RE$EARCH MONEY

CONFERENCE PROCEEDINGS

BY TIM LOUGHEED

NEW BETS AND OLD FAVOURITES:
**CREATING A RECIPE FOR SUCCESS
IN THE INNOVATION ECONOMY**

*APRIL 16-17 2019
NATIONAL ARTS CENTRE
OTTAWA, ON*

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New bets and old favourites: Creating a recipe for success in the innovation economy
April 16 - 17 2019
National Arts Centre, 1 Elgin Street, Ottawa, ON, Canada

Day 1 - April 16, 2019

Welcome address — Collaboration meets Commitment
JEFFREY CRELINSTEN, Publisher, RESEARCH MONEY

"Academic institutions must want to help companies by providing talent, technology, expertise, connections, training. Governments must want to provide access to customers in government through procurement, international connections, expertise, financial support, and promotion locally, regionally, nationally, and internationally. Companies must want to mentor start-ups, provide workplace experience for students, help policy makers design better innovation support programs, work with regulators to develop globally competitive regulations and standards."

Reflecting on how much he enjoys the dozens of teleconferences that take place between organizers and participants in preparation for this annual conference, Crelinsten noted that one of the most commonly used terms during these exchanges was "collaboration". The term was not brought up in a casual way, but as a regular touchstone for an important aspect of how major initiatives in business, government, and academia proceed.

"It keeps coming up because collaboration is difficult in Canada. For one thing we're spread thinly across a vast geography, but far more important are the cultural differences. There's too little mutual understanding between business, government, and academia. The glue that motivates and sustains collaboration is a common goal."

Crelinsten characterized the people attending this conference as sharing a common goal of improving Canadian prosperity and quality of life through innovation. In simplest terms, this means creating enterprises that will improve people's lives better than anyone else. "The more successful companies we have, the better Canada will do," he said. "These companies generate export revenue, corporate taxes, jobs, employee income taxes, products, services, financing for smaller firms, pensions, philanthropy, international branding and recognition. We need these."

He cautioned that any dedication to this common goal must include taking responsibility for helping these firms to succeed. "Academic institutions must want to help companies by providing talent, technology, expertise, connections, training," he argued. "Governments must want to provide access to customers in government through procurement, international connections, expertise, financial support, and promotion locally, regionally, nationally, and internationally. Companies must want to mentor start-ups, provide workplace experience for students, help policy makers design better innovation support programs, work with regulators to develop globally competitive

regulations and standards."

Despite the fact that some of this is happening, challenges persist. There is little or no government support for thriving companies that are past their start-up stage; rigid institutional demands on academics limit their ability to work with outside partners without compromising their own career prospects; Canada's largest companies and financial institutions do not invest in Canadian small to medium size enterprises. In countries much smaller than ours, like Israel, Switzerland, Sweden, and Denmark, all of these things do happen and they are integral to placing these nations at the top of the world's prosperity index.

"That's why we hold these conferences, that's why RE$EARCH Money exists: to help connect all of you, to help you understand one another's culture — the people, the challenges, your achievements, and the impact you're making and could further make on Canada's prosperity." The many different facets of this event, and the people who make it possible, represent a showcase of what Canadian collaboration looks like and can be.

Opening Keynote: Federal Budget 2019
DAVID WATTERS, President and CEO, Global Advantage Consulting Group Inc

"Without immediate and targeted action that builds upon existing strengths, addresses key gaps and weaknesses along the innovation continuum, and drives growth, Canada will fall even further behind, putting its high quality of life at risk."
    Industry, Science, and Economic Development Canada, Building a Nation of Innovators (2019)

"If I have to select one sentence to describe the state of the world, I would say we are in a world in which global challenges are more integrated, and the responses are more and more fragmented. And, if these are not reversed, it is a recipe for disaster."
    UN Secretary-General António Guterres, World Economic Council in Davos (2019)

Key points

- Some aspects of our economic outlook look promising: strong job creation, low unemployment and low debt-to-GDP
- Some aspects of our economic outlook look worrying: slowing export growth, major political conflicts compromising trade relations, interest rates may be rising, and mounting consumer debt
- Canada must invest much more in its innovation system
- The country must build collaborative partnerships that may require major changes to public administrative structures
- We must dismantle the silos that have grown up around various programs dedicated to innovation, research and development, specifically industrial

development in trade and skills

Over a two-year span the federal government has dedicated around $69 billion to research and development, while the current budget introduces just $552 million in new funding. "You can ask yourself: is this investment really going to have much of impact on our research and development base, and will it have much of an impact from an innovation point of view in terms of our entire economy," said Watters. "I would suggest that it's rather a meagre amount of money."

As for what specifically we are investing in, there are some interesting areas such as work-integrated learning programs, initiatives to reduce student debt, and co-op or international education programs. As another way of putting that $552M R&D investment into perspective, consider that the same amount is going to resolve problems with the Phoenix pay system. This is not to take away from the virtue of correcting this long-standing problem, but rather to indicate where R&D sits in relative terms amongst government priorities.

Citing Privy Council Clerk Kevin Lynch, Watters described research as a process that turns money into knowledge, and innovation is a process that turns knowledge into money. Since the outlets for R&D activity are comparatively few — provinces do little, while the federal government does much more — the larger issue is the direction to be taken by this work. "The function of research is to acquire new knowledge," he said. "The question should always be: what new knowledge do we need as Canadians to meet the needs of our citizens?"

As for wealth creation, that is the exclusive purview of the private sector, according to Watters. As of 2016, private sector was employing 61% of the country's R&D personnel, although they are actively shedding much of this talent. If we are looking to the private sector to move Canada forward in innovation, he argued, we need to understand where these firms are heading. And as a corollary of that observation, an innovation strategy that brings new money into the economy must necessarily be an export strategy.

We are a small country in a world of heavily populated competitors, which means we need to get much better at domestic collaboration in order to represent our interests abroad. "We used to think that we were friends with everybody, we're the peacekeepers," Watters observed. "Those days are long past. We need to reflect on what are our interests and a negotiate to respond effectively to those interests."

As an example of where our interests lie, Canada's exports consist primarily of manufactured goods and commodities, (47% & 36% respectively) but fully 75% of our economy is based on services, which puts that revenue into the economy at serious risk. He pointed to a persistent and significant gap: the proportion of GDP that is dedicated to R&D (GERD), which remains far below the OECD average. Just to reach that average, we would have to spend an additional $18B annually. To match a country

like Germany, which is far above that average, we would need to spend another $32B. "This is a significant downward slide that we've been on for a long period of time. Do we have the vision, courage, and discipline to become an innovation leader?"

By some measures, Canada ranks well, but on a global innovation index that specifically addressed how well our institutions and enterprises turn innovation into output, Canada ranks 61st in the world, below countries such as Malaysia, Mongolia, and Montenegro. Unfortunately, the Canadian rhetoric surrounding this subject fails to offer any kind of realistic appraisal of what has been happening and what should be done.

One revealing example is Germany, where a 65-year-old federation of research organizations with 50,000 members offers access to pre-competitive collaborative research that any member can license for their own purposes. Watters states that there is nothing like this in Canada, nor anything even remotely approaching it in scope or ambition. Yet we have declared ourselves to be a nation of innovators, an attitude that points to underlying cultural reasons why our progress in this area is so lacking. When the Council of Canadian Academies looked for areas of research strength, they pointed to fields such as psychology and religious studies, but very little in the way of traditional disciplines of science, technology, engineering, and medicine disciplines.

This awareness extends even to the innermost circles of government, as evidenced by a paragraph Watters extracted from *Building a Nation of Innovators*, a recently released report from Industry, Science, and Economic Development Canada: "Without immediate and targeted action that builds upon existing strengths, addresses key gaps and weaknesses along the innovation continuum, and drives growth, Canada will fall even further behind, putting its high quality of life at risk."

For Watters, such a forceful conclusion found in a government document indicates just how urgently many observers are calling for a review of our lacklustre performance. He acknowledged that there are attempts to take a different tack, including the introduction of superclusters, but he added that these are in fact experiments that have yet to reveal how these complex organizations are to be managed, held accountable for the major funding behind them, and what will happen to the knowledge that they generate.

He recommended collaboration in the form of an innovation strategy integrated with an industry strategy, which in turn would be integrated with trade strategy and ultimately integrated with a skills strategy. He suggested that the steps toward such an integration could be outlined and submitted to government prior to the drafting of the 2020 budget. As for why such collaboration must be achieved, Watters cited this year's meeting of the World Economic Forum in Davos, UN Secretary-General António Guterres offered a stark assessment of the problem dogging any kind of international venture: "If I have to select one sentence to describe the state of the world, I would say we are in a world in which global challenges are more integrated, and the responses are more and more fragmented. And, if these are not reversed, it is a recipe for disaster."

IBM Emerging Technology Presentation (Orenda Solutions)
TANYA SEAJAY, Founder and CEO, Orenda Software Solutions Inc

"It's to understand whether you're going to have a bad day, or a bad life, as well as to understand whether a particular event is escalating or not. That's the sort of thing that can help you sleep at night or keep you awake."
Tanya Seajay, Orenda Software Solutions Inc.

Key points

- Orenda is one of more than 1,000 firms that IBM has incubated over the last three years
- The firm specialized in "social positioning sentiment", using algorithms to assess the expression of emotions that can determine levels of trust around key issues
- Seajay presented information provided by those algorithms around discussion of the latest federal budget

Seajay, a former journalist who did a lot of work on the Sydney Tar Ponds clean-up process, became interested in how the provincial and federal governments communicated information around this high-profile challenge, and how the public responded to those efforts. She eventually concluded that trust is the most important objective and subsequently founded Orenda with the aim of assessing trust, which is a vital commodity for government departments trying to take stock of the reaction to their policy decisions. "It's to understand whether you're going to have a bad day, or a bad life, as well as to understand whether a particular event is escalating or not," she said. "That's the sort of thing that can help you sleep at night or keep you awake."

She noted that similar systems are also employed to determine how various commercial brands are ranked in public conversations, revealing levels of support or criticism based on attitudes to any given brand. She contrasts Orenda's approach with conventional "sentiment analysis", instead calling it "social positioning sentiment", which holds more meaning for the current crop of value-driven digital natives. The distinction lies in an assessment of fleeting expressions of emotion to longer term identifiers associated with levels of trust and when and where that trust may be affected.

Seajay presented a picture of some 4,000 data points representing conversations about the budget, starting on the day it was released. This data included geographic information about where these exchanges were taking place; for example, discussions about money laundering in the housing market attracted the attention of people in the Toronto area, one of the places where this problem is occurring.

Most of the on-line exchanges around the budget dealt with understanding, interpreting, and summarizing the document. These interactions reflected some strong emotions,

including complaints by representatives of some groups who regarded themselves as being overlooked. Even minor problems such as typographic errors caused a compromise in credibility. Other aspects of the analysis considered social responsibility, and the expectations of return attached to various budget expenditures such as a commitment to extend broadband Internet access to rural areas. There were also negative social sentiments, including elements of xenophobia and racism that were likely pre-existing and prompted by aspects of the budget. Many comments expressed dissatisfaction with the Prime Minister's performance as well as a sense of disappointment associated with being overlooked, a sentiment associated with people from oil and gas producing regions.

"What we see is an opportunity in terms of being able to take this snapshot and build it into a product that is of even more value," she said.

Parallel sessions l SESSION A l FDI attraction and scaling domestic MNEs: Are they compatible?
MODERATOR: JEFFREY CRELINSTEN, The Impact Group
JOHN HAYDEN, Venture Catalyst, Northumberland CFDC
EMMANUEL KAMARIANAKIS , Director General, Investment and Innovation, Global Affairs Canada
AUDREY MASCARENHAS, President and CEO, Questor

"When we get money from outside of Canada, those investors pull us to leave. It actually hurts our economy, because other countries are coming and hand-picking our amazing companies that are about to scale."
Audrey Mascarenhas, Questor

Key Points

- Foreign direct investment is no longer an optimal way of growing Canadian firms, since this activity has evolved toward more greenfield development, where these companies build their own, entirely new plants rather than enhancing an existing operation here
- Governments partner with private firms in ways that require formal applications and no personal interactions, while private firms partner with one another in a more organic fashion, based on face-to-face meetings
- Canadian public investments focus support on start-ups and firms that have not proven themselves, at the expense of support for larger, growing enterprises that have demonstrated their success
- Many countries, particularly the United States, work hard to entice these successful enterprises to relocate within their borders

Mascarenhas introduced her clean technology company, Questor, as a quickly growing Canadian firm whose business is almost entire outside of this country. The market for

their product, which is a highly efficient water treatment system, is upward of $1 trillion globally, which gives them plenty of room to grow as they contemplate measures to scale up. Speaking as chair of one of the economic strategy tables, which offered the government recommendations for scaling up Canadian firms, Mascarenhas responded that trying to bring FDI to Canada does a disservice to some of the outstanding firms that have already been established here. "When we get money from outside of Canada, those investors pull us to leave," she said. "It actually hurts our economy, because other countries are coming and hand-picking our amazing companies that are about to scale."

