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Inclusive Innovation

Government Science and Innovation in the New Normal Discussion Paper

By Louise Earl and Jeff Kinder | October 2022

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ABOUT GSINN – CANADA NEEDS A NEW RELATIONSHIP WITH SCIENCE AND INNOVATION THAT REFLECTS OUR TIME

In December 2020, the Institute on Governance launched *Government Science and Innovation in the New Normal (GSINN)*, a multi-year, collaborative research initiative designed to explore the impact of the pandemic on federally-performed science and innovation, to support medium-term planning for federal science and innovation departments and agencies, and to provide insights to help rebuild the relationship between science and society.

Throughout the pandemic, anti-vaxxers – joined by anti-maskers – have challenged scientific evidence and public health officials with a mandate to keep us safe and stop the spread of the disease. This is just one example that demonstrates society’s relationship with science is under strain.

But society’s relationship with science and innovation did not decline overnight. The governance model that underpins Canada’s relationship with science is based on a report called *Science: The Endless Frontier* (1945). This report outlined a basic compact in which society supports science with public funds and assures the scientific community a great deal of autonomy in exchange for the considerable but unpredictable benefits that can flow from the scientific enterprise.

Today, many of the underlying social, economic, and political assumptions in the postwar compact are outdated. This project examines the relationship between science and society and begins to imagine a new relationship, through nine specific themes:

- Equity, Diversity, and Inclusion;
- Global Research Collaboration and Infrastructure;
- Inclusive Innovation;
- Interdisciplinary Collaboration;
- Indigenous and Other Ways of Knowing;
- Mission-Driven Research and Innovation;
- Science Communications, Outreach, and Public Engagement;
- Skills and Knowledge; and,
- Trust, Integrity, and Science Ethics.



Taken together, these themes suggest elements of a new governance framework for science and innovation in Canada that embraces our current social, cultural and political realities, that recognizes the opportunities and limits of science. Perhaps most importantly, the project reinforces the role of science as part of society, and a tool ready to serve the needs of society.

Findings of the GSINN initiative were developed as a result of extensive research and engagement that included: a hindsight exercise, multiple foresight workshops, eight multisectoral roundtable discussions, and expert consultations that fed into this collection of 10 papers (one for each of the themes above and one capstone paper). Each discussion paper has been peer reviewed and explores a facet of how the relationship between government science, innovation, and society needs to be repaired in order to ensure science remains relevant in the new reality.

IOG extends its heartiest thanks to the eight federal departments and agencies that supported this work: Agriculture and Agri-Food Canada, Health Canada, Innovation, Science and Economic Development Canada, National Research Council, Natural Resources Canada, Public Health Agency of Canada, Public Services and Procurement Canada, and Transport Canada. We also wish to thank all of the individuals who participated in the workshops and roundtables whose input helped clarify and develop the project themes and findings. Finally, we want to acknowledge the following reviewers whose thoughtful feedback improved this paper: Amal Ahmed, Elizabeth Carmichael, Dan Munro, and Cheryl Power.



INTRODUCTION

Science and innovation are crucial for providing the ideas, insights, evidence, and technologies necessary to drive the economy, improve health and preserve our environment, and they have delivered great social and economic benefits. “The scientific enterprise is one of humanity’s most successful creations, and the system we’ve built has served us well” (Annan *et al.* 2019).

But the science and innovation system is clearly under strain in this “post-truth” / “post-trust” era. Recent surveys suggest a growing skepticism and distrust in science and technology (IOG 2020). The public struggles to keep pace with the accelerating, disruptive impacts of new innovations over which they have little input and feel powerless to control. There is a growing disconnect between what the public sees as a remote, exclusive scientific community that insists on undirected “fundamental science” and what scientists and engineers see as a lack of public appreciation and deference for the value of their work (Annan *et al.* 2019). According to Kinder and Schillo (2020) “...there is less trust in government and ‘elitist’ notions of what innovations are in the public interest.”

The postwar social contract between science and society saw little to no role for non-scientists in research and innovation. Over the last 75 years, despite the extraordinary advancements and accompanying benefits that have flowed from the scientific enterprise, this exclusion has led to a situation where large segments of the population are under-served by, and have diminishing trust in, science and innovation.

Greater inclusivity within science and innovation may help address these concerns (although this argument needs to be tested). As discussed in the GSINN paper on *Equity, Diversity and Inclusion*, research has shown that more diverse teams produce better outputs. With the recent moves toward open science, citizen science, community-based research, patient-centered research, and co-production of knowledge, the conduct of research and innovation can be opened up to contributions from society.

From this context, inclusive innovation has emerged as a potentially more trusted, more effective approach to fostering innovation. There are many potential benefits to inclusive innovation. Inclusive innovation may correct for the underrepresentation of historically disadvantaged groups in science and innovation, reinvigorate support for science and innovation, deliver more closely what Canadians want, and support a robust and inclusive prosperity and resiliency for the 21st century (Annan *et al.* 2019; Kinder and Schillo 2020). But there are also risks and challenges associated with adopting an inclusive innovation approach.

