

November 2020

Every five years, as part of the Ontario Institute for Cancer Research's (OICR) funding agreement with the Government of Ontario, OICR undergoes an independent external expert review to assess the Institute's performance and impact and provide advice with respect to the future strategy of the organization.

The 2020 external review was held from March 24-26 and it was conducted virtually due to the COVID-19 pandemic. The review was led by two co-chairs, Anne-Marie Mes-Masson, PhD, Associate Scientific Director, Centre de recherche du Centre hospitalier de l'Université de Montréal, Montréal (appointed by the Ministry of Colleges and Universities) and Gordon Mills, MD, PhD, Director of Precision Oncology, Knight Cancer Institute, Oregon Health & Science University, Portland, OR (appointed by the OICR Board of Directors ) and included five additional panel members:

- Garnet Anderson, PhD, Senior Vice President and Director, Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle
- Jennifer Grandis, MD, Professor, University of California, San Francisco
- Peter Finan, PhD, Partner, Epidarex Capital, Edinburgh
- Brad Nelson, PhD, Director and Distinguished Scientist, BC Cancer Agency, Victoria
- Stephen Robbins, PhD, Scientific Director, CIHR Institute of Cancer Research, Calgary.

The reviewers were focused on four key questions:

1. How well did OICR achieve the Goals set out in Strategic Plan 2016-2021?
2. Has OICR (in partnership with FACIT) made appropriate progress towards impact on the Ontario cancer research system, the health system and the economy, delivering value for money and good outcomes for the province of Ontario?
3. Are the Institute's structure and operations appropriate for achieving its mandate?
4. Do the vision and priorities proposed in OICR's draft strategic framework for 2021-2026 position the Institute for long term impact?

The resulting External Review Report presents a positive view of the Institute and its contributions to cancer research, noting that, *"OICR is a world-class research institute that has built on existing cancer research strengths in the province and fostered the commercialization of new therapies and innovations that benefit people in Ontario, Canada, and worldwide."*

The recommendations of the review have been fully considered by OICR's leadership and have been integrated into OICR Strategic Plan 2021-2026, which guides the Institute's research over the next five years.

We are pleased to share the results of the review with you and welcome any comments or feedback at [info@oicr.on.ca](mailto:info@oicr.on.ca).

Sincerely,



Laszlo G. Radvanyi, PhD  
President and Scientific Director, OICR



Tom Closson,  
Chair, Board of Directors

# OICR 2020 EXTERNAL REVIEW

## Executive Summary

The 2020 Ontario Institute for Cancer Research (OICR) External Review Panel was presented with a comprehensive data set, metrics, and review of the Institute following its previous review meeting in 2014 and its progress under Strategic Plan 2016–2021. Key discussions during the review included the transition of OICR to a more inclusive program, related efforts to increase its integration into the larger Ontario cancer research community, and the transition of OICR between different provincial agencies.

Details of the review and specific panel recommendations are provided in the full report and should be considered. The panel acknowledges the natural overlap of the data and themes in the presentations and the report is similarly structured. The executive summary is not meant to replace the panel’s detailed review. Rather, this summary highlights some key points and brings the recommendations together into a single, integrated assessment independent of the specific questions proposed to the panel.

### ***Highlights***

Throughout the review, the panel was provided with a rich set of data to analyze; for the most part, this data set was well-constituted and clear. The OICR team is to be congratulated on their efforts to achieve the goals as set out in their Strategic Plan (2016–2021) and to provide metrics of this success. Overall, the panel agrees that OICR is a world-class research institute that has built on existing cancer research strengths in the province and fostered the commercialization of new therapies and innovations that benefit people in Ontario, Canada, and worldwide. The committee was presented with strong examples to show how support from OICR, and in particular its role as a facilitator, is both building on opportunities in the province and having a major impact on Ontario’s cancer research ecosystem. This ranged from support of MaRS-based (intramural) and externally supported (extramural) research to recruitment of high-quality investigators to working to improve the entrepreneurial environment in Ontario through FACIT.

Further, OICR has attempted to respond and improve processes and goals in response to the previous external review: importantly, there have been major changes in leadership and overall strategic plans. The evolution from what was once perceived as an ‘exclusive’ program to a more inclusive approach of engaging the cancer research community across Ontario is seen as particularly positive. Indeed, the review panel was impressed with the accomplishments of OICR overall and of the Ontario cancer research community. The panel has provided a number of recommendations for consideration that could further extend the impact of OICR.

## **Recommendations**

OICR is currently well along in planning its next strategic plan. The Institute needs to continue to seek input and buy-in from the community. A key part of this process will be understanding what the community believes is the greatest contribution of OICR – currently and moving forward. Such a plan needs to encompass opportunities across Ontario; however, the review panel also cautions that the current approach requires clearer focus on how to best achieve the goals of OICR without running the risk of becoming diffuse, and thus not succeeding in achieving its goals for clinical impact.

The panel also notes that OICR needs to develop a coherent strategy to identify ‘unmet’ clinical needs to best fulfill its mandate. The committee recognizes the merit of focusing on present Ontario strengths, but would recommend a careful assessment of important gaps, including needs of northern and Indigenous communities and underprivileged populations, that can be addressed through OICR’s different support mechanisms. This needs to be balanced against the larger question of whether OICR should focus on a smaller set of core programs where they can have a greater impact or maintain a very broad portfolio.

Similarly, the panel also suggested the answers to “*Who is OICR?*” and “*What is OICR’s role in the community?*” need to be more fleshed out in the new strategic plan. OICR used the ‘honest broker’ description in their presentations, but beyond that, they need to define the programs that they drive, what they enable, and if they are using the best tools to achieve their goals.

OICR should continue its efforts to engage the cancer research community across all of Ontario. This should include holding meetings in centres outside of the downtown Toronto core at MaRS. It is particularly important to engage the broader community during the strategic planning process and during the strategic plan roll out. The review panel believes that OICR would benefit from determining whether there are additional areas of expertise and opportunity based on the cancer expertise already available in Ontario that should be included in the strategic plan. An example of this is the radiomics and imaging groups, who represent an area of expertise and commercialization, but were not emphasized during the review. The panel recommends that after the strategic planning process is completed, a province-wide tour is conducted at least biennially. However, the outreach must be done with care as it has the potential to lead to expectations of support from OICR for initiatives and efforts at all centres. Thus, outreach needs to be balanced with the need for focus on a set of core programs with greater impact as addressed above.

Further, the panel noted that the research community outside of OICR’s core investigators is supportive of the research platforms within OICR (at MaRS). However, additional efforts need to be made to make these resources readily accessible to the community and to develop business plans within each resource to accomplish these goals.

The review panel was particularly supportive of the three major research themes (Adaptive Oncology, Therapeutic Innovation and Clinical Translation). The genomics and bioinformatics

platforms within Adaptive Oncology and the drug development program within Therapeutic Innovation were seen as flagships. However, OICR's platforms and the expertise in Adaptive Oncology, including bioinformatics and biostatistics, could better integrate their expertise within high-quality transformative clinical trials conducted in Ontario. The panel also recommends that OICR continue its efforts to integrate across its genomics programs specifically to look at new data and mine as many possible new research and therapeutic leads as possible from this existing and largely untapped rich data pool.

However, given the charge to OICR of resolving key unmet needs within Ontario, and the challenges with implementing clinical translational studies without direct input into physicians and clinical care, it was felt that the Clinical Translation program should undergo a detailed review as part of the strategic planning process to determine whether it is optimally organized and supported. This includes the Ontario Cancer Research Ethics Board (OCREB), the Canadian Cancer Clinical Trials network (3CTN), the OICR-Cancer Care Ontario (CCO) Health Services Research Network, the Canadian Partnership for Tomorrow Project (CPTP; now called CanPath), as well as the Ontario Tumor Bank (OTB) within the Adaptive Oncology theme. In particular, the Clinical Translation program should review how optimally to support clinical trials as well as to focus on areas of need such as Indigenous and underserved populations in Ontario. The review panel felt that the areas of cancer detection, prevention, and health services research deserved additional attention and a review of how to best support these efforts within the new strategic plan.

Moreover, given OICR's broad mandate to improve the lives of cancer patients and also promote commercialization through FACIT and entrepreneurship in Ontario, its mission is relevant to several of the provincial ministries, namely the Ministry of Colleges and Universities (MCU), the Ministry of Health (MOH) and the Ministry of Economic Development, Job Creation and Trade (MEDJCT). The panel noted it would be helpful for OICR to preserve its recent connectivity to MEDJCT and also improve its connectivity to MOH and the new Ontario Health agency. MCU could help to broker those connections, and lead a cross-ministry liaison team. Ensuring OICR's strategic objectives and deliverables meet those of multiple ministries in the Ontario government would broaden support for continued investment in OICR and solidify its importance in helping the government to deliver on its priorities. The panel also suggests OICR work on creating structures and programs to form a rapid-response network for emerging issues the ministries might need help with. Sub-committees or linkages between the various ministries that are facilitated by OICR are one suggestion that was discussed, as well as building a framework into their relationships with other government-funded health and research organizations.

