



ARCHIMÈDES

We are gathering today on the unceded traditional territory of the Algonquin Anishinabeg and the people of the Algonquin Anishinabeg Nation, which encompasses the watershed of the Kitchissippi (Big River) now commonly known as the Ottawa River. The Algonquin Anishinabeg have been here in the watershed for thousands of years long before European contact and will continue to be here well into the future.

We recognize all Indigenous people in the region, from all Nations across Canada, who have also made Ottawa their home.

We acknowledge the traditional knowledge keepers, both young and old. And we honour their courageous leaders: past, present, and future.

We dedicate ourselves to moving forward in the spirit of partnership and Reconciliation.



FACING THE WIND *by Claude Latour*

Dr. Rob Beanlands



President & CEO
University of Ottawa Heart Institute

Dr. Alan Evans



**Scientific Director of McGill's "Healthy
Brains for Healthy Lives" and
ARCHIMEDES Co-Lead**
Centre for Integrative Neuroscience

ARCHIMEDES

www.archimedesdata.ca



The *Advanced Research Collaboration for Health Integration, MEDical Exploration, and data Synthesis* (ARCHIMEDES) is a multimodal informatics infrastructure that provides users with access to curated and federated health data, with open-access repository and advanced predictive analytics functionality



Harmonized
Governance



Interoperable
Infrastructure



Multi-modal Data
Sharing

ARCHIMEDES Background

A Common Goal



Leadership Team



Dr. Jodi Edwards,
PhD
Co-Chair



Dr. Kelly Cobey,
PhD
Co-Chair



Dr. Alan Evans,
PhD
Co-Chair



Dr. Peter Liu, MD,
FRCPC
Co-PI

Our Partners

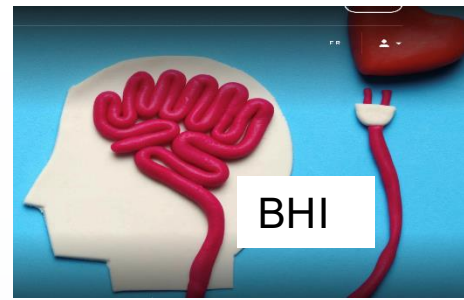


CFREF



HEALTHY BRAINS
FOR HEALTHY LIVES

Neurology, psychiatry



BRAIN-HEART
INTERCONNECTOME

Cardiology, neurology

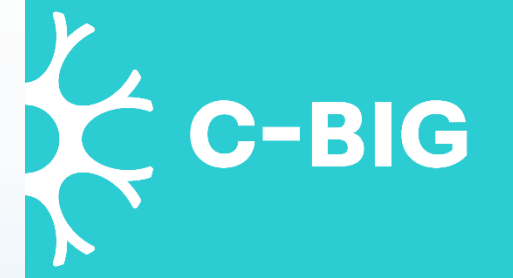
Organ/disease-agnostic platform



Network



pan-Canadian data/tool-sharing



Open tissue biorepository

IT

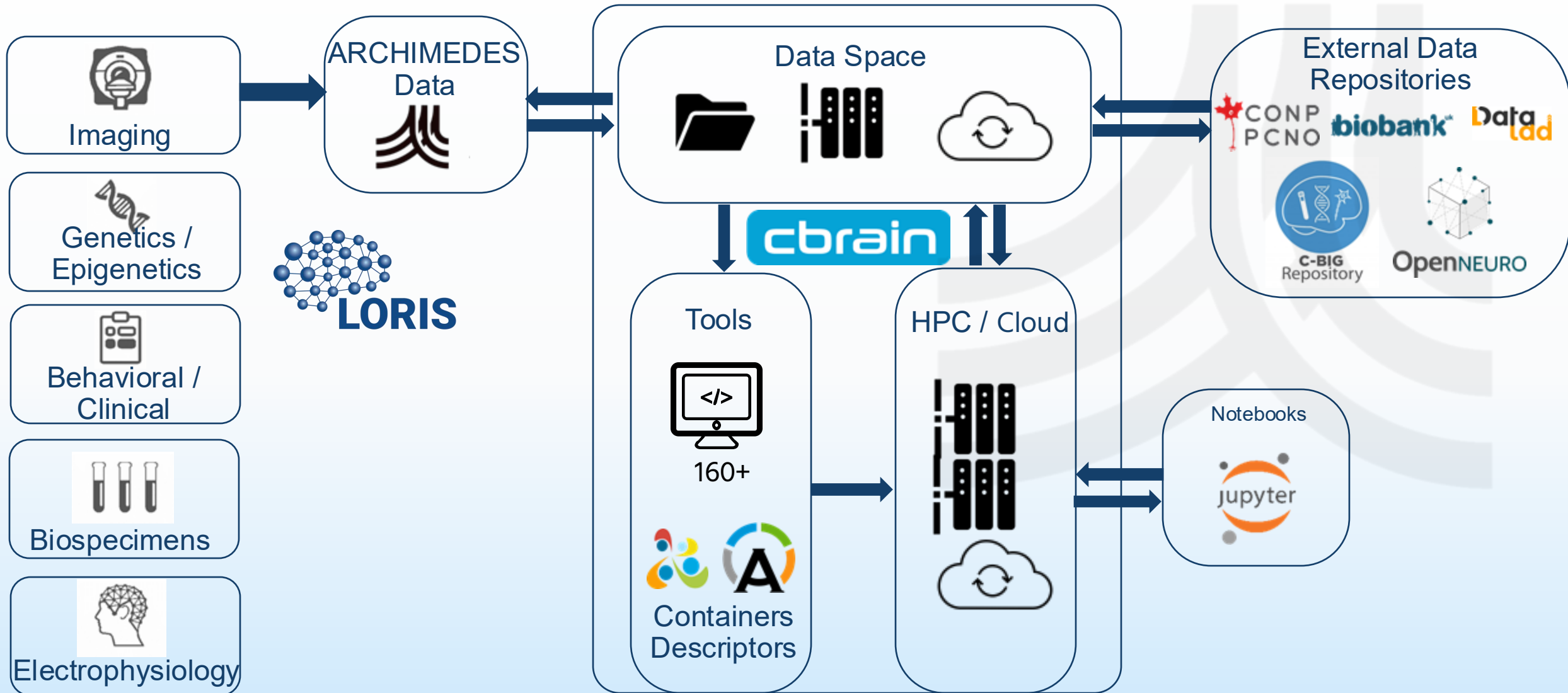


Multi-modality, multi-site database



HPC/cloud analytics portal

ARCHIMEDES





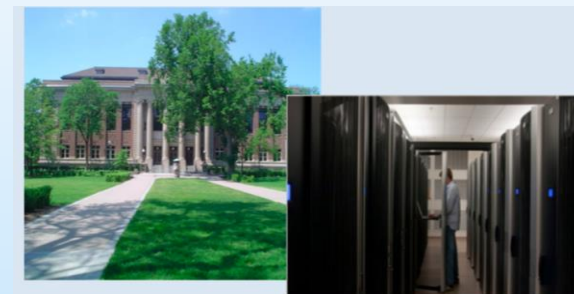
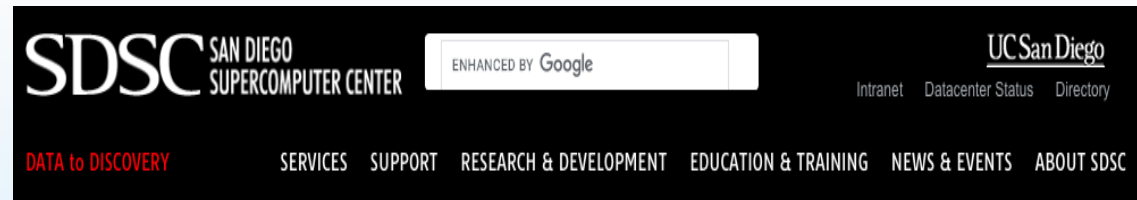
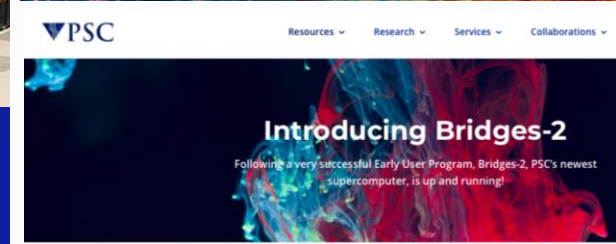
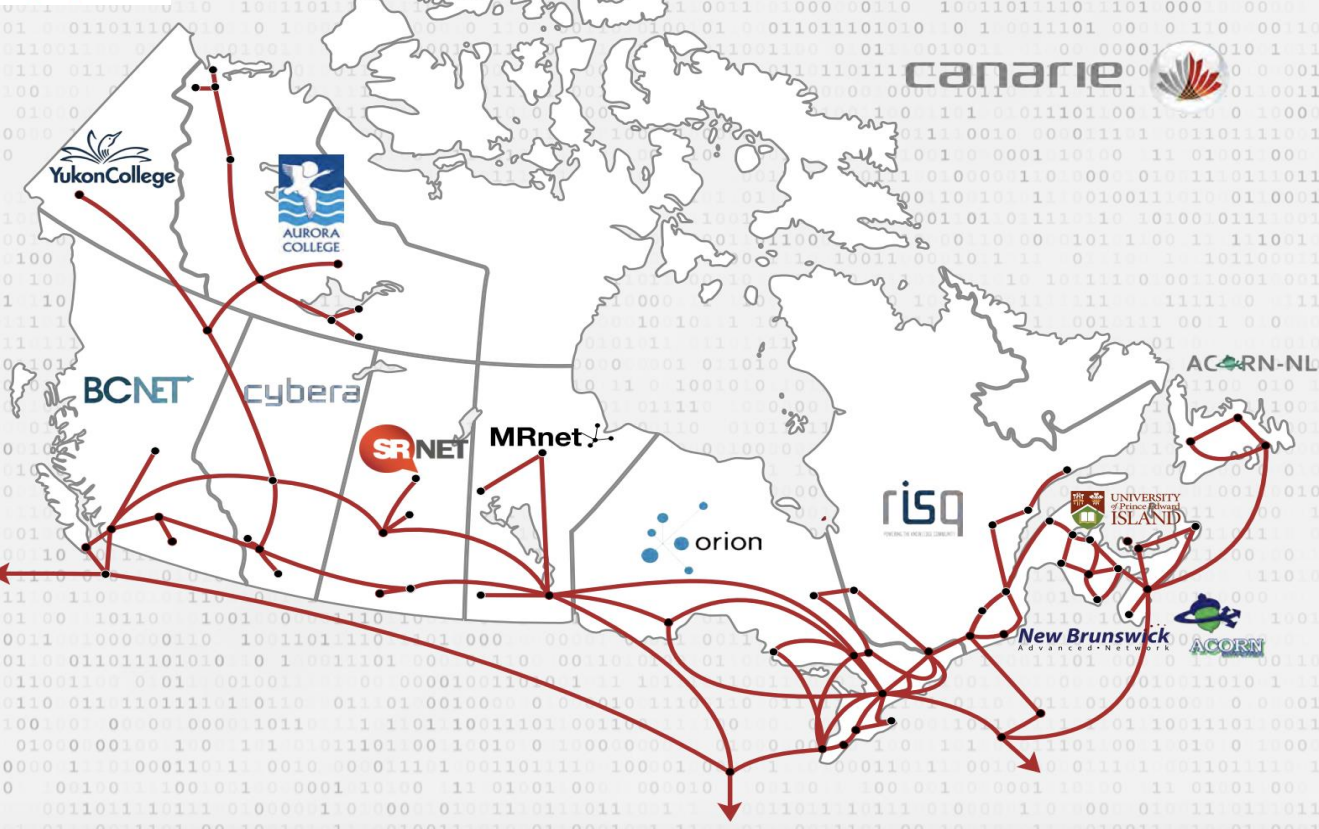
<https://cbrain.ca>

