Ontario Brain Institute
Annual Operating Plan
2019-2020

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2019-2020

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Ontario Brain Institute Annual Plan for 2019-2020

Introduction

The Ontario Brain Institute accelerates discovery and innovation to benefit patients and the economy, today and for generations to come. We are pioneering a 'team science' approach that brings together researchers, clinicians, industry, patients, and their advocates to foster discovery and deliver innovative treatments and services that improve the lives of those living with brain disorders. 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 2019/20 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 the 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. This Annual Plan outlines how we will continue the process of 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 Areas of Focus and 2018-2019 Key Accomplishments

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

- Ensuring Scientific Excellence
  - OBI has renewed 38 contracts with 40 sites across Ontario. The remaining two contracts are in the final stages of being executed.
  - OBI hosted workshops for its epilepsy (EpLink) and dementia (ONDRI) programs. At each of these workshops, programmatic plans for impact were established for the 2018-23 cycle.
  - A workshop was held for OBI's nascent program in concussion (CONNECT). OBI is supporting CONNECT with seed funding. The program has set plans to align with and leverage other strategic initiatives in the concussion space toward new collaborations and funding streams.
  - The ONDRI@Home platform is transferring data into Brain-CODE from wearable devices collected during an earlier pilot study. The pilot study was conducted to examine the suitability of wearable sensors for better understanding disease impact and progression in people with dementia and other neurodegenerative diseases.
  - The Integrated Discovery Programs have published several important publications this year. A few highlights include:
    - CAN-BIND researchers have successfully generated a new high throughput screening model to test and validate biomarkers for response to antidepressant medications. This will allow them to quickly and easily screen multiple drugs and identify new or more effective candidates for clinical use. CAN-BIND researchers published a paper in Psychiatry Research on a study showing that youth with lower neurocognitive performance such as attention, problem solving and working memory, may be markers for risk of developing serious mental illness.
    - POND researchers have generated cell lines from patients and published on the effects of multiple autism risk genes on neural transmission impairments. This foundational paper demonstrates the value of these cell lines for drug screening, allowing POND to predict which patients will respond to which drug based on genetic profiles.
    - CP-NET investigators published an open access paper in PLoS One about the utility of a new model to study the potential benefits of using stem cell therapies to repair the brain after perinatal strokes.

- ONDRI's genomics platform published a study on the next-generation sequencing (NGS) technique. This technique is highly cost and time efficient and aims at identifying the genetic determinants of various conditions. ONDRI's paper explains the protocol for this technique and help users understand the process underlying the generation and interpretation of NGS data.
  - The Integrated Discovery Programs have been engaged in clinical trials. Some highlights include:
    - POND completed their multi-site clinical trial of tideglusib in people with autism. POND researchers are working on the final analyses and publication, however industry partner AMO Pharma has already published a press release on the promising results of this trial (https://read.bi/2DZmZI0).
    - POND has also launched a clinical trial across all their sites using Arbaclofen in autism patients. This trial is part of a larger collaboration with EU-AIMS which is also conducting this trial across sites in Europe.
    - CAN-BIND has launched a trial comparing the treatment of Ketamine to electroconvulsive therapy (ECT), the current standard of treatment for drug-resistant depression. This study is based on previous preclinical evidence that ketamine may be as effective as ECT, and would offer substantial healthcare savings as ketamine would be a less intensive, outpatient procedure.
    - CAN-BIND has launched a probiotics trial, with the support of Lallemand as a partner, at their Kingston site.
- Integration and Collaboration
  - OBI, partnered with XCO Tech Inc., has submitted a full application to the Health and Biosciences competition of the Strategic Innovation Fund (SIF) – Stream 4. The goal of the application is to integrate novel wearable sensor technology with data analytics and machine learning for precision medicine applications.
  - OBI is also part of a separate full application submission to the Health and Biosciences competition of SIF – Stream 4. The application is led by Hoffmann-La Roche Ltd. and is entitled 'Canadian Personalzied Healthcare Innovation Network – Integrated Data Network (C-PHIN IDN)'. It aims to create a pan-Canadian data platform to link genomic data, electronic medical record, clinical trial and registry data, and patient-generated data from mobile devices.
  - The Canadian Open Neuroscience Platform (CONP), a $10.17-million grant, is a partnership of 15 universities that will facilitate the dissemination of data that support research to advance treaments for Canadians suffering from

neurological diseases. Brain-CODE will form a major component of CONP with team members involved in several CONP committees.

