Baeseman (who subsequently became Founding Director of this network that has grown with more than 3500 members in 76 countries) – enhancing their capacities to build common interests and achieve progress with planetary-scale challenges short-to-long term.

Webinar 3 (24 March 2022)

1. Main question: *What international efforts/processes are needed to facilitate progress in understanding the Arctic system and its global impacts?*

The 3rd webinar conceived to shed light on international efforts and processes that are crucial to facilitate progress in understanding the Arctic system and its global impacts. Delving into the issues of education, scientific data integration and funding schemes, this webinar examined whether the present collaborative research mechanisms are adequate. Another important question that the webinar elucidated was how the enhanced science cooperation in the Arctic could impact other areas of international relations. The concluding remarks made by the keynote speakers were devoted to the visions about the paths forward for the Arctic collaborative research under the increased geopolitical tensions and the pressing environmental problems.

2. Sub-question 1: *What are the mechanisms that exist?*

The Arctic Council remains as an important high-level forum to enhance international scientific cooperation in the Arctic with globally-relevant lessons, both helpful with inclusion and

¹⁷ Association of Polar Early Career Scientists (APECS). (<https://www.apecs.is/>).

harmful with exclusion, emphasizing the precarious 'pause' among the eight Arctic states without Russia following the Ukraine invasion. The Arctic Council working groups were highlighted in view of enhancing international scientific cooperation, particularly in the key areas of climate change and environment, integrating natural and social sciences with Indigenous knowledge. Other existing mechanisms to enhance international cooperation with science were discussed, including the ASM process (Table 1) and 2017 Arctic Science Agreement as well as IASC, IASSA and UArctic along with diverse international conference venues (including *Arctic Frontiers* in Norway; *Arctic Circle Assembly* in Iceland; *Arctic Circle Forums* hosted in many nations; and the *Arctic Territory of Dialogue Forums* in Russia).

3. Sub-question 2: *Are these mechanisms adequate?*

There is always room for improvement and where projects are repetitive or overlapping, there is a need more coordination particularly in the efficient utilization of funds. Furthermore, the question of knowledge aggregation is critical and there remains a need for processes (e.g., Table 1) to share observations that will reveal questions of common concern, enhancing international scientific cooperation while building common interests. It was recognized that research funding mechanisms differ widely among States with complexities that often create confusion for international scientific cooperation. Bringing youth into Arctic research and training as well as elevating cohorts of next-generation leaders offers the path to enhance international scientific cooperation in the Arctic and elsewhere short-to-long term.

4. Sub-question 3: *How could enhanced science cooperation impact other areas of international relations?*

It is crucial to build research and action capacities (Figure 1) with Arctic residents, including Indigenous communities, recognizing local knowledge is essential to be resilient in the changing environments of the Arctic and elsewhere on Earth. In our world with digital technologies to share knowledge virtually, as revealed prominently during the COVID-19 pandemic, international scientific cooperation has been enhanced. The current geopolitical situation with Ukraine also highlights the challenge to protect as well as enhance Open Science in the Arctic and across our globally-interconnected civilization, as illustrated notably among Arctic Indigenous Peoples who have survived for millennia without the borders of nations.

5. Concluding Observations

The 3rd webinar was concluded by highlighting that scientific cooperation among Arctic states and non-Arctic states is essential to build common interests, especially for nations to balance their national interests in manner that prevents or diminishes conflict. In this sense, scientific cooperation is fundamental to ensure the sustainable development of the Arctic, which is a 'common Arctic issue' among all Arctic states and Indigenous Peoples' Organizations. It also is important that people around the world understand that the Arctic is connected with their lives (e.g., with climate), rather than as a remote and isolated area. Science diplomats are needed to communicate with politicians and decisionmakers to overcome conflicts born from ignorance or biased perceptions. It is especially important to have continuity with people-to-people dialogues, even when national governments exclude institutional collaborations, as has happened with the Ukraine invasion, when each of us is a science diplomat. Protecting and enhancing international scientific cooperation, operating across and beyond diverse boundaries at local-global levels, is at the heart of sustainable development for the future humanity.

PARTICIPANT DEMOGRAPHICS AND FEEDBACK

As a final assessment of the webinar series on *Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries*, a survey was launched by UNITAR to collect data, addressing a core question (Figure 1): who participated in the webinar series? Table 2 details the distribution of participants who registered with UNITAR from 49 nations along with their involvement in the webinar series. Participation involved more than sixty percent (60%) of registrants in the 21 February 2022 webinar, decreasing across the series, but with nearly one-third still participating in the final webinar on 24 March 2022. Five of the Arctic states (Canada, Finland, Norway, Russian Federation and United States) contributed to the webinar series with the Russian Federation, United States, India and Japan each having more than ten registrants.

TABLE 2: INTERNATIONAL PARTICIPATION IN THE FEBRUARY-MARCH 2022 WEBINAR SERIES				
NATIONALITY	NUMBER OF PARTICIPANTS			
	Registrants	Webinar 1 21 February 2022	Webinar 2 10 March 2022	Webinar 3 24 March 2022
Afghanistan	2	1	1	1
Australia	2	-	-	-
Austria	2	1	1	-
Bahamas	1	-	-	-
Brazil	2	1	1	1
Canada	4	-	1	1
China	3	1	3	1
Colombia	2	-	-	-
Ecuador	1	1	1	1
Egypt	2	1	1	-
Ethiopia	2	-	-	-
Finland	1	1	-	-
France	1	-	-	-
Germany	4	1	1	1
Ghana	2	-	-	-
Greece	2	1	1	1
Guinea	1	1	-	-
India	14	7	6	4
Indonesia	3	-	1	-
Iran	4	1	1	1
Iraq	1	-	-	-
Ireland	1	-	-	-
Italy	2	-	1	-
Japan	13	7	7	6
Kenya	1	-	-	-
Malaysia	1	1	1	1
Mexico	1	-	1	-
Morocco	1	-	-	-
Nigeria	5	1	1	-
Norway	1	1	-	-
Pakistan	3	-	-	-
Philippines	2	1	-	-
Poland	1	-	1	-
Russian Federation	23	5	8	4

TABLE 2: INTERNATIONAL PARTICIPATION IN THE FEBRUARY-MARCH 2022 WEBINAR SERIES				
NATIONALITY	NUMBER OF PARTICIPANTS			
	Registrants	Webinar 1 21 February 2022	Webinar 2 10 March 2022	Webinar 3 24 March 2022
Saudi Arabia	1	-	-	-
Singapore	2	-	-	-
South Africa	1	-	-	-
Spain	3	-	-	-
Sudan	1	-	-	-
Thailand	1	1	1	1
Tunisia	2	-	1	1
Turkey	1	-	-	-
Uganda	1	-	-	-
Ukraine	1	-	1	1
United Kingdom	5	1	2	-
Tanzania	1	-	-	-
United States	14	3	5	5
Venezuela	1	-	-	-
Unidentified		52	13	19
TOTAL	149	90	61	49

A 7-question survey was designed and distributed by Ms. Clara López at UNITAR to 38 individuals who participated in two or three webinars. There were 26 responses, which is an unusually high survey-response rate of nearly seventy percent (70%). Without interpretation, self-identified representation of participants in the webinar series is shown below in view of their:

- Demographics with societal sectors (Figure 2) and diplomatic rank (Figure 3);
- Learning objectives in view of webinar-series novelty (Figure 4) and utility (Figure 5).
- Consideration of inclusivity (Figure 6), as an element of common interest building (Figure 1);¹⁸ and
- Alignment of learning objectives and needs with the webinar series (Figure 7).

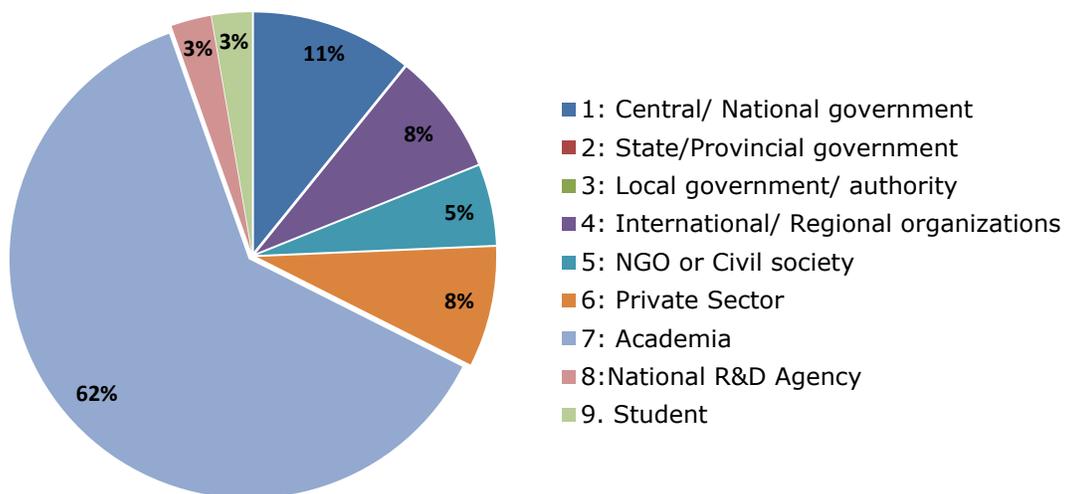


Figure 2: PERCENTAGE OF RESPONDENTS CONSIDERING THEIR SECTOR AMONG SURVEY CHOICES.

¹⁸ Berkman, P.A., Young, O.R., Vylegzhanin, A.N., Balton, D.A. and Øvretveit, O. 2022. Chapter 35. Conclusions: Building Global Inclusion with Common Interests. IN: Berkman, P.A., Vylegzhanin, A.N., Young, O.R., Balton, D.A. and Øvretveit, O. (eds). BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY. Springer, Dordrecht. Pp. 409-425. (<https://link.springer.com/book/10.1007/978-3-030-89312-5>).

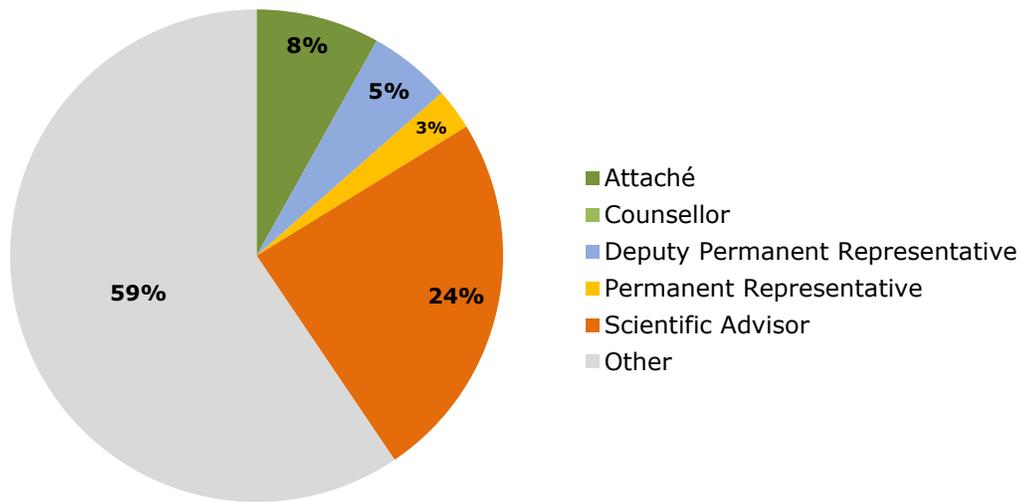


Figure 3: PERCENTAGE OF RESPONDENTS CONSIDERING THEIR DIPLOMATIC RANK AMONG SURVEY CHOICES.

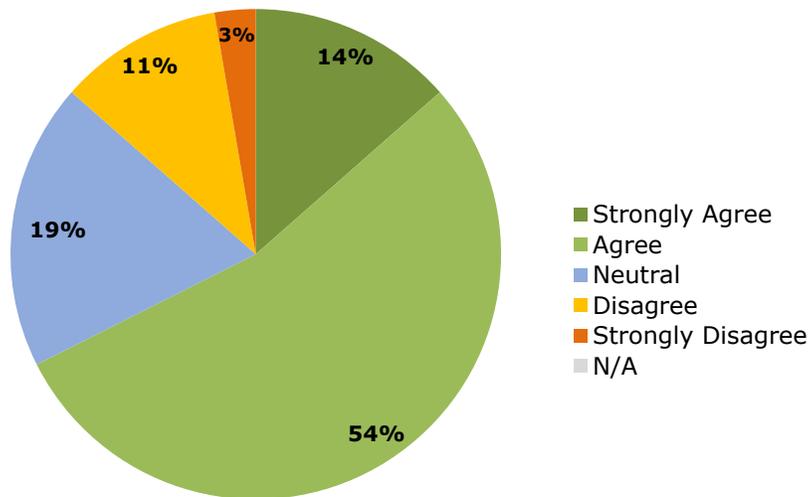


FIGURE 4: PERCENTAGE OF RESPONDENTS CONSIDERING WEBINAR SERIES WAS NOVEL AMONG SURVEY CHOICES.

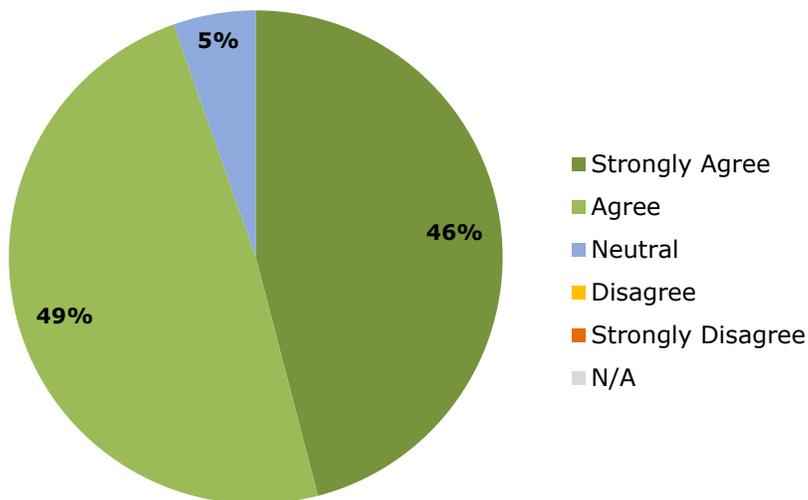


FIGURE 5: PERCENTAGE OF RESPONDENTS CONSIDERING WEBINAR SERIES WAS VERY USEFUL AMONG SURVEY CHOICES.

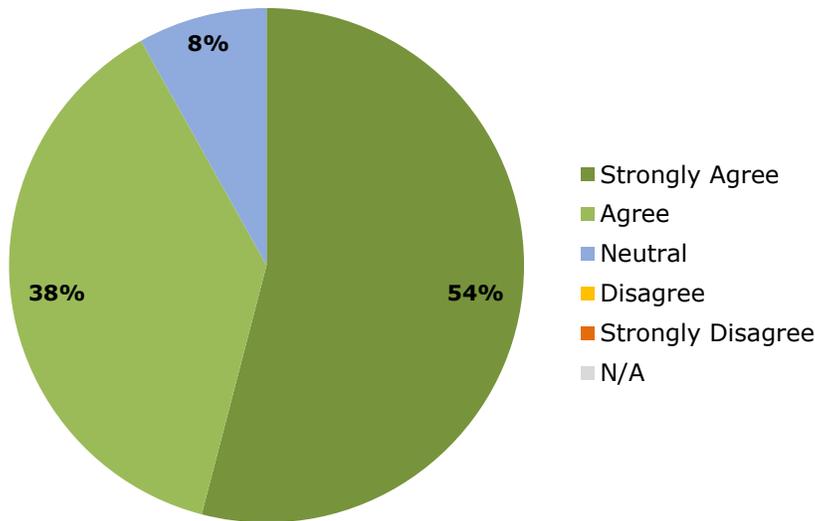


FIGURE 6: PERCENTAGE OF RESPONDENTS CONSIDERING THE WEBINAR SERIES FACILITATED AN INCLUSIVE DIALOGUE (without discriminating against any of the collaborators in terms of nationality, ideas, profile or other features).

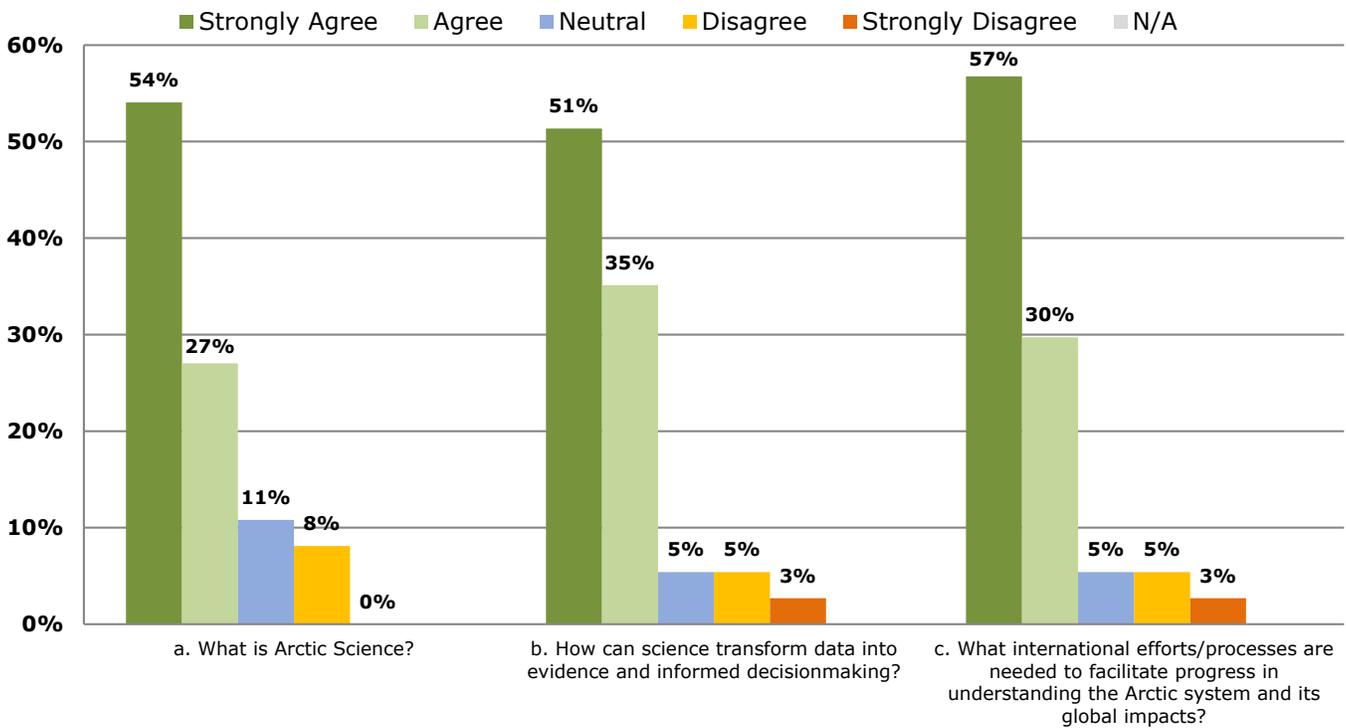


FIGURE 7: PERCENTAGE OF RESPONDENTS CONSIDERING THEIR LEARNING OBJECTIVES WERE ALIGNED WITH THEIR LEARNING NEEDS in Webinars 1-3 (left to right), as elaborated in the WEBINAR SERIES AGENDA.

As a summary observation, the number of nations and diverse participation throughout the February-March 2022 webinar series along with the enthusiastic survey responses all point to a high level of interest in *Enhancing International Scientific Cooperation*, which is fundamental with Open Science.

CONCLUSIONS

Observations from the Webinar Series Dialogues

The following major themes emerged during the webinar series, stimulated by questions (see WEBINAR SERIES AGENDA) to reveal questions of common concern about ENHANCING INTERNATIONAL SCIENTIFIC COOPERATION: ARCTIC SCIENCE AND TECHNOLOGY ADVICE WITH MINISTRIES:

Next-Generation Leaders. This topic was discussed in relation to the contributions of different institutions and initiatives (e.g., APECS and UArctic) for training as well as educating next-generation leaders, especially with trust-building and common-interest building. The discussions also emphasized the necessity to include early career scientists in research discussions and projects, introducing a diversity of visions about sustainable development in the Arctic. **How to empower next-generation leadership with transdisciplinary research capacities to achieve progress with sustainable development at local-global levels?**

Communication. This topic was discussed in relation to co-production of knowledge with designing and conducting field work that integrates Indigenous community-engaged knowledge and practices with natural sciences as well as social sciences. **How to facilitate inclusive and continuous dialogues with Indigenous communities through all stages of research design, development and implementation into outcomes that involve decisions?** Another angle of this topic was discussed in relation to communication of the importance of research to funders, policymakers, and the public, placing the urgency of climate change in the frontline of the discussions. **How to communicate about change, which operates at local-global scales over different periods (e.g., months-years with the COVID-19 pandemic to decades-centuries with climate and human population demographics¹⁹)?** Participants discussed the necessity that scientific communications should be understandable for funders, policymakers and the public, requiring inclusion of stakeholders, rightsholders and actors from the start, as framed with the foundation of questions (Figure 2).

Funding. Problems to fund projects led by Indigenous communities were discussed in relation to the existing competition for financial resources among big and small research institutions. Another funding challenge was identified in view of efficient allocation of funds to avoid repetition and overlapping research projects. **How to create synergies among diverse funding sources?** Funding allocations also were considered to support necessary research infrastructure (e.g., observing systems) that also has diverse societal uses, especially to make informed decisions, as framed in Figure 2. These matters represent important issues for discussion either led by the Arctic Council or by other entities with a potential goal of creating a system based on collective funds.

Non-Arctic states. Discussions emerged around the role of non-Arctic states in advancing knowledge about the Arctic, including with their research and participation in various regional institutions. The engagement of non-Arctic states was considered especially in view knowledge sharing about climate change, which is a planetary-scale process by definition (versus weather that

¹⁹ Berkman, P.A. 2020. The Pandemic Lens': Focusing Across Time Scales for Local-Global Sustainability. *Patterns* 1(8):1-4. (<https://pubmed.ncbi.nlm.nih.gov/33294877/>).

is regional), operating on Earth as well as all other planets with atmospheres in our solar system. The Arctic is both the ‘climate canary’ with amplified warming and a pronounced source of climate feedbacks with albedo and methane. **How to enhance knowledge development and sharing about Arctic change as a global concern?**

Arctic Governance. The Arctic Council was discussed as a key player in enhancing the role of Indigenous communities in Arctic decisionmaking and advancing knowledge about the global impacts of climate change. Concerns were expressed about maintaining and advancing the Arctic Council. Despite the diverse discussions about the important roles of different institutions, there was an agreement among the participants about opportunities to better integrate Arctic governance measures, including binding agreements about: search-and-rescue (2011); marine oil pollution prevention preparedness and response (2013); maritime ship traffic in polar oceans (2017) and precaution with fisheries in the Central Arctic Ocean High Sea (2018) with enhancing international scientific cooperation (2017) as a core contribution²⁰ from the Arctic for our world. **Without Open Science, where is the capacity among institutions and decisionmakers to serve as stewards of the governance complex that has evolved in the Arctic?**

International Scientific Cooperation Beyond Geopolitics. Despite the geopolitical challenges with the Russian invasion of Ukraine, the webinar series remained hopeful, highlighting the necessities to enhance international scientific cooperation with inclusion and continuity. There was recognition that humanity is in great peril without Open Science that is continuous across disciplinary boundaries and jurisdictional borders over generations forever. **How can we enhance Open Science in the Arctic and across the Earth to evolve as a globally-interconnected civilization?**

Enhancing Open Science Beyond the Geopolitics of Ukraine

This webinar-series on enhancing international scientific cooperation began with consideration about an inevitable question regarding relationships as well as synergies with the 2017 Arctic Science Agreement and Arctic Science Ministerial (ASM) process. Effective development and implementation of these Arctic science initiatives has been rotating with Arctic Council chairmanships among the eight Arctic states, involving their rotating chairmanships also with the Arctic Coast Guard Forum²¹ and Arctic Economic Forum.²² The setting for the webinar series also involves the history of Arctic Council implementation as the “*high-level forum*” since its establishment with the 1996 *Ottawa Declaration*,²³ which is mapped with holistic consideration up to the current Russian Federation chairmanship,²⁴ rotating from Iceland in 2021 until the hand-off to Norway in 2023.

