BRILL
NIJHOFF

THE HAGUE JOURNAL OF DIPLOMACY 15 (2020) 435-450

HJD

brill.com/hjd

Science Diplomacy and Its Engine of Informed Decisionmaking: Operating through Our Global Pandemic with Humanity

Paul Arthur Berkman
Science Diplomacy Center, The Fletcher School of Law and Diplomacy, Tufts University, Medford, MA, United States
paul.berkman@tufts.edu

Received: 2 June 2020; revised: 6 July 2020; accepted: 26 July 2020

Summary

Science diplomacy is an international, interdisciplinary and inclusive (holistic) process, involving informed decisionmaking to balance national interests and common interests for the benefit of all on Earth across generations. Informed decisions operate across a 'continuum of urgencies', which extends from security to sustainability time scales for peoples, nations and our world. The COVID-19 pandemic is the 'most challenging crisis we have faced since the Second World War', as noted in March 2020 by UN Secretary-General António Guterres, when survival is once again a common interest at local-global levels. This essay introduces common-interest-building strategies with science diplomacy to operate short term to long term, before-through-after the 'inflection point' of our global pandemic, as the next step in the evolution of our globally interconnected civilisation.

Keywords

holistic – decisionmaking – security – sustainability – governance – infrastructure

 | DOI:10.1163/1871191X-BJA10034

1 Humanity across Generations[1]

Science diplomacy is a language of hope for humanity, recognising we are living during a global pandemic as alarms are sounding about the vitality of our global order. To be sure, there are those who have doubts about the contributions of science diplomacy,[2] and indeed circumstances are dire when leading nations abandon essential international institutions with 'uninformed' decisions, as illustrated profoundly with the World Health Organization during our global pandemic.[3] It may even seem preposterous to be thinking in terms of humanity when injustices are clearly evident, as resurfaced with 'Black Lives Matter', angering for fairness and civil rights across the world.[4] Nonetheless, into this confusion, we all share a common interest in survival, revealed on a planetary scale with COVID-19 as the 'most challenging crisis we have faced since the Second World War'.[5]

Informed decisionmaking is fundamentally intertwined with the traditional taxonomy of science diplomacy,[6] enhancing the familiar framing of 'diplomacy for science, science for diplomacy and science in diplomacy'.[7] The enhancements involve science with broad characterisation to inform decisions with foreign policy making as well as built infrastructure development that together enable sustainable development, improving international relations and helping to solve local-global challenges. With international and interdisciplinary inclusion, the intertwined processes of science diplomacy facilitate common-interest building, which is a most basic skill to operate short term to long term, as is urgently needed before-through-after the inflection point with our global pandemic.

---

1 This article is a product of the Science Diplomacy Center at Tufts University in the Fletcher School of Law and Diplomacy with support from the US National Science Foundation (Award Nos. NSF-OPP 1263819 and NSF-ICER 1660449). The article follows from a virtual talk with the Program on Negotiation (2020) at the Harvard Law School on 'Operating Short-Term to Long-Term through the COVID-19 Pandemic: Negotiating a Global Renaissance with Science Diplomacy'. Leadership with the United Nations Institute for Training and Research (UNITAR) is respectfully acknowledged to train science diplomacy and its engine of informed decisionmaking for the benefit of all on Earth across generations.

2 Davis and Patman 2015; Roig 2020.

3 Trump 2020.

4 Murphy 2020.

5 Guterres 2020a.

6 Berkman et al. 2011; Berkman 2019.

7 Royal Society 2010.

For the past 75 years, global order has prevailed with the United Nations as '*our touchstone*', holding nations together '*for the benefit of all*'.[8] How do we continue to evolve with peace and stability on Earth, recognising the lesson of the 20th century that nationalism breeds global conflict in our world with advanced technologies and industrialised capacities? Part of the answer is recognising that global order matures after periods when survival is a common interest among all humankind, as epitomised with the League of Nations and the United Nations in the past century. Another part of the answer is understanding the context of present circumstances. Operating before-through-after the global inflection point of the COVID-19 pandemic is a rare and special opportunity for humanity, when there are common interests in survival once again at local-global levels but in the absence of 'world' war. This essay highlights a conceptual framework and methodology for humankind to build common interests among allies and adversaries alike with science diplomacy to produce informed decisions, operating short term to long term now through the COVID-19 pandemic for the benefit of all on Earth across generations.

