NAIT Researcher Handbook

Applied Research & Scholarly Activity at NAIT

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1.0.0 Introduction

NAIT's focus on real-world applications and industry-driven programming has prepared the institute to make a significant contribution to Canada's growing reputation in – and need for – applied research.

Why is applied research so important? It brings useful knowledge, ideas and innovations into the real world; in doing so, applied research generates wealth for business, industry and the economy as a whole. Applied research can also lead to important social change and improved quality of life (e.g. development of the hearing aid or the lightning rod)[1].

While research can take many forms, there are key differences between pure (basic) and applied research. Pure research involves the generation of new knowledge and may or may not have immediate applications, whereas applied research uses new or existing knowledge to create or adapt solutions to real world challenges.[2]

"Applied research is focused on the identification of practical solutions or applications."[3]

From NAIT's Mandate: "NAIT pursues applied research opportunities with organizations that seek to develop new technologies and processes and as a result, enhances the knowledge and skills of its own faculty and students. NAIT provides significant business incubator support for those seeking to create and develop new businesses and new products. NAIT is committed to the development of public and private partnerships that enhance student learning outcomes, create transfer opportunities and serve communities in which NAIT operates."[4]

Typical applied research projects conducted at NAIT involve:

- design and development of devices, systems, processes and products
- development of applied social science and business results
- analysis, testing, troubleshooting and evaluation of new technologies
- commercialization of new technologies and products
- scholarship of teaching and learning projects resulting in improved educational practices

NAIT's applied research strategy is aimed at enabling the development of essential, forward-looking, usable results for the Alberta economy. Applied research can benefit NAIT by enhancing the knowledge and skills of the institute's faculty, staff and students and by allowing NAIT to develop partnerships with business and industry[5].

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[1] NAIT (2009). *President's Report*. Edmonton, AB: Northern Alberta Institute of Technology.
[2] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors.
[3] Government of Alberta (2007). *Roles and Mandates Policy Framework for Alberta's Publicly Funded Advanced Education System.* Edmonton, AB: Ministry of Advanced Education and Technology.
[4] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. Page 8.
[5] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. Page 16

As part of its applied research mandate, NAIT also fosters scholarly activity and specifically, the Scholarship of Teaching and Learning (SoTL), a pedagogical initiative. Alberta's Ministry of Advanced Education and Technology describes scholarly activity as "developmental research that is conducted in support of faculty professional development. It is supplemental to the instructional function and geared to enhance and maintain faculty's knowledge base to support instruction."[6]

The advancement of SoTL is a worldwide movement in post-secondary education and is aimed at enhancing the quality of post-secondary education. NAIT fosters SoTL among faculty because it contributes to instructional excellence.

To support applied research and scholarly activity at NAIT, the institute has developed many strategies, including:

- Implementing a flexible and adaptive workload model that incorporates teaching, professional development, applied research and scholarly activity[7]
- Pursuing industrial and academic research opportunities that provide returns on investment and enhance student and staff success[8]
- Incorporating applied research, innovation and technologies in the design, development and delivery of curriculum[9]
- Creating a technology transfer model for NAIT that identifies, protects and markets intellectual property produced by NAIT faculty and staff.[10]

NAIT's ability to develop and participate in scholarly activity and applied research partnership projects is in tune with industry's need to be competitive and productive. NAIT contributes through its 250 programs, ranging from biomedical technology to materials testing, carpentry to machining, and environmental sciences to mechanical engineering. NAIT is on track with its vision "to be globally valued for student success, applied research, and innovation."

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[6] Government of Alberta (2007). *Roles and Mandates Policy Framework for Alberta's Publicly Funded Advanced Education System.* Edmonton, AB: Ministry of Advanced Education and Technology.

[7] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. → Strategy PAE2.1

[8] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. → Strategy PAE2.2

[9] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. → Strategy PAE3.1

[10] NAIT (2009). *NAIT Four Year Business Plan 2009/10 – 2012/13.* Edmonton, AB: NAIT Board of Governors. → Strategy PAE3.2

1.1.0 About this Handbook

This handbook was written as an informational resource for NAIT's faculty, staff and students to support them in their applied research and scholarly activities. This handbook summarizes key policies, procedures and guidelines relevant to applied research and more generally, scholarly activities, as well as relevant NAIT administrative structures and practices that are in place to support applied research and scholarly activities. For brevity, in this document the term '*applied research*' is broadly interpreted to include scholarly activities, including the Scholarship of Teaching and Learning (SoTL).

