



Sharing data and balancing priorities: A view from Canada's research funders

Moderator:

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Panellists:

Dr. Alejandro Adem, President, Natural Sciences and Engineering Research Council of Canada

Dr. Ted Hewitt, President, Social Sciences and Humanities Research Council

Dr. Michael Strong, President, Canadian Institutes of Health Research

Moderator: Welcome to this session on Canada's research funding ecosystem. I am Roseann O'Reilly Runte, President and CEO of the Canada Foundation for Innovation. And we take care of infrastructure for universities, colleges, and hospitals across the country, and look after some of the major science initiatives.

With me, I have Alejandro Adem, who is an award-winning mathematician. He's a Professor at the University of British Columbia; a Fellow of the American Mathematical Society; winner of the Jeffery-Williams Prize; former Director of the Pacific Institute for Mathematical Sciences; and a highly successful CEO and Scientific Director of Mitacs. He currently is the President of the Natural Sciences and Engineering Research Council of Canada.

Also with me is Ted Hewitt, former Vice-President Research and International Relations at Western University, where he was and still is a Professor of Sociology and a leading authority on Brazil, named Grand Officer of the Order of Branco by the Government of Brazil. He is also Co-Chair of the Canada-Brazil Joint Committee on Science Technology and Innovation. Known for his monographs and articles on innovation systems in Latin America and beyond, he is President of the Social Sciences and Humanities Research Council of Canada.

Michael Strong, was Dean at the Schulich School of Medicine and Dentistry at Western University, Chief of Neurology and Co-Chair of the Department of Clinical, Neurological Sciences at the London Health Services, Co-Chair of the Canadian ALS Research Consortium, he's the only Canadian to have received two awards for ALS research, the Forbes Norris Award and the Sheila Essey Award. He has done his degrees and training at Queen's University, Western University and the NIH in Maryland. He's currently President of the Canadian Institutes for Health Research (CIHR).



Welcome. And let me start off by asking you, what do you think about open science? Ted, maybe you'd like to start.

Dr. Ted Hewitt: Well as President of the Social Sciences and Humanities Research Council, we have strongly promoted access to research work, and I'm very pleased in the work that we fund in particular but really far beyond. We are very pleased to have worked with our two fellow councils at CIHR and NSERC on two particular policies that promote open science in Canada. One being our open access policy maintained by the tri-council established about three or four years ago, which requires that all the researchers who are funded by our agencies who publish, will ensure that those publications are made freely available within a period of 12 months and also our recently research data management policy, which intends to afford the same open access to research data. I think we still have some ways to go, but we're well on the road to ensuring that the data that's collected by researchers we fund, will be made broadly available not only Canada but internationally and certainly look forward to working together in future with partners across the globe, to promote this really, really worthy cause—worthy cause and essential cause if we're to move forward in advancement of science.

Moderator: Alejandro is President of the Natural Science and Engineering, but you're also chairing the coordinating committee for research in Canada. And I know open science is question on their agenda, could you possibly speak to the item?

Dr. Alejandro Adem: Open science is a very broad item, which involves not only a university based research or science but also the science being done within the government. The Chief Science Advisor produced a roadmap for open science a year and a half ago, and she's been working with the government departments of new science to facilitate and enable the principles of open science across [00:04:40 *world*]. And the CRCC, the committee you mentioned, we will be having discussions about her plans to do that, as well as how they connect with the open science initiatives that my colleague ahead talked about that we have in the three councils and ongoing consultations because open science is a dynamic concept. Access to data, access to the publications was something that is developing rather quickly and we want to make sure that our researchers and our citizens are complying and they're doing what it takes to make sure there's fully transparency and accessibility.



Moderator: Michael, you were one of the first organizations to sign on the open science and shared information during the pandemic, the international agreement. Would you like to speak to how important that is to the Canadian Institutes for Health Research and if there are any difficulties involved in supporting open science?