Kamarianakis responded that his department's Trade Commission Service is trying to help firms such as Questor scale up through exports with a trade diversification program. Global Affairs is also expanding its technology accelerator program to help companies move into new markets and a mentorship program to connect Canadian firms with prospective partners outside of Canada. Hayden offered an example of a firm in his region that mounted an aerospace summit in California with just such help from the Trade Commissioner's office.

He added that the criteria necessary to determine support for scale up can be hard to pin down. Some companies have very precise visions for where they want to go and how they want to get there, which is balanced off against assessments within Global Affairs about the nature of the company itself and its promise for thriving at an international level. By way of facilitating this process, they are opening new regional offices to make it easier to work closely with these firms wherever they happen to be located.

Based on her own frustrating experience at failing to obtain support from government programs that might have helped her firm grow, Mascarenhas perceived a fundamental disconnect in the way criteria are defined and information collected. "When you look at the private sector, they do not fund any company based on an application form," she said. "They go and meet the CEO, they look at the team, they talk to their clients." She blamed the shortcomings of government strategies on an unconscious bias toward helping those firms that are struggling rather than enhancing the prospects of those that are already enjoying success.

Hayden suggested that his organization, Northumberland Community Futures Development Corporation, has adopted the more competitive approach that Mascarenhas was suggesting, a process that feature expert advisors creating a short list of candidate firms for funding, as opposed to asking those firms to fill out formal applications. He described the satisfying goal of backing a company that can have a major impact on the economy and society, but which would not have been able to advance without his organization's help. She agreed with that strategy and said that it should not be a crude choice between helping either the weakest or the strongest players in the market.

"We've got to start to look at our whole innovation ecosystem," she said, recalling her own experience of being wooed by the American government's SelectUSA program, which provided her with services and contacts to encourage her firm to set up shop in that country. "A lot of countries aren't ashamed of success, they support it. I think we have a culture that's embarrassed by success."

Crelinsten concurred, characterizing the Canadian attitude as a charity mentality, a laudable desire to assist those who are less successful but which can create an unhealthy dependence on public support that does not ultimately benefit anyone to a significant extent. Kamarianakis agreed, adding that the real challenge is encouraging scale-up in an environment where the role of government is constrained so as not to compete with the private sector. Canada's clear dividing lines between government and business stand in contrast to many other jurisdictions, where this separation is not so fixed.

Parallel sessions | SESSION A | Financing scale: Finding the right investment blend
MODERATOR: NEAL HILL, Vice President, Market Development, BDC Capital
CRAIG BETTS, Founder, Executive Chairman, Solace
ANDRÉE-LISE MÉTHOT, Founder and Managing Partner, Cycle Capital

"Ideas will never bring the right people around the table. Talent will bring talent around the table. It's true for the management team, it's true for the board, and it's true for the VCs around the table. The best thing that we can do is make sure we are putting the right people at the right time around the table."
Andrée-Lise Méthot, Cycle Capital

Key Points
- There are positive signs of investment to scale-up Canadian enterprises, as deals become more frequent and larger
- Canada offers much more support for R&D activities than it offers to businesses based on R&D, which is why Canadian-born ideas and IP become the foundation for successful firms based elsewhere
- Regulations around domestic trade and procurement policy remain impediments for firms trying to grow within Canada

Hill recounted his own experience at BDC watching the amount of money being put into firms over the last few years as being positive. "The flow of dollars has increased, the flow of dollars per deal has increased, and in particular the flow of dollars into very large deals has especially increased," he said, adding that BDC has played a part in this acceleration of investment.

Betts introduced his firm, Solace, as having an outstanding router design for secure data transmission in high demand settings such as air traffic control or stock exchanges. The company's initial product was expensive to develop, he noted, but once it was

refined enough to market the subsequent amount needed to expand the company's operation was considerably less. This situation contrasts with the development of pure software applications, which are easy to invent but much more expensive to establish in markets in a sustainable way. Even so, he recalls starting his business in the wake of the late 1990's dot-com bust and subsequently taking the next 10 years to acquire enough capital to bring his product to market.

Méthot introduced her firm, Cycle Capital, as based in Montreal but with operations in the United States and China that has deployed around $150 million in investments and brought along another $1.1 billion in equity, most of that in Canada but with investments from outside of Canada. Her experiences have included not just the difficulties around finding investment capital in Canada but having to confront the challenge that investors here do not realize returns that are anywhere near as large as what they could earn elsewhere. She offered the example of an innovative biotechnology firm that she could only support by bringing in American financing and administrative talent, who eventually came to dominate the operation and take it out of the country.

"As a private venture cap, that's okay," she said. "But as a Canadian, I think it's not the right thing to do. It's very difficult for them to go back and keep the research in Canada; it's an advantage to do the R&D in Canada but it's not an advantage to do business in Canada because we don't have support for that."

Méthot noted that the only Canadian beneficiaries of this biotech enterprise are the two founders, who remain in Quebec, while everything else the company does — along with the economic benefits that it will generate — is in the United States. She regarded this as yet another example of how Canada generates the outstanding ideas behind successful enterprises that eventually become owned and controlled by non-Canadians.

When asked how an R&D company like Solace got through the valley of death, Betts explained that bringing experienced Canadian business people onto his board was more important to success than any investment funds, which further convinced him that it is possible to thrive here. Méthot described how she brought the automotive giant BMW into a venture with an Ottawa firm developing components for electric vehicles, an investment that was $15 million but which could ultimately lead to a contract worth $600 million.

Having done several deals of this magnitude, she described it as "dancing with the monster", where entrepreneurs run the risk of being completely absorbed within these giant corporate interests, rather than being able to build a successful enterprise of their own. She agreed that talented people are just as important as money when growing firms interact with much larger players in this way. "Ideas will never bring the right people around the table," she said. "Talent will bring talent around the table. It's true for the management team, it's true for the board, and it's true for the VCs around the table. The best thing that we can do is make sure we are putting the right people at the right

time around the table."

When asked about what government has done or could do to facilitate the growth of companies, Méthot emphasized the ongoing importance and potential of procurement. She described her frustration at taking six months to deliver a prototype piece of technology from a plant in Quebec to a prospective market in Alberta, a process that faced dozens of bureaucratic obstacles that made it more trouble than it was worth. "If different ministries work in silos, we'll never succeed," she said, pointing to the need for new technologies to deal with major environment challenges. "We need to change that, and we don't have a lot of time, because the clock is ticking very rapidly."

Parallel sessions | SESSION B | Using all of our chefs: Increasing the potency of interdisciplinary research
MODERATOR: ROSEANN O'REILLY RUNTE, President and CEO, Canada Foundation for Innovation (CFI)
MARIE FRANQUIN , Ph.D. student, Neuroscience, McGill University; Co-President, Science & Policy Exchange
CHELSEA GABEL, Assistant Professor, Canada Research Chair in Indigenous Well-Being, Community Engagement, and Innovation, McMaster University
STEFAN LESLIE, Executive Director, Marine Environmental Observation, Prediction and Response (MEOPAR)
DISCUSSANT: TED HEWITT, President, SSHRC

"The issue of identifying appropriate policy choices is never going to be the outcome of a natural sciences process. We're going to have to bring into the discussion what's socially acceptable, what's driving community choices, how to balance the immediate consequences and costs versus the potential long-term benefits."
Stefan Leslie, MEOPAR

Key Points
- Interdisciplinary work remains a flash point for conflict within academic circles, where peer review and career assessment are still rooted in traditional categories
- Interdisciplinary research reflects a solution-oriented approach, one that lends itself to framing economic or social policy decisions
- Research-granting organizations are providing increasing amounts of support to interdisciplinary projects, especially in areas that have greater social or economic significance

Runte recalled that one of her earliest experiences with interdisciplinary research was met with harsh resistance by more traditional researchers who warned that this trend would compromise academic standards, dubbing it "cafeteria style education". She responded to that critique by pointing out that a cafeteria could offer far greater choice than a conventional eatery, as well as a more attractive price. More importantly, she

suggested that an interdisciplinary approach encouraged more direct student participation in the content of their studies. "It will be more meaningful for them and they will be more creative and gain more from the program." She then asked the panel to define what this concept meant to them.

Leslie responded that it represents an integration of approaches from different disciplines, regardless of the background of whoever is engaged in the work or the fact that disciplinary activities are being included in a single budget. Gabel referred to her own work, which regularly partners with members of First Nations. "For me, it's not so much about interdisciplinary as it is working in partnership with indigenous people," she said, adding that this is a way of helping academics emerge from the silos in which they normally operate. "It's about working with multiple partners, it's about working within multiple knowledge systems to ultimately benefit communities in the way of knowledge translation and mobilization."

Franquin took a slightly different tack by suggesting that interdisciplinary work is inspired by complex problems, which require a broader range of knowledge to solve. By way of example, she recalled a challenge she was facing in the interpretation of brain scan imagery that was ultimately addressed with the help of astrophysicists, who confront similar challenges in their own data interpretation.

Hewitt agreed: "It's really about what makes sense — or the best sense — for coming at a problem or challenge". He added that it must also be an effort that must be meaningful to the participants, as exemplified by his own interaction with engineers refining human interfaces with technology who needed to be convinced that investigators in psychology were working on much the same area.

Gabel noted that assessing interdisciplinary work can be a slow and difficult process because of the intricate relationships amongst disciplines but added that it is worth the effort because the result can be much more powerful, such as comprehensive policy recommendations on a matter of broad public importance. Hewitt responded that such assessment must confront entrenched practices such as peer review. "People tend to move toward deep disciplinary approaches," he said, arguing that it was necessary to jar people out of these established categories of thinking.

Leslie conceded that traditional measures of the value of research are valid and effective, but the real test of interdisciplinary work will be what happens to it once it leaves a formal research setting. "We want to evaluate the effectiveness of the research, but really the question is: where is the research going and has it been applied to a problem for which it was done in the first place?" he observed. "The implementation or the application of research is invariably interdisciplinary, because it is filtered through a company that may be using it to sell a product or a service, a community that may adopt it, or a government agency that may be using it as the basis for program design."

By way of example, Franquin pointed to the ethical issues that have surrounded the development of artificial intelligence systems, a problem that might be easier to handle if that component had been integrated into the original technological research undertaking. Similarly, Leslie suggested that work on climate change could benefit from an interdisciplinary strategy, which could help to resolve the conundrum of taking action on this problem. "The issue of identifying appropriate policy choices is never going to be the outcome of a natural sciences process," he said. "We're going to have to bring into the discussion what's socially acceptable, what's driving community choices, how to balance the immediate consequences and costs versus the potential long-term benefits."

Gabel offered the even more specific example of her own academic work on the way in which the federal Indian Act was preventing First Nations communities from adopting an efficient means of on-line voting technology, research that resulted in an academic publication that in turn made its way into government and subsequently became the driver of legislative revisions that are now making this change possible.

Hewitt acknowledged that much of his organization's support falls well within traditional disciplinary boundaries, but the problems that are being addressed often call for interdisciplinary work. Leslie concurred, suggesting that interdisciplinary initiatives should be framed not in opposition to traditional academic structures but in support of making research findings more effective for specific goals. "It's not just a way of doing work because we're interested in the concept of interdisciplinary," he said. "What we're looking for is effective research that's addressing social and economic challenges or opportunities."

Gabel cautioned that many of the benefits of interdisciplinary work are not trickling down to individual researchers, who still find their careers constrained by strict disciplinary definitions that remain the basis for promotion criteria and the assessment of research. Runte pointed out that CFI's consultations with the research community have confirmed an overwhelming desire to transcend disciplinary lines in order to focus on specific topics, but this perspective is coupled with a desire for the freedom to define how those topics would be approached. As part of this thinking, researchers also proposed that there should be common ground for exchanging ideas in an interdisciplinary setting, comparable to the "maker spaces" that have become common in a great deal of science and technology work. Curiously, Runte noted, some observers argued that this kind of open forum is what universities are supposed to be from one end of the campus to the other.

Hewitt indicated that even as the traditional granting councils continue to go about their business, sources of funding increasingly ignore any kind of disciplinary hierarchy. By way of example, he pointed to the New Frontiers in Research Fund, created by the Canada Research Coordinating Committee. "It is unabashedly interdisciplinary and we're going to be looking for new types of using novel methodologies," he said. "You're

going to see also within the councils moves to become more flexible with respect to how disciplinary approaches get managed." He concluded by emphasizing the need to think along interdisciplinary lines as early as possible in the conception of any kind of research project, otherwise you run the risk of ending up in the awkward position of having completed all the technical aspects of the work little or no consideration of its ethical, social, or economic consequences. Far too often these considerations come far too late in the process to make a practical difference, which can undermine the political or public acceptability of the work.