National

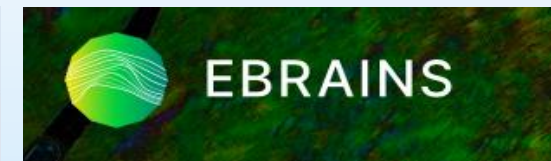
International

compute canada | calcul canada

Computational Resources provided by Compute Canada
~7 million CPU hours per year
8 PB of storage



UNIVERSITY OF MINNESOTA
Minnesota Supercomputing Institute



 **160+ Tools**

fMRI Analysis

fMRI Preprocessing

Structural MRI

Genomics
Transcriptomics

Tractography

PET

Arterial Spin Labeling

EEG

Data Conversion Tools

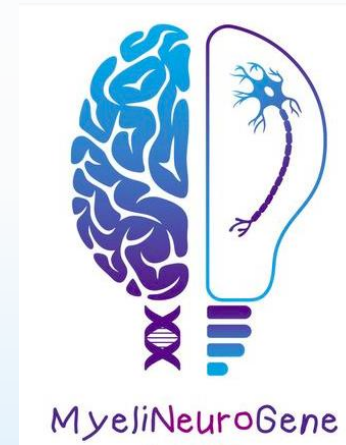
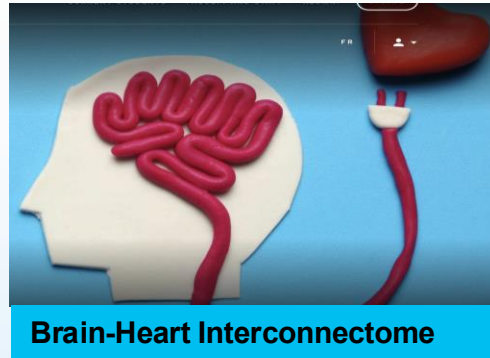
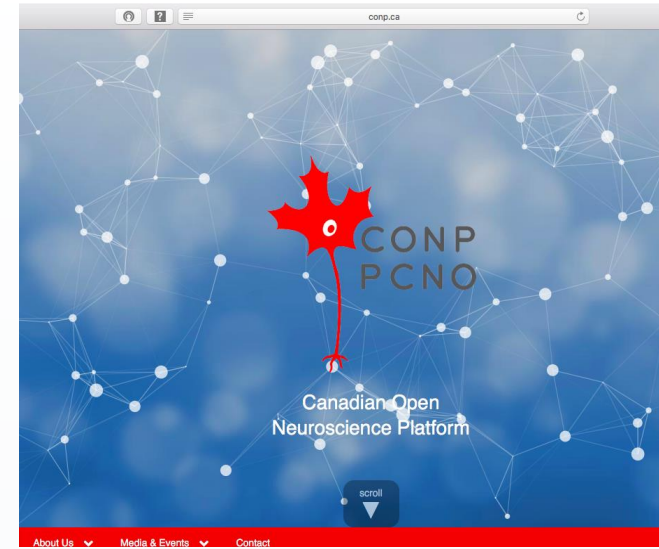
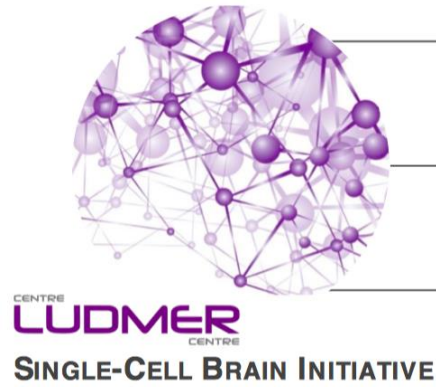
Statistics

