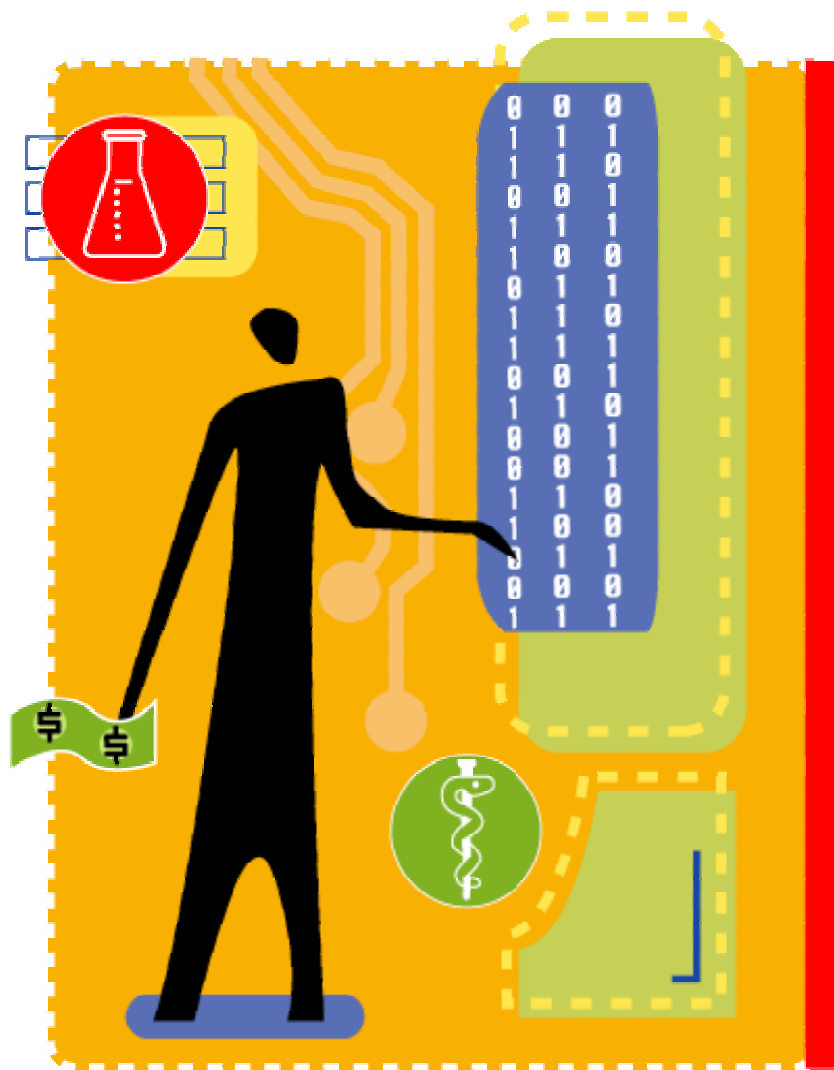


Commercialization Handbook

An Introductory Guide for Researchers



PRESENTED BY:

**The Intellectual Property Management Offices of
Ontario's Post-Secondary Research Institutions**

and

OCE Inc.: The Ontario Centres of Excellence

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The IPM (Intellectual Property Management) Ontario Group is a partnership made up of seventeen Ontario universities: Toronto, Ryerson, Lakehead, Ottawa, Waterloo, Wilfrid Laurier, Western Ontario, Windsor, Carleton, Guelph, Nipissing, McMaster, Queens, Brock, Laurentian, York and Trent. Ontario research hospitals and other post-secondary institutions are also represented through the participation of the Ontario Society for Excellence in Technology Transfer (onSETT).

These institutions collaborate on three key functions: To train technology transfer professionals through an internship program; manage a proof-of-concept fund for the “last step” to enable technologies to attract commercial partners; and share best practices for technology transfer offices.

Collectively, the Centres of Excellence promote the economic development of Ontario through directed research, commercialization of technology and training for highly qualified personnel. The Centres are among the few publicly funded institutions that systematically integrate and manage connections from academic research institutions to the marketplace to ensure the successful application of innovative science and technology to profitable new businesses.

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Table of Contents

ACKNOWLEDGMENTS	1
TABLE OF CONTENTS	2
1: INTRODUCTION	3
2: OWNERSHIP OF INTELLECTUAL PROPERTY	4
2.1 WHAT IS INTELLECTUAL PROPERTY?	4
2.2 UNIVERSITY POLICY	4
2.3 THE POLICIES OF COMMON RESEARCH FUNDING ORGANIZATIONS	4
2.4 THE IMPLICATIONS OF COLLABORATIVE RESEARCH	5
3: THE COMMERCIALIZATION PROCESS	6
3.1 POTENTIAL PERSONAL BENEFITS OF COMMERCIALIZING YOUR RESEARCH	6
3.2 UNIVERSITY BENEFITS OF COMMERCIALIZING RESEARCH	6
3.3 DISCLOSURE	6
3.4 WHAT INVENTIONS SHOULD BE DISCLOSED?	7
3.5 WHAT IF YOUR INVENTION IS MADE ON YOUR OWN TIME?	7
3.6 WILL THE DISCLOSURE PROCESS INTERFERE WITH YOUR PUBLICATION PLAN?	7
4: INTELLECTUAL PROPERTY PROTECTION	8
4.1 IS MY IDEA PATENTABLE?	8
4.2 WHY PATENT?	8
4.3 THE DANGERS OF PUBLIC DISCLOSURE	8
4.4 WHAT IS THE MEANING OF PUBLIC DISCLOSURE?	9
4.5 PROVISIONAL PATENT APPLICATIONS	9
4.6 PATENT APPLICATION PREPARATION WORKFLOW	9
5: CHOOSING THE RIGHT COMMERCIALIZATION PATH	13
5.1 DEFINING YOUR OBJECTIVES	13
5.2 THE CHANNELS OF COMMERCIALIZATION	14
5.3 SELLING OR ASSIGNING OWNERSHIP OF THE TECHNOLOGY	14
5.4 LICENSING A TECHNOLOGY	14
5.5 COMMERCIALIZATION VIA START-UP COMPANY	16
5.6 KEY ISSUES INVOLVED WITH ALL PATHS TO COMMERCIALIZATION	18
6: CONCEPT DEVELOPMENT AND FEASIBILITY ANALYSIS	19
6.1 DEVELOPING A BUSINESS CONCEPT	19
6.2 FEASIBILITY ANALYSIS	19
7: FINDING THE CASH TO GROW	21
7.1 THE FUNDING GAP	21
7.2 WHERE TO FIND FUNDING	22
APPENDIX A: TECHNOLOGY TRANSFER OFFICES IN ONTARIO UNIVERSITIES	24
APPENDIX B: INTELLECTUAL PROPERTY POLICIES OF MAJOR FUNDING BODIES	27
APPENDIX C: WHO ELSE CAN HELP?	30
APPENDIX D: GOVERNMENT SOURCES OF COMMERCIALIZATION FUNDING	32
APPENDIX E: UNIVERSITY / HOSPITAL POLICIES AND SERVICES	35



1: Introduction

This guide has been developed for faculty, students and staff within academic research institutions who have developed a new technology or with an invention or a technology they would like to commercialize. Its goal is to introduce the basic concepts and issues involved in commercializing university technology. It is designed as a reference document to help guide your discussions with the technology transfer professionals that will help you evaluate the potential of your technology and bring it to market.

From a researcher's perspective, commercialization is about maximizing the commercial impact and financial benefit of the technology.

To get an innovation to market you must do more than just develop a technology that works – you must understand how your technology meets a genuine market need. Whether you have a clear vision of how your technology might be commercialized, or are just beginning to explore the commercialization opportunities that might exist, this handbook is designed to provide an outline of the possible routes you might take and the likely obstacles, challenges and decisions you will come across along the way.

The guide has been designed to address the specific issues facing researchers considering commercializing their research. No guide of this sort can be either exhaustive or prescriptive and many of the issues you will encounter will require a solution tailored to your specific circumstances. With this said, this handbook should be seen as an overview of some of the fundamental issues that you should understand. Use the handbook as a starting point, but remember that there is a great deal of support available to you as you go deeper in to the commercialization process. Appendix A provides the contact details of university technology transfer offices, and Appendix C provides other contacts that may be useful.