It is noteworthy that there was a transition in the operation of the Arctic Council with the previous Norwegian chairmanship in 2006-2009, creating task forces that led to subsequent binding agreements with Arctic Council Ministerial Meetings at the level of foreign ministers, who introduced “peace” for the

²⁰ Berkman, P.A., Kullerud, L., Pope, A., Vylegzhanin, A.N. and Young, O.R. 2017. The Arctic Science Agreement Propels Science Diplomacy. *Science* 358:596-598 (<https://science.sciencemag.org/content/358/6363/596>).

²¹ Arctic Coast Guard Forum. (<https://www.arcticcoastguardforum.com/>).

²² Arctic Economic Forum. (<https://arcticeconomiccouncil.com/>).

²³ Ottawa Declaration. 1996. *Declaration on the Establishment of the Arctic Council*. 19 September 1996, Ottawa: Foreign Affairs and International Trade Canada. (<https://oarchive.arctic-council.org/handle/11374/85>).

²⁴ Vylegzhanin, A.N., Young, O.R., & Berkman, P.A. 2021. Russia in the Arctic Chair: Adapting the Arctic Governance System to Conditions Prevailing in the 2020s. *Polar Record* 57(E37). (<https://doi.org/10.1017/S0032247421000553>).

first time in the Arctic Council lexicon with the *Tromsø Declaration*.²⁵ The Norwegian foreign minister at that time, Jonas Gahr Støre, is now the Prime Minister of Norway, continuing to champion “*high north, low tension*”²⁶ bravely with common-interest building even after the Ukraine invasion.

With direct relevance to this webinar series, lessons about science diplomacy and informed decisionmaking (Figure 1) emerged from the first formal dialogue between the North Atlantic Treaty Organization (NATO) and Russia regarding security in the Arctic,²⁷ which was convened in 2010 at the University of Cambridge. The invasion of Crimea in 2014 was an “inflection” point for the NATO Science for Peace and Security (SPS) program²⁸ that had supported the NATO-Russia dialogue in 2010. Afterward, all SPS projects with Russia ceased, ending a path of international cooperation that had been ongoing since 1959 throughout the Cold War with the Soviet Union.

The same response, shutting down international scientific cooperation, was pursued more broadly with regard to Russia by European nations and allies after the Russian invasion of Ukraine on 24 February 2022. As an outcome, the Russian co-editor, who bravely co-convened the NATO-Russia dialogue in 2010, was excluded in May 2022 from the Arctic Frontiers book launch in Tromsø of BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY (FIGURE 1). More directly, “*pausing*” the Arctic Council by seven of the eight Arctic States without Russia²⁹ on 3 March 2022 was the unexpected backdrop for the two March 2022 webinars (see *Webinar Series Agenda*), noting “*limited resumption*”³⁰ of Arctic Council cooperation in June 2022.

The Ukraine invasion by Russia is the most prominent current example of nationalism, displacing consideration of other global urgencies – notably with the COVID-19 pandemic, climate change, food security and other challenges across the SDG. Consequently, there is renewed necessity to enhance international scientific cooperation as the most inclusive path for trust-building among allies and adversaries alike, as practiced after the ‘iron curtain’ came down following the Cold War. It also is ironic to see decades of investment in international scientific cooperation being squandered now with indiscriminate actions by nations, leading to uninformed decisions that operate only at a moment in time, in contrast to informed decisionmaking short-to-long term (Figure 1).

The February-March 2022 webinar series on *Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries* is both an hopeful example and a roadmap for dialogues with Open Science facilitated by UNITAR. The UNITAR hosting of the webinar series also highlights the wisdom of the United Nations after the Second World War to operate across the subnational-national-international spectrum of jurisdictions (Figure 1) inclusively in view of our common interest to survive at personal-global levels.

These dialogues about enhancing international scientific cooperation will continue in-person with sessions on “*Arctic Science and Technology Advice with Ministries*” during the Arctic Circle Japan Forum,

²⁵ Tromsø Declaration. 2009. *The Sixth Ministerial Meeting of the Arctic Council*. April 29, 2009. Tromsø, Norway. (<https://oarchive.arctic-council.org/handle/11374/91>).

²⁶ Reuters. 2022. UK and Norway Leaders Back Freedom of Choice for Nordic Partners on Security. 13 May 2022. (<https://www.reuters.com/world/uk-norway-leaders-back-freedom-choice-nordic-partners-security-2022-05-13/>).

²⁷ Berkman, P.A. and Vylegzhanin, A.N. (eds.). 2012a. ENVIRONMENTAL SECURITY IN THE ARCTIC OCEAN. NATO Science for Peace and Security Series. Springer, Dordrecht. (<https://www.springer.com/gp/book/9789400747128>).

²⁸ NATO. 2014. *The NATO Science for Peace and Security (SPS) Programme Annual Report*. North Atlantic Treaty Organization, Brussels. (https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_topics/SPS-Annual-Report-2014.pdf).

²⁹ *Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine*. 3 March 2022. (<https://www.state.gov/joint-statement-on-arctic-council-cooperation-following-russias-invasion-of-ukraine/>).

³⁰ *Joint Statement on Limited Resumption of Arctic Council Cooperation*. 10 June 2022. (<https://www.state.gov/joint-statement-on-limited-resumption-of-arctic-council-cooperation/>).

which will be co-hosted with the Sasakawa Peace Foundation from 4-6 March 2023 in Tokyo.³¹ These dialogues represent ongoing leadership from Japan, which started with the Ministry of Foreign Affairs funding for this webinar series.

As summary observations from the February-March 2022 webinar series – promoting cooperation and preventing conflict are two sides of the ‘coin of peace’³² that require Open Science, which emanates from questions among allies and adversaries alike (Figure 1). With consideration of the six elements of inclusion (who, what, when, where, how and why),³³ Open Science is akin to free speech.

Building common interests is the key contribution of science diplomacy with Open Science for humanity inclusively. In contrast, nations consider their national interests first and foremost exclusively. Other than with Open Science – how can we enhance leadership capacities that are urgently needed among nations to balance national interests and common interests so we can continue to evolve as a globally-interconnected civilization? Empowering strategies with both conflict resolution and common-interest building across a ‘continuum of urgencies’ (Fig. 1), our shared challenge and responsibility – all eight billion of us – is to learn the 20th-century lessons with the Second World War and the Cold War, forever after with Open Science, enhancing international scientific cooperation “*for the benefit of all on Earth across generations.*”

If we think it!! We can build it!!

³¹ Berkman, P.A. and Baeseman, J. (session conveners). *Arctic Science and Technology Advice with Ministries*. Arctic Circle Japan Forum with Sasakawa Peace Foundation. Asia in the Future of the Arctic (Science – Geopolitics – Economy – Oceans – Climate – Technology). Tokyo. 4-6 March 2023. (<https://www.arcticcircle.org/forums/arctic-circle-japan-forum>).

³² Berkman, P.A., Lang, M.A., Walton, D.W.H. and Young, O.R. (eds.). *SCIENCE DIPLOMACY: ANTARCTICA, SCIENCE AND THE GOVERNANCE OF INTERNATIONAL SPACES*. (With Foreword by HSH Prince Albert II of Monaco). Smithsonian Institution Scholarly Press, Washington, DC. (<https://repository.si.edu/handle/10088/16154>).

³³ Berkman, P.A., Young, O.R., Vylegzhanin, A.N., Balton, D.A. and Øvretveit, O. 2022. Chapter 35. Conclusions: Building Global Inclusion with Common Interests. IN: Berkman, P.A., Vylegzhanin, A.N., Young, O.R., Balton, D.A. and Øvretveit, O. (eds.). *BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY*. Springer, Dordrecht. Pp. 409-425. (<https://link.springer.com/book/10.1007/978-3-030-89312-5>).

APPENDIX 1

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APPENDIX 2

WEBINAR 1: WHAT IS ARCTIC SCIENCE?

MONDAY, 21 FEBRUARY 2022

TRANSCRIPT (RECORDING AVAILABLE ON THE [UNITAR WEBSITE](#) WITH TIME STAMPS, NOTING THERE MAY BE TRANSCRIPTION ERRORS REMAINING AFTER SEVERAL EDITS)

Prof. Paul Arthur Berkman - 00:02

Welcome to this Webinar Series on Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries

My name is Prof. Paul Arthur Berkman and I have the honour as well as pleasure to coordinate this webinar series that is funded by the Ministry of Foreign Affairs of Japan, starting today with Webinar 1; Webinar 2 (10 March 2022) and Webinar 3 (24 March 2022).

I thank Consul General Setsuo Ohmori from the Japanese Consulate in Boston for introducing the opportunity for this webinar series two years ago and Ms. Marisa Yamamoto for her efforts subsequently to enable this important dialogue, building on the 3rd Arctic Science Ministerial, which was convened in Tokyo in May 2021 by Japan and Iceland.

I especially thank Dr. Jenny Baeseman as well as Prof. Akiho Shibata at the Polar Cooperation Research Center, Kobe University, for their fundamental contributions to implement this project.

I thank Ms. Clara Lopez at the United Nations Institute for Training and Research (UNITAR) for managing the logistics of this webinar series, which was kindly enabled by Mr. Rabih El-Haddad who directs the Multilateral Diplomacy Program at UNITAR.

Importantly, I thank the wonderful team of scholars from the Harvard Kennedy School (Tulio Andrade, Teruaki Fujii and Nadia Filimonova) and the Arctic Challenge for Sustainability program in Japan (Zia Madani, Osamu Inagaki and Jugo Sato) who are contributing as rapporteurs with passion, initiative and creativity to synthesize the insights that will emerge from our dialogues.

We are on a journey together and, importantly, I thank each of you from across the 43 nations and many time zones, with deep appreciation for sharing your insights to help enhance international scientific cooperation *“for the benefit of all on Earth across generations.”*³⁴

The goal of this holistic (international, interdisciplinary and inclusive) project is to help enhance international scientific cooperation with transdisciplinary integration of international law, ministries of nations, Indigenous peoples and science inclusively.

³⁴ Berkman, P.A., Vylegzhanin, A.N., Young, O.R., Balton, D.A. and Øvretveit, O. (eds). 2022. BUILDING COMMON INTERESTS IN THE ARCTIC OCEAN WITH GLOBAL INCLUSION. VOLUME 2. INFORMED DECISIONMAKING FOR SUSTAINABILITY. Springer, Dordrecht. (<https://link.springer.com/book/9783030893118>).

The Arctic will be applied as a global case study, considering climate and planetary challenges to balance national interests and common interests, promoting cooperation and preventing conflict for the sustainable development of our globally-interconnected civilization.

Research and action contributions to produce informed decisions that operate short-to-long term with science in the Arctic are highlighted by the 2017 Agreement on Enhancing International Arctic Scientific Cooperation that is binding among the eight Arctic states and the Arctic Science Ministerial (ASM) process³⁵ that began in 2016 among Arctic and non-Arctic states with Arctic Indigenous Peoples' Organizations.

This project builds on contributions from experts involved with the ASM process since 2016, including: ASM1 in Washington, DC with the United States as the initial host; ASM2 in Germany with Finland and the European Commission as co-hosts in 2018; ASM3 in 2021 with Japan and Iceland as co-hosts; and ASM4 in 2023 with the Russian Federation and France as co-hosts.

Each webinar will involve an opening plenary session for an hour with keynote presenters who will introduce expert insights, addressing a set of questions, designed to build common interests. I will facilitate the panel dialogue among these experts, providing opportunity for the audience to raise questions in the chat. The opening plenary panels will be recorded.

After the first hour we will break into pre-assigned sessions where you will have the opportunity to interact with these experts, who will further facilitate dialogues with your inclusive input about addressing these questions. I will explain details of these breakout sessions at the end of this panel, which will address:

What is Arctic science?

- ❖ **How do natural sciences, social sciences and Indigenous knowledge 'fit together' and enhance each other?**
- ❖ **How is science facilitated/conducted? Who is needed to do 'the science'?**
- ❖ **Is international cooperation needed? If so, to what degree?**

It is an honour as well as pleasure to briefly introduce the four keynote presenters for today:

- **Mr. Henry Burgess** – Head, UK Arctic Office, Vice-President, International Arctic Science Committee (IASC).
- **Dr. Kirsi Latola** – Vice-President Networks, University of the Arctic, Finland; former Chair and current member of the European Polar Board.
- **Prof. Andrey Petrov** –Professor, University of Northern Iowa, US; Past President, International Arctic Social Sciences Association (IASSA).

³⁵ See Table 1 (above) about the Arctic Science Ministerial (ASM) process with ASM1, ASM2, ASM3 and ASM4.

- **Hon. Mikhail Pogodaev** – Vice-minister for Arctic Development and Indigenous Peoples Affairs of the Sakha Republic; Special Envoy of the Russian Chairmanship in the Arctic Council on Indigenous Peoples and Regional Cooperation; Former Chair of the World Reindeer Herders Association; Former Executive Director of the Northern Forum.

The three breakout sessions for each webinar (which will be unrecorded) will involve initial discussions (30 minutes) followed by a plenary reporting from the three sessions (15 minutes) with continued breakout group discussion (30 minutes) and final reporting (15 minutes). The breakout sessions will be managed by UNITAR.

The reports from each breakout session will be treated as data to synthesize for each webinar with leadership from the scholar-rapporteurs. The syntheses from the three webinars will be further distilled with your input into a Science Diplomacy Action publication (as previously), capturing insights from the webinar series that will help to enhance international scientific cooperation in the Arctic and globally as the umbrella goal.

Hon. Mikhail Pogodaev – 08:04

Thank you and hello dear friends. First of all, I would like to thank all the organizers of this webinar for the opportunity to share my thoughts and experience on Arctic science and I welcome everyone in my capacity as the special envoy of the Russian chairmanship, in fact, of the Council on Indigenous and Regional Cooperation in general. Science, in my opinion, should mainly serve to the wellbeing of humanity, for people and nature.

It should help us to comprehend and understand the processes taking place in the world around us and make people live better, so that nature also remains resilient. Indigenous peoples are originally the first researchers, because Indigenous knowledge is tested knowledge, it is working knowledge. It is in our peoples' nature to survive and thrive in some of the most inhospitable places on the planet.

This is a system of knowledge that has been accumulated and transferred by many generations of Indigenous peoples and Indigenous knowledge systems. Indigenous peoples have their own ontologies epistemologies and methodologies. Indigenous knowledge is key to accurate interpretation of changes in the natural and social systems in the Arctic. Science and policy that are not inclusive of Indigenous knowledge cannot be considered as adequate to address the Arctic system.

The Arctic is changing, and we need to have the best available knowledge to better understand the processes of this change, and ensure a sustainable development, in accordance with our 2030 Agenda.³⁶ Therefore, in my opinion, it is necessary to talk about the co-production of knowledge. When scientific knowledge is combined with traditional knowledge, will allow us to obtain something new; new knowledge. It seems to me strange to divide knowledge into natural sciences and social sciences from the point of view of Indigenous peoples.

For example, it would be difficult for me to imagine that my uncle, when he was going reindeer hunting would say: *"Oh well, we need to think about natural science or maybe we need to do some more social sciences"*. Because the entire life of Indigenous people is a multidisciplinary knowledge system.

³⁶ *Transforming Our World: The 2030 Agenda for Sustainable Development* (<https://sdgs.un.org/2030agenda>).

So what is Arctic science in Russia? We have a long experience in the development of the so-called northern studies. And one of the brightest representatives of Indigenous people, Evenk, Indigenous peoples of the north, was Vasilii Robbek. He was an outstanding scientist and first head of the world's only institute for Indigenous Peoples on the Siberian branch of the Russian Academy of Sciences,³⁷ and he used to talk about the introspective approach to research. This is when Indigenous knowledge holders do science and combine scientific knowledge with Indigenous thought. By that time, at this institute of Indigenous peoples in Yakutsk, 80% of the research staff were representatives of Indigenous Peoples. And thanks to this, the institute conducted a large number of new studies and received new scientific results which were acknowledged by many scientists in the world. Today we are observing an explosion of scientific activity in the Arctic, including from Indigenous Peoples.

All sorts of scientists get into the Indigenous communities, sometimes quite unceremoniously and engage in the extraction of traditional knowledge and thereby learn their scientific name.

Here it is necessary to develop ethical principles and guidelines, which should be followed in any process of scientific research. Indigenous communities today are absolutely not immune from this kind of researchers. There is no protection of the rights of Indigenous people. The process of co-production of knowledge should be fair and equitable for Indigenous peoples and scientists. It is necessary to create and support institutions of Indigenous peoples, including educational and scientific ones, such as the Vasilii Robbek Institute of Indigenous Peoples and underline this was the branch of the Russian Academy of Sciences that was purely scientific.

I often say that an unfair situation is building up in science arena when competition for scientific funding becomes practically impossible for Indigenous peoples, given that the few and small educational and scientific institutions of Indigenous peoples cannot compete with big universities and research centers for funding.

Therefore, it is necessary to develop special models for supporting the Indigenous institutions, especially transboundary institutions, which are very important from the point of view of international cooperation in science and the co-production of knowledge. International cooperation in science in the Arctic is certainly needed. And I firmly think that we need even more cooperation in Arctic nowadays. I have been involved in international cooperation regarding Indigenous Peoples for more than 30 years and in many was this was knowledge cooperation. For example, when I was working in the Association of World Reindeer Herders,³⁸ the first festival in Tromsø was held 30 years ago in 1993. Since then, we have managed to establish cooperation between reindeer herders, scientists, governments, and businesses, which has developed into a big movement. Literally, in a week, there will be the 7th World Reindeer Herders Congress³⁹ in Khanty-Mansiysk. We believe that it is necessary to invest in young people in order to increasingly involve them in research, and also the research of traditional knowledge and science.

³⁷ Institute for Humanitarian Research and North Indigenous Peoples Problems of the Siberian Branch of the Russian Academy of Sciences (<https://www.sbras.ru/en/organization/2418>).

³⁸ Association of World Reindeer Herders (<https://www.arctic-council.org/about/observers/awrh/>).

³⁹ 7th World Reindeer Herders' Congress. 4-8 March 2022. (<https://reindeerherding.org/news/310-7th-world-reindeer-herders-congress-website>)

Now, together with the Federal Agency for nationalities in Russia, MGIMO (international relations institute in Moscow),⁴⁰ the International Center for Reindeer Husbandry,⁴¹ and others, we wish to create a training course on traditional knowledge and science diplomacy for Indigenous youth based on International Center for Reindeer Husbandry experience, which provided such courses for Indigenous youth and Arctic cooperation. An action, traditional knowledge was used in the Arctic Council for diplomacy for decades.

We see that the Arctic Council are now developing. For example, Indigenous Peoples' Permanent Participants⁴² of the Arctic Council, developed traditional knowledge principles. So there is a lot of work or movement inside the Arctic Council that also could be very useable for science in general.

I believe that with international cooperation in the field of science and co-production of knowledge, we can conduct the comparative analysis and exchange of best practices. Again, when we combine these, two plus two will make five, we can achieve optimal results. In conclusion, I would like to underline that we need stability and cooperation in the Arctic are based on respect for each other.

Thank you. I think I will stop here and ready to discuss these points.

Prof. Paul Arthur Berkman - 17:03

Thank you very much. We call for your important insights and observations. Kirsi, I invite you to share your observations as well please. Thank you for that.

Dr. Kirsi Latola – 17:04

Thank you Paul and thanks for inviting me here. It's not easy to follow you Mikhail because you put it so nicely some of things that I also would like to present to you. So, I hope you don't mind about that. I would like to give three points on openness, and openness and inclusiveness with are the values of the University of the Arctic⁴³ that I work with, as Paul mentioned.

And first I would like to call for an open mind and everyone to give a chance for a new way of thinking on what is Arctic research; how it's done; and how it's kind of handled.

We all know that traditional western knowledge and Western science is often understood as physical hard sciences, expeditions to the Arctic and so on. Sometimes, it's also thought that this type of research and science is a stand-alone science. So, it's kind of done completely on its own. But, is that actually so? Wouldn't it be beneficial for scientists and researchers to learn what people Indigenous or non-Indigenous know about the place they have lived for 1000s of years? And, how the research benefits the peoples who live in the region? If you think about climate change, it of course is their homeland and they are affected by climate change. And we should have a huge meeting actually.

Secondly, I wanted to point out something that I quite recently heard from my colleagues in International Central Reindeer Husbandry, because they pointed out that in second ICARP⁴⁴ in 2005, it was kind of a starting point of a new era, because it stated in its science plan that future activities and implementation

⁴⁰ MGIMO University, Moscow State Institute of International Relations (<https://english.mgimo.ru/>).

⁴¹ International Centre for Reindeer Husbandry (<https://reindeerherding.org/>).

⁴² Permanent Participants of the Arctic Council (<https://www.arctic-council.org/about/permanent-participants/>).

⁴³ University of the Arctic (<https://www.uarctic.org/>).

⁴⁴ International Conference on Arctic Research Planning (<https://iasc.info/our-work/icarp>).

and I quote now:⁴⁵ *“A key issue is the ownership and active participation of arctic indigenous peoples in research activities. This should be reflected in future programs and the implementation of science plans. For each of the four focal points in this ICARP II science plan (i.e., culture and education, health and wellbeing, economic models, and indigenous peoples and the state) scientists and concerned indigenous persons and communities should be given the opportunity to propose specific research plans that break new ground.”* That was 17 years ago.

And since then, we have had ICARP III in 2015. We have, as Paul mentioned in his opening statement, three Arctic Science Ministerial meetings and statements. We have had other political statements, including the European Union's Arctic policy that was published last October. They all state the same. They all state the importance of inclusion of Indigenous traditional knowledge using the participatory research method, co-production of knowledge.

However, now, almost 17 years later, since we were in Copenhagen in 2005, we know that there has been a lot of improvement, and we know that there are good examples of the co-production of research, but as Mikhail has said it has also caused a kind of a negative effect that the ethical guidelines and all these good practices have also been forgotten.

I say that there's still a long way to get the full understanding on why Indigenous knowledge or local knowledge should be used together with Western science. How the different knowledge systems could actually work together in an ethical way? And how they could benefit each other, both locally and globally? As Mikhail said, two plus two is actually five.

Thirdly, I wanted to point out something in relation about the social sciences and humanities because I see that very often, the social sciences and humanities are not actually considered as sciences. They are often thought to be less important, and they are less funded. We know that if you look at the statistics, for example, in Europe, the most research funding has gone into the natural sciences and not social sciences.

However, we cannot get the holistic understanding and knowledge on studied issue, whatever that is, without working across the disciplines. We can't work in silos. We have to have a full complete understanding. And we know that there isn't a single factor, which will not influence another factor. Everything relates to everything, as my old professor used to say in the 1980's, when I studying biology. And I still believe in this because it is true. And this also why we need to do the cooperation; we need to cooperate across different disciplines.

We need to cooperate across the players. We need the research and educational organizations, public bodies, businesses, and so on. And of course, we need to cooperate with the people who live in the Arctic, whether they are Indigenous or not. We very often forget that there are actually non-Indigenous peoples as well in the Arctic. I myself think of myself as an Arctic person. And we, those who do live in the Arctic, we know our lands. We know what is going on here. We know what the issues are, and we do have a competence. We do have a highly ranked scientists and researchers and we do welcome a cooperation because we know that that is the key to the success to have a really full cooperation.

That was my short opening points. Thank you.

⁴⁵ ICARP II – Science Plan (https://icarp.iasc.info/images/articles/icarp2/Science_Plan_02_ICARP_II.pdf).

Prof. Paul Arthur Berkman - 23:08

Thank you Kirsi for helping us better understand two plus two equals five. For the next presentation, I invite Mr. Henry Burgess from the British Antarctic Survey to share insights as well, Henry, please.

Mr. Henry Burgess - 23:11

Paul, thank you very much indeed. Thank you to the previous two speakers and thank you to all for being here. I recognize some of the faces on my screen but not all, but it's a pleasure to see you all, thank you for this opportunity. My name is Henry Burgess, as Paul said I work at the British Antarctic Survey in Cambridge, in the UK. The role I do is as head of the UK Arctic office, and our job is to connect researchers from lots of different disciplines in the UK to researchers across the rest of the world with a view to kind of increasing scientific cooperation and coordination wherever possible.