This paper will a) define inclusive innovation and situate this still emerging concept among related concepts, b) explore the take up of inclusive innovation internationally and in Canadian federal



government policy, c) highlight how some scholars have thought about implementation and measurement of inclusive innovation, and d) conclude with questions for further discussion.

SITUATING INCLUSIVE INNOVATION

Innovation is regularly touted as essential to a nation's economic and social well-being. In fact, "innovation has become a Holy Grail in economic growth and sustainability agendas worldwide" according to Edwards-Schachter (2018, 65) Prior to 2005, in the internationally accepted definition found in the Organisation for Economic Cooperation and Development (OECD)/Eurostat's *Oslo Manual*, innovation was restricted to the business enterprise sector and to new products (goods and services) and processes (OECD 1997). It was narrowly viewed as *technological innovation*.

Starting with the third edition of the *Oslo Manual* the concept of innovation was extended to include new marketing methods, organizational models and business processes (OECD/Eurostat 2005). In 2018, the fourth and most recent edition introduced a generic definition of innovation that could be applied to all economic sectors:

"An **innovation** is a new or improved product or process (or combination thereof) that differs significantly from the unit's previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process)" (OECD/Eurostat 2018).

A relatively new addition to the research literature and thinking about innovation is inclusive innovation. Initially used to describe an approach to innovation in developing countries, recent work by Schillo and Robinson (2017) produced a framework for inclusive innovation (discussed later) applicable to developed countries, and it has been taken up and is gaining momentum around the world. But there remains much confusion about the concept:

"...inclusive innovation has become a bit of a buzzword that means different things to different people. Some have used the term when calling for more equitable distribution of the benefits of innovation. This "inclusive growth" emphasis is not much different from traditional calls for equitable wealth redistribution" (Kinder and Schillo 2020).¹

Inclusive innovation goes beyond inclusive distribution of gains to embrace more fundamental changes in the very nature of the innovation process and the policies that support it (Kinder and Schillo 2020). Inclusive innovation is premised on active participation of target communities within the innovation process. Building on the notion of "nothing about us, without us," to be inclusive, the

¹ For an example of the "inclusive growth" line of thinking see OECD 2015.



ideation of the product or process is created jointly between the developing organization and the target community that is the intended beneficiary.

Target communities can include those historically underrepresented in the science and innovation enterprise, such as women, visible minorities, persons with disabilities, the LGBTQ+ community, Indigenous peoples, and rural communities.² However, and importantly, the target communities need not be restricted to such groups. Inclusive innovation can also target those displaced by technology (e.g., long-haul truckers who may be displaced by autonomous vehicles).

Implicit in the Oslo Manual definition of innovation is that innovation will lead to economic value. A more holistic and inclusive approach to innovation extends the concept of value to include social and environmental as well as economic returns (Munro and Zachariah 2021). The social value of products developed for and with target communities may outweigh the economic returns to the producing unit, although such value needs to be measured and demonstrated.

To help bring a focus to this discussion paper the following definition of inclusive innovation is offered. The definition is an adaptation of many of the concepts included in the terms listed in the Glossary:

***Inclusive innovation** is the means by which new or improved products (goods or services) or processes (or combinations thereof) are ideated, developed, implemented (or brought into use), diffused and adopted for and by target communities including those historically underrepresented / marginalized or displaced by technology, that generate economic, social or environmental value for individuals, firms, communities, and/or economies.*

Ensuring that products and processes are readily available to meet the needs of traditionally excluded communities is a key objective. The inclusive innovation process is predicated on a trust-based relationship between the developing organization and the target community. It is this trust relationship – whereby the developing organization yields a large degree of control of the project’s success to the intended beneficiaries – that further differentiates the inclusive innovation process from traditional innovation collaborations. Capacity is built in the benefitting communities through this transference of control. One key consideration is that the target community can be charged with the implementation of processes or provide agents for product distribution (Gras *et al.* 2019).

² Cukier (2019) recommends employing a rural lens in her discussion of the roles of geography, digital technologies (including broadband infrastructure) and knowledge-intensive services in inclusive innovation.



ADJACENT CONCEPTS OF INNOVATION

To help situate the distinctiveness of inclusive innovation, this section briefly describes other, related conceptualizations of innovation, including user innovation, social innovation, undone science, open science, citizen science, and responsible research and innovation (see the Glossary for additional definitions).

User innovation (von Hippel 2005) ascribes ideation for new products or product modifications to the user or consumer population, with ideas then adopted and developed by companies and sold to the user community (OECD/Eurostat 2018). As the new products or product modifications can be created without the consent of the producing unit, the participation of the user community is not necessarily collaborative. The producing unit's objectives are driven as much by economic value as by extending the use of their products to new user communities. As such, user innovation is not necessarily inclusive.