2: Ownership of Intellectual Property

2.1 What is Intellectual Property?

The objective of protecting intellectual property is to encourage the creation of valuable ideas and to protect them from being stolen. The four most common types of intellectual property are:

Copyright ©: Gives the author exclusive rights to reproduce the copyrighted material. Copyrights can be in published or unpublished works, e.g., original literary, musical, dramatic or artistic works, computer programs and other matter. Copyright protects the expression of ideas, but not the ideas themselves.

Trade Secret: A broad term to cover secret information that is defined by how it is treated and protected. It provides an owner of the information with a market advantage over its competitors. To enforce trade secret actions, an owner must show that the trade secret has been maintained in a way that reasonably anticipates preventing others from learning about it. Unlike patents, trademarks, and copyrights, there is no registration of a trade secret with a government agency.

Trademark TM, ®: A logo, word, slogan, symbol or design that distinguishes a product or a service. Trademarks protect corporate identity and can be legally registered.

Patent: Provides inventors and those with rights to inventions the exclusive right for a limited period of time to prevent anyone else from making, using or selling the invention. Patents are granted on machines, articles of manufacture (devices), compositions of matter (materials), processes (methods), and improvements of any of these. Patents are filed in each country individually.

2.2 University Policy

Each university has their own policy regarding ownership of intellectual property and the rights of the inventor. The policies of each institution can vary dramatically so your first step should be to contact your technology transfer office to discuss what obligations you must fulfill and what services are available to you.

A list of the technology transfer offices in Ontario universities is available in Appendix A. A brief description of your university's policies and services is available in Appendix E.

2.3 The Policies of Common Research Funding Organizations

If you received grant funding at any time during the development of your technology, it will be important to consider the implications of any commitments or responsibilities you have to those granting organization(s).

Appendix B is a brief outline that lists the general policy for some of the major funding bodies, such as NSERC, SSHRC, NCE, CIHR, ORDCF, CFI and OCE. This information is simply an overview of their general policies and was accurate at the time of publication of this document. Please contact the funding agency to get a true understanding of your specific circumstances.



2.4 The Implications of Collaborative Research

It is not just the university and grant funding bodies to which you may have commitments and obligations. You must consider anyone else that may have participated in your research in any way during the development of the technology. Anyone who has participated in your research may have a legitimate claim of co-inventorship and might seek to share in any of the financial benefits from the commercialization of your research. Consider the following:

- Professors who supervised your work
- Students who have worked with you on the project
- Visiting researchers or casual collaborators from other institutions
- Gifts, grants or contracts from organizations or companies

Write an exhaustive list detailing everyone who had any involvement with the development of your research, no matter how minor. For some of the participants, it may become necessary to request a written waiver of any rights to the technology they might have. For others who may have been more heavily involved in the development of the technology, or who plan on participating in its commercialization, you will need to come to some amicable agreement as to how to share the financial benefits of commercialization.

Setting off on the right foot by determining the proper ownership of the intellectual property is fundamental to the successful commercialization of your technology. Although sometimes difficult, it is much easier to deal with such issues at the beginning of the process. Each case can be very different and you are not expected to do this alone. It is always worth-while to seek legal advice in these matters either independently or through your university's technology transfer office.



3: The Commercialization Process

Universities, Hospitals and Colleges in Ontario spend hundreds of millions of dollars annually on research. The most visible rewards of this research are the students that are educated at the university, and the host of publications, presentations, and graduate theses communicating these research findings to scientific colleagues throughout the world. The broad dissemination of research results is unquestionably the primary goal of the universities' research activities.

The commercialization process can be different at each university, but most respect many of the same basic principles. Your technology transfer office can help you understand the process and requirements of your specific institution.

3.1 Potential Personal Benefits of Commercializing Your Research

- Practical application of your research in developing products fosters the widest possible recognition of your research efforts.
- Collaboration with industrial partners may also result in financial sponsorship of additional research.
- Collaboration with industrial partners may financially support your students, provide them invaluable experience, and potentially future career paths.
- Potential monetary compensation in the form of equity, license fees or royalty payments.

3.2 University Benefits of Commercializing Research

- Ensure public benefit from university research.
- Enhance the university's research environment.
- Develop lasting industry relationships.
- Generate revenue for the university
- Meet the university's intellectual property obligations to research sponsors.

3.3 Disclosure

One of the most important steps in the university's technology transfer processes is the inventor's submission of a confidential invention disclosure form. This document gives the university technology transfer office the information that it needs to start working with you on the commercialization of your technology.

Invention disclosure forms typically ask the following questions:

- Who are the inventors?
- What is the invention?
- Who funded the research?
- What is published and what is unpublished data?
- Are there any likely candidates for licensing?

It can be a useful exercise to complete an invention disclosure form even if you do not plan to submit it. The form is a comprehensive and logical sequence of questions and the process of



answering the questions will become extremely helpful should you decide to continue on the path of commercializing your technology.

3.4 What inventions should be disclosed?

The definition of ‘invention’ varies from university to university, as does the disclosure policy. Generally, the technology is an invention if it meets any of the following criteria:

- a) New and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter, whether or not patentable.
- b) Computer software (non-teaching).
- c) Research data or research tool, including, without limitation, biological material and other tangible research material.
- d) Proprietary information, know-how or trademark related to any of the foregoing items.

Following your disclosure, the technology transfer office can inform you of the options and resources available, and provide an impartial opinion on the potential for commercialization.

3.5 What If Your Invention is Made on Your Own Time?

The university policies require that you must demonstrate to the university's satisfaction, by submitting a disclosure and a statement that your invention was made without the use of any university time, resources, or facilities, and is essentially unconnected to your university-based research. If you have made such an invention, the university will provide you with a formal waiver. You should check the policy of your university to clarify this position.

3.6 Will The Disclosure Process Interfere With Your Publication Plan?

The university will not interfere with a faculty member's right to publish research results. However, you are encouraged to advise the university of any plans to disclose or publish a potential invention as soon as possible so appropriate actions can be taken to protect it. You should check the policy of your university to clarify this position.



4: Intellectual Property Protection

4.1 Is my idea Patentable?

To be patented, your invention must satisfy the following criteria:

Novelty: Your invention must not have been disclosed to the public application by a person other than the inventor(s). Further, to preserve worldwide patent rights, your invention must not have been disclosed to the public before the filing date of the application by the inventor(s). However, Canada and the United States have a one-year grace period with respect to public disclosure of the invention by the inventor(s). Thus, for Canada and the United States, your invention must not have been disclosed to the public more than one year before the filing date of the application by the inventor(s).

Non-obviousness: To be patentable, your invention must be a new combination of features and/or give new and non-obvious results compared to known approaches. Ordinary differences in size, materials or other obvious modifications are generally not patentable.

Utility: Being new isn't enough nor is being different. For your invention to be patentable, it also must be useful. The invention must perform a function, do what you say it does, and have some benefit. A machine that doesn't perform its intended purpose is not useful, and therefore cannot be patented.

Determining patentability can be extremely complicated and it is always advisable to have an experienced patent agent or attorney who can sort out any legal and technical complexities.

4.2 Why Patent?

Patents confer market monopolies. Patents have a lifetime of 20 years and during this time the intellectual property is the sole property of the assignee. The patent enables its owner to prevent others from making, using, selling or importing the technology or product claimed in the patent.

Patents can be powerful business tools as they can reinforce a competitive advantage. The challenge for large and small entities is to use patents effectively. This means approaching patents from a business-minded perspective and at all times pursuing protection strategically.

4.3 The Dangers of Public Disclosure

If you do not file a patent application for an invention before disclosing it to the public, you will not be able to patent it in any country other than Canada or the United States. In Canada and the United States, you have a one year grace period after your public disclosure to apply for patent protection – after this time your invention will be un-patentable. In the United States, a one year grace period also applies to offers for sale, even if confidential.

If you would like an invention to be protected as a trade secret, you must not publish it in the public domain. By its very nature, a trade secret or know-how that has already been published will leave the intellectual property with no commercial value.



