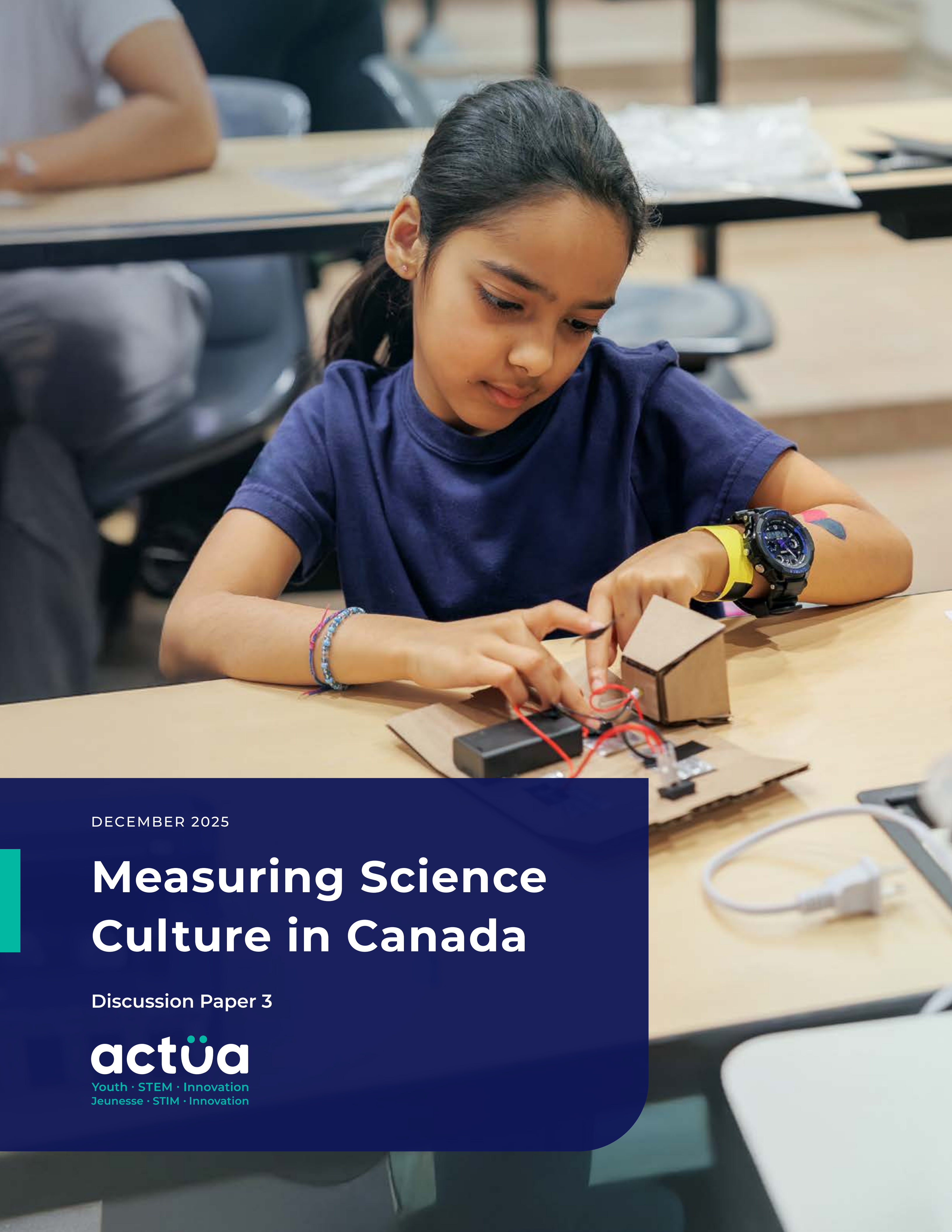

DECEMBER 2025

Measuring Science Culture in Canada

Discussion Paper 3

actua

Youth · STEM · Innovation
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Actua Asks: How Can We Measure Science Culture and Systemic Change?

Actua is creating a Canada where every child has the skills and confidence they need to achieve their full potential. As a leading science, technology, engineering and mathematics (STEM) outreach organization, Actua includes over 40 universities and colleges, engaging 500,000 youth in 600 communities each year. For 25 years, Actua has focused on identifying and removing the barriers for entry into STEM and now has national programs dedicated to engaging Indigenous youth, girls and young women, Black youth, those facing economic barriers and youth in Northern and remote communities.