Dr. Michael Strong: Thanks for that question, Roseann, and I'll follow along on some of Alejandro's comments as well. We tend to think about open science is really two categories of information. The first, as an investigator, we're most familiar with the open science concept at the time of publication, where the journals will ask you to bring your data forward into repositories, right down to reagents and that were used and where you purchased those from so that the experiments could be replicated going forward. That's still part in parcel of the peer review process as it's going through to achieve that, but that data then becomes part of open science. It comes with a price tag. Those journals are charging, if you want to have your data and your articles made open science, that can be thousands of dollars—five, six, seven for some journals in Canadian dollars. So on the one hand, there's a cost associated with that.

The second, however, is the broader one which relates to your question with regards to the pandemic. And that is, at the end of the day, as tri-agencies, we are funded by the Canadian taxpayer to deliver research across this broad domain that we have and so this data really does belong to Canadian researcher's writ large, to Canadian population. So how's it made accessible? And that's where it starts to become a bit of a challenge because some of these datasets are massive. They've terabytes of data out of one set of experiments. Where do you store those? Where does that get housed? So collectively, we're working with the Canadian Association and Research Libraries with their Portage Network that's getting established, to try and see how we can, at individual universities, ensure that the data is made available. It was the same thing at the beginning of the pandemic, which is to say that as discoveries were being made, particularly on characteristics of the virus, but that data needed to be made available, whether it was a clinical trial, whether it was basic biological data and so on with that. And you're right, we were one of the very first to sign-off on that. And it really came with two things. The first one is just that when you do that, you're kind of pulling the curtain away from what it's like to be a scientist. I did use the Wizard of Oz analogy on another time to talk about this, to see behind the curtain. It's because you now, as public, can get a chance to see data before it's been fully adjudicated, before people have

really had a chance as scientists, to ask if your interpretation is correct or not. And so one of the risks of that is that you get data out there that may not yet be fully vetted, and while the data may be accurate, the interpretation may be opened to some debate and discussion for it. And you saw that early in the course of the pandemic around a number of avenues. The other piece is that not everybody adhered to it and so sometimes you saw a publication by press with articles and commentaries coming out long before the scientific data were there. And so really, this open access in a pandemic or in a crisis mode has challenges that go along with it. But the fundamental principle remains the same: freely accessible data that can be interpreted and looked at by scientist's world-wide and open for their interpretation. It just has challenges.

Moderator: If it's open to scientists, it's also open to the public and we've been really fortunate during this pandemic that the public has looked to scientists to say you are the people who are going to find solutions to this pandemic. You're going to be able to find the vaccines. You're going to be able to create the respirators. You're going to do what we have to do to save the population of the world. But at the same time, the public views our hesitations, our mistakes, the trials that have to be retried. Does that increase or decrease the perception of the public that science is good and important?

Dr. Michael Strong: Maybe I'll take a first crack at that and turn it to my colleagues. There really, truly is a double-edge sword on that side.

First off, I think in the federal system, in the federal ecosystem in the government, it's very, very clear the decisions are made on the basis of evidence and where the evidence doesn't exist. We're commissioned to get on with it, the academic community. It doesn't matter whether it's the basic cellular biology, or whether it relates to outcomes in different patient populations, or work that Alejandro's groups are doing with PHAC around the issue of how do you begin to model more accurately what this data is looking like? So that sort of move by our government is really stating very clear that decisions will be made on the basis of excellent science. Haven't always heard that around the globe and it's caused problems where science has not driven the decisions. So I think that's one piece of the equation, the confidence that exists to be able to turn to all of that.

I also tend to look at the half full side of the glass with regards to this issue of debate around data and retractions for it. It is the scientists, all of us around this table, live with that. It's the recognition that your data is not



likely to be published and moved out there until it's been really rigorously peer reviewed and there's that sort of stamp of approval that this interpretation makes sense based on the data that you have in there. I think what the public should be really reassured about, is that that hasn't gone away. Just because the data gets out there and there's a discussion around it, doesn't mean that the academic community of scientists will look at it and say we accept that. We will look at it just as critically and say alright, it doesn't matter to us that it's real-time. Pull it back because it's the wrong decision. So I think there should be a really high level of comfort that that rigour of science of excellence exists for the vast majority of instances. But I turn it to my colleagues.