2 Characterising Informed Decisions

An informed decision will optimise the available data in view of the underlying questions inclusively. As first principles,[9] the dimensions of science diplomacy are international, interdisciplinary and inclusive (holistic) with accelerating urgency to balance national interests and common interests on a planetary scale. The acceleration exists across decades-centuries with growth of the human population and atmospheric carbon dioxide,[10] underscoring the long-term dynamics of our globally interconnected civilisation (see Fig. 1 below).

Inclusion is the biggest challenge to being holistic, underscoring the sources of injustice and myopia that emerge when systems and powers are dominated by self-interests. The challenge to be inclusive exists especially with the decisionmaking of governments in response to their populations. Governments range across the jurisdictional spectrum with its subnational-national-international levels,[11] which is another aspect of the scalability with

8 Guterres 2020b (emphasis in original).
9 Berkman et al. 2011, 2017; Berkman, Young and Vylegzhanin 2020.
10 Erlich and Holdren 1971; Holdren 2008.
11 Berkman 2019.

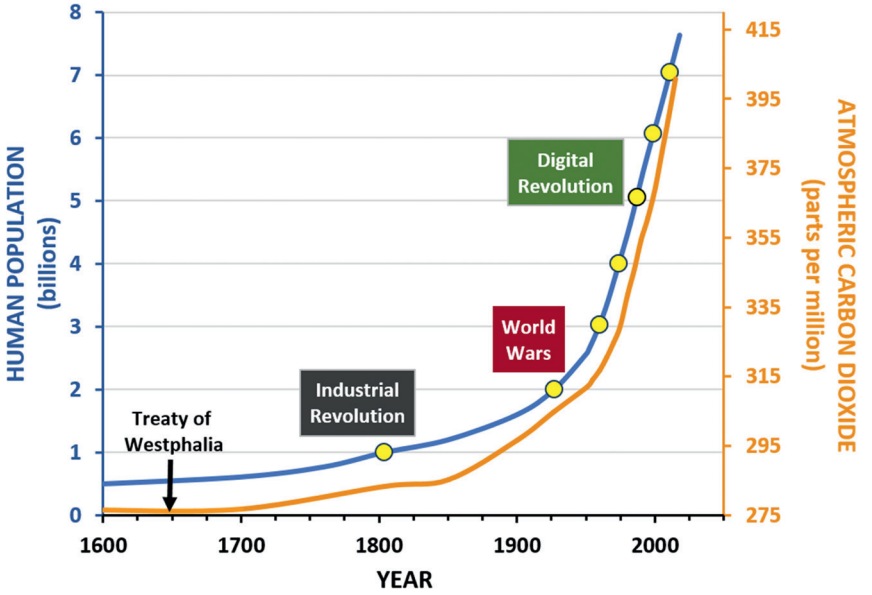

FIGURE 1 Globally interconnected civilisation, viewed on a planetary scale on Earth with exponential increases in human population size across orders of magnitude in parallel with atmospheric carbon dioxide concentrations over decades-centuries since the Treaty of Westphalia in 1648, when the basic jurisdictional unit of the nation state was established for the world we live in today. The intervening science and technology 'revolutions' track human need, recognising necessity is the spice of invention. However, it is the 'world' wars that unambiguously reveal that we are interconnected with synoptic changes on a planetary scale.
SOURCE: ADAPTED FROM BERKMAN 2019, 70; BERKMAN, YOUNG AND VYLEGZHANIN 2020, VIII

science diplomacy,[12] progressing beyond the traditional diplomatic venues of foreign ministries.[13]

To bridge the diverse interests with research and action, science opens doors to be holistic, as reflected by the 2019 merger of the International Council of Science and International Social Sciences Council to become the International Science Council: 'advancing science as a global public good'.[14] But what is science?

12 Gluckman et al. 2017.
13 Royal Society 2010.
14 ISC 2019, 4.

Natural sciences and social sciences as well as Indigenous knowledge all involve rigorous training with enquiry skills to characterise patterns and trends that become the bases for decisions. The challenge to be inclusive also exists across the disciplines that contribute to decisionmaking with different knowledge systems enabling individuals, cultures and governments to be resilient in the face of change. For the purposes of science diplomacy, broadly speaking with international and interdisciplinary inclusion of all these knowledge systems,[15] science is the 'study of change' (symbolised by the Greek letter delta Δ, as in mathematics).

Change includes the past, present and the future with context provided by looking across time rather than at the moment, as observed in 2016 during the 1st International Dialogue on Science and Technology Advice in Foreign Ministries with diplomats from nearly two dozen foreign ministries. An outcome of the inclusive international dialogue was the concept of *informed decisions,* operating across a 'continuum of urgencies'.[16] With governments, peoples and our world, informed decisions operate short term to long term from:

> **Security Time Scales:** mitigating risks of political, economic, cultural and environmental instabilities that are immediate; to
> **Sustainability Time Scales**: balancing economic prosperity, environmental protection and societal well-being across generations.

