Ontario Brain Institute
Annual Operating Plan
2018-2019

March 27, 2018

Ontario Brain Institute Annual Plan
2018-2019
Table of Contents

Ontario Brain Institute Annual Plan for 2018-2019

The Ontario Brain Institute (OBI) is a provincially-funded, not-for-profit research centre seeking to maximize the impact of neuroscience and establish Ontario as a world leader in brain research, commercialization and care. OBI creates convergent partnerships between researchers, clinicians, industry, patients, and their advocates to foster discovery and deliver innovative products and services that improve the lives of the 1 million Ontarians currently living with a brain disorder. OBI initiatives will have a significant impact on quality of life, cost of care and the economy of Ontario.

This Annual Plan presents the activities, milestones and metrics for the 2018/19 fiscal year in accordance with the 5 Year Operational Plan for 2018 to 2023 and is directly related to the OBI Vision. It reflects input from the various reviews undertaken as part of the renewal process – the Scientific Reviews of the OBI Integrated Discovery Programs, the OBI Wide External Review and the review by the Science and Industry Advisory Committees to the President and Scientific Director of OBI. This document demonstrates how OBI will address the recommendations to increase its capacity in commercialization and informatics / analytics through Brain-CODE, as well as support an expanded neuroscience community across Ontario.

OBI's model of integrated discovery achieves impact for patients, accelerates the commercialization of research advances, and changes the research culture. OBI's next phase is about integrating the research programs within primary care, focusing on the molecular underpinnings of the disorders, scaling-up of the tech sector, enhancing data-driven decision making, and embedding patient priorities in the research activities. With the support of the Government of Ontario, OBI is committed to continuing to achieve its milestones and make significant advances towards attaining its overarching goal of making a transformative impact on health, brain research and Ontario's economy.

OBI priorities include:

1. Build a learning healthcare system by integrating research and care, and fueling it with next generation informatics and analytics.

2. Grow a globally competitive neurotechnology cluster by training highly qualified personnel and working with partners to create a seamless pipeline of support for Ontario companies.

3. Improve brain health through shaping better policies with deployment of data-validated innovations and educating the public on brain health.

The following outlines OBI's plans for the upcoming year 2018-2019 by priority.

Priority 1: Build a Learning Healthcare System

As we move into the molecular era of brain disorders, OBI is uniquely poised to help build a learning healthcare system - by integrating research and patient care, and moving research from the lab and clinics into the community. The learning health care system embeds research into patient care and ensures that research findings are translated into evidence-based clinical practice and health system change to bring about real patient and economic impact.

To achieve this, OBI will ensure that the activities of the Integrated Discovery Programs (ID Programs) are in alignment with OBI's Vision to create learning healthcare system.

The ID Programs are large-scale multi-disciplinary, multi-institution collaborative efforts that bring together researchers, clinicians and industry partners, as well as patients and their advocates. Their goal is to drive patient-focused, high impact research across multiple sites, disciplines, and sectors. They are built on the underlying principles of research excellence, patient focus, integration, standardization and translational drive.

OBI will continue to fund and manage five pan-Ontario multidisciplinary research programs in the areas of cerebral palsy, epilepsy, depression, neurodegenerative disorders, and neurodevelopmental disorders.

The excellence and relevance of the ID Programs are maintained through scientific, industry and patient advisory committee reviews. These committees provide advice and actionable milestones, referred to as program benchmarks, to ensure scientific excellence, economic impact, and patient impact. The ID Programs enable us to build on Ontario's key neuroscience assets and address areas of brain disorders that have a very large personal, societal, and economic burden.

OBI will ensure that the programs continue to adhere to the ID Program research principles:

1. A focus on internationally ranked, leading edge science;
2. A focus on the patient;
3. Integration (across sectors, sites and disciplines);
4. Standardization; and
5. A translational thrust.

OBI's research is focused on gaining a deeper understanding of brain disorders and will yield new insights into the underlying mechanisms of disease. OBI is committed to the idea of using this research to drive improvements in health. Therefore, OBI works to ensure that as research advances our knowledge of brain disorders, the public benefits through better diagnosis and screening, new treatments, and updated policies. This includes increased translation of research into new treatments and tools, enhanced patient-care through evidence-based practice, faster movement of research finding to patients, and increased public access to information about brain research, brain disorders, tools, and treatments.

OBI has built one of the most comprehensive and secure brain research databases in the world: Brain-CODE. Currently, 35 universities and research hospitals have signed agreements to collect standardized data across multiple platforms and to share these data sets on Brain-CODE. This level of data harmonization and sharing is unprecedented among institutions nationally and internationally. As the number of participants and the richness of data continues to grow within Brain-CODE, the potential to leverage these data (i.e. through federations with other national and international databases) grows exponentially.

The pristine and well curated datasets in Brain-CODE are of considerable value and create both improved healthcare opportunities and economic development opportunities. Its primary purpose will still be to support our researchers – but it will be engaged with national and international opportunities to provide a consistent and secure approach to data collection including management, storage, and analysis. Privacy and security will remain at the forefront of the initiative and the sharing of data will be based within the context of international standards.