Social innovation has gained traction in recent years and was a pillar of the European Union's (EU) *Horizon 2020* funding program. The guiding principle of social innovation is to improve the wellbeing of its target communities as innovation is directed to the needs of vulnerable groups (OECD/Eurostat 2018; ESDC 2018; Meissner *et al.* 2017). However, while target communities are often consulted, they are not necessarily active participants in the innovation process; rather the results of the innovation process are intended to address social problems more generally (Patino-Valencia *et al.* 2008).

Woodson and Williams (2020) relate the concept of **undone science** to inclusive innovation based on science, technology, and innovation addressing socio-economic inequalities. "The undone science framework describes the systematic neglect of scientific issues that impact marginalised groups" (Woodson and Williams 2020, p.1). Both inclusive innovation and undone science focus on marginalized or excluded communities.

Hess (2007, p.36-38) argues that it is the decisions of researchers and scientists to follow the funding priorities set by governments, companies and institutions that then squeeze out other areas of research until the funding agencies determine new strategic goals. He further discusses biases against valuing knowledge created by different cultures of knowledge production leading to funding constraints for less dominant ways of knowing. This in turn thwarts new scientific pursuits that arise when scientific problems are viewed from excluded groups' perspectives. "Access restriction" to knowledge is the final effect of undone science. Increasing knowledge accessibility enhances its value and potential uses for all communities (Woodson and Williams 2020; Hess 2007).



Open science initiatives such as open data-sharing and open access journals are attempting to address the inclusivity issue of knowledge accessibility by encouraging greater transparency and availability of results. Such openness can allow a broader assessment of, and easier uptake of, research and innovation. But open access and open data initiatives address the *outputs or products* of the scientific process – i.e., publications and data. There is perhaps even greater potential for innovation by pushing more openness in the *conduct* of science and innovation, through collaborative co-production of knowledge, crowdsourcing and citizen science (Kinder 2013).

Citizen science engages community participation directly in the design and conduct of scientific research (Vohland *et al.* 2021; Kinder 2014). As participation is voluntary, its participants self-select by topics of interest, such as environment, biodiversity, culture, and health. Given its high degree of participation by non-scientists, citizen science can be thought of as the participatory analog to inclusive innovation for scientific research. However, important differences include that citizen science involves volunteers who self-identify and are usually already pro-science. As such, they may not serve a broader mandate to promote inclusion. In addition, while participants are encouraged to share suggestions and insights for project determination, professional scientists generally determine the research questions, design the studies, analyze the data, and disseminate results.

Crowdsourcing for ideas and crowdfunding of scientific projects is a recent addition to the citizen science tool chest. The potential to raise funds to respond to citizen-proposed questions changes the control dynamic as the professional scientists are more accountable to their “volunteers.”

During the period 2014-2020, Europe’s research program Horizon 2020 embraced **responsible research and innovation** (RRI) as a key component of its “Science with and for Society” objective. RRI is “an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation” (Europe Commission, 2022). RRI is perhaps the concept of innovation that most closely matches inclusive innovation.

According to the European Commission:

“Responsible Research and Innovation (RRI) implies that societal actors (researchers, citizens, policy makers, business, third sector organisations, etc.) work together during the whole research and innovation process in order *to better align both the process and its outcomes with the values, needs and expectations of society*” (European Commission; emphasis added).

RRI has been further characterized as “a collective commitment of care for the future through responsive stewardship of science and innovation in the present” (Schroeder *et al.* 2016, p.180). Such responsible stewardship requires anticipation, reflection, deliberation, and responsiveness.



Owen and collaborators (2012) capture the shift to RRI succinctly as “from science in society to science for society, with society.”

INCLUSIVE INNOVATION, GLOBAL CHALLENGES AND GOVERNMENT OF CANADA POLICY

The trajectory of science, technology and innovation (STI) policy has evolved since the end of World War II, as has been recorded by numerous scholars (Edwards-Schachter 2018). Inclusive innovation studies indicate that three policy areas – STI, industrial, and social – are in convergence to address today’s dynamic socio-economic and environmental challenges. An increasing emphasis on mission-driven approaches characterizes the current policy era with global research agendas directed to addressing wicked challenges (Meissner *et al.* 2017, Edwards-Schachter 2018, Gras *et al.* 2019, Mazzucato 2021).

At the turn of the millennium, the United Nations (UN) embarked on its 15-year Millennium Development Goals (MDG) agenda to address poverty, improve conditions of women and children, fight disease, and promote environmental sustainability and partnerships for development. The 2016 Sustainable Development Goals (SDG) to be accomplished by 2030 build on the MDGs and tackle 17 goals across three broad themes: eradication of poverty; inclusion of all communities (benefits to all); and building a healthy and sustainable environment. Canada is a signatory to the SDGs and meeting these goals is one of the drivers of the federal government’s integrated policy and program suites.

