

Chapter 1

Section 1.14

Ministry of Research, Innovation and Science

University Intellectual Property

Follow-Up on VFM Section 3.14, 2015 Annual Report

RECOMMENDATION STATUS OVERVIEW						
	# of Actions Recommended	Status of Actions Recommended				
		Fully Implemented	In Process of Being Implemented	Little or No Progress	Will Not Be Implemented	No Longer Applicable
Recommendation 1	1		1			
Recommendation 2	1		1			
Recommendation 3	1			1		
Recommendation 4	1		1			
Recommendation 5	4		3	1		
Recommendation 6	1			1		
Recommendation 7	1			1		
Recommendation 8	1	1/3	2/3			
Recommendation 9	4	1	1/3	1/3	2	1/3
Recommendation 10	1	1/3	1/3		1/3	
Recommendation 11	2	1/3	1/3	1/3	1	
Recommendation 12	2			1	2/3	1/3
Recommendation 13	2	2/3		1 1/3		
Recommendation 14	1	2/3	1/3			
Recommendation 15	4	3	1/3	1/3		1/3
Total	27	6 1/3	8 1/3	7 1/3	4	1
%	100	23	31	27	15	4

Overall Conclusion

According to the information provided to us as of August 8, 2017, by the Ministry of Research, Innovation and Science (Ministry), McMaster University, the University of Toronto and the University

of Waterloo, 54% of the actions we recommended in our 2015 Annual Report had either been fully implemented or were in the process of being implemented. Little progress was made on implementing another 27% of our recommendations, and 15% would not be implemented.

For recommendations directed to the Ministry, 67% were in the process of being implemented and

33% had little or no action taken. Specifically, the Ministry has done little to assess progress on the Province's 2008 Innovation Agenda and has not developed a strategy or action plan to address barriers to commercialization.

For recommendations directed at the universities, 48% were either implemented or in the process of being implemented, 24% had little or no progress, and 22% would not be implemented. For example, little or no progress was made in developing socio-economic performance indicators to better communicate outcomes of research and commercialization efforts. Recommendations that would not be implemented by at least one university included those aimed to help ensure all intellectual property created with university resources are being disclosed.

The status of each of our recommendations is included in the report.

Background

The audit focused on whether the Ministry of Research, Innovation and Science (Ministry) had put effective processes in place to provide research funding to universities, monitor the use of research funding, and assess the benefits to Ontarians. As well, the audit looked at how select universities manage intellectual property generated from university research, including identifying, protecting, assessing and commercializing intellectual property.

Ministry of Research, Innovation and Science

The Province provides research grants to post-secondary institutions, research hospitals and not-for-profit research institutions. Under Ontario's Innovation Agenda of 2008, the Ministry (previously the Ministry of Research and Innovation) is responsible for extracting "more value from all provincial investments in research and innova-

tion." The Ministry's commercialization programs are intended to provide services such as access to capital, business acceleration services, mentoring, training and networking to companies, entrepreneurs and researchers. The Ministry provides funding to a network of organizations, including the Ontario Centres of Excellence, MaRS, Regional Innovation Centres and sector innovation centres, which in turn fund and/or provide these services.

We estimated that from 2009/10 to 2013/14, the Province had provided at least \$1.9 billion for university research, excluding funding for service delivery agents (such as MaRS and regional innovation centres) and tax incentives for private companies.

In our *2015 Annual Report*, we noted that the Ministry did not co-ordinate or track all of the Province's investments in research and innovation, and had not measured the value created from these investments. As a result, it was difficult for the government to determine whether it was getting value for money from its significant investment in university research.

Some of our significant observations relating to the Ministry included the following:

- The Ministry needed to develop an implementation plan to monitor whether it is getting value for money from its investments in research and innovation in accordance with the strategic direction outlined in its 2008 Innovation Agenda.
- The Ministry had a comprehensive selection process for awarding university grants, and was generally following its guidelines for awarding these grants, but did not confirm that research outcomes aligned with those identified in grant proposals.
- In order to address barriers to commercialization, the Ministry needed to develop a strategy and action plans with timelines to monitor progress.
- The provincial government had virtually no rights to intellectual property resulting from the research it funded. Unlike Ontario, we

noted that U.S. federal government agencies could use intellectual property made with government funding royalty-free for their own non-commercial purposes.

Universities

Inventions and scientific discoveries made at universities could spur economic growth and enhance Ontarians' quality of life if they are commercialized. This requires universities to protect their rights to the intellectual property in their discoveries, and to bring their discoveries to market for the benefit of Ontarians.