At Actua, strengthening science culture and advancing systemic change in STEM are central to our mission of unlocking youth potential and breaking down barriers to STEM participation.[1] To truly understand our progress, we need to know what to measure and how to measure it. This discussion paper explores the challenge of measuring, including how to track whether science culture is becoming stronger, more inclusive and more equitable. We also need ways to measure where change is happening and where it may be stalling, so we can sustain momentum and ensure continued progress.

Introduction: Measuring What Matters

Improving Canada's science culture and achieving systemic change are important steps in enhancing equitable and sustainable health, wealth and well-being.[2] Part of this involves ensuring that Canadians have the skills, knowledge and attitudes that allow them to contribute to and benefit from science and innovation, and to engage in informed discussion about the direction and pace of science and technological developments. Another part involves reshaping the structures that act as enablers or gatekeepers to participation in science and fair distribution of benefits.

Efforts to improve science culture and achieve systemic change are widespread and there are signs of progress. But how do we know? What are the measures we should be looking at to know whether Canada's science culture is becoming more or less robust, how its components are distributed across demographic groups, and whether systemic change to enable more equitable and inclusive participation in STEM is actually occurring? If we want to improve, we need indicators to measure progress. What are those indicators?

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[1] To learn more about Actua's approach to science culture and systemic change in Canada, visit actua.ca to read two additional discussion papers: *Reimagining Science Culture in Canada*, Aug. 2025 and *Pipelines to Systems: Thinking About Systemic Change in STEM*, Aug. 2025.

[2] This discussion paper was prepared by Daniel Munro, Director of Research and Innovation at Actua, with substantial contributions from Bissy Waariyo. For constructive reactions and discussions, we thank Doug Dokis, Jennifer Flanagan, Virginia Hall, Val Iannitti, Creig Lamb, Rhonda Moore and Tracy Ross.

REFRESHING SCIENCE CULTURE MEASUREMENT

There are very few comprehensive efforts to measure science culture and systemic change in Canada. Occasional surveys and data offer windows onto some dimensions, but these are rarely rolled into overviews of the state of science culture as a whole. The most notable exception is the Council of Canadian Academies' 2014 report, Science Culture: Where Canada Stands, which offered a robust picture of Canadians' attitudes, engagement, knowledge and skills relevant to science.[3]

That report and its data are now over a decade old and new dimensions of science culture have emerged that are not included in the CCA's framework – including concerns about equity, diversity and inclusion; a focus on the institutions and systems that shape opportunities to participate in and benefit from science; and efforts to make science governance more participatory and democratic. Canada needs a fresh look at the state of science culture.

PURPOSE

This discussion paper sets out key features of an approach for measuring science culture and systemic change in Canada. It articulates core principles for measurement and identifies potential pitfalls. Building on other efforts to measure science culture and systemic change, it presents a framework and lists candidate indicators for consideration.

A key takeaway is that we face many data gaps to understanding the current state of Canada's science culture and systemic change efforts. In some cases, this is a result of data sources not being updated for at least a decade. In other cases, new dimensions of science culture do not yet have data or well-tested approaches for collecting data. Knowing where these gaps are and why they matter will help point new measurements efforts in relevant directions.

The paper is intended to spur and inform discussion, not to offer rigid conclusions. There are many people and organizations in Canada's science, technology and innovation ecosystem who have insights to contribute. Our hope is that this paper will prompt more organizations to engage in collaborative activities to refine the approach, collect and share relevant data, and discuss the implications of results for further improving science culture and driving systemic change.

[3] Council of Canadian Academies (2014) *Science Culture: Where Canada Stands.* Ottawa: The Expert Panel on the State of Canada's Science Culture, Council of Canadian Academies.

REIMAGINING SCIENCE CULTURE IN CANADA

Our efforts to rethink and reimagine science culture involve three related discussions: defining science culture, understanding systems and systemic change, and measuring science culture. To ensure that we give sufficient attention to each theme, we have prepared three discussion papers that explore the relevant dimensions and offer some preliminary thinking.

- Paper 1: Reimagining Science Culture in Canada
- Paper 2: From Pipelines to Systems: Thinking About Systemic Change
- Paper 3: Measuring Science Culture in Canada

The first two papers extend how we think about science culture and systemic change, while the third (the current paper) explores ways to measure both and offers a rough assessment on how Canada is doing.