Brain-CODE will be a key element of the broader Canadian Open Neuroscience Platform (CONP), an infrastructure that is in part being funded by a Brain Canada grant. We will also be working with University College London, UK and Lundbeck A/S, Denmark regarding both the reuse of Brain-CODE to support their research informatics requirements and the OBI model.

Action Item #1 – Integrate Research into a Community Care Setting

Building a learning healthcare system involves integrating research in the primary care setting. This is where the vast majority of people with brain disorders receive their care.

A learning healthcare system is defined by the Institute of Medicine as a process where "science, informatics, incentives, and culture are aligned for continuous improvement and

innovation, with best practices seamlessly embedded in the delivery process and new knowledge captured as an integral by-product of the delivery experience"[1]

Over the 5 years, OBI will work with each of its ID Programs to create pilot partnerships with a front line service organization including First Nation communities where discovery from the clinical research program is immediately applied into the primary health care setting. The first pilot will involve the ONDRI@home initiative. The ONDRI@Home initiative will assess sleep, mobility, and cognitive health in daily life through wearable technologies as a means to monitor dementia patients in the community setting.

ONDRI and OBI will work with the Ontario Dementia Strategy teams to implement new treatment protocols and determine how best to fill gaps in the dementia care strategies
OBI will launch a new program that supports the scale and spread of community-based initiatives that provide care and support for those living with a brain disorder (e.g., memory clinics, family and patient education, etc.). This support will include a robust evaluation plan so that community-based organizations can collect the data necessary to improve their services and supports and inform applications for longer-term more sustainable forms of support from other sources.

Action Item #2 – Engage and Educate the Public

OBI is also moving research from the lab into the community by continuing to:
- support research programs in developing knowledge translation initiatives
- host public talks that address stigma, empower people with lived experience, and educate the public
- create awareness campaigns as part of Brain Awareness Week and other opportunities addressing facts and myths about people living with brain disorders
- provide information on OBI supported research on the website and invite applications for OBI's Event Funding program to support neuroscience-related events and activities

Through this approach, OBI activities will be expanded beyond the bench to the bedside and increase the level of public education and outreach in our research programs and the broader neuroscience community.

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[1] The Learning Healthcare System: Workshop Summary (IOM Roundtable on Evidence-Based Medicine) LeighAnne Olsen, Dara Aisner, and J. Michael McGinnis, editors, Roundtable on Evidence-Based Medicine.

Action Item #3 – Integrating Industry and Research

OBI also integrates research with industry for economic impact. The commercialization activities of the ID Programs are supported through an embedded Core Innovation Team that advises the program on existing opportunities for commercialization based on their research activities and how to optimize the process for this research to contribute to the development of a successful market product. OBI will work with these teams and its Industry Advisory Council to build a validated commercialization pipeline for its research discoveries. These commercialization opportunities are integrated into OBI's ongoing activities to support the growth of neurotechnology companies across Ontario and the incorporation of these Ontario-based technologies into the Ontario healthcare system.

Action Item #4 – ONDRISeq – Develop for Implementation Readiness

Innovations arising from the ID Programs have the potential for economic impact through cost-savings to the healthcare system. For example, the ONDRI genomics team has created "ONDRISeq", a gene panel providing comprehensive and accurate sequencing information that specifically targets neurodegenerative and stroke-related disease genes within the human genome. The gene sequence test currently used by Ontario cost about $4,744 and is done outside of Canada for about 1,000 sequences per year. The ONDRISeq test costs $300-$500, is done in Ontario and if implemented could reduce healthcare costs by about $4.2 million per year.

OBI will work with ONDRI, Health Quality Ontario and the Ontario Health Technology Advisory Committee on the completion of community based validation studies and if successful the implementation of the ONDRISeq panel.

Action Item #5 - Brain-CODE – Building the Capacity for Analytics Based in Artificial Intelligence and Machine Learning

Brain-CODE's primary purpose will be to support our researchers – but it will be engaged with national and international opportunities to provide a consistent and secure approach to data collection including management, storage, data sharing and data analysis. Privacy and security will remain at the forefront of the initiative and the sharing of data will be based within the context of international standards. Linking the deep research data with broad based health administrative data and providing the tools to reach new discoveries will be key to the creation of a learning health system.

Data science, machine learning and artificial intelligence are areas of increasing importance to research, healthcare and economic development. Consistent with the OBI Wide External Panel recommendations, OBI is proposing to expand its Data Sciences focus by building on its existing informatics and analytics platform Brain-CODE to:

- provide a world class informatic tools based in artificial intelligence and machine learning to support the ID Programs
- provide data, analytical workspaces, and tools to engage the broader neurosciences community – nationally and internationally in the analysis of data
- engage industry to stimulate the development of new intellectual property, tools and treatments
- strengthen its relationship with the Vector Institute to stimulate the development of new analytical tools and algorithms to be included in Brain-CODE and support the creation of new companies and new products for existing companies to add to the marketplace.