The particular point I wanted to say at the start was that I come at this from a slightly different aspect, I think, perhaps, compared to the previous speakers, I don't have a science background. I'm not from an Arctic state, but the UK is a non-Arctic state, of course. My academic background is as a working professional for government, essentially. I moved into this role five, six years ago.

Therefore, I wanted to kind of think about one issue in particular, which is in my mind, and then three responses to that issue. I think we've been very good as a community at creating a powerful, necessary narrative about the importance of the Arctic and the impact of environmental and social change in the Arctic. And I think that cuts across lots of people who wouldn't consider that they know much about the Arctic or about science in general; that sense of kind of rapid change in the Arctic; the way that the Arctic is important for itself and for the people that live there, Indigenous, and local people. But also, for its global connection, the impact that that change in the Arctic has had on the rest of the world. I think that narrative is very strong. Whenever I speak to policy and decisionmakers in the UK or more broadly, they get that message essentially; that hits home. All of us have kind of worked very hard on that message over decades. Nonetheless, I think we've been less successful. It's naturally the case about kind of the science response to that message about how science organizes itself to respond to that change in a way that's kind of as timely as possible and as powerful as possible. And it's partly because this is of course an international effort.

The way that science is funded in all our different countries is completely different. For some, it's very directed from the top. Here, the government sets the priority. This is what we will study, these are the ships that we have available. And then in other countries, it all comes from the bottom, it comes from a science idea. Someone's kind of sitting on their own or working with colleagues to create a kind of an idea that then becomes a funded program on a project. Nowadays, we have all kinds of different ways of sharing data or not sharing data.

I think that narrative about change in the Arctic is very strong. And I'm not yet sure that we're in the right place when it comes to how science responds and particularly how science responds in connection; in close engagement with Indigenous and local communities. So that is the issue on mind and there are others too. What are their responses to that? Three of those, I think count and I'll speak a bit about now.

The first one of those is the State of Arctic Science Report, which comes from the International Arctic Science Committee. The first one of those was produced in 2020. The second one was last year. And this is not about the science itself in the Arctic. It's not about how the Arctic is changing. It's about the state of the

science, essentially. It's where the gaps are? Where we can cooperate more in the future? Where is the beginning of knowledge in some particular areas that are going to become huge priorities in the future? And so that's something that we can focus on in the future. That's something that I think the International Arctic Science Committee has provided a positive step forward because we know a lot about change in the Arctic. Of course, we need to know more, but it's that sense of the other science communities in the right place. Are we asking the right questions in order to respond to that change? I will put a link in the chat shortly to the State of Arctic Science report.⁴⁶ But I think that's a powerful response to that to that issue.

The second response I wanted to raise was the creation of the Arctic Science Founders Forum.⁴⁷ Because of course, we know we need to understand more about changing the Arctic. We know that the Arctic is absolutely not a homogenous environment, but it's very different in different places. And we don't have anything like the coverage and the depth of knowledge about that change yet. And of course, all of that happens because governments, states are keen to understand that change and to fund it fundamentally. So, the Arctic Science Founders Forum should bring together the key nations who have an interest in working together and in funding the understanding of change in the Arctic. The organization is very junior; very young. It's essentially only a couple of years old. And we're still working towards our Terms of Reference in our first meetings and kind of making something of this. But, I hope in the next year or two years, as we build up to the next Arctic Science Ministerial Meeting, this Arctic Science Funders Forum will be a really good place to think about some of these really big questions, because we're increasingly seeing that the biggest questions in the Arctic need the biggest responses in terms of international coordination and effort, much like the MOSAiC⁴⁸ cruise program in the past couple of years.

The third thing I wanted to mention just quickly, is a specific response that the UK and partners in Canada have undertaken, thinking about how we can properly, respectfully engage between traditional western science, if I can use that term, and Indigenous and other local knowledge.

This is a new Arctic research program called the Canada Inuit Nunangat UK Arctic research programme⁴⁹ and it will run from 2021 to 2025. It will be several million pounds in the UK and several million dollars on the Canadian side. What makes it different, we hope, is that this is started, planned, governed, assessed, delivered, and the data will be owned by all the different partners in the program. So right from the very start, this has not been about teams in Canada and the UK deciding we want to work Inuit Nunangat in the far north of Canada and here's what we'll do. It's actually a bit about what do the people that live in the far north, the Inuit themselves want to know. how we can combine teams research from Inuit research communities, Canadian research teams, UK research teams, all together and work together to support those principles of self-determination and research, which are very important in the Inuit communities of the North? And I'm happy to talk a bit more about that later on or in the facilitated breakout sessions.

For us, this is a really big step up, and it's been quite difficult to be honest, because all founders and organizations have their red lines. And working together in this way has been difficult for us but it's been intensely rewarding. We are now at the stage having signed a memorandum of understanding with all the different partners in Canada and in Inuit Nunangat a year or so ago. We have the applications, and we're

⁴⁶ IASC State of Arctic Science Report. (<https://iasc.info/about/publications-documents/state-of-arctic-science>).

⁴⁷ Arctic Science Funders Forum. (<https://iasc.info/cooperations/arctic-science-funders-forum>).

⁴⁸ Multidisciplinary drifting Observatory for the Study of Arctic Climate expedition (MOSAiC) (<https://mosaic-expedition.org/>).

⁴⁹ Canada Inuit Nunangat UK Arctic research programme (<https://www.ukri.org/what-we-offer/browse-our-areas-of-investment-and-support/canada-inuit-nunangat-uk-arctic-research-programme/>).

just at the stage now of deciding what are going to be the successful applications. Successful projects will now run for three years, we have joint teams between all the three different sets of partners, and they will own that data together. They will publish that data together. We hope this will be an interesting model for the future. So, we're not saying it's perfect. That's the last thing I'm saying but we've made a big leap forward I think in our understanding and hope that will make a significant difference.

Thank you, Paul. I'll leave it there but happy to come back to any of these points in the subsequent discussions. Thank you.

Prof. Paul Arthur Berkman - 32:15

Thank you very much Henry for your helpful observations. The last keynote presenter today is Professor Andrey Petrov from the International Arctic Social Science Association⁵⁰ and University of Northern Iowa.

Prof. Andrey Petrov - 32:30

Thank you very much for the opportunity to speak. It is quite early here. So, I'll try to be short and concise. I have a few points to deliver. I am the former president of the International Arctic Social Science Association, which of course brings together about 700 social scientists across the Arctic and beyond. I'd like to begin by reminding everyone that arctic scientists are diverse, and the social sciences and humanities are part of it, as Kirsi already mentioned, and it's growing rapidly. I think it is very important to recognize the diversity of the Arctic sciences family. At the same time, we must remember that Arctic research is incredibly and increasingly international, the University of the Arctic has done a study a few years ago, comparing generally research across the globe, whether using the Arctic regarding international cooperation, and we see that Arctic is much more international than research in other regions of the world. At the same time, most of the Arctic researchers are keen on international cooperation. About 90% of Arctic researchers in one way or another are interested in pursuing international cooperation when there's access to it, and data being in the field of sharing knowledge with each other or working with communities across the Arctic. Therefore, it's very important that these points, of course, kept on being highly considered.

Paul mentioned that the Arctic science cooperation agreement is an interesting instrument that's been developed with the cooperation of the science community, and it mentions some of the organizations that are involved here; specifically, IASSC, IASC and UArctic, who can be one of the leading forces and implementing it alongside the rest of the countries that are part of that agreement by creating a data platform or by establishing procedures. That's for sharing and exchange; for generating support from the funding agencies to the diverse research that is taking place in the Arctic.

At the same time, it's also important to remember that Arctic sciences, speaking together, have been changing quite rapidly as well. In terms of their methodological, even epistemological underpinnings from very disciplinary science perspectives that science organizations had 20-25 years ago; dominated heavily by nature of sciences, and really not embedded with Arctic communities. We're moving quickly science that is inter- and transdisciplinary, in which different science disciplines are working together and most importantly, which different knowledge systems are acknowledged and respected, working together on equal footing.

⁵⁰ International Arctic Social Sciences Association (<https://iassa.org/>).

That is the future Arctic science that we would like to have. We, of course, are still experiencing COVID a pandemic and, in terms of Arctic research, we could call it a strategic pause. This pause gave us an opportunity to reflect on our work as scientists in the Arctic. Arctic communities and Arctic people are also given an opportunity to reflect on what sort of science they would be welcoming in the future. And I think it is an opportunity for all of us to sit down and stand back and reflect on those sort of things.

In a recent paper, approximately written a year ago, we co-wrote with the President of UArctic and IASC and some other colleagues, particularly Indigenous partners, we outlined four important things that should be part of this reflection that are taking place right now. One of them is embracing the local turn. The other is fostering knowledge co-production. The third is focusing on the next generation. And the fourth is emphasizing global nature of Arctic research. And I will just say a few words on each of them.

Regarding the local turn, is really a turn to localization and decolonization of Arctic research enterprises, which means elevating role of Indigenous local communities, as we know that that is really important. We knew this before the COVID-19 outbreak, but the actual situation, which the Arctic scientific enterprise, speaking broadly, found itself two years ago, speaks to the necessity for us to double, triple, quadruple those efforts.

The investment is in local infrastructure and connectivity. The investment is in Arctic residents as scientists and as researchers who would conduct research in the Arctic, shifting to a paradigm where we have local first, and early career student first, and now we're finding principles. Focus on community-driven research, not just community-based, and also increase the role of citizens' science are important elements.

At the same time, we must remember that the resilient Arctic science we can build is based on a global coalition and meaningful collaboration of scientists, local and Indigenous rights-, stakes- and knowledge holders, policymakers, science advocates, citizen scientists, industry partners, research institutions, financing and many others. Just one group by itself, one place by itself, one country cannot do it. And even the Arctic Council just acting alone can't deliver it.

It is an international cooperation that is at the forefront of this effort. And that would be of course, a part of the process is taking place right now. As an example, the preparation for the International Conference on the Research Planning in Denver in 2025 or we all hope the International Polar Year 2032-2033.⁵¹ And a part of these efforts is, of course, as a decolonization of Arctic research enterprise. And this is partially achieved with co-production, knowledge co-production, of course from multiple times mentioned, ensuring that Indigenous and non-Indigenous research partners share a common vision of what the research priorities are; what these methods are; what are the goals and the products that are obtained by Arctic research; and what practical results important for Indigenous communities are brought about with this research. It means co-identifying research needs, co-creating research ideas, co-designing research questions co-defining research objectives, co-authoring research results and in co-implementing them together and of course, working to evaluate them collectively.

What does it mean for researchers? It means that a researcher or an agency must recognize and respect Indigenous knowledge and other knowledge system. But, first of all, in the Arctic, support the Indigenous knowledge. Support Indigenous people to identify Indigenous peoples' research priorities and act upon

⁵¹ 4th International Polar Year 2032-2033 survey (<https://form.jotform.com/220532776067054>).

their own research projects. It is very important for us to keep that in mind, not just the priorities that science community is bringing, but their own research priorities that Indigenous communities have, enabling and encouraging development for an equitable relationship, and understanding between Indigenous peoples and researchers, and very importantly, focusing on reciprocity and researchers. This should be a mutually enriching process which can support capacity building, and communities, both in our Arctic partner communities and in the science community itself, by expanding an understanding of the role and the opportunities that this co-production and collaboration can bring us.

I think we are in a very interesting juncture moment right now. Given all the circumstances, we can invest our efforts to changing the landscape of Arctic sciences, whether it's natural sciences or social sciences, by embracing this pause, reflecting on what we have done and developing a better way forward. That is my message.

Prof. Paul Arthur Berkman - 42:09

Excellent message. Indeed, Andrey, might I request you to put the reference for the paper you were speaking with those four points into the chat?⁵² I think that will be helpful and instructive. We have now about 20 minutes there for a dialogue among the panelists. And rather than being presumptuous and asking questions myself, do any of the four panelists have questions for each other that you would like to raise? Andrey, Henry, Mikhail and Kirsi, any question that you would like to raise? Otherwise, let me start with an observation that Mikhail made about how strange it feels to divide knowledge systems, from the perspective of Indigenous communities and as researchers. We should embrace all of these different components from natural sciences, social sciences and Indigenous knowledge, they're all knowledge systems. Is the concept of a knowledge system more helpful than thinking in terms of science? Are all these together at a higher level, knowledge systems that operate in concert to consider societal relevant approaches. I would just put that out there as a question, do any of the four of you like to respond?

Dr. Kirsi Latola - 43:47

Maybe I can respond if I may. I have often heard, and I also know that for myself, as a non-Indigenous person, it's not easy to understand what Indigenous knowledge outside the different knowledge systems is. Therefore, we definitely need more understanding and more information on it. But there has been a lot of discussion on how we could increase researchers and people's understanding about Indigenous knowledge and different knowledge systems because they are so different. I understand that but I can't explain, for example, very thoroughly, what is editor's choice because it, of course, depends on the communities but I know that Mikhail knows this much better than I do.

Hon. Mikhail Pogodaev – 44:48

I think that I probably don't know about the more general kind of system of knowledge which can provide with more understanding to Indigenous knowledge. And I think, of course, for researchers who are not Indigenous, it's often quite difficult to understand. The system and as I said, for example, in our region, our scientists who were Indigenous proposed this introspective approach. When Indigenous representatives' holders of this knowledge were educated as researchers, they started to combine knowledge and got something new. And as I said, we got very good results after this.

⁵² Degai T, Petrov AN, Badhe R, Egede Dahl PP, Döring N, Dudeck S, Herrmann TM, Golovnev A, Mack L, Omma EM, Retter G-B, Saxinger G, Scheepstra AJM, Shadrin CV, Shorty N, Strawhacker C. 2022. Shaping Arctic's Tomorrow through Indigenous Knowledge Engagement and Knowledge Co-Production. *Sustainability*. 14(3):1331. (<https://doi.org/10.3390/su14031331>).

Prof. Andrey Petrov – 46:20

This process is mostly capacity-building, institutional, but also individual. I think the best way is to always listen, and that's something we do not always do, and we should therefore put it more into practice. That's also the way to learn about different knowledge systems. Just sit down, step back, open your mind and listen and that's really the first step that we all need to undertake.

Prof. Paul Arthur Berkman – 47:00

In this consideration of knowledge systems of science and thinking how they originated in the first instance and why we have natural sciences, social sciences, Indigenous knowledge, and observation, they aimed to establish additional discussions. Each of these knowledge systems emerged to help with decisions that would potentially change the world. And it has always happened in the past and we created humankind systems to reveal understanding about patterns, trends, and processes. Ultimately, for the purpose of decisionmaking. Is it appropriate to think of science in a sense as a study of change? That all of these knowledge systems have a purpose, to understand the difference in the context of making decisions, so I throw that out as a question.

Mr. Henry Burgess – 47:59

I recognize what you said. I think that's a perfect way of looking at it. When you consider that traditional western science is better for those operating within, it sort of aims to challenge each other professionally and respectfully, and in order to understand that change of history, the systems of peer review, publishing, and academic challenges, all that kind of dialogue.

That professional way of politely, meaningfully disagreeing with each other is all built-in. Furthermore, it is not always polite that everyone understands how to challenge respectfully and how to change that sense of what is collectively known within that information system. I imagine a similar way within local communities on how that Indigenous and local knowledge can potentially evolve. We're struggling with how we can combine those two ways. Because sometimes it is more important to understand, to comprehend a conflict rather than an agreement in a situation where western scientists think about change for a particular case.

Because if we still have western scientists thinking about change in a particular way, and local Indigenous communities are thinking about it differently, I am not sure we have an appropriate and effective language for our lab. Both communities need to define a way of communicating and agreeing with each other in a meaningful and polite way to achieve a successful resolution. There must be a first learning stage at the beginning of the process, rather than running to an end or a goal.

Prof. Paul Arthur Berkman - 50:24

So your observation, Henry, about starting with questions is the essence of the webinar series itself, in the sense that it is designed around questions when ultimately, if we're successful, to reveal questions of common concern. Arguably, the questions are more critical in the process than the answers. And indeed, in terms of this evolution that Andrey had mentioned going from disciplinary to interdisciplinary to trans disciplinary, it's the design of questions among stakeholders, rights holders and actors together, this co-design that becomes important. Mikhail, Kirsi or Andrey, do you have additional observations based on the notion that science and systems knowledge systems originated to assist in decisionmaking?

Prof. Andrey Petrov - 51:21

I can quickly say, in addition to what Paul mentioned, we also talk about emerging from convergence research, which actually turns into disciplinary research. That is focused on addressing critical, specific challenges, in our case in the Arctic for Arctic communities. That's really, again the future of Arctic science and its collaboration with Indigenous knowledge systems because of course; co-production is the best way to conduct such convergence research.

Dr. Kirsi Latola - 52:18

I might be taking this in a different direction because I have been thinking that initially, when we started talking about the funding, that kind of sets the frame for the research. And then, when we discussed co-production and planning the research together, I wondered who makes the decision and who has the power to decide what is conducted because that is one of the critical questions. There needs to be someone who decides whether to fund or not. Therefore, there is still this kind of power question on who makes the final decisions and who has been causing problems? Sorry, go ahead.

Hon. Mikhail Pogodaev - 53:17

Thank you. Yes, it's a very important thing, and I would like to follow your talk by mentioning the importance of who has the power and the right to identify what kind of research should be done. The rules on legislation are based on a core scientific understanding of these processes and scientific research. But sometimes, we see that religious knowledge about nature is subject to different results, and occasionally, Indigenous people do not have an opportunity. Or more capacity to change and present their vision for the issues are particularly important to them. So I think it's crucial to always discuss who is identifying research agenda in the beginning. Therefore, if we start working together on enhancing scientific knowledge, it would best to enhance decisionmaking.

So I see two questions in the chat from Yulia Zaika. One is an observation along these lines, how can we ensure the proper application of knowledge systems of expertise across these different communities? For example, the aspiration of co-production, co-design, but how do we facilitate that?

Prof. Andrey Petrov - 56:04

I mean, probably there's no recipe for that. I was curious about what Jenny was talking about, maybe there are experiences to share, but really, it is an investment, an investment of time, an investment of resources. Providing opportunities that can foster this idea needs a commitment. Again, it's all about funding agencies for this purpose.

Mr. Henry Burgess - 56:54

I think the key for us has been giving everyone an equal stake in the program development. So, the reality is that, if you live in Nunangat, the northern part of Canada, then you will be experiencing this environmental social change firsthand. And the things that are happening to you and around you are of kind of huge interest to Western scientists. So it's a difficult starting point. The key is to work together, and the key is that during the setting of questions, the themes for what the program would cover, has to start off by responding to the concerns of the local community and those are in lots of cases. It is also important that in the funding program, researchers from all the different funding partners and from the local communities have equal status. So we made sure that when we were going to the application setting process, and nine months or so ago, it wasn't that you had to have a letter of support from the local organization. You had to have that engagement in the program and they will be funded through the

program. So if you're a Canadian and a UK researcher and you had a brilliant idea, that's not enough, you have to have the agreement of the local community to take part in your project and only then, it will be funded through the project. Following that, there is not just the typical Western peer review process that we all know about, but there is also an assessment process that is run by Indigenous communities themselves to assess whether that is something that is really worth looking at and whether they want to see that happening in their community, is it a priority?

In this case, we would work together, share the data, and publish together, and therefore, the credit of the work would be extended to both ends as well. And then ideally, of course, there is a legacy that's left, from our project, our program is a three-year program. But we hope very much that there will be a legacy format. And it's not just legacy in terms of explaining the science to school children a year later. It is something really meaningful to create the next generation of researchers who can really work on the next things together in international partnerships.

Did you have Canadian partners who knew the community beforehand or how did you build the trust? How did you start that? It is always said that you have to have this trust. So on the Canadian side, the partners are Polar Knowledge Canada, the National Research Council, Parks Canada, and the funding councils in Québec, together with ITK⁵³ in new capital. So, yes, to all of those links, people were in an excellent place to start. Because you're right, you can't just start from scratch in many cases. It would be best if you had those links already to have the confidence to put an application together, but we did do a two-stage process. So the first thing was just a simple two sides of the paper, you know, are you and the other three groups together able to take something in mind into agreeing to work on something. And once we got through that stage, people had to develop an entire application, so you know, you can have the idea first, and then come to it kind of later on in six months.

Hon. Mikhail Pogodaev – 01:01:31

Thank you. As it said at the beginning, we have small educational and research institutions in the Arctic with the US, as well as in Norway, for example, in New Delhi, in Finland, in the Russian Arctic, and other places. As I said, it is challenging for them to compete with prominent universities for funding, when there is quite a large pipeline of funding for research in the Arctic, usually from more renowned universities or consortium States. Those remote and smaller institutions never get support to deliver their research and development projects on Indigenous people's knowledge. So I have 20 years of experience trying to get this support and achieve an efficient response and disposable income. Therefore, there is a need for an extraordinary approach or a particular model for small institutions to have a different solution when they get funding for their projects. Moreover, they would have opportunities to participate in international cooperation, which is also very costly for small Indigenous communities. It is challenging and we should deem the complexity of the situation. It starts from education, the general education. Now we have federal standards in education, and from the very beginning, it is impossible to pull it off in people's knowledge development movements equally. We also have to look very seriously into the education standards.

Prof. Paul Arthur Berkman – 01:03:36

Thank you very much, Mikhail, Andrey, Henry, and Kirsi for your helpful insights and observations. Let me just briefly share the objective of the breakout sessions. Clara has identified three breakout sessions, roughly the same size and we've gone through and tried to balance this in an international context as well.

⁵³ Inuit Tapiriit Kanatami (<https://www.itk.ca/>).

Therefore, Clara will push a button and we will all disappear into the breakout sessions. The general framework is that we'll have about half an hour in the breakout sessions to address the questions for this webinar. Then we will reconvene for about a 15-minute debrief from each of the three breakout sessions and go back into a breakout session again for the remainder. Up until 15 minutes before the end. And then a final debrief. The objective for each of the breakout sessions is to thoughtfully consider each of the questions that were used to frame this webinar about what Arctic science is.

I think Henry, your observation about a dual review system where the Indigenous communities are in parallel with the formal national funding agencies is very important, and perhaps something that can be formalized more broadly. In terms of national responses, I think that would certainly send a clear and compelling signal of co-production in terms of shared review so that was a very important insight that he shared with us.

Kirsi, Andrey, Henry or Mikhail, do you have any final observations before we press the button that we all disappear into our breakout sessions?

Again, I thank all the presenters and all of the participants, I saw that there were many thoughtful questions in the chat. I encourage you all to make a copy of the chat to look at the questions. We will produce a report from this workshop which will become available for the second webinar, and so on. So again, I thank you and look forward to speaking after your first half-hour of dialogue.

FIRST BREAKOUT-SUMMARY SESSION

Prof. Paul Arthur Berkman – 01:07:03

Thank you all for your contributions to these dialogues. We have about 15 minutes for the three breakout sessions to share observations. So roughly five minutes for each breakout session. And starting with breakout session number one, I would like to call on either the facilitator, the keynote presenter or the rapporteurs to share observations, please.

Mr. Henry Burgess – 01:07:50

We had a good discussion in our group. There was a report discussion at the start about the value of transdisciplinary research and making sure that that was appropriately respected. There was then a discussion around the kind of practicalities of dealing with funding proposals that have co-development at their heart and making sure that there's enough time to form the partnerships and genuinely give people the ability to create interesting and innovative proposals, recognizing that funding agencies deal with very short deadlines. The money comes in and then you've got to get it out the door very quickly and that works against real projects that have co-development. So mainly, we discussed how we could get over those hurdles.

There was a discussion about the role of intermediaries' interlocutors in connecting between funding agencies and local communities, and we didn't get much into detail about that, but there was discussion around the role of those bodies. That might be something that we could come back into in the future, whether that's, in many cases very valuable to identify local experts who can connect to funding agencies and others, but also the tension perhaps about whether that takes away some agency from the local communities in some form.

Then, we discussed how you resolve some of those conflicts between researchers and local communities, Indigenous researchers, and how you can put that into practice. We talked through some examples of how that might work.

I think we focused attention on making sure that both parties had equal stakes financially and in governance terms with the outcomes. Although we recognize that it is very, very difficult, particularly when it comes down to disagreements on the data about wildlife and mammals in particular.

We touched on the issue of how Indigenous communities should be involved in Arctic science that doesn't relate directly to their life experiences. So, we were talking there about the funding of icebreakers and satellites, as well as aircraft. So, things that don't relate to the daily lived experience of communities and whether there was a role for Indigenous involvement in those decisions.