Science Culture and Systemic Change

To understand how to measure, we should remember what it is that we are trying to measure. Actua's previous discussion papers offer accounts of science culture and systemic change that, while provisional, provide some orientation.

SCIENCE CULTURE

Our understanding of science culture incorporates and extends the framework developed by the Council of Canadian Academies (CCA) in its 2014 report, *Science Culture: Where Canada Stands*.[4] The CCA emphasized four dimensions of science culture: public ***attitudes*** towards science and technology; public ***engagement*** in science; public science ***knowledge***; and science and technology ***skills***.

In our discussion paper, we reinforce the CCA's framework and note that science culture ought to incorporate three additional dimensions or lenses:

- ***equity, diversity and inclusion*** or, how attitudes, engagement, knowledge and skills – as well as opportunities to benefit from science – are *distributed* among identities and intersecting identities;

[4] Council of Canadian Academies (2014) *Science Culture: Where Canada Stands.* Ottawa: The Expert Panel on the State of Canada's Science Culture, Council of Canadian Academies.

- ***institutions and systems***, recognizing that structures have as much impact on people's opportunities to participate in and benefit from science as the levels and distribution of individuals' skills, knowledge and confidence; and

- ***participatory democratic governance*** of the priorities, direction and pace of science and technology in society. A science culture that takes seriously the relationship between science and society should offer meaningful opportunities for informed and motivated citizens to shape how science is done and how it affects their lives and communities.

SYSTEMIC CHANGE

Our evolving approach to imagining science culture emphasizes the importance of the institutions and systems that occupy and shape the science ecosystem. As we note in our discussion paper on systemic change, organizations working to improve EDI are increasingly recognizing that systems are getting in the way. Even when people who work in and manage STEM institutions have good intentions to advance EDI, underlying structures and systems can undermine their efforts and perpetuate injustice.[5]

What science ecosystems need is systemic change - that is, efforts that focus as much on reshaping the systems in which people live, learn and work as they do on equipping individuals with skills, knowledge and confidence to succeed within those systems. Concretely, this means analyzing and addressing ***system deficits*** rather than individual deficits; focusing on ***causes of exclusion*** and inequity and not just symptoms; developing ***holistic approaches***; and ensuring that the aims of systems and systemic change ***align with justice***. Systemic change aims to bend systems to serve people rather than bending people to fit into ineffective and unjust systems.

Measurement Principles

Well-designed measurement initiatives can provide some insight into the state of science culture, progress on improving it, and the impact of efforts to achieve systemic change. We want to know how Canada is doing on key indicators in order to help design and adopt programs and activities that might improve science culture, assess whether ongoing efforts are having a positive impact, and cease efforts that are having no or negative effects. Measurement can help with all of these goals.

[5] The late feminist philosopher, Iris Marion Young, articulated a compelling account of "structural injustice" whereby systems and structures themselves can generate unjust outcomes even if no individual agents working in or interacting with those systems or structures has any intention of behaving unjustly. I.M. Young (2011) *Responsibility for Justice* (Oxford University Press).

Still, developing meaningful measurement approaches can be hampered by differences in how one defines science culture, how indicators are selected and weighted, and whether data are accurate, current and genuinely illuminating. Moreover, measurement can introduce the risk that one focuses only on those things that can be measured to the exclusion of things that are harder to measure but are more important. Selecting indicators and data requires constant attention to the phenomena we are trying to measure – i.e., science culture and systemic change.

Measuring science culture should be guided by four principles: ***accuracy, reliability, comparability and meaningfulness***.

In general, indicators and measurement approaches are better when they are:[6]

- ***Accurate.*** Indicators and data should correctly capture the phenomenon being measured.
- ***Reliable.*** Indicators and data should consistently produce the same results for the same phenomenon when measured across time and space.
- ***Comparable.*** Indicators and data are more useful if they can be used to make comparisons – whether over time or across peer jurisdictions.
- ***Meaningful.*** There are many things that can be measured, but we should focus on those that give a sense of the important features or dimensions of science culture and systemic change. As Muller notes, not everything that is important is measurable, and much that is measurable is unimportant.[7]

Relatedly, when selecting indicators and interpreting data, we should evaluate what they appear to show in context. For example, public trust in scientific institutions is often included as a measure of science culture on the assumption that a higher level of trust implies a stronger science culture. But in some contexts, that is not true. Consider what it means for Americans to continue to trust federal health institutions when some of those institutions are staffed by people who reject basic scientific knowledge and processes.[8] High levels of trust in flawed institutions would signal a weak, rather than a strong, science culture. The upshot is that we need to be mindful of what indicators tell us by looking at the contexts in which they are collected.