Magnetic Resonance
Spectroscopy



Example Tool List: <https://portal.cbrain.mcgill.ca/available/>

Canada Networks



International

biobank^{uk}

Improving the health of future generations



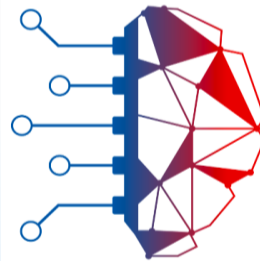
INFANT BRAIN IMAGING STUDY

\$65.7M



Adolescent Brain Cognitive Development[®]

Teen Brains. Today's Science. Brighter Future.



HIBALL

HELMHOLTZ International BigBrain
Analytics & Learning Laboratory



THE HEALTHY BRAIN
& CHILD DEVELOPMENT STUDY



THE **UNITED**
CONSORTIUM



**GLOBAL
BRAIN
CONSORTIUM**

Montreal Neurological Institute
de Grandpré Communications Centre

9-10 May 2019

The CANadian Openscience Ecosystem (CANOE - an application for rare diseases)

Genomics meets Phenomics: integrated analysis to enhance gene discovery and modeling of variants in an interdisciplinary approach

Large-Scale Genomics Resources



Pan-Canadian Genome Library
Bibliothèque génomique pancanadienne



Current C-BIG Infrastructure

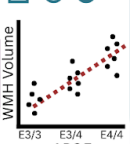
ID	Sex	Phenotype	Blood Sample	Imaging	Genomics	iPSCs
CBIG-001	F	Parkinson disease	S_002546	IMG_1214	WGS_44558	C_0341
CBIG-002	M	Alzheimer disease	S_007882	IMG_7554	EXM_04631	NA
CBIG-003	M	Congenital Malformation	NA	IMG_9491	WGS_12100	C_0074

Examples of use cases:

A) Family based analysis in rare disease



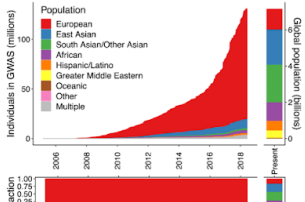
B) Modeling of variants of interest coupled with multimodal data



ID	Disease Category	Phenomic Data	Genomic Data	Biological Material	Genomic Assessment	Gene	Variant	Zygosity	Frequency in PCGL
CBIG-464	Neurological	Phen_0464	WGS_00464	NA	Affected homz child, carrier parents	SPG11	c.5769del (p.Ser1923fs)	Homz	4.22e-4
CBIG-772	Muscular	Phen_0772	EXM_00772	iPSC_772	De novo het child, non-carrier parents	LMNA	c.116A>G (p.Asn39Ser)	Het	1.08e-6
CBIG-893	Pediatric, Rare	Phen_0893	WGS_00893	FB_893	Affected het carrier, parents unknown	KMT2D	c.16018C>T (p.Arg5340Ter)	Het	NA

Benefits of Our Approach

1) Overcoming the European bias of genomics data: increase representation of underrepresented populations to enhance and expedite genetic diagnosis



Adapted from: Martin et al. 2019, Nat Gen

2) Expanding global-resources: contribute novel genes and variants to identify additional samples and disseminate data



Matchmaker Exchange



Disease-Specific Genomics Initiatives

3) Leveraging interdisciplinary teams and methods: model genes and variants *in vitro* and *in vivo* to functionally validate novel findings