The panel also extensively reviewed the relationship between OICR and FACIT, and it is seen overall as a positive. The panel is cognizant and supportive of the concept that creating an entrepreneurial culture in Ontario is a long-term effort and will require ongoing support. Within that concept, there should be a review of funds flowing from successful commercialization efforts back to FACIT to provide additional funds for investment.

The panel further suggests that OICR and FACIT strengthen their efforts to raise awareness of the unique value-add of its commercialization pipeline and the incentives and support available to Ontario researchers and companies. OICR should also review its “Ontario-first” concept with MCU and consider an “Ontario-centric” or an “Ontario-benefitting” program that is more integrated with nationwide or larger needs and opportunities. This will allow the program to benefit from and contribute to larger national and international efforts.

Finally, the committee strongly recommends that OICR develop a formal equity, diversity and inclusion (EDI) policy, as well as a clear approach for its implementation across all aspects of the Institute. The panel also recommends that OICR work with its Board to review and refine its conflicts of interest process.

## Background and Scope

The [Ontario Institute for Cancer Research](#) (OICR) undergoes a mandated independent external expert review every five years as part of its funding agreement with the Government of Ontario. This is the Institute's third external review; it is preceded by the [2014 External Review report](#) and 2010 External Review.

The review assesses the Institute's performance and impact and provides recommendations for increasing both. Specifically, the 2020 External Review followed a specific criteria focused on assessing: the achievement of OICR's goals as set out in their [Strategic Plan 2016–2021](#); the Institute's progress towards impact on the cancer research ecosystem, cancer patients and the general population, and the Ontario economy; and the Institute's operating model. To that end, the panel also reviewed how OICR works with its commercialization arm [FACIT](#) to deliver economic benefit to Ontario but did not independently assess FACIT's performance and impact.

OICR's 2020 External Review panel was led by two co-chairs, one appointed by the OICR Board, and the other by the Ministry of Colleges and Universities (MCU), and included five additional members with broad expertise in cancer and cancer research:

### Panel Co-Chairs

- [Anne-Marie Mes-Masson](#), Associate Scientific Director, Centre de recherche du Centre hospitalier de l'Université de Montréal, Montréal
- [Gordon Mills](#), Director of Precision Oncology, Knight Cancer Institute, Oregon Health & Science University, Portland

### Panel Members

- [Garnet Anderson](#), Senior Vice President and Director, Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle
- [Jennifer Grandis](#), Professor, University of California, San Francisco
- [Peter Finan](#), Partner, Epidarex Capital, Edinburgh
- [Brad Nelson](#), Director and Distinguished Scientist, BC Cancer Agency, Victoria
- [Stephen Robbins](#), Scientific Director, CIHR Institute of Cancer Research, Calgary

The 2020 External Review was conducted as a three-day online meeting (March 24–26, 2020) with the review panel, OICR management and scientific leaders, the Board chair, FACIT leadership, and individual members of Ontario's cancer research community. Presentations and discussions were anchored around four key questions related to OICR's strategic goals and intended impacts. The outcome of the review is this report; the series of recommendations will inform the development of the Institute's next strategic plan (2021–2026).

## QUESTION 1

### ***How well did OICR achieve the Goals set out in Strategic Plan 2016–2021?***

The panel was provided with a rich set of data to analyze this question and the data provided was for the most part well-constituted and clear. The team is to be congratulated on their efforts to achieve the goals as set out in the Strategic Plan (2016–2021) and to provide metrics of this success. Further related to this, OICR has attempted to respond and improve processes and goals in response to the previous external review: importantly, there have been major changes in leadership and overall plans.

However, throughout the evaluation of OICR's achievements, the panel felt it was difficult to parse what was obtained or led by intramural (internal MaRS-based) efforts versus achievements that came through OICR's support of the Ontario ecosystem. The panel concludes nonetheless that both intramural and extramural support are key to OICR's mandate.

### **Goal 1: Perform cutting-edge translational cancer research.**

*(Undertake world-class transformative research focused on solving pressing clinical challenges to improve cancer prevention, detection, diagnosis and treatment.)*

#### **Summary**

The panel was presented with a wealth of metrics during the presentation relevant to the Institute's overall scientific performance. Bibliometrics were excellent and demonstrated a major effort into assessing productivity. Overall, the data indicated a vibrant scientific output of high-quality and international impact. In order to demonstrate an impact on translational research, the panel was presented with specific cases of clinical impact selected from [TRIs](#) (Translational Research Initiatives) as part of the clinical translational theme and other funded projects.

Overall, the panel agrees that OICR has achieved this goal very well. OICR is a key contributor to impactful and world-class translational cancer research within specific sectors. However, there could be an increased focus on efforts that change Standard of Care and a review of the types of studies and programs that have the greatest likelihood to promote changes in clinical practice, such as the impact of the imaging program in Ontario supported by OICR.

#### **Strengths**

OICR provided a lot of positive, useful metrics, which the panel agrees should continue to be employed as they are relevant to tracking their progress in meeting their current ministry-set mandate and the mandate as it matures with the shift to a different ministry. The data and metrics were also developed to demonstrate OICR's response to the recommendations of the

last external review, and the panel feels these are appropriate and the progress is well demonstrated.

Further, a number of world-class translational programs with demonstrated clinical or potential clinical impacts that reflect the strengths of OICR were noted by the panel:

- [Genomics](#) (under the Adaptive Oncology program)
- [Bioinformatics/computational biology](#) (under the Adaptive Oncology program)
- Medicinal chemistry (under the [Drug Discovery program](#))

### **Gaps & Opportunities**

The panel noted that with respect to cancer detection, prevention, and health services research, OICR has not developed and implemented world-class leadership at the level seen with some of their other initiatives. However, the panel did agree there were several notable examples where OICR is clearly a key enabler of impactful cancer prevention research including:

- OICR support and scientific leadership within [CanPath](#) (Canadian Partnership for Tomorrow's Health or the Tobacco Control work)
- Dr. Geoffrey Fong's world-recognized leadership in the International Tobacco Control Policy Evaluation Project

Similarly, imaging is a leading program for Ontario and should also be for OICR yet did not receive a major emphasis in the presentations. The panel notes that support and direction for this program, particularly in terms of faculty recruitment and succession planning, should be more fully considered.

### **Panel Recommendations**

As undertaking cancer prevention, early cancer detection, and outcomes research is part of OICR's ministry-set mandate, the Institute should continue to support and perhaps even increase prioritization of vehicles for this area. OICR's enabling role has been seen as useful to advancing detection and prevention research and related impacts within the Ontario cancer research community as a whole. However, given the importance of this area, it should be integrated as a specific area of concern and opportunity in the current strategic planning process.

The cancer research ecosystem in Ontario is robust. While OICR has recently put additional effort into outreach and identifying opportunities for collaboration and investment, the review panel believes OICR would benefit from determining whether there are additional areas of expertise and opportunity based on the cancer expertise already available in Ontario that should be included in the next strategic plan.



It is clear that OICR provides benefits to the cancer research community of Ontario. However, in most cases, the efforts are seen as facilitating other ongoing efforts. It was difficult to determine the direct result of contributions from OICR as compared to results from leveraging efforts already ongoing. Thus, the panel recommends that additional metrics be used to provide more clarity on the distinct impact of direct OICR contribution as compared to the outcomes of co-funded projects (including actual numbers and funding levels).

In addition, it will be important to carefully delineate the accomplishments that arise from funding to intramural (MaRS-based researchers) versus extramural OICR investigators. As an independent metric, it will be important to quantify the leveraging of OICR investment by support from other sources. This is particularly apparent in tracking the relative contributions of salary support from OICR and other agencies.

## **Goal 2: Mobilize Ontario research strengths around key cancer priorities.**

*(Focus provincial expertise and capacity on collaborative, multidisciplinary translational research activities aimed at addressing unmet clinical needs for cancer patients in Ontario and beyond.)*

### **Summary**

Overall, the panel agrees that OICR is a world-class research institute that has built on existing cancer research strengths in the province and fostered the commercialization of new therapies and innovations that benefit people in Ontario, Canada, and worldwide. However, the research priorities are global in nature. While this is typical of many research institutes, given OICR's provincial mandate and funding, it should consider whether there are key unmet needs in the population of Ontario, such as in Indigenous communities, where investment for OICR could uniquely impact clinical needs. It is important to integrate the role of OICR in providing research and clinical impact for underserved communities in Ontario into the strategic planning process. The focus on expertise available in Ontario could then be balanced by determining whether there are unique clinical and patient needs that could be applicable to Ontario and beyond.