Considering your intellectual property protection options should be one of the first steps in the commercialization of your technology. Consult a patent lawyer or agent, or your technology transfer office as early as possible in the process.

4.4 What is the Meaning of Public Disclosure?

The term “public disclosure” not only includes conventional publication in a journal or conference proceedings, but also refers to anything in the ‘public domain’. In other words, public disclosure means any communication medium that can be read, spoken and/or viewed by the general public, such as internet, radio, television, written publications, e-mail, presentation slides, posters at conferences or talks, workshops or lectures, advertisements, public use, or, in the United States, sale or offer for sale.

If you are concerned about how the sharing of certain information might impact the protection of your invention, you can request that the recipient sign a ‘Confidentiality Agreement’ that legally commits them to not disclosing the information they receive and protects you against public disclosure of your invention.

4.5 Provisional Patent Applications

A provisional patent application can be an effective vehicle for securing patent protection. A provisional application (U.S. or U.K.) is typically a simplified document that requires a specification and drawings, optionally with claims, and no oath/declaration, and is never examined by the patent office. A full patent application filed within 12 months may claim the benefit of the filing date of the provisional application. When patent budgets are limited, or a premature disclosure cannot be avoided, or market validation is desired before defining the scope of the patent, provisional patent applications can be quite useful.

The advantage of a provisional patent application is that it can be significantly less expensive to prepare than a regular patent application, and can help buy extra time to obtain market validation before incurring the cost of a full patent application. There are also some pitfalls involved with provisional patent applications. First, the invention claimed in the subsequent full patent application must be supported by the invention described in the provisional application. Otherwise, the priority date of the provisional application may not be valid. Second, because examination by the patent office will not begin until the full patent application is filed, the grant of any patent is delayed.

4.6 Patent Application Preparation Workflow

The drafting of a patent application is the product of collaboration between the patent agent and the inventor. The key contribution of the inventor is the technical disclosure. The leading enabler for a good patent is a good invention disclosure.

There are two documents that are critical to creating a good invention disclosure. The first is a “technical disclosure” of the invention; the second is an “invention summary”. These are usually best prepared in tandem, as outlined below. They are then used by the patent agent to prepare the “detailed description” and the claims that are key components of a patent application.



It is important that the detailed description be an “enabling disclosure”. That is, the patent must provide a full disclosure that is sufficient to allow others to make and use the invention. Patents can be invalidated if they fail to disclose an aspect of the invention in terms readily understood by a person with ordinary skill based on information that is commonly available.

The information required for a patent application filing, depending on the invention, can be fairly extensive. The following is a description of the process through which patent applications are prepared and revised:

1) Explanation of Requirements

Inventors should first understand the items that the detailed description should include, namely:

- Extensive drawings illustrating the invention. These generally include illustrations, tables, flowcharts and the like; whatever best explains the particular invention.
- Technical description of the invention, based on a logical order. Usually this means describing the “large pieces” first, and then explaining the invention in greater and greater detail.
- All aspects of the invention should be explained. For example, a method, a computer program that implements the method, and a system in which the computer program is loaded on a computer. An illustrative explanation of how the invention would be implemented in each of its aspects is important. This may include reciting, for example, sample hardware configurations for the system aspect of the invention. The same is true in other art areas as well.
- One or more examples of the implementation of the invention. Where relevant, sample data should be provided.
- Summary of the advantages of the invention over the prior art.

In addition, a Background section is required and should include:

- Summary of the relevant prior art (may include art found in the patentability search, below).
- Explanation of the disadvantages of the prior art, resulting in the need for the invention.

2) Patentability Search

When sufficient disclosure of the invention has been obtained to gain a detailed understanding of the invention, it is recommended that a thorough literature/patent search be conducted of the relevant databases to identify the closest prior art. Identifying any relevant art early in the application process will aid in determining the appropriate patenting strategy.

3) Establish any Due Dates

All due dates should be established and logged immediately. For example, for Canada and the United States, if aspects of the invention were disclosed less than one year ago, the one-year anniversary of the date is logged.



4) Review of Existing Material

Documentation may have been prepared for other uses that can be valuable in the preparation of the technical disclosure. For example, journal articles, papers and theses, invention disclosures, grant applications, and research notes could all be useful. Feedback from the patent agent should be provided on this documentation, indicating where further documentation is required, and examples of the type of content required based on existing documentation.

5) Create List of Action Items

Based on due dates, a detailed list of action items is prepared for completing the technical disclosure. This will include assignment of tasks to specific individuals and due dates. Where preparation of the technical disclosure requires collaboration of several individuals, a formal project management approach is often critical.

6) Casting Invention in Light of Prior Art

As soon as possible, the technical disclosure is reviewed along side the patentability search by both the inventors and the patent agent. Based on this review, a draft of the summary of Invention is agreed to. This document ideally abstracts the key aspects of the invention or inventions as broadly as possible in light of the prior art identified in the patentability search.

7) Completion of Technical Disclosure

The technical disclosure is completed which provides an “enabling disclosure” on all key aspects of the invention identified in the summary of invention.

8) Finalization of Detailed Description

The patent agent transforms the technical disclosure into a detailed description that contains an “enabling disclosure” but also abstracts the invention to the necessary scope from a patent perspective. Where a provisional filing is being made, claims may be included that foreshadow the claims that will be filed at a later date, and at any rate, the detailed description should foreshadow the claims that will be filed at a later date.

9) Finalization of Claims

Where a non-provisional patent filing is being made, the claims are finalized at this stage. There should be adequate support for each of the claims in the detailed description.

10) Completion of Patent Related Documents

A “Multiple Inventorship Form” is signed by all inventors stating their respective contributions to the invention. Assignments are signed by all the inventors. An extra original copy of all documents is retained for the file.

11) Filing

The patent application or applications is (are) filed.



12) Due Dates

All due dates are logged, including due dates for making foreign filings or for considering filing further patent applications on improvements.

13) Monitoring

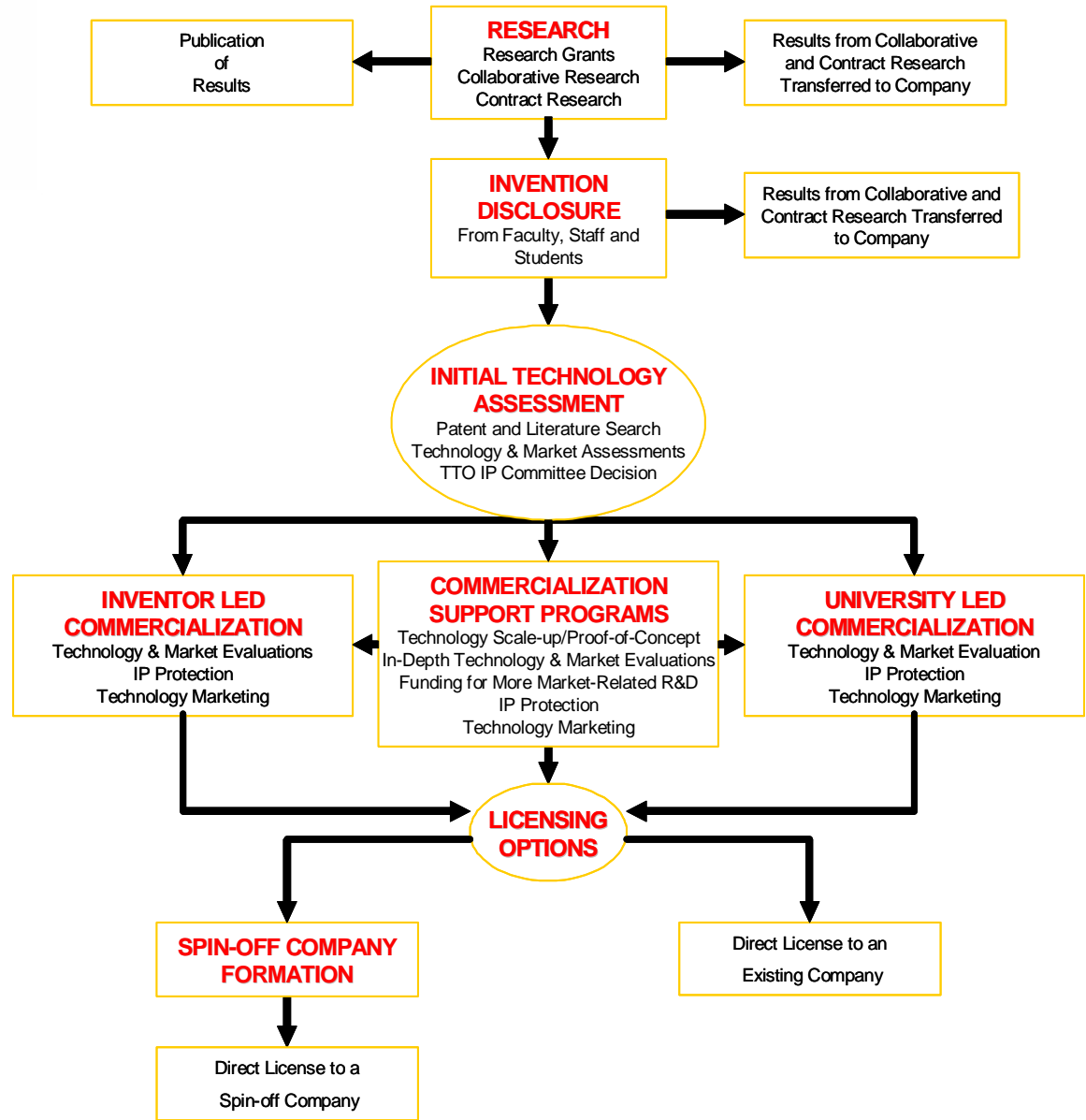
An appropriate monitoring process is put in place, for example, monitoring of newly published patent applications in a specific technical area, or newly published patent applications of a particular competitor. The monitoring process may also include a process for identifying infringements in the marketplace.