Parallel sessions l SESSION B l IP: An essential ingredient for progress
MODERATOR: ERIN CAMPBELL, Director of Patent Policy, Innovation, Science and Economic Development Canada (ISED)
SUMITRA RAJAGOPALAN, Founder and CEO, BioAstra Technologies
MAX SKUDRA, Director, Research and Government Relations, Canadian Council for Aboriginal Business (CCAB)
PAUL SNELGROVE, Director, Canadian Healthy Ocean Network (CHONe) and Associate Scientific Director, Ocean Frontier Institute

"Making the wrong choices about what you make public, what should be proprietary, and what you share — you can give away your entire value proposition with one poor decision or one poor partnership."
        Max Skudra, CCAB

Key Points
  - IP does not lend itself to a single strategy; how it should be handled can vary dramatically from one case to the next
  - IP and patents are not synonymous, reflecting degrees to which enterprises may be inclined to share different types of proprietary information
  - In some cases, making IP available to others and licensing its use is more profitable than trying to retain exclusive control
  - Canadian policy makers can help firms gain better access to IP and patent authorities, which will have a distinct economic impact

Snelgrove began by observing that because of the mandate of the network that he manages, much of the IP he handles cannot necessarily be monetized, as might be typically assumed. Instead, the work is a matter of providing training and cultivating expertise that supports other work that can be monetized. In contrast, Rajagopalan maintained that IP represents the only way a firm like hers can capture value from the work that they do. She noted that IP and patents are not necessarily synonymous, as some of the most important strategic decisions her company makes are about what knowledge should be patented for their own use and what should be left in the public domain to further collaborative work. For Skudra, with a company representing hundreds of businesses based in aboriginal communities, IP is a key aspect of

understanding how these enterprises fit into the wider innovation economy. CCAB therefore keeps tabs on how its members are using IP and what it can do for their performance in the marketplace.

Further to the notion that IP is not the same as patents, Snelgrove pointed out that much of the IP he encounters consists of data. For example, information about biologically rich sections of the ocean, which might be targeted by the fishing industry, can be restricted from widespread dissemination in order to prevent harmful commercial exploitation. This has led to a very different IP policy for the network than it might have if it were producing specific technologies that could be bought and solid as commodities. Rajagopalan expanded on this point by insisting that IP strategy is dictated by management, with an eye toward what this resource could mean for the company fortunes, rather than by patent lawyers, whose perspective would necessarily be much narrower.

In this context, IP is part-and-parcel of creating and keeping jobs in Canada, but this cannot be a one-dimensional strategy; in some cases IP and its potential are surrendered in order to further other, longer-term goals such as ensuring that a range of partners will have access to the knowledge resources for effective collaboration. Skudra agreed with making a priority out of monetizing innovation, which can be a challenge for businesses in the isolated and often extraordinary circumstances of many First Nations communities, where needs may be very different from those found in Canada's major urban centres.

Asked about what "strategy" means in the context of IP, Rajagopalan insisted that this does not imply a one-size-fits-all model, but something that must be handled on a case-by-case basis. Some products are simply not worth the trouble of creating IP, nor is there always the possibility of doing so, given that physically there are only so many molecules available for this kind of legal protection. Despite these constraints, a creative approach can nevertheless reap significant rewards, especially when it comes to specific applications; it might be advisable to abandon any rights to a key patentable item, such as a molecule or a processing technique, in order to allow others to have access to that item so that you can obtain income from licensing its use to them.

Skudra added that IP strategy is often affected by the legal and regulatory regimes around IP which, if not properly understood, could interfere with the success of that strategy. "Making the wrong choices about what you make public, what should be proprietary, and what you share — you can give away your entire value proposition with one poor decision or one poor partnership," he said. "The balancing act between sharing something to increase its value or increase its application and keeping it proprietary is a real struggle of understanding what your rights are and what law can protect you."

This difficulty is enhanced for much of Skudra's clientele, which regularly deals with

goods and services produced using traditional knowledge that are much less well defined in a legal context. Rajagopalan offered just such an example from India, whose supreme court allowed a patent on a plant traditionally used for insect control, which led other groups to remain vigilant about attempts to protect and monetize other forms of traditional scientific knowledge in a similar fashion.

With respect to government policy, Snelgrove argued that the potential of IP must be understood in order for Canada to thrive in any kind of innovation economy. Skudra concurred, suggesting that policymakers should understand just how much value IP can contribute to Canada's economic well-being and what they must do to ensure that this value helps the economy to grow. More specifically, Rajagopalan observed that Canada has done well in helping Canadian firms gain access to US patent authorities, something she would like to see extended to the equivalent European offices. When asked about what it means for IP when Canadian firms look abroad for their growth, Skudra argued that the overarching goal of the companies he works with was still to bring value back to Canada. Rajagopalan agreed with that priority but insisted that IP strategy must migrate wherever the market dictates. "Ultimately it should not be about where you come from, it should be about where you want to sell the product or service and that's where the patent should be filed and protected."

IBM Emerging Technology Presentations
VIBHU BHAN, Founder & CEO, hiwave
JOHN HAYDEN, Venture Catalyst, Northumberland Community Futures Development Corporation (CFDC)

"We answer a simple question, which is how do people actually feel about your products and services bases on what they're saying on-line, in blogs and comments that they post on Web sites, and how published media is reacting."
    Vibhu Bhan, hiwave

Key points

- hiwave is a Canadian SME that offers clients the ability to analyse large amounts of material published on-line or as comments on social media
- The firm employs sophisticated AI systems that can identify a wide range of emotions and sentiments as they are expressed in written form, which makes it possible to assess the degree to which people are being sarcastic, angry, or even misinformed
- This technology represents a way of gauging how a particular product or service is being received by the public, by examining issues defined by the project authority as well as topics that emerge from public discussions
- RE$EARCH Money asked hiwave to apply its system to assess how the 2019 federal budget was received by Canadians and Bhan outlined some of insights that emerged from its analysis

Bhan introduced his firm's major product, a technology called TAIT (talk-AI-tive) that can analyse social media content. More specifically, this system can distinguish among some 64 categories of emotional aspects within that content, such as sarcasm. The motivation for this kind of analysis revolves around the intelligence it gathers on specific topics.

"A lot of people are going on-line, whether they're consumers of public or private services, to describe their experiences," he explained. "And in those experiences they're describing contexts that are full of emotions and sentiment."

He added that such information makes it possible to help clients address fundamental aspects of how they are faring in their intended market. "We answer a simple question, which is how do people actually feel about your products and services bases on what they're saying on-line, in blogs and comments that they post on Web sites, and how published media is reacting."

By way of demonstration, hiwave employed this approach to the latest federal budget. Looking at major social networks such as Facebook, Reddit, and Twitter, as well as millions of blog posts during the two weeks after the budget was released, this survey established about 60,000 data points within published articles and another 100,000 data points across social networks, each of which represented some kind of reference to this event.

Bhan noted that the findings are continuing to evolve from day to day and are likely to continue doing so for several more weeks. The information being presented referred to categories that had been specified at the outset, such as technology superclusters and gender equality, while others fell into categories that emerged from the on-line exchanges, such as housing affordability. TAIT can also detect whether a specific organization is being mentioned and whether the on-line content represents factually incorrect information that has made its way into people's viewpoints. Above all, the results are offered in a format that resembles what one might get from a human assessor.

"Our models are able to generate their own opinions to reflect what is being said on-line," he concluded. "This is what AI thinks people are trying to express in relation to the categories of interest."

IBM Emerging Technology Presentations
JOHN HAYDEN, Venture Catalyst, Northumberland Community Futures Development Corporation (CFDC)

"Government innovation programs suffer from a lack of awareness among the people they intend to support, meaning the target client segment."
    John Hayden, Northumberland CFDC

Key points

- Qoints is an Ontario start-up firm that employs AI technology to provide competitive benchmarking for digital activation campaigns
- Among the company's specialties is psychographic profiling that identifies influencers who can promote a client's product or service to targeted markets in a highly credible way
- By automating the identification of these individuals, Qoints makes it possible to efficiently adopt a highly granular marketing strategy that might otherwise be impractical
- Speaking on behalf of the company founders, Hayden outlined the example of how Qoints could present a client with influencers to market programs announced in the 2019 federal budget, such as the funding for innovation

Hayden, who works for an organization that provides financing to start-up entrepreneurs, was speaking on behalf of the founders of Qoints, a digital marketing innovation firm that in 2015 won a CFDC competition to receive $250,000 in venture capital funding. Qoints employs AI-based software tools to obtain benchmarking data that can help its clients take stock of their markets. More specifically, these tools make it possible to analyse social media postings with the aim of assembling psychographic profiles of high-engagement influencers within those markets. Such individuals can then be recruited to pass along information directly to prospective customers in ways that are more effective and credible to those customers than traditional marketing strategies.

This approach could be of interest to many attendees in the conference audience, Hayden argued. "Government innovation programs suffer from a lack of awareness among the people they intend to support, meaning the target client segment," he suggested, adding that the goal is to engage with these individuals in a way that ensures the right support will reach the right people.

Qoints automates the identification of individuals who can communicate the details of these programs throughout the desired target audience. The numbers may be small, on the order of just a few thousand, but Hayden insisted that this method is more cost effective and far less obtrusive than a formal communication campaign. The system can also distinguish the influence of organizations from that of individuals, along with traits such as "agreeableness" that determine how much sway an influencer has over the opinions of others.

Parallel sessions | SESSION A | Growth strategies for Canadian companies – insights from Canada's winners
MODERATOR: CHRIS BROSINSKY, Director, Innovation for Defence Excellence and Security (IDEaS), Department of National Defence
NEIL DESAI, Vice-President at Magnet Forensics
AUDREY MASCARENHAS, President and CEO, Questor
RUPEN SEONI, Senior Vice President, Practice Leader, Environics Analytics

"I continue to be inspired by the entrepreneurs, the innovators, the quality of the ideas. You can get the ecosystem right but if there's no spark, it doesn't really matter. That being said, you can get a lot of sparks without any fire starting. I'm still hopeful, but I think we need to get that fire started and breath some life into it."
Neil Desai, Magnet Forensics

Key Points
- Governments appear to be more inclined to help venture capital-backed enterprises than self-financed ones, suggesting a bias against independent entrepreneurs
- Canadian incentives designed to encourage large firms to invest through collaborative R&D undertakings often do little more than provide a gateway for talent and IP to leave Canada
- Freedom to operate in the market is more advantageous than the technical superiority of a good or service
- Regulation, licensing and procurement policies can be instrumental in keeping a growing enterprise in Canada, as well driving it out

Brosinsky began by suggesting that although everyone is eager to see economic improvement, this is much harder to accomplish in practice. "This is a very complex problem," he explained. "If it were just complicated, there would be a formula to help companies scale up and everybody would be doing it."

Seoni introduced his firm, Environics Analytics, as a 2003 entry into the family of companies that is part of the 50-year old Environics Research. With about 200 people, they represent a confluence of statistics, geography, and analytical expertise applied to business problems. The resources for the enterprise, including the people and the software resources, are based in Toronto rather than overseas. Similar types of businesses had grown up in Canada in the 1980s and 1990s, but they have since been acquired and taken offshore, so Environics Analytics was created to bring these resources back into a Canadian setting. They have grown and expanded by acquiring other Canadian businesses and they are now actively moving into US markets.

Desai introduced his firm, Magnet Forensics, as a decade-old enterprise founded by a police officer who wound up working in digital forensics. He identified that the tools

being used for this purpose by police were based on a structured data model that was common in older computer networks, as opposed to the unstructured data systems that were now being much more widely used on major operations like Facebook. He then wrote some code which provided access to this unstructured data in a way that allowed investigators to extract useful information, such as dates and locations associated with particular images found on-line. He then founded Magnet as a place to develop the tools necessary to carry out this kind of analysis in the fast-changing world of digital communication apps, relying on self-financing growth to ensure that the clientele will remain diverse and in particular ensuring that it will remain accessible to law enforcement agencies.

Mascarenhas introduced her firm, Questor, as a clean technology enterprise focused on waste gas. Their patented system can remove unwanted agents from a gas stream, which is then used to produced power and water. Over the last two years their revenue has grown from $8M to $23M, while the share price has gone from $2 to $5, with a market cap of around $130M, which has led to offers from all over the world to buy the company. However, she is eager to continue growing the firm, so she is searching for the kind of capital that will allow them to take their business onto a global stage.

When asked about what kinds of measures would support growth, Desai argued that one of the most obvious drivers of growth is capital, most often in the form of venture investment or perhaps debt financing. "When we think about capital in reality, at our executive table and our board table, we have to think about all forms of capital," he said. "And I would put at the top of that list a purchase order, which still is the most fundamental, valuable form of capital you can get. I just wish we could have those discussions when we talk about the overall capital landscape."

He added that there is no reason for government to overlook the value of a purchase order as a capital tool when considering strategies for economic development. Similarly, there appears to be little support for the notion of helping to make a company profitable rather than helping those who would lend money to a company. "I find it perplexing that the federal government and the province of Ontario are willing to backstop venture investment but wouldn't backstop a self-financed executive team," he said, noting that the former is a far riskier bet than the latter.

Although the federal budget earmarked $2.3 billion for clean technology, Mascarenhas pointed out that most of this money is targeted at smaller, start-up companies. While that aim is worthwhile, she maintained that it overestimates the value to the economy that these enterprises will bring and undervalues the much larger contribution that will be made by more mature firms. "You've got to take a look at the whole ecosystem," she said. "When we shy away from investing in our success stories, you abandon them for the rest of the world to pick up — you're subsidizing the rest of the world's GDP."

Desai suggested that it is easy to blame entrepreneurs whose ventures fail to grow, but

he suggested that this behaviour is formally promoted by government policies. For example, a successful company that receives tax benefits for research must stop doing so once it become profitable, while a failing enterprise will continue to receive this assistance. Similarly, support from the National Research Council's Industrial Reseach Assistance Program ends once a company has 500 employees, which creates an incentive to remain small. "If we actually want scale, we can't just look at the culture, we have to address the structures," he concluded.