### **Strengths**

OICR continues to harness some of the real strengths and unique opportunities offered by the Ontario research community. Their three overarching program themes seem well aligned with the strengths of the Ontario ecosystem. In particular, the TRIs were presented as an excellent example of how to deliver team science to large translational objectives within their Clinical Translational theme that bring together the best scientists from across the province to meet specific cancer patient needs. These programs appear to be largely opportunistic, as most are built on existing research strengths within the Ontario ecosystem; however, they are also distinguished by their multidisciplinary approach and their focus on tangible patient-centered outcomes. Building on renewable competitive advantages in Ontario is considered a positive.

OICR also clearly demonstrated to the panel that their ‘honest broker role’ in bridging the best of academic and industry is what sets them apart provincially and nationally and fills a gap in the Ontario research ecosystem. One of the key goals is to help overcome the ‘valleys of death’ towards commercialization and improved patient outcomes. Recognition of this need and investment through FACIT and the Clinical Translational theme are seen as positives, but it is not clear that they are yet attaining their goals. Independent programs to attract talent to the province, like the Investigator Awards, are clearly an asset. The committee also noted the strength of different technological and analytical platforms supported by OICR that were also praised by groups outside of OICR.

The mandate to be Ontario-first does seem to hamper OICR’s ability to be a part of bigger initiatives with potential impact on clinical needs that are happening nationally or internationally. Despite this, there was a recognition that programs like CanPath, [3CTN](#), the [TFRI Marathon of Hope](#) and [ICGC-ARGO](#) all broaden the impact of OICR’s contribution.

### **Gaps & Opportunities**

OICR has invested heavily in opportunistic programs based on strengths in Ontario. The panel believes that OICR should review its research programs to determine whether they are addressing ‘unmet’ clinical needs, which is their charge. This applies to basic and translational research and clinical trials as well as cancer detection, prevention, and outcomes research. There should be a review of unique needs, such as those of Indigenous or underprivileged populations. At the present time, there does not appear to be a systematic approach to identifying what needs should specifically be addressed, and what criteria would be used to prioritize the large field of cancer research and specific cancer clinical needs.

The panel also did not see examples of strong priorities being set from a health services perspective. Here the investment is largely governed by open competition. The amount of resources to be directed to this area should be reviewed.

### **Panel Recommendations**

Barring a coherent strategy to identify ‘unmet’ clinical needs, the committee recognizes the merit of focusing on present Ontario strengths, but would recommend a careful assessment of important gaps, including needs of northern and Indigenous communities and underprivileged populations, that can be addressed through OICR’s different support mechanisms. This needs to be balanced against a theme (discussed below) of whether OICR should focus on a smaller set of core programs where they can have a greater impact or continue maintaining a very broad portfolio.

For cancer detection, prevention, and health services research, OICR could use tools such as defining competition priorities to incentivise the research community to focus on areas of interest that would lead to more investment in these areas.

OICR should also review the “Ontario-first” concept and consider an “Ontario-centric” or an “Ontario-benefitting” program that is integrated with nationwide or larger needs and opportunities. This will allow the program to benefit from and contribute to larger national and international efforts.

**Goal 3: Partner with the Ontario cancer community to leverage and elevate the level and impact of cancer research in the province.**

*(Provide access to resources, expertise, technologies and training opportunities to strengthen Ontario’s translational research capacity.)*

**Summary**

The presentations here provided a number of ways that OICR accomplishes its partnership goal, and there are several examples of their influence in this capacity.

**Strengths**

As an example of outreach and community engagement, the panel noted that the Institute’s [biostatistics](#) and [bioinformatics](#) workshops are heavily subscribed, and panel members recognized as a result there is a much better understanding Canada-wide of what researchers can do with these tools and how to properly use them. The [Ontario Molecular Pathology Research Network](#) (OMPRN) is also seen as a particularly positive aspect of the community outreach and engagement efforts of OICR.

Further, the panel’s discussions with additional external researchers from the community confirmed that among OICR’s recognized premier areas of service and collaborative excellence are medicinal chemistry, bioinformatics analysis, genomics platforms, and the pathology consortium.

**Gaps & Opportunities**

The presentations provided an impressive list of [Collaborative Research Resources](#) (CRR) available to the Ontario research community to use to further cancer research objectives. The panel’s discussions with additional members of the research community indicated that while these resources are highly valued there is still a lack of clarity and awareness among many non-OICR researchers about what is available and how to access these leading-edge technical and analytical platforms.

**Panel Recommendations**

OICR’s Collaborative Research Resources (i.e., Diagnostic Development, Drug Discovery, Genomics/TGL, Informatics, Imaging, and data and tissue repositories consisting of the Ontario Health Study and the Ontario Tumour Bank) and training modules (i.e., biostatistics and

bioinformatics workshops, BioLab) have significant impact on the research community and its capacity in Ontario and Canada-wide, leading to better and more clinical impacts, and should be preserved going forward.

In terms of utilization of the core resources by the community, OICR should continue and expand its efforts to reach out to the research community. The OICR should review the business model used by each core resource to develop approaches that would further promote the use of these shared collaborative resources by the broader cancer research community in Ontario.

OICR's recent outreach tour to regional centres should be repeated as the new strategic plan begins to take shape. Further, tours and similar community outreach should be an ongoing biennial event. This should include a module on OICR's core resources and how to access them.

Similarly, OICR holds the majority of their meetings and training programs in the Toronto downtown core: to further their integration into the Ontario ecosystem more broadly, efforts should be made to go out to the overall community by holding meetings at other sites beyond the Greater Toronto Area.

#### **Goal 4: Drive the adoption and commercialization of cancer innovations in Ontario.**

*(Collaborate with healthcare providers/agencies and private sector partners to ensure that Ontario discoveries realize their potential to improve cancer outcomes and deliver economic benefit to Ontario.)*

#### **Summary**

The panel was impressed with the specific examples and case studies that were presented in this section. At the present time, the return on investment is impressive. The panel acknowledges that in the current culture, developing this area is challenging and will require long-term efforts and investment to develop the needed ecosystem.

#### **Strengths**

The two Drug Discovery program assets that have been picked up in pharma deals are great case studies (Propellon Therapeutics/Partnership with Triphase/Celgene – WDR5; and Novera Therapeutics/University Health Network collaboration/Partnership with Janssen – BCL6).

Dr. Nicole Mittmann's health service research on community care for breast cancer survivors provided a compelling example of how health services research could help implement cost effective change within the Ontario health system.

There was information provided as to how imaging innovations have both fueled better care and returned economic investment.

The economic impact of OICR and FACIT was also well demonstrated. The panel was particularly impressed with the metrics for return on investment:

- For every dollar invested in OICR and FACIT operations, \$1.82 is created in economic output.
- OICR and FACIT operating expenditures directly support 543 full-time equivalent (FTE) jobs; when indirect and induced economic impacts are taken into consideration, a total of 925 FTE jobs are supported annually.

### **Gaps & Opportunities**

The panel did note that OICR has an opportunistic approach to investments in this area, especially for the Drug Discovery case studies presented. These seem to emanate from longstanding investigator-initiated programs that were 'ripe' for investment at the time.

The panel was made aware of the success of OICR-funded imaging research, but this program seems largely extramural and at arm's length. While apparently commercially successful, there were few details about the start-up companies and the integration of new imaging protocols within the healthcare system. This seems like an opportunity that has not been fully exploited, and OICR risks losing its leadership position if there is not a concerted effort to ensure long-term sustainability in this area. The panel was also unsure of the depth and expertise of OICR researchers in the area of radiomics which is clearly an emerging field of interest and could benefit from ongoing expertise and large patient databases. For example, the radiomics research group at Sunnybrook Health Sciences Centre is world-recognized yet did not appear to be part of OICR efforts.

In addition, it was not clear to the panel how funds flow from the different programs and projects back to OICR and FACIT for further investment. FACIT appears to have a fairly broad portfolio of Incentive Distribution Rights (IDRs) and patents. As the program develops, it will become important to develop a transparent and financially justified process to determine which concepts go to IDRs and patents. It was not clear that OICR support for efforts in the intra- and extramural programs are captured through IDRs, patents, and efforts of FACIT. It was also not clear to the panel that investigators across all of OICR's funding model have access to the resources of FACIT.

