

The Indicator Project: Assessing the Impact of Open Science

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Canada – a global leader in OS



The screenshot shows the top portion of the SGC website. At the top left is the SGC logo, which consists of a stylized orange and yellow figure resembling a person or a molecule next to the letters 'SGC' in green. To the right of the logo are several partner university logos: the University of Toronto, the University of Oxford, UNICAMP, the Karolinska Institute, the University of North Carolina, and Goethe University Frankfurt am Main. Below these logos are two navigation links: 'About' and 'Science', both with downward-pointing arrows. Below the navigation links is a large graphic featuring a blue molecular structure with a red and yellow atom, set against a background of orange and red clouds. A light green box is overlaid on the left side of this graphic, containing the text 'About' and a description of the SGC as a public-private partnership.

About

The SGC is a public-private partnership that supports the discovery of new medicines through open access research.



Open Science Platform: SGC

- **Structural Genomics Consortium**
 - Originally re. 3D structure of proteins... epigenetic
 - Public-private collaboration
 - Huge success! 25% of global output of novel human protein structures/year
 - 40% of protein structures from human parasites
 - 2 clinical trials
 - Original agreements contemplated patent rights but never used
 - Current iteration explicitly open science



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Open Science Platform: MNI/Neuro

- **Montreal Neurological Institute**
 - World-recognised centre for neuroscience research and patient care
 - Frustrated at slow pace in neuroscience
 - Urgent need for new drugs and treatments
 - 1/3 Canadians affected by a brain disorder in their lifetime
 - Decided to take a radical approach to push change
 - Asked for our help to develop policy: independent, academic and transparent



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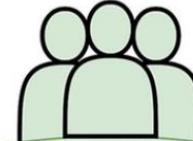
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1. Public release of data and other scientific resources

The MNI and its researchers will render all positive and negative numerical data, models used, datasources, reagents, algorithms, software and other scientific resources publicly available no later than the publication date of the first article that relies on this data or resource.



2. External research partnerships

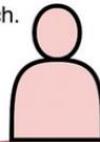
All data and scientific resources generated through research partnerships –whether with commercial, philanthropic, or public sector actors – are to be released on the same basis as set out in Principle 1.



5. Intellectual property

Subject to patient confidentiality and informed consent given, neither the MNI nor its researchers in their capacity as employees or consultants of McGill – MNI unit will obtain patent protection or assert data protection rights in respect of any of their research.

MNI Open Science Policy



4. Researcher and patient autonomy

The MNI supports the autonomy of its stakeholders, including but not limited to researchers, staff, trainees and patients, through recognizing their right to decline to participate in research and associated activities under an OS framework. However, the MNI will not support activities that compromise the OS principles outlined above.



3. The MNI Biobank

The Biobank will be managed in such a way as to remain financially self-sustaining, while continuing to enrich and strengthen its informational content and the knowledge it provides. In the conduct of the Neuro Biobank, the MNI recognizes the primacy of safe guarding the dignity and privacy of patient-participants, and respecting the rights and duties owed them through the informed consent process.

A Meta-Experiment

- While the MNI and SGC run their living experiments, we will study them
- The aim is to test three hypotheses:
 - That OS is a viable model to increase university-private-public collaboration
 - That OS reduces research and innovation barriers, makes them faster, more efficient
 - That OS leads to greater social and economic value
 - That OS leads to local value
- Identify 5 - 8 other OS projects and control institutions



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Methodology – assessing the value of OS

- Step 1: What should we measure?
 - Gather thought-leaders from government, philanthropy, industry, funders and patient organizations to answer this question:
 - What outcomes would lead your organization to invest (money, time, resources) into OS?
- Step 2: Bring international experts together to develop metrics based on answers provided in Step 1:
 - Produce indicator toolkit – measure OS progress and its social and economic outcomes
- Step 3: Collect data, develop data sharing platforms and share data
- Step 4: Analyze data and report back to stakeholders