Seoni had previously written about the need for the government to employ big data in order to solve some of its own administrative challenges as well as improve economic performance, but procurement policies make it difficult to partner with innovative enterprises that would help meet these goals. "I see the imagination of the people I speak with in government, but there's this gap," he said. "Right now we have to get this in front of the right person at the right level of seniority who will somehow make an exception and make it happen. That's not the way the way to work with business — by exhausting the business that's trying to work with you."

Mascarenhas recalled how she was approached by state regulators in Colorado, who were so impressed by the efficiency of her company's equipment that they were mandating its performance as their standard. However, to ensure that this would be possible, they asked her to invest in some local operations to make this equipment available. That was in 2016 and her investment there has more than doubled since then. She regarded this as an opportunity to witness how government can examine a problem and set the stage for a solution that has allowed a company like hers to thrive.

Her account illustrated the importance of what Desai called the "intangible sector", where the value of ideas and expertise are more critical to economic development than manufacturing the actual hardware. Governments can play a prominent role in this space through their power over regulations and standards, as the Colorado regulators demonstrated.

In light of that experience, Mascarenhas emphasized how difficult it can be to keep a growing, profitable company in Canada. She has been specifically approached by a representative of the US Department of Commerce, who shared a formal assessment that her company was going to be successful and wanted to make it possible for that success to happen in the United States. "That relationship still exists today," she said. "We don't have anything like that at all in Canada. We're very in love with the early stage, when it's fun and it's sexy. The later stage — when you're successful and you've got a nice strong management team — we leave these companies solely unsupported."

Desai suggested that Canada has been peddling an outdated technology vision from the 1990s, which touts the country as a low-cost jurisdiction, supported by detailed comparisons about how benefits such as public health care and public education make the country internationally competitive. While that may be true, he noted that this pitch

overlooked the larger cost to our society of building an economy in this way. Further to his earlier comment about intangibles such as ideas and expertise, these are produced here but effectively exported in the form of intellectual property that is acquired by foreign interests, who may then sell it back to us at a profit.

"We actually have negative spillovers when someone 'invests in Canada', and we have an agency set up here in Ottawa to do this kind of work," he observed. "At the same time, companies that are starting to thrive in Canada will start looking elsewhere, because there's pull for companies like that in the global economy."

Mascarenhas explained how this strategy has become even more sophisticated, as major multinational technology firms such as Apple and Google no longer bother to mount recruiting campaigns in Canada, but instead target universities directly. The Canadian government celebrates and financially encourages these companies to foster programs in a rich talent pool like the University of Waterloo, so that they can identify the best and the brightest for their own purposes. "We don't even realize it, but we're paying somebody to set up shop, and for a minimum investment of sponsorship they steal all of our talent," she said.

When asked about whether growing businesses should tailor their activities to reflect government policy in whatever market they serve, Desai responded that the question should be turned around, since a growing enterprise should be in a position to ultimately become a policy-setting force. "There's this assumption that the best technology wins and that's probably the largest fallacy," he said, suggesting that what drives success is the ability to leverage standards, patents, or IP to provide your enterprise with the most freedom to operate. "Those who control their freedom to operate usually win, even with inferior technology."

In this way, a great deal of technology is brought to market but subsequently surrendered to others who have retained the control over the intangible aspects of that technology that would allow it to operate in the market and gives them the power to license it back to the original inventors at a profit. In the area of clean technology, for example, Mascarenhas pointed to the freedom to operate that should be provided by regulations around carbon. Unfortunately, across Canada these regulations have been deployed in ways that have been delayed and remain confusing. In contrast, places like Mexico have put in place clear, sweeping rules on matters such as methane, which makes the way forward that much easier for companies in those markets. "It actually hurts innovators when we don't have great regulation," she said. "It impacts adoption. And that's why less than 2% of my revenue is now within Canada."

In light of how well some other places are tackling these matters, Mascarenhas pointed to Select USA, which focuses foreign direct investment. A Canadian version of this program should be straightforward to establish, she insisted, and the alternative should be unacceptable: an external pull of scale-up capital that results in a brain drain of

entrepreneurs. Rather than trying to internationally showcase small players who cannot meet the needs of international markets, the federal government should support larger players who can make a major impact abroad while still staying in Canada.

Desai was even more blunt: "Prosperity as a country is everyone's purview. You have to find ways to structurally incentivize everyone in our public sector to think about it that way." His firm has been unable to get its software licensed for military grade use by working through the Canadian government and cannot even obtain feedback as to why this cannot be done. This dramatically hinders their ability to export their product, since that qualification represents a major international requirement, without which they must continually apply for export licenses each and every time they make a sale.

The session did wind up on an optimistic note, as the panelists recounted signs that people in government and business are trying to come up with better strategies, along with a willingness to improve collaboration in areas such as procurement. Nevertheless, Desai reiterated how difficult it can be to harbour optimism. "I continue to be inspired by the entrepreneurs, the innovators, the quality of the ideas," he said. "You can get the ecosystem right but if there's no spark, it doesn't really matter. That being said, you can get a lot of sparks without any fire starting. I'm still hopeful, but I think we need to get that fire started and breath some life into it."

Parallel sessions | SESSION A | Re-thinking Regulation – Adding agility to Canada's system
MODERATOR: COLLEEN BARNES, Associate Vice President Policy and Programs, Canada Food Inspection Agency
KAREN HAMBERG, Vice-Present, Government Relations, Westport
TINA GREEN, ADM, Health Canada
CORINNE POHLMANN, Senior Vice President, National Affairs and Partnerships, CFIB
MICHAEL PRESLEY, Director, Centre for Public Management and Policy (Odell House) at the University of Ottawa

"You'd scope a regulatory problem, the company and the regulator meet, you agree on a set of outcomes and certainty for investment, for timing a stage-gated process. Then take the outcomes to try to learn how to accelerate the outcome more broadly. Someone needs to go first. We've offered to go first."
   Karen Hamberg, Westport

Key Points
- Regulations can stifle economic growth, but as "innovative" changes to financial rules demonstrated in 2008, they can also encourage risky behaviour that leads to catastrophe
- Industry must be willing to invest the time and energy into helping governments optimize regulatory systems based on the current state of any given industry
- The value of such effort was demonstrated by the recommendations offered in

the 2018 ISED Economic Strategy Tables
- Government, in turn, must invite and remain open to this information from industry

Hamberg introduced her company, Westport, as one of just a handful of clean technology firms that are now operating at scale by any measure. Headquartered in Vancouver, with $280M in revenue last year, 1,200 employees in 11 locations and selling in 70 countries, she indicated that the firm has found outstanding support from both the federal government and the British Columbia government since 1989. However, the firm has run into significant regulatory roadblocks when it comes to deploying its made-in-Canada technology in Canada. This despite having what might appear to be all the qualifications and resources to meet any bureaucratic requirement, as it has demonstrated in other jurisdictions around the world.

She encouraged the audience to review the 2018 ISED Economic Strategy Tables report to which she contributed, *The Innovation and Competitiveness Imperative, Seizing Opportunities for Growth*. It examined a number of key areas for economic development, including a chapter on clean technology, and identifies six signature initiatives intended to improve Canada's global competitiveness and attract international investment. She was cheered, then, when just a couple of months later the federal fall economic statement included a number of recommendations from this report. Hamburg also indicated that her experience with the Economic Strategy Tables left her optimistic that the business community does want to contribute to an innovation strategy, despite media coverage suggesting that executives in the private sector find the process of working with government to be a frustrating and cumbersome exercise.

Pohlmann introduced her organization, the Canadian Federation of Independent Business, as a non-profit, non-partisan body representing some 110,000 small- and medium-size independently owned enterprises across Canada. Her members regularly rank regulation as being one of the most significant impediments to competitiveness and growth. Although it has taken a while to muster political will on this topic, that is now changing and there is a desire within government to come to terms with the implications that regulations have for business decisions that are being made every day.

CFIB has costed out the impact of regulation as being on the order of $37B annually, much of it directed to upholding health, safety, and environmental standards, while about a third consists of red tape, rules that are redundant and could be eliminated. This has been a slow, daunting process, but she identified signs of progress like the one-to-one rule, which specifies that a new regulation can only be put in place if another one is taken away.

Green stated that the Economic Strategy Tables report was well received in government, opening the door to the potential of further work on regulatory road maps. From a Health Canada perspective, this means taking the form of revised rules on

activities such as clinical trials to bring the country into line with others around the world or timelines around drug approvals.

Presley explained that he left his post in the Treasury Board Secretariat about five years ago to join the University of Ottawa and create a program to help people exchange innovative practices in public policy. As departments move forward in different and sometimes novel areas, such as the regulation of marijuana, they can then benefit from one another's experience.

"We look at regulatory management as a continuum, and that continuum idea is something a lot of governments don't get when they're doing regulatory reform," he noted, adding that he has been pleased by the current government's willingness to adopt that perspective. The sweep and power of regulations cannot be underestimated, but their implementation is no less important than their design. This has been precisely the challenge in as large and diverse a country as Canada, and he emphasized the need for regular input from industry, which is essential to tailoring regulations as conditions in the business community change.

"Every department and agency runs a suite of regulations," he said. "They need to have ongoing mechanisms for feedback. It requires an investment from those who are regulated, to help us understand the changes that are taking place in the industry so that we can make our systems more agile, more responsive, more predictable, and more transparent."

Pohlmann agreed that the implementation of regulations poses one of the greatest challenges, but she added that the attendant processes around complying with regulations are often created to suit larger companies. CFIB members, which are much smaller, many of the new outcome-based regulations must be approached in a different way. "So many small companies just want to know what they need to do to be compliant — they just need to have examples of compliance," she said, acknowledging that government departments are getting better at providing this kind of customer service.

Hamburg added that the role of industry does require further clarification, a role that essentially calls for making partners out of participating companies on the way to shaping regulations and how they are applied. And as partners, she maintained, these firms should be prepared to bring hard information about their business into these exchanges, rather than simply presenting superficial accounts that may be little better than marketing material.

Barnes suggested that this kind of interaction could be understood as the means to make Canada's regulatory environment a source of competitive advantage, which prompted Presley to offer the case of the financial services sector. After the US introduced some highly innovative regulations in this area, the ensuing risky and damaging behaviour caused worldwide economic hardship that continues today, a

painful reminder of the need for careful, measured approaches in any regulatory undertaking.

"We could learn a lot from other jurisdictions," he said. "This is a business where we have to be comparing all the time with the best in class. You don't always want to be the first innovator because things could turn out very badly. But it is important to know who they are and engage them on an ongoing basis."

Green concurred that it can be easy to go too far with innovative regulation and working with international partners can minimize that risk. Pohlmann pointed out that there is an equivalent need to foster domestic interactions, so that provincial and federal regulatory frameworks are not at odds with one another. Hamburg indicated that her company has acquired the maturity to make stronger contributions at both the domestic and international level and has offered some specific suggestions to ISED as to how this might be put into practice.

"You'd scope a regulatory problem, the company and the regulator meet, you agree on a set of outcomes and certainty for investment, for timing, a stage-gated process," she said. "Then take the outcomes to try to learn how to accelerate the outcome more broadly. Someone needs to go first. We've offered to go first."

When asked about how regulation can be used as a policy tool to develop and grow companies, Presley noted that this would be a useful strategy to help firms understand and manage risk, a concept that remains abstract for many people who have never been in a position to carry out formal risk assessments. He added that the experience of interacting with government on regulatory matters could be a useful learning exercise for many newer, smaller firms that have not had that opportunity before, after which they will be in a position to work more closely with government in other areas as well. It is far too easy for bureaucrats to work more closely with companies that are already familiar with this kind of interaction, when in fact there should be a push to help out those entrepreneurs who are unfamiliar with the process but will benefit from it.

Asked about the distinction between setting regulations and enforcing them, Green responded that Canada does need to strengthen its enforcement mechanisms. This is evidenced by the fact that a common set of players regularly contravene regulations, which indicated to her the need to sharpen regulations to focus on the areas these firms are exploiting. Presley suggested that most of what is being enforced is simple compliance, the level of enforcement that is required to ensure public safety. Nevertheless, he acknowledged that regulators must sometimes take a different approach with some major enterprises because they literally are too big to let fail because of non-compliance.

Parallel sessions | SESSION B | Digital strategies for a successful tomorrow
MODERATOR: OLIVIA NEAL, Executive Director for Digital Change, Treasury Board of Canada Secretariat
ANIL ARORA, Chief Statistician of Canada
SASHA HOBBS, Chief Operating Officer, First Nations Technology Council (FNTC)
DUGAN O'NEIL, Associate Vice President, Research, and Professor of Physics, Simon Fraser University
BEN SANDERS, CEO, Proof

"The idea of digital is now far beyond a strategy; it's a fundamental tactic embedded in every industry."
Ben Sanders, CEO, Proof

Key Points
- The ability to collect and use data is driving the growth of businesses and the emergence of entirely new business sectors
- The role and impact of data within any organization will be determined by the expertise that accompanies it
- Effective partnerships can bring together different types of data for powerful insights into complex social or economic problems that can guide public policy

Arora introduced Statistics Canada as an agency dedicated to helping Canadians with all kinds of decision making, which means the organization has become engrossed in measuring different aspects of the digital economy. "There's a fairly substantive change in the way data are driving new business models and platforms," he said, which affects the impact that data is having on society. Nor does the agency regard itself just as a provider of data, but also as a source of expertise providing stewardship of data. Working on the leading edge of contemporary data processing methods, he and his colleagues have built innovative partnerships with organizations across the country, which has also put them at the forefront of issues around trust and privacy.