We acknowledge that there's no day-to-day engagement in the reality of what happens in the Central Arctic Ocean, but actually Indigenous communities are stakeholders in the wider Arctic. What happens in the Central Arctic Ocean would affect them more quickly than what it would affect other people? We are just beginning to get into some of that discussion. We also talked about learning from other Indigenous communities across the world, in the Amazon or Asia, and elsewhere, about their experience and their example of how you resolve some of these complexities and move forward.

Then we talked a little bit about funding and how we could be creative in funding new programs and projects, and whether that should be done internationally by individual partners giving money, making a project with another partner, or whether it is possible for countries to begin sharing funding in a central fund that is then available for more people. So, a Circumpolar Arctic funding arrangement, which we recognize is difficult and doesn't really exist at the moment.

Hopefully, that is reflective. If anyone remembers anything from my group that I have misrepresented or that I might have missed out, please let us know.

Prof. Paul Arthur Berkman – 01:12:25

Thanks. Before inviting the second breakout room to share observations I just wanted to add a comment. Henry, we did an analysis of the five binding agreements that entered into force in 2009. And curiously, the central Arctic Ocean High Seas fishery agreement includes the term Indigenous more than the search and rescue agreement, more than the pollution preparedness and agreement, more than the polar code, and more than the Arctic science agreements. Therefore, the term Indigenous is actually most well represented in the central Arctic Ocean High Seas fisheries agreement.

The second break breakout session, please. Jenny has requested a health break. Please, proceed without concern. Jenny from your session.

Dr. Jenny Baeseman – 01:13:37

Andrey is incredibly eloquent and trying to do my best and if anyone from this session has other thoughts or additions to what I'm about to say please, go ahead just when I finished.

Prof. Andrey Petrov – 01:13:48

There has been a very intense discussion and some of the topics are similar to what we were talking about, but I do want to highlight a few different ones that may be of interest to everyone. Firstly, was the thought about co- production of knowledge and how to go about it. We returned to the discussion about listening as the best way of starting and conducting co-production or beginning this relationship. But I think there were other interesting concepts involved that require for listening to be successful on one hand, a kind of humbleness that requires engagement but also for an understanding that no knowledge system, no matter how long term and elaborate it is, is not perfect. Is also is an important kind of prerequisite for success. And there is a corporate active process. There is a need for different knowledge systems to work together to attain the knowledge that would be actually beneficial for communities, for our planet. I think that is an important thought that could be there. The other element we discussed is whether or why Arctic science is somewhat different or special in the way that this co-productive work is being conducted or in general, what do we bring to the global society, a global science community in that experience. One context is the Arctic Council which has been on for many years now, which recognizes and generalizes efforts to elevate Indigenous knowledge and its own work. And that's, of course, the representation of Permanent participants as one of the ways in which in those discussions in the Arctic Council, the Indigenous knowledge could be brought up and could be placed on a relatively similar footing as other knowledge systems of scientific knowledge system, or Western science. At the same time, it was discussed that same designed ministries have anyways different structures and different ways in which that is done and for a variety of reasons.

Of course, there are ways to go with understanding how exactly Indigenous communities could be represented, but also, there is a variety of other parts of a dynamic state part of it and so kind of how this complex system could work to further highlight and elevate Indigenous knowledge. I think they've been quite a bit of effort made and fortunate to have other Arctic states contributing as well

Another interesting thought that I actually didn't think of before, was about time. Both knowledge systems, whether of course Indigenous systems that developed throughout millennia, and on the science systems that were developed in the last few 100 years. I mean, they're long-term evolving systems, but we really have a short time to develop a way that we could work successfully together to address very urgent needs. So how do we play and work across the different timeframes? That is, I think, an important question that we have not answered, but I think is really a very important question to ask. Thank you, and if there are any additions, please, go ahead and add any of the members from the breakout session.

Prof. Paul Arthur Berkman – 01:18:15

Thank you very much, Andrey, just as an observation. The whole concept of informed decision operating short-term to long-term has as the framework working across time, it's a security timescale, dealing with immediate risks. And at the other end of the scale, it's at a sustainability timescale, trying to balance environmental, economic, and societal issues across generations. For the third breakout session, Mikhail, would you like to share observations, please?

Hon. Mikhail Pogodaev – 01:18: 54

Yes, thank you. I would also say that there were many similar issues discussed in our session. Today, we started our discussion with the question of how to make it happen that we just always Indigenous knowledge also be incorporated into decisionmaking processes.

We all agreed that the most important thing is to begin with no fundamental ideas about the need for respect and trust between researchers and Indigenous knowledge holders. Because sometimes it is difficult to understand each other's different understandings of what science is working. So, we agreed that the respect and trust was very important. Then we also were discussing what could be the possible models for the programs which could incorporate storage into research and into decisionmaking process. We also discussed dual model for validation of different ways of knowledge.

And also, some participants were asking about, for example, different events like Arctic Resilience Forum,⁵⁴ which could be also useful for the discussion on multidisciplinary ways of understanding different types of knowledge and we were also thinking about how we could provide funding opportunities to small institutions, and Indigenous peoples. And again, we had some discussion about what at the International level what different programs there are to support research and use people for solutions. Of course, I said that it's difficult for many small and remote institutions to be supported because they have limited access to all these international funding institutions and also at a national level. We also had a discussion about what are the differences between the situation of Indigenous knowledge between the Arctic States and non- Arctic States. It was also said that there are similarities between other Indigenous peoples living in non-Arctic states but that they face just the same challenges with regards to the use of their knowledge. Another question was, how to use traditional knowledge in understanding of climate change, which is also a global challenge. Here we also discussed there are many similarities in this regard, and of course the Arctic is very place with special climate.

These are my observations, maybe someone could also add something I might have forgotten. Thank you.

Prof. Paul Arthur Berkman – 01:23:11

Thank you very much Mikhail. The objective here is to continue to break out session dialogues. The idea is that we will be punctual and try and complete the activity on time, which is at in another 34 minutes. So why don't we plan to have a discussion for about another 20 minutes and then we'll have a brief wrap-up in terms of any final conclusions from the keynote presenters from today. So why don't we return to the breakout sessions Clara, please. And then we'll meet in about 20 minutes.

FINAL BREAKOUT-SUMMARY SESSION

Prof. Paul Arthur Berkman – 01:25:48

Thank you, everyone, for your kind collaboration. The intention in the last few minutes is to identify any overarching key points that emerged from the various breakout sessions. In terms of parity, perhaps Kirsi, you'd like to comment on breakout session one since Henry provided the last helpful observations.

Dr. Kirsi Latola – 01:26:20

And he actually was willing to do that, but maybe I'll just say one thing and then I will give the floor to Henry because I know that he is preparing excellent notes. I wanted to point out that I think that it's really important and good that we have in this group also a lot of people who come from outside the Arctic with different backgrounds than in the Arctic countries and the Arctic context. We are very often facing the same faces in these webinars, and we are here to say we know what each other is going to say. We are like sitting among the family members because we know everyone so well. What I realized in this webinar

⁵⁴ Arctic Resilience Forum, Belfer Center (<https://www.belfercenter.org/event/arctic-resilience-forum>).

is that we can certainly learn from each other from Asian Pacific and other countries, and we should kind of use that opportunity and maybe even often connect to the other parts of the world. Because the issue of climate change, for example, is exactly the same and it's an issue with how it works with the small universities or small colleges. The Arctic is not unique in that sense. So, there's a lot for us to learn from the others. And I think that's it has been really good. So that's maybe also my conclusion. Paul, if I may, but I think that was what I was just thinking. We can read if you have anything to add, please.

Mr. Henry Burgess – 01:27:54

I think you covered it very well. Actually. We have good contributions in our group from people that have experience of working with small island developing states, in the Asia Pacific and the Caribbean and beyond, and some really extreme experiences of using the Green Climate funds and transboundary funding. And people have experience of putting together programs and projects between different universities over several years.

There is definitely a potential to share some of that learning more broadly at venues like the Arctic Circle assembly, where it's happened, I think in the past but you know, potentially doing that again in the future. It was also an interesting point that was made about non-Arctic Indigenous groups looking with envy a little bit towards the north and thinking about how well integrated and how well connected some Arctic Indigenous communities are for decisionmaking process. I'm not saying that's universal, but definitely, some people who were thinking kind of that way.

It is important to share practical experiences amongst Asian Pacific communities about dealing with some of the issues that we're going to be dealing with in the Arctic as well, for example, kind of shipping and access to shipping straights and to international waters and national waters issues where that's a very live issue in some parts of the world and will increasingly become so in the Arctic.

And then Kirsi mentioned, particularly the University of the Arctic and the 61 thematic networks and how those are particularly valued, I think, by small institutions because it gives people who have a kind of a specific niche interest, a higher profile than they would normally have in a much bigger group. So you can find even as a small institution, you can find your niche in one of those thematic networks and have a role in helping to set the priorities and potentially have some funding through that route. So Thank you.

Prof. Andrey Petrov - 58:05

Thanks.

Prof. Paul Arthur Berkman – 01:30:03

Thank you, Kirsi and Henry, Andrey, please.

Prof. Andrey Petrov – 01:30:08

Yes, thank you. I think it was a very, very fruitful discussion. I guess maybe I'll summarize by saying that the time of action is now, and the burden is upon us to do stuff to pull off the work and make sure that what we talk about is implementable. I mean, they don't want us to miss the importance of the moment and actually, maybe the fact that this webinar did actually contribute to larger processes like international conference obligations planning, which really is the process that will lead us to have priorities and Arctic research, including priorities around co-production in the next 10 years. That will lead us to the International Polar Year. There are small deals and then the large things we could do. I mean, in our second

iteration, we talked about funding mechanisms and a variety of funding mechanism that already exists, or could be modified to ensure that Indigenous communities and knowledge holders have access to funding, whether it's a small funding process or big funding – all money is good. I think the idea is that we need to incorporate mechanisms in both very large-scale elements and then create small-scale opportunities as well. Another thought was that since the Arctic's science community is working in many ways - there are not only major needs and certainties about climate and other environmental change aspects but also work with businesses to develop economic opportunities in a private-public partnership, but we are also part of the discussion, and we don't need to forget about it. The audiences for our collective future planning is also changing. Again, it's not just the funding agencies and ministries, there's also the society and business and that's, I think, something that is important for us to keep in mind as we move forward. The general sentiment is that we come from various disciplines, various backgrounds, various knowledge systems and ways of life, and we need to coalesce uniting forces now into building this resilience for Arctic science that would address the needs of the communities while of course providing us with fundamental knowledge that will help us change the world. Thank you.

Prof. Paul Arthur Berkman - 1:32:47

Thank you, Andrey. Mikhail, I invite you to share observations from the third breakout session, please.

Hon. Mikhail Pogodaev - 1:33:04

Yes, thank you I think it was a very interesting discussion. We've discussed many things and in general, for enhancing scientific cooperation in the Arctic, we have, as the previous speaker said, we have everything we need. All the mechanisms are in place. We just need to continue and have more cooperation.

Of course, the pandemic gives us new challenges and it became, for one side more difficult to cooperate, but on the other hand, we can meet online and discuss and have this webinar available. So opportunities are here and I think that we should use the best practices that we already have on how to conduct research on the Arctic. As Andrey said, there are already certain mechanisms and we just need to maybe think about modifying them to meet the needs of the Indigenous communities and make science more sustainable, as we spoke about sustainable development in the Arctic. We also need that science, which is dealing with the development of the Arctic and sustaining Indigenous communities and make the science more sustainable with funding for research and also for Indigenous knowledge and co-production.

Prof. Paul Arthur Berkman - 1:35:21

Thank you very much. Mikhail. So before leaving today, I just want to share that the second webinar will be on March 10. And the question there is how can science transform data into evidence for informed decisionmaking so much of the discussion today is about roll up the role of science and Indigenous knowledge with regard to decisionmaking? That will be the focus of the second webinar, dealing with how are the decisions on what priorities are to be addressed, and made? Who are the decision-makers again, the questions that came up in the discussion today and what evidence is needed, and how is that evidence defined?

The next webinar will involve Professor Anne Husebekk Professor and Former Rector, UiT | The Arctic University of Norway; Vice-President for Freedom and Responsibility in Science, International Science Council. Professor Larry Hinzman who's the director, Executive Director for the Interagency Arctic Research Policy Committee, Assistant Director for Polar Sciences of the Office of Science and Technology at the Executive Office of the President at the White House, and then president of the International Arctic

Science Committee. And the third distinguished presenter in the next session will be Dr. Volker Rachold, who is involved with our discussions today as a head of the German Arctic office, former executive director for the International Arctic science committee, and co-host of the second Arctic science ministerial.

It's truly been a pleasure and an honor to have the opportunity to convene this webinar series and to begin today with the distinguished speakers, Keynote presenters. I'd like to thank Mikhail, Kirsi, Henry, and Andrey for your excellent contributions. I'd like to thank the scholars for their excellent job and reporting. I'd like to thank you UNITAR for their facilitation of this webinar series. And to all of you, I wish you good health and I look forward to our next discussions. We will report on this, and we will share in the next webinar the synthesis from today's dialogues. I look forward to the next steps and I wish everybody well.

APPENDIX 3

WEBINAR 2: HOW CAN SCIENCE TRANSFORM DATA INTO EVIDENCE FOR INFORMED DECISIONMAKING?

THURSDAY, 10 MARCH 2022

TRANSCRIPT (RECORDING AVAILABLE ON THE [UNITAR WEBSITE](#) WITH TIME STAMPS, NOTING THERE MAY BE TRANSCRIPTION ERRORS REMAINING AFTER SEVERAL EDITS)

Prof. Paul Arthur Berkman – 00:12

Welcome to this Webinar Series on Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries

My name is Prof. Paul Arthur Berkman and I have the honour as well as pleasure to coordinate this webinar series that is funded by the Ministry of Foreign Affairs of Japan, continuing today with Webinar 2 and Webinar 3 on 24 March 2022.

This webinar series is convened in the spirit of science diplomacy – as a “language of hope” – as an international, interdisciplinary and inclusive process, involving informed decisionmaking to balance national interests and common interests for the benefit of all on Earth across generations.”

I thank the Japanese Consulate in Boston for introducing the opportunity for this webinar series building on the 3rd Arctic Science Ministerial, which was convened in Tokyo in May 2021 by Japan and Iceland.

I especially thank the excellent team of collaborators with the webinar series: Dr. Jenny Baeseman at Baeseman Consulting and Prof. Akiho Shibata at the Polar Cooperation Research Center, Kobe University for their core partnership; Ms. Clara López and Ms. Michelle Glazer at the United Nations Institute for Training and Research (UNITAR) for superbly managing the logistics of this webinar series; and wonderful team of scholars from the Harvard Kennedy School (including Mr. Teruaki Fujii and Ms. Nadia Filimonova) and the Arctic Challenge for Sustainability (ArCS II) program in Japan (Dr. Zia Madani, Dr. Osamu Inagaki and Mr. Jugo Sato).

Importantly, I thank each of you from across the 43 nations and many time zones, with deep appreciation for sharing your insights to help enhance international cooperation with science “for the benefit of all on Earth across generations.”

“What is science” was the focus of the first webinar. The observations from the keynote presenters (again thank you to the Hon. Mikhail Pogodaev, Prof. Kirsi Latola, Mr. Henry Burgess, Prof. Andrey Petrov) and the participants emphasized the transdisciplinary convergence of the natural sciences and social sciences with Indigenous knowledge together as the ‘study of change.’ All of these knowledge systems reveal patterns, trends and processes (albeit with different methodologies) that become the bases for decisions, which is the focus of today’s webinar to consider “How can science transform data into evidence for informed decisionmaking?” Importantly, Webinar 1 highlighted the core elements of inclusion, respect and trust that give us the capacity to enhance international scientific cooperation.

We are now confronted with the war in Ukraine, which is shaking the foundation of our globally-interconnected civilization with great peril for all eight billion of us. This terrible situation has heightened the importance of enhancing international scientific cooperation to make informed decisions, operating across a ‘continuum of urgencies’ with resilience from security time scales (addressing immediate instabilities) to sustainability time scales (balancing societal, economic and environmental considerations across generations). Short-to-long term, international scientific cooperation is a vital bridge for dialogues among allies and adversaries alike inclusively, ultimately to enable the stability and peace of our world based on our common interest to survive.

As stated with Webinar 1, the Arctic will be applied as a global case study, considering climate and planetary challenges to balance national interests and common interests, promoting cooperation and preventing conflict for the sustainable development of our globally-interconnected civilization. The Arctic also is a harbinger of great danger, where “*burning security issues*” noted by Soviet President Mikhail Gorbachev in his 1987 Murmansk speech still remain as does the enduring hope for the North Pole as “*a pole of peace.*”

This 1987 Gorbachev speech also introduced the concept of an “*Arctic Research Council*”, building on the example of the Scientific Committee on Antarctic Research that preceded the 1959 *Antarctic Treaty*, where the United States and Soviet Union along with ten other nations agreed to consult continuously on “*matters of common interests.*” The “*matters of common interest*” that enabled the United States and Soviet Union to cooperate continuously throughout the Cold War in Antarctica as well as outer space – the umbrella that was larger than the national interests of the two superpower adversaries – simply was matter of survival in the face of mutually assured destruction, which is why the Antarctic Treaty became the first nuclear arms agreement.

The instabilities from Ukraine have propagated prominently into the Arctic, challenging the dynamics of the eight Arctic states, who established the Arctic Council in 1996 along with the six Indigenous Peoples’ Organizations to address “*common Arctic issues*” of sustainable development and environmental protection. Our informal dialogue today, convened with inclusion, is a timely opportunity to contribute substantively to informed decisionmaking, short-to-long term, especially in view of the Joint Statement on Arctic Council Cooperation Following Russia’s Invasion of Ukraine on 3 March 2022, considering “*the necessary modalities that can allow us to continue the Council’s important work in view of the current circumstances.*” More closely coupled to our webinar today is the IASC Statement on Ukraine from 7 March 2022, noting the International Arctic Science Committee “*will evaluate the situation at its next meeting at the end of March during the Arctic Science Summit Week 2022 in Tromsø, Norway*” – with deep respect for the leadership of Prof. Larry Hinzman as President of IASC and with sincere appreciation for his contributions to today’s dialogue.

As noted in the International Science Council Statement on Ukraine from 28 February 2022: “*Science has proven to act as a platform for dialogue even in times of war.*” Echoing the timeless guidance of US President Kennedy in his 1961 inaugural speech: “*Let us never negotiate out of fear. But let us never fear to negotiate.*”

Science is a critical tool of diplomacy because of its contribution to common-interest building as a necessary complement to conflict resolution. The freedom of Ukraine to speak as a nation demands

listening and hearing the voices, loud and soft, from wherever they come. This is our common responsibility at local to global levels now and forever – facilitating dialogues with inclusion and respect for the diversity of perspectives – ultimately to destroy the tyranny of systemic exclusion, condemning violence in any form.

We are both observers and participants in the holistic (international, interdisciplinary and inclusive) process of informed decisionmaking with research that involves data to answer questions and actions that involve evidence for decisions by institutions that produce governance mechanisms and built infrastructure as well as their coupling for sustainable development.

Enhancing international scientific cooperation involves contributions across the data-evidence interface with research and action to produce informed decisions – not good decisions or bad decisions; right decisions or wrong decisions; but decisions that optimize the available information to operate short-to-long term.

This webinar will involve an opening plenary session for an hour with keynote presenters who will introduce expert insights, addressing a set of questions, designed to build common interests. I will facilitate the panel dialogue among these experts, welcoming questions and comments from the audience in the chat for consideration toward the end of the panel.

After the first hour we will break into pre-assigned sessions where you will have the opportunity to interact with the keynote presenters, who will further facilitate dialogues with your inclusive input about addressing the framing questions for this Webinar. Considering the focus on enhancing international scientific cooperation, in view of the core elements of inclusion, respect and trust, this Webinar is designed to consider:

How can science transform data into evidence for informed decisionmaking?

- ❖ How are the decisions and priorities to be addressed?
- ❖ Who are the decisionmakers?
- ❖ What evidence is needed and how is that evidence defined?

To reflect on these questions, it is an honour as well as pleasure to briefly introduce the three keynote presenters for today:

- **Dr. Volker Rachold** – Head of the German Arctic Office, Germany; Co-Host of the 2nd Arctic Science Ministerial; Former Executive Director of the International Arctic Science Committee (IASC).
- **Prof. Anne Husebekk** – Professor and Former Rector, UiT | The Arctic University of Norway; Vice-President for Freedom and Responsibility in Science, International Science Council.
- **Prof. Larry Hinzman** – Executive Director, Interagency Arctic Research Policy Committee (IARPC); Assistant Director for Polar Sciences, Office of Science and Technology Policy (OSTP), Executive Office of the President, The White House; President, International Arctic Science Committee (IASC).

This plenary session will be recorded and placed on the UNITAR platform, but the following 45-minute breakout sessions will be unrecorded. There will be a health break after the breakout sessions, before the final plenary reporting. With appreciation for the scholar-rapporteurs, reporting from this webinar will be further distilled into a Science Diplomacy Action publication (as previously), capturing insights from the webinar series to help enhance international scientific cooperation in the Arctic with global lessons to both promote cooperation and prevent conflict as the umbrella goal.

Dr. Volker Rachold – 09:33

Thank you very much, Paul, and welcome, everyone. Good morning or whatever time zone you're in. When I started thinking about this webinar and what I was supposed to say, the situation was a bit different than it is today. And of course, it also has influence of what I'm going to say. Paul mentioned the various statements that appeared in response to the war in Ukraine in the last days. This has major impacts on international cooperation in the Arctic. We cannot ignore that. I think that's important that we cannot.

Of course, I want to start with the Arctic Council, which in my view, is, of course, the main forum for the Arctic. It's very effective. It's successful in terms of providing the advice that people need for the Arctic to decisionmakers. But as you saw, the statement says that the Arctic Council decided to pause all these activities, and that also relates to the working groups of the Arctic Council. The Arctic Council is currently in a hold mode and is not doing any activities. Of course, this has some impacts on international cooperation in the Arctic. I think what made the Arctic Council strong over the last 25 years are particular scientific assessments. The assessments are the main instrument that the Council has to get science into policy advice. And I think if you take, for example, the Arctic Climate Impact Assessment, which was really the first big one, I think it changed people's mind on what the Arctic is.

And that continued with various agreements, various assessments that the Arctic Council working groups did and that were then translated to the ministers. I think it is a very efficient and very effective form of providing advice to policymakers. The other thing I think that the Arctic Council did was also very successful is that they used the forum also to get the Arctic States together to negotiate legally binding agreements. What the Arctic Council does is not really legally binding. It's more like advice or recommendations for the member countries. But these agreements that were developed under the auspices of the Arctic Council, they are legally binding. So we can take the oil assessment, the oil school assessment, we can take the search and rescue assessment, the agreement, the agreement for scientific cooperation. All legally binding agreements which are really actually the outcome of the work of the Arctic Council. And then of course the Arctic Council is also very strong in terms of getting the Indigenous peoples on board. And I think that's a unique setting in the Arctic Council that the Indigenous Peoples are participating in the activities, and they have a say on what the Council does. They are asked. Furthermore, also the observer countries are participating in the council's activities and providing their science and helping to get really the advice to the right people.

So that's about the Arctic Council, of course, the Arctic Council, that's nothing that should be mentioned. The Arctic Council does not talk about security issues and does not talk about resources. The Arctic Council focuses on the environment of the Arctic and the Arctic Council focuses on sustainable development. And I think that is what made it successful. And now of course, it's very sad that exactly those kinds of things are affecting the Arctic and that the Arctic Council cannot continue its work simply because one member country decided to get into war with another country. So that's about the Arctic Council.

The other thing I want to mention, of course, is the International Arctic Science Committee. I will not talk about this too much because there are incidents also here. It is the role in defining scientific priorities that must be highlighted. I think it is the organization that helps to really identify what are the big questions in science and it has been very effective and very successful on that with this international conference on Arctic research planning. I'm honored to participate in two of them. I know they are working on the fourth one.