Without being prescriptive, defining an *informed decision* (see Fig. 2 below) introduces the potential for iteration and the capacity to avoid jargon, which happens otherwise when terms are applied without definition. An advantage of informed decisions also is the framework to identify 'uninformed' decisions that emerge when decisions operate short term or long term only, as happens with politics involving conflicts and paralysis among competing agendas for momentary benefit.

As the engine of science diplomacy, informed decisionmaking is scalable to each of us at a personal level, as symbolised when we drive a car and must decide about the immediate urgencies to the left and right while manoeuvring in view of future urgencies with the red lights ahead and circumstances to consider in the rear. For governments and civil society, the lens of informed decisionmaking is available for all to address urgencies with balance, applying the negotiation strategies of conflict resolution and common-interest

15 Berkman, Young and Vylegzhanin 2020.
16 Vienna Dialogue Team 2017; Berkman 2019; Berkman, Young and Vylegzhanin 2020.

FIGURE 2 Informed decisions operate across a 'continuum of urgencies' introduced by the Vienna Dialogue Team 2017, as illustrated from security to sustainability time scales, with 'conflict resolution' and 'common-interest building' as negotiation strategies to achieve balance with issues, impacts and resources at local-global levels.
SOURCE: AUTHOR

building at local to global levels (see Fig. 2). With holistic pedagogy, the seventeen Sustainable Development Goals[17] are a gift to humanity, tailor-made with common-interest building in view of the urgencies that exist with worldwide implications in view of 'our common future'.[18] Into this brave new world, science diplomacy is evolving[19] as a holistic 'process, involving informed decisionmaking to balance national interests and common interests for the benefit of all on Earth across generations'.[20]

3 Common-interest Building

Understanding time highlights the challenge to make informed decisions that operate short term to long term, addressing urgencies continuously across diverse time scales, as illustrated: month-years with our global pandemic and years-decades with high technologies[21] as well as across decades-centuries with our Earth system (Fig. 1). Informed decisionmaking introduces a theoretical proposition that science diplomacy is scalable, operating within governments and across society more broadly, complemented by the diplomatic

17 UN General Assembly 2015.
18 UN 1987, 'Chairman's Foreword'.
19 Ruffini 2017; Turekian 2018; Berkman 2019; Krasnyak and Ruffini 2020.
20 Concept of the holistic process for the benefit of all on Earth across generations is herein refined from previous publications. Berkman et al. 2011; Berkman, Young and Vylegzhanin 2020.
21 Moore 1965.

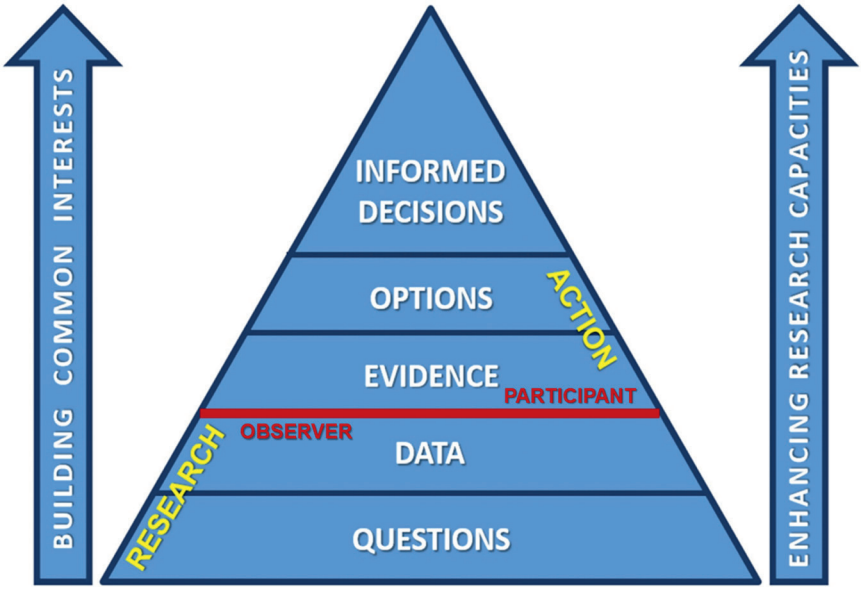

FIGURE 3 Pyramid of informed decisionmaking as the underlying methodology that is being applied, trained and refined with informed decisions (Fig. 2) as the apex goal of science diplomacy. With holistic integration, the iterative stages of research and action facilitate common-interest building and enhanced research capacities.