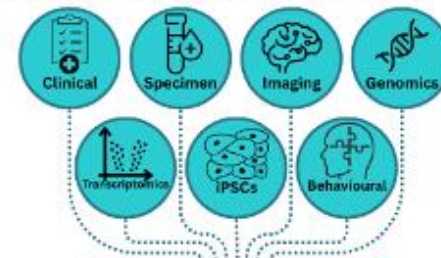
Early Drug Discovery Unit (EDDU) + Centre for Gene Therapy

- iPSCs and Other Cell Models
- Animal Models
- Gene Therapy

A. Pan-Canadian Genome Library participating centres



B. Current model of the C-BIG Repository

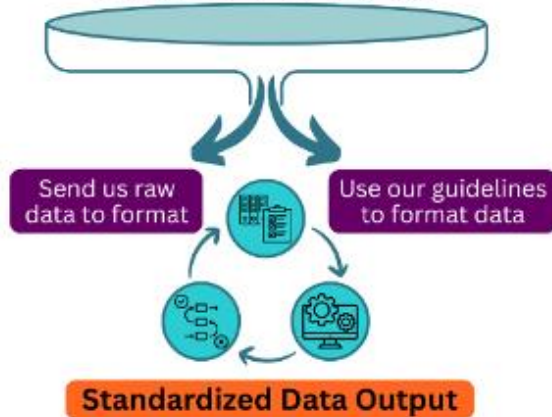


Multi-Modal Curation

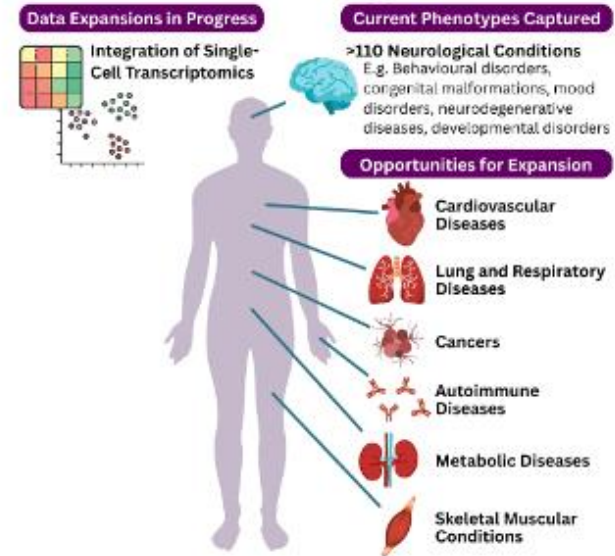
ID	Sex	Phenotype	Blood Sample	Imaging	Genomics	iPSCs
CBIG-001	F	Parkinson disease	S_002546	IMG_1214	WGS_44558	C_0341
CBIG-002	M	Alzheimer disease	S_007882	IMG_7554	EXM_04631	NA
CBIG-003	M	Congenital Malformation	NA	IMG_9491	WGS_12100	C_0074

C. Structuring of C-BIG's interoperable, secure database

Flexible Data Input



D. Disease and data versatility of the C-BIG model



Lasso: The ONLY Platform You Need

- 1 EEG Data
- 2 Wearable Data
- 3 MRI Data
- 4 Clinical data
- 5 Biosample data
- 6 Behavioural Data
- 7 Human or animal data
- 8 Demographic data



ACQUIRE DATA



PROCESS DATA



QC DATA



QUERY DATA

Dr. Jodi Edwards



Co-Lead of ARCHIMEDES
University of Ottawa Heart
Institute

Canada's
health
data are
uniquely
valuable





Canada's health data are siloed

Data matters. What we don't know about health care in Canada



Right now, Canada has no coherent national approach for collecting and sharing crucial health data.

<https://www.cma.ca/our-focus/workforce-planning/data-matters-what-we-dont-know-about-health-care-canada>

2025

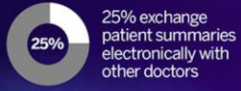
Canada needs a robust,
sovereign national health
data ecosystem