I think that's an extremely important element. Of course, this is connected to the Arctic Council. The active climate impact assessment was a joint venture of the Arctic Council which was actually initiated by IASC. The thing that most people don't know, it came from IASC and was then taken to the Arctic Council. The third thing on that high international level that I want to mention is of course, the process of the Arctic Science Ministerial started in the US in 2016 with the Washington Ministerial. And then I had the honor and the pleasure together with Jenny Baseman to help coordinating the second one in Berlin. And then there was a third one held in Iceland, Iceland with Japan last year, and there was supposed to be a fourth one, and also for this fourth one, which was supposed to be jointly organized by Russia and by France, we see that this is not going to work, at least in the timeline that was supposed to be organized. Also, here we see that scientific cooperation in the Arctic, of course, is really substantially affected by the political situation in the world, but the war in Ukraine. These are all the high-level things.

But I think we must go a bit deeper. If we talk about providing advice on policymakers, we must go a bit deeper and also look into regional things. One thing that we have been working a lot on is the European level. So how do we provide advice on the European level? We have instruments for that. We have European funded projects like Europe PolarNet.⁵⁵ We have the European Polar Board⁵⁶ and other mechanisms for doing that. So that's one level, just an example of, let's say there's regional format. And then the other one that I want to mention is the more local level. And we are also working, of course, with, for example, the Arctic mayors in terms of providing our advice or science to those kind of decisionmakers, which are more, say lower level. Overall I think there are two things that we must keep in mind when we translate science into policy advice or how do we transfer our science to policymakers. I think the first thing is everything that we do need to have some dialogue.

If we don't know what the questions policymakers have, we cannot answer them. So, we need to have that dialogue in order to be able to provide the advice that's needed. That's one central point. And then the second point, I think, is that we need to somehow translate our science in a way that is understandable for decisionmakers, and that's very important if we just do our science and write a scientific paper that will not be understandable for a policymaker. And that is a very important process. And I think the Arctic Council has been very good at that, because all the assessments that the Arctic Council produces, they all have a scientific component, which is normally a book or a publication. They also have the layman version, which is understandable for everyone. And then they have a very important document, which is their summary for policymakers. And that document really translates the science into an understandable version for policymakers, including recommendations. I think these are the two main points, the two overarching points that I put forward in terms of how do we communicate science to policymakers.

⁵⁵ EU-PolarNet (<https://eu-polarnet.eu/>).

⁵⁶ European Polar Board (<https://www.europeanpolarboard.org/>).

So, yeah, and with that I would like to end, and I guess that Larry will continue a bit more on IASC and Anne will also have something to say. I get. So, thank you very much and I'm looking forward to the discussion and to the breakout session and to discuss this with you.

Prof. Paul Arthur Berkman – 17:26

Thank you very much, Volker, for your thoughtful insights and passionate comments. I now have the pleasure and honor to introduce to you Professor Anne Husebekk. Anne. Please.

Prof. Anne Husebekk – 17:38

Thank you, Paul. Thank you for the nice introduction and thank you for inviting me to give a speech in this webinar. I think also I must start with Ukraine because that is in our mind all the time. And we could ask ourselves and, maybe discuss in the breakout session, whether the war in Ukraine is in favor of science diplomacy or not.

Also without an operating Arctic Council, I think we are so much worse off. I think that the Arctic Council was sort of a guarantee that we could collaborate in the Arctic area around very important questions, for instance the climate question. Without Russia participating in this research, I think we lose a lot of input, discussions and also data that could provide a more accurate picture of the situation in the north. So, these are very unfortunate things that have happened.

I would say that there is a ban on collaboration with Russia from almost every country in the world. And that affects the politicians. But it also affects scientists that has condemned the war and young people who we wanted to have discussions about Arctic questions. So exchange of students for instance, and collaboration within the framework of University of the Arctic, in which I am also board member, is now put back to a minimum. And it's very unfortunate. So, about the questions that are asked in this webinar. How are the decisions on what priorities are to be best made? So I want to leave Ukraine and ask a more general question.

Even in most democracies, politicians are elected for a four-year period. Many of the questions that we think are important and which are important now have a much longer timeline. And many of the decisions that politicians have to make are not necessarily very popular among the public that should eventually reelect the politicians. In that case, I think it's hard to see that the right decisions are made even in very developed democracies. And I think that the SDGs made by the UN are an attempt to make a global approach to really overarching questions that need to be addressed and hopefully we will succeed with the 2030 agenda by the UN. But we cannot take that for granted. I think it is a very hard work to reach the goals. And when we have setbacks, as we have right now, I think the chances of reaching these goals are less than we would like to see.

Who are the decisionmakers? I would claim that the decisionmakers are politicians. And I think that politicians are normal people with some education, more education, and some have the ability to understand scientific questions and answers very well. Others have not. And also, the political parties are made on or they are created by ideologies that may set scientific questions aside because the ideology is stronger.

I will give an example of how politicians can struggle. In Norway, for instance, the national budget is based on the fossil fuels that are exploited in Norway and sold to other countries. And there is a big opposition to what's been done today in order to stop exploiting fossil fuels. Knowing that one fifth of the national budget

is based on income from fossil fuels. It is of course a challenge for the politicians to stop this exploitation because it will affect the welfare, it will affect all kinds of things in the Norwegian society, and the politicians will probably not be reelected.

Also, I can give another example related to the IPCC⁵⁷ reports it's made by scientists. The scientists say that there is a 99.5% or even more percent probability that this information is correct based on all available scientific knowledge. But even if there is a slight amount of uncertainty, I think many people will use that uncertainty to say we cannot trust scientists; we see other solutions; we see other problems that is not addressed by the scientists. So what evidence is needed and how is that evidence defined? I think and by the examples I've made that politicians often base their ideas on other basis compared to scientists. It may also be very difficult to understand a scientist's approach. Also, some of the problems or challenges we are facing are not addressed by one scientist in one discipline. It is a transdisciplinary societal challenges that have to be approached. By just listening to one scientist's approach is probably not the solution to a problem.

I think that we, as scientists, must approach the public and politicians in a nice way so that we can give our message in an understandable way and communicate the complexity by putting different disciplines together to advise politicians. I think that we need communication skills. We need to discuss with each other how to approach politicians on serious matters. And by doing this the right way, I think that we can influence political decisions in a knowledge-based manner. But it takes some effort from our side. And I think that the field of science diplomacy is addressed more than ever. And the International Science Council⁵⁸ has now gathered a group of people being experts in science advice to try to approach the difficult problems related to the war in Ukraine, but also other international questions. I think I'll stop there as an introduction. Paul. Thank you.

Prof. Paul Arthur Berkman – 25:45

Thank you very much, Anne, for your helpful and insightful observations to stimulate the discussion. Professor Larry Hinzman, it's an honor and a pleasure to have you participate in this webinar. I provide the floor to you please, Larry.

Prof. Larry Hinzman – 26:03

Thanks, Paul. And it's wonderful to be a part of this. Thank you very much for this invitation. It's wonderful to see so many of my old friends and colleagues and so many new faces. It's a real pleasure to be here. In contrast to my previous colleagues. I'm going to end with Ukraine. I'm going to go back a little bit in history and talk about how science does play a really important role in affecting diplomacy.

I guess first, I must say so. I am the assistant director for Polar Sciences at The White House Office of Science Technology Policy,⁵⁹ and I'm also the Executive Director of the Interagency Arctic Research Policy Committee.⁶⁰ And I need to say that because I have to note to acknowledge that I am not speaking for The White House on this point. I will talk a little bit about the Interagency Arctic Research Policy Committee, but not with respect to current world affairs.

⁵⁷ Intergovernmental Panel on Climate Change (<https://www.ipcc.ch/>).

⁵⁸ International Science Council (<https://council.science/>).

⁵⁹ Office of Science and Technology Policy (OSTP), The White House (<https://www.whitehouse.gov/ostp/>).

⁶⁰ Interagency Arctic Research Policy Committee (IARPC). (<https://www.iarpcollaborations.org/index.html>).

I want to note that just going back, Volker and I will know very well how important Sciences played a role in melting the Cold War. The first International Conference on Permafrost was held in Yakutsk, Russia 1973 and Volker and I have since and have since each hosted permafrost conferences on our own following that. But it was those first meetings, those early scientific meetings that really opened the doors for scientific collaboration cooperation. And from that following that policy relation relationships opened up. And so, the same is true for other relationships with China and other nations around the world. I think we can't underestimate the importance the value of maintaining these relationships and these partnerships.

I was also the director of the International Arctic Research Center,⁶¹ which the purpose was to foster and promote collaborations across the Pan-Arctic. And through that, I worked very closely with the Arctic Challenge for Sustainability. And it's a pleasure for me to note all my colleagues, Drs. Fukasawa Masao and Yuji Kodama on this call today, and that I think that those partnerships that we shared as far as studying the Arctic, sharing data, sharing understanding, sharing resources, working together to advance those collaborations – that improved the strength of both of our nations. It improved our capability for understanding weather dynamics, for navigation, and just so many different aspects that carried on helping our nations become stronger, but also helping the global environment maintain the peaceful nature that we had and we saw in the Arctic for so many years.

That understanding from those collaborations and research that reduced, that improved understanding, that reduced risk, that eliminated some hazards that our nations, our communities, our industry faced. When we can reduce risk, we can improve business opportunities, industry, and it improves the economics of all nations. Again, science led the way to do that. It is very important.

Another point that I want to note for my time at IARC, because when I worked with Jenny Baseman to establish and she led the establishment of APECS, the Association of Early Polar Career Researchers, Scientists, excuse me. And that is the program, the effort that gives me the most hope for our future. Seeing these young researchers and the capability and the enthusiasm and the tools they bring to our scientific world just opens the doors for great opportunities in the future. And in these dark times, it gives me the most hope for where we are going. I will forever be in debt to Jenny and the early career researchers as far as where they will take us into the future.

I also want to come back to a comment that Volker made with respect to the Arctic Science Ministerial and ICARP, the International Conference on Arctic Research Planning. Those have been very successful efforts in uniting the world's researchers, at least Arctic researchers, and looking at what needs to be done. And again, when we can focus our attentions and on challenges that are of international nature that we can make great advancements on when we work together, again when we share our understanding, when we share our data, when we share our resources, when we share a common focus, we can make great achievements.

And, I think looking back, we are planning now the fourth International Conference on Arctic Research Planning. But if we look back at the first, which was in 1995 and the second which was in 2005, and the third, which was hosted in Toyama in 2015, by Dr. Enomoto was one of the leads on that. When we look back at those programs and what has been accomplished, we have to take the long view. We have to look back 10, 20, 30 years to see what those priorities were, what was accomplished, and how it changed the

⁶¹ International Arctic Research Center (<https://uaf-iarc.org/>).

world. And looking back a year or two, you can't see that when we take a long view, we really do see we can acknowledge the importance of science in advancing our nation's policies and making the world a better place.

Finally, I do need to come back to Ukraine. I want to acknowledge and thank my friend Michael Lucia from Poland. He's helped clarify my own thinking on this. This has been a very difficult time for all of us. As the President of IASC, this has been a very difficult time for us. We do have the Arctic Science Summit Week⁶² coming up in a couple of weeks in Tromsø. I look forward to seeing Paul there.

And it's a very difficult time for us because IASC has been the home for 23 member nations, including Russia, and we've had strong, the purpose, again was to foster international collaborations. We've done so much good work over the past 30 years. It is very difficult for us now to lose our collaborations with Russia. I must also thank again, Volker helped us develop this statement that was issued by IASC a few weeks ago or I'm sorry, just yesterday. And we are moving forward to look at the harsh actions that must be taken by the international Arctic research community and what we can do to help end this conflict in Ukraine.

It's so difficult for all of us. It's been very difficult for me as one who spent all my life essentially developing these collaborations and string these partnerships to put up these walls and end it. But at the same time, we do feel great sympathy for the people in Ukraine. And the world must stand United to stop these harsh events. It is a difficult time for us. The host of the Arctic Science Summit Week in Norway have issued a statement that the scientists from, the scientists and researchers, policymakers from Russia, from institutions within Russia will not be invited to participate, will not be allowed to participate either in person or online. This is a very hard line for us. But unfortunately, it's a line that we had to draw on, a line we have to stand behind. And so, with that, I will thank you and look forward to the discussion.

Prof. Paul Arthur Berkman – 34:42

Thank you very much, Larry, for your leadership in these difficult times and for your helpful comments. I'd like to ask a question in response to one of the points that you raised, Larry, that has to do with the Association for Polar Early Career Scientists and our responsibility collectively to empower and champion the leadership of the next generation. What type of messages should we be giving to the next generation in terms of operating short-term to long-term in a hopeful manner, recognizing that we are struggling seriously with problems that are of a global nature now? But what kind of message should we be giving to the next generation leaders: To empower them rather than to incapacitate them with the gloom and the doom? And so I asked that to each of you, Larry, Volker and Anne.

Prof. Larry Hinzman – 35:49

I will jump in really quickly with a brief response in that that's been the most fulfilling and rewarding part of my life is to work with the young researchers and to see how they can take the accomplishments of the past, build upon the knowledge that we have, and really leap forward with that to resolve many of these challenges. Right now, this political situation is awful. The pandemic is terrible. But we also face this issue of climate change. And the challenges before us are beyond our capabilities that we're going to resolve by driving electric cars or using paper instead of plastic bags. We have to have some huge technological and scientific and policy advances. And, on one hand worry, but I'm also grateful for our young people, because I know that they can and will resolve these challenges. There are technological advances that we

⁶² Arctic Science Summit Week (<https://www.assw.info/>).

must, and we will make to resolve this and to preserve the world we have. But unfortunately, that responsibility is going to fall to our next generation of researchers. Because I'm afraid that our generation has not done such a great job resolving those issues. And I'll pass it to Anne and Volker.

Prof. Paul Arthur Berkman – 37:10

Please Anne or Volker

Prof. Anne Husebekk – 37:12

Well, I can maybe follow up. I did say something about young people. I think they are the future. We have to invest in young people. We have to invest in young people in the circumpolar area as well as the rest of the world. And as it is now, it is much harder in the Arctic area because there is sanctions that we have to follow up. But I do not think that it is young people's will to have a war in Ukraine. And I think we have to as soon as possible, when the actual situation probably is solved, and go back and resume of a programs for young researchers and students in the Arctic area, including what is being done with Indigenous peoples. I believe they are capable of looking into the future, trying to solve the most pressing problems. And I fully agree with Larry that we do not leave the Earth in a good state. There is a lot to do for those who are following in our steps. But I think we still have to prepare the best we can, a society that will be resilient also in the future together with young people. So hopefully we can resume the work in UArctic and with young Arctic researchers as soon as possible, also with Russia as a participant.

Prof. Paul Arthur Berkman – 38:48

Thank you, Anne. Volker, please.

Dr. Volker Rachold – 38:56

Yeah, I can only support what Larry and Anne said. I remember when APECS was starting, or APECS was formed. When I met Jenny for the first time, it was within the IPY, International Polar Year, and I think it was 2006 or seven or something like that. When we met Jenny, we met in Hanover, New Hampshire, I think for the first time at the Arctic Science Summit Week. And then Jenny and a few other smart people started to design APECS. Of course, they came to us and we supported them and helped them. And when I look back and see what these people are, some of these people are doing now, it's interesting to observe that Jenny has been the Executive Director of SCAR⁶³ for a couple of years. My successors in IASC; the first was Allen Pope. He was the President of APECS for some time. Now it is Gerlis Fugmann. She was the executive director of APECS for quite some time. She's now the direct director of IASC. I think it really pays off that we changed things and made the young generation more responsible and gave them more visibility and more responsibility.

The other example that I would like to mention is, of course, the IASC fellowship program that we started in I think 2014 for the first time. Also, I did an Arctic Science Summit Week and these fellows that we supported through IASC. And now there are more additional programs that were kind of modeled on the IASC fellowship program. And I very much enjoyed working with these people. They are all dynamic and enthusiastic people, I think, who can really change things. I think this is a very successful thing. And I think it started within the International Polar Year. Before it was different, before it was just the old people having to say what happens. But, now I think it has changed, and that's important.

⁶³ Scientific Committee on Antarctic Research (SCAR). (<https://www.scar.org/>).

Prof. Paul Arthur Berkman – 40:48

Thank you, Volker. I hadn't anticipated inviting Jenny to ask questions or comments, but Jenny, your name is invoked with appreciation, and I would like to provide an opportunity for you to either address questions or ask questions.

Dr. Jenny Baeseman – 41:05

Thanks, Paul, and thank you all for such wonderful comments. And it brings up great memories to think about the building of APECS. And there were some struggles along the way to try and get people's minds to change and to realize that young people did have a place and could have a voice, and that our well, I'm not young anymore, but what we had to say or what young people had to say could be important. And I can't help but thinking in these times of uncertainty and how really crucial of a role APECS could play, particularly because it's an organization made up of members and not countries. And I think there's a real strength in that, and I hope that the APECS leadership takes advantage of that and thinks long term through some of these things. But I also want to make sure that it's clear that the three of you and Paul as well, you guys were instrumental in helping us make sure that we had a voice and that you helped us navigate the political waters to do something really good. And I want to make sure that you get the definite recognition for helping us to do that as well. I just really think it's great to see how things are changing and opening these wonderful opportunities for young people and just have been really glad to be part of it. Thanks, Paul.

Prof. Paul Arthur Berkman – 42:32

Thank you. Jenny. Volker, you just mentioned the context of the IPY. I understand that there is planning for another International Polar Year in 2032, and if we begin to think short-to-long term, that's a decade into the future, how do we imagine the circumstances today where doors are being shut, isolation is happening, Russia is being excluded from programs like the Arctic Science Summit Week. How do we imagine moving to develop next International Polar Year in 2032?

Dr. Volker Rachold – 43:14

Maybe we should go back to history and see what the IPY originally was. The first IPY, I think, was the first coordinative effort to do polar research, extremely successful. And then the one, the International Geophysical Year 1957-58, there was more on the Antarctic. It was a huge international Antarctic program, and it was in the 50s, where really during difficult political times, and still there was scientific cooperation. And I mean, the outcome of that International Geophysical Year⁶⁴ was at the end, the Antarctic Treaty System and also SCAR was formed as an outcome of this International Polar Year. The last one in 2007-2008, was a bit different because it was during very positive times, I would say. I'm not involved in the next one. Because I will be retired at the time, I guess, I hope. So, but of course, I would hope that people who oversee organizing it, they think about that, and they also think about the history of the International Polar Year and what it can do. So, of course, it's a chance ten years, something like that, Larry, you know more about it. But yeah, I would hope that it's a way to get people again on the same table and to continue the 25 years of fruitful cooperation that we had in the Arctic until just two weeks ago.

Prof. Paul Arthur Berkman – 44:52

Very good.

⁶⁴ International Geophysical Year, 1957-1958. (<https://www.eisenhowerlibrary.gov/research/online-documents/international-geophysical-year-igy>).

Prof. Larry Hinzman – 44:54

I've been working as the President of the University Arctic, Lars Kulerud, and with Andrey Petrov former President of the International Arctic Social Sciences Association (IASSA). We have been trying to promote the initiation of the International Polar Year in 2032-2033. And we've been working with SCAR, which is the Scientific Committee on Antarctic Research. Because we can't have an International Polar Year without the Antarctic research community. That is ten years away. But it is time to start thinking about this. Because it takes ten years to really develop international programs. We get the international collaboration. We get the funding agencies to develop new money to support these programs.

And I also think it's very appropriate to have it only 25 years after the fourth International Polar Year. In that, at this point, many of the young researchers that we talked about in APECS, they will still be active researchers in 2032. They will be the ones who can reoccupy the previous research sites who can repeat the cruise tracks from the oceanographic expeditions. And revisit these studies that were conducted. So that we do understand how our polar regions are changing. We can really characterize that and quantify it well. So, we can develop the projections of where we're going. This really does need to be done in 2032.

With respect to Russian participation. It's my most fervent hope that this does not evolve into another Cold War. That we don't enter those dark periods of isolation. I'm hoping. I'm just praying that this conflict ends soon. And we can welcome back Russian researchers. Who have done so much for Arctic research over the years. Welcome back into this international fold of collaborators. I do think we need to take a hard line now. But at the same time, we need to be optimistic and hopeful that international collaborations and partnerships do continue again for the benefit of all our nations. I'll stop there. Thank you.

Prof. Paul Arthur Berkman – 47:23

Thank you, Larry. Anne, did you have comments? Please.

Prof. Anne Husebekk – 47:26

Please just to say that I think the International Polar Year is in one year. But the process ahead of this year is what is important. It seems a long way to go in 2032, but I think that the process that will go on until this year arrives is very important. And it is, of course, not a possibility just to stop the Arctic research and wait for this International Polar Year. We need to do whatever we can to understand what's happening and prevent climate change that are to make the situation bad for all of us, both in the south and the north. So it is sort of a goal to look forward to the International Polar Year and then we have to do as much as we can in the meantime to make the situation as good as possible. Thank you.

Prof. Paul Arthur Berkman – 48:26

Thank you very much, Anne, for the audience. If you have questions, please put them in the chat. I will endeavor to ask them in the remaining ten minutes. Larry, Volker, and Anne, the response from the seven Arctic States without Russia regarding the Arctic Council talked about new modalities during this period. What do you imagine those new modalities might look like to continue the operation of the science in the Arctic going forward?

Prof. Anne Husebekk – 49:07

Well, I can start, the new modalities have to do research and approach without having Russia as active participants, which is, of course, doable, but will not be a good solution. We can't stop collaborating the other seven countries in the meantime until we hopefully have Russia on board again in good shape. I

think that this is an option that needs to be discussed, and we think that that is a new modality. I don't know, but I think so.

Prof. Paul Arthur Berkman – 49:50

Thank you, Anne. Larry or Volker, please.

Dr. Volker Rachold – 49:52

I can say something. I think it is a bit more because the Arctic Council operates on consensus, and that's, of course, an issue. If one country is not there, you cannot reach the consensus. It is not possible for the, let's say, the remaining seven Arctic countries who just continue the Arctic Council and excluding Russia, that will not work. I think that's what they mean with new modalities, that there must be another arrangement in order to continue the work of the Council. And I think that's what they must work on. I mean, I don't think that anyone was surprised by the statement of the Arctic Council. At least I was not surprised. It was to be expected, I think. But the way how they will continue the work of the Council, especially at the moment since Russia has the Chairmanship, which makes it even more difficult. I don't know. I don't think that people know this now. I think this requires some discussion.

Prof. Paul Arthur Berkman – 50:49

Larry, please.

Prof. Larry Hinzman – 50:51

I very much appreciate the comments from Anne and Volker. IASC, the International Arctic Science Committee, is struggling with the same issues and how we will move forward, and we are fortunate to have wonderful Council members and a wonderful Executive Committee. I need to acknowledge that Dr. Enomoto from NIPR⁶⁵ is also one of our vice presidents and has been very helpful in trying to resolve this as far as how we will move forward in a nature of international collaborations. And we're struggling with this at this point. And unfortunately, I don't have a good answer for you, Paul. And I don't foresee a really positive solution in the short term. I think the only thing we can say is that it is something we need to we have the best intentions of working through and continuing our international collaborations. But exactly how we will do this into the future is really a challenge for us at this point.

Prof. Paul Arthur Berkman – 52:00

Are there questions from the audience? Any questions will be welcome, particularly in the context of this webinar, which seeks to address informed decisionmaking, which operates across a 'continuum of urgencies', short-term to long-term. The objective is not just thinking about the moment and the responses now, but how to translate actions and research from the moment across time. Certainly, a component of this discussion was introduced in thinking about next-generation leaders. But are there other elements of informed decisionmaking where we as a community of researchers can contribute to a process, not necessarily the answers, but the process of framing questions that bring together dialogues among allies and adversaries to operate with continuity, peace, and stability going forward?

That is the intention of the Webinar series itself, to think about how science contributes to that type of stability short-to-long term and brought specifically forward today and thinking about informed decisions. Volker and Larry, do you have any observations based on what we've talked about? You're thinking about

⁶⁵ National Institute of Polar Research (NIPR). (<https://www.nipr.ac.jp/english/>).

your activities. How given the circumstances, we operate with continuity from the present and the future, even with bumps in the road and wiggles and variability in terms of responses and dynamics. How do we create the continuity from the present into the future, recognizing we have challenges to address along the way?