- o OBI was the lead applicant of a successful consortium bid to a CANARIE Research Data Management Program call that funds the development of software components. The project will focus on the development of a research portal to provide secure data discovery, access, and collaboration and Consortium members include Indoc, CAMH, University of Ottawa Institute of Mental Health Research (IMHR), and St. Joseph's Healthcare, Hamilton.

- Improving Data Sharing
  - o OBI, CAMH, and Nature Neuroscience partnered to host a conference "Redefining Neurodegeneration: A global collaboration to share deep phenotyping data" with a focus on standardized approaches to the collection of neurodegenerative disease deep phenotyping data and platform configurations for data sharing and analysis.
  - o Our system to catalyze discovery and allow researchers from around the world to access data in Brain-CODE has been tested and is ready for implementation. Brain-CODE's first open release of human concussion data will take place in early 2019.
  - o An academic article describing the functionality of Brain-CODE was published in May 2018 in Frontiers in Neuroinformatics and has garnered more views than 74% of all Frontiers articles in the last 12 months. An article describing the implementation of Brain-CODE at the Centre for Addiction and Mental Health (CAMH) was published in the same special edition.
  - o Brain-CODE and CAN-BIND co-authored an article in the Psychiatric Times entited 'Big Data for Depression' showcasing CAN-BIND's use of Brain-CODE.
  - o The governance surrounding the Brain-CODE platform was described in a chapter of the Canadian Health Information 4th Edition: A Practical Legal and Risk Management Guide.
  - o A manuscript describing Brain-CODE's governance model is under final review for publication in a Frontiers in Neuroinformatics special edition on Big Data Ethics.
  - o Brain-CODE was presented at several national and international conferences including Bio-IT 2018, Neuroinformatics 2018, the International Population Data Linkage Conference 2018, and a Machine Learning for Brain Health Symposium raising the profile of the platform.
  - o OBI's relationship with the International Neuroinformatics Coordinating Facility (INCF), an international organization for promoting the sharing of data, was strengthened with Brain-CODE presentations at INCF's Neuroinformatics 2018

conference and at the INCF booth at the Society for Neuroscience conference – an annual conference with over 30,000 attendees.

- o The 3rd round of the Neuroinformatics Internship program launched in October 2018 with the placement of five interns who are working with the Integrated Discovery Programs. This program provides a valuable training opportunity for recent graduates and supports the development of unique skillsets within the informatics field.
- o Brain-CODE continues to follow up on implementing several recommendations from an extensive Privacy Impact Assessment, Threat Risk Assessment, and Threat Vulnerability Assessment completed earlier this year. Brain-CODE performed well in all assessments with minor recommendations on how to improve the privacy and security of the platform.
- o OBI was awarded continued access to computational infrastructure awarded through Compute Canada's Resource Allocation Competitions 2018.
- o ONDRI's neuroinformatics platform has developed and documented standards for exchanging, curating and releasing data files across multiple assessment platforms. The related curation processes and tools are being made open source for other research groups who wish to perform similar data processing and analyses.

- Informatics Partnerships
  - o The first linkage of encrypted OHIP numbers between Brain-CODE and the Institute for Clinical Evaluative Sciences (ICES) was successfully completed involving 667 participant datasets from the Province of Ontario Neurodevelopmental Disorders Network (POND) program.
  - o OBI has successfully completed a scoping exercise for Hong Kong Science and Technology Parks Corporation (HKSTP) in relation to the setting up of an informatics platform to support data sharing between its researchers, companies, and affiliates.
  - o In addition to OBI's Integrated Discovery Programs using Brain-CODE, OBI is continuing to offer informatics support for the Brain-Eye Amyloid Memory Study (BEAM), Toronto Dementia Research Alliance (TDRA), and the Stroke Imaging Laboratory for Children (SILC) at the Hosptial for Sick Children.
- Sharing Science
  - o ONDRI's Neurionformatics Lead, Dr. Stephen Strother, was invited to give a plenary talk at the Machine Learning for Brain Health Symposium, McMaster, Sept 2018. Dr. Strother highlighted the ONDRI curation process and analysis in Brain-CODE. This formed part of a session devoted to Brain-CODE at the meeting.