Each university in Ontario has a vice-president of research responsible for managing and coordinating the university's research and commercialization activities. University technology transfer offices share their expertise and industry connections with inventors, in exchange for which inventors may agree to give up some or all of their intellectual property rights, in accordance with the universities' policies.

We further found during our 2015 audit that technology transfer offices we visited had experience with assessing the commercialization potential of inventions, but could make some improvements. Specifically:

- While universities were tracking key commercialization indicators and results of their technology transfer offices, they were not yet measuring the socio-economic impact of their research activities and commercialization efforts.
- Universities may not always be taking out patent protection in time to prevent others from obtaining patents on their inventions.
- None of the technology transfer offices we visited highlighted revenue generation as a driving force.
- None of the technology transfer offices we visited had formal guidelines or policies on managing costs associated with commercialization. In a number of cases, there were

delays in collecting revenues from intellectual property revenue-generating agreements.

- From our review of files in technology transfer offices, documentation was not available to confirm that formal processes were used to assess the feasibility of commercialization and track decisions/actions being taken.

In our 2015 report, we recommended that the Ministry establish processes to track and monitor the total direct and indirect provincial funding for research and innovation, and the new technologies and inventions resulting from the funding; develop a strategy and action plan on addressing barriers to commercialization and monitor its progress; collaborate with stakeholders to collectively develop useful performance measures that assess the socio-economic benefits to Ontarians; and revisit and assess the pros and cons of including provisions in selective research funding agreements that would allow the Province to share in future income and/or have the non-exclusive right to use intellectual property royalty-free for non-commercial internal purposes.

We also recommended that universities review their performance measures and identify opportunities to report more detailed information in their annual research reports and in reports going to senior management; develop guidelines to help faculties assess whether university resources were used in the creation of intellectual property; formally track and review how long it takes to complete assessments on whether or not to commercialize disclosures and address any delays; file for patent protection as early as possible; develop case management documentation guidelines and ensure commercialization decisions and actions are clearly and consistently documented; implement policies and guidelines regarding cost management and track costs incurred by type for each disclosure; and improve revenue collection efforts.

In total, we made 15 recommendations, consisting of 27 actions, to address our audit findings and received commitments from the Ministry that it would take action to address most of them

and from the universities that they would take action to address the ones most applicable to their circumstances.

Status of Actions Taken on Recommendations

We conducted assurance work between April 1, 2017, and August 8, 2017, and obtained written representation from the Ministry of Research, Innovation and Science, the University of Toronto, McMaster University and the University of Waterloo on September 8, 2017 that they have provided us with a complete update of the status of the recommendations we made in the original audit two years ago.

Government Research-Related Investments and Activities

Recommendation 1

As the lead ministry in ensuring Ontario's efforts to strengthen its innovation culture are co-ordinated and comprehensive, the Ministry of Research and Innovation should establish processes to track and monitor the total direct and indirect provincial funding for research and innovation and the new technologies and inventions resulting from that funding.

Status: In the process of being implemented by October 2017.

Details

The Ministry has developed a research inventory tracking tool to be used by ministries for tracking research investments and expenditures, including both direct and indirect costs. The tool is expected to be finalized and provided to all government ministries by October 31, 2017, and will capture information related to research funding programs available; total funding for each research activity, including the breakdown between direct and indirect costs; and whether each ministry tracks

the intellectual property arising from the funded research activities—that is, invention disclosures, patents applied for and granted, copyrights and licences. Ministries will be expected to report annually on their previous fiscal year's activity.

Recommendation 2

The Ministry of Research and Innovation should develop and implement a multi-year plan to cover the Innovation Agenda's strategic direction as well as provincial goals and initiatives on research and innovation. This plan should provide enough detail to clearly summarize the deliverables, and establish timelines and targets to deliver on key strategies, initiatives and research and innovation programs.

Status: In the process of being implemented by March 2018.

Details

In 2016 the government announced the \$400 million Ontario Business Growth Initiative, which provides an overarching framework and strategy for key ministries involved in economic development. This initiative complements the Innovation Agenda by building on three components:

- investing in research and innovation, including the commercialization and adoption of new technologies;
- scaling up by helping Ontario's small- and medium-sized companies gain access to capital and expertise to grow their businesses; and
- streamlining the regulatory system to avoid impeding business growth.