Prof. Larry Hinzman – 53:45

So maybe I'll respond first. I guess I'd like to come back and acknowledge something that Volker mentioned really touched home on that the fellowship that IASC sponsored, as far as giving young people the opportunity to take a leadership role and to promote their ideas, moving forward, I think has been really important. The other thing I think has been important, and I think looking back on the last 30 years that I can see has been super effective is by sharing our expertise in that I think some of the most productive researchers that we've had, those who have had the best impact, the biggest impact, have been those who have worked across international lines. So, I know from all the collaborations that we've had with Japan over the years that the greatest productivity has been from those who have spent time in other nations when we have sent researchers to work in Japan or any other nation. What a great benefit it has been to our nation as far as the tools, the techniques, the insights, the partnerships that they picked up over the years and how that has benefited all our nations.

And so I would really strongly continue to encourage that sharing of information and that development of those internships, those partnerships, those fellowships where we can share people. I think that's our greatest strength and allowing these individuals to develop those capabilities in other laboratories and then bring that information home, or stay there and continue the collaborations that they have from their home nation. It's just a tremendous benefit to everyone and I think that's something we should really continue to promote and foster in these coming years.

Prof. Paul Arthur Berkman – 55:44

Thank you, Larry. Anne or Volker, please.

Prof. Anne Husebekk – 55:48

I can continue I agree with Larry I think that science by itself is international, and science should be for the global public good. So, in its nature it is to collaborate and to make progress together and today it's not only a disciplinary progress. It is also combining different disciplines in interdisciplinary research and also what's coming out of the transdisciplinary approach in research combined with collaboration with, for instance, industry and so on. So, I think the time is not there anymore where you can sit in your laboratory and doing the experiments that you think you should do without looking to the rest of the world and trying to put your research into a global context. I think that young scientists today see this as something that they would like to participate in and see the beauty of this collaboration, which now is somewhat destroyed, but hopefully it will be up and going soon again.

Prof. Paul Arthur Berkman – 57:22

Anne, thank you for this.

Dr. Volker Rachold – 57:24

Maybe in that context one thing that I always feel is somehow going wrong because the criteria for a scientist to be successful is still scientific papers. I mean, if I'm going into a scientific career and if I apply for professorship, of course they only want to see peer-reviewed papers. So, there's nobody asking what

did you do in terms of policy advice? What did you do in terms of communicating? And that's really a problem. I mean for a young PhD or a postdoc. Of course, I get responses when I ask them can you help with this? I don't have time. I must write a paper. So, nobody is giving me any credits for doing this kind of work. It's not part of my job. And I think there's something wrong in the system that we must think about, that this kind of work needs to be somehow honored and somehow reflected. If you do something like that, that this is the criteria for you also to be promoted in your career. I'm in a good position that I'm only doing that. So, I'm beyond that already. So, I'm only getting paid for doing this kind of work. But for young scientists, it is difficult. And I think I hear that very often.

Prof. Paul Arthur Berkman – 58:31

It was very much along those lines. That sentiment, Volker, that the context of today's discussion emerged in the sense of bridging the data-to-evidence interface, recognizing that data is a component of research, and evidence for decisions involves actions with decisionmakers, and bridging that across that data-evidence interface was an intention of the discussion. So, I appreciate your highlighting that in the closing remarks here. I have one question that has emerged in the chat.

It's sort of a specific question. I'll see if I can make it a more general. What is the success of joint environmental research activities and scientific dialogues as confidence building measures? So how do we, in a sense, take these dialogues, these research activities, as confidence-building measures?

Prof. Larry Hinzman – 59:34

Maybe I'll jump out with just talking about the recent MOSAiC expedition, which was very much a tremendous ordeal. It was really led by the German government, but it was an international partnership which strongly included the Russian government and China and Japan and just many other nations with the interest in Arctic research. And it produced really important outcomes. So, it was an expedition where the ship was frozen from the ice. But the studies that were able to be done extended far beyond anything we've ever done before, as far as looking at the atmospheric processes, the influence of solar influences, but also looking at the subsurface, the subsea dynamics of not just the major ocean currents, but also the subtle eddies and what role they play in transferring heat. So really important results come out of that study. It was a tremendous international collaboration as follows, involving so many ice breakers from so many countries and just the contributions of scientists from around the world playing a huge role.

The success that came out of that gives us great hope to look forward into other major international collaborations that could do something very similar. So right now, there is international cooperation on a program called T-MOSaIC,⁶⁶ which is terrestrial MOSaIC, looking at the same thing to try and make similar progress in a different regime. Again, tremendous international interdisciplinary activities. And there's also further plans on the horizon to think about something similar conducted in the Southern Hemisphere, around the Southern Ocean. I think it is those successes where success begets success, those achievements that give us great hope and great confidence that we can take this further. We can do more if we work together. I'll stop there. Thanks.

Prof. Paul Arthur Berkman – 01:01:51

Thank you very much, Larry, for comments that are hopeful. Volker or Anne, please.

⁶⁶ Terrestrial Multidisciplinary distributed Observatories for the Study of Arctic Connections (T-MOSaIC). (<https://www.t-mosaic.com/>).

Prof. Anne Husebekk – 01:01:56

I think another example is the IPCC reports. I mean, it's so many researchers, so many scientists who are sort of forced in a good way to collaborate. And what comes out of it is meta-analysis. That is important. And I think it makes impression also on public and politicians. But it is, of course, hard to take the steps forward to avoid further damage to happen. But I think among the public, these reports are really discussed and reported on discussed in the news. I think this is maybe the greatest effort ever to put scientific knowledge together in order to influence public and politicians. And, then you also have a summary for politicians, a summary for the public. You don't have to read those thousands of pages in order to know what this is about. So, I think it is hope that it takes courage. It takes international collaboration, and it takes a lot of money to have these things going on, but we can't afford not to do it.

Prof. Paul Arthur Berkman – 01:03:18

Thank you very much. Anne. Volker, do you have observation, please?

Dr. Volker Rachold – 01:03:22

Yeah, just a very short comment. I think the very best example is the Arctic Council itself. Because, I mean, the Arctic Council started as an environmental protection strategy and then later became the Arctic Council. So, in terms of the question, what is the most successful thing? I think you can just name the Arctic Council because that's how it started from the common interests of the eight Arctic countries to protect the Arctic and to have an Environmental Protection Strategy,⁶⁷ and that later became the Arctic Council. So, I think it's a fantastic model.

Prof. Paul Arthur Berkman – 01:03:54

Excellent. I very much appreciate everybody's, Larry, Volker, Anne's thoughtful comments throughout this discussion and hope for the next-generation leaders listening that what they see is an approach of everyone struggling in spirit of humanity to try and improve the research circumstances, recognizing we have ongoing challenges to address. With that, I would like to take this opportunity to personally thank you, Larry, Anne, Volker, for taking your time and participating in this opening plenary and now invite you to facilitate breakout sessions for the next 45 minutes. Michelle and Reim, if you could transfer us into the various breakout sessions, and then after that, there will be a ten-minute break in preparing for the final plenary. So again, thank you, Larry, Volker, and Anne, for your important and hopeful observations.

Final question to address before we go into the breakout sessions. I would like to ask how difficult it is, in your opinion, to reach common people when promoting informed decisionmaking about major issues, particularly because most of the time people are not involved in science find it difficult to interpret scientific data? That's a question of communication and I would say it's a question of how do we as a community build common interests across the board with each other cross boundaries of nations, across boundaries of disciplines, across boundaries of ages? How can we as a community be inclusive? So, question of reaching common people. I would say the challenge is one of common-interest building. But, leave us if Volker, Anne, or Larry have additional feedback on this question, please.

⁶⁷ Arctic Environmental Protection Strategy, Rovaniemi, June 1991.
(http://library.arcticportal.org/1542/1/artic_environment.pdf).

Prof. Larry Hinzman – 01:06:01

I have a slightly different take on this. I think one of the things that we've done over the last 30- 50 years is much of our science has been focused upon understanding of processes, particularly in the Arctic. We studied permafrost, we study sea ice, we study ocean circulation. But most of that is not of interest to the public. For the last year I've been working on developing the Arctic Research Plan for the United States⁶⁸ and we've changed that as far as our approach and we've taken these disciplinary studies to address the challenges that you see in the newspaper every day, the front page of the newspaper taking on those issues people. They're of course interested in climate change; they're interested in sea ice dynamics. But, what they're really concerned about is food security and how they're going to make their mortgage payments. And so, what we're trying to do is take all these scientific studies and pull it together to address these major challenges and so we're taking on issues of economics, livelihoods, community resilience. But, all of that must be those resolutions to those challenges has to be based in the strong understanding and coherence of science. So, we bring all these multidisciplinary sciences together to address these common, everyday challenges. And I'll stop there.

Prof. Paul Arthur Berkman – 01:07:35

Thank you very much, Larry. Anna or Volker, do you have any additional observations?

Dr. Volker Rachold – 01:07:41

I think we mentioned a few things already. I think it's all about how to translate your science to make it understandable and make it interesting. I brought the example of the Arctic Climate Impact Assessment⁶⁹ and I think that report was so welcome communicated that it also changed the public opinion on the arctic that was a successful story. And then the other thing is, of course, especially young people in APECS. I must mention APECS again. Of course, they use different formats of communicating science. There are citizen science projects. There are, for example, permafrost cartoons and different things, interactive websites, and very different and modern ways of communicating science. And I think that's the way to reach, let's say the person on the street and not only other scientists or policymakers. So, I think it very much depends on how you sell your science and communicate it.

Prof. Anne Husebekk – 01:08:32

I totally agree with what has already been said. But I think that schools and universities also need to be places where the students learn to understand and to translate things into what must be understood by the public. And since so many people or young people go to schools for a long period of time and then most of them go to universities, I think it is a big challenge and something that must be approached also among students as sort of generic 21st century skills to understand and to participate in the public discussion around these main challenges.

Prof. Paul Arthur Berkman – 01:09:28

You've set the bar high for next generation in terms of a skill for them to develop and communicating with the public. So, I thank you again, Larry, Anne, and Volker. Michelle and Reim, if you could place us in our various breakout sessions and we will continue from that.

⁶⁸ Arctic Research Plan 2022-2026, Interagency Arctic Research Policy Committee. (<https://www.iarpcollaborations.org/plan/index.html#download-plan>).

⁶⁹ Arctic Climate Impact Assessment (2004). Arctic Monitoring and Assessment Programme (<https://acia.amap.no/>).

FIRST BREAKOUT-SUMMARY SESSION

Prof. Paul Arthur Berkman – 01:09:45

Thank you very much, everybody. I hope there was a lot of fun in the breakout sessions. I would like to invite Anne, Volker, and Larry to provide debrief synthesis of the breakout sessions, if that makes sense. And, if it does make sense, perhaps we can start with you, Anne.

Prof. Anne Husebekk – 01:10:17

I don't know if we had fun, but we had very good discussions Paul. So it was good to have a smaller group and we went into the questions and discussed both the communication of scientific messages to the public and to the politicians, which is maybe hard but could be done. And maybe we should think into new sources or communication channels like social media, which is not new anymore, but which could be used actively. And we could use influencers that are trustworthy to give our message to those who make the decision.

It was also discussed how we should communicate in a way that is understood by layman and by those who we would like to address. It has to be a simple message that can be understood also with those with science literacy. We discussed also how decisions are made. Is it so that there is a straight line from the scientist to the decisionmaker? No, it is not. It's a lot of influence. It's an ecosystem of influence on the way and all from different organizations, those who promote fake news, those who will lobby their own view into a decisionmaker. And even in a perfect democracy, we must look at what those influencers are in order to know that the message we want the decisionmakers to take is still in a way that is based on knowledge. I think that was what is left from the discussion.

The last question that I haven't addressed in this breakout session is the homework that everyone had to do to discuss the paper that was provided as homework. So, this has not been done. If this can be approached now, I'm more than willing to participate in that discussion, but maybe some of the rapporteurs from the group can add something to my summary. That's fine with me. Thank you.

Prof. Paul Arthur Berkman – 01:13:08

Thank you very much, Anne. Was it Teru and Jugo were in this section? I don't know whether Akiho was in that session or not. Teru or Jugo, did you have additional comments?

Teruaki Fuji – 01:13:23

No, thank you very much. I don't have additional comments. But, we had a very fruitful discussion and good leadership by Anne. Thank you very much.

Prof. Paul Arthur Berkman – 01:13:34

Excellent. Thank you very much, Anne, for facilitating the discussion. Absolutely. Volker, please.

Dr. Volker Rachold – 01:13:42

Yeah, thanks, Paul. So, we didn't specifically work along the questions that you provided, but had a just general discussion, but I think we touched upon all of them, and I think we had a very interesting and lively discussion. So, with many points and many questions and many comments. It's all on the Google Docs. But I will try to make just a few key points that we talked about.

We started with a question, who are decisionmakers? Are scientists decisionmakers too? And we thought, yes, they somehow are. But of course, it's very often practical issues that dictate the science. But what we agreed is that the fundament of any communication is scientific getting facts. Without scientific getting facts, it doesn't make any sense to communicate things. This is something that I think is the starting point where we are.

And then we talked a bit about the role of media communicating science or not communicating, translating science. And is there an influence that the media has on the public, on the person on the street? Can science be politicized? And we think, yes, of course it can.

Then we talked about what is the role of the scientists. So, should scientists also be part of this political discussion or is there a danger to becoming an activist? Are you still a good scientist if you are considered an activist? So, it's quite dangerous. But, we in any case agree that it's responsibility of scientists to make corrections in the context of science. If there's something wrong, of course we as scientists set to take responsibility to correct things and, particularly in the context of climate change.

Then we talked a bit more about decisionmakers. Decisionmakers in the Arctic, are they more knowledgeable than those outside of the Arctic? We agreed that they're probably not. But on the other hand, politicians are traveling to the Arctic to see what climate change means because there's no place on the globe where you can see climate change more obviously than in the Arctic. So, from that point of view the Arctic plays a very important role in terms of decisionmaking.

We had a little discussion on non-Arctic countries what non-Arctic countries view as important in terms of science in the Arctic. And of course, we agreed that one thing is changes that happen in the Arctic and affect the rest of the world. For example, permafrost. Also, economic interests are an important issue for non-Arctic countries. Things like shipping, tourism, exploitation of resources. That's something that non-Arctic countries are also very interested in.

And then we discussed Indigenous and Western research. And, we agreed that you cannot distinguish between Indigenous research and Western research. But, what is important to notice that there is Indigenous knowledge. And we normally as scientists would not use this as research, but it is still extremely important to get this traditional knowledge. The correct term is Indigenous knowledge, to get this knowledge into our science and to use it in terms of making advice or giving advice to policymakers. Decisionmakers so that this Indigenous knowledge is considered. We talked a bit more about the role of media and of course the media is important to make people aware of what's happening in the Arctic.

And then in the last part we talked a bit about priorities. Who defines priorities? And now we noted that of course an important thing is to have a dialogue between scientists and policymakers. Otherwise, you will not be able to identify the priorities that scientific decisionmakers have. We need that dialogue. Scientists, of course, are responsible to answer questions to society and that requires that you know the questions, of course. Then we talked a bit the last part here. Oh, yeah, we talked a bit about the human element. We talked about who do you talk to if you talk to policymakers? And I think we agreed that you will never talk to a Minister. There are always hundreds of people supporting the Minister, writing the speeches, preparing agreements, and then at the end, the Minister comes and just signs this agreement or gives a speech.

So, it's important, if you want to have an influence, to find the right people to talk to, talk to those people who prepare the ministers for a decision. In that context, we talked about training opportunities for young scientists. We talked about the role of APECS because as a scientist, you are normally not trained to do science communication and policy advice. And Jenny highlighted that there are, of course, a couple of activities that APECS has and others have to help people getting into that field and to better understand what it means to do science communication. So, I think that more or less was what we talked about. And Jenny, or any other one of the groups, if you have anything to add, please do. Jenny, are you happy with that?

Prof. Larry Hinzman – 01:19:29

Thumbs up from Jenny.

Dr. Volker Rachold – 01:10:31

Okay, good. Head over to Larry.

Prof. Paul Arthur Berkman – 01:10:34

Okay, Larry, please. Thank you very much, Volker.

Prof. Larry Hinzman – 01:19:37

Thanks. I'll be brief in the time we have left, so I apologize upfront to anybody if I missed your comments. So, we had a really good discussion, and I think it reflected many of the comments that Anne and Volker just mentioned on too. So, we did talk about the importance of culture and educational exchanges with the next generation as far as facilitating the next generation of researchers to work with communities and to advance the science and how important it is. We also talked about how important it is, again, for researchers and scientists, but also policymakers to spend time in other cultures, other communities, so that they have that understanding of walking in their shoes and being able to understand where people are coming from. Again, we talked much about APECS and significance of incorporating young scientists. We all agree that's hugely important for building our world.

We talked about common-interest building and conflict resolution. And we think that common interest building can be an effective mechanism for conflict prevention and conflict resolution. People have a good understanding of where others are coming. From their perspective, we can really avoid a lot of problems to begin with. Paul brought up a really good point. I thought that a great model that we should have for contract resolution is the Antarctic Treaty and space cooperation. The Antarctic Treaty is signed by a couple dozen nations. The space collaboration is a smaller group of nations, but it's very positive approach. And I think the big difference in those two examples is that both those examples are forward looking examples. The nations came together and said, what do we have to do to go from where we are to where we want to be? And so many of the other conflicts that we're in now are based on history, and it's so hard to resolve history from everybody's perspective. And so that's always difficult. So, if we can look forward instead of looking backward, everybody would be better off. One of the challenges for conflict resolution is negotiating with sides starting with different interests and so different perspectives.

The challenges again, how do we pull those all together? We did talk about the importance of communications and informing at the local level. And it's not just providing science to the local level, but also getting their perspectives and their concerns up to the higher levels. We talked about ways of bringing those local needs to national and global awareness. And then we talked about the value of bringing science into communities and how that can improve life in those communities, but also, again, expand our own

capabilities, capacity for doing science in communities and in the future. And with that, I think I'll stop and turn it back to Paul. Thank you.

Prof. Paul Arthur Berkman – 01:22:44

Thank you very much, Larry. It's truly an honor and a pleasure to have Larry Hinzman, Anne Husebekk, and Volker Rachold as the keynote presenters for the second webinar. And, I profoundly thank you for your contributions. And I thank you for your leadership and, just in general. And Larry, I wish you every success with the challenging decisions that are coming up. And, I guess as one among many congratulate you on your stewardship as President of the International Arctic Science Committee.

Next, we do have planned a third webinar on the 24th of March, and the webinar series has been developed and implemented in the spirit of inclusion, recognizing the challenges that are currently being faced. Andrey Bryksenkov is one of the keynote presenters who's been involved in these throughout the first and the second webinar. Andrey, very much appreciate your collaboration. Certainly, welcome your contributions in the third webinar. We'll also have Fran Ulmer, Anton Vasiliev was in the audience today. I saw as well. And, we will also have Hiroyuki Enomoto, who is Vice President for IASC and is among the leadership at the National Institute of Polar Research in Tokyo in Japan.

So, I thank everybody for their kind collaboration, their important contributions to the second webinar. It's truly an honor and a pleasure to be able to coordinate this series with support of the Ministry of Foreign Affairs of Japan and the implementation by the United Nations Institute for Training and Research. And again, I thank Volker, Anne, and Larry for your important contributions today. Thank the audience and participants for your many important observations as well. And, to that on 4:30, looking at mytime at the end is on time. I wish everybody good health and I look forward to next steps.

Stay healthy. Thank you very much.

APPENDIX 4

WEBINAR 3: WHAT INTERNATIONAL EFFORTS/PROCESSES ARE NEEDED TO FACILITATE PROGRESS IN UNDERSTANDING THE ARCTIC SYSTEM AND ITS GLOBAL IMPACTS?

THURSDAY, 24 MARCH 2022

TRANSCRIPT (RECORDING AVAILABLE ON THE [UNITAR WEBSITE](#) WITH TIME STAMPS, NOTING THERE MAY BE TRANSCRIPTION ERRORS REMAINING AFTER SEVERAL EDITS)

Prof. Paul Arthur Berkman – 00:00:19

Well, good morning, everybody. Good afternoon. Good evening. For wherever you are, welcome to this webinar series on *Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries*.

My name is Prof. Paul Arthur Berkman and I have the honour as well as pleasure to coordinate this webinar series that is funded by the Ministry of Foreign Affairs of Japan, concluding today with Webinar 3.

Our open and inclusive dialogue today is far more important than was ever imagined – under the gathering clouds of world war – but with hope that informed decisionmaking will prevail in the spirit of science diplomacy “*to balance national interests and common interests for the benefit of all on Earth across generations.*” This is a time for all of us to be brave; cherishing and preserving the integrity of humanity to pursue knowledge and wisdom; recognizing that doors of dialogue are being shut among academic communities when militaries dictate the fate of humanity.

I thank the Japanese Consulate in Boston and excellent team of collaborators with the webinar series: Dr. Jenny Baeseman at Baeseman Consulting and Prof. Akiho Shibata at the Polar Cooperation Research Center, Kobe University, for their core partnership; Ms. Clara López and her team at the United Nations Institute for Training and Research (UNITAR) for superbly managing the logistics of this webinar series; and wonderful team of scholars from the Harvard Kennedy School (including Mr. Teruaki Fujii and Ms. Nadia Filimonova) and the Arctic Challenge for Sustainability (ArCS II) program in Japan (Dr. Zia Madani, Dr. Osamu Inagaki and Mr. Jugo Sato).

Importantly, I thank each of you from across the 21 nations and many time zones, with deep appreciation for sharing your insights today with inclusion, championing the transdisciplinary as well as transboundary capacities of the scientific community to build bridges between the present and the future.

We are living through an important moment in human history, which relates to the aspirations of this webinar series to enhance international cooperation with science, applying the Arctic as a global case study. Just after this webinar series was proposed, the COVID-19 pandemic erupted with devastating consequences worldwide. Now, just after the first webinar in this series last month, events in Ukraine

have created new peril that has the potential to cascade into world war, something we all have responsibilities to prevent – all eight billion of us – forever after the 20th century.

Circumstances in Ukraine already have created significant instabilities in international relations, including for the Arctic region, jeopardizing dialogue, cooperation and progress among the eight Arctic states, six Indigenous Peoples' Organizations and international community of observers participating in the Arctic Council. Our informal dialogue today, convened with inclusion, is a timely opportunity to contribute substantively to informed decisionmaking, short-term to long-term, especially in view of the Joint Statement on Arctic Council Cooperation Following Russia's Invasion of Ukraine on 3 March 2022, considering *"the necessary modalities that can allow us to continue the Council's important work in view of the current circumstances."* Closely coupled to our webinar today also is the International Science Council Statement on Ukraine from 28 February 2022, noting bravely that: *"Science has proven to act as a platform for dialogue even in times of war."*

As previously, this webinar will involve an opening plenary session for an hour with keynote presenters who will introduce expert insights, addressing a set of questions, designed to build common interests. I will facilitate the panel dialogue among these experts, welcoming questions and comments from the audience in the chat for consideration toward the end of the panel, addressing the framing questions for today:

What international efforts/processes are needed to facilitate progress in understanding the Arctic system and its global impacts?

- ❖ What are the mechanisms that exist?
- ❖ Are these mechanisms adequate?
- ❖ How could enhanced science cooperation impact other areas of international relations?

To reflect on these questions, it is an honour as well as pleasure to briefly introduce the three keynote presenters for today:

- **Hon. Fran Ulmer** (Former Lt. Governor, Alaska; Former Chair, US Arctic Research Commission; Senior Fellow, Arctic Initiative, Belfer Center, Harvard Kennedy School).
- **Amb. Anton Vasiliev** (Russia's Senior Arctic Official 2008-2014; Ambassador to the Republic of Iceland 2014-2020; and Deputy Director of Russian State Hydrometeorological University).
- **Dr. Hiroyuki Enomoto** (Vice Director-General, National Institute for Polar Research, Japan; Co-chair 3rd Arctic Science Ministerial (ASM3) Advisory Board; Vice-President, International Arctic Science Committee (IASC)).

This plenary session is being recorded and will be placed on the UNITAR platform, as with the plenary dialogues from the first two webinars.

Unfortunately, Dr. Andrey Bryksenkov sent me a note this morning that he has come down with COVID and will be unable to participate in today's discussion. Andrey apologizes for the objective reasons and hopes for further cooperation.