Sanders introduced Proof as a firm founded by the intersection of his own interests in government and technology, which reflects his career background with Silicon Valley ventures and a personal interest in government affairs that led him to serve as a candidate in the last federal election. Proof is intended to provide digital systems that can help governments streamline their approvals processes for various public programs.

Hobbs introduced the FNTC as an example of an organization that is scaling up, which provides digital skills to educate and promote innovators within aboriginal communities across British Columbia. There is also a strategic initiative division that can tackle specific challenges, such as connectivity problems facing people in more isolated areas.

O'Neil introduced several facets of the relationship between academia and data, including an emphasis on training, which is reflected not just in the manner in which

much of the curriculum is presented to students, but also in the content of that curriculum. Research institutions also produce huge amounts of data, which pose a growing challenge to find ways of storing and processing it. Academic institutions also seek out partners like Statistics Canada who can help them shape public policies that affect all Canadians, as well as new methodologies that are bringing digital technology into new spheres such as the humanities.

With specific respect to partnerships, Arora suggested that digital tool kits are starting to become more accessible and standardized, along with the ability to build digital relationships between institutions for shared goals. Similarly, these partnerships will rely on a common sense of values, which builds the trust necessary to move forward. "There are some common themes, but it's also a question of adapting them to our unique mandates," he suggested. O'Neil added that digital technologies make it possible to bring new and more diverse communities into mainstream discussions and decision-making processes.

Sanders described his own perspective on this subject in somewhat different terms. "When I think of partnerships, I think of teams collaborating better together, often outside of their existing silos," he said, referring to a frustration with government that led him to focus on the public sector. "Ultimately we believe that we can't change this in a significant way without other companies contributing as well." In this way, he has transplanted insights he learned in Silicon Valley to establishing a maker space occupying a former grocery store in the Yukon.

O'Neil argued that the results of such ventures can be assessed with some traditional metrics, although much of the impact is more difficult to quantify, such as changes to policy. As these metrics become part of decision-making, institutions become better data-informed, a cyclical process that reinforces new approaches to governance and ultimately transcends the input that used to come from traditionally siloed departments. Arora observed that the value of data contained within various organizations is often overlooked in traditional accounting practices, something that Statistics Canada is now trying to incorporate into its own assessments. "There was a time when we couldn't measure human capital or other abstract constructs that we today take for granted and are used for indicators such as inflation," he said. "Those are the kinds of tools that we're bringing to bear."

By way of concrete example, Arora outlined a project conducted in Surrey, BC, that collected information about people who had died as a result of opioid overdoses. The resulting data made it possible to create surprisingly detailed portraits of these individuals, along with the various interactions they had with various public institutions such as a fire department or the justice system. More significantly, this intricate picture showed points at which different types of interventions might have been able to prevent such a tragic outcome, the kind of insight that can change public policy.

"This all starts with data and here's something that we can work backwards," he said. "Now when we look at the lessons and how to apply them forward, you can start to quantify the lives that you potentially save and determine the value of a life."

Neal cautioned that working with such data means developing and maintaining a sense of trust with the people who are sharing this information. Sanders pointed to the loss of public trust in all manner of institutions, from religion to government to technology firms, a loss that could be addressed by keeping lines of communication open.

"Improving customer service, from the standpoint of government, is one of the best things we can do to rebuild that trust," he insisted. "This is a fundamental tenet for every other technology-based service in our lives. The idea of digital is now far beyond a strategy, it's a fundamental tactic embedded in every industry."

Simon Fraser University took part in the Surrey project introduced by Arora, and O'Neil credited the trusted profile of Statistics Canada as a key factor in making it possible to build an intricate array of successful relationships with organizations throughout that community, such as the fire department, hospitals, and homeless shelters. "It's not about the great statistical skills that people in StatsCan have," he said. "It's really about the trust that the agency has amongst the various groups involved that hold this data."

Parallel sessions l SESSION B l The place of policy in enforcing EDI practices
MODERATOR: KELLY MCGAHEY, Senior Manager of Stakeholder Relations, Hire Immigrants Ottawa
DOMINIQUE BÉRUBÉ, Vice-president, Research Programs, SSHRC
JANE NGOBIA, Senior Advisor, to the President, Equity, Diversity and Inclusive Communities, Sheridan College
MAHADEO SUKHAI, Head of Research and Chief Accessibility Officer, CNIB

"We have organizations where people buy into the rationale for doing diversity and inclusion work, they're just not that good at it."
Kelly McGahey, Hire Immigrants Ottawa

Key Points
  • For different reasons, many employers are becoming as concerned about equity, diversity, and inclusion priorities as most employees
  • Diversity and inclusion are not identical; simply counting people in respective categories does not tell you how they got there
  • Even in organizations that have ostensibly adopted an EDI policy, actual practices suffer when behaviour is not discussed, which makes the case for ongoing, transparent discussion of this topic

Ngobia introduced herself as an individual bringing her perspective on institutional approaches to equity and inclusion, based on her 15 years of developing policies in this

area for postsecondary institutions. Bérubé described her own "coming of age" on EDI issues throughout her career, which has balanced the roles of family and academic responsibilities and eventually led her to distinguish between those who face straightforward, self-imposed challenges and others who must deal with systemic barriers that hold them back. Sukhai introduced himself as a former post-doctoral researcher and academic health care worker before he came to the CNIB, which gives him a well-developed perspective on policy frameworks in post-secondary institutions. More specifically, he has a sense of accessibility in terms of "universal design", which accommodates individuals of any ability, and which can be applied to policy as well.

McGahey recounted that as part of her work helping immigrants find work in Canada, she has been regularly approached by employers who worry about the rise of anti-immigrant or white supremist attitudes and what it might mean for their businesses. "The conversations that we're having about these things are really evolving with employers, which is an interesting opportunity but very concerning that we need to be as worried about these things as we are," she said.

As an example of what happens when policy changes encounter an established initiative, Bérubé described a conflict within the Canada Research Chairs program, which began in 2000 and by 2006 had received eight complaints from women citing discrimination in the way chairs were being assigned. Their case was supported by the fact that at the time only about 15% of the existing chairs had been allocated to women, something that was not regarded as a low success rate but a bias in the way universities were picking candidates for these posts. Attempts to resolve this problem over the next few years proved to be unsatisfactory for all concerned. This prompted a new set of administrative measures for the program, which demanded equity action plans from each of the participating institutions and ultimately levied the threat of dismissing from competition any institution that failed to offer such a plan. Consequently, the latest round of chair appointments actually consisted of more women than men, along with increases in the presence of minorities. She cited University of Toronto as an outstanding example of the success around this strategy and how well it satisfied the academic community.

According to Sukhai, how change is being assessed is important because what is being measured becomes the basis of policy. He therefore asked whether diversity and inclusion were synonymous, i.e. whether a diversified institution is necessarily inclusive. Simply measuring the number of individuals found within designated groups does not reveal everything about the background and experience of those individuals, which can have a large bearing on how and why they came to be part of those groups. Ngobia noted that when organizations discover there is more that needs to be done, they often adopt specific interventions to ensure greater diversity. That step reveals flaws in the original program, which should be amended so that further intervention would no longer be necessary. She also observed that equity has remained an act of good will as opposed to something integral to the structure of most organizations.

"Equity depends on the priorities of the president of the day or the administration of the day," she said. "It has not become a tool that galvanizes the work that we do and therefore an indispensable component of our institutions." Sukhai went further, suggesting that equity is aspirational and should be subject to revision if a particular approach turns out to be unsuccessful. By way of example, he pointed to the finance software used by the CNIB, which is not accessible to the organization's users with limited vision but perhaps could be made so by negotiating with the company responsible for this product.

Bérubé concluded that the challenges around equity become worse when it is not discussed at all, which led her to maintain that the best way of promoting its principles is to make sure that they remain the topic of formal exchanges within the organization. Inappropriate comments in business meetings are often ignored, which amounts to a form of tolerance which then goes on to render the organization's culture as one in which this behaviour is accepted. If instead these comments were called out as soon as they occur, it would signal the relevance of equity in the day-to-day life of the organization and shape policy accordingly.

Ngobia said equity initiatives can be polarizing, especially when some members of the organization believe these initiatives have nothing to do with them. She took this to be the result of how equity discussions are often framed so that individuals who would not themselves have a need for this kind of change — able-bodied, straight, white men, for example — do not feel they have anything to contribute and the result will not affect them directly.

In this way, an inherent friction can arise while trying to change fundamental features of workplace culture and at the same time trying to invent new policy tools that will facilitate EDI principles. Sukhai turned the question around and argued that tenets of EDI should come before other aspects of administration, and the impact of this strategy can be seen in organizations that have adopted it whole-heartedly. Bérubé responded that there is a solid business case to be made for embracing equity, including tangible growth in revenue.

"Even in organizations where the case has been made really strongly, we continue to struggle in terms of making actual change," she said. "We have organizations where people buy into the rationale for doing diversity and inclusion work, they're just not that good at it."

Plenary Panel – Talent and Skills: Using the full spice rack
MODERATOR: BENOIT TESSIER, Director General of Skills Policy and Economic Strategy Tables at Innovation, Science and Economic Development (ISED)
RHONDA BARNET, President & Chief Operating Officer, AVIT Manufacturing
CHADI ELKADRI, Chief Innovation Officer, SOTI Research and Innovation Lab
ELISHA RAM, Associate ADM, Skills and Employment Branch, Employment and Social Development Canada (ESDC)
AJ TIBANDO, Executive Director, Palette Inc.

"You can't continue to talk about a skills shortage or a skills gap without being open to new sources of skills and talent pools."
> *A.J. Tibando, Palette Inc.*

Key points
- Technological disruption is often celebrated as progress in some business circles, but in people's personal lives disruption raises mostly negative connotations
- Disruption in some traditional sectors, such as retail sales, could free up talent that is in short supply in newer, growing sectors like technology firms, where the same skill set is required
- Lifelong training for a variety of occupations throughout the course of one's career may not involve a complete re-education but instead shorter stints of specialized training to move from one field into another
- Desirable qualities from an elementary, high school, and even university graduate will not be a defined set of vocational skills, but instead a suite of basic competencies along with the flexibility and resilience to continue adapting these abilities in response to market needs

Tibando introduced her firm, Palette, a non-profit launched earlier this year to tackle the challenge of up-skilling the work force. The firm's two objectives are helping fast-growing companies find the talent that they need and helping mid-career workers who are experiencing disruption in their current industries by moving them into these fast-growing sectors. Many of these positions are not necessarily the most technical jobs in an industry, but rather more conventional management and administration jobs that are conducted within a novel setting such as advanced technology.

Barnet introduced herself as the first female chair of the trade association Canadian Manufacturers and Exporters, where she has been working to ensure that there is more female representation in the labour force. She is also highly active in other aspects of the manufacturing sector, including the supercluster dedicated to that theme.

Ram introduced the mandate of ESDC as helping Canadians join and stay in the labour market by providing them with information and training opportunities. He argued that the key to achieving this mandate is talking with individuals and understanding the specific needs of employees and employers.

Tessier asked the panelists to comment on a familiar "blame game" that seeks to assign responsibility for mis-matches of skills and talent, such as when governments criticize industry for not investing in workforce training, while industry blames educational institutions for providing students with inappropriate background. He assigned each panelist a role as a representative of one of those respective sectors and asked them what they would demand from one another with an economic system to ensure the best use of human resources.

Barnet, speaking as a representative of the industry component of this economic model, suggested that she would find ways to tailor the activity of the other components, such as volunteering to sit on a program advisory council or assign staff members to become involved in educational institutions' curriculum development initiatives. She would also build direct linkages within the community of prospective employees through events such as robotics competitions and mentoring to young people in order to provide them with necessary role models.

Tibando, speaking as a skills/training provider, suggested that she would ask for insight from industry to determine what success looks like from the employer's perspective. With a specific emphasis on helping individuals make mid-career moves, she would like to cultivate an openness to hiring people with an established skill base from another sector, but whose skills are transferrable into a new environment. "You can't continue to talk about a skills shortage or a skills gap without being open to new sources of skills and talent pools," she said, adding that she would expect both government and industry to begin operating outside of a comfort zone where they only looked to support people in ways that had worked in the past, rather than considering fresh options.

Ram, speaking as a representative of government, indicated that setting regulations around labour would be a priority. By identifying what industry must do to serve its own best interest, he suggested, government could create incentives around this behaviour. This process would also mean collaborating with industry and academia to determine what that behaviour should be, as well as nurturing an openness to cooperating in this initiative.

Tibando returned to the subject of education, pointing to Canada's outstanding infrastructure for cultivating skilled expertise in a wide range of fields. She suggested that the demand and supply sides of the employment equation could be better balanced through efforts of a company like hers, which can determine just what skills are available and where they are most needed.