Primary health care electronic medical records

Information stored in PHC EMRs

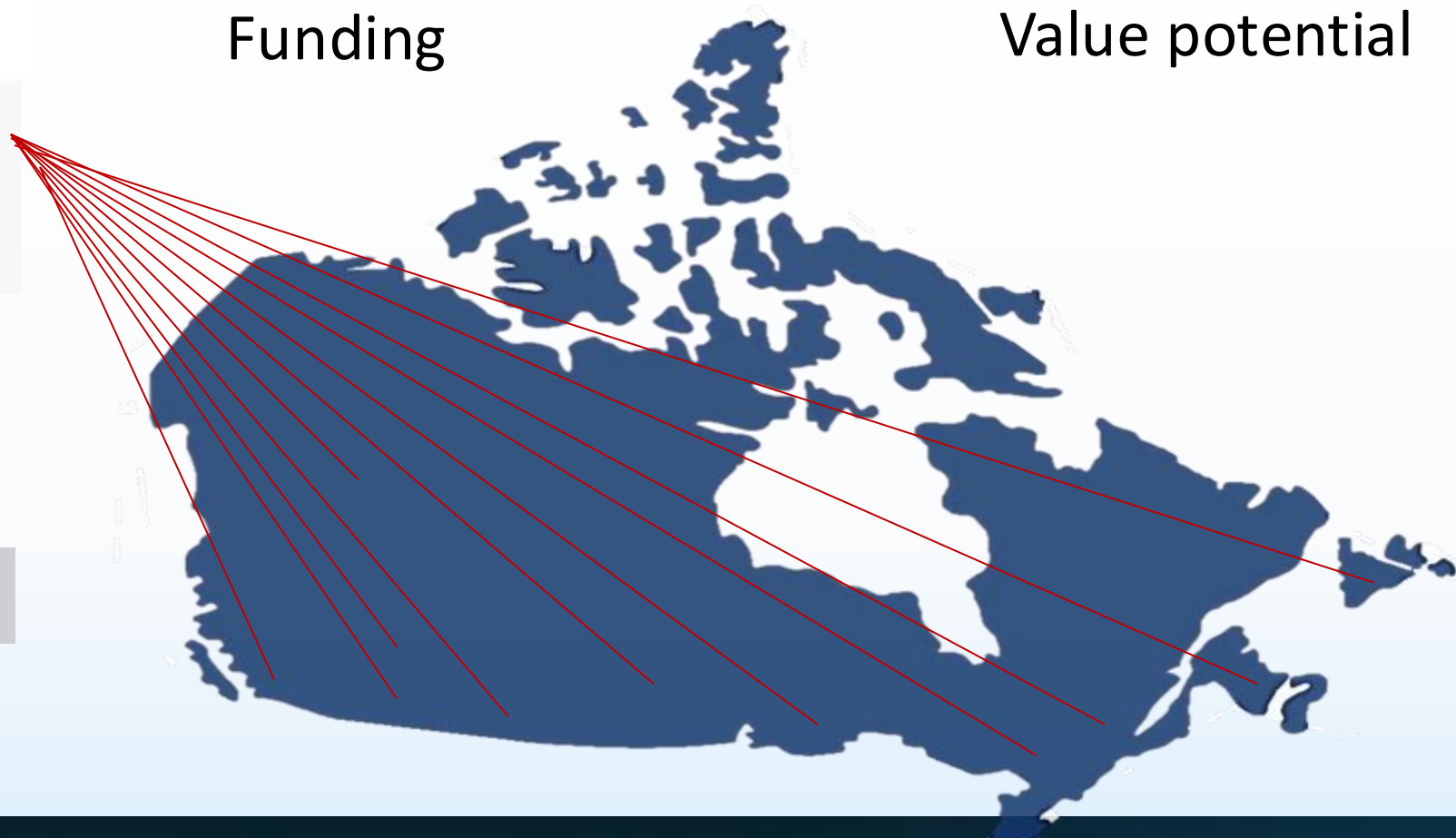
- Demographics
- Immunization
- Diagnoses
- Medications
- Family history
- Procedures
- Allergies
- Lab results