As with the first two webinars, after the plenary session, we would have turned off the recording, and moved into pre-assigned breakout sessions for open dialogue among the webinar participants. As a consequence of the unexpected change among the keynote presenters today – recognizing that doors are rapidly shutting for inclusive dialogue across the global scientific community – we will turn off the recording after the plenary session and have an open dialogue off-the-record (Chatham House guidelines) for the next 70 minutes among all participants. I ask you, request you to be cordial and respectful during the hour and ten minutes. For the remaining 20 minutes in our webinar today, I will then invite closing 5-minute summary comments from our three keynote presenters in the final plenary session. As with previous webinars, the final plenary comments will be recorded.

With appreciation for the scholar-rapporteurs, reporting from this webinar will be further distilled into a *Science Diplomacy Action*⁷⁰ publication, capturing insights from the webinar series to help enhance international scientific cooperation in the Arctic with global lessons to both promote cooperation and prevent conflict as the umbrella goal.

This webinar series and its journey reveal common-interest building as a necessary complement to conflict resolution; to operate across a ‘continuum of urgencies’ from security time scales that are immediate to sustainability time scales across generations. Perspectives about time are the bread-and-butter of science, considering: months-years in view of our global pandemic; years-decades with the acceleration of high-technologies; and across decades-centuries with exponential changes in human-population size and atmospheric carbon associated with Earth’s climate.

Today’s concluding webinar has direct application to the challenges we collectively face as a globally-interconnected civilization – enhancing international scientific cooperation as a central interaction among great powers to both promote cooperation and prevent conflict – building dialogues among allies and adversaries alike inclusively based on our common interest to survive.

With that as opening remarks, it is an honor as well as pleasure to invite the Honorable Fran Ulmer to share her comments. Fran please. You’re on mute.

Hon. Fran Ulmer – 00:10:08

There we go. Can you hear me now?

Paul Arthur Berkman – 00:10:10

Yes. Thank you very much, Fran.

Hon. Fran Ulmer – 00:10:12

Thank you, Paul. And thanks to all of the organizers for this opportunity for us to discuss a very important topic, which you point out has become increasingly timely as we look for ways that countries with shared goals, particularly as it relates to the Arctic and to scientific research, can still find ways to have not only conversations, but also opportunities to brainstorm about the future, not just the past.

When I was asked if I would participate in this gathering, I said yes, because I do believe that the way in which the Arctic countries and frankly, many countries all around the world have spent a great deal of time,

⁷⁰ *Science Diplomacy Action* (<https://scidiplo.org/science-diplomacy-research/science-diplomacy-action/>).

energy, money, and effort to better understand the changing conditions of the Arctic. And, although we've already done a lot in that regard, that there are ways in which we could potentially do a better job. And, as the changing conditions are going so rapidly in the Arctic, it's important for us to be open to other ways in which we could actually work together internationally.

So just very briefly, all of the people on this call, I suspect, are very familiar with why all those changes in the Arctic are important not only to the people who live in the Arctic, but to people literally everywhere in the world. So the role of scientific research organizations that support that research, countries that support that research, is not only to understand what is changing, but to use that information to adapt, to prepare, to make decisions, policy decisions, investment decisions, decisions about infrastructure, decisions about how to avoid risk to the environment and to the people. Being able to take what we learn and apply it is obviously why much scientific research is done everywhere, but is particularly important in a place like the Arctic region, which is experiencing such a rapid rate of change and such a dramatic change from what the Arctic was 50 years ago to what it is today to what we know it will be quite different 50 years from today.

Over the years, in addition to the individual efforts of countries and of universities and of many organizations – to do that kind of research that would help guide decisionmaking and improve our ability to face an uncertain future – many countries and many organizations have found ways to bridge across the nations to be able to more effectively, efficiently, comprehensively do that research, sharing across borders, not only resources and research capabilities, but also data, information, and results that are relevant all across the Arctic.

Why is this so important in the Arctic? It's a huge area. Again, as everyone who is on this call understands that you can't really understand one part of the Arctic, you have to think more holistically because it is a system, and because it is such a huge area, it is obviously important to spend resources wisely and share the information, share the resources and share the access to the entire Arctic region to be able to fully understand it. So, that is why over the years, many things have evolved. Special events, like the International Polar Years that started all the way back in 1882, and then 1932, and then 1957 and then more recently, 2007, were literally the world focused on the challenges of both doing research and understanding the polar regions. There have been many, many specialized events that have looked at Arctic science cooperation recently.

A couple of examples of the Arctic Science Ministerials one, two, and three, and hopefully there will be a fourth at some point. These not only for the Arctic nations, but for all the nations who are doing Arctic research, provides these specialized moments when there is a convening of those who are interested in Arctic science research to really focus the attention of not only those who are doing the Arctic science and Arctic research and Arctic countries, but literally the world. And, of course, there are numerous organizations, some that bridge in an interdisciplinary way Arctic science research, like the International Arctic Science Committee, or some that are specialized, like the International Permafrost Association⁷¹ that just focuses on bringing together permafrost researchers, or IASSA, the International Arctic Social Sciences Association.

There are specialized and there are interdisciplinary general organizations that through the years have provided a forum for dialogue and exchange of information and the opportunity for scientists to network in

⁷¹ International Permafrost Association (<https://www.permafrost.org/>).

a way that really enables them to expand their sphere of understanding and the way in which they do research with partners across borders. I could go on for quite a while describing all of these, but I'm not going to. I'm just going to stop by saying these are important building blocks toward what I would describe as an extremely important overarching goal, which is to build the bridges necessary, not only across disciplines, but across borders, to do what society needs, which is a better understanding of how the Arctic is changing; how those changes are impacting the people of the Arctic, as well as globally; and to be able to prepare societies, governments, businesses, individuals, communities for the rapid rate of change ahead; being able to use that information to improve decisions, to reduce risk, to enable society to adjust and adapt in a way that minimizes the pain, suffering, and expense of not being prepared for what lies ahead.

I will close by simply pointing out, as I'm sure we will discuss the importance of the Ministerials from all of the countries that have leaned into supporting these efforts, and particularly as it relates to the Arctic Council, which I'm certain that Anton will talk about after his long long experience with the Arctic Council, which is, I think, where we first met many years ago.

Clearly, the Arctic Council, since its formulation in 1996, also provides one of these important building blocks of infrastructure that has enabled, supported, and encouraged the kind of international scientific cooperation that is so essential. That, of course, was the body that really put in place the International Arctic Science Agreement⁷² back in 2017 which was focused primarily on assuring access to the other Arctic regions. But, it again describes and shines a light on the importance of different parts of society, both different parts of government, different parts of scientific operations, different parts of the Indigenous communities of the Arctic, being able to participate in a meaningful way to advance our goals for science cooperation. I will stop there. Thank you again, Paul, for inviting me and thanks to all of the organizers for putting together this series of webinars. Back to you.

Prof. Paul Arthur Berkman – 00:19:16

Thank you very much, Fran for your eloquent observations, insightful and helpful as always. And now it is a pleasure and an honor to introduce to you, Ambassador Anton Vasiliev. Anton, please.

Amb. Anton Vasiliev – 00:19:29

Thank you very much, Paul. And, thank you very much for your kind invitation. It's my pleasure to be here and share my views about the Arctic and past and its present and its future. I think it's really very important subject and it really has global dimension, and the importance of things is being understood would become aware by many people in the world now. So you don't need to be so eloquent to describe that. I think it's now clear for everyone.

But quite briefly, I think the two things have changed the Arctic in the last couple of decades. One is climate change and the second is technological progress. Both have made accessible many things in the Arctic that were not accessible from the economic point of view, from political point of view, from security point of view. So we have found ourselves in front of a vast area, which possesses a lot of mineral resources and, accessible now, and which is open for transportation for whatever purpose it may be used. So there are two major things that have changed the face of the Arctic. And there are two major magnets that have ignited the interest to the Arctic in the world.

⁷² Arctic Science Agreement. 2017. *Agreement on Enhancing International Arctic Scientific Cooperation*. Signed Fairbanks, Alaska, United States, 11 May 2017. Entry into Force, 23 May 2018. (<https://www.state.gov/e/oes/rls/other/2017/270809.htm>).

So, in parallel to this process of changes in the Arctic, I think the whole world, the Arctic States themselves have arranged themselves and arranged the dialogue, frank open dialogue based on one simple foundation which I felt for many years of my work in the Arctic Council, the commonality of interests of all Arctic States. We all Arctic States, we all face the same challenges, huge challenges because of the changing in the climate and also the huge potential. And all of us, we agreed to the understanding that it is much more efficient, better and perspective to fight these challenges and use these opportunities collectively in unison with the others.

So this is the basis of the work of many Arctic foras, including the Ministerials. And I shared the view that Ministerials, of course, are important. And it was a great pleasure for me to work in the Arctic Council because I felt this unity of interests of Arctic Council States every day of my life. Arctic Council is my professional life in the Arctic Council. Arctic Council is the key mechanism of international Arctic scientific cooperation, by the way. And the Agreement on enhancing such cooperation is one of the three legally binding agreements elaborated under the Arctic Council. And quite frankly, in my judgment, about 90% of everything the Arctic Council does is scientific cooperation, scientific collaboration.

If you open the web page of the Arctic Council, we will find that there are around 100 projects currently underway in six Working Groups⁷³ of the Arctic Council. It is a unique combination of science and traditional knowledge of Indigenous people. And of course, the key areas are climate change and environment. And the important part of this scientific cooperation, is that it's not art for the arts' sake, it's not the science for the science's sake, although it may be important for many. But it's a unique combination of science and practical recommendations on many, many things such as, for example, extraction of natural resources or shipping in the Arctic, many other practical areas. And what's important about the Arctic Council that is that recently we have adopted strategic vision of our common movement forward. That is the Arctic strategic plan. It's set of research priorities for ten years ahead.

Apart from the Arctic Council there are many other mechanisms of the Arctic scientific cooperation. Yes, International Polar Year is one of them and we support the idea of arranging the fifth International Polar Year in 2032-2033. And I think that would be a great way to move on with globalization of Arctic research. In a nutshell, IPY (International Polar Year) is an international coordinated research project over long term geophysical, hydrometeorological, environmental and other monitoring and analyzing of the situation in both poles. And its value is in comprehensive, sufficient, systematic, and prolonged measurements of changes that produce a more detailed and solid picture and thus producing more solid basis for political decisionmaking.

So, it allows us to use efficiently the limited resources of individual countries, however big they are, including Russia, to concentrate on key areas and have the research and share this research results among many participants. So, we can talk more about that later. But, I also agree that the initiative of the Arctic Circle,⁷⁴ this is one of the NGOs in the Arctic, one of the non-governmental organizations, which is to arrange the Arctic Science Ministerial during each period of a two-year chairmanship of a country in the Arctic Council by the chair itself, plus by one of the observer nations. It's a very good initiative.

We had three Arctic science ministries already. They were quite effective. And we had the last one, the third one in Tokyo, coverage by Icelandic Chairmanship of the Arctic Council and Japan as observer of the Arctic Council. That was quite an effort because it was very hard to arrange by itself. Plus there were so

⁷³ Working Groups, Arctic Council (<https://www.arctic-council.org/about/working-groups/>).

⁷⁴ Arctic Circle (<https://www.arcticcircle.org/>).

many limits because of transportation, has hazards, because of COVID. But still it was a very effective and very useful meeting.

We as chair of the Arctic Council this year, we are working together with our French colleagues and we have already agreed preliminary agreed that yes, we are going to arrange the ASM4 in spring of 2023. I'm part of the organizing community of ASM4, so I'm working closely I've been working closely with our French colleagues till the very last moment and still resolute in arranging the ASM4 whatever the circumstances. And we shall bear responsibility for that as the chair of the Arctic Council now. So, we feel it is our responsibility to do. We are working, we are preparing everything, and I hope we should succeed.

So are many other forums. There are many Arctic Circle, very successful NGO, very informative and very high-level meetings. Regular meeting is important here. So other conference, regular Council such as Russian Arctic Territory of Dialogue⁷⁵ or the Norwegian Arctic Frontiers.⁷⁶ There are many. I think there's even a sort of competition between the Arctic States to have their own regular NGO meeting. I think there's one in Alaska as well. I forgot the name, but it's Arctic something. But I don't want to offend anyone. But I think Russia was the first. Nevertheless, I think all of this is important and we're not really competing that, and I think it's very much more than the self-supporting.

Let me finish here and tell you that I think that we have many mechanisms of Arctic scientific cooperation. And, yes, the challenges we face are really very serious. We need to have a very serious and open dialogue and we have a very good basis for cooperation and scientific area among the Arctic States, which is the Agreement on enhancing cooperation in the Arctic. And, we are open to cooperation with everyone in the world, of who have interest or stake in the problems that we are discussing in the Arctic in various form.

So yes, we are there. We have problems now currently, but I hope that taking a broader picture in our mind thinking about broader I think we share a huge common interest here and I think climate change is one of the most important things. This is something that knocks at our door everywhere in the world now in form of floods, wildfires et cetera, melted permafrost and other many things.

So we need to move forward. And with this I would simply like to welcome the idea of discussion of international scientific operation in the Arctic about Arctic and hope that it will bring even more attention to this issue and bring more interested scholars and expert and researchers into the field, and we will be more than happy to cooperate with them. Thank you.

Prof. Paul Arthur Berkman – 00:31:09

Thank you very much Anton for your important and helpful observations. Certainly, in the spirit of building common interests. It is an honor as well as a pleasure to introduce and welcome observations from Professor Hiroyuki Enomoto. Enomoto-san please.

Dr. Hiroyuki Enomoto – 00:31:26

Thank you very much. Paul. As Paul introduced me, I'm from those natural scientists and also Vice President of the International Arctic Science Committee. And I was the co-chair of the ASM3 science advisory board. I worked as the individual scientist institute administration and IASC member and ASM3 organizer. There are many participants today and from the national interest there is a wide range of interest

⁷⁵ Arctic: Territory of Dialogue (<https://forumspb.com/en/programme/arctic/>).

⁷⁶ Arctic Frontiers (<https://www.arcticfrontiers.com/>).

and intent to know from the individual condition to the international action. And also I'm from Japan, not Arctic country and not the member of the Arctic Council. But, we are acting as a scientist in the academy as IASC and ASM3.

We organized ASM3 with Iceland, that expanded dimensions beyond Arctic Council members. What we can do is also one idea from me. So the picture behind me, you can see the that is the Ny-Ålesund station⁷⁷ in Svalbard. We started observation there from 1991. IASC established in 1990. Since then, we started observation there and almost the same period of IASC, the Arctic Council was established. Researchers who joined the academic movement of IASC were almost same timing. So, the scientist is very much proud of the good starting to the international Arctic science in the 1990s.

Why 1990s? It is the end of the east-west of political suspension with east-west countries. We started peacefully this station in the Arctic region. We could start the international cooperation over the Arctic. So we are aiming to continue this situation for coming decades. That is so on the behind of the starting IASC international science activity the peaceful condition is very essential. The previous webinars already are introduced. So, I want to introduce some main action of the ASM3 and please use that legacy to the ASM4. And I worked also as lead author of the IPCC. IPCC is global, but I joined a special report on ocean and cryosphere in climate change. It focused in the polar region and also on the Indigenous knowledge and recent knowledge how to work together. It's also a very unique issue of that special report on ocean changing climate. That is my thought behind.

And I will talk about the ASM3 procedure. ASM collects member country's information on the activity of the Arctic, and ASM analyzes their activities. ASM has the Arctic Science Ministerial meeting every two years. Also proposing recommendation and direction. And each country approves them. Then all agreed and it must start. But not yet all was done. So it's a problem. Many research activities of 434 registered projects were submitted at ASM3 held in 2021, last year in Tokyo. And ASM3 called the importance of "Observation", "Understanding", "Respond", and "Strengthen". So there were many important suggestions from the previous ASMs. But ASM3 tried to concise state that message. So the first step is "Observation".

We know that we must "Understand" and not only the understanding. That is maybe the academic is fine for understanding. But the ASM must "Respond" and "Strengthen" the next generation of international cooperation. That is sustainable Arctic and development. So the first step is very important. And in many stages of national or the international individual activities. We are trying to implement these four steps. They were enhanced those actions under the theme, 'Knowledge for a Sustainable Arctic.' So knowledge was a very essential point. IPCC also is knowledge based.

Then regarding what or not to transfer the aggregated knowledge to realization. ASM3 proposes long-term and near-term realization. So then comes to the practical problem. As a practical problem, there remains the issue of a system for intensively investing in situations where resources for strengthening the network of international cooperation. The cooperation, observation and survey must be done for short period as a very integrated system.

When we observe the world, Europe and the Atlantic area of cooperative action. The European Polar Board and many different groups exist in Europe. But in Asia, or the Pacific region, it is still developing. So Japan,

⁷⁷ Ny-Ålesund research station, Svalbard (<https://nyalesundresearch.no/>).

China, Korea and Malaysia and India have a forum for polar science.⁷⁸ And we are developing that system. And maybe future we can connect east and west.

And scientists are already working to connect north and south of the Arctic. Middle latitude issues already are established as an international important Arctic activity. Then as the implementing system, we need the mechanism across the world, including commitments coming from Asian countries. So we have room, but it is not so difficult.

So why, Japan, a non-Arctic country are working in the Arctic? The number of non-Arctic countries now is increasing. The Arctic Council is eight countries. But IASC has 24 countries member and ASM3 had 28 countries and region. So, not only is the Arctic Circle closing inside, the issues are expanding globally. So Arctic science cooperation goes beyond solving problems surrounding the Arctic. The problem is now a global issue.

Through this attempt, or through this challenge, through the method of discussion, the flow of solutions, and the spread, solving Arctic problem, we can get maybe a good example of how to solve the problem, and to get a good example of the human-nature balance. So good models can be seen from Arctic activities.

Non-Arctic researchers can also see what Arctic members are doing, such as the link between recent or modern science and traditional knowledge mentioned in the IPCC effort. So I already talked. And, also ASM3 enhanced in community participation, decisionmaking by themselves and that is a way to move towards achieving the SDGs. So the community's work is very important. And Arctic issue is trying to make a good example of that. So it's not only the Arctic issue, but you can learn from the Arctic what they are doing and how you can apply that.

And finally I want to mention, there are many big committees with IASC and ASM3 organizers. But if you attend those, you can find very key persons. So today, the panelists, Anton and Fran are a very good example of the key persons. And, also some individuals' continuous efforts are moving all organization forward. So, then it come to how Japan or Asian or any Arctic country can do? Is there any key person we have? Or a key person that stands out, or is there a platform where he can stand out? And the point is how we cultivate him or her properly? That is the next-generation development and through the Arctic issue, we want to find that very good model case. Thank you very much.

Prof. Paul Arthur Berkman – 00:43:49

Domo arigato gozaimashita. Thank you Hiroyuki for your important comments. I have a couple of questions to pose to Fran, Hiroyuki and Anton, but perhaps with the first question just following on Hiroyuki's last observation about how to cultivate; who to cultivate.

We as a generation have responsibility, I think, to create capacities among next-generation leaders. And I would reflect recently on the Association for Polar Early Career Scientists and their relatively brave, and I would say, statement⁷⁹ on circumstances with Ukraine seeking to facilitate dialogues rather than close doors. As we move forward and think about how to cultivate those key persons, as you identified Enomoto-san, and with consideration, Fran and Anton, how do we do that? How do we elevate the next-

⁷⁸ Asian Forum for Polar Sciences (AFOPS). (<https://afops.org/>).

⁷⁹ APECS Statement on the Invasion of Ukraine. 18 March 2022. (<https://apecs.is/news/apecs-news/4967-apecs-statement-on-the-invasion-of-ukraine.html>).

generation leaders, given that the people that are placed in positions of influence generally have worked through their careers? But can we figure out mechanisms to elevate next-generation leaders because of their passion and insights and quite honestly, their skills, to think in terms of common interests?

Dr. Hiroyuki Enomoto – 00:45:22

Can I answer very quickly, please? I have no good answer yet. But we are trying. And, the implementation of the ASM3 ideas came to Japan; the development of the next generation. So Japanese government or Japanese Arctic research projects are investing in the next-generation training. It was not only for very sharp, narrow science area, but we want to try to make the leader person who is the next generation. But it is a very big challenge, and we want to learn, for example, how to prepare scholarship for Japanese researchers and also oversees early career scientists to working together. And, very good example, we are observing the Fulbright system, which has a very good continuous support system. And we want to learn from those ongoing systems, to apply this to new Japanese activities. So, I have not yet good solution. But we are working.

Prof. Paul Arthur Berkman – 00:47:15

The passion is the key. So, thank you very much for your leadership. Fran or Anton, do you have observations? Please? You're muted, Fran, you're muted.

Hon. Fran Ulmer – 00:47:32

There we go.

Prof. Paul Arthur Berkman – 00:47:34

Good.

Hon. Fran Ulmer – 00:47:35

Yeah. Three quick comments on your question. First of all, the pipeline of people who are young and interested in the Arctic and also obtain information about it and become active in it is many different paths. One, of course, is the University of the Arctic. And the University of the Arctic has been for a number of years been a mechanism for connecting universities across the world with Arctic programming to make it easier for people, regardless of where they live or where they are going to school, to be able to take deeper dives into Arctic programming and understand the issues and the potential research questions associated with the Arctic.

And similarly, many institutions, including Harvard, where I am with the Arctic Initiative at the Kennedy School, definitely provides opportunities for young scholars to find not only colleagues, but also get to know mentors who can help open doors for them. So, I just want to basically thank the University of the Arctic and the many universities like my own, that are really trying very hard to find mechanisms to both bring more students who may be interested in both scientific research, but also policy, governance, law, economics, and the other aspects of Arctic issues that are important in terms of better understanding the Arctic.

Also, I would just say that as you pointed out, the association for early-career scientists in polar regions is an important thing for all of us who have been around Arctic meetings for a long time. To always be looking for younger people to pull in to the meetings, to speak on panels and to provide them avenues to be able to effectively engage.

And I guess one example of that Anton mentioned another Arctic gathering that is happening in Alaska next month. The Arctic Encounters⁸⁰ is actually organized by a young woman who is in her early 30s. Arctic Encounters which will happen in Anchorage is a great example, frankly of a young person who found Arctic issues interesting and has gone on to organize efforts that really bring both nationally and internationally people together to better understand the challenges of the region and to work on problem-solving. So those are just a few quick thoughts, but it is a very important question that you have raised and something that I think we all have an obligation to attempt to work on in whatever way we can.

Prof. Paul Arthur Berkman - 00:50:42

Thank you very much, Fran for your helpful observations. Anton, please.

Amb. Anton Vasiliev – 00:50:48

First of all, bringing youth in research of the Arctic, to live in the Arctic and, to participate in decisionmaking in the Arctic about Arctic, is one of the priorities of the Russian Championship in the Arctic Council. We already have a lot of events already taken and planned for the future for this particular purpose. I agree with Fran. I think that we have nearly everything we have it's enough for us, nearly enough. Of course, there's always a room for perfection. We should think about any new routes, new pipelines and new incentives.

But, I think that the key thing here is to make Arctic interesting for the young researchers because as we remember from our childhood that as we grow we see the whole world around us. There are so many attractive things. So I think the important in a very general sense the important thing is while fighting to bring to the Arctic the best, the brightest minds, the best way is to make it interesting. You can do it by many ways, but I think the key idea is to do that. We have many, apart from the Arctic Council, we have many other for us which are doing that. There's a lot of things that have been done already within the Arctic Council.

A lot of things have been done in the forest such as Arctic Frontiers in Norway or Arctic Circle in Reykjavik. And it's important everywhere I talk about in nearly all these foras I can tell you that huge attention is paid to participating of young scholars and they're making speeches, bringing out their ideas, whatever answer they are and they raise the discussion and they feel that what they are doing is interested and they are in demand and this is the most important thing. This is the most important thing. That's a very interesting and very important question indeed. And I think while arranging new initiatives such as International Polar Year or expedition such as last year, the year before we had a fantastic MOSAiC expedition, international expedition there.

We should always bear it in mind and bring young scientists, the young scholars. I think that as we are arranging the Arctic Science Ministerial are building on the experience of our predecessors, including the fantastic experience, very helpful experience of our Japanese colleagues. It is a huge work that they have done, which is reproduced in this big booklet. This is the outcome of ASM4, there's a very big part devoted to the bringing of young scholars into the Arctic and the cooperation of science ministers around the world in bringing young scholars to this particularly interesting and fascinating subjects. I think I will limit myself here.