Rather than focusing specifically on the Innovation Agenda, the Ministry has revised its approach and throughout the 2017/18 fiscal year it plans to design and implement programs and more detailed action plans in alignment with this new framework, with a key focus on measuring program performance. Specific details of programs, initiatives and related performance measures were released in June 2017 as part of the Ministry's *2017/18 Estimates Briefing Book*.

Recommendation 3

To assess progress on the Province's 2008 Innovation Agenda and provide comparisons between Ontario and its peer jurisdictions, the Ministry of Research and Innovation should conduct assessments periodically against the indicators in the scorecard and report the results publicly.

Status: Little or no progress.

Details

According to the Ministry, its existing innovation indicators, developed in 2013 by its Research and Analysis Branch to help inform policy and program development, are no longer appropriate. It informed us that work is underway to revise these to develop a suite of high-level key performance innovation indicators to better measure program effectiveness and reflect both the 2008 Innovation Agenda and the 2016 Ontario Business Growth Initiative. For example, the Ministry informed us that it is seeking to identify reliable data sources, data gaps and methods to operationalize these indicators once approval is obtained. It expects to have these indicators by November 2017. The Ministry continues to assess the merit of publishing an innovation scorecard or other comparative benchmark measurements.

Recommendation 4

To address barriers to commercialization of intellectual property, the Ministry of Research and Innovation should consult again with stakeholders for a current review of barriers, develop a strategy and action plan with a timeline for implementation, and monitor its progress on addressing those barriers.

Status: In the process of being implemented by November 2017.

Details

The Ministry informed us that legislation and regulations regarding intellectual property are the purview of the federal government. As Ontario is a sub-national government, its approach to intel-

lectual property is either enabled or constrained by national legislation and international agreements.

The Ministry held roundtable sessions in September 2016, December 2016 and March 2017 to engage policy makers, academics and representatives of Canada's intellectual property business sector. The objective of these sessions was to identify challenges and problems facing the national and provincial intellectual property landscape and to develop new ideas about how intellectual property could be further leveraged to strengthen Canada's performance. The key problems identified included a lack of understanding of intellectual property and insufficient intellectual property expertise to meet needs; lack of access to affordable legal services, especially at the earliest stages of the business venture; systemic gaps in technology transfer and commercialization at universities and research institutions; and absence of a national intellectual property strategy and co-ordination among different levels of government. The Ministry informed us that it is planning further engagements with stakeholders to help validate potential provincial policy approaches. It also told us that it has engaged with the federal government.

In conjunction with these stakeholder consultations, the Ministry told us it is also undertaking research to support the development of an intellectual property framework. As part of this process, the Ministry is examining policies and programs in other jurisdictions and seeking to further identify gaps and barriers affecting innovation and commercialization of intellectual property in Ontario. The Ministry expects to implement an intellectual property framework by November 2017.

Recommendation 5

To ensure the Ministry of Research and Innovation (Ministry) is getting value for money for its investment in research and commercialization activities, the Ministry should:

- *track what portion of research funding goes to basic vs. applied research, and develop appropriate indicators for each type of research;*
Status: In the process of being implemented by fall 2017.

Details

The Ministry has designed a tool to track the amount of research funding it provides and the nature of research activity—that is, basic versus applied. The tracking tool allows research funding recipients to assess the percentage of their research that falls within the categories of pure basic research, oriented basic research, applied research and experimental development. The Ministry has tested the tool in two pilot studies involving recipients of the Ontario Research Fund – Research Excellence program (July 2016) and recipients of Early Researcher Awards funding (October 2016). The Ministry plans to launch the tracking tool for all active projects within its major research funding programs by July 31, 2017, with results available in fall 2017. The Ministry informed us that while it will be including a performance measure that distinguishes basic versus applied research undertaken for its major funding programs, no performance targets will be established because the Ministry’s objectives with research funding are broader than simply encouraging one type of research over another.

The intent of our recommendation was that the Ministry develop a distinct set of indicators to be used to assess the effectiveness of basic research, and a different and distinct set of indicators to be used for applied research. We recognize that the purpose of basic research is different from applied research (that is, generating and advancing basic knowledge versus developing new technologies or techniques). Therefore, basic research would not perform well when judged against indicators that measure, for example, the number of invention disclosures, patents and licences.

- *collaborate with stakeholders to collectively develop useful performance measures that assess the socio-economic benefits to Ontarians;*
Status: In the process of being implemented by summer 2018.

Details

The Ministry has not yet developed specific performance measures that assess the socio-economic benefits to Ontarians. However, the Ministry expects an upcoming review of the Ontario Research Fund to provide recommendations on how to assess impact, which could include suggestions for socio-economic performance indicators. The review will be conducted by an expert panel. The Ministry expects the review to be completed by summer 2018.