Moderator: Ted, with the humanities and social sciences, is there something that you would like to say about the communication of results and perhaps about the ethics of releasing results?

Dr. Ted Hewitt: I think the issues are really very much the same. When we talk about science, we always include social science and the humanities, and in the process of science we collect evidence to draw inferences and in order to publish a result. I think that confidence generally has eroded to some extent, in science broadly speaking, and that would include social science research. And I think that as funding agencies, there's a couple of things really we can do, but the best thing we can do is to make sure we always fund excellence in research, and I think in Canada we do a good job of that and we need to advertise that and we need to help our researchers to promote the results of their research and that's why open science is so important.

The other piece and this is something we have to reiterate time and time again and Mike, I think, alluded to this, and that is that we have to help people to understand that science is not monolithic. It's based on gathering evidence. It's based on applying analytical tools. It's based on drawing inferences. That may change and the findings of science can change with time, and that's perfectly okay, and that's perfectly in accordance with the way that science is done and I think that's not always entirely well understood by the public and something that we need to emphasize.

Moderator: Alejandro, as you move to applied science and applied research and dealing with companies and so on and proprietary rights about inventions and so on, how does that enter into the open science debate?



Dr. Alejandro Adem: Well the issue of IP of course, is very important because the Canadians expect that the IP that was generally created with investments from funding agencies, the government will stay in Canada and be harnessed in Canada. So that can be an ongoing concern and [00:13:51] efforts by the government to ensure that the intellectual property remains where it should be. Now obviously, any issues around the pandemic, there was, I think, some very good work done where the researchers and industry worked together on finding solutions, particularly the case of a ventilator that was developed by a group with Arthur McDonald, the Nobel Prize winner and international groups involved who were able to produce a ventilator, which I think was at much lower cost than those commercially available. And that was the knowhow of physicists, [00:14:31] physicists and engineers applied to this particular pandemic.

Now I do think that the importance of science, the value of science, is higher now than it was before because in the end, the vaccines are a product of science and I think folks will recognize that. But there have been bumps along the way and the expectations have to be measured and controlled. And I think what Mike and Ted agree with, too, is that the messiness of science is now more publicly aware, the debates that happened in the scientific community are also [00:15:07]. So that's maybe where I think that we were really careful. We have to communicate in context and make it easy.

Moderator: Alejandro, along the same lines, when governments see science as being more important, they can link science funding to national priorities and sometimes those national priorities may lead away from some of the work that happens in basic science and lead towards applications to certain topics. What do you think is important? Is it important to have a balance? How important are the relegation of values to basic science and applied science and science for national priorities?

Dr. Alejandro Adem: I see science as a continuum or another way from the blue skies research, other way to commercialization. So all the great ideas, interventions that came from thinking and ideas and experimenting, but then they have to be mobilized for the benefit of humanity. The reason the government pays for science is because of the benefits to humanity, our population. So they both coexist. Right now we're incubating. In our pure theoretical research funding, we're incubating the ideas of tomorrow. And if you think of things like artificial intelligence, quantum, these are disruptive technologies that emerged from dedicated, many years of funding slightly esoteric pure



science research projects, which are now being mobilized world-wide and have a big impact.

Moderator: And how does the humanities and social sciences community fit in, Ted?

Dr. Ted Hewitt: Well, I think it's a question of balance, right? I mean, we have cases in history where some of the best discoveries that we have and some of the insights that gain came from open inquiries. I mean, absolutely. I don't think that Newton or Freud or others were working under government contracts to go out and do research that was going to lead to a particular solution. And on the other hand, if you remember the story of Watson's discovering the steam engine, he was actually trying to solve a problem for Scottish distilleries. So you can get knowledge and you can advance understanding in both ways, but I think whether you're talking about social sciences or engineering or health sciences, there has to be a balance. Open discovery, really, has to be the basis of new knowledge and people have to be free to follow their own path towards discovery. On the other hand, there are times at which the wellbeing of the nation, economic advance, security, really depends on governments taking the lead and then bringing researchers along to deliver, and that's true whether you're talking about research for immigrants or aerospace or vaccines. Absolutely, it has to be a bit of both.