- ONDRI's researchers have been collaborating with the Parkinson Society of Canada to rewrite a new client/caregiver information book on cognition, communication and swallowing issues in Parkinson's disease as well as to co-develop an on-line caregiver education program.
- CAN-BIND and community partner Mood Disorders Association of Ontario continue to bring awareness to the public and gain recognition for the CHOICE-D Guide, a lay language guide for depression care.
  - A public launch event for the CHOICE-D Guide, was held on October 11 to raise awareness about the newly published guidelines written by patients for patients.
  - Two posters about the guidelines were presented at the Health Quality Transformation 2018 conference.
  - The CHOICE-D Project team won the 2018 Paula Goering Collaborative Research and Knowledge Translation Award and were invited to present a webinar on the guidelines on November 22, 2018.

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.
- Six new 2018 ONtrepreneurs were selected and announced at a celebration event:
  - Kareem Ayyad – Cerebrian: Software and wearable that enable communication for incapacitated individuals.
  - Shea Balish – Curv: Transforms cameras into diagnostic tools for assessing physical health such as Parkinson's disease.
  - Mohammad Ali Amini – Nanology Labs: Safe and smart MRI contrast agents for early detection of brain tumours.
  - Morgan Rosenberg – SupportsHealth: Evidence-based platform to support the family of people with depression.
  - Jeff Perron – Tru Reach: Self-help platform for people with mild-to-moderate depression and anxiety.
  - Elizabeth Audette-Bourdeau – Welbi: Using AI to reduce social isolation in retirement communities.
- Four NERD projects were initiated: Winterlight Labs; Trexo Robotics, Awake Labs, and Steadiwear.
- Two startups initiated new collaborations with IDP researchers:
  - Trexo Robotics with CP-NET (Dr. Anna McCormick)
  - Awake Labs with POND (Dr. Azadeh Kushki)
- 15 recent graduate interns were placed at organizations across Ontario. Overall, 82% of OBI supported interns get full time jobs within six months of the end of their internship. 37% of those remain as full-time new hires with the same organization.

- Investments are being finalized for two new NERD projects involving Ontario neurotech companies and Ontario CRO's.
- A strategic partnership between a multinational company and an IDP is expected to be finalized.
- An agreement was reached with Pfizer to support the placement, through the Internship Program, of recent graduates into neurotech startups.

Improve brain health through shaping better policies with deployment of data-validated innovations and educating the public on brain health.
- Completed a 6-month partnership with the Canadian Museum of Nature on "Brain the Inside Story", visited by 174,000 people. We also co-hosted on four Public Talks (585 attendees) and ran a neuroscience showcase that brought 25 partner organizations (universities, hospitals, patient advocacy organizations, companies) together to showcase their work.
- Launched the "Stories from Our Roots" program, working with the Chiefs of Ontario and University of Western Ontario to train Indigenous youth to be champions of life promotion in their communities. Five training sessions held in 2018/19.
- OBI, POND, and the James Lind Alliance partnered on a patient priority setting partnership to determine the top 10 research priorities of Ontarians living with a neurodevelopmental disorder. The report can be found here: http://braininstitute.ca/programs-opportunities/setting-research-priorities/neurodevelopmental-disorders-psp
- OBI and members of its EpLink program partnered with ECHO Ontario and the Hospital for Sick Children to launch Project ECHO: Epilepsy Across the Lifespan. The ECHO project builds capacity among primary care to better diagnose and treat epilepsy in Ontario. We have launched three paediatric sites (SickKids, CHEO, London paeds) and three adult sites (London adult, Toronto Western, Kingston).
- OBI's EpLink program, in partnership with its Patient and Community Advisory Committee, developed public-friendly versions of Ontario's epilepsy care guidelines. These resources can be found here: http://ontarioepilepsyguidelines.ca/
- OBI's depression program (CANBIND) worked with its Community Advisory Committee and the Mood Disorders Association of Ontario to create the CHOICE-D guidelines – a "for patients, by patients" clinical practice guideline for the treatment of major depressive disorder. The resource won the Paula Goering Collaborative Research and Knowledge Translation Award. It can be found here: https://drive.google.com/drive/folders/1vSCzfzOPjexvBPVcE-u5jBeTCGM2_xHk
- OBI launched GEEK, a program that provides funding, evaluation expertise, and support to community-based programs and services for people living with brain disorders. GEEK supports the sustainability, scale or spread of these programs, to improve the quality

and quantity of evidence-based care in the community. Letters of intent are being submitted and the first programs will be selected in early 2019.