Barnet responded that more was still required of academic institutions, so that they think along the same lines as industry about the future of employment. "Young kids need to grow up with technology wherever they are in academic institutions, because by the time they're in my factory it's going to be a completely digital factory," she said, offering

the example of making work with 3D printers a standard part of curricula, rather than extra-curricular as it is now. "We have to think of ways to fast-track people to make them more job-ready, and not once-and-you're done. We need to rethink the way we educate people."

Ram concurred, arguing that the "half-life" of skills is less than what it was even a few years go, which means the traditional linear path of education — leading to some kind of formal qualification that would suffice for a career — is not sufficient in this environment. Instead, we must instill a form of resilience in educated individuals.

"We need to ensure that when people come out of whatever system we have, they have the flexibility and essential competencies that will allow them to adjust to whatever comes at them in the course of their careers," he said. "In some cases maybe they just need a three-month refresher, in other cases an entire sector might disappear and they're going to have to take whatever skills they've got and transfer it to something else."

Nor can we expect people at a relatively advanced stage in life, with families and other personal obligations, to be able to take years to confront such disruption and make that transition. Tibando extended this point by making a further distinction between the broad, foundational activity of education and the very focused work of acquiring specific skills. There may be no need to upend the traditional academic infrastructure to ensure resilience, she argued, while delivering skills can be done much more nimbly and quickly.

When asked if all employers are as enthusiastic about these initiatives as she is, Barnet replied there were many with this perspective, but they need to let the world know that they are adopting that stance. She outlined an opportunity to do just that with members of the millennial generation who make up so much of her own workforce and who embrace a similar attitude about making the world a better place through their work. Government is also well poised to help in these efforts, such as promoting the role of women in manufacturing, which amplifies a message from within industry. More importantly, various analyses have revealed a distinct economic return on this investment. "It's not only the right thing to do, it's actually a good business decision," she concluded.

Tibando noted that she is looking forward to an event where her firm will try to place sales people from the traditional retail sector in technology enterprises, which have a reputation for hiring only from within their own distinctive corporate culture. "Two challenges are coming together at the same time, where you're starting to see traditional industries being disrupted, and we really need to figure out what to do with these workers who are going to be losing their jobs," she said. "At the same time, we're seeing high growth industries hitting the wall in terms of their talent system and looking to try something new."

Barnet pointed to her organization's major study on untapped labour in Canada, which demonstrated from an employer's perspective how diversity and inclusion programs could increase the available talent pool. Similarly, they have made a priority out of displaying the work force for young people, which for manufacturers means opening up operations for this new generation to see for themselves. "They need to do more than just the Grade 9 day of shadowing," she said. "They really need to show what the workplace looks like and what a lot of different workplaces look like." In Manitoba, for example, these programs targeted the aboriginal population as a way of helping underrepresented groups find this kind of employment. Similarly, veterans retire relatively early but highly skilled, and this is another group whose talent could be brought into other areas of the economy.

Ram responded to that point by underscoring how challenging this process could be, even though the goal of simply employing these people is very simple and clear. The social and cultural transitions that will be necessary to help them transition into different parts of the work force could be profound. "We can't assume there is any one-size-fits-all approach," he insisted. He also advocated that governments make partners out of companies that have successfully scaled up, as their insights into an evolving labour force will point the way to best practices.

When asked about the role of innovation in this regard, Barnet responded that it is not helpful to tout that aspect, as the notion can instill fear in an older work force as well as unions that are suspicious of technology being used to replace workers. Tibando agreed, noting that the concept of disruption is seen positively when it is cast as part of technological progress, but it raises negative connotations in the specific context of an individual's life. In order to address the fears that can accompany such change, people must be able to see their role with respect to new technology and how it will enable them to live their lives. Ram stressed that there is no real choice about innovation, which is built into natural evolution as well as the evolution of our economic systems. It can be easy to portray such change as disruptive in negative terms, but if cast in a positive, promising light it can be much more inspirational.

When asked whether these kinds of measures can be implemented quickly enough to compete with the discontent that is driving reactionary political populism, Ram suggested that Canada was more fortunate than most countries in this regard. However, he cautioned that we cannot take our good fortune for granted, building on our natural advantages rather than simply relying on them. Tibando expressed her own confidence that progress could be swift, since most of the components necessary for change are already in place, they simply need to be brought together as her organization is doing.

At the same time, she acknowledged that other observers have suggested we must work within the constraints of the political and administrative structures that we already have, such as particular provincial-federal arrangements of power. She agreed that

educational organizations like colleges are well placed to overcome some of these limitations, perhaps moving quickly enough to operate at the same pace that various industries are changing. Ram observed that doing so would require a common language, so that whenever any party is speaking about "skills", it means the same to others who are engaged in the process.

Fireside Chat - Getting engaged: How governments can connect with startups
MODERATOR: DAN SINAI, Senior Executive, IBM Canada
VIBHU BHAN, Founder & CEO, hiwave
TANYA SEAJAY, Founder and CEO, Orenda Software Solutions Inc

"Control just incapacitates people, and empowerment energizes them."
    Doug Barber, McMaster University

Key Points
- Inability to find ready markets in Canada, particularly within government circles, drives many start-ups out of the country as a matter of survival
- Streamlined decision-making processes within government could provide individuals with enough authority to direct procurement, so that it is not a frustrating, protracted process for applicants
- Innovation initiatives launched by government often accomplish little more than moving around resources that are already there, rather than introducing outsiders and their projects as a way of building partnerships

This session was dedicated to getting the personal perspectives of two entrepreneurs on how they became involved with government. Sinai indicated that while government has done much to help SMEs and start-ups, challenges around procurement continue to surface and often drive Canadian firms into foreign markets for growth or simple survival.

Bhan highlighted the significance of gaining a government standard validation, which is essential to obtaining contracts but can be highly elusive. Seajay said that it is easy to characterize government as wasting money by investing it in the wrong places, but having worked within the procurement process, she has come to respect how careful and thorough that process actually is. If companies were brought into the process more easily, however, they could help to streamline it.

Sinai pointed out that "government" represents a generic category, but the challenge runs across a broad spectrum of different levels of governments, as well as public institutions like universities or hospitals, all of which have their own particular procurement policies that can make life difficult for prospective partners. "Is there something missing from the support system?" he asked. "For instance, governments are launching these innovation labs, but what they end up doing is that they only use their own staff and work on projects for internal people, and they're scared to bring outside

people in."

Bhan was not surprised by Sinai's observation about innovation labs, since entry into these organizations simply represents another type of procurement process and the same challenges apply. Alternatively, Seajay suggested that setting aside dedicated funding, for which small businesses can compete, could be a promising way of bringing these firms into the procurement process.

Darren Lawless, the Dean of Applied Research and Innovation at Humber College, synopsized the problem as being the simple task of making a sale. He therefore suggested creating a dedicated marketplace for these kinds of opportunities, where government could try out innovative technologies with minimal risk. Bhan concurred with the idea of framing early adoption within government, especially since the public sector represents the country's largest assortment of services that would lend themselves to innovation that could benefit most of the population.

Doug Barber, of McMaster University suggested that it comes down to whether administrators are capable of living with empowerment as opposed to control. "Control just incapacitates people, and empowerment energizes them," he said, recalling a transformation of medical education that did not subject students to classes but put them in front of actual patients in order to make diagnoses and recommendations for treatment. "That whole approach completely changed medical schools in Canada and beyond." He suggested that start-ups must be empowered in this way, but a bureaucratic culture that imposes control over innovation will not allow these enterprises to thrive in the same way.

Seajay responded that the people most in need of empowerment are those who should be able to make decisions about procurement quickly and definitively, as opposed to the painfully slow process that discourages many start-ups from even becoming involved in this process. This prompted Ben Sanders, whose company Proof is aimed at making government decision-making processes more efficient, to observe that this situation is no less frustrating for the people in government who are caught up in this cycle of delays. "What we are trying to do to combat this is offering our solution as a subscription, like Netflix, which allows us to come in and help procurement move a little more quickly," he said. "The benefit is that we're working with governments across the country on one single product, which means we can deploy to more of them. They all benefit from the same service."

Dinner Speaker
JONATHAN MARGOLIS, Acting Deputy Assistant Secretary for Science, Space and Health, US Bureau of Oceans and International Environmental and Scientific Affairs

"Something you may not think about when you're in Ottawa is that in the United States, we consider ourselves to be extremely fortunate to have such an extensive science and technology relationship with our neighbours to the north."
Jonathan Margolis, US Bureau of Oceans and International Environmental and Scientific Affairs

Key Points
- Science pertains directly to our quality of life
- Science diplomacy can maintain relationships between countries even when formal diplomatic channels fail
- Scientists can be effectively recruited to help frame international policy

Margolis introduced himself as a participant in bilateral discussions with his Canadian colleagues, identifying four areas that are essential to shared scientific priorities: artificial intelligence, quantum computing, Arctic studies, and health. "Something you may not think about when you're in Ottawa is that in the United States, we consider ourselves to be extremely fortunate to have such an extensive science and technology relationship with our neighbours to the north."

He described these international science and technology relationships as pertinent not just to research and development, but our quality of life. And while Margolis and his colleagues have been pleased with the interactions so far, there is room for improvement within the institutions where these activities take place.

All of this falls under the heading of science diplomacy, which musters expertise and facilities across borders for ambitious discovery science, as happened with the creation of the first image of a black hole. International development challenges offer similarly rich opportunities for collaborative and innovative research. Above all, he argued, science contributes to decision-making, which facilitates relationships between countries when conventional diplomatic channels are not open.

The United States also has a number of programs that bring people with scientific experience into policy circles, including the American Association for the Advancement of Science fellowship program that places doctoral students in posts throughout the federal government. Another program places American scientists in overseas embassies to improve international scientific outreach. Jefferson fellowships bring working academics into government circles for foreign policy work, after which they remain "on call" for future consultations, while others are recruited as "science envoys", who travel around the world engaged in public diplomacy.

He cited two lingering challenges, including the integration of women into this kind of

work, where there has been much progress but much still to be made. Similarly, as many countries begin to thrive as hubs for science and technology, there is a need to ensure that they are included as vibrant parts of the international research community.

Dinner Panel - Whither science advice: A conversation with Canada's science advisors
MODERATOR: PAUL DUFOUR, Senior fellow, University of Ottawa's Institute for Science, Society and Policy and Principal, PaulicyWorks
SARAH GALLAGHER, Associate Professor, Physics and Astronomy, Western University, Science Advisor to the President of the Canadian Space Agency
MONA NEMER, Chief Science Advisor
DAN WAYNER, Science Advisor & Chief Science Officer, National Research Council (NRC)

"We have not had any long-term vision of our science enterprise as a country."
    Mona Nemer, Chief Science Advisor

Key Points
  • Input from a science advisor must be relevant to the needs and interests of people in government
  • Science advisors themselves must place a premium on trustworthiness, as they could well need to speak an unpleasant truth to power
  • Successful science policy depends on a shared perception of who is doing science and why

In keeping with the gastronomical theme around many of the conference presentations, Dufour asked the panelists to comment on their preferred recipes for providing science advice. He framed this request with respect to a comment by Canadian physicist Allan Bromley, who served as the American presidential science advisor from 1989-1993 and once said "There is nothing so useless as unwanted science advice." Dufour took this comment to mean that science advice requires a demand, an appreciation of the context it will be received, and the institutional capacity to sustain it.

Even more challenging can be the high expectations attached to a science advisory position. "Always remember that they are advisors, not decision makers," Dufour cautioned. Nor is there any formal training regime, which means these individuals wind up learning on the job.

Nemer introduced herself as someone whom she hoped would be among a long line of science advisors in this country. She outlined her mandate in terms of three primary activities: directly providing input on science issues; offering recommendations about the intramural science conducted between various government departments; promoting a broader understanding of science in general.

Gallagher introduced herself as an advisor as well as a professor at Western University,

which enables her to build that link with members of the scientific community. She also finds herself serving as a liaison with other branches of government that are making increasing use of data collected from space. All that being said, she described her work as varying widely from one day to the next; she speaks at conferences, meets with the Space Agency's industrial partners, and conducts her own astronomical work.

Wayner introduced himself as a former NRC employee who had retired but returned in order to help provide insight into the organization's wide ranging activities — a balancing act between developing technologies and products that take advantage of current knowledge and purely scientific investigation that contributes to knowledge that will be applied at some future date. He portrayed this role as a challenge function, both within NRC and in its dealings with other parts of government, with priorities such as ensuring that scientists are free to communicate their results with the rest of the research community.

Returning to the question of ensuring that there is a demand for science advice, Nemer suggested that it is important to stay abreast of everything that is happening in government, so that any advice to be offered will not come so late as to be unhelpful. Interest in her work has also benefited from a growing awareness that the impact of science on policy is not siloed within particular departments but integrated across disciplines and internal government boundaries.

Gallagher indicated that she does not have to work at creating a demand for her input, which has been welcomed throughout the Space Agency. For his part, Wayner described his position calling for the courage to tell people things they do not want to hear, which makes the question of demand a subtle one. It means not just building a relationship based on trust, but clarifying the distinction between facts, opinions based on facts, and beliefs that may not have a strictly factual basis. In this way, demand emerges from a willingness to accept an advisor's input at face value. "If you want to have a science advice function, it needs to be beyond reproach," he said.