SOURCES: ADAPTED FROM BERKMAN ET AL. 2017, SUPPLEMENTARY MATERIALS; BERKMAN, YOUNG AND VYLEGZHANIN 2020, XIII.

skill of common-interest building (Fig. 2). As the engine of science diplomacy, informed decisionmaking also involves methods to apply, train and refine with research and action (see Fig. 3).

The action-oriented scope of informed decisionmaking (Figs. 2 and 3) compliments and expands on the traditional taxonomy of 'diplomacy for science, science for diplomacy and science in diplomacy',[22] which is widely used to train science diplomacy.[23] It also is noteworthy that limited practical application of the traditional taxonomy is recognised by Science and Technology Advisors to Foreign Ministers, who have been seeking a 'more utilitarian framing of science diplomacy, and one that better resonates with government agencies'.[24] Science diplomacy and its engine of informed decisionmaking have been core

22 Royal Society 2010.

23 AAAS 2020; S4D4C 2020; InsSciDE 2020.

24 Gluckman et al. 2017.

to the video-conferencing course through the Science Diplomacy Center[25] with Tufts University in the United States and MGIMO University in the Russian Federation since 2017, subsequently progressing to training through the United Nations Institute for Training and Research.[26]

To be practical in a holistic manner, with informed decisionmaking science diplomats can be identified as those who serve as both observers and participants across the research-action interface (Fig. 3), upward and downward, creating synergies to generate informed decisions as the apex goal of science diplomacy. Research starts with questions, which also is the least complicated stage to engage allies and adversaries alike in building common interests. With global relevance, this role of science as a tool of diplomacy is illustrated after the Second World War by the 1959 Antarctic Treaty, applying the lessons of the 1957-1958 International Geophysical Year 'with the interests of science and the progress of all mankind … forever'[27] in this first nuclear arms agreement.[28] What enabled the United States and the Soviet Union to co-operate continuously in Antarctica, as well as outer space, throughout the Cold War despite the geopolitics that isolated these superpower adversaries in every other sphere?

Both common-interest building and conflict resolution (Fig. 2) have the same end objectives: to promote co-operation and prevent conflict. However, building on science (Δ) as a tool of diplomacy, it is consulting on 'matters of common interest' that enables allies and adversaries to co-operate continuously through the 1959 Antarctic Treaty. The lesson is that the negotiation starting point determines the journey with co-operation or conflict.

From personal experiences with co-convening many high-level international dialogues — including the first formal dialogue between the North Atlantic Treaty Organization and the Russian government regarding security in the Arctic[29] as well as the 1st and 2nd International Dialogues on Science and Technology Advice in Foreign Ministries[30] — common-interest building is facilitated with questions (Figs. 2 and 3). When there are questions of common concern, it then becomes possible to identify the science (Δ) methods that will generate the data to answer the questions in an iterative manner with research. However, data to answer questions are different than evidence for decisions,[31] which involve action with decisionmaking institutions to produce:

25 Science Diplomacy Center 2020.
26 UNITAR 2019, 2020a, 2020b, 2020c.
27 Antarctic Treaty 1959, Preface.
28 Berkman 2002, 2009; Berkman et al. 2011.
29 Berkman and Vylegzhanin 2012.
30 Vienna Dialogue Team 2017; Talloires Dialogue Team 2018.
31 Donnelly et al. 2018.

> **Governance Mechanisms**: laws, agreements and policies as well as regulatory strategies, including insurance, at diverse jurisdictional levels; or
> **Built Infrastructure**: fixed, mobile and other assets, including communication, observing, information and other systems that require technology plus investment.

Science diplomats are essential at this foundational stage, operating with objectivity across the data-evidence interface as observers and participants, independent of whether they are the researchers, science attachés or the decision-makers. During crises, especially now with the COVID-19 pandemic, science diplomats are critical to operate across the 'evidentiary-politics interface'.[32]

While evidence is necessary to compel action from institutions, the sufficiency for informed decisionmaking comes with the options (without advocacy), which can be used or ignored explicitly. Options introduce the diplomacy with science (Δ), unlike recommendations that convey real or perceived agendas that introduce political responses, respecting the decision-makers as well as their institutions to build common interests with holistic integration (Fig. 3). The result of this science diplomacy process is an informed decision (Fig. 2): not a good or bad decision, not a right or wrong decision, but a decision that optimises the available data in view of the underlying questions inclusively.