- OBI continues to be a leader in patient engagement in health research. Over 20 patient partnership activities in the areas of priority setting, study design, knowledge translation, and research evaluation occurred within our research programs this past year.
- OBI reaches out to 85,110 people through its Twitter, Facebook and LinkedIn channels with a 2.3% increase in engagement rate over the last year.
- OBI currently has 10,415 followers across all social media platforms and observed an 18.9% increase in its followers over the last year.
- OBI reaches out to its key stakeholders through a quarterly newsletter to share achievements and stories about its Research, Commercialization and Knowledge Translation initiatives. Currently, OBI has 1357 subscribers, with a 32% increase since last year. OBI has a strong 42% open rate for its newsletters where the industry average stands at 19%.

OBI Leveraging

OBI has commited to achieving a cumulative 2:1 ratio of leveraged investments in its 2018-2023 contract with the Ontario Government. OBI has already achieved $38.2 million in 2018/2019 and anticipates meeting the $40 million target for 2019/2020.

Fiscal Year	Target	Total Leveraged
2018/2019	$40 million	$15,525,377
2019/2020	$40 million	$9,125,758
2020/2021	$40 million	$7,211,384
2021/2022	$40 million	$6,387,400
2022/2023	$40 million	$0
Total	$200 million	$38,249,919

OBI's Operational Plans for 2019-2020 By Priority

Focus Area: Build a Learning Healthcare System
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.

The Integrated Discovery 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.

OBI will ensure that the activities of the Integrated Discovery Programs are in alignment with OBI's Vision to create learning healthcare system through the ongoing monitoring and evaluation of the programs in comparison to the logic model and milestones set for each program. OBI will be supported in these efforts through the Scientific, Industry and Patient and Community 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 Integrated Discovery 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 Integrated Discovery 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, we work 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.

National and international data sharing opportunities will be pursued with Brain-CODE either at the centre of the activities or being linked to other platforms to create additional opportunities. The continued development, improvement and support of Brain-CODE will be a key priority of OBI in the coming year. Much of the new development will take place through funds that will be generated through the participation in national and international activities where grant or contract funding will be possible. Examples of this include:
- 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.
- Brain-CODE will be a central core of 2 applications to the Federal Government's Strategic Innovation Fund program to help manage, curate, store and share data in an appropriate fashion.
- OBI will continue to participate in the Digital Technology Supercluster to build partnerships and opportunities with the cluster and individual companies for project funding to support informatics development needs.

- OBI is in discussions with the Hong Kong Science and Technology Park regarding their data management and analytical needs which may lead to Brain-CODE being adopted for their use.
- OBI will be following up on its very successful event – in partnership with Nature Neuroscience and CAMH – on data sharing to improve dementia research which may lead to Brain-CODE either being linked to other informatics platform or forming a core piece of an integrated solution.

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]

OBI is working with each of its Integrated Discovery Programs to create partnerships with a frontline service organizations, including First Nation communities, where discovery from the clinical research program is immediately applied into the local care setting. The first project to come into full swing in 2019 is the ONDRI@Home initiative. ONDRI@Home is assessing sleep, mobility, and cognitive health in daily life through wearable technologies as a means to monitor dementia patients. A pilot project, assessing patients in the community setting, has been completed. The results of this pilot will now be used to develop a second-phase patient-cohort study, including participants from the ONDRI cohort. This study will begin in early 2019. CONNECT will launch a pilot feasibility study at the St, Michaels hospital. This pilot aims at studying head injuries in a novel way in order to enhance care. Participants will be assessed as early as 24 hours post-injury (a unique feature compared to other head injury studies) and followed for up to 12 weeks. The purpose of this study is to collect information from the same adults over a 12 week period of time. This is a novel way to study head injury. The purpose is to enhance our understanding of the changes that an adult may experiences along the pathway to recovery. Ultimately, this knowledge can help clinicians deliver the right treatment to the right patient at the right time.

