Technology Transfer and Intellectual Property in the Postsecondary Education Sector

The University of Toronto's Submission to the Expert Panel of the Ministry of Training, Colleges and Universities

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UNIVERSITY OF TORONTO

INTRODUCTION

On May 17th, 2019, Ontario's government launched an expert panel and consultation on intellectual property to help protect made-in-Ontario ideas, maximize commercialization opportunities, and create jobs and economic growth.

Commercialization of university ideas is one of the many ways in which the public benefits from research and talent at Ontario's universities. Through the process of helping ideas become products, universities develop talent, encourage and support student and faculty start-ups, publish work in the public realm, and improve quality of life in areas like health care and beyond. For example, research in health services can lead to significant improvements in quality of life and affordability, or research in education can lead to curricular changes which improve educational outcomes. Such research can have tremendous economic impact which is not measured through commercialization metrics.

This submission from the University of Toronto offers an overview of how the University's research and associated commercialization ecosystem creates value for Ontario and offers recommendations for the panel's consideration. Included below is information on the University's core teaching and research missions, the entrepreneurship supports it provides to students, faculty and industry partners through its Innovations & Partnerships Office, and the University's intellectual property policies.

THE UNIVERSITY OF TORONTO

Universities are fundamental to Ontario's innovation-based economy. They conduct high-quality research and produce talent for the economy, two of the principal inputs for Ontario's economic growth and competitiveness. The University of Toronto is Ontario's and Canada's largest university and is the most research-intensive.

U of T has attributes that, in combination, make it unique in the world. U of T is ranked as a top 10 public research university globally, and is the top public university in North America for the employability of its graduates.[i] U of T has rocketed up the rankings of the world's "most innovative" universities (measured by patenting and commercialization activities) rising 22 spots in the last two years to 35th and 1st in Canada — one of only two Canadian universities within this ranking of the top 100 innovative universities in the world.[ii]

While U of T's excellence is recognized globally, the University is dedicated to access. One-quarter of domestic students come from families with incomes under $50,000.[iii] The University has financial support programs designed to guarantee every student has the resources necessary to meet his or her needs. Across our three campuses in Toronto, Scarborough and Mississauga, over 90,000 undergraduate, graduate and professional students benefit from the University's dedication to excellence and access. We have over 560,000 alumni around the world.

In short, the University of Toronto is a key part of Ontario's innovation economy and supports research, job creation, and social and economic development.

THE MISSION OF THE UNIVERSITY

The primary mission of the University of Toronto is teaching and research.

The University contributes to Ontario's prosperity by creating new knowledge and providing solutions to economic and social challenges, transferring knowledge and intellectual property (IP) into companies and society, developing student talent, and deploying talent to the workforce. These ingredients are central to an innovative economy.

Commercialization of university ideas is one of the many ways in which the public benefits from research and talent at Ontario's universities.

HOW U OF T SUPPORTS COMMERCIALIZATION

WHAT IS THE UNIVERSITY'S ROLE IN COMMERCIALIZATION?

Commercialization can be described as the process of taking a discovery or invention to the market through the creation of a new product or service. First, it should be noted that universities are not commercial entities and do not directly engage in the production, manufacturing, distribution or sale of commercial goods and services. Therefore, the commercialization of university research is often referred to as "technology transfer," reflecting the fact that, ultimately, technology or IP must be transferred from the university to a commercial entity with the capacity to further develop an invention into commercial products. This process requires significant investment in activities such as securing IP protection, prototyping, testing, manufacturing, regulatory approvals, marketing, packaging, distribution, and ultimately sales.

To support the commercialization of research, U of T actively seeks partners with this required expertise and capacity to bring early-stage technologies to the market. We maintain a searchable list of technologies available for licensing[iv] and seek partnerships with industry that can further develop the technology into a commercial product. The University has entered into hundreds of partnerships that have advanced the competitiveness of industry in Ontario, including with companies in the auto, mining, forestry and manufacturing sectors.

We structure these partnerships to align with the primary mission of the university — to train young people who will work in the private and public sectors or start their own companies, and to create new knowledge that contributes to social and economic development. These are fundamental capacity building functions for an innovative economy. The Ontario government's proposed Strategic Mandate Agreement framework recognizes the contribution of U of T and all Ontario universities to the competitiveness of private companies in the province through the inclusion of industry funding of research as a metric.