The panel also recommends that OICR work with its Board to review and refine its conflicts of interest process.

### **Panel recommendations**

The panel feels there needs to be better tracking, with more detail on impact, of both intramural and extramural metrics; success should be commensurate with funding envelopes.

Regarding the OICR/FACIT model, the panel would ideally prefer to see the same investment model as used in the two case studies presented: continued longer-term investment in a number of projects to take them through to a higher level of impact and success.

But overall, the panel agrees the partnership is having an impact with their existing model as well as providing a service that fills a big commercialization gap by allowing/supporting others to pick up pharma deals.

The premier areas of collaborative service for the research community need to be further developed. How OICR and FACIT can adapt to providing professional services related to knowledge translation in implementation and commercialization space should be considered.

In regard to growing the radiomics program, the panel saw clear evidence of where OICR's incredible strengths are currently, but also that these are led by senior investigators nearing retirement. There needs to be succession to keep this program strong. The panel suggests that despite the current power in this program, and despite what FACIT offers, radiomics should be reviewed to determine the appropriate funding and opportunities: a whole new program does not need to be built but building up what strengths already exist would be impactful. OICR has a unique ability to bring individual parts together when and if it is likely to have greater impact than when those parts act alone. OICR can perhaps consider a community engagement around imaging and radiomics: an outreach activity to identify the opportunities and where a hub-and-spoke approach could be facilitated. OICR should also explore the opportunities to integrate radiomics and imaging into the new strategic plan.

It is important to ensure that OICR-supported efforts in the intra- and extramural programs are captured, and further, that investigators across all of OICR have access to the resources of FACIT.

OICR also needs to develop and implement a clearer conflicts of interest process particularly as it applies to FACIT but also across all aspects of its funding model.

### **Goal 5: Enhance Ontario's global leadership in cancer research.**

*(Undertake national and international initiatives where Ontario can provide leadership and unique expertise to tackle major challenges in translational cancer research.)*

#### **Summary**

The panel felt strongly that OICR deserves to be recognized for enhancing Ontario's global leadership through strategic initiatives they have undertaken.

#### **Strengths**

Intramurally, OICR's strengths are in genomics and bioinformatics and this is where they have taken on a considerable leadership position on the global stage. In particular, OICR drove the

success and coordination of international programs like the ICGC, PCAWG and the GA4GH, even within the confines of its Ontario-first agenda.

Similarly, the infrastructure, information, platforms, and services within the [Adaptive Oncology program](#) under Dr. Lincoln Stein, are noteworthy. This program is perceived as being collaborative, interactive, and Dr. Stein himself appears very engaged and integrated within the wider research community.

While OICR does not itself conduct clinical trials, there is the recognition that they are partnering with important trials that incorporate genomics within their design and analysis. For example, they have a major contribution to the clinical ecosystem through the support of 3CTN, created to help support academic trials following a white paper report signalling the decline of these investigator-initiated oncology trials. With OICR support, 3CTN has increased academic trials by 80% in a five-year window in Ontario, which is a remarkable achievement.

The panel also recognizes the strengths of specific [TRIs](#) that directly link to world-class research with clinical translation activity and impact.

### **Gaps & Opportunities**

While genomic databases are now richly populated, there was a recognition that the temptation is to constantly generate more, while not necessarily drawing out the richness of what already is available. This is especially important for identifying new targets or signatures, as well as improving our understanding of tumour evolution and therapeutic resistance.

In addition, the Institute's bioinformatics expertise, while superb, seems to be limited to genomics. This could be a missed opportunity in that OICR has not yet leveraged or developed expertise in the broader 'omics' data science.

### **Panel Recommendations**

The panel highly recommends OICR continue on in their role with key international programs such as [ICGC-ARGO](#).

The panel also recommends that OICR continue its efforts to integrate across its genomics programs specifically to look at new data and mine as many possible new research and therapeutic leads as possible from this existing and largely untapped rich data pool. OICR noted they now have regular meetings to review data sets, and the panel agrees this should be continued and even enhanced.

Finally, OICR's platforms and the expertise in Adaptive Oncology, including bioinformatics and biostatistics, could be better integrated with efforts to obtain high-quality transformative clinical trials including investigator-initiated trials. The role of OICR in translating opportunities

from the research community to clinical and translational studies requires review and development.

While the themes of Adaptive Oncology and Therapeutic Innovation were seen overall as well organized and productive, the Clinical Translational Theme needs a detailed review during the ongoing strategic planning process to determine which components should be continued in the next strategic plan. Multiple examples of clinical impact were presented related to the TRIs. Thus, the panel was supportive of a review to determine whether TRIs should be included in the Clinical Translational theme. The enthusiasm of the review panel for the Adaptive Oncology and Therapeutic Innovation themes, and its lesser enthusiasm for the Clinical Translational Theme as it is currently constituted and its need for extensive review and planning, should be integrated into the ongoing strategic planning process.



## QUESTION 2

***Has OICR (in partnership with FACIT): (a) made appropriate progress towards delivering impact on the Ontario cancer research system, the health system and the economy? and (b) delivered value for money and good outcomes for the province of Ontario?***

In addition to metrics previously presented, here the panel was provided with specific examples of OICR's impact on the healthcare system through translational research, including details on their logic model for anticipated short- and longer-term outcomes and impacts that OICR aims to deliver through its research investments. Metrics on training were highlighted, the impact of the Ontario Molecular Pathology Research Network ([OMPRN](#)) and the Ontario Tumour Bank ([OTB](#)) were featured, and an overview of the impact of technical research services was detailed. Infrastructure support and metrics relevant to the [Ontario Health Study/CanPath](#), the Canadian Cancer Clinical Trials Network ([3CTN](#)), and the Ontario Cancer Research Ethics Board ([OCREB](#)) were detailed.

Specific investments that had translational impact were also highlighted, including those related to precision medicine and tobacco control. A detailed presentation and discussion on the impact of OICR/FACIT on Ontario's healthcare system and economy was also covered. OICR's Logic Model was presented: a performance indicator tool that sets out the flow of activities to overall impact that covers both short-term and longer-term horizons to reflect the timelines from discovery to implementation.

### **Summary**

Looking at what OICR has accomplished since 2005, the panel feels there are clear impacts on the Ontario research system and the province's economy, while larger impacts on the healthcare system are still in development.

### **Strengths**

In terms of the cancer research system, it is clear that the Ontario ecosystem has benefitted from the presence of OICR. Following advice from the previous external review, OICR has strengthened its extramural ties and has made an effort to understand the needs of the entire ecosystem. The impact on training, job creation, and recruitment of high-caliber researchers was positively noted.

There were clear examples provided to support impact in early wins within the health system. In particular, the panel was impressed with the work done in imaging and the ability to transfer new approaches to the clinic.

In addition, there were examples discussed of how OICR helps enable and mobilize Ontario cancer research through its service platforms. The genomics and bioinformatics infrastructure

in particular appear to have contributed to high-impact clinical trials with rich genomic components to support personalized medicine.

The panel also noted that OICR's role in the [CanPath](#) biospecimen project means there are regional cohorts for Ontario that are harmonized and supported within the national cohort. Ideally, biological collection will continue depending on new funding from outside studies. Thus, data linkage to clinical data can happen through future research or funding, and every study enriches the data in the cohort in some way.

Delivering economic benefits to Ontario was part of OICR's core mandate, especially relevant to its previous association with the Ministry of Economic Development, Job Creation and Trade (MEDJCT). The panel agreed that considering multiple metrics, OICR has largely attained this goal. The panel appreciated the relationship between OICR and FACIT and its recent success at commercializing specific assets.

With regards to FACIT, they appear to have made good investments and partnerships in seed and lead development projects with impactful ideas, and the panel hopes the province will continue to support OICR/FACIT to further maximize their value creation through more or larger co-investments. As well, the panel noted that FACIT President David O'Neill was impressive in his commercialization sector knowledge and experience, and the team he has built is very strong.

### **Gaps & Opportunities**

While the OICR service platforms appear to be a clear asset, their management as presented did not reflect a strategic business-type plan that would allow the platforms to be both responsive to researcher needs across Ontario and also provide a subsidized service to all at an equitable price. There was however the example given of the Ontario Tumour Bank ([OTB](#)) where it was highlighted that Ontario users pay a lower fee than outside users (though it was not clear to the panel that intramural and extramural academic investigators are charged the same rate). It was also not clear to the panel how the costing strategy is applied to OICR's industrial partners inside and outside Ontario, or to differently sized companies.