The Ministry is also conducting studies including a jurisdictional scan to support the development of a potential socio-economic impact framework. It has advised that no gold standard exists for measuring the socio-economic impact of research, but that these studies will be used as a reference point. The Ministry expects to complete the jurisdictional scan by December 2017.

- *increase the reliability of performance results by implementing measures to increase the response rate from clients receiving commercialization supports and developing processes to eliminate duplicate reporting;*
Status: Little or no progress.

Details

The Ministry advised that since our audit, each Regional Innovation Centre has conducted follow-up activities with its clients in order to increase survey response rates. For example, Regional Innovation Centres review their survey tool to determine which clients have not yet responded and then send out weekly reminders to complete the survey. We were also informed that the Toronto-based Regional Innovation Centre called clients up to three times if they did not respond to the survey. As a result, since the time of our audit, the survey

response rate has increased about 5 percentage points, from 36.5% in 2014/15 to 41.2% in 2015/16 for all Regional Innovation Centres combined. Although there has been improvement, this is still a low response rate.

In 2016, the Ministry started requiring the Ontario Network of Entrepreneurs tech-based delivery partners to collect Canada Revenue Agency business numbers from clients. The Ministry expects that collection of this information could eliminate some duplicate reporting by, for example, removing the double-counting of jobs created by clients. However, this is still very early in a long-term project, which the Ministry expects could take a number of years before yielding insightful results.

- *publicly report performance results on research funding and commercialization programs.*

Status: In the process of being implemented by December 2017.

Details

The Ministry advised that it will report on performance of its research and commercialization programs through its *2017/18 Estimates Briefing Book*. The briefing book will highlight achievements of the Ministry's major funding programs, including results related to job creation and the number of businesses supported.

As part of the Province's Open Data Directive to make government data publicly-accessible, the Ministry has agreed to share some performance data related to the Ontario Network of Entrepreneurs (which provides ministry-funded commercialization services) with the Treasury Board Secretariat, which is co-ordinating data from all ministries. The data, which includes client profile and impact information (including licences), has not yet been approved by the Minister but the Ministry expects it to be approved and released before the end of 2017.

Intellectual Property Rights

Recommendation 6

The Province should re-visit and assess the pros and cons of including provisions in selective research funding agreements that would allow it to share in future income from the sale or licence of resulting intellectual property, and/or to have the non-exclusive right to use the intellectual property royalty-free for non-commercial internal purposes, where there may be value to do so.

Status: Little or no progress.

Details

At the time of our 2015 audit, the Ministry indicated that Ontario's approach to intellectual property ownership was consistent with best jurisdictional practices, federal policy and academic/industry preference, and was based on the assertion that government ownership of intellectual property is costly and may be an impediment to commercialization and innovation. We reported that intellectual property rights should not be viewed as an impediment to commercialization without further detailed analysis of the impact and potential value to Ontario. In its response to our audit recommendation, the Ministry agreed to assess the pros and cons of adopting this approach. However, since the time of our audit, the Ministry has not performed any additional review or analysis.

The Ministry informed us that it was in the middle of developing a strategy for intellectual property, and that there is no consensus about the most effective ways to secure value for inventions.

University Oversight of Research and Intellectual Property

Recommendation 7

In conjunction with government sponsors, universities should develop socio-economic performance measures to better communicate the outcomes of their research and commercialization efforts.

Status: All three universities: Little or no progress.

Details

None of the universities have developed socio-economic performance measures in conjunction with government sponsors. Although the Ministry hosted roundtable events in 2016 to discuss intellectual property commercialization strategies, awareness and outreach, and technology transfer at universities, the universities informed us that the development of socio-economic performance measures has not been part of these discussions. All three universities were interested in participating in government-led discussions to design such measures.

Recommendation 8

Universities should review their research reporting requirements on performance measures, and identify opportunities to report more detailed information in the annual research report and in management reports going to senior management.

Status: University of Toronto: Fully implemented.

McMaster University: In the process of being implemented by December 2017.

University of Waterloo: In the process of being implemented by December 2017.