Please note that the information contained herein is only of general application. It is important to obtain specific advice based on particular circumstances.



5: Choosing the Right Commercialization Path

The following is a generalized commercialization process that outlines key steps from research to the transfer of the technology to a new or existing company. The process and services provided can differ significantly between institutions.



5.1 Defining Your Objectives

Following the technology disclosure process, it is time to pause and consider your personal and commercial objectives. You must define your end game so that you are able to devise a strategy to achieve it.



A commercialization effort of any sort is likely to take up considerable personal resources so it is of the utmost importance that you consider your personal objectives. These objectives may encompass any of the following:

- The achievement of personal wealth
- Academic recognition
- A short-term exit to enable you to pursue other activities
- The avoidance of personal risk
- The most effective way to maximize the impact of your technology

Be honest with yourself about what you really want to put in to the commercialization effort and what you really expect out of it. Be upfront with your technology transfer office or potential partners as it is vital that all participants have clear and realistic expectations.

5.2 The Channels of Commercialization

There are three broad channels for the commercialization of your technology:

- a) Selling or assigning ownership of the technology to an existing company
- b) Licensing the technology to an existing company
- c) Starting a new company

The choice of the right channel is critical. Key variables that can affect this decision include the nature of the technology itself, the industry it will be applied to, and the objectives of the inventor.

5.3 Selling or Assigning Ownership of the Technology

Technology acquisition could be a viable solution in the following situations:

- When there are major companies who control the market and will make starting a competitive business very difficult
- When your technology could offer a competitive advantage to one of these major companies, who may offer to buy it in order to improve their products and services
- When there is only one market in which the technology could be commercialized, or when one company in particular is an ideal target for the technology

You may not be legally entitled to make the decision to sell the technology without consulting other inventors, the university, granting or funding agencies, or past industry sponsors. A key disadvantage to selling the technology is that, once sold, you will no longer have any influence in how the technology is used or commercialized. You may lose the right to use it yourself, even for research or teaching purposes, unless it is part of the assignment agreement.

5.4 Licensing a Technology

Licensing a technology could be a viable solution in the following situations:



- When the technology applied to a variety of different markets, it can be licensed to different partners who will commercialize in each of these markets and potentially create multiple revenue streams
- Unlike selling or assigning the technology, you can give the licensee only the rights that you are willing to grant
- When the inventor wants to commercialize, but does not have the resources or interest to develop a new business
- When the market opportunity is too small to warrant the creation of a new company

Although the licensing route helps share the risk associated with the commercialization of a new technology, it will generate substantially lower returns for the inventor than might be achieved if they commercialized it themselves.

Licensing Agreements

Licensing agreements usually take one of two basic forms: a nonexclusive license or an exclusive license.

Nonexclusive Licenses. Nonexclusive licenses typically grant to the licensee the right to make, have made, use and sell the specific technology described in the license, with or without the right to sublicense others.

These licenses can be granted with defined geographical rights, and for a specific field of use or application, depending upon the licensee's business and the purpose of the agreement.

Exclusive Licenses. An exclusive license grants to the licensee the right to make, use and sell the specific technology described in the license, rights to the exclusion of all others including the inventor.

Companies like exclusive licenses because they restrict their competitors from gaining access to the technology. This creates more risk for you as the inventor, since the successful commercialization of the technology depends entirely on one company. Therefore, the licensing terms are usually more restrictive. For example, exclusive licensing agreements often require the payment of minimum royalties, and reasonable efforts on the part of the licensee to commercially exploit the inventions, in order to maintain the exclusivity of the license. In the event the licensee fails to meet these requirements, the agreements usually provide for termination, or conversion to a nonexclusive license.

Advantages of Licensing

- Instant resources dedicated to commercialization
- Sharing and diversification of risk
- Earlier financial reward
- Less time and resource intensive for inventor

Disadvantages of Licensing

- Losing partial control of the technology
- Lower financial return than inventor-led commercialization



- Involvement of the inventor is reduced
- Difficult to find appropriate licensee

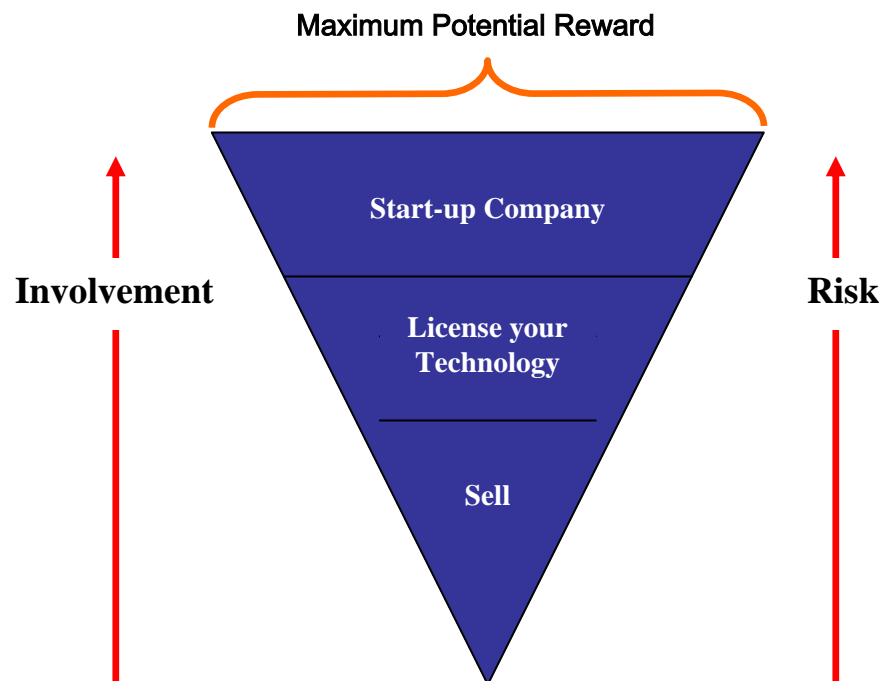
5.5 Commercialization via Start-up Company

Increasingly at universities, faculty, staff and students are interested in seeing their research results reach the marketplace by starting a new company rather than the more traditional way of licensing the technology to an existing company.

Many will consider starting a new company for the following reasons:

- The market potential for the opportunity is worth the added risk
- They have the desire to participate in maximizing the value of the technology
- They wish to work with an experienced business person who can lead the company
- They have contacts to create a business team and access to other support and resources
- Attempts to license the technology have been unsuccessful

Creating a successful new company is very difficult and success is often heavily influenced by factors outside your control. The stark reality is that a very large proportion of start-ups fail. Although creating a new company to commercialize your technology holds the highest risk, it can also lead to the highest potential reward.