For more information on any of the topics described in this handbook, contact *nova*NAIT's team of applied research and technology transfer professionals. The most up-to-date contact information will be available at www.novanait.ca.

W207, NAIT HP Centre
10504 Princess Elizabeth Ave
Phone: 780.378.6170
Email: novaNAITinfo@nait.ca
Web: www.novanait.ca

This handbook was written as an informational resource and guide for researchers and scholars at NAIT. If any of the information reported herein is in conflict with NAIT-approved policies, procedures and guidelines, the approved policies, procedures and guidelines are the definitive resource. This handbook links to resources that are available on the World Wide Web. These links are provided for the convenience of handbook users and NAIT is not responsible for the accuracy, content maintenance, or reliability of the content within these external sites. There is no expressed or implied affiliation with or endorsement by NAIT of any of these sites or their content.

*In preparation of this handbook, nova*NAIT *acknowledges its reliance on the research handbooks of other institutions, notably Red River College's Researcher Guide, to help provide detail into the steps involved in research commercialization.*

1.2.0 How to Use this Handbook

This document was written in three main sections:

- Applied Research Administration and Services at NAIT
- NAIT Policies, Guidelines and Procedures
- Research at NAIT.

The first two sections provide overviews of the organizational and policy structures in place at NAIT, including internal and external funding programs and specialized applied research clusters in place or in development at NAIT. The final section provides a step-by-step guide for interested faculty, staff and students in the process of engaging in research and various special considerations. All efforts have been made to make this as inclusive as possible, however, please contact *nova*NAIT if you identify any errors, omissions or passages that create confusion.

Ideally readers will review the entire package; however, this document has been drafted with the expectation that readers will use the table of contents to guide inquiry into their specific applied research and scholarly activity questions. Thus, there are circular references embedded in the document to help guide non-linear readers.

1.3.0 Role of Applied Research and Scholarly Activities at Colleges

Colleges and institutes deliver practical education to Canada's population. This vital activity is central to supporting Canada's national science and technology strategy, known as "Mobilizing Science and Technology to Canada's Advantage," which sets a goal for Canada to develop the best-skilled workforce in the world.[11] According to Madder's report to the Association of Canadian Community Colleges (ACCC) on innovation in Canadian colleges:

> "The traditional role of colleges and institutes has been to support economic development by [training graduates for public and private sector work]. These education and training activities have been and will remain the primary role of colleges and institutes in supporting the economic well-being of society. In order to ensure relevant curriculum, colleges/institutes and employers (often SMEs – small to medium enterprises) have developed close ties focused on training or retraining [the regional workforce]. These relationships have often resulted in colleges and institutes responding to regional industry needs by embarking on a variety of innovative activities. . . . A significant number of colleges and institutes have built upon these relationships and conduct applied research, proof of concept and prototype development to support corporate innovation."[12]

With 157 post-secondary colleges, institutes, polytechnics, CÉGEPs and university-colleges serving over 900 communities in Canada, colleges are well positioned to directly serve the needs of SMEs throughout Canada to deliver focussed practical knowledge-based solutions to address the innovation challenges of regional industry.[13,14] According to Alberta Advanced Education and Technology's policy framework, NAIT is a polytechnic institution. "Polytechnics, in particular, with their applied research focus help fill a gap in the marketplace between the university and the college system. Integrating applied research into programs provides graduates the commercialization and workforce skills essential to solving Canada's competitiveness challenges."[15]

In 2007, the Government of Alberta gave colleges and polytechnics the mandate to engage in applied research and scholarly activity: "Applied research may be conducted to foster innovation, and scholarly research activity may be conducted as a basis to enhance the instructional mandate of [the institution]."[16] Further, Campus Alberta Quality Council (CAQC) requires academic organizations that offer baccalaureate programs to adhere to organizational and program standards that require "faculty [to] have an