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[6] These criteria are taken from D. Munro and C. Lamb (Forthcoming 2025) *Measuring Innovation in an Age of Intangibles: Discussion Paper for the Expert Panel on Innovation* (Council of Canadian Academies). https://cca-reports.ca/wp-content/uploads/2025/11/measuring-innovation-in-the-age-of-intangibles-knowledge-synthesis-paper.pdf

[7] J. Muller (2018). The Tyranny of Metrics (Princeton: Princeton University Press).

[8] R. Stein (2025). “Ancient miasma theory may help explain Health Secretary Robert F. Kennedy Jr.'s vaccine moves.” NPR. https://www.npr.org/sections/shots-health-news/2025/06/14/nx-s1-5429732/ancient-miasma-theory-may-help-explain-health-secretary-robert-f-kennedy-jr-s-vaccine-moves

Additionally, we should keep in mind that a strong science culture **does *not* require everyone to exhibit the same level of scientific knowledge** or even the same kinds of knowledge. The level of science literacy required to benefit from and contribute to science as a citizen is much more modest than that required by, for example, a physics teacher, engineer or nuclear safety technician. Moreover the kind of knowledge required will vary by role and context. In that case, while aggregate indicators and measures are important, we will also want to think about science culture in different contexts and roles.

Finally, it is useful to maintain ***humility about measurement ambitions***. There are some things we would like to measure but for which there are no existing data sources – or at least not obvious sources. At the same time, while approaches to collecting new data could be developed, sometimes the nature of the thing we want to measure does not lend itself to easy measurement. This is especially true of systemic change. At other times, there may be ways to collect data, but ethical considerations caution against doing so.

Measurement Frameworks

With these principles in mind, how should we go about measuring science culture and systemic change in Canada?

CCA'S SELECTED SCIENCE CULTURE INDICATORS

The CCA's framework for measuring science culture provides a good foundation, to which we can add measures for EDI, institutions and systems, and participatory governance. The CCA developed indicators for each of the four dimensions of science culture in its model, recognizing that good data are not always available. Two points are worth nothing at the outset:

- First, in addition to relying on data from Statistics Canada, the OECD and other public sources, the CCA commissioned its own public opinion surveys to fill some gaps. While the public sources regularly report new data, the surveys commissioned by CCA, as well as some of the surveys used for international comparisons, were snapshots in time and have not been repeated since the assessment was released in 2014.

- Second, in some cases, the CCA has developed ***indices*** of certain dimensions that combine individual metrics into a single measure. We have noted where the CCA uses an index and highlight the individual metrics that comprise the index where possible.

We have included some additional indicators that would help to give a more robust picture for each of the CCA's four dimensions of science culture. We have italicized these indicators in the table below.

MEASURING EQUITY, DIVERSITY AND INCLUSION IN SCIENCE CULTURE

Measuring science culture with EDI and distributive lenses in mind is ***complicated by data gaps***, but it is nevertheless ***critical that we include these lenses*** even if only aspirationally.

As we note in our discussion paper on rethinking the definition of science culture, we should be attentive to how the dimensions of science culture are distributed among demographic identities.[9] Key elements of science culture (including skills, attitudes and knowledge) are associated with a range of economic, social, health and other outcomes and it is likely that differences in the distribution of the dimensions have implications for who gets to participate in and benefit from science. In that case, we want indicators that give us insight into that distribution so that we can adopt and track progress on efforts to improve the distribution.

The CCA report offered some insight into differences by gender, age, education and socio-economic status, but not on a range of other important identities. For some dimensions where the CCA relied on its own survey – such as attitudes to and engagement in science – there are gaps in our knowledge and no readily available sources to fill those gaps. For other dimensions – specifically, knowledge and skills – there are data sources that simply need to be drawn into the fold, such as scores in the OECD's PISA and PIAAC and Canadian census data on educational attainment and STEM employment by demographics. However, data to compare Canada to other jurisdictions through an EDI or distributive lens are not always available.

Measuring science culture with EDI and distributive lenses in mind is complicated by data gaps, but it is nevertheless critical that we include these lenses even if only aspirationally.