With this in mind, it is worth considering all of the supports available to you to help maximize your chances of success. Your technology transfer office may have some commercialization support resources available. You should always endeavor to understand your university's



policies regarding start-up companies to determine what rights you have, and what your ongoing responsibilities to the university might be.

The process of creating a new company has more to do with the quality of the market than the quality of the technology. The following describes the common steps involved in assessing the potential to create a new technology-based business:

1. Product or Service Options

For any given technology, there are often many potential directions or areas of application. The first step should be to explore different product or service concepts that the technology could enable, as well as the different markets to which they could be targeted.

2. Business Concept Development

The best product or service options from step 1 should be chosen for further analysis. This might include either primary or secondary research within each technology or market area. A brief document on each option should be prepared outlining a description of the product or service, and an analysis of its strengths, weaknesses, opportunities and threats (SWOT analysis).

3. Feasibility Analysis

Based on the analysis from step 2, the new company will need to select an initial product or service direction that will serve as the basis for entering the market. Too many early stage companies try to become all things to all people. Given the scarce resources available to new start-ups, it is important to begin with a specific product direction that is focused on a target market. A 5-10 page feasibility analysis should be prepared that includes a more detailed description of the product or services, the underlying technology, the market opportunity, the key competitors, your competitive advantage, and identification of any obvious issues that are not yet addressed. Concept development and feasibility analysis are discussed in more detail in Section 6.

4. Identification of Initial Business Team

Although the initial product/service and target market have been identified, these plans are meaningless without the right team to develop and implement them. Where successful licensing is based on the strength of the technology, the greatest single predictor of the success of a start-up company is the strength of its management team. In fact, investors have a maxim that goes: 'Always choose a first rate manager with a second rate product over a first rate product in the hands of a second rate manager'. Inventors often focus their efforts on identifying and recruiting the technical team because it is easier for them to identify the skills required. It is equally important to identify the management team as early as possible. If no experienced business leaders are involved, the technology transfer office may have links to other organizations, and the business and investment community that can help identify potential candidates.

5. Preparation of the Business Plan

A business plan serves two main functions. First, it can be a management document that helps the team develop and implement the strategies essential to building a successful business. Second, it can be a sales document that is used to attract investors or strategic partners to the



business. The business plan is an expansion of the feasibility analysis, but is more comprehensive, and provides full details of key strategies, the management and technical team, financial projections and the investment opportunity.

5.6 Key Issues Involved With All Paths to Commercialization

Control Issues

Whether licensing the technology, or starting up a new company, commercialization means giving up some measure of control over the technology. No matter which commercialization path you follow, you will need to collaborate and communicate with others who may have different perspectives than you do. For example, you may need to deal with business people who are less interested in the technology itself and are focused more on the market opportunity and financial rewards. Commercialization is often collaboration between people with common objectives but different motives.

Technology Issues

No matter which commercialization path you follow, you will need to prove that your technology works. In other words, you will be required to provide some tangible proof-of-concept, or better, a functional prototype. The technology transfer office may have resources to help support proof-of-concept or prototype development, or can help you access other programs that can.

Market Issues

The potential market for the technology can be an important factor in the choice of commercialization path. Not every invention warrants the creation of a new company. Some markets, quite simply, will be too small to warrant company creation. In other cases, markets may be controlled by large and mature companies that would make it difficult to compete. Be realistic about the value of the technology and carefully weigh the size and structure of the market as part of choosing the right path to commercialization.

Team Issues

Inventors must be honest about their role and commitment to the commercialization of their technology. If inventors are not prepared to make a large commitment, or are not interested in working as part of a management team, then a licensing path might be appropriate. When creating a start-up company, inventors must recognize their skills and limitations and seek to fill any gaps with the right expertise. Most new companies fail because of poor management. Sometimes inventors believe their strengths as researchers can be equally applied to company management. While this can sometimes be the case, an inventor rarely becomes the President of the company that is created to commercialize their technology. If the inventor remains actively involved in the start-up company, they are often most productive in the role of Chief Scientist or Chief Technology Officer.



6: *Concept Development and Feasibility Analysis*

This section describes in more detail the critical steps in assessing the potential to create a new technology-based business. Concept development and feasibility analysis will guide you through the process of considering what kind of products or services could be created using the technology and analyzing the market feasibility of those products and services. These steps should not be followed in isolation. Input from the tech transfer office, potential customers and others involved in the industry can be important to choosing a product direction that meets a real market need. Whether your technology will be licensed to a company or whether you decide to start a company, a feasibility analysis is vital.

6.1 Developing a Business Concept

A business concept is a concise description of an opportunity that contains four elements:

- The product/service
- Customer definition
- Value proposition (benefit to the customer)
- Distribution channel (how you will deliver the benefit to the customer).

6.2 Feasibility Analysis

A feasibility analysis tests a business concept to determine its market potential. This is in contrast to a business plan, which assumes feasibility of the concept and simply describes a plan to execute the business concept. There are two key questions that the feasibility analysis should answer:

- a) Is there a market of sufficient size to make the concept feasible and worth the time and effort to create a new product or service?
- b) Under what conditions should the product or service be developed, or should a new company be launched? Many concepts can achieve feasibility if the right conditions are in place. The feasibility tests listed below will help you determine those conditions.

The following are important questions to answer when considering the commercial feasibility of your project:

Industry

1. What are the demographics, trends, patterns of change, life cycle stage of the industry?
2. Are there any barriers to entry? If so, what are they?
3. What is the status of technology and R&D expenditures?
4. What are typical profit margins in the industry?
5. What are distributors, competitors, retailers, etc. saying about the industry?

Market/Customer

6. What are the demographics of the target market?
7. What is the customer profile? Who is the customer?
8. Have you talked with customers?



9. Who are your competitors and how are you differentiated from them?

Product/Service

10. What are the features and benefits of the product or service?
11. What are the product development tasks and what is the timeline for completion?
12. Is there potential for intellectual property rights?
13. How is the product or service differentiated from others in the market?

Finance

14. What are your start-up capital requirements?
15. What are your working capital requirements?
16. What are your fixed cost requirements?
17. How long will it take to achieve a positive cash flow?
18. What is the break-even point for the business?

Distribution Channels

19. What are potential distribution channels and which customers will be served by them?
20. Are there ways to innovate in the distribution channel?

The Team

21. Can an appropriate start-up or genesis team be put together to execute the concept?
22. What experience and expertise do we have? What are the gaps and how do we fill them?