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[11] Government of Canada (2007). *Mobilizing Science and Technology to Canada's Advantage*. Ottawa, ON: Government of Canada Publication, 2007.
[12] Madder, D.J. (2005). *Innovation at Canadian Colleges and Institutes*. Ottawa, ON: Association of Canadian Community Colleges, p12.
[13] Association of Canadian Community Colleges (2002). *Colleges & Institutes and Canada's Innovation Strategy.* Ottawa, ON: Association of Canadian Community Colleges.
[14] Madder, D.J. (2005). *Innovation at Canadian Colleges and Institutes*. Ottawa, ON: Association of Canadian Community Colleges.
[15] Polytechnics Canada (2009). *Solutions Report*. Ottawa, ON: Polytechnics Canada.
[16] Government of Alberta (2007). *Roles and Mandates Policy Framework for Alberta's Publicly Funded Advanced Education System.* Edmonton, AB: Ministry of Advanced Education and Technology.

appropriate level of scholarly output and/or research or creative activity for the baccalaureate or graduate program involved."[17]

NAIT partners with businesses to provide hands-on experiences for students working towards their degree or other credentials. These real-world exposures enhance NAIT's curricula and give students the opportunity to explore and solve industry challenges. By participating in applied research, NAIT helps close the innovation gap by supporting the development and commercialization aspects of the research and development continuum (see Appendix 1). This activity supports NAIT's core mandate to serve the needs of industry and the community and contribute to the province's economic well-being, while providing learners with the best education and practical experiences possible.

A significant part of strengthening the experience for learners is for faculty to continuously improve instructional practices. One of the ways this can be accomplished is through the Scholarship of Teaching and Learning (SoTL). SoTL is critically important to NAIT's mission as it contributes to instructional excellence. For the purposes of this document, the term '*applied research*' will also encompass scholarly activities, including the scholarship of teaching and learning, since it is research that encompasses excellence in teaching.

All instructors at NAIT are expected to integrate ongoing disciplinary expertise and currency with pedagogical best practices. For this purpose, instructors are encouraged to inquire into the processes of teaching and learning to discover, integrate, apply, and share knowledge. As such, scholarship of teaching and learning (SoTL) is aimed at connecting the learning of individual instructors with other instructors within and outside of NAIT to enhance the overall experience for learners and to gain a better understanding of how students learn. This in turn guides a scholarly approach to program planning and curriculum development.

[17]Government of Alberta (2009). *Handbook: Quality Assessment and Quality Assurance.*Edmonton, Alberta: Campus Alberta Quality Council.

2.0.0 Applied Research Administration and Services

NAIT has established *nova*NAIT, the institute's centre for applied research and technology transfer, as the primary access point for applied research administration, development and support services for both internal and external stakeholders.

2.1.0 Organizational Units

2.1.1 novaNAIT

*nova*NAIT bridges the applied research capacity of NAIT to deliver relevant solutions to industry and the community. *nova*NAIT is mandated to facilitate, support, manage and administer applied research and innovation, research grants and contracts, technology transfer, commercialization, enterprise development and business incubation for all Schools and Departments at NAIT.

*nova*NAIT serves three main functions:

- applied research facilitation
- enterprise development
- technology transfer.

2.1.1.1 Applied Research Facilitation

*nova*NAIT facilitates applied research at NAIT by coordinating the applied research capacity of its faculty, staff and students to meet the needs of the "real world".

As an applied research institution, NAIT has chosen to build the infrastructure and operational support to unleash NAIT's research talent and capacity in order to create value in the short term for tangible impact on society.

*nova*NAIT facilitates applied research at NAIT by:

- validating and organizing NAIT's applied research strengths against the needs of the marketplace,
- identifying and supporting the development of opportunities for collaborative applied research with industry and community partners,
- developing applied research collaborations and relationships,
- managing applied research projects and programming in collaboration with NAIT Schools & Departments,
- engaging faculty, staff and students in the conduct of applied research,
- coordinating funding proposal identification, development and submission,
- supporting NAIT's campus development by articulating the needs of its applied research community, and
- supporting the implementation and activity of NAIT's Applied Research Chairs.

*nova*NAIT's staff support and encourage faculty members conducting research on topics relevant to both their program areas and disciplinary fields of interest. Specialized expertise in various applied research disciplines exist to aid researchers in those areas.

Key Contacts:

Natural Sciences and Engineering Technologies:
TBA
Director of Applied Research in Technology

Social Sciences, Business & Health:
Michael McNamara
Director of Applied Research in Social Sciences

2.1.1.2 Enterprise Development

*nova*NAIT facilitates enterprise development to create sustainable, technology-based, high-potential companies that are aligned with NAIT's applied research capacity for the benefit of the local community and economy.