[9] Actua (2025). *Reimagining Science Culture in Canada*. Some of our thinking on incorporating an EDI or distributive lens into science culture measurement is informed by work on the Inclusive Innovation Monitor by the Munk School of Global Affairs' Innovation Policy Lab and Toronto Metropolitan University's The DAIS. D. Munro (2020) *An Inclusive Innovation Monitor for Canada: Discussion Paper* (Munk School & The DAIS); D. Munro and J. Zachariah (2021). *Inclusive Innovation Monitor: Tracking Growth, Inclusion and Distribution for a More Prosperous, Just Society* (Munk School & The DAIS)

MEASURING SCIENCE CULTURE - CCA FRAMEWORK[10]

<table>
<tr><th>DIMENSION</th><th>INDICATOR</th><th>EDI/DISTRIBUTION</th></tr>
<tr><td rowspan="3">Public attitudes towards science and technology</td><td>Public views about the “promise” of science (index)</td><td rowspan="15">How do each of the indicators differ by demographic identity (and intersecting identities), including:
• age
• class
• (dis)ability
• racial identity
• gender
• immigration experience
• Indigenous identity
• geography
• urban-rural-remote
• region
• province/territory</td></tr>
<tr><td>Public reservations about science (index)</td></tr>
<tr><td>% population agreeing government should support science even if it does not generate immediate benefits</td></tr>
<tr><td rowspan="6">Public engagement in science</td><td>% population interested in new scientific discoveries and tech developments</td></tr>
<tr><td>% population that has visited a science and technology (S&T) museum in previous year</td></tr>
<tr><td>% population that signs petitions or joins demonstrations on matters of nuclear power, biotechnology or the environment</td></tr>
<tr><td>% population that regularly or occasionally attends public meetings/debates about S&T</td></tr>
<tr><td>% population that participates in activities of an NGO focused on S&T issues</td></tr>
<tr><td>% population that donates to fundraising campaigns for medical research</td></tr>
<tr><td rowspan="5">Public science knowledge</td><td>Estimated % population that demonstrates a basic level of scientific literacy</td></tr>
<tr><td>Average score on PISA science test (15 year olds)</td></tr>
<tr><td>Average score on PISA math test (15 year olds)</td></tr>
<tr><td>Average score on PIAAC numeracy (Adults 15-64)</td></tr>
<tr><td>Average score on PIAAC problem-solving (Adults 15-64)</td></tr>
</table>

[10] The CCA draws on domestic and international sources to populate the indicators with relevant data. Canadian data in the public attitudes and engagement dimensions draw mainly from a survey the CCA commissioned (CCA 2014, *Panel Survey Data*) with domestic comparisons to a similar survey conducted in 1989 (Einsiedel 1990) and another by EKOS in 2004. International comparisons are made using data drawn from the National Science Board (2012) *Science & Engineering Indicators; the World Values Survey* (2013); and the European Commission (2010) *Eurobarometer*. Data for the public science knowledge dimension are drawn from the CCA (2014) and Einsiedel (1990), with comparisons using NSB (2012) and EC (2010); as well as the OECD's PISA survey. Our proposed additions draw from the OECD's PIAAC (adult skills) surveys. Data for science and technology skills use Statistics Canada and OECD data.

DIMENSION	INDICATOR	EDI/DISTRIBUTION
Science and technology *skills*	% population with tertiary education (25-64)	
	% of first university degrees in science or engineering	
	% of first university degrees in science fields awarded to women (and by other identities)	
	% of first university degrees in engineering awarded to women (and by other identities)	
	% of all doctoral degrees in science and engineering fields	
	% of total employment in science and technology occupations	

MEASURING INSTITUTIONAL HEALTH

The CCA's model generally measures and aggregates individual dimensions of science culture – e.g., how many individuals have relevant attitudes, engagement, knowledge and skills and to what extent. While the report did make valiant efforts to map the informal science education system (e.g., museums, science advocacy organizations, science media ecosystem), the result was limited. **Given how important institutions are to science culture, more attention should be paid to measuring the health of the institutional ecosystem.** How might we do that?

Consider a few options. We offer these neither as settled nor as comprehensive, but as possibilities for review and discussion. While it is hard to say how many, what kinds and how well resourced certain institutions need to be to conclude that one has a strong science culture, we can select indicators that, if observed over time, can tell us whether we are seeing improvement or deterioration.