The recently announced Federal innovation funding and approach to supercluster development will provide an opportunity for funding to address the development of capacity for analytics based in artificial Intelligence and machine learning as well as new company formation and growth. OBI is part of the Digital Technology Supercluster consortium of industry participants, academia and not for profits on a national basis who have been awarded funding under the federal supercluster initiative. OBI will be a key component of the Precision Health Pillar in this supercluster.

Action Item #6 – Linking Brain-CODE Data with ICES Data

Brain-CODE is a critical link between research, healthcare and economic development. The pristine and well curated datasets in Brain-CODE are of considerable value and create both improved healthcare opportunities and economic development opportunities.   Critical to this is the linking of the deep data that comes from OBI's ID Programs with the broad health administrative data that is contained at ICES and within doctors electronic Medical Records. OBI and ICES will complete the linking of data through 3 pilot projects to demonstrate the linkage process and opportunities created by data linkages. These projects will be in the areas of:

1) epilepsy – linkage related to 60 subjects from a ketogenic diet study, a high fat diet used to treat seizures in kids that do not respond to seizure medications, to determine the health system benefits of increasing availability to the ketogenic diet for children with intractable epilepsy

2) linkage of whole genome sequencing and administrative health data for the study of autism spectrum disorder, to create an algorithm that will enable OBI/ICES to determine the health administrative costs of children with autism
3) screening for depression, obstructive sleep apnea and cognitive impairment to identify stroke clinic patients at risk of adverse outcomes

OBI and ICES will also complete the implementation of a regularized approach to data sharing between OBI and ICES to demonstrate the value of digital phenotyping and impacts of potential changes on the health care system.

Action Item #7 – Participating in National and International Data Sharing Opportunities

The Brain-CODE platform is unique in its ability to facilitate both external collaborations to enhance Ontario's research system and link with health administrative data for more effective health outcomes. On a national level, Brain-CODE is building linkages with McGill's Longitudinal Online Research and Imaging System (LORIS) to federate databases with the Canadian Consortium for Neurodegeneration and Aging (CCNA), creating similar data sharing opportunities and benefits.

The value of Brain-CODE is also being recognized by the Centre for Addiction and Mental Health, which has established a centralized database powered by Brain-CODE for research being conducted at the institute. OBI will continue to support the installation of Brain-CODE at CAMH and work with CAMH regarding potential enhancements to the platform that would benefit both parties.

In addition, Brain-CODE will be a key element of the broader Canadian Open Neuroscience Platform (CONP), an infrastructure that is being funded in part by a Brain Canada grant. Lastly, we will be working with University College London, UK and Lundbeck A/S, Denmark regarding both the reuse of Brain-CODE to support their research informatics requirements and the OBI model.

Priority 2:   Grow a Globally Competitive Neurotechnology Cluster

OBI is growing a globally competitive neurotechnology cluster by training highly qualified personnel and working with partners to create a seamless pipeline of support for Ontario companies.

OBI strives to catalyse the collaborative approach to supporting Ontario companies by working with entrepreneurs and companies across Ontario and in the broad neuroscience community. OBI will continue to support entrepreneurs through the ONtrepreneurs program.

To address the need for increased capital in Ontario's neurotechnology cluster and to support small and medium sized enterprises, OBI will continue the Neurotech Early Research & Development (NERD) funding program. This program funds product development or testing at Ontario-based Contract Research Organizations on behalf of selected companies that have an engaged follow-on investor, to address development gaps or the valley of death as it is sometimes referred to.

OBI will forge strong relationships with local, national and international partners to attract investments and to make Ontario a globally-recognized neurotechnology cluster. Through this approach OBI will work across all of Ontario and engage with the broader neurosciences community.

OBI continues to support the growth of the NeuroTech Ontario cluster ecosystem and foster collaborations between industry, institutions, and other innovation-based organizations. Activities and events are organized to engage the cluster's players as well as attract experts and resources from outside the ecosystem. To track the resources in the neurotech cluster, OBI has continued to update and make improvements to AXON – an application that provides information on the broader neuroscience community in Ontario.

The goal moving forward is to have a number of strategic partnerships with larger multinational enterprises to establish OBI as a preferred product development partner. These relationships may lead to a variety of collaborations including clinical trials and the co-founding of Ontario companies.

Developing management skills in neuroscience graduates is necessary to support growth in the regional neurotech cluster, its existing and new companies, and to improve the quality and competitiveness of human capital. OBI's Entrepreneurship and Management Training (EMT) program is aimed at growing Ontario's neuroscience management talent through entrepreneurship and internship opportunities. This program supports Ontario Government objectives related to training, innovation and healthcare improvement through technology development.

The internship program places interns at OBI or at industry and institutional partner organizations across the province. The combination of OBI funding and matching funds from the partner organizations makes for particularly attractive internships and helps facilitate "off the bench" experiential training for recent graduates.

Action Item #8 – Improving Access to Capital

As indicated in the OBI Wide Review, OBI strives to catalyse the collaborative approach to supporting Ontario companies by working with entrepreneurs and companies across Ontario and in the broad neuroscience community. OBI will continue to support entrepreneurs through the ONtrepreneurs program.