Further to the need to transcend traditional government lines, Nemer indicated that this can be a crucial function in maintaining or opening up lines of communication. Wayner suggested that departments become siloed as a defensive measure, which makes it important to understand why that happened and prevent people within a silo from feeling threatened by attempts to collaborate. He often finds himself in the position of being able to articulate a higher purpose in a coherent way, so that it can be shared among different departments.

For her part, Gallagher has not had much experience with interdepartmental dealings within government, but she has been in the middle of disconnects that take place between the Space Agency and universities. Here she has found herself responsible for conveying common goals and how the respective organizations normally try to achieve them. When asked about what maintains these kinds of interactions, she warned that

sudden changes in funding can throw off projects that can easily take a decade to come to fruition. "There are so many different ways in which you can establish structures to keep embedding science in the activities of the Space Agency," she said. "I'm meeting with policy people, I'm meeting with communications people, as well as programming teams in order to have it embedded in all the different components."

When asked about resolving differences between the scientific community and government policymakers, Nemer responded that this process was fundamental to her work. "We have not had any long-term vision of our science enterprise as a country," she said, calling for a shared perception of who is doing science and why. She noted that most Canadians are unaware of just how much science is done within government departments and nurturing just such an awareness will be essential to ensuring that this work continues to thrive everywhere, whether in industry, academia, or government.

Day 2 - April 17, 2019

Plenary Panel – Superclusters: Post-launch plans and strategies
MODERATOR: MARC FORTIN, VP Research Partnerships, NSERC
JULIEN BILLOT , CEO, SCALE AI
BILL GREUEL, CEO, Protein Industries Canada
KENDRA MACDONALD, CEO, Ocean Supercluster
JAYSON MYERS, CEO, Next Generation Manufacturing Canada
SUE PAISH, CEO, Digital Technology Supercluster

"This is not just about five different clusters spending a billion dollars. This is about doing something that has never been done before. This is about changing the ecosystem."
    Marc Fortin, NSERC

"It's not magic. It's basic human engagement. There's a constant flow between the five of us on a real-time basis. We're in this together, we consider ourselves a family and we're going to help each other."
    Sue Paish, Digital Technology Supercluster

Key Points
- The supercluster concept is an attempt to transform the litany of Canadian R&D activities that have not culminated in tangible accomplishments for the Canadian economy
- Superclusters are bringing start-up companies together with the resources of major firms and government agencies
- Although the five superclusters have distinctly different themes, they share an approach that is further enhanced by close collaboration among their leadership

Fortin began by underscoring just how exceptional a moment it was to have all five CEOs of all five superclusters in the same room at the same time. Together they

represent the lion's share of the new federal funding for research over the last two years. The expectations are high: some $50B in economic impact over the next 10 years, spawned by just $1B investment by the Canadian government. They are also looking at the creation of about 50,000 new jobs associated with various aspects of the work.

"This is not just about five different clusters spending a billion dollars," he said. "This is about doing something that has never been done before. This is about changing the ecosystem."

Macdonald responded by noting that the global economy is set to double by 2030, a $1.5 trillion opportunity with respect to oceans that is highly relevant to Canada, which has the world's fourth largest ocean territory, a significant Arctic coastline, and research capacity to match these frontiers. "And yet, the ocean economy only contributes 1.5% to Canadian GDP, versus the world average of 3%," she noted, which adds to the overall economic opportunity. Upon closer analysis, the various sectors that could take part in this activity have shared perspectives on the risk and other challenges associated with this growth, which made the establishment of the supercluster a logical move to try and overcome these challenges.

Greuel observed that agriculture and food represent the largest employment sector in Canada and the second largest contributor to GDP, but the looming global reality is that by 2050 we need to produce 70% more food than we do today as three billion new middle-class consumers enter the market. Put another way, this represents more food in the next 45 years than the globe has produced in the last 10,000 years, all while taking into account limitations on land use, climate change, and ongoing political upheaval. As one of the world's few jurisdictions that is a net exporter of food, the Canadian prairies are well positioned to help meet this demand. Today most of these products are being shipped out raw, but there is an opportunity to begin processing more of them in Canada, an export opportunity that could be worth $19 billion.

Billot acknowledged the tremendous changes in all aspects of our lives that AI is expected to have, which is why SCALE AI is positioned to help Canada become a net exporter of this technology. Nor is this technology mature yet, which means there is a still a great deal of work to be done in designing and building various elements of its systems — the kind of work that this cluster will be supporting, both in companies big and small.

Paish observed the tremendous growth in the amount of data that is now being generated in all aspects of human life around the world and is expected to continue growing at an exponential rate. "There is a massive opportunity for the jurisdictions, the sectors, and the organizations that learn how to effectively manage, leverage, secure, share, and monetize data," she said. "That's what the digital technology supercluster is about; it's about helping organizations leverage data in an era of intelligent enterprise."

The supercluster is based in Vancouver, where much of the necessary expertise already exists in areas such as precision health and quantum computing.

Myers portrayed global competition in the manufacturing sector as nothing new, but the pace of technological change in this sector has been accelerating. "We want to overcome a challenge that has plagued our innovation system for a long time, which is that we do great work in research and with start-ups, but there is a big gap between our innovation capabilities on one hand and our ability to apply them to produce things of greater value," he said.

As for what these clusters will do that has never been done before, he pointed to financing from a wide range of sources, something that had been dismissed as next to impossible. Nevertheless, the supercluster raised more than $850 million in six months from various part of the manufacturing and technology sectors, a significant commitment to collaboration that is especially important since the risks associated with innovation are too great for any one enterprise to shoulder.

Paish was blunter: "We've got a lot of work to do in Canada when it comes to innovation and delivering on promises, delivering outcomes." The Conference Board of Canada ranked the country as 12th out of 16 OECD innovation leaders, which she does not regard as being anywhere near a good enough performance.

"We have to move up that ranking in terms of the perception of what Canada is globally," she said. "Right now, we are regarded very positively in terms of how nice we are, rules of law, ethics, business integrity. Those are important qualities, but we're also seen as a country that doesn't get much done. This is what the supercluster initiative is here to do. This is some of the most ambitious and bold public policy I've seen in a generation."

Echoing Myers' point about collaboration, Paish recommended moving business practice away from government funding toward co-investment with private sector support. This should produce deliverable products that will put the world on notice that Canada can get things done.

Billot picked up on the co-investment theme by observing how difficult it has been to fund software development in Canada. This is why we have very few of the highly desirable "unicorn" enterprises here, because although we have many promising start-ups, they simply cannot find the large-scale financing to take the next step and grow significantly. We fund the research, he explained, and we fund the education of the people who conduct this work, but we lose these enterprises when they go elsewhere to continue growing. "Part of our mission is to help these companies grow, not through direct funding but by helping them find support through collaboration," he said.

Greuel agreed with the foregoing perspectives and underscored the timeliness of his

supercluster with respect to the current state of the food and agriculture industry. Although huge multinational firms have dominated this sector for a long time, the barriers to entry have been steadily dropping thanks to disruptive technologies. Distribution and retail of these commodities is changing rapidly, thanks to innovations such as information and data technology that are changing the way producers make decisions.

"We have to find a way to support small and medium size enterprises, put them in collaboration with large organizations that have access to markets and can capitalize this technology," he said. "We will create those connections between the small innovative companies and the large companies that have access to market and retail distribution."

As for what will change to make these superclusters successful, Macdonald says she is often asked about how the investment in the ocean supercluster will be spread evenly through the Atlantic provinces. "That is not what this is about," she insisted. "This is actually a fundamental culture shift in how we think about working together and leveraging tools and how we think about our competitors."

Myers concurred, suggesting that Next Generation Manufacturing Canada is not in the business of funding initiatives that would not otherwise happen. The supercluster is instead dedicated to finding new, collaborative ways of working together toward innovation, not just amongst private sector companies but also educational and government institutions.

"We're dealing with three different languages," he said. "The language of research, the language of manufacturing, and the language of technology, everybody with different business models about how to succeed. It's the end user that creates the value of this technology, and it's that focus that should be driving everybody toward that goal. The most important change in manufacturing is to convince companies that their strategy cannot be about getting a product out the door, but about providing a customer's solution. That solution is built not just by technology and manufacturing capability, but it's built on services."

Paish said the Digital Technology Supercluster had finished its first competitive cycle, a process revealing that collaboration is easy to talk about but much more difficult to define. "Collaboration doesn't mean calling people around the table so they can hear how great your idea is," she said. "Collaboration means learning how to listen, how to change your perspective and understand that one-plus-one can sometimes equal three."

As an industry-led initiative, she added, these kinds of exchanges are also more focused on outcomes, which has made this a learning experience for everyone. Nor did she regard the superclusters as a five-year undertaking but instead a century-long push

to fundamentally and profoundly change how we do business in Canada. Greuel agreed with that perspective and sees much the same long-term impacts in food and agriculture.

Myers observed that the superclusters themselves will be working together ever more closely, since the various challenges they face are closely related to one another. He also emphasized the fact, often underestimated by Canadians, that the manufacturing sector has the resources in place to thrive, even if most of it consists of companies that have a low profile here because they do most of their business offshore. In many cases, these firms do not even know each other exist, as he recounted from the case of two board members who were across the parking lot from one another and have only struck up a fruitful collaboration after discovering that fact through the supercluster. Eventually, he added, the same sort of collaboration should begin happening between the superclusters themselves.

Macdonald concluded by pointing out that Canada is not the only country that is taking this kind of approach, which means there is a limited window for effective action and there needs to be a sense of urgency around the task.

When asked about how the superclusters will be accepting feedback in order to identify best practice and promote learning, Paish indicated that the five of them get together for a teleconference each week to keep one another apprised of their respective activities. "It's not magic," she said. "It's basic human engagement. There's a constant flow between the five of us on a real-time basis. We're in this together, we consider ourselves a family and we're going to help each other." Myers noted that there also some overlap with European superclusters, in order to find out how they are approaching many of the same challenges.

Audrey Mascarenhas, President and CEO of the quickly growing clean technology firm Questor, asked directly for advice about how a company like hers should interact with the superclusters. Billot responded that she could offer up a proposal to a supercluster at any time, as a way of finding support or partners for that work. Each of the superclusters has a Web site for such queries, Paish added, and if a firm wants to join one of the superclusters, there is no fee attached to that participation.

Asked about the role of educational institutions, Paish said the aim is to keep more of our well-educated population building on their skills in Canada instead of elsewhere. Her supercluster has two streams focused on collaboration with post-secondary institutions: one with a technology theme and the other aimed at capacity-building, which includes expanding the depth, breadth, and diversity of talent. Much the same kind of initiative exists at Protein Industries Canada, said Greuel, but in addition colleges and universities across western Canada have come together to ensure that their curricula reflect the interests being expressed within the supercluster.

With respect to the often time-consuming prospect of protecting IP, Myers suggested that there must be a balance between providing the necessary protection and ensuring that partners can share knowledge. Some of the key aspects of this approach have been borrowed from the successful model of CRIAQ, (Consortium de recherche et d'innovation en aérospatiale au Québec), which has been able to improve the knowledge base of that province's aerospace industry as well as help to train students. Paish added that the disposition of IP has taken up a significant amount of the superclusters' work with Innovation, Science and Economic Development.

Plenary Panel – Superclusters: Industry perspectives
MODERATOR: MARTHA CRAGO , VP Research, McGill University
MOYA CAHILL, CEO, PanGeo Subsea
DAVID DZISIAK, North America Commercial Leader for Grains & Oils for Corteva Agriscience
STEPHANY LAPIERRE, Founder and CEO, Tealbook
WARREN WALL, Executive Vice President, Corporate Affairs, D-Wave

"We need to be thinking about ways to drive real change. It's not just about addressing a problem in your company."
        David Dzisiak, Corteva Agriscience

Key Points
  •   Superclusters are not only shaping industrial policy in key sectors, but in areas like agriculture they are introducing the first policy Canada has ever had
  •   Although companies of all sizes make up each supercluster, the research agenda is not being driven primarily by the largest of these participants
  •   For smaller firms, access to a new source of funding through a supercluster is less important than access to collaboration with other firms with shared interests

Fresh from a discussion of the mandate and vision of the superclusters, Crago asked each of the panelists to comment on their experiences as part of the user community for these massive networks.

Cahill introduced her firm, PanGeo Subsea, as a subsea ordinance recovery enterprise that uses technology similar to the familiar medical system Magnetic Resonance Imaging to scan the ocean bottom for unexploded weapons that could disrupt construction work such as drilling or installing pipelines. Dzisiak introduced his firm, Corteva Agriscience as the agriculture division of DowDuPont, producing chemical and data products for that market, and in his case specifically in grain and oilseed production. Lapierre introduced her firm, Tealbook, as an AI-driven database that provides procuring organizations with accurate, interactive information about all the vendors that might be available for their needs. Wall introduced his firm, D-Wave, a quantum computing company and a Canadian leader in this technology, which promises to tackle problems that are beyond the capabilities of standard information technology

systems.

As for what the superclusters may be doing for each firm, Cahill admitted that after a long career as an entrepreneur, this is the first time she has been excited about leading a Canadian firm. "I believe the superclusters will provide credibility to Canadian companies," she said. "It will attract large anchor firms to look within our country for their solutions."