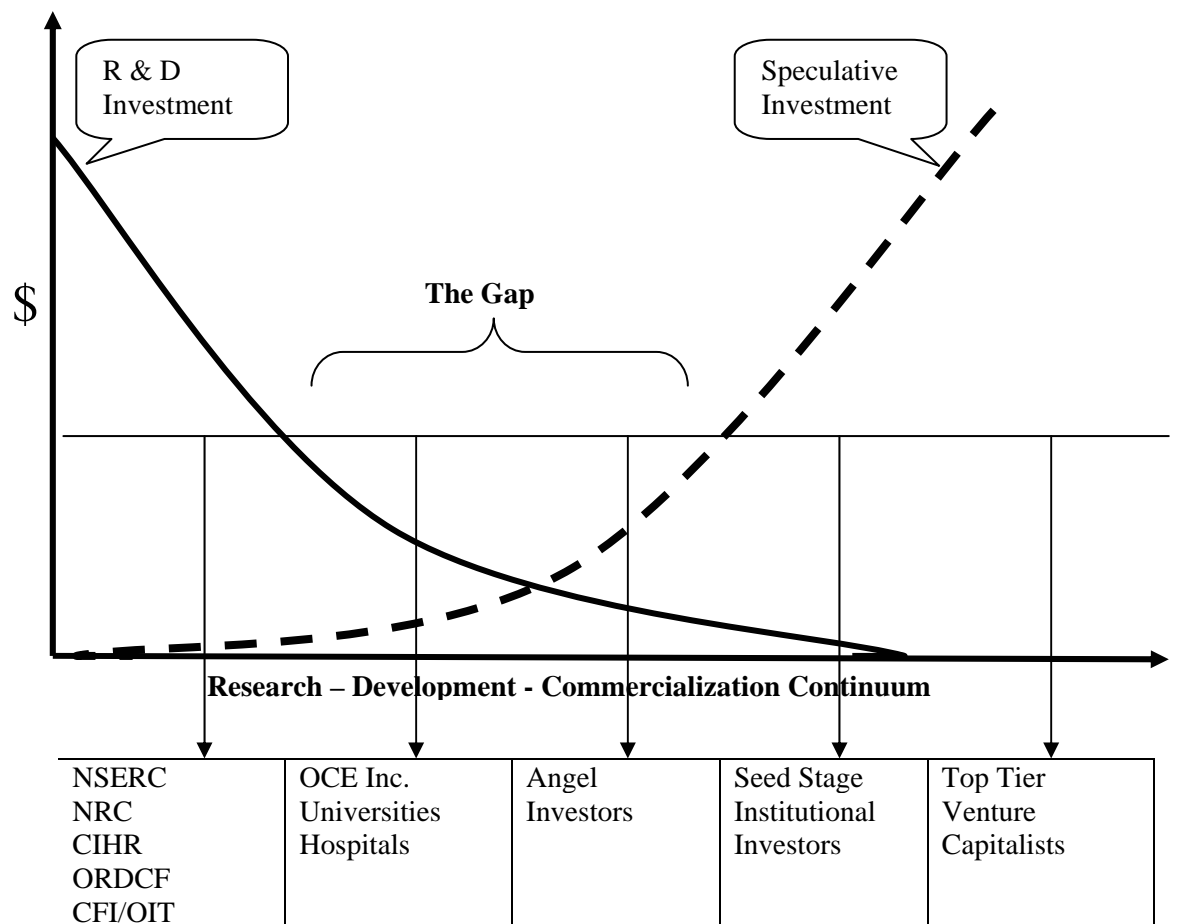


7: Finding the Cash to Grow

7.1 The Funding Gap

When a company grows from the concept stage towards becoming a large company its cash needs are likely to grow with it. While it may be relatively easy to raise around \$50,000 through friends, family, grants, subsidies etc., there is a well known funding gap between where that funding stops and where the investment community can take the company to the next level. Some early stage investors will occasionally make investments below \$1 million, but the majority prefer larger investments.

A company working up the ladder of investment is often left struggling to raise the vital money that it takes to carry them from concept stage to the size of a small or medium sized enterprise (SME). This situation has created this funding gap, which can cause even the most innovative and high potential start-ups difficulty in raising first stage funding.





7.2 Where to Find Funding

Banks and Loans

An early stage technology company will almost certainly need some kind of financial support to successfully get started. The key problem is that most institutional funding organizations (e.g. banks and most conventional investors) will be accustomed to investing in very different propositions (see the funding gap above).

Banks and some Investors Prefer	Technology Start-up Business Characteristics
<ul style="list-style-type: none"> • Stable Cash Flow forecasts • Track Records • Steady Growth forecasts • An easy to understand market • Good fixed asset ratio • Low gearing ratio 	<ul style="list-style-type: none"> • Fluctuating cash needs • Business inexperience • High growth rate • New markets/ complicated technology • Low fixed assets ratios • High gearing ratios

While you may get some support from the bank you will almost certainly have to put up some sort of personal security against the loan. Be very wary of this; remember that setting up a business and commercializing research is extremely high risk. If you are unable to pay off your debts the banks will collect on their security.

Business Angel Networks and Private Investors

Business angel networks have popped up across Canada in an attempt to fill the funding gap. The networks are there to introduce investors to companies seeking investment. Good networks will not only introduce you to private investors but importantly should have excellent connections with relevant funds. When searching out a suitable business angel network it is worthwhile to investigate their track record in closing deals in your specific technology sector.

The majority of business angel networks will introduce companies to private investors who, unlike the venture capitalist, may not have the ability to support a second round of funding or to deal with unexpected complications along the way. Not only does this limit the ability of the company to grow but it can create significant confidence problems for new investors when the current ones refuse to participate.

Be aware that over enthusiastic amateur private investors can be willing to jump in to a hyped up company and end up paying at too high a valuation. While in the short term this seems to be in the company's interest it can make it very difficult to attract professional venture capitalists who may not want to pay a similar high valuation in later rounds. Dropping your valuation to a reasonable level that attracts the venture capitalists can leave a number of existing share holders angry and could price you out of the market for further investors. When it comes to valuing your company or any negotiations with a potential investor, it is of the utmost importance that you have the right advisors around you. Having a good quality legal advisor/accountant beside you will not only make a better impression with investors but should help you provide a clear and crisp capitalization structure as well as well as creating referrals to other investors.



Venture Capital

The cost to venture capitalists in terms of management time will be similar regardless of the ultimate deal size so it is perhaps unsurprising that in Canada they are heading towards the larger deals. (See www.cvca.ca for a list of many of the venture capitalists who are active in Canada).

Public Markets

An initial public offering (IPO) is the mechanism through which a company raises funds from the public by selling a given number of shares of the company in an open market like a stock exchange. Commonly referred to as “going public”, an IPO is inappropriate for the majority of early stage companies attempting to raise a relatively small amount of capital. It is also expensive to get through the fairly tight regulation so the process quickly becomes economically unviable if you are seeking below \$1million.

Government

There are a variety of government programs designed to assist companies in commercialization, research and product development, such as IRAP, RCA’s SR&ED Tax Credits, and OCE Inc. Additional information on these programs is available in Appendix D. There are other technology or sector specific resources that may be available. Consult your technology transfer office for additional advice.



Appendix A: Technology Transfer Offices in Ontario Universities

Who	Institution & Address
Treasurywala, Adi President and CEO	INNOVATIONS FOUNDATION 243 College Street Suite 100 Toronto, ON M5T 1R5 www.innovationsfoundation.com
Dirstein, Bob Director, Office of Research Services	RYERSON UNIVERSITY 350 Victoria Street Toronto, ON M5B 2K3 www.ryerson.ca/research
Eccles, Barbara Manager, Technology Transfer, Innovation Management Office	LAKEHEAD UNIVERSITY 955 Oliver Road Thunder Bay, ON P7B 5E1 www.lakeheadu.ca/~techtx
Flanigan, Sean P. Director, Technology Transfer and Business Enterprise	UNIVERSITY OF OTTAWA 800 King Edward Avenue Room 3042 Ottawa, ON K1N 6N5 www.ttbe.uottawa.ca www.ttbe.uottawa.ca/transf/faq.html
Gray, Gerald G. H. (Jerry) Director, Technology Transfer and Licensing Office	UNIVERSITY OF WATERLOO 200 University Avenue West Waterloo, ON N2L 3G1 www.research.uwaterloo.ca/ttlo www.research.uwaterloo.ca/ttlo/policies.htm
Gray, Sally Coordinator, Research Services	WILFRID LAURIER UNIVERSITY Alvin Woods Building Room 1-601 Waterloo, ON N2L 3C5 www.wlu.ca/research www.wlu.ca/~wwwsecr/policy/11-3.shtml



<p>Herold, Rob Acting Director, Office of Industry Liaison</p>	<p>UNIVERSITY OF WESTERN ONTARIO Stevenson-Lawson Building Room 319 London, ON N6A 5B8 www.uwo.ca www.uwo.ca/industry/forfaculty/facpolicies/policiesandprocedures.htm</p>
<p>Kaps, Vesna Contract/Technology Transfer Manager, Office of Research Services</p>	<p>UNIVERSITY OF WINDSOR 401 Sunset Avenue Windsor, ON N9B 3P4 www.uwindsor.ca</p>
<p>Lalande, Luc Director, Technology and Research Development Office</p>	<p>CARLETON UNIVERSITY Room 511B, Tory Building 1125 Colonel By Drive Ottawa, ON K1S 5B6 www.carleton.ca/trdo</p>
<p>Lorenz, Pat Director, Business Development Office</p>	<p>UNIVERSITY OF GUELPH 130 Research Lane, Unit 4 Guelph, ON N1G 5G3 www.uoguelph.ca/research/bdo http://production.web.uoguelph.ca/research/policies/index.shtml</p>
<p>Menc, Marie-France Consultant, Office of Research Services</p>	<p>NIPISSING UNIVERSITY 100 College Drive, Box 5002 North Bay, ON P1B 8L7 www.nipissingu.ca</p>
<p>Mongeon, Marcel Executive Director & Legal Counsel, Office of Research Contracts & Intellectual Property</p>	<p>MCMASTER UNIVERSITY GH-306 1280 Main Street West Hamilton, ON L8S 4L8 www.mcmaster.ca/research http://ip.mcmaster.ca/docs/IPPolicy.htm</p>