There was also some flexibility in terms of how services are accessed, as the panel heard that OTB has brokered two recent deals with small biotech companies where OICR provides the tissue samples at a discount and the company then provides their genome and transcriptome sequencing data to the OTB, as well as any residual unused tissue. The companies also get a one-year industry embargo/exclusive access to the sequencing (but academic researchers still get immediate access to the new data). This type of flexibility is laudable, but the case-by-case approach calls into question how these various business decisions are made and how equitable they are for all Ontario researchers.

Further, the OTB is transitioning very intentionally towards bespoke collections with clinical data collection and follow up in contract or collaboration with clinical trialists, cancer registry

databases, the death registry, and administrative healthcare records. The new strategic plan will also prioritize how this platform moves from being a static collection to one driven by the demand of the research community. The panel noted this is the only way to ensure the biospecimens have innovative research value moving forward. OICR also confirmed that since they have modified their approach to collection, access rates have indeed gone up 30–40 percent.

The panel suggests that the impact of the OTB and approaches for sample collection with focus on gaps in the collection, rare disease, and areas of investigator needs should be implemented in a continuous reassessment model to ensure that it evolves with investigator needs. Obtaining clinical-trial-quality outcomes data, as well as ensuring that molecular data is returned to the tumour bank to increase the utility of the samples and decrease expensive redundant testing, needs to be implemented across all studies.

The panel noted that in the scope of Ontario's provincial budget, OICR has made an impact on the economy, but there is room to grow yet as they move forward with their mandate. For example, in FACIT's current structure, it's unclear to the panel how much revenue comes back to OICR/FACIT for investment in OICR/FACIT and this should be taken into consideration in any future investment strategy from the province.

### **Panel recommendations**

The panel discussed the need to build in more clarity and even standardization around access to resources between academics and corporate clients. The panel suggests developing this further into a well-documented transparent model that is broadly available and covers both academic and industrial approaches. The panel also suggests OICR work to clearly define and re-evaluate annually a business strategy for each of their large platforms that balances revenue generation (to both internal and external users) with support to the Ontario ecosystem via access to cost-effective solutions.

While the panel was not asked to comment directly on specific programs, and indeed metrics were largely aggregated and thus difficult to parse out between different activities, there were programs that generated more discussion as to their value. In particular, the OMPRN, while fulfilling an important role, lacks metrics that would support a clear understanding of its full impact.

In addition, the OTB model is clearly in transition from a passive biobank to more bespoke collections. As a general comment, going forward, the focus for OICR and its platforms should encompass all of Ontario. The full expertise of the team is probably underused and could be further exploited to support the ecosystem across all of Ontario.

## QUESTION 3

### ***Are the Institute's structure and operations appropriate for achieving its mandate?***

The panel was provided with examples, information, and data to assess the impact and effectiveness of OICR in regard to its: i) value-add to the Ontario cancer research community, ii) funding model, iii) leadership and governance and iv) operations.

The review in this section is predicated on the current Strategic Plan (2016–2021), as in the absence of a new strategic plan, it is impossible to fully comment on the structure going forward. Nonetheless, many of OICR's solid governance structures in place now likely won't change under the strategic plan in development (2021–2026), and these structures have served the Institute well in responding to the previous external review and implementation of the current strategic plan. Significant changes made in leadership, programs, and approaches will also aid in the implementation of the new strategic plan. Importantly, the OICR leadership team has made visits to all of the different cancer research constituents across Ontario and have brought them to Toronto for planning meetings: this represents a very positive change in the operations approach of OICR.

#### **i) Value-add to the Ontario cancer research community**

##### **Summary**

The panel was presented with strong evidence of OICR's clear role as an effective facilitator and enabler of impactful cancer research. This impact was measured through a commissioned survey of research collaborators, organizational partners, and companies supported by OICR and FACIT.

The survey showed strengths in impact, awareness, and value over several domains, although the perceived benefits in healthcare research, clinical trials and commercialization were areas where further improvements could be made. Further, as noted previously, providing additional clarity of OICR resources and how to access the platforms across the Ontario ecosystem would increase both the value and the reputation of the Institute.

##### **Strengths**

OICR's response to the last external review has shown great progress in addressing the historical perspective and tensions of OICR within the research community; the panel encourages the Institute to continue to expand its recent outreach efforts with the community and stakeholders. While there has been great progress, there are still major steps needed to truly engage the Ontario research ecosystem.

OICR has become more outwardly focused since the last review, and the panel did see strong evidence of their evolution from a perceived exclusive program to a more inclusive, accessible program that actively reaches out to and engages the research community. The Institute has begun to make a change from being perceived as a silo-structured granting agency to a community-based resource with tools and platforms that offer real value to the Ontario research community (in particular the genomics, drug discovery, and computational biology/bioinformatics programs).

OICR has fostered collaborations through a series of initiatives, some of which are strategic in nature (such as the OMPRN) while others are more opportunistic (such as the TRIs) but both models have clearly driven pan-Ontario collaborative research.

In addition, OICR's national and international initiatives have clearly placed Ontario researchers in leadership positions within larger programs.

### **Gaps & Opportunities**

While it was clear that OICR's services and platforms are well valued, their complexity, utility, and approaches for access are still not clear to the overall Ontario research community. The feedback was consistent in that OICR is seen as moving in the right, inclusive direction, but there is work still to do to raise awareness of what they offer outside of their own institute and the major Toronto centres. It was also clear that there needs to be continued, regular outreach to other components of the Ontario ecosystem with visits to the centres and holding planning and other meetings at sites other than downtown Toronto.

There also appeared to be a need for more clarity around the commercialization pipeline as it relates to FACIT's relationship with external stakeholders: more clarity is needed about the incentive and process for using the OICR/FACIT pipeline versus more institutional-based programs. OICR and FACIT are encouraged to work actively with the technology transfer offices in each Ontario institution to develop the province's entrepreneurial ecosystem.

While OICR and FACIT have a strong commercialization strategy, it was less clear whether they can act as an expert resource centre for investigators requiring assistance with commercialization, even in the absence of direct FACIT funding. Developing an entrepreneurial ecosystem with the appropriate local leadership and funding is a major challenge. The provincial ministries need to be aware that this is a process that will take a significant period of time and support to build the needed ecosystem.

The panel was acutely aware of the difficulties of changing provincial ministries in terms of their overall organizational structure. More direction and clarity are needed to improve and streamline communications with the three ministries that focus on education, the economy, and healthcare that are all critical to the mandate of OICR.

## **Panel recommendations**

The panel suggests the answer to “*Who is OICR?*” needs to be more fleshed out in the new strategic plan. OICR used the ‘honest broker’ description in their presentations, but beyond that, they need to define the programs that they drive, what they enable, and if they are using the best tools to achieve their goals.

Similarly, the panel suggests OICR/FACIT strengthen its efforts to raise awareness of the unique value-add of its commercialization pipeline and the incentives and support available to Ontario researchers and companies.

In regard to raising awareness of its value-add to the ministries, the panel also suggests OICR work on creating structures and programs to form a rapid-response network for emerging issues the ministries might need help with. Sub-committees or linkages between the various ministries that are facilitated by OICR are one suggestion that was discussed, as well as building this framework into their relationships with other government-funded health and research organizations.

## **ii) Funding model**

### **Summary**

OICR’s funding model identifies its activities as being distributed between activities that directly impact the conduct of research and those activities that support capacity, networks, and resources that underpin a healthy research ecosystem.

### **Strengths**

While a significant proportion of the budget is spent at its home base within MaRS, an even greater part of its investment has been made through the support of collaborations that support the larger Ontario ecosystem.

At its inception, OICR identified gaps in the provincial research translation pipeline and has actively addressed these gaps by sustaining programs and infrastructures that address these gaps or evolving some of their priorities to adapt to the evolving landscape.

OICR has continued to invest in the continuum of basic research to clinical impact, which is appropriate: there is a clear focus on getting translatable discoveries moving forward both from a commercial as well as a healthcare perspective.

OICR defines its risk strategy as moderate but shows sufficient attention to emerging opportunities to remain nimble.

OICR has also conducted targeted training in areas that are perceived gaps thereby strengthening the overall ecosystem.

### **Gaps & Opportunities**

It is difficult to evaluate the appropriateness of program funding as the panel was not presented with performance metrics for individual programs. While the distribution of funds appears appropriate, with the majority going directly to support research and commercialization, it is impossible to provide specific recommendations for each of the major activities. While Collaborative Research Resources are clearly an area that is positively viewed by the research community, their funding model is impossible to evaluate as these are aggregated into different program funding initiatives.