To address the need for increased growth capital in Ontario's neurotechnology cluster and to support small and medium sized enterprises, OBI will continue and scale up the NERD funding program. This program funds product development or testing at Ontario-based contract research organizations on behalf of selected companies that have an engaged follow-on investor, to address development gaps or the valley of death as it is sometimes referred to. OBI will forge strong relationships with local, national and international partners to attract investments and to make Ontario a globally-recognized neurotechnology cluster.

Action Item #9 – Working across the broader Ontario Neurotech Cluster

OBI plans to expand its lead role in developing central nervous system products in terms of increasing the funding level and developing formal relationships with co-funding and follow-on funding partners across Canada and globally. OBI will engage in fund raising initiatives to increase the funds available to work with the neurotech community across Ontario. Through this approach OBI will work across all of Ontario and engage with the broader neurosciences community.

More specifically, OBI will:
- increase interactions with Ontario companies and ID Programs;
- increase integration with company support programs across Ontario;
- forge a path for Ontario-based technologies to have an impact in the Ontario healthcare system
- categorize and triage portfolio companies;
- manage the use of Brain-CODE to validate/help develop data companies;
- review the need to create an entity that will consolidate IP/technologies across Ontario for follow-on investment/partnership;
- consider the need to organize an annual investor event;
- provide internship support for start-ups and industry-related entities;
- increase cluster promotion; and
- support for scale-up activities through cluster partners.

The goal moving forward is to have a number of strategic partnerships with larger multinational enterprises (MNE) to establish OBI as a preferred product development partner. These relationships may lead to a variety of collaborations including clinical trials and the co-founding of Ontario companies. More specifically, OBI's activities in the commercialization space will catalyze:

- the joint development of pre-clinical assets;
- phase 2 clinical trials;
- combined implementation of policy initiatives;
- phase 4 studies with patient advocacy groups;
- key opinion leader role(s) for OBI researchers;
- collaborative primary care initiatives; and
- co-funding of Ontario companies through MNE-based venture funds.

Action Item #10 – Data Analytic Capacity Building

With the evolution of OBI's commercialization programs and of Brain-CODE, OBI must be poised to help develop the growing number of Ontario data companies through validating their software platforms and algorithms. In addition to supporting our research community, as mentioned earlier, this will help to further build the artificial and machine learning capacity in Ontario and keep Ontario at the leading edge of this field. OBI will strengthen its relationship with the Vector Institute to stimulate the development of new analytical tools and algorithms to be included in Brain-CODE and support the creation of new companies and new products for existing companies to add to the marketplace. OBI will also lever its involvement in the Digital Technology Supercluster to help develop and grow companies in the AI and Machine Learning market space.

Priority 3:   Improve brain health

OBI's goal is to improve brain health through shaping better policies with deployment of data-validated innovations and educating the public on brain health. OBI is focused on getting research findings to patients faster, improving public access to reliable information about brain research, brain disorders, tools and treatments, and building stronger connectivity with research, industry, and patients.

OBI will continue to involve the broader research, clinical, industry and community advisors in the process of getting the messages out about results of the research and commercialization, the potential successes and celebrate the opportunities for improvements in healthcare.

OBI is engaging patients and public in neuroscience and their health care by fostering knowledge translation and exchange and facilitating linkages between researchers and decision-makers for the uptake and use of evidence through the Patient Advisory Committees, partnerships with other organizations and publically accessible events like our public talks.

OBI involves patients, care partners/givers and advocates in research by integrating the patient voice in research through the Patient Advisory Committees for each ID Program, which meet quarterly. OBI will continue to host an annual Patient Advisory Committee workshop.

Through strategic outreach activities such as the Primary Care Memory Clinics and Minds in Motion, OBI will translate research into improved efficiencies in health care service delivery and facilitate linkages between researchers and decision-makers for the uptake and use of evidence.

OBI will ensure that policy shapes research and research shapes policy through initiatives such as working with the Ontario Government and First Nations on a program linking the depression Integrated Discovery research program with First Nations communities to develop a suicide prevention program.

OBI is partnering with the Alzheimer's Society of Ontario to support their Minds in Motion two-year pilot project and is involved in the development of Ontario's Dementia Strategy through the advisory group, capacity planning working group, and the healthy brain and research working groups.

OBI and its epilepsy program (EpLink) will continue to be a partner in the Epilepsy Implementation Task Force. This task force has produced six clinical guidelines around the management and care of epilepsy in Ontario. OBI and its partners are working on ways to train clinicians on using these guidelines to improve evidence-based care, as well as increase patient and family knowledge about the guidelines to ensure they can access evidence-based care in a timely manner.

OBI is evaluating the impact of investments by refining and implementing the evaluation plan it developed in conjunction with the International Evaluation Advisory Committee to establish a logic model framework and identify key metrics to measure outcomes.

In order to build a culture of evaluation within community organizations, the Evaluation Support Program will continue to link community organizations with evaluation specialists to tackle a specific evaluation project and to build community capacity for evaluation. This is part of OBI's overall efforts to enhance patient care by helping organizations learn to evaluate and improve the services that they provide to patients.