However, a university's efforts to support commercialization in Canada has limits based on the public mandate of the institution, the early stage nature of our innovations and discoveries, and that commercialization subsequently depends upon private sector, regulatory, market and other factors. Most notably, the limited receptor capacity of Canadian industry is a barrier to more effective domestic commercialization of university research. As has been documented extensively in numerous reports on Canadian innovation capacity over past decades, business expenditure on research and development (BERD) lags behind comparator countries in the OECD and remains a drag on Canadian productivity and innovation capacity.[v]

One way that universities have attempted to boost domestic receptor capacity is by supporting the creation of research-based firms and by providing students with entrepreneurship experiences that help facilitate domestic technology transfer from the university. U of T and many other Canadian universities have developed entrepreneurship programs to help support students with an interest in starting a new business. These experiences can happen within and in addition to the academic curriculum and develop lifelong entrepreneurial skills in participants that can be carried into a broad range of employment settings, whether in start-ups or established businesses. U of T currently has a network of various

entrepreneurship programs across our three campuses to assist entrepreneurs and early-stage companies created by the university's students and faculty. These programs ensure that our students seeking support or advice on how to start a new business can access an entrepreneurship program at any of our campuses. Many of these programs have sectoral focus and expertise (e.g. health, engineering, computer science). Over the last decade, the U of T community has created over 500 start-ups, which together have raised over $1-billion in financing. Driven by student interest and enthusiasm, these activities continue to grow.

Another way that U of T contributes to the province's competitiveness is through research partnerships with global companies that transfer research from the lab to the marketplace. When working with multinational companies (MNEs), U of T most often works with Canadian subsidiaries, which often have significant presence and employment here in Canada and are household names to most Ontarians. These research partnerships include IP terms that are appropriate to the project, support the teaching and research mission of the university, and can bring a range of benefits to Canada. For example, partnerships with leading MNEs provide our community with access to the latest technologies, raw investment for new and existing research labs to Ontario, and lead to job creation and broader economic impacts. Our faculty and trainees gain valuable experience working with these multinationals, for example, in how to build global supply chains, which they can then carry back into Ontario-based companies.

UNIVERSITY SUPPORT FOR COMMERCIALIZATION

The University of Toronto Early Stage Technology (UTEST) program was created in 2012 with the mandate to provide extensive support services to U of T entrepreneurs commercializing inventions created at the University. UTEST has worked with over 85 companies to date, providing support in terms of investment of up to $100,000, professional services (i.e. incorporation and company structure, intellectual property protection), mentorship, a formal business education program, and dedicated incubation space. The University of Toronto has invested $825,000 in these companies which have gone on to raise an additional $115-million resulting in over 500 jobs in Toronto.

A member of the 2015 UTEST cohort, Blue J Legal was founded by 3 University of Toronto Law Professors trying to commercialize a proof-of-concept legal AI platform. UTEST provided formal education, seed investment, mentorship, and incubation space for their first 18 months. Since then, Blue J Legal has raised an additional $10-million, grown to a team of over 65 employees and secured large international customers. Blue J Legal is widely regarded as a leader in the AI legal space.

STUDENT ENTREPRENEURSHIP

Genecis, founded by a University of Toronto student, was launched in The Hub, UTSC's start-up space. It now has local and global clients and has succeeded by doing good: Genecis turns food waste into higher value products. By using systemic biological design to convert mixed organic waste into carbon sources, the company produces bioplastics at 40 per cent lower cost than current commercial production. Genecis is working with food services companies to create a full cycle of products, converting food waste into utensils.

HOW DOES THE UNIVERSITY OF TORONTO'S INTELLECTUAL PROPERTY POLICY WORK?

U of T has a strong policy framework regarding inventions and IP created at the university. The university also seeks to assert our IP rights in partnerships with industry. Inventors who have used U of T resources (e.g. funding administered by the university, lab spaces, equipment) to create ideas and inventions able to be commercialized are required to disclose them to the University. This mandatory disclosure provides the institution with awareness of innovations created at the university. It also allows the University to review the terms of any researcher funding agreements, to fulfill obligations to sponsors and partners.