Moderator: Michael, right within health science, you find that those competing agendas because right now people are worried uniquely about the COVID-19, but cancer is still a problem, Alzheimer's still a problem. ALS is still a problem. How do you create some kind of a balance and keep reminding the world that we don't just have one problem to solve?

Dr. Michael Strong: I think it's a terrific question. I would look right now and say that one of the things that have really worked out well over the course of the last year is that certainly in our government, the federal government has provided additional funding over and above the existent funding in our research programs. So allowing the stability of ongoing research notwithstanding the challenges of the pandemic and the impacts that it's had on the individual scientists with lab closures and such, the economics have still been there to be able to continue what both Alejandro and Ted have been talking about, that fundamental science that we need to do, interspersed with directed science, which was always part of our sort of mosaics to begin with. But what you're seeing now is the infusion of additional funds that allow us to really focus on the pandemic. So it really is, I would think, an ultimate example of doing the hybrid and the balance is maintain what we need to



be doing because that's where the next course of discoveries will come from, but also resourcing very focused research, very top down for it. So I think it's been a good balance.

Moderator: So across the sessions at this conference, people have been talking about the importance of the SDGs and the importance particularly of the environment and health. Would you like to kind of wrap up here thinking a little bit in terms of how the balance in priorities plays out against the big challenges that the world faces?

Dr. Michael Strong: Well maybe I'll take a quick crack at that. I mean that's really the core of the United Nations research roadmap for recovery, right? It speaks exactly to that, that that balance has been disrupted when you think about low and middle-income countries, when you think about the types of focused research that may have pulled away or therapies that have pulled away from interventions or treatments elsewhere. And that document really led by Canadians developing for the United Nations with a really significant consultation process for it, speaks to that in spades. So I would have to say that it's a problem and it's been highlighted as one of the inadvertent consequences of the pandemic in and of itself. We're going to have to back to these SDGs.

Moderator: Ted, would you like to say something about that?

Dr. Ted Hewitt: Well just that I couldn't agree more. In fact, the roadmap or pursuit of the SDGs, it's a perfect example of how we need to work together across borders on these global challenges. But on the other hand, we set a framework which is in fact quite broad, but allows for local research ecosystems and for funding agencies and so forth to promote the kind of research that can provide solutions or contribute to solving some of these challenges in local ways that in turn can be shared again, with others all around the world and promote the process that way. So I think these are perfect examples of how bottom up and top down mechanisms local and international, priority and novel approaches can contribute to really, really, really critical and sophisticated solutions.

Moderator: Alejandro, something to add to that.

Dr. Alejandro Adem: Well I think the key thing, is that there's great science in the sustainable development goals and scientists, engineers, they're ideologists. So if you look at the existing suite of programs that were already funded, many, many of them are already focused on issues, for example, the environment,



biodiversity, cleantech if we think about it on the engineering side. So just focusing and making it clear, the importance to humanity of reducing the carbon emissions, for example, will motivate even more, especially the early career researchers who are even more idealistic, a new breed of people who really care about society, about the world. So I'm very optimistic and it won't be something that has to be legislated, something which will happen naturally because it's a great cause and it's fantastic science, too.

Moderator:

You know great minds run along the same path, they say. And today we had three great minds and I'm so fortunate to work with three incredible colleagues. And we work together and listening to what they say, you cannot doubt that they work together and that we all work together very closely and arrive with great thought and careful work at trying to do the very best for researcher's right across Canada, but also around the world as we all work together to solving international problems.

So I'd like to thank all three of you very much for these introductory remarks. Thank you.