***nova*NAIT provides a supportive environment for entrepreneurs and early-stage companies as they develop their commercial opportunities into sustainable business entities.** *nova*NAIT believes that establishing a sustainable and successful company requires more than beneficial technology. Strong business capabilities to plan, prototype, market, manufacture and distribute the product are also necessities.

*nova*NAIT helps business and industry by coordinating NAIT capacity and expertise including:

- access to NAIT's expertise and resources,
- technical development and consultation through programming such as:
  - Product Development Program,
  - NAIT Shell Manufacturing Centre,
  - NAIT Green Chemistry and Engineering Applied Research Centre, and
  - novaNAIT Boreal Research Institute,
- business incubation, through the Duncan McNeill Centre for Innovation and novaNAIT St. Albert which provides access to programming such as:
  - professional facilities and meeting spaces,
  - business expertise,
  - product development,
  - commercial assessment and strategy development,
  - intellectual property protection,
  - business planning expertise,
  - fundraising, and
  - business mentorship.

Key Contacts:

David Burry
Manager of Enterprise Development and Technology Transfer
Phone 780.378.6187 Fax 780.471.8380 Email dburry@nait.ca

2.1.1.3 Technology Transfer

*nova*NAIT applies due diligence including technical and business principles to its applied research and enterprise development activities to ensure the focus is on opportunities that are industry relevant and directed toward commercialization.

*nova*NAIT helps bridge the gap between applied research and technology commercialization by providing:

- intellectual property development and assessment,
- feasibility and commercial assessments,
- strategic planning and guidance, and
- regulatory pathway assistance.

Technology transfer includes both knowledge transfer activities (e.g. publications, presentations) and commercialization activities such as getting knowledge out into the marketplace. *nova*NAIT's strategic planning services focus on determining the best approach for developing a technology as well as the preferred path to the market for a given technology. Options such as assignment (sale), or licensing specific usage rights is considered, including licensing to a new start-up company. Identifying a strategic commercialization plan can clarify the value proposition for a technology and increase the odds of commercial success.

Identifying a strategic commercialization plan can clarify the value proposition for a technology and increase the odds of commercial success. *no*vaNAIT can also provide guidance in the preparation of regulatory filings (CSA, Health Canada, Canadian Food Inspection Agency) as necessary.

Key Contacts:

David Burry
Manager of Enterprise Development and Technology Transfer
Phone 780.378.6187 Fax 780.471.8380 Email dburry@nait.ca

2.1.2 Department of Teaching and Academic Development

NAIT's Department of Teaching and Academic Development (DTAD) is, amongst other activities, responsible for supporting NAIT schools and instructors in establishing evidence-based practices in teaching and learning. As such DTAD helps foster a scholarly approach towards teaching and learning at NAIT.

NAIT endorses SoTL through a standing committee of its Academic Management Team called the SoTL Committee. "The purpose of the SoTL committee is to foster a supportive environment that will help nurture and build a culture that embraces and values scholarship as it relates to the improvement of teaching practice and student learning experience at NAIT"[18].

The SoTL Committee enables discussion of best practices at NAIT and facilitates the SoTL grant and award programs. As support for the Scholarship of Teaching and

[18] SoTL Committee Terms of Reference

Learning is a shared responsibility of DTAD and novaNAIT, both departments are represented in the SoTL committee.

2.2.0 Programs and Services

There are a wide variety of NAIT programs and services available to faculty, staff, students, alumni and the public to support applied research and enterprise development. Other programs and services will be developed as required. The following non-exhaustive list summarizes several well-established and emergent programs and services.

2.2.1 NAIT Programs for Applied Research

2.2.1.1 Applied Research Chair Program

NAIT Applied Research Chairs anchor industry-driven applied research programs within the institute. Chairs are selected based on an alignment of interests and strengths between the industry donor and NAIT. The institute will leverage the industry donation with other funding sources (e.g. the Alberta government's Access to the Future Fund) to establish an endowment. The endowment funds a full-time equivalent faculty position at NAIT with a primary research focus and some teaching responsibilities to ensure that knowledge is translated into the classroom.

The Chair maintains strong ties with the applicable industry in Alberta. The success of the program is measured by the Chair's achievements in providing three outcomes to the applicable industry:

- state-of-the-art research innovation that broadens the possibilities for enhanced productivity and cost reduction
- technology transfer that immediately benefits the sponsor's industry and collaborating companies
- human and technological resources that benefit the industry as a whole.