CAN-BIND has completed recruitment of the Wellness study in collaboration with Janssen. This study involves real-time data capture with mobile devices to help predict markers of relapse. CAN-BIND investigators are pooling data with Janssen for joint analysis and plan to use their findings to

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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.

inform the use of mobile device markers for predicting relapse following depression treatment with other therapies.

OBI has launched GEEK, 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.). The call for applications generated great interest from across Ontario and we will be selecting the successful organizations in early 2019. GEEK support will includes 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.

Action Item #3 – Integrating Industry and Research
OBI also integrates research with industry for economic impact. The commercialization activities of the Integrated Discovery Programs are supported through an embedded Core Innovation Team (program-specific industry advisors) that advise 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 – the NERD Program and Entrepreneurship and Management Training (EMT) Program – to support the growth of neurotechnology companies across Ontario and the incorporation of these Ontario-based technologies into the Ontario healthcare system.

OBI will continue to engage multi-national enterprises to help secure further partnerships and funding for our Integrated Discovery Programs. CAN-BIND plans to launch a biomarker study to validate their previous findings in partnership with Otsuka. CAN-BIND will also continue their Ketamine/ECT study and will expand the study to include 2 new sites at Sunnybrook Hospital and The Douglas (in Montreal). POND will also be continuing their Arbaclofen trial at all 5 sites, as the Canadian partner of this cross-continental trial being conducted in collaboration with EU-AIMS.

Action Item #4 – ONDRISeq – Develop for Implementation Readiness
Innovations arising from the Integrated Discovery 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 costs 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 create jobs and reduce healthcare costs by about $4.2 million per year.

OBI will work with ONDRI and key policy groups within the healthcare system to complete assess the feasibility of implementing 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 Integrated Discovery 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.

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. Funding agreements have now been reached between the Supercluster and the Federal Government which will now lead to the ability of the Supercluster to issue calls for proposals. OBI will be seeking partnership arrangements to take advantage of the funding available for the development of analytical capabilities and the development of Ontario based opportunities in artificial intelligence.

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 Integrated Discovery Programs with the broad health administrative data that is contained at ICES and within electronic medical Records.

OBI and ICES have successfully linked datasets in order to create an algorithm that will enable OBI/ICES to determine the health administrative costs of children with autism spectrum disorder. This is the first of three data linkage studies. The remaining two pilot linkages will be performed in 2019:
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) Screening for depression, obstructive sleep apnea and cognitive impairment to identify stroke clinic patients at risk of adverse outcomes in approximately 8520 patients.

From these pilot linkage studies, it has been determined that OBI and ICES are poised to implement a more regularized approach to data sharing to demonstrate the value of digital phenotyping and impacts of potential changes on the health care system. OBI and ICES will aim

to develop a routine linking protocol encompassing all participants on Brain-CODE to allow for more immediate linkages.

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.

Brain-CODE continues to be used by CAMH, which has established a centralized database powered by Brain-CODE for research being conducted at the institute. OBI will continue to support the operation 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.

OBI will work with Hong Kong Science and Technology Park (HKSTP) in preparing for its planned Health Informatics Support Platform (HISP). The HISP is an initiative to provide a data management and analytic platform for Hong Kong Science Park partner companies and academic research groups for biomedical and health research and development purpose.

OBI will continue to work with consortia members linked to our two SIF applications in the areas of creating a pan-Canadian data platform for genomic data, EMR data, clinical trial data, and patient-generated data from mobile devices, and the integration of novel wearbale sensor technology, data analytics, and machine learning for precision medicine applications.

Following up on the "Redefining Neurodegeneration: A global collaboration to share deep phenotyping data" conference, co-hosted with CAMH, and Nature Neuroscience, a follow-up meeting is being planned to continue the global collaborations.

Focus Area: 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 (Atlas for Ontario Neuroscience) – 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 Entrepreneurship and Management Training (EMT) 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.