The University has created the Innovations & Partnerships Office (IPO) that helps build partnerships among industry, business, government and the University of Toronto research community and assists with commercialization. This office also manages U of T's portfolio of intellectual property, which aims to engage in commercial partnerships to help turn ideas and innovations into products, services, companies and jobs. In short, our IPO's mission is to bring U of T inventions to the world.

U of T's IP policy is similar to that found at Stanford University, which requires that inventors using university resources disclose potentially patentable works to the University. However, we extend additional flexibility in ownership options to our inventors and entrepreneurs such that our

policy can be considered "Inventor's Choice," as explained below. [vi]

In addition to our strong framework to ensure that inventions are disclosed early and transparently to the institution, we also permit our inventors to assume ownership and responsibility for patenting and commercialization if they choose. In that case, our policy requires that a pre-defined revenue portion be shared back to the institution should the IP generate significant funds. All of this revenue is returned to the University for re-investment into the teaching and research mission of the University.

While flexibility is provided to our inventors to assume ownership and patenting responsibilities, it is much more common that they prefer the University take full ownership of the IP. The University, through the IPO, can then directly support IP protection and some of the early steps to commercialization. For instance, in the last 10 years, U of T has filed over 2,300 national patents in 49 jurisdictions around the world and spent more than $7-million on IP-related costs. We incur these costs on behalf of our inventors and entrepreneurs to help ensure made-in-Ontario ideas are protected, and to give our inventors and entrepreneurs the opportunity to focus on building their business model, securing additional private investment, and building their new company.

We evaluate the impact of our efforts through several metrics, including invention disclosures, patents, jobs created, number of licenses, licensing income and start-up growth and duration. The University of Toronto, along with most major universities in North America, voluntarily reports on commercialization metrics to the AUTM Licensing Survey. This survey is a benchmarking tool to inform discussions and sharing of best practices between universities, while offering evidence of U of T's impact. We are a North American leader in the number of new invention disclosures, new licenses and options, and in new intellectual property-based start-up companies.

THE UNIVERSITY OF TORONTO'S INVENTIONS POLICY

The University of Toronto Inventions Policy has three basic objectives:

- to encourage creativity and innovation within the University community.

- to facilitate the translation of knowledge for the greatest possible public benefit, including by commercialization through development of Inventions into commercial products or processes.

- to ensure that revenue generated by these Inventions is distributed in a manner consistent with the first two objectives and the advancement of research at the University.

Our peers are universities globally renowned for driving and accelerating innovation in their regions, including MIT, Stanford, and U Michigan.

We also seek to help our entrepreneurs who wish to leverage the University's IP into innovative products and processes by licensing or transferring IP rights to their start-up company.

When working with start-ups, the University is careful to transfer IP into companies that are positioned for success. We evaluate a company's business plan, professional management, investment or a plan to secure capital, and its ability to maintain IP protection. To assist in building a strong start-up, our inventors can access various entrepreneurship programs at the University which provide mentoring, business and marketing support, introductions to investors, etc. This suite of programs has led to U of T to be ranked among the world's top five university-managed business incubators.[vii]

To further support and equip our inventors and entrepreneurs, U of T recently created two guidebooks:

1) ***Inventor's Guide to Technology Transfer*** outlines the ways that U of T supports the licensing and transfer of IP to companies and other third parties.[viii]

2) The ***Start-up Guidebook***, a broad overview of the start-up process that provides background on resources available for all U of T entrepreneurs.[ix]

The University seeks to build bridges and connections to help University entrepreneurs and their companies succeed in Ontario. Supported by a $3-million commitment from RBC, we recently opened a 15,000 sq. ft facility for our start-ups called ONRamp, which connects entrepreneurs across U of T's entrepreneurship incubators and our partner organizations, as well as helping them accelerate their businesses with access to space, events, networks and the entrepreneurial ecosystem in downtown Toronto. U of T has also partnered in ONRamp with Queen's, Waterloo, McMaster and Western so that new companies from across Ontario can access these facilities and academic-business networks in the province.
In summary, the University of Toronto has created an effective IP policy framework, maintains strong operational processes to identify inventions and all of the co-inventors and contributors, adheres and asserts our IP rights with third-parties, files and protects IP, and assumes IP costs for an initial period of time.