2.2.1.2 Applied Research Ideas Grant (ARIG)

The ARIG Fund was established to support faculty and staff in exploring, developing and planning applied research project proposals. Up to $7,500 per person is available to all active NAIT employees to cover release time or vacation modifiers to provide applicants protected time to develop and prepare proposals for applied research funding and secure outside assistance for grant preparation.

For more information on this program and how to apply, contact the Program Manager, Kirsty Dunlop at 780.378.6175, email kirstyd@nait.ca or visit the *nova*NAIT website.

*ARIG is administered by nova*NAIT *and is a pilot program in 2009-10.*

2.2.1.3 Applied Research Opportunities for Students (AROS)

The AROS Program was established to facilitate student-led research projects at NAIT. All full-time students are eligible to apply for a $5,000 award ($4,500 for student stipend, $500 for project materials). Students must be paired with a NAIT employee advisor who will provide assistance and monitor research progress. The proposed project activity may be eligible for credit towards a co-op diploma.

For more information on this program and how to apply, contact the Program Manager, Kirsty Dunlop at 780.378.6175, email kirstyd@nait.ca or visit the *nova*NAIT website.

*AROS is administered by nova*NAIT *and is a pilot program in 2009-10.*

2.2.1.4 Faculty Release Time (FRT) Fund

The Faculty Release Time (FRT) Fund was established to provide NAIT faculty protected time to undertake research activities. Faculty can apply for release time using the **Application for Faculty Release Time Form**, available from *nova*NAIT. Applicants must specify how much down load is required and describe the project work plan including any requirements for ethics. Since this program provides funds for release time only, it is necessary that applicants include a description of how they will finance the direct costs of research activity (student salaries, materials and supplies, dissemination or other expenses). Release time will be approved based upon a comprehensive funding strategy for the research project and, as applicable, an appropriate technology transfer strategy (which will depend on the stage of the research). Applications are accepted on an ongoing basis, subject to the availability of funds.

Successful applicants may be required to provide regular oral and written (with a copy to novaNAIT) reports to their chairs/deans on research progress. Formal final reporting must adhere to the report format provided by *nova*NAIT.

For more information on this program and how to apply, contact the Program Manager, Kirsty Dunlop at 780.378.6175, email kirstyd@nait.ca or visit the *nova*NAIT website.

2.2.1.5 Scholarship of Teaching and Learning (SoTL) Awards

The Scholarship of Teaching and Learning Awards are intended to recognize instructors at NAIT for excellence in SoTL activities.

For information on how to nominate NAIT instructors for a SoTL Award, contact Annemarieke Hoekstra at 780.471.7862, email annemarh@nait.ca or visit the SoTL website.

2.2.1.6 SoTL Grants

The SoTL Grants provide NAIT instructors with time to engage in SoTL activities such as research and reflection into their teaching practice and sharing their results with colleagues. All NAIT employees with a minimum of two years of work experience at an educational institution are eligible. NAIT employees may apply for release time of up to

50% of their annual workload. Funds can be used to cover release time, research materials and dissemination costs.

For more information on the grants and how to apply for these competitive awards, contact Annemarieke Hoekstra at 780.471.7862, email annemarh@nait.ca or visit the SoTL website.

2.2.1.7 SHINE Awards

SHINE is NAIT's formal employee recognition program. All NAIT employees are eligible for nomination in the following SHINE award categories:

- "S" Superb Customer Service
- "H" Health and Safety
- "I" Initiatives in Sustainability
- "N" New Technology and Innovation
- "E" Extra Mile.

Award recipients are announced during the Employee Recognition Celebration in January each year. For more information on the awards and nomination forms, contact Human Resources, 780.471.7466 or 780.471.8666 or access the e-forms through the NAITrix. Nominations are accepted throughout the year, with an annual deadline on the last Friday of October.

2.2.2 External Funding Opportunities

Applied research is an important part of the research, development and commercialization continuum. *nova*NAIT provides grant facilitation assistance to faculty, staff, students and industry partners seeking external funding for applied research at NAIT. There are several funding programs available to institute faculty from regional, provincial and national funding organizations.

Contact *nova*NAIT's Contracts and Grants Manager, Guru Chinnasamy at 780.378.6171 or email gurusamc@nait.ca to discuss your project and identify any available external funding opportunities.