Based on the global challenges outlined in the SDGs, the OECD has identified that innovation is now required to support more than economic growth and employment by linking it to social challenges. For the OECD this linkage, assisted by digitalization, will involve more people in the innovation process leading to its democratization. However, in 2018, the OECD noted that “few research and innovation funding programmes are explicitly linked to the SDGs” (OECD 2018, p.3).

While recent STI policy has been focused on overcoming COVID-19, global challenges such as aging populations and their associated health issues, climate change, poverty and food security, and income and other inequalities persist. Technological disruptions and new roles for innovation activities have raised governance and regulatory challenges facing societies, scientists, and policy makers. These challenges will increasingly be the focus of international STI, industrial and social policy initiatives going forward and inclusive innovation will be a required approach.



At the same time, while SDGs target global wicked challenges, they do not represent all the challenges facing Canada. The COVID-19 pandemic, Indigenous reconciliation, and high-profile instances of racism, white supremacy and discrimination have brought to the forefront heightened societal tensions between communities and within institutions such as the military and police forces. Eradicating systemic racism has become a rallying call for civic action and may be a challenge ripe for an inclusive innovation approach.

To support greater inclusivity, since 1995 the Government of Canada has been encouraging gender-based analysis (GBA) of legislation, policies and programs towards gender equality. In 2016 the GBA+ Action Plan came into effect (Government of Canada). GBA+ takes a gender- and diversity-sensitive lens to policy making and assessment. It recognizes and promotes analysis of differences beyond biologically determined sex and socio-culturally established gender. Analysis is undertaken at intersections of multiple identity factors that can lead to barriers for inclusion in policy and program initiatives. Identity barriers include race, ethnic origin, culture, income inequality, mental and physical disabilities, and geographical location (remote and isolated communities). GBA+ progress is reported by Statistics Canada [here](#).

Employing the GBA+ lens to government medical research is becoming routinized for sex- and gender-related projects. Criado Perez itemizes sex- and gender-based oversights and biases in medical research, diagnoses, and treatments. According to a Government of Canada official webpage “Until recently, research on heart attacks focused mainly on men. However, studies now show that some of the symptoms of heart attacks in women are different from those in men” (Government of Canada, 2009).

In June 2016, the Government of Canada released “Positioning Canada to Lead: An Inclusive Innovation Agenda” (see Appendix 1). Like earlier STI strategies, this strategy continues to focus on skills and capabilities, intellectual property commercialization and management, competitiveness, technology adoption and use, and regulatory framework and infrastructure supports. The 2016 strategy incorporated elements of the advice provided by the OECD (2015) in its *Innovation Policies for Inclusive Growth* report. The strategy is situated in the GBA+ policy lens and therefore promotes programs for marginalized communities including Indigenous peoples, women entrepreneurs, and, unique to this strategy, Canada’s middle class. It also reflects “the challenge of boosting economic growth while ensuring that gains remain socially inclusive” that policy makers currently face (OECD 2015, p.5).

The Canadian STI enterprise has been under long-standing criticism for low business investment in R&D and deficient business management skills as evidenced through countless expert panel reviews (see for example CCA 2018a, 2018b, 2015, 2013a, 2013c, Industry Canada 2011a, 2011b



and 2011c). According to these reviews, although Canada is well reputed for its generous Scientific Research and Experimental Development tax incentive program and its suite of business innovation support programs including the Industrial Research Assistance Program, business investment in R&D has steadily declined for almost two decades. As Canada continues to focus on new policy instruments in support of advancing business innovation, inclusive innovation offers an additional lens and a potentially fresh contribution to this interminable debate.