Details

University of Toronto: At the time of our 2015 audit, only this university's technology transfer office had some performance measures related to commercialization activities and was reporting regularly on them. At the time of our follow-up, we noted that it continues to report both internally and publicly on a number of research and commercialization performance measures. For example, the technology transfer office provides a quarterly report on industry partnerships, disclosures, licensing and start-up activity to the Vice-President Research and Innovation and also to the research administrative leadership of each faculty. As well, its annual research report contains information on research funding, including funding provided, number of principal investigators, fund-

ing programs involved, private-sector partners, new funding applications and other matters. It contains innovation and entrepreneurship information as well, including disclosures, licensing agreements, patent filings, start-ups, start-up investment dollars, start-up sales and other information. The university informed us that it undertakes an annual review of its performance measures as part of its regular reporting process and considers any new measures that may warrant inclusion.

McMaster University: The technology transfer office's annual report on commercialization activity was revised to include a more detailed analysis of the distribution of inventors and revenues among the different faculties and hospitals; this information was not present in previous annual reports. It also continues to examine whether any other information should be included in its performance reports and is currently considering the inclusion of performance measures surrounding workshops given or hosted and company connections made. In addition, the university plans to provide further guidance on performance measures reported to senior administration and to the public in its next strategic research plan, which it expects to develop by December 2017.

University of Waterloo: At the time of our follow-up, no significant changes had been made since our 2015 audit in the type of information reported publicly or internally to senior management. The university's strategic plan continued to provide high-level information in two areas related to research and innovation, which it referred to as "transformational research" and "uniquely entrepreneurial." For example, in the area of "transformational research," performance indicators reported on are primarily based on the amount of research funding overall and by source. In the area of "uniquely entrepreneurial," performance indicators include the number of jobs and new enterprises created by students and alumni, the number of new enterprises still active after one year, and number of university-based undergraduate students whose

companies receive venture capital backing. The university informed us that by December 2017, it expects to assemble information similar to that reported by the other two universities into an annual report for the Vice President of Research, who will, in turn, discuss the information with the deans and other senior administrative personnel.

Commercialization Activity at Universities

Recommendation 9

To ensure that all intellectual property created with university resources is disclosed, universities should:

- *develop guidelines to help faculties assess university resources in the creation of intellectual property and to require such assessments be documented;*

Status: University of Toronto: Fully implemented.

McMaster University: In the process of being implemented by December 31, 2017.

University of Waterloo: No longer applicable.

Details

University of Toronto: The university's FAQ sheet relating to Inventions and Commercialization activity at the university describes "what constitutes the use of university resources": namely, whether all or part of the work was supported by research grants administered by the university; performed in a university-owned or operated facility; made use of proprietary software or other applications; or made use of specialized facilities owned or operated by the university. In addition, the university has an intellectual property officer who acts as a resource to the university community, including faculties, to clarify concerns surrounding the use of university resources. On a case-by-case basis, the technology transfer office's director will also assist if additional clarification is needed beyond the policy and guidelines.

The technology transfer office does not maintain documentation of the methods used by faculties to assess the use of resources in the creation of an invention; however, where a faculty member discloses an invention that was created with no significant use of university resources, the technology transfer office maintains the signed attestation by the inventor(s) with the applicable department chair/director sign-off.

McMaster University: In early 2017, the university developed guidelines to help faculties assess the use of university resources used in the creation of intellectual property. This new process will first be communicated to the university's research council and deans of research and will then be posted on the university's website and formally communicated to faculties. The assessment will require written confirmation through the review and approval of the use of university resources by the appropriate department chair, supervisor, faculty dean or vice-president. Documentation will be kept on file at the technology transfer office. The university plans to have this process in place by December 31, 2017.

University of Waterloo: This university has an inventor-owned intellectual property policy; as a result, this recommendation is not applicable to it.

- *clearly communicate invention disclosure requirements during technology transfer office presentations to staff and students;*

Status: University of Toronto and the University of Waterloo: Fully implemented.

McMaster University: Little or no progress.

Details

University of Toronto: In January 2017, the university developed new presentation materials outlining its invention disclosure requirements, including information on why, when and how inventions should be disclosed. Presentations, using the revised material, have since been made to university faculty, departments and students.

McMaster University: The university's technology transfer office has continued to make presentations to faculty and students since our audit. However, we noted that presentation materials it provided did not include sufficient detail to ensure that staff and students are fully aware of the university's disclosure requirements. For example, presentation slides provided highlight the university's intellectual property policy, including ownership, but do not explicitly mention the disclosure requirements.

University of Waterloo: In September 2016, the university developed a presentation deck that articulates the university's intellectual property disclosure policy for use with students and faculty. This presentation deck was used to make two presentations to chairs/deans and to graduate students in 2017.

- *require all faculties to use only disclosures made directly to the technology transfer office for performance review purposes; and*
Status: All three universities: Will not be implemented. The Office of the Auditor General continues to support the implementation of this recommendation.