Prof. Paul Arthur Berkman – 00:54:55

Thank you very much, Anton. As I mentioned in my opening comments, this initial Plenary panel was intended to go for an hour and then to open it up for a general dialogue among all participants off the record. But before going to that general dialogue, open dialogue that will be off the record, I have a last

⁸⁰ Arctic Encounter Symposium (<https://www.arcticencounter.com/>).

question to ask Fran, Hiroyuki, and Anton. In view of your comments, both introducing the Arctic Science Ministerial process with Arctic Science Ministerial 1, 2 and 3, beginning in the United States in 2016; in Germany in 2018; in Japan in 2021; and presumably in France in 2023. With the Arctic Science Ministerial process, you also mentioned in your comments the *Agreement on Enhancing International Arctic Scientific Cooperation*, which is a binding agreement among the eight Arctic States.

When this webinar series was initially convened, proposed it was a question was, are there relationships, are there synergies that can emerge in terms of the spirit of international scientific cooperation between the Arctic Science Ministerial process, which is a process, and the Arctic Science Agreement, which is a binding agreement that's enforced among the Arctic States? Are there synergies that would be self-reinforcing, that would enhance the capabilities to enhance international scientific cooperation between these two complementary activities that both involve the Arctic science and ministries? So it's a question in terms of seeking synergies to enhance international scientific cooperation, are there synergies or relationships between the Arctic Science Agreement and the Arctic Science Ministerial Process?

Hon. Fran Ulmer – 00:57:17

Am I off mute? Can you hear me?

Prof. Paul Arthur Berkman – 00:57:19

Yes, please.

Hon. Fran Ulmer – 00:57:20

Okay, fine. I would add one more to that list of whether or not there are synergies and what are they, and it would be the Arctic Observing Summit⁸¹ and all of the efforts associated with Arctic observing efforts. I think those three things, in a way, fit together in the sense that they all, as you point out, support the spirit of Arctic research cooperation across borders, but they are all different in terms of what they are actually trying to achieve and how they might achieve it.

The International Arctic Science Agreement is really intended to bring down any doors or barriers to access to the Arctic region so that researchers, regardless of where they come from, have the opportunity to do the research necessary in the region and have access to data, information and be able to share it. So for me, it's the equivalent of opening up the doors and windows. It's basically saying there aren't going to be barriers that artificially restrict the ability of the Arctic research community to be able to do the kind of collaborative and cross-disciplinary and cross-border research, which is essential.

That is different than the Arctic Science Ministerial's purpose, which is really to focus the world's attention on what Arctic research is being done and by whom and where might there be potential synergies so that countries can work together, perhaps along the lines of the MOSAiC project, but even if not the MOSAiC project at a different level, being able to connect dots and over time have that kind of continuity that will really enhance the ability of the science community to be able to do the research, whether it's on a specific topic like permafrost or more general topic of understanding how the Arctic ocean is changing.

And the third piece of what I added, which is the observing summit and the Arctic observing efforts, is this notion that if you do not have sustained overtime funding and resources and a structure that will organize the way and which the way in which the various observing efforts, which really basically just gives you the

⁸¹ Arctic Observing Summit (<https://arcticobservingsummit.org/>).

basic data, it doesn't necessarily tell you what to make of that. It just allows the observing networks to be able to integrate their information, their data, their ability for others to take advantage of that information and do research with it. That third piece is also very important to any of these discussions about how to enhance and improve and strengthen the science community and the science effort at understanding Arctic change. So, yes, Paul, they are connected, but they're not the same, and they each play a different role in the spirit of enhancing, supporting, improving, strengthening all those things.

And I know that as the Arctic Science ministerial three left with some recommendations for how to go forward and whether or not those will be topics taken up at an ASM4 or in a different setting. I think it's very important because one of the limitations that was identified was the lack of funding across borders to actually do the necessary planning and collaboration. In other words, many countries fund their researchers, but they don't fund these large international projects across borders. And that's understandable at one level, that's sort of in countries trying to do the research that's in their national interest. But when you're talking about a region like the Arctic, where understanding the entire ecosystem and the entire system is so important, we need to find ways that not only organize those projects but fund them. And that seems to me something that could logically grow out of these three things that we've identified, the ASMs and the International Arctic Science Agreement and the effort to build an observing network. That's all for now.

Prof. Paul Arthur Berkman – 01:02:26

Outstanding. Thank you very much for bringing in the Arctic Observing Summit, which will happen on the 1 April in Tromsø. So, Hiroyuki, or Anton, do you have additional comments? Anton, please?

Amb. Anton Vasiliev – 01:02:41

Yes, of course. I was one of the initiators of the Arctic Scientific Cooperation Agreement. So I can say that, yes. The one common thing about where you can find the synergy among the two is the spirit is the spirit of enhancing cooperation in the important area. But there are, of course, different areas that the two processes, two documents, two events, the target. The Agreement is about moving the barriers, moving the barriers of movement scientists across the board of moving research equipment, of issuing visas, et cetera, et cetera. But this is an agreement among the Arctic Council States, and it is agreement among them. And this is important to understand the nature because we, the Arctic States, took these obligations vis-à-vis each other, understanding that we shall open our borders and for movement of people, movement of researchers, moving of scientific documents and scientific equipment, et cetera, in exchange for the others opening their borders for us, that was a sort of multilateral agreement with one common interest. I will not repeat myself, but what Fran has said about the purpose of ASM3. It's exactly that different thing. But again, the purpose of both is to stimulate and foster Arctic scientific research.

But the Agreement, it doesn't exclude the fostering of international cooperation beyond the sphere of the Arctic circle. And if you read carefully the agreement, there's an article about cooperation with observers in Arctic research, which is welcome. And, I would also say that in the practical performance of the Arctic Council, many scientific projects which include the observers and nonmembers of the Arctic Council. And this is also important. And, another thing, one more thing to insert here is that it is important in all scientific research processes; it is important to sustain cohesion and to sustain continuity. And this is why we as ASM4 are building on what has been already achieved by previous ASMs and especially by ASM3. And in this way, we want to use the spirit of the Agreement of cooperation in the Arctic, applying it to ASM process. So, this is really important.

Yes, I agree totally with funding. This is one of the key problems that all scientists are solving. And I think it's the work with funders potential funded, this is really one of the important issues under all activities of ASM processes and even the realization of the Arctic science capacity. And, also many other things. I think one of the answers to the question why are you proposing an International Polar Year ten years ahead of the dates is that we should have enough time to work with potential funders to interest them, to convey them the idea of the importance of the exercise. Thank you.

Prof. Paul Arthur Berkman – 01:07:09

Thank you very much. Anton. Hiroyuki, please, if you have a response.

Dr. Hiroyuki Enomoto – 01:07:14

Thank you very much. So Arctic Science Agreement is a critical rule to realize cooperation. And then the question comes to what do we want to realize? There is a gap of the observation area in the Arctic. The research analyzes the gap of the observation area. And who can fill that area? And, how they can fill that area? ASM2 recommended the funders forum, but we still are preparing the funders forum for Arctic science. The new mechanism is now initiating in the funders forum. Who can fill that gap or area, depending on the design?

ASM3 strongly recommended Sustainable Arctic Observing Network⁸² system for all countries of 28 countries should join, not only the Arctic countries, but 28. The SAON is trying to fill the gap of the observation area and then we can start, and we can ask to non-Arctic countries to fill some points. So Japan can fill some area. So, that is not only the Arctic country, but including the member countries of the ASM3, 28 we can fill more efficiently the area.

That is moving forward from the agreement and the ASM3 implementation. And one more point, the Arctic Observing Summit. I chaired the global issue session in 2016. Some people noticed 2016 was also a very difficult condition to implement Arctic research and Arctic observations. So, also political is a difficult situation. So, in that case researchers try to collaborate over the borders of countries. Someone, please fills the data with continuous observation. Even if the country or countries are not accessible, the countries have researchers. Please keep that data and continue. If the situation changes, we can collaborate again, as with our experience in 2016 that we discussed at the AOS 2016 in Fairbanks.

Thank you very much.

Prof. Paul Arthur Berkman – 01:10:40

Thank you very much. Hiroyuki. At this point what I would like to do and recognizing take health breaks and so on. So we're not programming that into the schedule.

Dr. Hiroyuki Enomoto – 01:10:52

Sorry. Sorry. So in the chat box I put the ASM3 digital database⁸³ you can access and yourself analyze that data which country what they are doing what is a newly database we are expecting ASM4 organizer use to expand that system. Sorry.

⁸² Sustaining Arctic Observing Networks (<https://www.arcticobserving.org/>).

⁸³ The ASM3 Project Database. (<https://ads.nipr.ac.jp/ASM3DB/>).

Prof. Paul Arthur Berkman - 01:11:14

No. No. No. This is very important and welcome other observations to put in the chat in the spirit of transparency and sharing with all involved. At this point, what I'd like to do is ask Clara to turn off the recording please.

SUMMARY SESSION

Prof. Paul Arthur Berkman - 01:11:24

And this is an opportunity an invitation to Fran, Hiroyuki, and Anton to provide their summary comments and observations from this third webinar which was designed to address what international efforts and processes are needed to facilitate progress in understanding the Arctic system and its global impacts. Certainly, we have had a very rich discussion stimulated by opening comments from yourself Professor Enomoto, Ambassador Anton Vasiliev and the Honorable Frances Ulmer. So I would leave it to the three of you to provide summary comments please. How would you like to proceed? Just raise your hand and I will choose you first. Hiroyuki, please.

Dr. Hiroyuki Enomoto – 01:12:32

I want to state only a small comment. There are many big countries' projects, but the leading effort was done often by some individuals. So, in the current situation and previous situations. And in the coming situation. For example, COVID-19, limitations of the local observation. Scientists have a good contact and asked the local scientists. We could not go to Greenland, but Greenland scientists in Greenland supported our instrument maintenance and taking data. And with a new system, we asked the Indigenous people to maintain our instrument. They learned how to use, and the new collaboration has started during COVID-19. And, also remote sensing can cover that area. So it's a Norwegian activity to try to compensate and cover other countries' observations, not to miss the data.

Talking about Russia, a big part are the Russian databases. In the early 1990s, the National Snow and Ice Data Center⁸⁴ there was data rescue. They had a very good quality data that were in very dangerous condition of disappearing. So, US researchers tried to rescue the data, which we have used as climatic data. I hope the current situation is not the case of missing data. So using the individual connection with we can find some solutions, but try to continue the data, not by the national effort, but using the individual researchers' communication. That is my final comment.

Prof. Paul Arthur Berkman – 01:15:10

Thank you very much Enomoto-san for those important observations. Anton, please.

Amb. Anton Vasiliev – 01:15:17

Thank you very much for an interesting webinar. I think I will not repeat myself and sum up what I said, but another contribution, one contribution to our discussion. I would like to tell you that I am approached by a growing a group of Russian scientists who are signing a letter addressed to me in my capacity of Vice President of the Russian Association of Polar Explorers. This is one of my hats I'm wearing now. And, they are trying to solve the question that is in the air that we have been discussing that didn't touch upon yet.

What to do in the current situation? What is our way out of the pause in the working of existing mechanism of international Arctic scientific cooperation?

⁸⁴ National Snow and Ice Data Center (<https://nsidc.org/>).

And, I can read out such some points of this letter. And, they addressed to me and the scientists. Many scientists signed a letter with a request to head an initiative to create an international move in the field of joint international scientific activities, scientists for further strengthening of international cooperation. Among other things, what is being addressed to me is the phrase that in recent days, despite the difficult geopolitical situation, a number of Russian universities and scientific institutions have received requests from scientists from Western Europe, the US, Japan, and to continue working together in international scientific cooperation, including the Arctic region in the context of the Russian chairmanship of the Arctic Council.

“We clearly understand that the development of science as a field of activity for creating new knowledge requires the expansion and strengthening of scientific ties between scientists from all the countries. The implementation of the international collaboration Science initiative. Scientists for the further strengthening of international cooperation should lead to the development of forms of what is commonly called Open Science, unified platforms where data from observations and experiments are collected and open access to publication. International foras and the preparation of special monograms and reports could be events.”

So now I am contemplating, I'm considering this very interesting interest public initiative and this is why I'm putting the, as they say, putting a 'bee in your ear' and asking you to think about this thing. If you further support this people-to-people scientific cooperation, that could be one of the possible layouts of the pause in international Arctic scientific cooperation in the current geopolitical situation.

Thank you very much for a very successful webinar.

Prof. Paul Arthur Berkman – 01:18:30

Thank you very much, Anton, for sharing that letter and those observations. Certainly, as one in this group, as just an individual, it would be an honor and a pleasure to contribute to those people-to-people interactions going forward in the spirit of preserving the integrity of the scientific community. Fran, please, I leave the closing comments to you.

Hon. Fran Ulmer – 01:18:54

Well, first of all, let me say, Anton, I'm very grateful that you read that and shared it with us because I think many of us were hoping that there may be some sort of initiated dialogue at this level among not only the science community, but frankly, the people-to-people community that for a very long time has provided the kind of continuity of positive relationships, even when our national governments find many things to disagree about.

So I would just note that many of the scientists with whom I have dialogue on a regular basis express very similar sentiments that it is so important that for those of us who believe in science diplomacy, for those of us who believe that it is in the best interests of all of our people, for these lines of communication and collaborative work to continue that we can individually do whatever we can to foster that, to explain to the rest of our governments and people as to why this is important.

Obviously, the scientific research that is being done in the Arctic must be done collaboratively if it's going to be effective. We must continue to honor the institutions that have served us so well, like the Arctic Council, like the University of the Arctic, like so many of the other entities that have really erased borders as a problem and rather emphasize what it is that we share as common needs and values and experience and understanding and resources. And, it is my hope that dialogues like the one we have had today will

continue the momentum for strengthening these organizations, as well as shining a light on things where additional entities or organizations or funding would be helpful, like the discussion we've just had about the Central Arctic Ocean.

I do believe that more can be done to create the platforms for Arctic observing that would, over time, enhance the ability of scientists, regardless of what country they are in, Arctic or non-Arctic, to be able to do the work they do. And I do hope that over time, we can strengthen things like the International Arctic Science Agreement to make certain that there aren't boundaries and unnecessary barriers put up to making sure that that kind of scientific research can benefit all humanity.

So with that, I will just say thanks again to Paul, to Jenny, to all of the organizers that made this possible. And may we all remain optimistic that the Arctic science community will play an important and positive role during, not only these difficult times, but long into the future. Thank you.

Prof. Paul Arthur Berkman – 01:22:12

Thank you very much, Fran. It is an honor and a pleasure to thank you, Fran. Honorable Fran Ulmer, Professor Hiroyuki Enomoto, and Ambassador Anton Vasiliev, for your important, insightful observations during this third webinar.

By way of concluding the webinar series, again with appreciation to the Ministry of Foreign Affairs of Japan, there is a synthesis that will emerge. The scholars from the Harvard Kennedy School and from the Japan ArCS II program have been thoughtfully compiling observations that have been circulated to the keynote presenters from each of the webinars. We will turn those observations, along with the transcripts that are presented as part of the recording into a publication through *Science Diplomacy Action*. And we certainly invite the keynote presenters to assist us in completing that synthesis and invite you to serve also as co-authors of that, as appropriate.

With that, it has truly been an honor. And it is a pleasure to convene these three webinars on Enhancing International Scientific Cooperation with the Arctic as a case study, but certainly with global relevance and with hope and inspiration as a primary responsibility that all generations have to think short-term to long-term for the benefit of all on Earth across generations.

With that, I thank each of the participants for your thoughtful observations and comments. I thank the team for being a team for having fun together and producing this in a way that has resonated with hope and inspiration for all of us. And, to that I wish everybody good health going forward and look forward to our next meetings. Thank you very much.

APPENDIX 5

INVITED NATURE CORRESPONDENCE (28 APRIL 2022)

Readers respond

Correspondence

World Bank speeds Africa's COVID vaccination

Thomas Bollyky and colleagues suggest ways in which the World Bank could accelerate vaccination in Africa (see *Nature* **603**, 788–792; 2022). Such initiatives are in fact already under way.

Last year, the World Bank teamed up with the African Union, the Africa Centres for Disease Control and Prevention (CDC) and others to support the Africa Vaccine Acquisition Trust to help countries swiftly purchase and deploy vaccines for up to 400 million people (see go.nature.com/37w8je). Moreover, the World Bank has supported the Africa CDC since 2017, to combat epidemics and advance public-health priorities. This support helped the Africa CDC to play a crucial part in tackling the COVID-19 pandemic from the outset.

The private-sector arm of the World Bank, the International Finance Corporation, has increased its activities in Africa. It is helping to fund early-stage development of local manufacturing projects for vaccines and personal protective equipment. It is also contributing to existing vaccine facilities to build up domestic capabilities. Further funding will cover logistics, transport, distribution and cold storage.

The pandemic will not end until everyone in every country has access to vaccines. The World Bank Group is committed to supporting developing countries throughout the pandemic and to helping them towards a resilient and inclusive recovery.

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One Health: evaluation framework launched

The 'One Health' approach aims to balance and optimize the health of people, animals and ecosystems in a sustainable way (see go.nature.com/3j7w8re). However, a dearth of evaluation tools is hampering application of this initiative in shaping policies and practice.

As members of the Global One Health Index team of 38 researchers and an expert advisory committee, we have developed a framework for assessing One Health performance in guiding policymaking in local settings. We used the index to assess the One Health approach of more than 200 countries and territories to zoonotic-disease control, food security, climate-change mitigation and antimicrobial resistance (see X.-X. Zhang *et al.* Preprint at <https://doi.org/hq75>; 2022).

As well as helping to advance general understanding of the determinants and functions of a One Health approach, the results will enable the formulation of a realistic plan for implementing the principles globally and for promoting capacity building where it is needed.

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*On behalf of 6 correspondents. See go.nature.com/3mmrbxs
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Revitalize China's cotton industry

China is the world's largest producer of cotton, but productivity is stalling. We identify three crop-breeding factors that could help to counteract this trend.

China's cotton production is being limited by its yield-directed breeding strategies. These have narrowed the genetic background and resulted in a dearth of early-maturing, disease-resistant and high-quality traits in modern cotton cultivars. There is no effective genetic transformation platform for developing elite genotypes (X. Du *et al.* *Nature Genet.* **50**, 796–802; 2018), hindering attempts to tap into their genomic profiles – for example, to improve fibre quality (S. He *et al.* *Nature Genet.* **53**, 916–924; 2021). And technical barriers are curtailing haploid breeding, which bypasses the repeated crossing and backcrossing of conventional breeding.

Extensive screening of seed germplasm resources, coupled with molecular-marker-assisted breeding, would promote desirable traits in new cotton varieties that are suitable for mechanized production (L. Fang *et al.* *Nature Genet.* **49**, 1089–1098; 2017). In addition, establishing an efficient cotton-transformation platform and a haploid breeding system would accelerate the generation of pure inbred lines with multiple desired traits.

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Arctic science diplomacy maintains Russia co-operation

Leaders of international Arctic research organizations and Arctic Indigenous peoples' organizations, from Arctic and non-Arctic states – including Russia – contributed to three webinars held in February and March. These dialogues continued despite Russia's invasion of Ukraine, conveying the importance of open science (see go.nature.com/3jkffpe) with both allies and adversaries for our shared survival as a globally interconnected civilization (see go.nature.com/3m9n1fq).

The webinar series was entitled Enhancing International Scientific Cooperation: Arctic Science and Technology Advice with Ministries (see go.nature.com/3jswed7). Funded by Japan's Ministry of Foreign Affairs, with logistic support from the United Nations Institute for Training and Research, it involved participants from 43 nations. After Russia's invasion, some representatives from European countries withdrew.

The discussions inspired international cooperation and common-interest building. Such informed decision-making operates across a continuum of urgencies, short- to long-term – from pandemic to climate timescales – for the sustainability of all (see go.nature.com/3r1vds).

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ABOUT THE SERIAL

This incidental serial will share rigorous syntheses of meetings that relate to science diplomacy. The spirit of this serial is to be holistic (international, interdisciplinary and inclusive) in a manner that will be helpful to the future of our globally-interconnected civilization.

This serial is intended to integrate stakeholder perspectives, holistic evidence and governance records in a manner that reveals options (without advocacy), which can be used or ignored, with the goal of contributing to informed decisionmaking in our world.

Informed decisions are at the summit, overlying options and evidence. The evidence itself is distilled from data, with observations and information integrated from questions at the earliest stage possible for stakeholder engagement, which is the reason for the meetings in the first instance.

The decisions relate to the combination of fixed, mobile, and other built assets (including communications, research, observing and information systems) that require capitalization and technology PLUS regulatory, policy, legal, official-statement and other governance mechanisms (including insurance). Behind the decisions is the science, as the study of change, including natural and social sciences as well as Indigenous knowledge. Change itself reveals patterns and trends over time and space – to anticipate as well as respond to issues, impacts and resources – over generations within, across and beyond the boundaries of nations.

Science Diplomacy Action addresses an immediate and long-term need to publish rigorous syntheses and summaries of meetings associated with science and technology advice in government at all levels, especially among the foreign ministries of nations. This need is reflected by the rapidly growing number of meetings that focus on science diplomacy as a holistic process of evidence integration to balance national interests and common interests for the benefit of all on Earth. The value of these science-diplomacy meetings (or any meetings) is largely limited to those that attend. *Science Diplomacy Action* recognizes this unrealized opportunity to extend value beyond the meetings by soliciting and publishing rigorous meeting syntheses.

SCIENCE DIPLOMACY CENTER™

Nation states have sovereignty, sovereign rights and jurisdictions across nearly thirty percent of the Earth. In contrast, international spaces established from World War II beyond sovereign jurisdictions exist across nearly seventy percent on the Earth as well as in outer space. On a global scale, across one hundred percent of our home planet, the challenge is to balance national interests and common interests. Recognizing this forever challenge, the Science Diplomacy Center was launched in February 2017, initially at The Fletcher School of Law and Diplomacy at Tufts University with funding from the National Science Foundation (NSF). The NSF funding and Science Diplomacy Center™ were transferred to EvREsearch LTD in 2020, extending into the Science Diplomacy Center™ at MGIMO University in 2021.

With its three triangulated areas of focus – Education, Research and Leadership – the Science Diplomacy Center™ aims to:

- Educate the next generation of science diplomats;
- Facilitate research to transform data into evidence and options that contribute to informed decisions, operating across a ‘continuum of urgencies’; and
- Provide leadership with science-diplomacy networks to build common interests among allies and adversaries alike across our globally-interconnected civilization.

The decision-support process applied by the Science Diplomacy Center™ involves holistic (international, interdisciplinary and inclusive) integration from the natural and social sciences as well as Indigenous knowledge regarding impacts, issues and resources within, across and beyond sovereign jurisdictions. This holistic integration further involves stakeholder perspectives inclusively as well as governance mechanisms that represent the operation of government institutions. Importantly, this decision-support process is designed to reveal options (without advocacy), which can be used or ignored explicitly, contributing to informed decisionmaking across the jurisdictional spectrum with its subnational-national-international levels.

To help with informed decisions, involving the combination of built elements and governance mechanisms for sustainable infrastructure development, the Science Diplomacy Center™ operates across the ‘continuum of urgencies’ that exists for peoples, nations and our world from security time scales (responding to the risks of political, economic and cultural instabilities that are immediate) to sustainability time scales (balancing economic prosperity, environmental protection and societal well-being across generations).

SUBMITTING MEETING SYNTHESSES:

As an incidental serial for rigorous meeting syntheses, the intention is to grow this serial in a manner that is both practical and helpful. The standard for the publication in *Science Diplomacy Action* is represented by Synthesis No. 1 (September 1, 2017), which emerged from the *1st International Dialogue on Science and Technology Advice in Foreign Ministries* in October 2016. Please see the Science Diplomacy Center website for Instructions for Authors (<https://scidiplo.org/science-diplomacy-research/science-diplomacy-action/instructions-for-authors/>).

In an holistic manner – *Science Diplomacy Action* seeks syntheses to share questions, observations, information, data, evidence and options that contribute to informed decisionmaking about issues, impacts and resources across jurisdictions in our globally-interconnected civilization. *Science Diplomacy Action* will operate as a rigorous publication with peer review, considering the overall quality, relevance and integrity of each submission. Each accepted synthesis will be an authoritative outcome of the relevant meeting with an author point-of-contact and other meeting participants listed as coauthors with their approval. This synthesis represents a series of meetings.



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