<p>Molloy, John President & CEO, PARTEQ Innovations</p>	<p>QUEENS UNIVERSITY Biosciences Complex, Room 1625 Kingston, ON K7L 3N6</p> <p>www.parteqinnovations.com www.parteqinnovations.com/ip-ownership.html</p>
<p>Owen, Dr. Michael Director, Office of Research Services</p>	<p>BROCK UNIVERSITY 500 Glenridge Avenue St. Catharines, ON L2S 3A1</p> <p>www.brocku.ca www.brocku.ca/hr/policies/intellectual.html</p>
<p>Purcell, Ron Manager, Intellectual Property</p>	<p>LAURENTIAN UNIVERSITY Ramsay Lake Road Sudbury, ON</p> <p>www.laurentian.ca/introp http://laurentian.ca/intprop/policies.htm</p>
<p>Reid, Rosalyn Manager, Technology Transfer, Office of the V.P. Research and Innovation</p>	<p>YORK UNIVERSITY 200 York Lanes 4700 Keele Street Toronto, ON M3J 1P3</p> <p>www.yorku.ca</p>
<p>Rigby, Craig Industry Liaison Officer</p>	<p>TRENT UNIVERSITY 1600 West Bank Drive Suite 101, Otonabee College Peterborough, ON K9J 7B8</p> <p>www.trentu.ca</p>



Appendix B: Intellectual Property Policies of Major Funding Bodies

NSERC: Natural Sciences and Engineering Research Council www.nserc.ca

NSERC's policy on intellectual property (IP) supports the premise that every effort should be made to exploit the results of NSERC-funded research in Canada, for the benefit of Canadians. As a condition of accepting an award, NSERC grantees agree to disclose to their institutions any IP with commercial potential arising from the award, should they decide to pursue commercialization. The grantees and their institutions also agree to strive to obtain the greatest possible economic benefit to Canada from any resulting economic activity.

NSERC does not participate in funding projects that involve a contractual arrangement with an industrial partner who expects total control of the project results stemming from publicly funded research.

NSERC claims no rights of ownership of IP associated with an award. NSERC expects that any IP resulting from research it funds wholly or in part will be owned by the university or the inventor, according to university policy. Access to IP should be accorded to other sponsors in recognition of, and in proportion to, the sponsor's contribution to the collaboration. As a minimum, partners may expect advance knowledge of the research results and/or licensing opportunities. Within the constraints imposed by the desirability of facilitating eventual commercial benefits, the university researchers must be free to use the research results for academic purposes, and students must be able to publish their theses.

SSHRC: Social Sciences and Humanities Research Council www.sshrc.ca

Copyright and any rights to intellectual property developed under SSHRC funding are owned by the applicant (principal investigators) and co-applicants (co-investigators) or by the university or organization, depending on intellectual property agreements as defined by the university or organization where the grant holder is employed. SSHRC does not retain or own any membership or exploration rights to any such intellectual property. Scholars receiving SSHRC grants for research activities that involve a partnership must retain ownership of all intellectual property and publication rights accruing from the joint activities

NCE: Networks of Centres of Excellence www.nce.gc.ca

Ownership of Network-Supported Intellectual Property (NSIP) shall be determined by applicable Canadian law and the policies of the relevant Participating Institution(s).

Commercialization of Intellectual Property

- a. Pursuant to the mandate of the NCE Program, every reasonable effort must be made to have the results of Network Research exploited in Canada for the benefit of Canadians. Accordingly the Parties shall act in accordance with the Benefit to Canada Working Guidelines, as outlined in the NCE Program Guide.
- b. Upon written request to the owner(s) of the NSIP, the Network Members shall be offered a non-transferable, non-exclusive, royalty-free, perpetual license to use and



- modify all NSIP solely for research and educational purposes provided that the terms and conditions of such license will not interfere with efforts to commercialize the NSIP.
- c. Within 30 days after the receipt of a written disclosure, the NSIP owner(s), the inventor's employer or the Network shall call a meeting of all interested parties to discuss the history of support, the potential for commercialization, a plan for management, share of returns and commercialization of the intellectual property.

Sharing of Net Revenues

The owner, the inventor, the inventor's employer, the Network and the relevant Network Affiliate or Network Member, shall be entitled to a share of the Net Revenues commensurate with their contributions related to the NSIP, in accordance with the applicable Participating Institution's official policies, those of other Network Members as appropriate, as well as the terms of any relevant Network Affiliate agreement.

CIHR: Canadian Institute of Health Research www.cihr-irsc.gc.ca

CIHR must be informed of any commercial exploitation arising from CIHR-supported activity.

CIHR does not retain or claim any ownership of, or exploitation rights to, intellectual property developed under CIHR funding. These are owned by the Institution and/or by the grant/award holder (inventor) according to the policies of the Institution.

Should grant/award holders decide to pursue commercialization of any results of the research funded by CIHR, they must disclose to their Institution any potential intellectual property arising from the research; they and the Institution must make every effort to obtain the greatest possible economic benefit to Canada from the resulting commercial activity. The onus is on the grant/award holder to seek patent protection in collaboration with the Institution for inventions or developments arising from CIHR-supported research.

The above requirement for disclosure is not intended to supersede any policy on disclosure that the Institution might already have in place.

ORDCF: Ontario Research & Development Challenge Fund www.ontario-canada.com/ontcan/en/rts/cf/cf_intro.jsp

The applicant institution(s) and/or individual researcher(s) will, according to the institution's IP policies, own any IP resulting directly from proposals funded by the Ontario Research & Development Challenge Fund (ORDCF).

Contract research, for which the IP is owned by the private sector contracting the research, is not eligible for ORDCF support.

Applicants are expected to make mutually agreeable commercialization arrangements with their business and industry partners, and to demonstrate how the economic benefit of the proposal extends beyond the business partners. Applicant (institutional) share of revenues from patents, licenses, and royalties emanating from ORDCF supported proposals must be reinvested in research and development within the institution.



Applications to the ORDCF expecting to result in IP must clearly outline the disposition of the IP rights and the manner in which the institution will track revenues in order to meet the requirement for the re-investment of IP revenues.

The ORDCF Board will make final rulings on the suitability of IP arrangements.

CFI: Canadian Foundation for Innovation www.innovation.ca and Ontario Innovation Trust www.oit.on.ca

The CFI does not keep or claim any ownership of, or exploitation rights to, any intellectual property arising from CFI funded infrastructure projects. The recipient institution will determine these rights, in accordance with its current institutional policies.

OCE Inc.: The Ontario Centres of Excellence www.oce-ontario.org

OCE Inc. views the research projects it supports a partnership with the research team, the academic institution and in many cases the business partner. Each stakeholder has an important role to play in carrying out the research and the commercialization of any outcomes from the project.

In general, intellectual property arising from projects supported by OCE Inc. is owned by its inventor(s), subject to any existing obligations under relevant policies of the academic institution. When business partners are involved, any intellectual property rights provided to the business partner are typically outlined in a Research Collaborative Agreement (RCA). RCAs can vary significantly from project to project. If you plan to commercialize technology developed either in part or in full with the support of OCE Inc., contact your OCE Inc. representative to discuss what additional resources might be available to you.



Appendix C: Who Else Can Help?