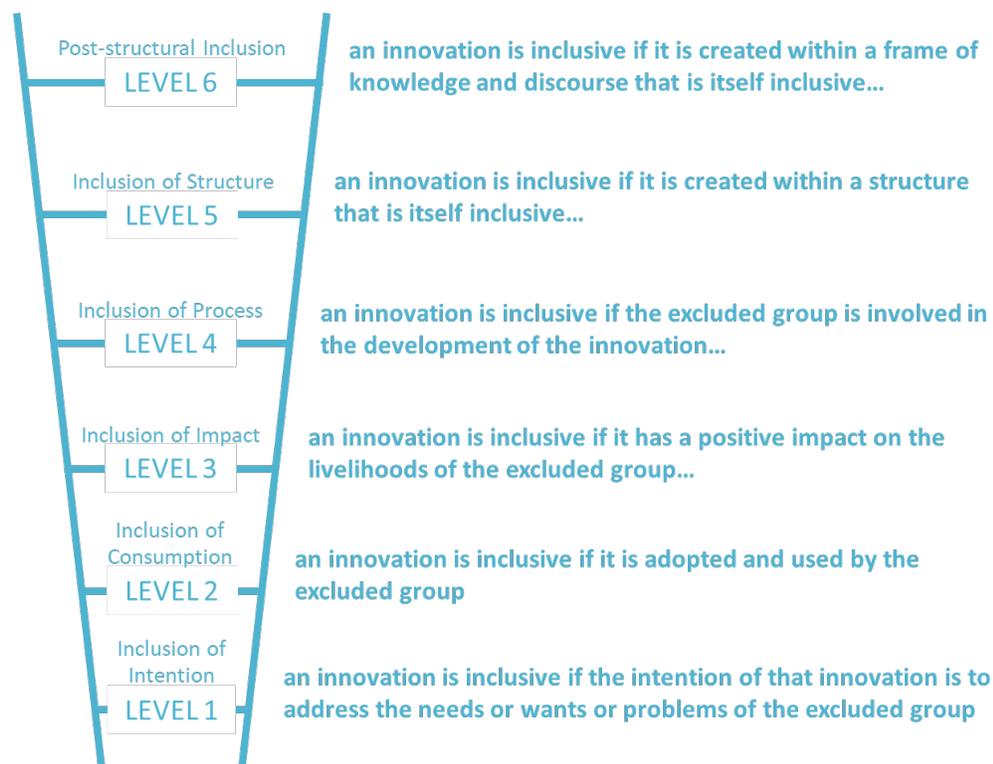
Inclusive innovation goes beyond business investments and activities to include other sectoral actors. It extends the Triple Helix model of innovation that describes the networked knowledge flows and interactions of academic-industry-government organizations that support innovation-based economic growth. More recently, scholars have expanded the Triple Helix concept to a quadruple helix that adds civil society as a fourth key player in the innovation system. Still others speak of the quintuple helix by adding the natural environment or ecological helix as a fifth actor to “ensure socially and environmentally responsible growth” (Galvao *et al.* 2019, 815). These ideas point the way to new approaches to innovation policy in Canada based on inclusive innovation.

IMPLEMENTING INCLUSIVE INNOVATION

Foster and Heeks (2013) and Heeks *et al.* (2014) develop a six-rung ladder (see Figure 1) to classify inclusive innovation according to the level of inclusion and involvement of the target community. The first or lowest rung represents the *intention* of the innovation producers to find solutions for the target community. The second level, *consumption*, records whether the target community uses the innovation produced. At the next level of inclusivity, the innovation has *impact* on the target community. *Involvement* of the community within the development process of the innovation represents the fourth rung. The fifth level requires that the innovation structure within which the innovation occurs is itself inclusive. And the highest rung looks at the inclusive underpinnings of knowledge, cultural and social structures of the larger eco-system. This ladder has been employed for studies of inclusive innovation in developing countries and can provide a useful framework for Canada.



Figure 1: Inclusive Innovation Ladder



Source: Foster and Heeks, 2013

Kalkanci, Rahmani and Toktay (2019) approach their inclusive innovation research from an operations management perspective. They primarily focus on implementation by for-profit organizations with a social sustainability objective. Social sustainability is “how the company contributes to the well-being of the society and neighbourhood in which it operates, and the individuals who work for it” (Kalkanci 2019, p. 2960) although their approach could be adapted for the non-profit and government sectors.

Inspired by the Foster and Heeks’ ladder, they approach inclusive innovation across three domains, (1) inclusive product and service innovation, (2) inclusive process and business model innovation and (3) inclusive supply chain management. Inclusive product and service innovation is further sub-categorized by three high-level innovation phases, ideation, concept evaluation, and development and launch. Within the inclusive innovation process, changing who controls resource allocation (supplies or human resources) can lead to improvements in productivity, effectiveness, and workforce stability. On the other hand, new business models such as Airbnb and Uber that support the gig economy while increasing flexibility have led to unintended consequences on labour security and service pricing stability.



The authors note that inclusive sourcing whereby the inclusiveness policies and practices are only committed to the immediate suppliers and not further upstream in the supply chain is a major challenge. Operational challenges in retailing and distribution balancing profit making imperatives with the identified needs of “underserved populations” that experience product access issues due to a lack of digital infrastructure or capability to use, by geographic locations such as rural, remote communities or urban deserts or by socio-economic characteristics including low income and racialized neighbourhoods.

Drawing on a framework by Schillo and Robinson (2017), Kinder and Schillo (2020) suggest four sets of questions that can help guide implementation of inclusive innovation:

People (Who?) – who is not served by current innovation? Who should be included in innovation and how?

To be fully successful, inclusive innovation must systematically consider who will be impacted by innovation. For example, automation and logistical innovations are already transforming the automotive sector and numerous Canadian communities.

“Rather than treating these implications as secondary to innovation, inclusive innovation under a new social contract explicitly involves all concerned to ensure consideration of the ethical, legal, social, and political implications of innovation for all of society” (Kinder and Schillo 2020).