4 Operating through the Global Inflection Point

It is with context that constructive dialogues emerge, which is something all nations, jurisdictions and people on Earth are being forced to consider in view of the COVID-19 pandemic. The last time all humans on Earth felt concern about their survival was the Second World War, following on the heels of the Great Depression and the Spanish flu pandemic that killed at least 50 million people in 1918-1919 after the First World War one century ago,[33] recognising that our global human population has increased 400 per cent since then (Fig. 1).

All of us now have a common interest in survival because of the coronavirus: for ourselves and those closest, young and old, good health or not, educated or illiterate, rich or poor, in cities or villages indiscriminately across our home planet. The COVID-19 pandemic is a powerful example when informed decisionmaking (see Fig. 4 below) is urgently needed everywhere on Earth to

32 Gluckman 2020.

33 CDC 2019.

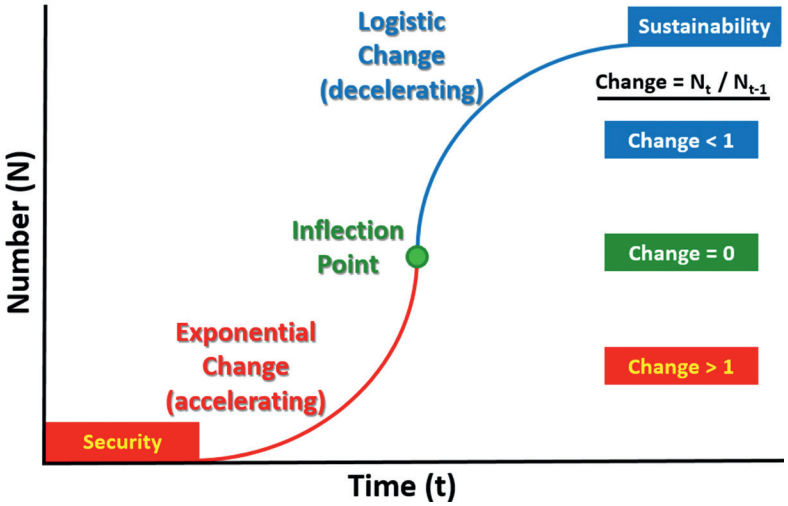

FIGURE 4 Trajectory of exponential changes evident across the Earth over months-years with the COVID-19 pandemic, years-decades with advanced technologies and decades-centuries with planetary processes influenced by our global human population during the Anthropocene (Fig. 1). Informed decisionmaking (Fig. 2) applies at all of these time scales with holistic integration of research and action (Fig. 3), short term to long term — before-through-after the inflection point from security to sustainability time scales.
SOURCE: AUTHOR

facilitate trust and resilience.[34] Such wisdom will come with holistic integration and compassion.[35]

Our world has a most terrible fever, heating up in many ways around the Earth at the pace of exponential change across orders of magnitude, as illustrated over diverse time scales with our climate (Fig. 1) as well as our current pandemic. For example, the United States had its first COVID-19 mortality on 1 March 2020, increasing to 10, then 100, onto 1,000, escalating to 10,000, and reaching 100,000 deaths on 26 May 2020.[36] Any uncertainties about the next order of magnitude (millions) in the United States are in the context of exponential change and the size of the uninfected population. Setting expectations correctly, the impacts will continue compounding until we reach a global inflection point, which will occur with certainty (albeit at an undefined date)

34 Colglazier 2020.
35 McNutt 2020; Rose 2020.
36 COVID-19 Dashboard 2020.

either because the coronavirus has ravaged the entire human population or because we have developed a vaccine with the distribution channels to inoculate everyone on Earth. The relevant observation, attributed to Albert Einstein, is that 'compound interest is the most powerful force in the universe'.[37]

The inflection point with the COVID-19 pandemic offers a source of hope, preceding the logistic phase when the coronavirus impacts will decelerate in our globally interconnected civilisation. The trajectory of COVID-19 pandemic impacts (Fig. 4) reveals a generalised framework to produce informed decisions at local-global levels, short term to long term, before-through-after the inflection point in view of security to sustainability time scales (Fig. 2).