The panel did conclude that OICR is still in its infancy in thinking about how its funding model impacts Equality, Diversity and Inclusivity (EDI), including specific ways to engage and support Indigenous Peoples, gender balance, and more funding for early-career researchers. Their Board presentation and new research strategy however did indicate they are addressing the fact that currently, their gender balance is not equal across awards, as well as the issue of how their renewable, no-cap awards move the funding disproportionately towards senior investigators. The panel cautions that the proposed solution of moving their own senior researchers out of the Investigator Award program also removes the commensurate funding out of this portfolio and this strategy should be revisited.

The models for revenue generation could also be strengthened across the Institute's platforms, along with outreach plans to attract more paying clients. Currently, their business models are passive: as collaborators, they generate a bit of revenue, but not consistently and the platforms are not organized around a central guiding business model. Similarly, the variation in how the community is charged (fee-for-service vs. collaborative and free) is a risky business model for sustainability.

Lastly, as the new strategic plan is developed, it will be necessary to resolve the tension between trying to fund "everything for everyone" and focusing on areas where OICR can maximize its impact.

### **Panel Recommendations**

The panel discussed OICR's needs to take additional steps to address EDI in their recruitment and funding. The panel noted that the Institute is beginning to look at addressing EDI, the geography of the cancer research community across Ontario, and support for new and mid-career investigators with structures like term funding and requiring host centres to allocate their funding across EDI decisions. This is the right direction, but stronger, clearer policies and plans are recommended to have an impact.

Further, there needs to be a clear strategy about how to bring Indigenous Peoples from remote and northern communities into OICR's future research directions. While this represents a formidable task, OICR is encouraged to establish strategic partnerships to address this in a more pan-Ontario approach.

There is a need to establish an appropriate balance between funding key core efforts where they can achieve maximum impact, funding broadly, and extending core resources that are seen as a benefit to the community. The committee recommends that additional outreach efforts and meeting with centres across the province be implemented to refine the "identity" of OICR and balance the different opportunities and approaches moving forward.

There is also a suggestion that each Collaborative Research Resource should perhaps have its own business plan going forward, with specific revenue targets and outreach plans. Metrics addressing these objectives should similarly be developed.

The panel also encourages OICR to reach out to companies or other entities as possible co-sponsors of some of their education platforms, as there may be creative opportunities to support these activities.

### **iii) Leadership and governance**

#### **Summary**

The current leadership and governance structures at OICR are strong and have served the Institute well thus far in achieving its mandate. Since the last external review, there has been a major turnover in leadership and structure that demonstrates a great benefit to OICR and its relationship with the overall research community.

#### **Strengths**

OICR has been able to bring together broad expertise in their governance structures. Their board is well organized and meets current standards in board management. There is a recognition of EDI at the board level. At the present time, two ad hoc committees focus on strategic planning and restructuring and have an important role going forward. FACIT has its own independent board, but two members sit on both the OICR and FACIT boards which the panel viewed positively.

The Scientific Advisory Board is impressive in terms of their collective credentials. The governance model at the scientific level is based around adaptive oncology, therapeutic innovation, and clinical translation and thus aligns with OICR's present program structure. There are also more administrative structures related to corporate services and strategic planning which is appropriate.

Administrative operations also appear well managed.



## **Gaps & Opportunities**

There is a recognition of a lack of integration between OICR's intramural and extramural programs. As an example, the Investigator Awards represent an impressive group of scientists, but there appears little effort to harness their collective expertise in priorities set by OICR.

Similarly, while imaging is recognized as an area of strength, it was not clear whether they are well served under the Adaptive Oncology portfolio. There was little discussion on strengthening this group or plans for developing emerging fields such as radiomics.

## **Panel Recommendations**

The panel recommends that OICR work with its Board to review and refine its conflicts of interest process. It was unclear to the panel if OICR and FACIT are truly separate when it comes to pursuing intellectual property (IP), determining the pass-off point, and the decisions about when IP is filed. Even if the two arms are only linked at the top governance levels, specific policies relevant to commercialization would be beneficial.

The panel also suggests that OICR communicate more clearly and transparently the process for reviewing and evaluating the success of its MaRS-based programs.

There is also a panel suggestion to add a board member or ad hoc role with expertise to advise OICR on moving to a charitable status for tax purposes, particularly to manage the possible perception within the community as a competitor for fundraising under that change.

It is also worth reviewing and adding clarity to how commercial assets are prioritized: for example, asking what the process is, whether it is transparent, and how OICR prioritizes which assets go into their pipeline.

Similarly, Board Chair Tom Closson did note in his presentation that OICR's current IP policy is inadequate and they are actively working on developing a revised policy for the spring of 2020. More guidelines around EDI and conflicts of interest should also form part of a revised policy.

## **iv) Operations**

### **Summary**

There was a general feeling among the panel that a very impressive repertoire of OICR achievements was presented, and the depth of their programs is clear. Structurally, they have ensured that many of the programs are not dependent on a single researcher and can be maintained as needed through the existing teams.

## **Strengths**

The funding decision-making process for competitive awards is robust and transparent. There is also clear oversight of funded projects. However, it was not clear whether the review and review process are achieving the goals of OICR rather than funding the “best” science as ascertained by outside reviewers who are not aware of the strengths and weaknesses of the Ontario ecosystem.

OICR presented information on their strong internal policies and procedures for regular staff performance measurement, mentoring, and promotion. The positive work and outcomes of senior leadership in terms of outreach, transparency, and collaborative efforts was also noted many times.

## **Gaps & Opportunities**

OICR should more clearly communicate the funding process and degree of oversight applied to intramural programs. This is particularly clear in terms of ongoing salary support for investigators and whether there is a process to transition them to alternative funding sources to allow recruitment of new young investigators.

OICR presented information about some of the hurdles they have as a not-for-profit in terms of funding training or mentoring opportunities within FACIT or for-profit entities, but they do overcome this through agreements for contract research.

They also noted that as the Ministry is looking at different models for mentorship and training, OICR is consulting with other institutes such as McMaster and the Rotman School of Management (re: Creative Destruction Labs) to create new models for drug discovery. Similarly, other funding mechanisms they could develop to promote mentorship and training includes using the Investigator Award platform or postdoctoral awards for placements in biotech companies. Again, this would depend on the Ministry mandate and what their priorities will be going forward.

## **Panel Recommendations**

It is suggested that OICR implement a strategy to encourage communication and collaboration between different programs. For example, they could consider a mentoring program that would ensure the integration of Investigator Award recipients into a large province-wide ecosystem.

With a renewed focus on training, OICR can also work with the Ministry of Colleges and Universities (MCU) to foster collaborative training opportunities. Indeed, the panel heard of some initiatives with other education-focused entities that were nascent, and the panel encourages continued work in this area.

## QUESTION 4

### ***Do the vision and priorities proposed in OICR's draft strategic framework for 2021–2026 position the Institute for long term impact?***

For this question, the panel was provided with an overview of the Ontario government's priorities, OICR's strategic planning process, the gaps and strengths in the province's cancer research ecosystem, and OICR's developing plan for its strategic and operational directions for 2021–2026. Overall, the process they have followed in their planning is commendable and inclusive but hasn't quite yet delivered on firm strategic directions.

This section covers the panel's discussion on what areas need more planning and strategy to help with this decision-making and how OICR can make the process inclusive and engage the overall research community.

#### **Summary**

The panel was cognisant that OICR's strategic planning has to align with government priorities. Over its existence, OICR has had a Transfer Payment Agreement relationship with a number of different Ontario government ministries. Presently OICR's Transfer Payment Agreement is with the Ministry of Colleges and Universities (MCU).

The panel was made aware of the numerous ministerial and deputy ministerial changes in recent years, and notably since 2018, OICR has been under the mandate of four different ministers. The move from the Ministry of Economic Development, Job Creation and Trade (MEDJCT) to MCU was significant, as OICR went from being a large transfer payment within a small ministry to becoming a relatively small institute within a large ministry. The change in mandate of the ministry was also potentially significant for OICR and FACIT, given the emphasis in MCU on the post-secondary education academic sector rather than economic development. However, despite these changes, it was also noted that there has been a consistent message about the importance of value for money, need for commercialization of research investments, and concrete outcomes like job creation, economic returns, and cost savings – and all with an Ontario-first focus.

The panel observed that OICR is still grappling with how to define itself and find the right balance between enabling activities and those where OICR claims ownership. Their strategic planning process and developing plan makes it clear they have listened to multiple stakeholders but from the panel's point of view, OICR has not made some of the hard decisions relevant to the actual focus of a new strategic plan. Further, additional work will be necessary to ensure that the strategic plan supports both the needs of the Ministry and the diverse research communities across the province.