Details

All three universities informed us that they will not implement this recommendation. The University of Toronto told us that it does not believe that a significant amount of intellectual property is not being disclosed to its technology transfer office. McMaster University did not believe that making this a requirement would lead to an increase in the likelihood that all inventions would be disclosed because faculty performance reviews, in most cases, do not have a heavy weighting on disclosures. The University of Waterloo said that technology disclosures are not significantly used in evaluating staff performance and are only nominally used within the faculty of engineering.

- *use research grant status reports sent to research funders to anticipate and track completeness of disclosures.*

Status: All three universities: Will not be implemented. The Office of the Auditor General continues to support the implementation of this recommendation.

Details

All three universities informed us that they will not implement this recommendation. The University of Toronto told us that it does not believe that a significant amount of intellectual property is not being disclosed to its technology transfer office. McMaster University advised us that it would not be implementing this recommendation due to the time and resources needed to complete such a review. However, it informed us that it has occasionally followed up with inventors on the status of their work based on grant funding received, especially if the funding had objectives related to commercialization or developing applied technologies. The University of Waterloo said that there may not be a clear benefit given that it operates under an inventor-owned intellectual property policy.

Recommendation 10

In the absence of objective criteria to assess the commercial potential of disclosures, university technology transfer offices should develop a formal process to discuss and challenge decisions on commercial potential, including assessments undergoing a second level of review.

Status: University of Toronto: Fully implemented.

McMaster University: In the process of being implemented by December 2017.

University of Waterloo: Will not be implemented. The Office of the Auditor General continues to support the implementation of this recommendation.

Details

University of Toronto: All invention disclosures available to the university (those where ownership has not been acquired by the inventor or a third party) are reviewed by the technology transfer office and also by an external organization (MaRS Innovation), which provides a second level of review. In addition, the university works with other external commercialization partners, such as the Centre for the Commercialization of Regenerative Medicine, for additional review as required.

McMaster University: The technology transfer office holds monthly group meetings to review and challenge decisions made regarding the commercial potential of inventions. A guideline has been developed to formalize this secondary review process but no documentation of these discussions is currently retained. The technology transfer office intends to implement a process for recording minutes and keeping other documentation to support this review by December 2017.

University of Waterloo: The university advised us that it will not implement this recommendation because implementation of a secondary staff-level review would consume significant additional staff time for limited benefit. The university believes its current practice of completing an assessment worksheet and discussion between the designated Technology Manager and the Director is adequate to ensure that a project can be initiated in a timely manner. Furthermore, it says its current assessment processes rely on submitting project proposals to various federal government programs to secure funding to further demonstrate commercial viability. These programs perform their own expert peer review process, which the university considers to serve as a better second level of review than additional internal staff efforts.

Recommendation 11

To help ensure commercialization assessments are completed within a reasonable timeframe to avoid

delays in patent filings, university technology transfer offices should:

- *establish time frames to complete assessments based on technology type or complexity of invention; and*

Status: All three universities: Will not be implemented.

Details

None of the universities have established time frames to complete assessments based on the type or complexity of an invention. All three universities advised us that determining unique time frames for assessments would be too difficult to complete because of the diverse range of technologies assessed, stage of technological development, researcher interest in commercializing, and other considerations.

- *formally track and review how long it takes to complete assessments, and address any delays identified.*

Status: University of Toronto: Little or no progress.

McMaster University: In the process of being implemented by December 2017.

University of Waterloo: Fully implemented.

Details

University of Toronto: The university does not track compliance with its 45-day target for completing an initial assessment of a disclosure. It noted that assessment times are often dependent on response times to information requests made to inventors and/or industry partners. At the time of our follow-up, the university informed us that it would commit to undertaking an annual process to review overall disclosure processing timelines and identifying possible system reasons for delay.

McMaster University: An informal review of assessment timelines began in June 2016 as part of monthly group meetings. However, no formal report or analysis is prepared. The technology

transfer office is exploring ways to generate reports on assessment completion times and plans to have these reports in place and to evaluate whether they help identify undue delays by December 2017.

University of Waterloo: As of June 2017, the university began receiving a report to periodically review assessment times. But it advised us that there can be good reasons for purposely delaying a patent application—for example, to assemble additional data leading to a stronger application.