Activities (What?) – what activities are/should be considered innovative?

Our traditional view of innovation as deriving from advancements in science and technology to support economic competitiveness is too narrow. Today, much value creation comes from business model and value chain innovations. In addition, companies are seeking advantage by integrating social purpose as a core business strategy.

“Inclusive innovation makes visible the contributions of a broad range of types of innovation and their convergence—from technological through social and business to institutional innovations—opening opportunities for a new social contract in terms of what innovation activities are seen as valuable” (Kinder and Schillo 2020).

Outcomes (Why?) – what kinds of innovation outcomes and impacts need to be considered and what are the relations among these?

Innovation policy often takes for granted that broad societal benefits will flow automatically from innovation. Climate change and other grand challenges suggest this logic is not always sound.



Inclusive innovation must actively manage towards positive outcomes on all fronts – economic, social and environmental.

Trusted Governance (How?) – How should the governance of innovation evolve to be more inclusive? What governance structures foster inclusion and trust among the target communities, and ensure the ethics and sustainability of the innovations?

“Meaningful inclusion of diverse voices, activities and outcomes in the innovation and innovation policy processes will require new forms of governance... Governance of innovation will and should only be trusted when it reflects the values, interests, and world views of those it will affect” (Kinder and Schillo 2020).

More recently, Munro and Zachariah (2021) produced an inclusive innovation framework for monitoring progress towards inclusiveness goals (inclusivity). This framework is based on three pillars – opportunities, activities, and outcomes – with themes for indicators included for each pillar. Supporting the framework are policies related to “education and skills, employment and wages, health, innovation, regulation, trade and tax” as well as components of market structure including “industrial composition, competition, concentration, import/export exposure and supply chain structures” (Munro and Zachariah 2021, p.6). The purpose of this framework is to associate outcomes of innovation activities with initial distribution of opportunities while also contextualizing how these outcomes influence future opportunities.

MEASURING INCLUSIVE INNOVATION

Inclusive innovation is dynamic, and its results have ripple effects. Impact assessment requires complex measurement techniques for dynamic spillovers and additionality (Mazzucato 2021). Additionality measures how policies or projects make things happen that would not have happened otherwise. Spillover effects are the unanticipated effects (positive or negative) of innovation that produce wider social and economic benefits.

Evaluators and policy analysts generally employ impact assessment techniques to measure the impact of a policy intervention on program users or beneficiaries over defined periods. Innovation may lead to behavioural or commercial impacts over different timelines adding to the complexity of assessment. For impact assessment techniques to work, the counterfactual population or untreated group must share characteristics with the treated or beneficiary population (Khandker *et al.* 2010, OECD/Eurostat 2018, CCA 2013b, White and Raitzer 2017).

Evaluation criteria for projects should be determined at their outset and with the support and input of all partners. Measurement for the social value of the inclusive innovation activity should be included.



Some of these measures include take-up or use-frequency indicators of the product (good or service) innovation by the target community and adoption rates for process innovations. Similarly, distribution counts of the use of inclusive practices to co-create products and processes would show the extent of the use of these practices. And benchmark macro indicators such as those found in the *Inclusive Innovation Monitor* (Munro and Zachariah 2021) will show progress towards inclusivity objectives.

CONCLUSION

Inclusive innovation is based on the participation of target communities throughout the innovation process from ideation to end use. It is characterized by developing new competencies in the target community as well as in the producing unit. New performance measures and indicators will be required that quantify the social and economic value of inclusive innovation projects. These indicators will need to be negotiated with target communities and program evaluators (Earl *et al.*, forthcoming).

The OECD's (then) Secretary-General Angel Gurría stated that “Governments need to become more agile, more responsive, more open to stakeholder participation and better informed of the potential opportunities and challenges of new technologies” (OECD 2018, p.4). COVID-19 responses have shown the strengths and weaknesses in the agility, flexibility, and responsiveness of all levels of governments in Canada as well as public, private and non-profit organizations, and Canadians themselves.

Developing new governance models, communicating success stories, routinizing techniques for inclusive innovation practices while respecting the time, interests and needs of target communities are today's challenges. Target communities may not find that proposals and initiatives are of relevance to them. Creating engagement processes whereby target communities can identify their needs and wants may support more strategic and inclusive priority-setting. Discussion of governance models for inclusive innovation and citizen science where partnerships across sectors and a reliance on volunteers could be informed by the non-profit sector. Organizations in this sector have valuable experience in attracting, retaining, developing and benefitting volunteers across many target communities.

Policy makers and program managers will need to consider how much control over priority-setting and implementation processes they are willing to relinquish to target communities. Trust will be key.