OBI also intends to update the report "Brain Disorders in Ontario: Prevalence, Incidence and Costs from Health Administrative Data" produced in partnership with the Institute of Clinical Evaluative Sciences.

Action Item #11 – Engaging those with Lived Experiences and the Public

OBI engages patients and public in neuroscience and their health care by fostering knowledge translation and exchange and facilitating linkages between researchers and decision-makers for the uptake and use of evidence through the Patient Advisory Committees, partnerships with other organizations and publicly accessible events like our public talks.

OBI will involve patients, care partners/givers and advocates in research by continuing to integrate the patient voice in research through the Patient Advisory Committees for each ID Program, which meet quarterly. OBI will continue to host an annual Patient Advisory Committee workshop. OBI has helped to build lasting relationships between its research programs, and patient advocacy groups. Due to the stable and long-term funding of these research programs, meaningful partnerships between researchers and neurological charities have been created and expanded. In total, OBI has created partnerships between the five ID Programs and the 21 patient advocacy groups shown below.
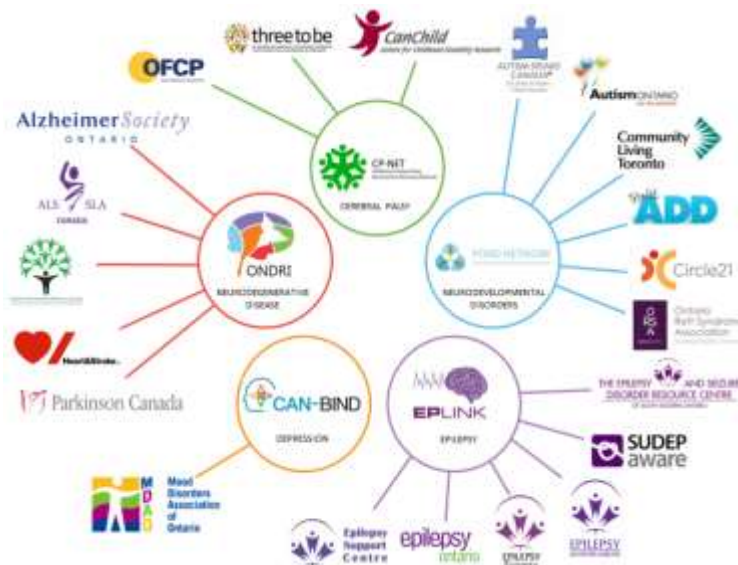
Through strategic outreach activities (past examples include Primary Care Memory Clinics and Minds in Motion), OBI will translate research into improved efficiencies in health care service

delivery and facilitate linkages between researchers and decision-makers for the uptake and use of evidence.

OBI will launch a new program to help community-based organizations to evaluate and scale initiatives that help improve the brain health of Ontarians. This program will provide short-term support that will allow organizations to collect the data necessary to demonstrate the effectiveness of their initiative and, ultimately, give them the data they need to seek more sustainable funding sources.

OBI has made similar investments in the past, including support for the Primary Care Memory Clinics, which has helped to reduce wait times and build capacity for dementia care among Family Health Teams. OBI's support was followed by the ARTIC program, which provided longer-term funding for memory clinic development. Another investment was made, in partnership with the Alzheimer's Society of Ontario, to support the Minds in Motion project. This project is designed for older adults with dementia and their caregivers to incorporate physical activity in their daily lives. The intervention has been shown to increase quality of life. OBI's support led to longer-term support and scale up by Ontario's Trillium Foundation.

Action Item #12 – Link to MoHLTC Policies and Planning Models

OBI engages government and policy makers to ensure that research informs policy and policy informs research by imbedding OBI staff and researchers within the Ontario government projects such as the development of a capacity planning model for dementia care. Through this mechanism OBI ensures that the research results are directly aligned with government strategies for improved care. As part of this, OBI will work the Chiefs of Ontario and CAN-BIND to scale a youth suicide prevention program to 30 First Nation Communities over a 3 year time period helping to support a province-wide mental wellness initiative for indigenous youth.

OBI continues to be involved in the development of Ontario's Dementia Strategy through the provincial advisory group, capacity planning working group, and the healthy brain and research working groups. Participation in the Dementia Strategy supports OBI's role as a connector to stakeholders in dementia research and care, and OBI's efforts to work with policy-makers to enhance patient care.
OBI and its epilepsy program (EpLink) are important partners in epilepsy ECHO. OBI will work with its EpLink Program and the ECHO to determine the health system impact of receiving guideline-concordant care for intractable epilepsy and evaluating the impact of the ECHO. Through partnerships with ICES and the epilepsy ECHO program, EpLink will also conduct a health impact assessment on the impact of receiving guideline-concordant care through the district epilepsy centres and regional surgical epilepsy centres.

Action Item #13 – Evaluating Effectiveness

OBI is evaluating the impact of investments by refining and implementing the evaluation plan it developed in conjunction with the International Evaluation Advisory Committee to establish a logic model framework and identify key metrics to measure outcomes. In order to build a culture of evaluation within community organizations, OBI will embed evaluation as a required component of all support for community-based organizations. Similarly, OBI is embedding a culture of evaluation within its ID Programs by creating logic models and working with them to identify their metrics for measuring success.