## Strengths

While the responsibility for government liaison and communication sits with the Deputy Director of OICR, all of the OICR and FACIT executive team appear to engage with the government regularly. OICR has had a strong relationship with the public sector staff in their ministries. After almost a year of OICR working with a new civil service staff team at MCU, a decision was made by the government to move the research branch of the civil service at MEDJCT over to MCU. This was fortunate for OICR and FACIT, as it restored the historical knowledge that team had from working with OICR and FACIT for many years in previous ministries.

The panel was impressed with the inclusive process for the development of the new strategic plan and how they have addressed the issues from the last review. The flow chart of the process showed OICR is following a completely different process than in previous years. In 2019, they overlaid the strategic planning process into a tour of regional cancer centres and universities etc., and then hosted all the leads from those centres in January 2020 to present the feedback, findings, and developing strategic directions. This process is lauded but needs to be continued and extended throughout the remainder of the planning process and implementation of the strategic plan.

The panel did get a consistent message that the core functions most valued by the research community include genomics, medicinal chemistry, the TRI team science program, the platforms that are core efforts of OICR, and the extramural Investigator Awards. The proposed funding and plans for these programs seem mostly appropriate to the panel. However, there is a need to balance between a focus on key areas of emphasis with attempting to implement too many programs. The intrinsic conflict between focus and serving the needs of all constituents will need major emphasis and resolution.

The panel noted the intramural investigator program and number of internal PIs (8.5) has led to the recruitment of excellent research leaders and the creation of a healthy ecosystem for retention. They can be thought of as the ones driving the innovation in the core, and the model makes sense for OICR in this way moving forward. In particular, if the internal PIs are viewed as part of the resources available to the larger research community, this is particularly valuable. However, the roles and support of these investigators, and their contribution to the resources and community, needs greater clarity and transparency with the overall research community.

OICR noted its key roles as: leadership in facilitating cancer research as an honest broker, working non-competitively to attack problems, and filling gaps in the ecosystem that involve larger cohorts, larger consortiums, to make real differences. They also see their key role as a centralized hub or warehouse providing access to necessary world-class research services. The panel agrees this is OICR's strength as an enabler.

## Gaps & Opportunities

While the movement of staff with historical knowledge of OICR from MEDJCT to MCU is viewed positively, this staff change was only completed two weeks before the 2020 OICR External Review. Concurrently, the eruption of the COVID-19 pandemic in Ontario vastly and understandably consumed government staff time and resources. As a result, the civil service staff team from MEDJCT had limited opportunity for a transition of the OICR and FACIT files from their new MCU colleagues. It is expected that this situation will be corrected over time.

In terms of the research community, it is clear in this plan that OICR has attempted to get broad input, but this also presents a downside: by attempting to incorporate all the feedback into their programs going forward, the strategic plan in development lacks clear focus. Biologics was one of the few examples of a program area they will not invest in going forward; as biologics is well covered elsewhere in the Ontario cancer research ecosystem (e.g., Princess Margaret), the panel agrees this is an appropriate decision.

The developing strategic plan appears to include several new activities and the panel asked how OICR will manage this scope and scale change while maintaining their core efforts and competencies. OICR noted the solution would be to hire additional supervisory staff as needed to ensure anything they add is done well. They would need to expand the set of directors so they can continue to do what they do well without being overwhelmed by new responsibilities. This was not clear in the budget however, and further, more clarity is needed on how these processes will influence their ongoing efforts.

Clearer plans are also needed as to how OICR can leverage the expertise and infrastructure across Ontario for the different priorities they are considering. There is a need to further mature certain priorities if they are deemed to be included in the next phase (such as detection, prevention, and health services) while balancing any new initiatives intended to enrich the overall ecosystem. As an example, while imaging was noted as an area of expertise and one that has led to commercial success, there was little evidence that support was being developed that would be adequate and would ensure renewal and durability of the program.

The strategic plan has been described as involving a hub-and-spoke model, although the links to sites outside the Greater Toronto Area may not be strong enough to invoke this type of description. While there was discussion of a co-funding model for different programs, especially the IAs, there is a risk this would exacerbate the problem whereby larger centres have a higher success rate for recruiting IAs as their foundations are better able to support this type of co-funding.

OICR's developing strategic plan continues to support their overarching clinical translation mission, yet the panel noted that OICR itself is without a direct link to patients and this point needs to be part of the overall considerations in the strategic plan. Indeed, this may be one of the key areas that needs major input prior to implementation of the strategic plan. The panel

felt there needs to be better integration between clinical trial efforts in Ontario and OICR's commercial development and priorities.

The panel also felt that OICR should place major emphasis on EDI, including all aspects of recruitment, appointment, salaries, and career advancement. This is part of the panel's observations on equality and diversity gaps that need to be addressed with a formal, institute-wide EDI policy.

## **Panel Recommendations**

### *General*

OICR has a broad mandate to improve the lives of cancer patients and also promote commercialization and entrepreneurship in Ontario. As a result, the mission of the Institute is relevant to several government ministries in addition to MCU, notably the Ministry of Health (MOH) and MEDJCT. It would be helpful for OICR to preserve its recent connectivity to MEDJCT and also improve its connectivity to MOH and the new Ontario Health agency. MCU could help to broker those connections, and lead a cross-ministry liaison team. Ensuring its strategic objectives and deliverables meet those of multiple ministries in the Ontario government would also broaden support for continued investment in OICR and solidify its importance in helping the government to deliver on its priorities.

With respect to the presentation of the new strategic plan, the panel feels that it needs more work to further develop, refine, and focus its major programs. Currently, the plan has both continuing and new initiatives, but they do not seem to have been carefully prioritized. In addition, there should be careful consideration as to the budget allotted to each program and how that will influence support for other programs; there is a sense that some programs may be underfunded which will hamper their success while others may have larger budgets that can be more carefully refocused and/or leveraged with other funding sources.

While the structural basis for a strategic plan has been carefully laid out, there is a need for decisive decision making. For example, the proposed new focus on the understanding and management of early-stage cancers is laudable but needs to be more carefully integrated with the existing priorities of OICR and its partner organizations. The next steps in the strategic planning effort should be around developing a balance between focus on key areas that fit the mandate of OICR and the broad goals of the research and clinical community in Ontario. OICR needs to carefully determine their identity by clearly answering "*What is OICR?*" and how best to communicate the answer to the community.

Overall, a research catalyst role for OICR is appropriate. However, if OICR wants to build its role as a 'hub-and-spoke model', or as a connector between nodes, the panel suggests they determine which nodes are on a thin spoke or thread. They should ask, "*If that spoke were to be severed, what would be affected?*" For example, the link to surgeons is a very thin thread for

OICR and if that was bolstered, it could be a value-add to the community to help centres ensure high-quality trials, sample capture, discovery, and translational research.

It was unclear to the panel that OICR's MaRS-based programs undergo the same rigorous peer review process as its extramural programs; it is recommended that OICR articulate this more clearly and transparently to the Ontario research community.

It is further suggested that OICR continue to develop its logic model and metrics to better capture their impact on cancer detection, prevention and health services, so their impact is more clearly demonstrated. Some programs are not clearly focused on milestones or have not been well-integrated into the logic model.

The panel was impressed with the recent outreach efforts across the province's research community. OICR is encouraged to keep going out to the community, instead of inviting people to come to them (i.e., continue the regional visits, and host meetings outside of Toronto).

OICR enunciated several core principles that guided their priority setting, many of which are already well-embedded into the structure of the organization. However, OICR has identified improving synergies across OICR research themes and programs as well as being proactive about diversity in terms of funding distribution. The panel strongly agrees with the principle but did not see a real plan of how this will be operationalized.

Equality, Diversity and Inclusivity (EDI) is problematic in the context of both intramural and extramural OICR programs. There needs to be a more formal plan to address this issue and specific strategies, including a strong mentoring program, needs to be implemented. Salary equity was not analyzed as part of the review and should be the focus of further study.

#### *Existing programs*

The panel was not tasked with reviewing each program individually, but based on the overviews of each presented, and feedback from community members outside of OICR, the panel can make certain general recommendations.

The panel noted that when OICR has funded cancer detection, prevention, and health services research, it has a measurable impact. But as OICR noted, their niche is to drive science that gets into the clinic, so how can they leverage that strength while also building up capacity in areas where they do not currently have strength? Here the alignment of their priorities with those that are presently being identified through an initiative of the Canadian Cancer Research Alliances is appropriate. However, it is imperative for leadership to first understand the mandate and priorities of the Ontario government in order to align its strategic priorities with those of the government and demonstrate value.

There appears to be real assets and strengths in Ontario around early cancer detection. OICR noted there has been fragmented efforts across Ontario, and that OICR can bring these

activities together as they have for other areas to make a real impact. The panel agrees that this is an area that can be further developed and where assets can be harnessed to maximize their benefits.