QUESTIONS FOR DISCUSSION

- How should we define inclusive innovation? What is meant by inclusive in the Canadian context? What kinds of communities need to be included?
- What benefits can inclusive innovation offer? How could inclusive innovation enable the Government of Canada to better serve Canadians? What would success look like?
- What are the risks, tensions or challenges associated with inclusive innovation that you would be concerned about? For example, in pursuing inclusive innovation are we risking less evidence-based science and innovation?
- Thinking about the particular features of Canada's science and innovation system – including your knowledge of the system's culture, organization, governance and resources (including people) -- how might these need to be changed to foster inclusive innovation?
- Can inclusive innovation build trust? What governance structures foster inclusion and trust among the target communities, and ensure the ethics and sustainability of the innovations? Can inclusive innovation be measured?



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APPENDIX 1: GLOSSARY

Type of Innovation	Definition and source
Citizen science	<p>“Citizen science is the practice of public participation and collaboration in scientific research to increase scientific knowledge. Through citizen science, people share and contribute to data monitoring and collection programs.” (National Geographic Society, undated)</p> <p>“Citizen science is the voluntary involvement of the public in scientific research. Citizen scientists can help design experiments, collect data, analyze results, and solve problems.” (U.S. National Park Service, not dated.)</p> <p>“The term citizen science means a form of open collaboration in which individuals or organizations participate in the scientific process in various ways, including (A) enabling the formulation of research questions; (B) creating and refining project design; (C) conducting scientific experiments; (D) collecting and analysing data; (E) interpreting the results of data; (F) developing technologies and applications; (G) making discoveries; and (H) solving problems.” (US Crowdsourcing and Citizen Science Act (15 USC 3724) (2016) cited in Vohland <i>et al.</i>. 2021, 16.)</p>
Frugal	<p>“In general, frugal innovation focuses on (re)designing products, services and business models in order to reduce complexity and total lifecycle costs while providing high value and affordable solutions for BOP customers in developing countries.” [BOP = bottom of pyramid] (Onsongo and Knorrninga, 2020, 1.)</p>
Innovation (general)	<p>“An innovation is a new or improved product or process (or combination thereof) that differs significantly from the unit’s previous products or processes and that has been made available to potential users (product) or brought into use by the unit (process*)”.</p> <p>*Functional categories of processes: production of goods or services; distribution and logistics; marketing (methods and new market development; pricing strategies and methods, and sales and after-sales activities; information and communications systems; administration and management (strategic and general management, governance, finances, human resources, procurement, relationship, etc.); product and business process development.</p>



	<p>Notes: The term innovation can be used to describe both an activity as well as the outcome of the activity. Value creation is an implicit goal of innovation (page 254). Criteria for innovation activities are knowledge, novelty, implementation, and value creation (pages 46-48). (OECD/Eurostat 2018, 20 and 73.)</p>
<p>Inclusive innovation</p>	<p>“Innovation is the development, diffusion, or implementation of new or improved products, services, and processes that generate economic or social value for individuals, firms, communities, and/or economies.”</p> <p>Innovation requirements:</p> <ul style="list-style-type: none"> • “the emergence or adoption of a new or improved product, service, or process; and • the generation of new value, whether economic or social” <p>An innovation economy is inclusive when there are:</p> <ul style="list-style-type: none"> • opportunities for all people to participate as workers (in good jobs with decent wages and security), entrepreneurs (if they choose), and consumers (with sufficient resources to lead good lives); • fair distributions of the benefits and harm produced by innovation—including more attention to and management of where and to whom the economic and social gains of innovation and growth flow, and who bears the burden of market failures and negative externalities; and • opportunities for people to participate in decision-making about the priorities, direction, and regulation of innovation” <p>Munro and Zachariah 2021, 4-5</p>
<p>Inclusive innovation</p>	<p>“(I)nclusive innovation is the means by which new goods and services are developed for and/or by the billions living on the lowest incomes”</p> <p>“(I)nclusive innovation explicitly conceives development in terms of active inclusion of those who are excluded from the mainstream of development.”</p> <p>At least one of the following four inclusivity criteria must be met:</p>