Dzisiak argued that there had never been an industrial strategy for agriculture in Canada, since most investment was around simple production agriculture. The limitations of this approach were revealed recently in an unpleasant way by China's refusal to purchase Canadian canola, which immediately eliminated about a quarter of the entire market for this crop, along with all the attendant activity in moving and processing that crop. Nor has Canada been doing the kind of research that would allow its crop to stand up against much larger international competitors. Such difficulties would be less dire if Canada were offering value added products, which would allow us to seek out more diverse and valuable markets, as well as withstand any volatility within those markets.

Lapierre defined the potential for success within the superclusters as having richer interaction with the public sector, which she hopes will cultivate a new attitude to procurement, an area where Canada has traditionally lagged. Wall would like to see a series of new projects based on quantum computing, as well as drawing in universities to contribute the new talent that the field eagerly needs. Even more promising, he added, is the possibility that participating firms will be able to scale their operations while still keeping them in Canada.

Regarding the role of large anchor firms within superclusters, Cahill suggested that they are critical members of the network. "Without them, I don't have a client," she said. "Canada does not have as many of these large firms, so it's really important that we encourage them to step up and communicate with our industry here." Lapierre agreed, drawing from her own positive experience working with a large American partner, which moved her firm ahead in a variety of ways.

Despite this optimistic picture, the superclusters are not without their challenges, according to Dzisiak. He suggested that instead of spreading investment money too thinly amongst smaller firms for any one of them to make a difference, as has happened in the past, the superclusters could begin to amass support in larger amounts that that would be dedicated to a smaller number of market-driven initiatives. The challenge will be turning down some attractive possibilities in order to remain diligent about supporting work that will have a major impact. Similarly, Wall called upon governments and participating firms to take a different look at support for new technology. "Don't think about this as a way to fund your pet projects," he advised. "We need to be thinking about ways to drive real change. It's not just about addressing a problem in your

company."

When asked about how the superclusters might help aboriginal communities embrace new technology, Lapierre recounted her organization's experience working with the Canadian Council for Aboriginal Business (CCAB), which wanted to create a database so that their corporate champions could find certified aboriginal businesses. Tealbook subsequently trained a number of CCAB's members so they could identify these enterprises and include them in more opportunities for growth.

Representatives of organizations such as CMC Microsystems, Global Advantage, the National Research Council, Mitacs, and even RE$EARCH Money all indicated their willingness to partner with the various superclusters with technology, expertise, networking, or organizing regional events.

When asked if the stated five-year timeline for the superclusters is sufficient to making real change happen, Dzisiak responded that regardless of what goals were set, there will be enough progress to justify building a new program that will carry on. Cahill emphasized that participating firms are poised to move quickly but even more important for them is to reach out to one another within their respective sectors, something that can be difficult to achieve. The superclusters are making this kind of interaction possible, she concluded, and the effect should accelerate across the field.

Ron Freedman noted that none of the foregoing discussions had touched on the term "research", implying that this is not what is needed from the researchers, raising the question of what exactly is being sought from these networks. Dzisiak insists that it is in fact core business research, even if it is not stated as such. Cahill added that research tends not to be discussed formally since it is often seen as being expensive and not necessarily helpful to business, although she disagrees with that harsh assessment. Innovative firms are engaged in just this kind of work, she said, which depends on retaining the talent that is essential to success.

David Watters identified the crown corporation as Canada's preferred model for moving into many sectors, rather than trying to encourage a market full of profit-driven enterprises run by highly motivated entrepreneurs. Cahill indicated that her own motivation is that of showing that Canadian business talent can deliver solutions to problems, a perspective echoed by Lapierre, who added that she comes from a family line of entrepreneurs.

Mark Lowey posed the quandary that the interests of specific supercluster members might be distinct from that of the entire supercluster, raising the prospect that influential members may lobby for projects that benefit themselves in particular. Wall recounted his own firm's experience in bringing smaller firms together to help one another, which is precisely how his firm viewed their role. Lapierre said self-interest was a necessary component of all this work, but in this case with the goal of having something your firm

could offer to other members of the supercluster.

Dzisiak put it more simply, suggesting that members must stay in business and get a return on their investment if they are going to contribute to the success of the entire supercluster concept. "There's also a lot of rules around the project," he said. "It's not just a case that one wins at the expense of someone else. And at the end a big win for Canada."

Cahill emphasized that much of the work being done through the superclusters would have been pursued by members in any case, but in more discrete, siloed ways. The superclusters offer a large pool of ideas, resources, and prospective partners available to make these same projects possible. Similarly, Crago made the point that major enterprises around the world regularly integrate the abilities of Canadian firms into their own networks, although that integration remains hidden from most Canadians. The superclusters are aimed at similar integration in a Canadian context and making it more apparent to a population demanding signs of progress.

Stephane Dubois, a Mitacs science policy fellow with the International Development Research Centre, emphasized how young academics see the supercluster initiative as a way to apply their research and skills outside of the academic sector. "It has to be the 'R', the 'D', and 'C'," he said, insisting that commercialization must be brought into every consideration of the way forward. "I would encourage anybody here who is working in academia to keep publicizing the superclusters, keep letting them know that there are these wonderful partnerships. They're going to be the future; that's how we're going to keep the talent inside Canada."

Special Announcement
TOM HUGHES, Manager, Innovation Exploitation, Defence Research and Development Canada (DRDC)

"If you know someone who knows how to take a small drone out of the air, we're very interested in talking with them."
Tom Hughes, DRDC

Key points

- DRDC's Innovation for Defence, Excellence, and Security (IDEaS) program provides a platform called a sandbox, where companies can present their potential solutions specifically defined security challenges
- In addition to offering a venue to demonstrate a particular product or service, participants will also receive immediate feedback from representatives of the Department of National Defence or the Canadian Armed Forces
- Hughes was alerting the conference audience to the next IDEaS sandbox, taking place in Suffield, Alberta in September, which will examine how to address

threats posed by unmanned aerial vehicles (UAVs, or drones) in public venues such as airports

Hughes outlined DRDC's Innovation for Defence, Excellence, and Security (IDEaS) program, which has established a number of different venues where individuals and organizations can present solutions to particular defence and security challenges. On this particular occasion he was discussing a sandbox, which is an opportunity for participants to demonstrate their product or service in a setting and scenario provided by the Department of National Defence and the Canadian Armed Forces, which will also provide feedback on how well entrants performed.

"We do it in a military context, trying to take those defence and security challenges that we have and look for non-traditional ways of helping those external innovation communities bring forward different solutions," said Hughes. He was alerting the conference audience to a sandbox that would be held in September in Suffield, Alberta, where participants would be invited to address the challenge of identifying and conceivably eliminating unmanned aerial vehicles from within a defined air space.

As these devices become smaller and more potent as weapons, capable of slipping past conventional lines of defence, it will be increasingly important to be able to deal with them. Hughes referred to the interruption of air traffic at the UK's Gatwick airport as an example of how relevant this kind of response will become.

"You can see how something that is very small can bring something that is economically very large to a grinding halt," he said. "In a military context, that has a whole variety of applications as well."

The IDEaS sandbox would invite anyone with a prototype system for responding to this threat to demonstrate it under real-world conditions at Suffield. "If you know someone who knows how to take a small drone out of the air, we're very interested in talking with them," Hughes concluded.

Plenary Panel – Mixing Ingredients: Whole-of-government initiatives in supporting innovation
MODERATOR: CHRISTINE TRAUTTMANSDORFF, Vice-President, Government Relations and Canadian Partnerships, Colleges and Institutes Canada
NANCY HAMZAWI, Assistant Deputy Minister, Science and Technology at Environment and Climate Change Canada
ANDREA JOHNSTON, ADM, Innovation Canada - Innovation, Science and Economic Development Canada (ISED)
WAYNE MOORE, Director General, Strategic and Regulatory Science Directorate, Fisheries and Oceans Canada (DFO)
ROB WRIGHT, ADM, Science and Parliamentary Infrastructure Branch, Public Services

and Procurement Canada
GILLES SAINDON, Associate Assistant Deputy Minister, Agriculture and Agri-Food Canada

"This government has fundamentally changed expectations and we're experimenting with these clusters. The essential notion of government as a bit of a lab is coming back in a meaningful way."
         Wayne Moore, Fisheries and Oceans Canada

Key Points
- The unprecedented service capabilities of on-line enterprises like Amazon have increased public expectations around interactions with various government departments
- Departments are responding to these expectations with more client-focused activities, often aimed at specific economic or social goals
- The search for greater efficiency in government services is also promoting greater interaction between departments that were once siloed

Wright introduced himself as an outlier on the panel, since his organization is not science-based, but instead part of the federal science and technology infrastructure initiative that brings together all the departments that are science-based. This is part of a 25-year commitment to revitalizing federal research infrastructure by assembling clusters of organizations.

Saindon introduced his department as one that does production research and value-added research with respect to food. This work has already established clusters within the government's own value chains, building links with departments such as ISED even as the superclusters seek to expand these links further. Speaking for ISED, Johnston described how her department has moved to a more client-oriented focus as it has drawn together these different departments with shared interests. Similarly, Hamzawi suggested that ECCC has been increasing its collaboration with a variety of other department whose interests touch on its mandate around environmental regulation. Moore acknowledged Fisheries and Oceans Canada as one of those departments, which like ECCC handles a great deal of scientific information for major projects such as the oceans protection plan, marine safety, and community engagement, including reconciliation with the aboriginal community.

Trauttmansdorff highlighted the discussion theme of interdepartmental cooperation, pointing to how the current government's high-profile mandate statements for different departments featured a call for greater interaction within and between those departments. She asked the panel whether this move reflected something genuinely new.

Wright responded that there has been a culture change, one that balances vertical accountability within departments with horizontal interactions among departments. "It

does create some challenges around accountability," he acknowledged. "It can be messy. But it's difficult for individual entities within the federal government to address the complex challenges that face them and partnership is critical to success."

Moore concurred, indicating that he has not only seen an interest in his department in what other departments are doing, but a rise in the expectations that Canadians attach to all departments. He and his colleagues describe this as the "Amazonification" of government, referring to the setting of higher standards for fast, comprehensive responses to any demand. Johnston described how she has encountered the same effect in the creation of a single-window approach to services, both within government as well as externally. Hamzawi added that these trends have made it easier to strike up new partnerships as well as strengthening the existing ones.

Such partnerships help departments transcend their own limitations, according to Saindon, who pointed out that Agriculture and Agri-Food Canada has neither granting capabilities nor regulatory functions but still struck a collaborative research agreement with Genome Canada, an example of shared interests that make the most use of resources within each organization. Similar strategies have enabled his department to achieve specific goals with partners outside of government through efforts such as the Living Laboratories Initiative, which brings together farmers, scientists, and others to consider shared themes such as adaptation to climate change, environmental management, and maximizing biodiversity in agricultural regions.

With further reference to climate change research, Hamzawi noted that the federal government only conducts a fraction of this work, which makes external liaisons all the more attractive in order to ensure that policy is based on the best available knowledge. This is taking the specific form of a National Climate Change Science and Knowledge Plan, which was launched early in 2019 with a workshop that included participants from federal and provincial government departments, private sector firms, and academia. Similar efforts are under way in the area of plastics pollution, in order to match growing international interest in this problem.

Further to his earlier remark about "Amazonification", Moore indicated that a rising desire for greater amounts of consultation is changing the way governments work. More specifically, this has made their work more transparent to public scrutiny and led to greater levels of engagement with the wider scientific community. "We're changing how we experiment," he said. "This government has fundamentally changed expectations and we're experimenting with these clusters. The essential notion of government as a bit of a lab is coming back in a meaningful way."

That being said, Trauttmansdorff suggested that it is easy to be overwhelmed by just how much more could be done. Moore agreed, and suggested that the way forward be inspired by client-focused activities with well-defined social or economic goals. Hamzawi observed that Environment and Climate Change Canada is also experimenting with

ways of making the department's science more relevant and interesting to Canadians, such as *Canada's Changing Climate*, an on-line report produced with Fisheries and Oceans Canada, Natural Resources Canada, and university-based partners. She and her colleagues have been impressed by the public response to this project, which has provided a single portal to a wide range of organizations with a shared interest in a common environmental challenge.

When asked about the government's high-profile commitment to consolidating innovation program activities, Johnston responded that these efforts have led to a much greater appreciation of how different facets of government address this work. There have also been concrete measures such as the consolidation of the Strategic Innovation Fund, which replaced a range of programming that had previously been parceled into discrete areas such as the automotive, aerospace, or food processing sectors and would have led interested parties to a number of different departments to meet their needs. Hamzami recounted a similar experience in working with the federal research councils on a call for climate change work, which began with a $5 million commitment and garnered some $120 million in proposals. She suggested this experience has given them a better sense of how large and ambitious such programs should be.

By way of concluding the entire conference Crelinsten asked the panelists what it would take to accelerate these positive steps. Moore responded that the tremendous impact that digital technology has had on simplifying the process of filing taxes indicates what is possible. "There's no reason why we can't make these changes because we've done them," he said. "Part of making those changes is the openness to experimentation and the openness to new ideas."

Platinum

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NSERC CRSNG

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