MEASURING INSTITUTIONAL HEALTH: CANDIDATE INDICATORS

INSTITUTION TYPE	CANDIDATE INDICATORS
Science Centres and Museums	• Total number • Ratio of science centres and museums to population • Geographic accessibility • Resources (e.g., funding, staff, facilities)

INSTITUTION TYPE	CANDIDATE INDICATORS
Science Media Ecosystem	• Total science journalists; science journalists per capita • Media outlets focused on science or with dedicated section • Circulation/Impressions • Resources
Informal Science Education (e.g., youth camps, clubs, workshops)	• Total offerings/participation • Distribution of participation (by demographic identities) • Geographic reach • Resources (e.g., funding, staff, facilities)
Formal Science Education	• Science educators (secondary and post-secondary) • Post-secondary science programs • Geographic accessibility • Resources (e.g., funding, staff/faculty, facilities)
Science Governance and Science in Government	• Science Advisors & Advisory Bodies (federal, prov/territorial, municipal) • Total scientists working in government • Policy-makers' use of science in decision-making
Laws, Policies, Programs and Funding	• Level/distribution of science funding (e.g., R&D, education) • Extent to which laws/policies/programs support pursuit and use of science to benefit society

Most, though not all, of these indicators are quantitative. A rich picture of the institutional ecosystem of a science culture should also take a qualitative approach – for example, assessments of whether science journalists' output is scientifically accurate, whether policy-makers use the best science and not merely that which confirms their pre-existing views, and whether science museums and informal and formal education organizations offer high quality educational experiences.

Moreover, even for the quantitative indicators, we want to pay attention to whether they are measuring what matters. For example, if a major science museum closes and two very small museums open in a given year, is that better, worse, or of no consequence for the health of the overall institutional ecosystem?

MEASURING SYSTEMIC CHANGE

Just as critical are measurements of systemic change. As we note in our discussion paper on systemic change, achieving meaningful inclusion and empowerment in science requires efforts not merely to upskill and educate individuals, but to reshape the institutions, structures and systems that block and exclude many otherwise skilled and talented people.[11] But developing an approach that meets the four criteria of good measurement is especially challenging in the case of systemic change for a few reasons:

- ***Scale.*** When we focus on science culture as the aggregate attributes and knowledge of individuals, we can select individual measures that tell us whether some aspect of science culture is improving, holding or deteriorating. When we focus on systems, however, no individual measure will be able to tell us whether systemic change is occurring because systems are large, multi-faceted phenomena. To know whether change is occurring in an education system, for example, we have to measure many features (e.g., funding, enrolment, performance) and across many institutions of different types (e.g., schools, boards, education ministries).

- ***Complexity.*** Systems are made up of many parts that interact with each other and with other external systems and actors to affect outcomes. Identifying what a system is and, critically, which features of a system are the driving forces of outputs and outcomes can be daunting. We might start with ***output indicators*** to see, for example, if a science education program is producing more women or Indigenous graduates. But understanding what exactly contributes to changes in those output indicators – or understanding why they might not be changing despite robust efforts throughout a given system – requires examining the various parts of a system and how they interact. More inclusive recruitment efforts might be for naught in the absence of well-designed mentorship practices, for example.

  This leads some measurement efforts to focus on mapping systems and measuring ***inputs***, in the hope that resourcing the right inputs will lead to desired outputs and outcomes. But that depends on knowing what the "right" inputs are and how they interact with other system features.

Given these challenges, there is a case to be made for ***context-specific*** and ***adaptive*** measurement approaches. Presumably, an organization or coalition of organizations pursuing a systemic change initiative will have diagnosed the challenge they aim to address. That diagnosis should reflect a logic model (explicit or implicit) about how acting on certain features might generate desirable outcomes. Measurement activities should be aligned with that logic model and indicators selected that track changes in inputs, intermediate outputs, and ultimate outcomes.

[11] Actua (2025) *Pipelines to Systems: Thinking About Systemic Change in STEM.*

Moreover, careful attention should be paid not only to whether the effort is moving the needle on the ultimate outcomes, but also to which input and intermediate variables, or combinations thereof, appear to be having the most influence. In doing so, the measurement approach can contribute to continuous improvement by helping change agents adapt their logic model and reassign resources to more salient variables.

In this case, what might be best to offer and discuss is not a set of indicators and data sources, but a set of questions that, once answered, would help change agents select the right indicators for their initiative.