	<ol style="list-style-type: none"> 1) “Inclusivity of innovation precursors: for example that problems to be addressed by innovation are of relevance to the poor. 2) Inclusivity of innovation processes: for example that the poor are involved in the development of innovative goods and services. 3) Inclusivity of innovation adoption: for example that poor consumers have the capabilities to absorb innovations. 4) Inclusivity of innovation impacts: for example that innovative goods and services have a beneficial effect on the livelihoods of the poor.” <p>(Foster and Heeks, 2013, 335)</p>
<p>Inclusive innovation</p>	<p>“Inclusive innovation is the development of new ideas which aspire to create opportunities that enhance social and economic wellbeing for disenfranchised members of society – it has action and actionability at the core of its definition.”</p> <p>(George <i>et al.</i>, 2019, 19.)</p>
<p>Open science</p>	<p>The idea behind Open Science is to allow scientific information, data and outputs to be more widely accessible (Open Access) and more reliably harnessed (Open Data) with the active engagement of all the stakeholders (Open to Society). (UNESCO, not dated.)</p> <p>By encouraging science to be more connected to societal needs and by promoting equal opportunities for all (scientists, policy-makers and citizens), Open Science can be a true game changer in bridging the science, technology and innovation gaps between and within countries and fulfilling the human right to science.</p> <p>“Open science’ describes a movement to promote greater transparency in scientific methodology and data, the availability and reusability of data, tools and materials by researchers; and the availability to researchers and the general public of research results (particularly when publicly funded).”</p> <p>(OECD/Eurostat 2018, 133.)</p>
<p>Responsible Research and Innovation (RRI)</p>	<p>“RRI is an inclusive approach to research and innovation (R&I), to ensure that societal actors work together during the whole research and innovation process. It aims to better align both the process and outcomes of R&I, with the values, needs and expectations of European society. In general terms, RRI implies anticipating and assessing potential implications and societal expectations with regard to research and innovation.”</p>



	<p>RRI is a “[T]ransparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).”</p> <p>“Responsible innovation is a collective commitment of care for the future through responsive stewardship of science and innovation in the present.” (Schroeder <i>et al.</i>, 2016)</p>
Social	<p>“Innovations defined by their (social) objectives to improve the welfare of individuals or communities.” (OECD/Eurostat 2018, 253.)</p> <p>“Social innovation refers to new ideas which, when adopted, improve a community’s well-being.” (ESDC, 2018, 5.)</p> <p>“Social finance refers to the practice of making investments intended to create social or environmental impact, in addition to financial returns.” (ESDC, 2018, 5.)</p> <p>“Social Innovation relates to the development of new forms of organisation and interactions to respond to social issues (the process dimension). It aims at addressing (the outcome dimension):</p> <ul style="list-style-type: none"> • • Social demands that are traditionally not addressed by the market or existing institutions and are directed towards vulnerable groups in society. • • Societal challenges in which the boundary between ‘social’ and ‘economic’ blurs, and which are directed towards society as a whole. • • The need to reform society in the direction of a more participative arena where empowerment and learning are sources and outcomes of well-being.” <p>(Meissner, D., W. Polt, and N. Vonortas. 2017, 1194 quoting BEPA 2011, 43.)</p>
Undone science	<p>“The undone science framework describes the systematic neglect of scientific issues that impact marginalised groups.” (Woodson and Williams 2020)</p>



User	“User innovation refers to activities whereby consumers or end-users modify a firm’s products, with or without the firm’s consent, or when users develop entirely new products.” (OECD/Eurostat 2018, 254.)
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APPENDIX 2: CANADA'S INCLUSIVE INNOVATION AGENDA

Positioning Canada to Lead: An Inclusive Innovation Agenda

1. Entrepreneurial and Creative Society – Being innovative becomes a core Canadian value (p.4) (Supporting business and social networks with objectives to improve lives.)
2. Global Science Excellence – Canadian science capabilities and research infrastructure become among the best in the world (pp. 4-5) (Strengthening basic and applied research capabilities)
3. World-Leading Clusters and Partnerships – Super clusters that are the destination of choice for ideas, talent and capital (p. 5)
4. Grow Companies and Accelerate Clean Growth – Canadian companies compete to win and create jobs (p. 5) (Creating jobs in Canada.)
5. Compete in a Digital World – Canada is at the forefront of economy-wide digital development and adoption (p. 6) (Providing affordable high-speed Internet access for rural and low-income Canada)
6. Ease of Doing Business – Canada is the location of choice for investment and growth (p. 6)



APPENDIX 3: ADDITIONAL RESOURCES

INCLUSIVE INNOVATION PODCASTS / WEBINARS:

[Canada's future skills strategy: Workforce development for inclusive innovation](#)

This is a recording of the January 19th 2021 webinar discussing the Future Skills Council report, released in November 2020, which recommends equitable and competitive labour market strategies in response to disruptive technological, economic, social and environmental events. It aims to provide a roadmap to a stronger, more resilient future for Canada. In this webinar, panelists discuss the report's key action areas and pathways to successful implementation. Speakers: Rachel Wernick, Denise Amyot, Dan Munro, & David Ticoll.

[Inclusive Innovation: COVID and After](#)

This is a recording of the December 10th 2020 webinar discussing the importance of inclusive innovation; policies needed to bring it about; opportunities and prospects for doing so in the era of COVID-19; and new initiatives for measuring and tracking progress – including GDP 2.0 and the Innovation Policy Lab's Inclusive Innovation Monitor. Speakers: **Dan Breznitz, Susan Helper, Daniel Munro, & Anjum Sultana**

[Who has a seat at the innovation table? | Nesta](#)

On paper, the UK is a hotbed of innovation. But are we getting it right in practice? Is innovation