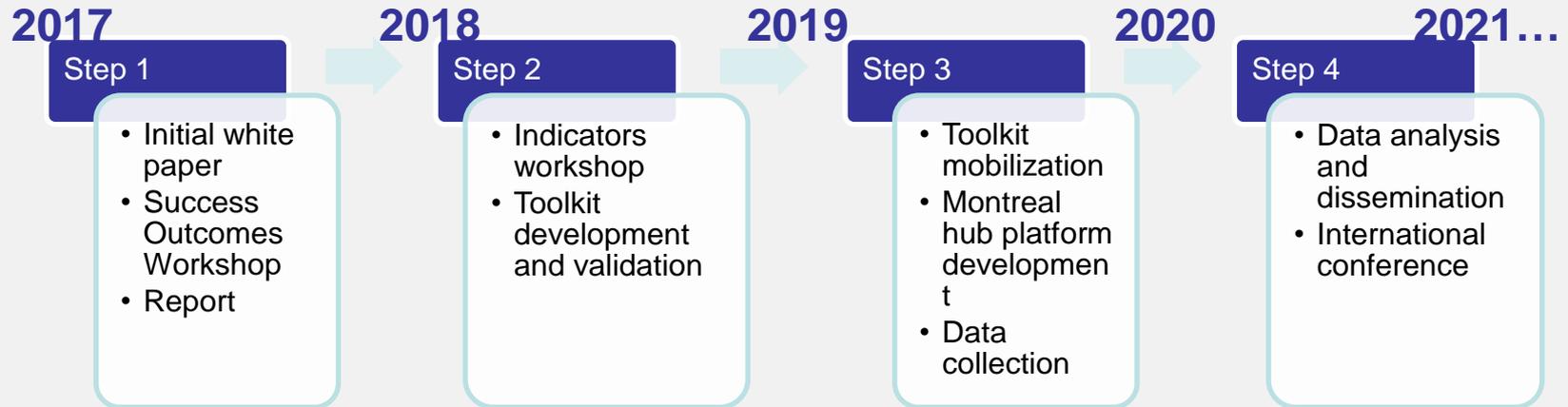
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Timeline



- Toolkit is unique – no metrics yet to measure social and economic outcomes of different innovation models
- Answer question: does OS work? In which contexts, mechanisms?
- If not, we will have novel data on why
- Answer long-standing questions about how we can maximize the value of S&T research and development



Outcomes of OS success

- Increased quality and efficiency of scientific outputs
- Accelerated innovation and impact
- Increased trust and accountability of research enterprise
- Increase equity in research
- Better opportunities and recognition for early stage researchers and youth
- Positive economic impact



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Types of Indicators: examples

- Independent variables
 - OS policy
 - Access to OS infrastructure
 - Scientific capacity
 - Investments in OS
- Are they doing OS? (controls)
 - % shared data, OA publication, decreased patenting
 - Amount of data up and downloaded
 - Citations to data
 - Attitudes to OS
- Dependent variables
 - Changes in funding to institution & researchers
 - Attraction of researchers, post-docs, grad students etc



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Types of Indicators: examples

- Normative uptake
 - # of organizations adopting OS initiatives
- Quality and efficiency
 - # , quality and diversity of datasets available + meta-data
 - # of negative results datasets
 - # of independent verifications
- Economic benefits
 - # of firms engaged in project
 - # of firms attracted to location, # new skilled jobs
 - # products/services made available through initiative
 - funds to universities from industry collaborations
 - Local private sector investment



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Types of Indicators: examples

- Innovation and impact
 - Diversity of research questions, research questions in completely new field
 - # local clinical trials
 - Time to innovate new products etc. of measurable public health impact
 - # and diversity of new clinical interventions
- Equity
 - Diversity of stakeholders collaborating in projects
 - Do patients feel they are more involved?
- Trust and accountability
 - # open projects and lab books, # pubs with open datasets, open peer review, OA pubs
 - # mechanisms to manage and market data to researchers, effectiveness
 - Public trust in research enterprise
 - Time and process to establish collaborations, 'trust' case studies



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Next steps

- Complete toolkit over 2018
- Identify partners around the world who are willing to collect and share data
- We plan to support these efforts by:
 - Disseminate toolkit internationally
 - Provide guidance on how to establish open science
 - Establish data hub through to share collected data
 - Work with stakeholders to identify barriers and source solutions among network participants



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BILL & MELINDA
GATES foundation



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