- What is the ***ultimate change goal***?
  - How would you measure it?
- What does your ***diagnosis*** of the current state reveal about ***variables that likely shape ultimate outcomes***?
  - What are the inputs, intermediate variables, barriers, and mechanisms in your logic model?
  - How would you measure changes in each of them?
- How do ***variables interact*** in your logical model?
  - For example, if you enrol more participants from a certain underrepresented group, does that increase, lower or have no effect on the per-participant resources you have to support them?
- As you implement and observe the effects of your change initiative, ***what variables are having the greatest impact*** (for better or worse)?
  - Should you make changes to your initiative?
  - Do you need new measures/indicators for the revised initiative?

MEASURING DEMOCRATIC GOVERNANCE OF SCIENCE

A strong science culture ensures that people affected by science and technology have meaningful opportunities to shape the direction and pace of scientific and technological developments. As we note in our discussion paper on systemic change, institutionalizing a more democratic approach to science governance is no easy task. While citizens ought to have power to shape the direction and pace of science and technology in their societies, too many lack the knowledge and expertise needed to understand science, leaving them exposed to influence by narrow economic and political interests.

What this means for science culture is an open question. More democratic engagement is valuable, but how a conception of science culture should build that in and how it can and should be institutionalized require more thinking.[12] This does not mean that we cannot take some first steps towards measuring and mapping the existing ecosystem of democratic engagement.

We can start with the general question, ***What opportunities do citizens have for sharing views about and shaping the priorities, direction and pace of science and technology in society?*** Then, we can examine institutional arrangements for doing so. This might include quantifying and evaluating the impact of citizen participation in:

- Adherence to the duty to consult Indigenous groups (especially where actions might affect potential or established Indigenous or treaty rights);[13]
- Formal calls for input to decision making on science and tech issues, policies and programs (e.g., from federal, provincial/territorial and municipal S&T ministries, departments and agencies);
- Open consultation meetings/town halls;
- Multi-day deliberative consultations (e.g. Citizens' Assemblies);
- Permanent institutions that facilitate public engagement and deliberation on science and technology (e.g., Danish Board of Technology);[14]
- Political candidates' debates with a science and technology focus;
- Extent to which party platforms reflect public priorities and values about science and technology.

[12] F. Fischer (2009). *Democracy and Expertise: Reorienting Policy Inquiry* (Oxford University Press). See also Chapter IV of Council of Canadian Academies (2008). *Small is Different: A Science Perspective on the Regulatory Challenges of the Nanoscale* (CCA).
[13] Government of Canada (2025). *Government of Canada and the Duty to Consult* https://www.rcaanc-cirnac.gc.ca/eng/1331832510888/1609421255810
[14] Danish Board of Technology (2025). *About Us* https://tekno.dk/about-danish-board-of-technology/?lang=en.

Measuring the prevalence and quality of these kinds of participatory mechanisms is likely best achieved by a case-by-case or issue-by-issue approach which attends to the relevant context and uses both quantitative and qualitative measures. Theoretically, an index of how democratic or participatory a society's science culture is could be developed, informed in part by initiatives that measure and benchmark the state of democracy - such as the Varieties of Democracy (V-Dem) initiative and the Economist Intelligence Unit's Democracy Index.[15]

Advancing Science Culture Through Measurement

As science culture and systems are especially pervasive and complex phenomena, ***approaches to measurement must be multifaceted***, both quantitative and qualitative, and aligned with ***key measurement principles of accuracy, reliability, comparability and meaningfulness***.

Efforts to improve Canada's science culture and achieve systemic change require sound measurement. We want to know not only how we are doing and whether change efforts are having an impact on the overall health of science culture, but also whether opportunities to participate in and benefit from science are equitably distributed. We also want to know whether science priorities and policies reflect citizens' priorities and values. As science culture and systems are especially pervasive and complex phenomena, approaches to measurement must be multifaceted, both quantitative and qualitative, and aligned with key measurement principles of accuracy, reliability, comparability and meaningfulness.

At the same time, measurement efforts must be pursued with humility. We must recognize that we cannot measure everything that matters and that there is a risk of abandoning what matters for what can be measured. Still, there are many things we can do to improve measurement of science culture and systemic change in Canada. Efforts to do so are essential to acquiring a good understanding of the strengths and weaknesses of Canada's science culture, who benefits, who has a say, and how resources should be redistributed to improve outcomes for all.

[15] Varieties of Democracy (2025). The V-Dem Project. https://www.v-dem.net/about/v-dem-project/; Economist Intelligence Unit (2025). The Democracy Index. https://www.eiu.com/n/global-themes/democracy-index/

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