For our students, faculty and researchers, we have created programs to engage, inspire and equip them for entrepreneurship. This year, for example, we launched a $5-million philanthropic entrepreneurship fund to encourage entrepreneurs to develop game-changing technologies and businesses — helping to create new jobs and investment.

We provide these supports and services with limited expectation of financial return to the institution. Instead, we hope to encourage the growth of our private sector partner firms and the companies our entrepreneurs create, enabling them to prosper, stay, and scale up, here in Ontario.

Attempts to capture more value for the institution at an early stage would simply reduce the incentives for the inventors of technologies and founders of companies, as well as their prospects for investment. Rather than trying to arbitrarily extract value in that way, we are developing a Founders Pledge, modelled on practices at leading institutions, that will commit founders to donating back to the institution in the future.

COLLABORATION WITH PUBLIC & PRIVATE PARTNERS

The University of Toronto is a partner in the Southern Ontario Smart Computing for Innovation Platform (SOSCIP), which gives industry partners and academic research teams access to leading-edge technology and technical expertise. Developed as a collaboration between 15 Ontario postsecondary institutions, IBM Canada Ltd. and many small- and medium-sized enterprises across the province, SOSCIP is active in the areas of agile computing, health, water, energy, cities, mining, advanced manufacturing, digital media and cybersecurity.

SOSCIP helps Ontario companies develop products and services, creates jobs, and brings Canadian products and services to the global market faster and more efficiently. Currently, there are more than 40 joint projects underway.

RECOMMENDATIONS

INVEST IN TALENT: TALENT IS THE FOUNDATION OF INNOVATION AND COMPETITIVENESS

People create the intellectual property that leads to new products, launch new firms, and attract investment from companies across Canada and around the world.

The Toronto-Waterloo corridor is leading North America for job creation in the tech sector, and the region is experiencing a brain-gain, with talented graduates choosing to stay or relocate to the province. Over the past year, domestic and global firms including Shopify, Top Hat, Samsung, Lyft and LG have announced they will expand their workforce and make strategic investments in Ontario that will create jobs and contribute to the innovation ecosystem.

Investments in education, training and skills that support the development and retention of an educated workforce, and immigration policies that encourage the recruitment of skilled talent from around the world, will advance commercialization in Ontario.

THERE IS NO ONE-SIZE-FITS-ALL APPROACH TO IP AND COMMERCIALIZATION STRATEGY

The University of Toronto is helping to create and support companies that are driving Ontario's competitiveness in areas like advanced manufacturing, regenerative medicine and artificial intelligence. Our "Inventor's Choice" framework for intellectual property is leading to an average of 180 invention disclosures a year. U of T and its partner hospitals file a patent approximately every three days.

This flexible approach to IP ownership is helping to encourage and foster a culture of invention and entrepreneurship at the University, while also helping U of T assert IP rights and protections. Nevertheless, there are a variety of intellectual property regimes at universities in Ontario. Each approach reflects the needs of different partners, communities and regions. Each institution is best placed to evaluate the success of its approach in accomplishing the shared mission of serving the public good.

Novel approaches to managing intellectual property, including a patent pool in which inventors, institutions and companies could voluntarily participate, may offer new and innovative ways to support commercialization. The University welcomes the opportunity to engage with the panel to discuss any such proposals.

SCALABLE, SUSTAINABLE COMMERCIALIZATION PROGRAMS FACILITATE SUCCESSFUL INNOVATION PARTNERSHIPS

Partnerships between universities and industry benefit from predictable and stable regulatory frameworks and coordinated provincial and federal supports. Frequent shifts in boutique entrepreneurship and commercialization support programs create administrative uncertainty and can act as barriers to industry-academic partnerships that lead to firm growth and competitiveness.

In contrast, efficient, sustainable and long-term commercialization support programs operating at scale reduce the risks of investments in research and new technology for industry and facilitate the establishment of dynamic partnerships that benefit all partners and the public.

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[i] https://www.utoronto.ca/news/u-t-top-public-university-north-america-employability-times-higher-education-ranking
[ii] https://www.reuters.com/innovative-universities-2018/profile?uid=35
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