A worldwide example of informed decisionmaking is demonstrated with the global inflection point of the Second World War, which happened in August 1945 with the end of conflict in the Pacific, bringing us full circle to the urgencies facing us *forever* as a globally interconnected civilisation (Fig. 1). Subsequent peace, stability and resilience of our world are because of the contributions before the inflection point. The Bretton Woods Conference in New Hampshire happened in July 1944 with imagination of the International Monetary Fund and the International Bank for Reconstruction and Development that became the World Bank for a new world order.[38] Most importantly, the UN Conference on International Organization happened in San Francisco from April to June 1945, resulting in the Charter of the United Nations and Statute of the International Court of Justice[39] — symbolised for the ages with the California redwoods, where Franklin Delano Roosevelt, the 'chief architect of the United Nations, and apostle of lasting peace for all mankind', was memorialised on 19 May 1945.[40]

In the context of the oldest continuous calendars on Earth over nearly 60 centuries, we are just in our infancy as a globally interconnected civilisation (Fig. 1), operating across the jurisdictional spectrum on a planetary scale where nations alone are insufficient for our shared survival. Like children, we are bumping into things and making mistakes with desperation, emphasising the injustices and dangers of exclusion that exist with human nature and self-interests. Nonetheless, there is hope with informed decisionmaking (Figs. 2-4) — appreciating there are those alive who will be living in the 22nd century with capacities to operate short term to long term.

37 Calaprice 2011, 479.
38 Steil 2013.
39 UN 1945.
40 United States 2020.

Education to operate across a continuum of urgencies can start during childhood — introducing a necessary skill in our digital society with effectively infinite and instantaneous access to information — beyond reading, writing and arithmetic that are taught in every language. It also is important to note that children are inherently curious, underlying the enquiry skills that are the essence of any science (Δ) to encourage with methods that answer questions as stages of research (Fig. 3). For world leaders, especially those of you in your twenties and even teens, contributing for decades to come — as an option (without advocacy) to use or ignore — apply questions (Fig. 3) that triangulate your leadership with education and research as elements of lifelong learning. With inspiration from Jules Verne's science fiction becoming reality, lifelong learning with science diplomacy and its engine of informed decisionmaking will awaken an era of common-interest building for the benefit of all on Earth across generations.

Bibliography

AAAS (American Association for the Advancement of Science). 'Center for Science Diplomacy'. (Washington, DC: AAAS, June 2020). https://www.aaas.org/programs/center-science-diplomacy.

Antarctic Treaty. Signed: Washington, DC: 1 December 1959. Entry into Force: 23 June 1961. https://www.ats.aq/e/antarctictreaty.html.

Berkman, Paul Arthur. *Science into Policy: Global Lessons from Antarctica* (New York: Academic Press, 2002).

Berkman, Paul Arthur. 'International Spaces Promote Peace'. *Nature* 462 (2009), 412-413. DOI 10.1038/462412a. https://www.nature.com/articles/462412a.

Berkman, Paul Arthur. 'Evolution of Science Diplomacy and Its Local-Global Applications'. Special issue, 'Broadening Soft Power in EU-US Relations', *European Foreign Affairs Review* 24 (2019), 63-79. https://www.ingsa.org/wp-content/uploads/2019/09/Evolution-of-Science-Diplomacy-and-its-Local-Global-Applications_23JUL19.pdf.

Berkman, Paul Arthur, Lars Kullerud, Allen Pope, Alexander N. Vylegzhanin and Oran R. Young. 'The Arctic Science Agreement Propels Science Diplomacy'. *Science* 358 (6363) (2017), 596-598. DOI 10.1126/science.aaq0890. https://science.sciencemag.org/content/358/6363/596.

Berkman, Paul Arthur, Michael A. Lang, David W.H. Walton and Oran R. Young, eds. *Science Diplomacy: Antarctica, Science and the Governance of International Spaces* (Washington, DC: Smithsonian Institution Scholarly Press, 2011). https://repository.si.edu/handle/10088/16154.

Berkman, Paul Arthur and Alexander N. Vylegzhanin, eds. *Environmental Security in the Arctic Ocean NATO Science for Peace and Security Series — C: Environmental Security* (Dordrecht: Springer, 2012).

Berkman, Paul Arthur, Oran R. Young and Alexander N. Vylegzhanin. 'Book Series Preface for Informed Decsionmaking for Sustainability'. In *Informed Decisionmaking for Sustainability,* vol. 1: *Governing Arctic Seas: Regional Lessons from the Bering Strait and Barents Sea,* eds. Oran R. Young, Paul Arthur Berkman and Alexander N. Vylegzhanin (Dordrecht: Springer, 2020), v-xxv.

Calaprice, Albert, ed. *The Ultimate Quotable Einstein* (Princeton: Princeton University Press, 2011).

CDC (Centers for Disease Control and Prevention). 'Pandemic (H1N1 Virus)'. Centers for Disease Control and Prevention, National Center for Immunization and Respiratory Diseases, 20 March 2019. https://www.cdc.gov/flu/pandemic-resources/1918-pandemic-h1n1.html.

Colglazier, William. 'America's Science Policy and Science Diplomacy after COVID-19'. *Science and Diplomacy* 9 (2) (2020). http://sciencediplomacy.org/editorial/2020/americas-science-policy-and-science-diplomacy-after-covid-19.