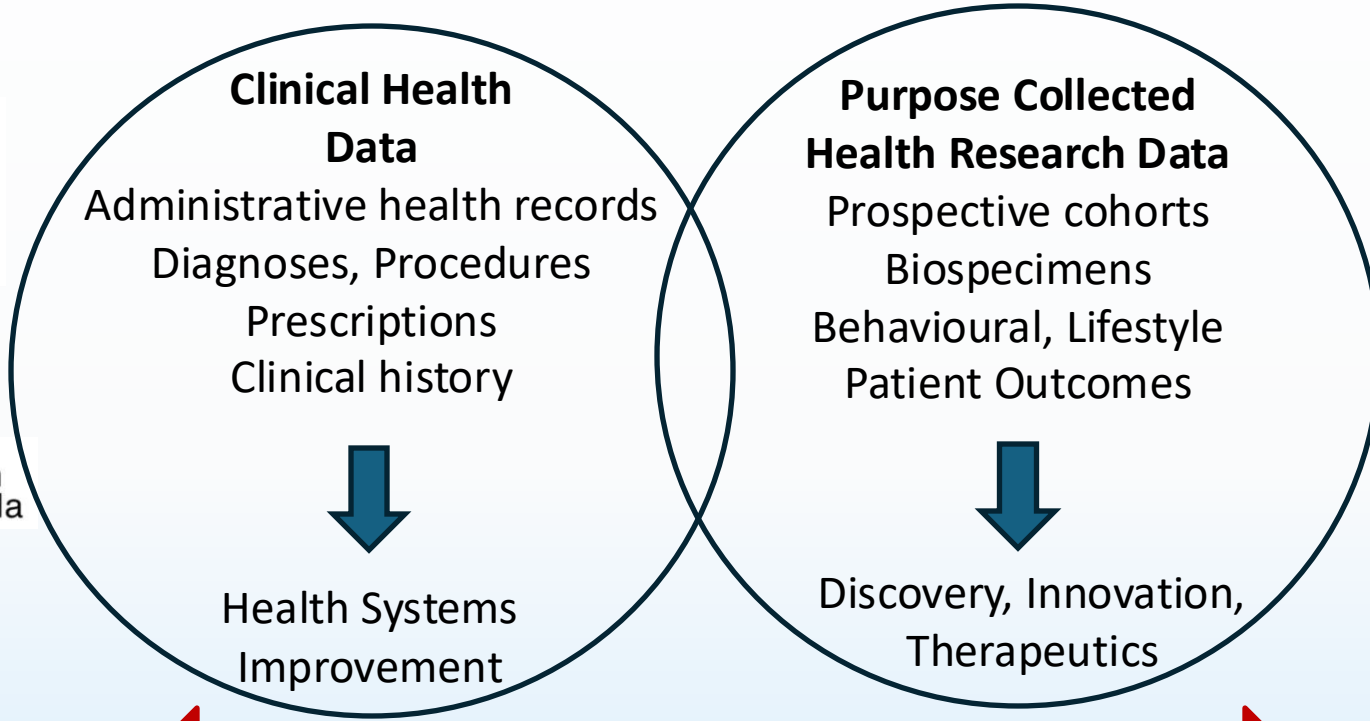
Fragmentation
Interoperability
Funding



Data Sharing
Utilization
Value potential



The time is NOW for a coordinated solution leveraging ALL of Canada's health data resources



← Cross-Sectoral Collaboration →



Why is ARCHIMEDES needed and timely?

Tri-Agency Data Management Policy

- Mandates require more robust data management → transparency

AI Deployment Capability

- Leveraging AI requires critical interoperability between data modalities and systems

Health Data Independence

- Independent Canadian health data records/repository

Resource Constraint Environment

- Maximize leverage, streamline redundancies

ARCHIMEDES is intentionally flexible to user needs

Accommodates **multi-modal** data inputs

Supports **variable access**: Open, Controlled

All data are **coded/ de-identified**

Supports large dataset **linkages**

Accommodates customized, **high-performance** analytics

ARCHIMEDES Launch



Visit our website



ARCHIMEDES LAUNCH

THE EUREKA MOMENT FOR HEALTHCARE

Join us for the launch of ARCHIMEDES, a health data platform designed to support secure, ethical, and impactful research. Discover how ARCHIMEDES can support your research and learn how to get started using the platform. The ARCHIMEDES team will be present to answer questions and provide details. Refreshments will be provided.

Date: March 5, 2026
Time: 12 pm-1 pm EST
Location: Hybrid (In-person at the University of Ottawa Heart Institute (Foustanelas H-2367) and MS Teams)

Register here



Questions? ARCHIMEDES@ottawaheart.ca

Dr. Kelly Cobey



Co-Lead of ARCHIMEDES
University of Ottawa Heart
Institute

ARCHIMEDES data governance



Full Data Governance

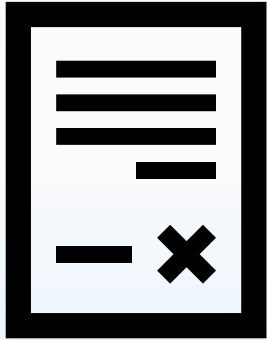


Summary



You will not simply be uploading a .csv file....

Contributing data to ARCHIMEDES



Step 1: Data Contribution Agreement (DCA)

- **Institutional-level** agreement
- Requires signature of **Institutional Signing Official (ISO)**
- ISO must indicate **approved list of PIs**
- These PIs can then create account and proceed with account creation & data contribution
- DCA can be amended (i.e., to add/remove PIs, etc.)

Contributing data to ARCHIMEDES cont.

Step 2. Create new project

- Select “Create New Project” & Indicate project name
- Access link to complete Data Contribution Form (DCF)

Step 3. Data Contribution Form (DCF)

- Complete DCF, export PDF & email to DACO (+ supporting documents)
 - Specify team members who should be given access
- DACO review and approval process

Step 4. Proceed with project setup

- Provide project descriptors and work with technical team to setup project

Account Types

Principal Investigator (PI) account

- **Submit account request**
 - If covered by existing DCA/I-DAA, account will be created
 - If not covered by existing DCA/I-DAA, triggers process of establishing these
- Once account created, can proceed with data contribution/access processes

Other user accounts (trainees, research assistants, etc.)