Recommendation 12

To help ensure intellectual property is properly protected, universities and/or their technology transfer offices, as applicable, should:

- *ensure contracts with faculty associations and researchers include provisions to make them aware of the importance of not disclosing inventions prior to filing for patent protection;*

Status: University of Toronto and the University of Waterloo: Will not be implemented. The Office of the Auditor General continues to support the implementation of this recommendation.

McMaster University: No longer applicable. Objective of the recommended action is being met through other means.

Details

University of Toronto: The university does not consider it necessary to amend its agreement with its faculty association because the purpose of the agreement is to set out the general relationship between faculty and the university, not specific provisions such as disclosing inventions. As a condition of employment, all faculty members agree to follow university policies (including the inventions policy) as outlined in their appointment letters. The university considers it inappropriate to single out the inventions policy among all others in appointment letters, since the majority of faculty will not be engaged in activities that result in disclosures.

However, we noted that the university's invention policy does not warn against publicly disclosing inventions before filing for patent protection.

McMaster University: At the time of our audit, only this university had a formal policy on its website warning faculty and students about public disclosure of discoveries. The university's faculty association handbook is provided to all faculty to inform them of the policies they are expected to adhere to, including the university's intellectual property policy. This policy states that those involved in commercialization may be asked to withhold publication or refrain from making any presentations for at most six months from the time of disclosure, to ensure that appropriate protection can be put in place.

University of Waterloo: The university will not be implementing this recommendation. The university's reasoning is that the memorandum of understanding (MOU) with faculty spells out the terms and conditions of employment and it does not believe the MOU is the proper vehicle to specifically detail aspects of protecting intellectual property. The university believes that the objectives of this recommendation would be more appropriately implemented through education initiatives to increase awareness rather than formal faculty employment agreements.

- *file for patent protection as early as possible, where appropriate, to minimize the risk of others filing first and precluding them from obtaining a patent.*

Status: All three universities: Little or no progress.

Details

All three universities informed us that they try to balance quick filing of patent protection with ensuring sufficient data has been compiled to support a strong patent application, thereby increasing the chances that a patent is granted. All three indicated that many factors have to be considered in determining when to file an application. However, none

of the universities have done an analysis to compare the length of time taken to file a patent application with the success rate in obtaining a patent to support their assertions. Timely filing for patent protection does not preclude taking the time to develop a strong application.

Since our 2015 audit, the University of Toronto has hired a Patent Portfolio Administrator to aid with the timely filing of patent applications. We reviewed disclosures made at McMaster University for 2016 and noted that 37% of inventors indicated that they had made information public before disclosure to the transfer technology office.

Recommendation 13

To permit efficient management review of commercialization decisions and efforts and to help facilitate knowledge transfer among personnel in case of staff turnover, universities should:

- *develop case management documentation guidelines; and*

Status: University of Toronto and McMaster University: Little or no progress.

University of Waterloo: Fully implemented.

Details

At the time of our 2015 audit, we noted that the method used by all three universities to document the decisions and actions they took to manage inventions disclosed to them made it difficult to assess the sufficiency and scope of commercialization activities. For example, key decisions and actions were not summarized, and there were no checklists noting the full suite of commercialization activities to be undertaken. It was difficult to understand the full scope of commercialization activities from a review of the electronic files alone without commercialization managers explaining what actions and decisions they had taken to date.

At the time of our follow-up, the University of Toronto and McMaster University had not developed guidelines or made changes to their

case management documentation to address the concerns above. McMaster University advised us that the nature of the technology or discovery may vary greatly, making it difficult to standardize documentation.

In May 2017, the University of Waterloo developed a draft case management standard operating procedure document that outlines the commercialization process staff should follow as well as certain documentation requirements.

- *ensure that commercialization decisions and actions are clearly and consistently documented in accordance with the guidelines to be developed.*

Status: University of Toronto and McMaster University: Little or no progress.

University of Waterloo: Fully implemented.

Details

University of Toronto and McMaster University:

The universities were using the same case management system that was in place during our initial audit. McMaster University advised us that the nature of the intellectual property may vary greatly, making it difficult to standardize documentation.

University of Waterloo: The university designed an activities checklist to be used as a case management guideline for staff, starting June 2017. This checklist identifies standard tasks to be performed in the assessment and management of each disclosure received by the technology transfer office. These include looking for evidence that an invention is already known, scheduling internal meetings with the Director of Commercialization, contacting private companies for feedback, developing marketing plans, and other tasks. The case management system was also upgraded to allow management reports to be pulled based on the checklist data. These management reports could allow for review of key tasks and their associated due dates and completion dates, along with details of actions taken.