COVID-19 Dashboard. 'COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) Johns Hopkins University of Medicine'. 2020. https://coronavirus.jhu.edu/map.html.

Davis, Lloyd S. and Robert G. Patman, eds. *Science Diplomacy: New Day or False Dawn?* (Singapore: World Scientific, 2015).

Donnelly, Christl A., Ian Boyd, Philip Campbell, Claire Craig, Patrick Vallance, Mark Walport, Christopher J.M. Whitty, Emma Woods and Chris Wormald. 'Four Principles for Synthesizing Evidence'. *Nature* 558 (2018), 361-364. https://www.ingsa.org/wp-content/uploads/2018/07/4-principles-Nature-June-2018.pdf.

Ehrlich, Paul R. and John P. Holdren. 'Impact of Population Growth'. *Science* 171 (3977) (1971), 1212-1217. DOI 10.1126/science.171.3977.1212. https://science.sciencemag.org/content/171/3977/1212.

Gluckman, Peter D. 'Reflections on the Evidentiary-Politics Interface'. International Science Council, 11 May 2020. https://www.ingsa.org/covidtag/covid-19-featured/gluckman-interface/.

Gluckman, Peter D., Vaughan C. Turekian, Robin W. Grimes and Teruo Kishi. 'Science Diplomacy: A Pragmatic Perspective from the Inside'. *Science and Diplomacy* 6 (4) (2017 http://sciencediplomacy.org/files/pragmatic_perspective_science_advice_dec2017_1.pdf).

Guterres, António. 'Transcript of UN Secretary-General's Virtual Press Encounter to Launch the Report on the Socio-Economic Impacts of COVID-19'. United Nations Secretary-General, 31 March 2020a. https://www.un.org/sg/en/content/sg/press-encounter/2020-03-31/transcript-of-un-secretary-general%E2%80%99s-virtual-press-encounter-launch-the-report-the-socio-economic-impacts-of-covid-19.

Guterres, António. 'United Nations Charter Remains Our Touchstone amid COVID-19 Pandemic, Rise in Nationalism, Climate Change, Secretary-General Says in Anniversary Message'. United Nations Secretary-General, 26 June 2020b. https://www.un.org/press/en/2020/sgsm20144.doc.htm.

Holdren, John P. 'Science and Technology for Sustainable Well-Being'. *Science* 319 (5862) (2008), 424-434. DOI 10.1126/science.1153386. https://science.sciencemag.org/content/319/5862/424.

InsSciDE. *Inventing a Shared Science Diplomacy for Europe.* June 2020. https://www.insscide.eu/.

ISC (International Science Council). *Advancing Science as a Global Public Good: Action Plan 2019-2021* (Paris: ISC, 2019). DOI 10.24948/2019.09. https://council.science/actionplan/.

Krasnyak, Olga and Pierre-Bruno Ruffini. 'Science Diplomacy'. *Oxford Bibliographies,* 26 February 2020. DOI 10.1093/OBO/9780199743292-0277. https://www.oxfordbibliographies.com/view/document/obo-9780199743292/obo-9780199743292-0277.xml.

McNutt, Marcia. 'The Coronavirus Pandemic: Delivering Science in a Crisis'. *Issues in Science and Technology,* 16 June 2020. https://issues.org/mcnutt-actionable-strategic-irreplaceable-data-delivering-science-in-a-crisis/.

Moore, Gordon E. 'Cramming More Components onto Integrated Circuits'. *Electronics* 38 (8) (1965), 114-117. https://newsroom.intel.com/wp-content/uploads/sites/11/2018/05/moores-law-electronics.pdf.

Murphy, Chris. 'A New Civil Rights Movement Is a Foreign Policy Win: This Is What Democracy Looks Like'. *Foreign Affairs,* 12 June 2020. https://www.foreignaffairs.com/articles/2020-06-12/new-civil-rights-movement-foreign-policy-win.

Program on Negotiation. 'Operating Short-Term to Long-Term through the COVID-19 Pandemic: Negotiating a Global Renaissance with Science Diplomacy'. Harvard Law School, 26 March 2020. Virtual talk with Paul Arthur Berkman. YouTube. https://www.pon.harvard.edu/daily/teaching-negotiation-daily/operating-short-term-to-long-term-through-the-covid-19-pandemic/.

Roig, Alexis. 'COVID-19 Crisis in Europe: A Failure of Science Diplomacy?' *Barcelona Science and Technology Diplomacy Hub,* 6 April 2020. https://www.youtube.com/watch?v=1wGuP1TP4nc.