Action Item #14 - Impact of Brain Disorders

OBI also intends to update the report "Brain Disorders in Ontario: Prevalence, Incidence and Costs from Health Administrative Data" produced in partnership with the Institute of Clinical Evaluative Sciences. The report quantifies the social and economic impact of 13 brain disorders. Several patient advocacy groups and health planning units are currently using this report as a resource including Epilepsy Ontario, Parkinson Canada, Ontario community epilepsy agencies, and the Ontario dementia strategy.

Integrated Discovery Programs – Areas of Impact

The ID Programs are built on the underlying principles of research excellence, patient focus, collaboration, integration, standardization and translational drive. The integrated discovery approach is the key component of our innovation system. A system that is designed to create knowledge and move that knowledge faster into improvement in healthcare and economic opportunities. The system is based on the fundamental principle of people being at the centre of the system and their engagement in the process is key to success.

The excellence and relevance of our ID Programs are maintained through scientific, industry and patient advisory committee review. These committees provide advice and actionable milestones (referred to as 'Program Benchmarks') for the Programs to ensure scientific excellence, economic impact, and patient impact. The ID Programs enable us to build on Ontario's key neuroscience assets and address areas of brain disorders that have a very large personal, societal, and economic burden.

OBI will ensure that the ID Programs adhere the following research principles:

a) A focus on internationally ranked, leading edge science;
b) A focus on the patient;

c) Integration (across sectors, sites and disciplines);
d) Standardization; and
e) A translational thrust.

OBI has created a vibrant and collaborative ecosystem that links researchers, clinicians, companies, and the patient community not only within Ontario, but also with other networks across Canada and around the world. Through this invaluable network, OBI and its partners are striving to ensure its work drives impact in neuroscience and establish Ontario as a world leader in brain research, commercialization, and care.

Action Item # 15 – Ensure the ID Programs Operate Consistent with the OBI Vision

OBI will be working with each of the ID Programs to ensure that they operate consistent with OBI's vision to create a learning healthcare system and are restructured to operate consistent with the OBI model as recommended by the External Review.

As part of the renewal process, the ID Programs were asked to prepare a renewal application that included information about their progress to date as well as future plans. The applications were reviewed by an external, international scientific committee and each Program's respective science, industry and patient advisory teams. The purpose of these reviews was to provide OBI with the advice it needs to ensure scientific excellence and alignment between the ID Programs and OBI's vision.

The reviews revealed clear Program strengths as well as opportunities for further improvement. Clear strengths include the ID Programs' scientific excellence, province-wide integration, and patient engagement. As we move forward, however, the reviews highlighted the following opportunities and we will be working with the ID Programs to ensure that these challenges are addressed:
- Refine overarching goal(s) or hypotheses and use these to focus the ID Programs' work;
- Build in a more rigorous performance management approach;
- Make appropriate use of analytics specifically and Brain-CODE in general;
- Provide implementation details, especially in Programs where the budget is large; and
- Strengthen the focus on commercialization.

The ID Programs' clinical framework drives OBI's Innovation System. OBI funding will continue to reflect this and will not duplicate or replace what other funding agencies provide. OBI's support of basic science will be limited to reverse translational research that is closely tied to

the clinical component and thus contributes to development and validation of models and/or biomarkers.

Action Item #16 – Implementation of a Performance Management Framework for ID Programs

To address the opportunities identified above, OBI has developed a performance management framework that is based on its logic model. We are now working with each ID Program to develop a logic model that will inform budget, timelines, milestones, and deliverables. This updated performance management framework will create clear linkages to the Programs and the health and economic impacts that they will achieve.

Action Item #17 – Funding Opportunities for Concussion

In the coming years OBI will also examine the opportunities to gain new resources through its fund-raising initiatives to enhance our pilot program in Traumatic Brain Injury to create an ID Program in Concussion. OBI has previously provided some project-based funding to concussion – both in partnership with CIHR and for projects that align with OBI's vision. Expanding this group to a fully-funded ID Program will fill a gap in OBI's systems approach to understanding the brain. It will provide the opportunity to compare and contrast mechanisms linked to brain 'injury' to brain 'disease'. It will also allow to explore the well established but poorly understood link between concussion, post-concussive syndrome, depression and anxiety

Building Capacity for Revenue Diversification and Program Growth

The need to generate additional revenue above the level of funding provided by the Province of Ontario has been demonstrated as necessary to increase our capacity for research, economic growth and improvements in brain health.   Government has provided a significant investment in OBI and that investment should be levered to generate increased investments from philanthropy, national and international foundations and others to increase the knowledge base in brain diseases and disorders. Wherever possible OBI will work with its partners – researchers, programs, foundations and their institutions – to generate and collaborate on fund raising activities.

Action Item #18 – Fund Raising

In 2018/19 OBI will increase its own capacity for revenue generation and fund raising to support other research initiatives, increase growth opportunities for small and medium sized companies and expand its programs and services to the broader Ontario neuroscience community. OBI will build its capacity through collaborating with its current partners in the

research community and engage with independent professionals who specialize in raising of funds to support health related care and commercialization requirements.