Lastly, 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 Integrated Discovery 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.

Focus Area: Improve 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 and Community 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 and Community Advisory Committees for each ID Program, which meet quarterly. OBI will continue to host an annual Patient and Community Advisory Committee workshop.

OBI is evaluating the impact of investments by refining and implementing the evaluation plan it developed in conjunction with the newly constituted Outreach Advisory Committee, involving global leaders in evaluation, knowledge translation, and public engagement.

OBI has launched the GEEK (Growing Expertise in Evaluation and Knowledge Translation) program, which provides funding, evaluation expertise, and support to community-based programs and services for people living with brain disorders. GEEK supports the sustainability, scale or spread of these programs, to improve the quality and quantity of evidence-based care in the community. In 2019, OBI will support the first cohort of GEEK awardees to spread and/or scale and evaluate the impact of their programs in Ontario.

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 and Community 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 and Community Advisory Committees for each ID Program, which meet quarterly. OBI will continue to host an annual Patient and Community 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 Integrated Discovery Programs and the 21 patient advocacy groups shown below.
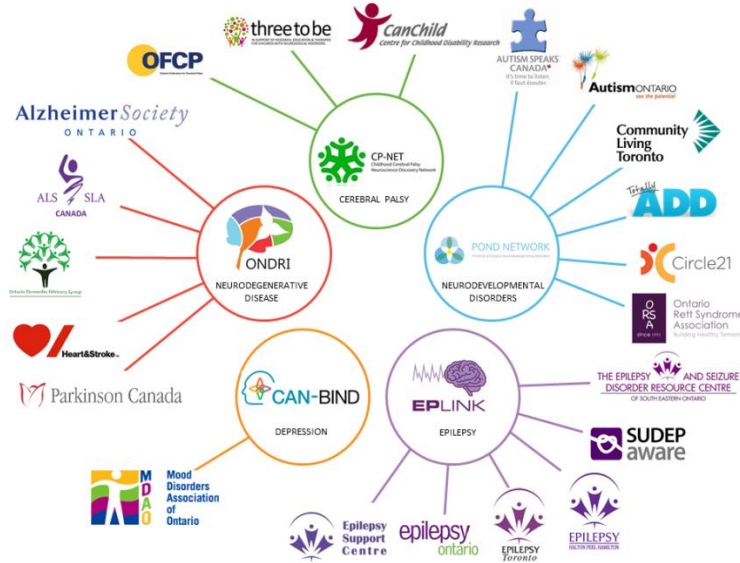
Through strategic outreach activities (past examples include Primary Care Collaborative Memory Clinics and Minds in Motion), OBI will translate research into improved efficiencies in health care service delivery and facilitate linkages between researchers and decision-makers for the uptake and use of evidence.

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 continue to work with the Chiefs of Ontario to scale a youth suicide prevention program to First Nation Communities, helping to support a province-wide mental wellness initiative for Indigenous youth.

OBI will continue to be involved in the development of Ontario's Dementia Strategy through the provincial advisory group. 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 launch three ECHO hubs in adult epilepsy centres in 2019. These hub sites are in Toronto, London, and Ottawa.

Action Item #13 – Evaluating Effectiveness

OBI is evaluating the impact of investments by refining and implementing the evaluation plan it developed in conjunction with its International Evaluation Advisory Committee (now re-constituted as our Outreach 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 has embedded a culture of evaluation within its Integrated Discovery Programs by creating logic models and will be 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. As a first step we are working to develop codes that will identify brain disorders that are currently unidentifiable through administrative data, such as autism. The first version of the report is being used by several patient advocacy groups and health planning units as a resource, including Epilepsy Ontario, Parkinson Canada, Ontario community epilepsy agencies, and the Ontario dementia strategy.

Focus Area: Integrated Discovery Programs – Areas of Impact

The Integrated Discovery 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.

OBI will ensure that the Integrated Discovery 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 Integrated Discovery Programs Operate Consistent with the OBI Vision

OBI continues to work with each of the Integrated Discovery Programs to ensure that they operate consistent with OBI's vision to create a learning healthcare system and funding and activities in alignment with the OBI model as recommended by the External Review.