The Ontario Centres of Excellence:

http://oce-ontario.org	OCE Inc.
http://www.cito.ca	Communications and Information Technology Ontario division
http://www.mmo.on.ca	Materials and Manufacturing Ontario division
http://www.crestech.ca	Centre for Research in Earth and Space Technology division
http://www.pro.on.ca	Photonics Research Ontario division

Networking Organizations Across Ontario:

http://www.cata.ca	Canadian Advanced Technology Association
http://www.cvca.ca	Canadian Venture Capital Association
http://www.itac.ca	Information Technology Association of Canada (ITAC)
http://www.itaontario.com/	ITAC Ontario
www.tvg.org	Toronto Venture Group
www.yta.org	York Technology Association
www.iscm.com	Innovation Synergy Centre of Markham
http://www.ocri.com	The Ottawa Centre for Research and Innovation
www.communitech.org	Waterloo technology association
http://www.techalliance.ca	London technology association
http://www.kingstontechnology.net	Kingston technology association

Industry Trends and White Papers:

http://www.canadavc.com/	Macdonald & Associates Market News
http://www.idc.ca	International Data Corporation
http://www.gartner.com	The Gartner Group
http://metagroup.com	Meta Group
http://evansresearch.com	Evans Research
http://www.branhamgroup.com	Branham Group
http://strategis.ic.gc.ca	Business and consumer information from Industry Canada
http://biotech.gc.ca	Government of Canada's biotechnology resource for consumers
http://www.itbusiness.ca	IT Business (Electronic Publisher)

Company Information:

http://www.uspto.gov/patft/index.html	US Patent Search
http://www.european-patent-office.org/espacenet/info/index.htm	European Patent Search
http://cipo.gc.ca	The Canadian Intellectual Property Office



	(CIPO)
http://www.theglobeandmail.com	Globe and Mail newspaper
http://www.robmagazine.com	Report on Business Magazine (publication)
http://www.nationalpostbusiness.com	National Post Business Magazine (publication)
http://www.canadianbusiness.com	Canadian Business (publication)
http://www.profitguide.com	Guide to business success (publication)
http://www.svn.ca	Silicon Valley North (publication)
http://www.hbr.com	Harvard Business Review (Harvard Business School publishing)
http://www.forbes.com	Forbes Magazine (publication)
http://www.newswire.ca	Canada NewsWire (resource for time critical news)
http://www.ccnmatthews.com	Canadian Corporate New (Canadian media contact database)
http://alert.venturewire.com	VentureWire Alert
www.vfinance.com	vFinance.com's DealMonitor newsletter
http://www.ceoexpress.com	Chief Executive Officer (information database)
http://www.torontovc.com	Toronto Venture Capital (database)
http://www.ctidirectory.com	Canadian Trade Index (information database)
http://www.branhamgroup.com	Provides "Go to Market" direction to the global Information Technology products and services companies

Local Contacts

[To be completed by each TTO / OCE locally]



Appendix D: Government Sources of Commercialization Funding

IRAP (<http://irap-pari.nrc-cnrc.gc.ca>)

The National Research Council's Industrial Research Assistance Program (NRC-IRAP) is Canada's premier innovation assistance program for small and medium Canadian enterprises (SMEs). NRC-IRAP provides Canadian SMEs with value-added technological and business advice, financial assistance and a range of other innovation assistance.

The IRAP portfolio of services has four main components:

- Technology Expertise and Advisory Services
- Financial Assistance for R&D activities
- Networking
- Partnerships

Who Qualifies

Canadian small and medium-sized enterprises (SME's) with fewer than 500 employees and industrial associations desiring to enhance their technological capability are eligible for support, if the forecast eligible costs of a project do not exceed \$3,000,000.

Technology Expertise and Advisory Services

NRC-IRAP Industrial Technology Advisors (ITAs) help to identify and address the technical and research needs of SMEs, as well as their sustainable development issues, at each stage of the R&D development process and the innovation cycle. Chosen for their experience in business and their skills in technology and science, ITAs provide customized solutions to clients.

Financial Assistance for R&D Activities

NRC-IRAP offers three kinds of financial assistance:

- Contributions for R&D Activities - IRAP provides non-repayable contributions to Canadian SMEs on a cost-shared basis for research and pre-competitive development technical projects, upon assessment of a project and firm by a team of ITAs. IRAP's partner organizations, also receive contributions to provide technical and research assistance to Canadian SMEs.
- NRC-IRAP Technology Partnerships Canada (IRAP-TPC) - The IRAP-Technology Partnerships Canada (TPC) program provides Canadian SMEs with repayable financial assistance for projects at the pre-commercialization stage. Firms use these funds to develop technology for new or significantly improved products, processes or services, as well as to support initial demonstration and pilot projects. IRAP delivers pre-commercialization assistance on behalf of Technology Partnerships Canada/Industry Canada.
- Youth Employment Strategy Programs - IRAP's Science and Technology Internships and Science Collaborative Research Internships programs (Y/YN) provide firms with support to hire recent college and university graduates who are unemployed or underemployed. Both firms and graduates benefit from these programs: firms benefit



from graduates' expertise in science, technology and business and graduates gain valuable work experience that will help open the doors for future employment. NRC-IRAP delivers this youth initiative on behalf of Human Resources Development Canada's Youth Employment Strategy (YES) Programs.

IRAP Networks

The IRAP Network NRC-IRAP plays a critical role in bringing together the key players in the Canadian Innovation System for the benefit of SMEs. Extensive networks link entrepreneurs, players knowledgeable about local sources of financing, R&D institutions and technology brokers, and technology transfer centres.

The reach of the NRC-IRAP network extends past Canada's borders, with international connections forged by technology trade missions, linkages with Technology Development Officers (TDOs) and numerous visits and collaborations.

SR&ED (www.cra-adrc.gc.ca/taxcredit/sred/aboutus-e.html)

The Scientific Research and Experimental Development (SR&ED) program is a federal tax incentive program to encourage Canadian businesses of all sizes and in all sectors to conduct research and development (R&D) in Canada that will lead to new, improved, or technologically advanced products or processes. The SR&ED program is the largest single source of federal government support for industrial research and development.

Claimants can apply for SR&ED investment tax credits for expenditures such as wages, materials, machinery, equipment, some overhead, and SR&ED contracts.

It should be noted that the CRA is responsible for administering the SR&ED program, while the Department of Finance is responsible for the legislation that governs it.

Who Qualifies?

Generally, Canadian-controlled private corporations with less than \$200,000 in taxable income can receive a refundable investment tax credit (ITC) of 35% of qualifying SR&ED expenditures, to a maximum of \$2 million of expenditures.

Most other Canadian corporations, proprietorships, partnerships, and trusts can receive an investment tax credit of 20% of qualifying SR&ED expenditures.

What Kind of Projects Qualify?

To qualify for the SR&ED program, work must advance the understanding of scientific relations or technologies, address scientific or technological uncertainty, and incorporate a systematic investigation by qualified personnel.

Work that qualifies for SR&ED tax credits includes:

- **experimental development** to achieve technological advancement to create new materials, devices, products, or processes, or improve existing ones;
- **applied research** to advance scientific knowledge with a specific practical application in view;



- **basic research** to advance scientific knowledge without a specific practical application in view; and
- **support work** in engineering, design, operations research, mathematical analysis, computer programming, data collection, testing, or psychological research, but only if the work is commensurate with, and directly supports, the eligible experimental development, or applied or basic research.

The following activities are **not** eligible for benefits under the program:

- social science and humanities research; commercial production of a new or improved material, device, or product, or the commercial use of a new or improved process;
- style changes; market research or sales promotion; quality control or routine testing of materials, devices, products, or processes; routine data collection; prospecting, exploring, or drilling for or producing minerals, petroleum, or natural gas; and development based solely on design or routine engineering practice.

OCE Inc.: The Ontario Centres of Excellence (www.oce-ontario.org)

OCE Inc. is a not-for-profit corporation that contains 4 divisions:

- Communications and Information Technology Ontario (CITO)
- The Centre for Research in Earth and Space Technology (CRESTech)
- Materials and Manufacturing Ontario (MMO)
- Photonics Research Ontario (PRO)

Collectively, the Centres promote the economic development of Ontario through directed research, commercialization of technology and training for highly qualified personnel.

The Centres are among the few publicly funded institutions that systematically integrate and manage connections from university to marketplace to ensure the successful application of innovative science and technology to profitable new businesses.



Appendix E: University / Hospital Policies and Services

[To be completed by each TTO / OCE locally]

Each TTO can have the opportunity of outlining the following:

- Introduction
- Services offered
- Intellectual property policy of university / hospital
- Contacts