Operations and Governance
The Administration area will provide support to OBI program areas in implementing their activities, as well as ensuring that OBI meets its corporate obligations including legislation, accounting standards, and commitments to funders. This includes activities in the areas of reporting and operational planning, procurement, management controls, human resources, and governance. Administration will work to ensure that OBI is a corporately responsible, well organized company under the new contract.

Action Item – Creating Operational Efficiencies

- Implementing an electronic expense claim system
- Investigating an electronic application and grant management system for research grants

Action Item – Reporting and Operational Planning

- Continue to prepare financial statements for Audit and Finance Committee and the OBI Board.
- Submit Annual Report by July 31, 2018 including operating plan results, expenditures, leveraging results, compliance with contract report, and media coverage.
- Submit quarterly requests for funding by 15th of the month proceeding next quarter.
- Continue liaison meetings with MRIS and MOHLTC on a regular basis.
- Prepare a new contract if request for renewal approved.

Action Item – Procurement

- Ongoing review of procurement requirements and guidelines and templates to ensure compliance with the BPS Directive.

Action Item – Management Controls

- Maintain adherence to financial policies and procedures in compliance with requirements of MRIS funding agreement and the BPSAA.
- Conduct an external audit for FY 2017-2018 by July 2018.

Action Item – Human Resources

- Develop HR Strategy for post-renewal workforce planning.
- Continue development and monitoring of HR strategic frameworks and systems.
- Continue to act as a business partner to help drive OBI's success
- Recruitment, development and retention of a talent pool that supports and strengthens OBI's mission.
- Continue efforts to build and maintain a qualified and representative workforce and developing and supporting staff.
- Continue to monitor and respond to changes in the labour landscape to ensure compliance across OBI.
- Survey staff around overall satisfaction and the human resource programs OBI offers.

Action Item – Governance

- The Governance Committee will continue to review the terms of references and memberships, board composition and performance and training, and OBI policies to assess their adequacy, whether they meet best practices standards for non-profits.
- Provisions for staff team bonus of up to 5% for 2017-2018 if warranted by performance, subject to Board approval.

Appendix 1 - 2018-2019 Milestones by Priority

1. Build a learning healthcare system by integrating research and care, and fueling it with next generation informatics and analytics.

    a. Renewal of five current ID programs, ensure alignment with OBI Vision and adherence to the OBI model
        i. Prioritize funding of ID Program activities linked to OBI's key asset – the standardized clinical framework
        ii. Conduct an analysis of cross-ID Program Brain-CODE common data elements to look at disease comorbidities
        iii. Conduct a baseline bibliometric analysis on the impact of ID Program publications
        iv. Conduct 4 cross-ID Program workshops to build capacity and create opportunities for cross-program collaborations
        v. Renew system of advisory capacities to support patient, industry and scientific input into the programs
    b. Active testing of biomarkers in the community care setting
        i. Begin implementation of ONDRI@Home
        ii. Initiate a prospective biomarker trial for depression
    c. Artificial intelligence for disease modeling and diagnostics
        i. Stimulate development of new IP, analytic tools, and treatments through participation in Digital Technologies SuperCluster
        ii. Provide the ID Programs with access to a group of AI experts that can assist with analysis or provide guidance
    d. Quality improvement processes for healthcare
        i. Link with Ontario Dementia Strategy team to implement new treatment protocols and pilots
        ii. Integrate EpLink with the Ontario Epilepsy ECHO program to better understand health outcomes
    e. New treatments
        i. Build capacity for conducting Phase 2 clinical trials by holding a cross-ID Program workshop and completing a Brain-CODE audit
        ii. Conduct 3 clinical trials through the ID Programs
    f. Real-time data access and analytics

       i.   Stimulate the development of new intellectual property, analytical tools and treatments through participation in the Digital Technologies Supercluster

      ii.   Complete 1st phase of work related to the Canadian Open Neuroscience Platform as a mechanism to engage with the broader neurosciences community – nationally and internationally

     iii.   First Brain-CODE human data release for 3rd party usage from the ID Programs

     iv.   Develop a data federation plan for each of the ID Programs

g. Complete community based validations studies of ONDRISeq working with ONDRI, Health Quality Ontario and Ontario Health Technology Advisory Committee

h. Respond to recommendations from OBI Wide External review to ensure a world class informatics platform to support the ID Programs

2. **Growing a Globally Competitive Neurotechnology Cluster**

a. Scale-up of small companies
      i.   Continue and scale up NERD program

b. Attract and develop new management talent and increase employment in the neurotech sector
      i.   Run OBI ONtrepreneurs program
      ii.   Continue OBI's internship program

c. Procure home grown products into healthcare system
      i.   Work with OCHIS office on new technologies and companies coming through our programs

d. Work across the broader neurotech cluster to:
      i.   increase interactions with Ontario companies and ID Programs
      ii.   increase integration with company support programs across Ontario
     iii.   categorize and triage portfolio companies
     iv.   provide internship support for start-ups and industry-related entities
     v.   increase cluster promotion

e. Catalyze clinical trials through the ID Programs

f. Hold annual meeting on the potential for consolidation of similar intellectual property/technologies across research institutions participating in the ID Programs

g. Establish process for the validation of software platforms and algorithms on Brain-CODE