Each of the Integrated Discovery Programs has developed a logic model that highlights the short-term outputs and long-term goals of the program. This logic model and the implementation of the performance management framework will enable us to keep the Programs focused towards prioritized activites (e.g. those with healthcare impacts). We will also continue to hold quarterly Strategic Planning meetings with each program to allow for joint planning and to monitor milestone progress. In cases where there is a failure to meet milestones or to adhere to the OBI model, these meetings will provide an opportunity to provide warnings and adjust accordindly.

In the coming year, OBI will also be working with each of the Integrated Disovery Programs to develop metrics that will help to demonstrate progress towards their long-term goals. We will be using their program-specific logic models to help develop these indicators of success, as each program has its own unique areas of strength and set of goals.

The Integrated Discovery Programs' clinical framework will continue to drive 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 Integrated Discovery 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 utilize their logic models to inform budgets, 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 upcoming fiscal year, OBI will continue to support Concussion Ontario Network: Neuroinformatics to Enhance Clinical care and Translation (CONNECT) with seed funding to allow for completion and analysis of the pilot feasibility clinical study that is about to launch at St. Michael's hospital. Funding will also support a management structure within the program to allow for further harmonization of CONNECT with other national and international studies and continue to build a strong research network by using the same common data elements. The program will also continue to map capacity across Ontario institutions to allow it to launch in other sites should funding be available. 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 concussion to create an Integrated Discovery 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 would fill a gap in OBI's systems approach to understanding the brain. It would also provide the opportunity to compare and contrast mechanisms linked to brain 'injury' to brain 'disease' and allow the exploration of well established but poorly understood links between concussion, post-concussive syndrome, depression and anxiety.

Focus Area: 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.

The 2019/20 Revenue plan includes a total target of $5m for Other revenue generation. The plan is based on: $2m in revenue being generated through fee for services; $2m in grant funding from federal innovation programs; and $1m in fund raising initiatives. The fund raising activities will be focused on individual philanthropy giving and international foundations.

Action Item #18 – Fund Raising

OBI has established a specific fund raising target of $7M over a 3 year time period beginning in 2019/20. This will increase capacity to support 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 establishing a dedicated focus on fund raising in the organization, contracting for services to support its fund

raising needs, collaborating with its current partners in the research community and engage with other independent professionals who specialize in raising of funds to support health related care and commercialization requirements.

Focus Area: Operations

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 – Reporting and Operational Planning
- Continue to prepare financial statements for Audit and Finance Committee and the OBI Board.
- Submit Annual Report by July 31, 2019 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 the Ontario government 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 Broader Public Sector Procurement Directive.

Action Item – Management Controls
- Maintain adherence to financial policies and procedures in compliance with requirements of the Ontario government funding agreement and the Broader Public Sector Accountability Act.
- Conduct an external audit for FY 2018-2019 by July 2019.

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.
- Provisions for staff team bonus of up to 5% for 2018-2019 if warranted by performance, subject to Board approval.

Action Item – Leveraging

OBI's 2019-2020 leveraging plans include:

1. Our research programs will focus on maximizing grant impact, especially those that are federally funded, to ensure that we are recognizing and accounting for all potential research-driven leveraged funds. An additional $26M in leveraged funds is anticipated from our research programs.
2. The Brain-CODE platform is poised to raise up to $10M in funding from federal sources as well as other local, national, and international partners.
3. OBI's commercialization activities including the Neuroscience Early Research and Development Program and the Entrepreneurship Program are expected to raise up to $3M in follow-on funding.
4. Knowledge Translation activities are anticipated to raise up to $1M through its GEEK Program, Event Funding Program, and partnerships with neurological charities.