- Must receive invite to project by PI
 - First invitation, will be prompted to create an account
 - Subsequent invitations – project access will be added to account

It's time to get your DCA!



ARCHIMÉDES

FOR MENTAL HEALTH

**THE
/LE ROYAL**

Data Access – search tool coming soon!

Open Access

- Datasets are openly accessible to anyone – No account required

Controlled Access

- **Step 1. Data Access Request (DAR)**
 - Indicate intended research purpose, and append DAA
 - PI can specify team members/collaborators to be given access
- **Step 2. DACO/DAC Review**
 - Ensure eligibility
- **Step 3. Terms of Use and Access granted**
- **Step 4. Access Renewal**
 - Required every 2 years

Data Sharing Consent Templates

- Templates with **consent language** for researchers to contribute data to ARCHIMEDES
- Suitable both for **prospective and retrospective** consent
- ARCHIMEDES **self-assessment** tool “Retrospective Consent Filter”



Purpose-built toolkits for the community

Data De-Identification

- List of open-source toolkits
- Short instructional videos
- Interactive tutorials



DMP Templates

- Available for multiple study types
- Worked examples
- Short instructional videos

DMP TEMPLATE FOR RANDOMIZED CLINICAL TRIALS
(Examples were extracted from a fictional trial and the template was adapted from the Portage general template - https://dmp-pgd.ca/template_export/878086536.pdf)

This document is a working draft and will continue to undergo piloting and refinement. It represents an ongoing effort to improve data management plans in the biomedical sciences.

The individuals involved in the development of the template include Dr. Anna Catharina V. Armond, Dr. David Moher, Dr. Florian Naudet, Dr. Dean Fergusson, Dong Vo, and Dr. Kelly D. Cobey.

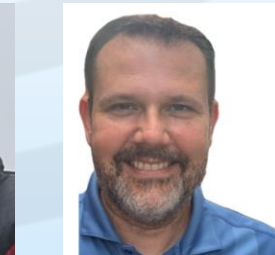
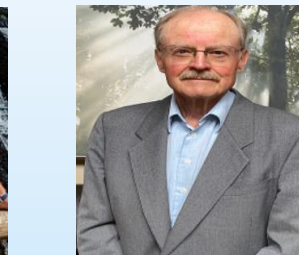
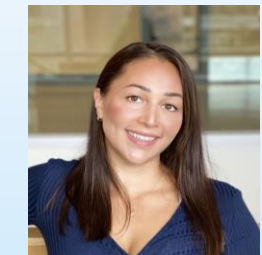
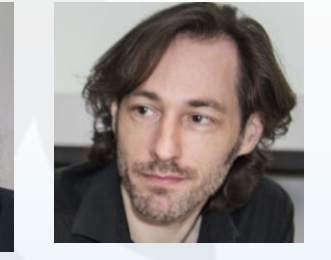
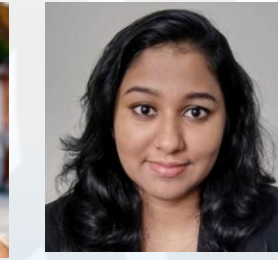
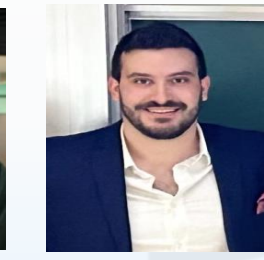
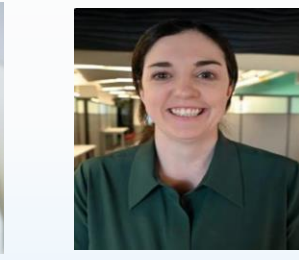
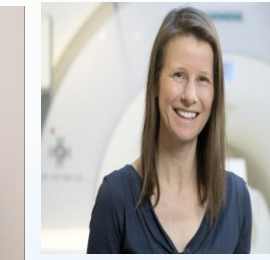
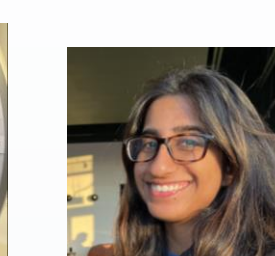
1. DATA DESCRIPTION AND COLLECTION

1a. Describe the Randomized Clinical Trial (RCT) for which the data are being collected.

Example:

"MOZART trial is a two-arm, parallel randomized controlled trial. The trial will investigate whether listening Mozart (Flute & Harp Concerto - 2nd Movement) reduces the time taken to fall asleep (sleep onset latency)."

ARCHIMEDES Team



Dr. Peter Liu



Co-PI BHI

University of Ottawa Heart Institute



ARCHIMEDES

Thank you for attending our launch!

If you are interested in learning more, please contact us ARCHIMEDES@ottawaheart.ca