Rose, Gideon. 'The World after the Pandemic'. *Foreign Affairs,* 8 June 2020. https://www.foreignaffairs.com/issue-packages/2020-06-03/world-after-pandemic

Royal Society. *New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power* (London: Royal Society, 2010). https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2010/4294969468.pdf.

Ruffini, Pierre-Bruno. *Science and Diplomacy: A New Dimension of International Relations* (Dordrecht, Springer, 2017).

S4D4C. 'Using Science for/in Diplomacy for Addressing Global Challenges'. European Union, June 2020. https://www.s4d4c.eu/.

Science Diplomacy Center. 'Science Diplomacy: Environmental Security and Law in the Arctic Ocean'. Video-conferencing course with the Fletcher School of Law and Diplomacy, Tufts University (United States) and MGIMO University (Russian Federation), June 2020. https://sites.tufts.edu/sciencediplomacy/education/courses/science-diplomacy-course/.

Steil, Benn. *The Battle of Bretton Woods: John Maynard Keynes, Harry Dexter White, and the Making of a New World Order* (Princeton: Princeton University Press, 2013).

Talloires Dialogue Team. 'Science Diplomacy: To 2030 and Beyond'. *Science Diplomacy Action* 2 (2018), 1-9. https://sites.tufts.edu/sciencediplomacy1/files/2019/02/Synthesis_2.pdf.

Trump, Donald J. 'Remarks by President Trump on Actions against China'. White House, 29 May 2020. https://www.whitehouse.gov/briefings-statements/remarks-president-trump-actions-china/.

Turekian, Vaughan C. 'Evolution of Science Diplomacy'. *Global Policy* 9 (3) (2018), 5-7. DOI 10.1111/1758-5899.12622. https://onlinelibrary.wiley.com/doi/full/10.1111/1758-5899.12622.

UN. *United Nations Archive: United Nations Conference on International Organization* (UNCIO) (1945) — AG-012. 1945. https://search.archives.un.org/united-nations-conference-on-international-organization-uncio-1945.

UN. 'Our Common Future: From One Earth to One World'. Report Transmitted to the General Assembly as an Annex to Resolution A/RES/42/187 (New York: UN, World Commission on Environment and Development, 1987).

UN General Assembly. *Transforming Our World: The 2030 Agenda for Sustainable Development.* Res. A/RES/70/1 (25 September 2015). https://sustainabledevelopment.un.org/post2015/transformingourworld/publication.

UNITAR (United Nations Institute for Training and Research). *Retreat for Directors of Arab Diplomatic Academies and Institutes*. UNITAR, Algiers, 12-13 June 2019. https://www.unitar.org/event/full-catalog/retreat-directors-arab-diplomatic-academies-and-institutes.

UNITAR. *United Nations Diplomacy 4.0 Training Programme* (Geneva: United Nations Institute for Training and Research, 2020a). https://unitar.org/about/news-stories/news/united-nations-diplomacy-40-training-programme.

UNITAR. *Science Diplomacy and Informed Decision-Making during Our Global Pandemic* (Geneva: United Nations Institute for Training and Research, 2020b). https://www.unitar.org/event/full-catalog/science-diplomacy-and-informed-decision-making-during-our-global-pandemic.

UNITAR. *Executive Diploma on International Law.* United Nations Institute for Training and Research, Geneva, 25 May-5 June 2020c. https://www.unitar.org/event/full-catalog/executive-diploma-international-law-online.

United States. 2020. *The United Nations Memorial Service at Muir Woods*. US National Park Service, 30 July 2019. https://www.nps.gov/articles/the-united-nations-memorial-service-at-muir-woods.htm.

Vienna Dialogue Team. 'A Global Network of Science and Technology Advice in Foreign Ministries'. *Science Diplomacy Action* 1 (2017), 1-20. https://sites.tufts.edu/sciencediplomacy/ /2019/02/Synthesis_1.pdf.

Paul Arthur Berkman

is a science diplomat, applying, training and refining informed decisionmaking to balance national interests and common interests for the benefit of all on Earth across generations. He is Professor of Practice in Science Diplomacy and Founding Director of the Science Diplomacy Center at the Fletcher School of Law and Diplomacy, Tufts University, Medford, MA, as well as an Associated Fellow of the United Nations Institute for Training and Research (UNITAR). His recent co-produced books are the *Baseline of Russian Arctic Laws* (2019) and *Informed Decisionmaking for Sustainability. Volume 1. Governing Arctic Seas: Regional Lessons from the Bering Strait and Barents Sea* (2020).