Appendix 1 - 2019-2020 Milestones by Priority

1) **Build a learning healthcare system by integrating research and care, and fueling it with next generation informatics and analytics**
   a) Ongoing management of five current Integrated Discovery Programs, ensure alignment with OBI Vision and adherence to the OBI model
      i) Ongoing implementation of each ID Program standardized clinical framework
      ii) Conduct annual analysis of cross-ID Program Brain-CODE common data elements to look at disease comorbidities
      iii) Conduct an annual bibliometric analysis on ID Program publications
      iv) Conduct annual cross-IDP workshops to build capacity and create opportunities for cross-program collaborations
      v) Ongoing management of advisory capacities to support patient, industry and scientific input into the programs
   b) Active testing of biomarkers in the community care setting
      i) Continue ONDRI@Home
      ii) Continue biomarker testing for depression
      iii) Initiative new biomarker trial in other Integrated Discovery Programs
   c) Artificial intelligence for disease modeling and diagnostics
      i) Ongoing development of new IP, analytic tools, and treatments through participation in Digital Technologies SuperCluster
      ii) Ongoing engagement between Integrated Discovery Programs, AI experts and analytical tools to increase Brain-CODE's analytical capacity
   d) Quality improvement processes for healthcare
      i) Ongoing participation in the Ontario Dementia Strategy and where appropriate work to implement new treatment protocols and pilots
      ii) Initiate EpLink studies on the Ontario Epilepsy ECHO program to better understand health outcomes
   e) New treatments
      i) Hold annual cross-IDP workshop seeking partnerships for conducting Phase 2 clinical trials
   f) Real-time data access and analytics
      i) Complete 2nd phase of work related to the Canadian Open Neuroscience Platform as a mechanism to engage with the broader neurosciences community – nationally and internationally
      ii) Ongoing Brain-CODE data releases for 3rd party usage
      iii) Ongoing data federation across the Integrated Discovery Programs

g) If appropriate, initiate policy processes related to the provincial adoption of ONDRISeq as genetic screen for dementia risk assessment

h) Full implementation of recommendations from OBI Wide External review to ensure a world class informatics platform to support the Integrated Discovery Programs

2) **Growing a Globally Competitive Neurotechnology Cluster**
   a) Scale-up of small companies
      i) Continue with scaled up NERD program
   b) Attract and develop new management talent and increase employment in the neurotech sector
      i) Continue OBI ONtrepreneurs program
      ii) Continue OBI's internship program
   c) Procure home grown products into healthcare system
      i) Work with OCHIS on new technologies and companies coming through our programs
   d) Work across the broader neurotech cluster to:
      i) increase interactions with Ontario companies and Integrated Discovery 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 Integrated Discovery Programs
   f) Hold annual meeting on the potential for consolidation of similar intellectual property/technologies across research institutions participating in the Integrated Discovery Programs
   g) Work with companies and researchers on the validation of software platforms and algorithms on Brain-CODE

3) **Improving Brain Health**
   a) Data-driven decision making / policies
      i) Continued participation in Ontario's dementia strategy and capacity planning work
      ii) Ongoing work to develop codes for capturing autism and depression in administrative data
   b) Patient research priorities addressed in research
      i) Initiate second patient priority setting partnership
   c) Community-based implementation pilots
      i) Continue implementation of GEEK Program
      ii) Continue to 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) Health system planning using research and administrative data
    i) Continue to explore opportunities for linking of research and health administrative data
f) Self-management of health
    i) Continue OBI Public Talks series to educate and inform public

4) External Review
    a) Identify Co-Chairs for External Review of first half of operations
    b) Finalize terms of reference for External Review

Appendix 2 – 2019-2020 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 Integrated Discovery 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 Integrated Discovery 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

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

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

Appendix 3 2019-2020 Financial Information

Ontario Brain Institute Financial Plan – Operating Plan		$ 2019-2020
Revenue		
Ontario Government		20,000,000
Other Revenue		5,000,000*
Total Funding		**25,000,000**
Government Funding		
Expenditures		
Research		9,975,000
Informatics		2,600,000
Industry & Training		1,100,000
KT & Community Outreach		1,250,000
Salaries & Operating		5,075,000
Total Government-Funded Expenditures		**20,000,000**
Other Revenue		
ID Program Opportunities		500,000
Informatics		200,000
Data Science		1,250,000
Industry and Training		250,000
K&T & Community Outreach		200,000
Total Exp-Other Revenue Sources		**2,400,000***
Total Expenditures		**22,400,000**
Other Funds Surplus/(Deficit)		**2,600,000**

*the Other Revenue of $5m have offsetting expenditures of $2.4m as indicated above. The $2.4m in expenditures do not take place unless the revenue is raised in the first place.