Recommendation 14

To manage costs incurred in the effort to commercialize intellectual property, university technology transfer offices should implement formal policies and guidelines regarding cost management, and track costs incurred by type (e.g., legal costs, patent fees, and marketing) for each disclosure.

Status: University of Toronto: Fully implemented.

McMaster University: Fully implemented.

University of Waterloo: In the process of being implemented by fall 2017.

Details

University of Toronto: The university has not established policies related to cost management of commercialization efforts for projects because commercialization activities vary across projects, and therefore it advised that a single framework is not appropriate. However, the university does track costs of commercialization activities for each project, for example, legal fees and patent costs, against informal guidelines.

McMaster University: Patent and legal expenses for each technology are recorded in the technology transfer office's information system and updated on a monthly basis. Technology transfer office staff also provide quarterly cost projections of expected patent and legal costs for each active disclosure they are managing to allow for better cost management.

University of Waterloo: The university is developing a semi-annual report that will provide staff with a snapshot of total patent and marketing costs for each of their projects and will require them to estimate and report on upcoming costs within the next six months; the report is expected to be implemented by fall 2017.

Recommendation 15

To help ensure the timely and accurate collection of revenue owing, all universities should:

- ensure they have an accurate and up-to-date tracking payment schedule that includes due dates, so that universities can bill one-time payments in advance and remind licensees to submit royalty payments on time;

Status: All three universities: Fully implemented.

Details

University of Toronto: Since our 2015 report, the university has created a new administrative position to formally track all licensing projects, royalty payments and invoicing. Tracking documents have been created to let the university track money owed to it.

McMaster University: As of March 2016, payment schedules and licensee reporting requirements for current and active licences or commercialization agreements have been updated in the technology transfer office's information system. They now include activity alerts to ensure that university staff can issue invoices, request royalty reports, and follow up on late payments in a timely manner.

University of Waterloo: The university has developed a licence agreement checklist, containing information on fees due and licensee reporting requirements, that staff use once a commercialization deal has been executed. The technology transfer office administrator inputs the information from the checklist into the office's information system. Payment alerts have been programmed into the system, allowing staff to follow up when due dates are missed.

- obtain sales and revenue reports from licensees to support the amount of royalties remitted;

Status: All three universities: Fully implemented.

Details

University of Toronto: The new administrative officer regularly reviews sales and revenue reports from licensees to support the amount of royalties received.

McMaster University: The technology transfer office's information system has been modified to

request revenue reports from licensees and follow up when these are not received.

University of Waterloo: At the time of the audit, this university was in compliance with the recommended action to obtain adequate documentation to support the royalty payments received.

- *develop criteria to help assess when it is worthwhile to ask for an audit report (for example, when royalty payments are dependent on sales generated); and*

Status: University of Toronto: Fully implemented.

McMaster University: Little or no progress.

University of Waterloo: In the process of being implemented by end of September 2017.

Details

University of Toronto: As part of a commercialization FAQ document, the university has developed criteria for when an audit may be undertaken. The criteria include:

- The products being sold are clearly dependent on the intellectual property licensed under the agreement.
- There is a sudden or unexpected decrease in royalty revenue.
- The lost revenue is expected to be greater than 5%.
- The lost revenue is expected to be greater than \$250,000.

McMaster University: No criteria have been developed, but the technology transfer office advised that it has been involved in discussions with other universities regarding best practices for audit criteria.

University of Waterloo: The University of Waterloo has had discussions with the University of Toronto

on the process it used to implement our recommendation, and was determining what elements of the process fit best with its practices. The university expects to implement this recommendation by end of September 2017.

- *enforce the interest penalties stipulated in contracts to encourage licensees to submit revenue payments on time.*

Status: University of Toronto and McMaster University: Fully implemented.

University of Waterloo: No longer applicable.

Details

University of Toronto: The university informed us that it follows up on delinquent payments as applicable and flags them for senior management at the technology transfer office. The university informed us that since 2015, it has had only three delinquent payments and charged interest in one case. In the second case, it terminated the licensing agreement, and in the third, it was waiting as the entity was undergoing restructuring.

McMaster University: At the time of our follow-up, this university was enforcing interest rate penalties. However, the university advised that interest penalties are not always an option for start-up or small companies where payment may be delayed due to their financial situation. In these cases, consideration is given to renegotiation or development of alternative payment schedules.

University of Waterloo: The technology transfer office's template for future agreements has eliminated the interest penalty provision because it believes that the provision to terminate an agreement for non-payment is much more of an incentive to pay than collecting a nominal interest penalty.