Improving Brain Health

a) Data-driven decision making / policies
   i. Continued participation in Ontario's dementia strategy and capacity planning work
   ii. Work with ICES to develop codes for key brain disorders that we cannot currently capture through administrative data (i.e., autism, depression)

b) Patient research priorities addressed in research
   i. Support patient priority setting partnerships
   ii. Finalize report for OBI / POND / James Lind Alliance patient priority setting partnership and identify next priority setting partnership opportunity.

c) Community-based implementation pilots
   i. Launch "GEEK", a program aimed at supporting the scale, spread, and evaluation of community-based services and supports
   ii. Scale suicide risk reduction program with Ontario First Nations in partnership with CANBIND and Chiefs of Ontario

d) Cost-effective healthcare outcomes and interventions
   i. Develop and disseminate tools to promote brain health (e.g, epilepsy clinical practice guidelines for drug resistant epilepsy)

e) Health system planning using research and administrative data
   i. Develop plan for routine linking of research and health administrative data
   ii. Complete three pilot projects linking data from Brain-CODE with ICES administrative data

f) Self-management of health
   i. Continue OBI Public Talks series to educate and inform public
   ii. Partner with Museum of Nature (Ottawa) on brain exhibition to promote Ontario excellence in neuroscience, commercialization, and care

Appendix 2 – 2018-2019 Metrics

Build a learning healthcare system by integrating research and care, and fueling it with next generation informatics and analytics.

- Embedding research into front-line care
    - Number of partnerships between our ID Programs and front-line care organizations
    - Number of research pilots embedded in the community care setting
    - Number of front line care providers involved in ID Program research
    - Number of data federations with front line provider EMRs
- Increase the connectivity of the Ontario research community
    - Strength of connectivity across our network through the Atlas for Ontario Neuroscience (www.axon.braininstitute.ca)
    - Amount of national and international research grants and awards due to ID Program involvement
    - Percentage growth in Brain-CODE users and capacity
    - Impact narratives from members of the ID Programs

- Better integrate research, industry, and patients
    - Percentage growth in ID Program partnerships
    - Number of federations with other databases (including ICES)
    - Number of external data access requests
    - Number of studies where patients are involved in setting research priorities
    - Number of partnerships between research and patient community to translate and implement evidence
    - Impact narratives from OBI's external advisors and key stakeholders

- Increase recognition of Ontario as a world leader in brain research, commercialization, and care
    - Number and quality of research publications
    - Number of invites to share OBI model provincially, nationally, and internationally
    - Number of Brain-CODE licensing agreements
    - Number of collaborations nationally and internationally
    - Percentage of OBI-funded studies that are multi-institutional, multi-disciplinary, and multi-modal
    - Impact narratives from leadership of partner organizations

24

Growing a Globally Competitive Neurotechnology Cluster

OBI will measure success of these initiatives through the following metrics:
- ONtrepreneurs and NERD – follow on investments
- # of strategic partnerships with MNEs / funders
- # of interns per year / % follow-on employment
- # of new companies engaged in discussions over the 5 years
- # new companies supported over the 5 years
- # new co-funders or cluster partners
- Creation of a well-defined roadmap connecting startups to resources
- Global recognition of the cluster demonstrated by the engagement of international companies and investors
- Increase investment in Ontario neurotech companies
  - Measure the growth in the value and size of the companies that we invest in
- Increase the number and sustainability of Ontario-based companies
  - Measure the number of companies that we support and nurture as it relates to their longevity
- Increase jobs in Ontario
  - Number of jobs created through our companies and their employee retention rates
  - Number of HQP trained

Improving Brain Health of Ontarians

- Enhance patient-care through evidence-based practice (practice)
  - Number of policies and tools using evidence from our research programs
  - Number consultations with our researchers in the development of toolkits
  - Renewal of Burden of Brain Disorders Report in partnership with ICES

- Move research findings to patients faster (knowledge)
  - Number of plain language summaries for our research programs
  - Number of patients and families engaged in our family days and science days
  - Number of partnerships between research and patient community to translate and implement evidence

- Increase translation of research into new treatments and tools (products)
  - Number of patents granted and development of intellectual property
  - Number of clinical trials
  - Number of market-ready interventions that will improve the quality of life of

Ontarians and beyond

- o Increase public access to information about brain research, brain disorders, tools, treatments
  - o Number of people that we engage in our research programs both online and in person

Appendix 3 2018-2019 Financial Information

Ontario Brain Institute Financial Plan – Operating Plan		$ 2018-19
Revenue		
Ontario Government		20,000,000
Other Funding		2,000,000
Total Funding		**22,000,000**
Expenditures		
Research Programs		10,969,498
Informatics and Analysis		4,300,050
Industry and Education		1,354,737
Administrative Support		2,113,205
Knowledge Translations		2,662,510
Total Expenditures		**21,400,000**
Surplus/(Deficit)		**600,000**