The panel is not sure if the imaging group has sufficient succession planning in the new strategic plan, and it was not clear if there are sufficient resources in radiomics in particular. The panel is convinced this is a strength worth building on, especially as it also supports the Ontario-first mandate.

The panel feels there was a lack of clarity around [OCREB](#) (Ontario Cancer Research Ethics Board) and questions if it is a strength with a value-add that justifies its portion of budget. While the notion of a single board of record is attractive, OICR should identify metrics to collect around this activity to measure success and demonstrate its worth to stakeholders. Specifically, they need to track how many projects were reviewed, rejected, modified, and accepted by OCREB, as well as the timelines, in comparison to internal review boards at individual centres. This would help demonstrate the true value of multi-centric trials in particular.

The panel suggests that OICR also focus and clarify its role as an enabler versus driver of clinical trials. Their success in supporting important clinical investigator-initiated trials within Ontario and Canada through 3CTN is essential and impactful and should be a model they continue. However, without access to patients themselves, driving clinical trials is not seen as feasible. Access to the strong analytic and bioinformatics programs as well as the research platforms could be leveraged by the community to attract innovative trials to Ontario. To achieve this goal, it will be necessary to develop stronger relationships with the clinical trial community and develop approaches for that community to access OICR resources.

The panel further notes that OICR's proposed strategy for supporting clinical trials involves building a clearer framework and thematic parameters based on where they can have clinical impact so that investigator proposals for trials are less opportunistic. To be clear, the panel is not suggesting OICR stop funding clinical trials outright, but that the Institute review their whole proposed portfolio and overall costs and ask if funding individual clinical trials are the best investment. This would be a key part of the review of the Clinical Translational theme as recommended in earlier in this report.

In addition, the panel strongly recommends OICR conducts an in-depth analysis of how they can contribute to tumour banking, especially in an era where clinical trials and large-scale programs like ICGC-ARGO and the TFRI Marathon of Hope are looking to link up 'omics'-interrogated samples with high-quality clinical data. While there is clear expertise in this area, it does not appear to be deployed in a way to support some of the large emerging needs. In particular, feedback from the community was less than positive about OICR's current contribution in this area. OICR needs to work with multiple stakeholders to see what actions it can take to more strongly support innovative cancer clinical biobanking across the ecosystem. While there was an indication that collection would become more focused, the panel heard conflicting indications from OICR and the cancer centres as to their role and value.



The developing strategic plan suggests OICR is going to transition towards funding early-career awardees in lieu of funding more senior researchers. The panel strongly agrees with this plan, but also suggests that OICR ensure that sufficient funds are allocated to career development for early investigators. A more sustainable plan is needed where funding for salaries from OICR is leveraged by support from other approaches and agencies.

In regard to healthcare services research, where commercialization and costs are important factors, the panel would like to have seen more plans as to how to grow this. There is not currently a staff scientist in this area, but OICR noted during discussions that this is a position they could prioritize and hire for. Currently, it is a small area and externally funded via formal calls for proposals. OICR noted it is waiting on a review of healthcare services research and capacity by the Canadian Cancer Research Alliance so they can align their priorities with that report. The panel agrees with this approach and notes that there is a rich pool of valuable research opportunities OICR could fund and support, such as value and comparative effectiveness, user-centred design, patient centered, AI, and machine learning etc.

### *Commercialization*

As noted in previous questions, the panel was looking for more clarity in the developing strategic plan around how much return actually comes back into FACIT and how these funds are used to support the goals of OICR and FACIT. A functional reinvestment strategy was not articulated. FACIT does not have to be cost-neutral, but the panel suggests there should be a business plan that addresses some level of return on investment (ROI) to justify further investment from the province. Any outside development group would be expected to have some reinvested funds as part of the plan, so it should be considered here.

Likewise, OICR and FACIT have made strong investments in good seed projects with impactful ideas, but the province should be encouraged to think about how they can further maximize the value creation going on at the Institute. Will the province be willing co-investors on lead assets to keep more of the revenue in Ontario? Additionally, communication of the role of FACIT in the provincial healthcare ecosystem needs to be considered in the context of similar commercialization offices at other centres in the province so as to avoid a perception of duplication of efforts.

There was also a discussion around the idea of ROI, and that FACIT still needs an influx of funds to achieve its goals of building an Ontario ecosystem that could then become independent of continued investment. Creating the needed ecosystem will take time and ongoing investment. The panel heard that their main focus “is bent towards driving economic impact”, but they are hampered by their scale. The panel notes it is a very unlikely prospect right now that FACIT will become self-sufficient in the near future. They are getting there, but the challenge is that the value for what they are building is not always tangible (e.g., jobs, infrastructure, the commercialization culture, recruitment, tertiary funding, and overcoming the catch 22 of risky early-stage venture capital). FACIT described themselves as “roots underground supporting the

tree.” Indeed, traditional ROI cannot measure their full impact, so additional metrics need to be considered to ensure that the Ministry remains convinced of their need to invest.

The Ontario-first mandate is also seen as problematic for OICR and FACIT going forward. Panel suggestions were “Ontario-first, but not exclusively”. In other words, it should be “Ontario-benefitting”, meaning that it would be okay to go outside the province or Canada for asset development because value will ultimately come back into Ontario for reinvestment. As an Ontario investor, the money still comes back, so there is an incentive. In this way, OICR could protect the mandate, but still be competitive. A 50-50 model (50% is Ontario-first, the other 50% outside, with some flexibility) is suggested.

As noted above, the panel does support OICR’s decision to not invest in biologics, but a cost-effective way to support development in this area for the province is to mine their data extensively for biologics and move promising targets to collaborative efforts with pharma. This way, OICR is moving the field forward without having to fund all the commercialization work itself.

Moreover, partnerships with contract research organizations should be considered for the developing strategic plan. Moving towards full partnerships with pharma and contract partners on shared assets would need to be done carefully, but this type of business model could be very cost-effective. Likewise, OICR and FACIT can continue working to build a large drug discovery community to leverage other centres’ infrastructure capital and divide up the workload so all the heavy lifting is not left to OICR.

The panel suggests there are more things that OICR and FACIT can do to further develop their commercialization pipeline. For example, given the ability they have from their TRI researchers, who are taking innovations through Phase 1 and 2 clinical trials, the value-added potential is massive. They should be looking at how new properties (inventions) from TRIs can be developed or translated further before patenting and licensing. The other properties they do license out can then bring funds back into development. In other words, the model needs to include selling off less-exciting projects to generate some money back into the pipeline. As academic trials are much less expensive to conduct, the panel suggests this is a realistic and affordable way to increase OICR’s value in Ontario and Canada. In this scenario, the funds for manufacturing drugs and therapies comes from bringing money back from other properties that are sold off. They could also partner rather than continue to sell off pieces as per the current model: the further a property or drug can move down the pipeline, the more its value will grow exponentially. Thus, having funds to invest in development of key properties will result in a much greater ROI.

The path of commercialization should sometimes also include taking money from outside investors. The panel suggests that consideration should be given to taking an early licensing approach, not creating the Ontario-based company, and being able to reinvest the proceeds. It would still be the ideal for companies to stay in Ontario, but 30 percent of the pipeline needs to

be just focused on generating funds for reinvestment. It will be more impactful too: as long as the asset reaches patients, it doesn't always matter where it is manufactured.

The panel also encourages OICR and FACIT to further consider and build upon the concept that what makes a venture attractive to outside investors is the community itself. In this case, what makes Ontario, and in particular the larger Toronto area, attractive is its quality of science, that it has enough of an ecosystem for growth, and enough people who know what they are doing. There is enough of a portfolio to be attractive to better incentivize outside investment.

Similarly, currently all OICR internal principal investigators must first attempt to commercialize through FACIT, but this is not true of any other funded investigator elsewhere. If OICR can be more collaborative, how does this impact FACIT? The panel suggests looking to see if this model can be refined and improved.

FACIT could perhaps also provide more value-added service for the research community when they turn down opportunities (i.e., they can more widely use their expertise and make it clear as to how and why a project is turned down). David O'Neill did touch on this in his presentation: FACIT does take input from the community and provides feedback to competitors in their open competition on how to better compete for seed funding. And they do have a document they share that shows researchers what needs to be addressed in a pitch to investors. There are other groups that do monitoring of the ecosystem, and they are involved as guest speakers and mentors etc. The panel suggests these kinds of efforts should be expanded for even more value-add.

Lastly, succession planning for FACIT leadership is another recommendation to limit risks for FACIT's continued sustainability.