NAIT has confirmed its eligibility to host Natural Science and Engineering Research Council of Canada (NSERC) grants and has submitted an eligibility request to host Social Sciences and Humanities Research Council of Canada (SSHRC) grants.

The following non-exhaustive list is a sampling of external funding opportunities that are accessible to NAIT researchers. To develop a customized funding prospect list for your project please contact *nova*NAIT's Contracts and Grants Manager.

Applied Research Funding Programs – Available to All Academic Researchers	
Alberta Ingenuity	Alberta Ingenuity funds Alberta science and engineering research through several funding programs.
Forest Resource Improvement Association of Alberta (FRIAA)	The Forest Resource Improvement Association of Alberta (FRIAA) was established to promote and initiate projects that enhance Alberta's forest resources. FRIAA runs several programs.
Natural Resources Canada,	NRCan Canadian Forest Service has various funding

Canadian Forest Service Funding Programs	programs available, ranging from First Nations forestry to scholarships and internships and Mountain Pine Beetle research.
NSERC Idea to Innovation (I2I)	The objective of the I2I Program is to accelerate the pre-competitive development of promising technology and promote its transfer to Canadian companies. Funds available: $125,000 for 1 year in Phase 1.
Sustainable Development Technology Canada (SDTC) SD Tech Fund	The SD Tech Fund™ is aimed at supporting the late-stage development and pre-commercial demonstration of clean technology solutions: products and processes that contribute to clean air, clean water and clean land, that address climate change and that improve the productivity and the global competitiveness of Canadian industry. Funds are available to 33-50% of eligible project costs.
The Alberta Foundation for the Arts and the Canada Council for the Arts - The Alberta Creative Development Initiative	The objective of the initiative is to support the development of professional artists and arts organizations in Alberta and to foster a dynamic, vibrant arts community in the province. Funds available: $30,000 - $75,000 for organizations, $20,000 for individuals
Alberta Government, Summer Temporary Employment Program (STEP)	NAIT can access this program to secure funding to hire summer students for project work.
Applied Research Funding Programs – Available to Colleges only	
NSERC College and Community Innovation Program (CCI)	The objective of the CCI Program is to increase innovation at the community and/or regional level by enabling Canadian colleges to increase their capacity to work with local companies, particularly SMEs. It supports applied research and collaborations that facilitate commercialization, as well as technology transfer, adaptation and adoption of new technologies. Funds available: $2.3 million for 5 years
Alberta Association of Colleges and Technical Institutes (AACTI)	AACTI provides funds for applied research projects to Alberta's colleges and technical institutes. Contact *nova*NAIT for more information on how to access AACTI funding.

*nova*NAIT has a copy of the 2010 Subsidy Directory available to NAIT researchers. The directory profiles direct and indirect subsidies, grants and loans available from Canadian government departments, agencies, foundations, associations and organizations.

2.2.3. NAIT Programs for Entrepreneurs and Industry

2.2.3.1 Prototype Development Program

The Prototype Development Program (PDP) was established in 2006 to help industry evaluate and develop new ideas and services. The PDP supports the development of a more effective regional innovation system in Alberta by funding technical consultancy and product development. PDP activities include:

- designing and developing prototype devices, systems, processes, and products
- analyzing, testing, troubleshooting, and evaluating new technologies
- assessing and commercializing new technologies and products.

The program works on a cost-sharing basis, where individual entrepreneurs or companies cover 50% of the costs of prototype development through cash or in-kind contributions. NAIT receives funding from Alberta Advanced Education and Technology for the remainder of expenses. Proposals are assessed for proof of concept status and then are qualified on a first-come, first-served basis.

For information on how to access the PDP, contact David Burry at 780.378.6187, email dburry@nait.ca or visit the *nova*NAIT website.

2.2.3.2 Technology Commercialization Challenge

Access up to $10,000 in *nova*NAIT services for your entrepreneurial venture through the Technology Commercialization Challenge!

The *nova*NAIT Technology Commercialization Challenge gives innovators and entrepreneurs from NAIT and the greater Edmonton area a chance to win free access to *nova*NAIT technical or business development services. The objective of the competition is to increase the amount of applied research and technology transfer at NAIT and improve access to *nova*NAIT services.

Competitors pitch their technology, product, or business ideas to a panel of judges made up of representatives from *nova*NAIT, industry, and the financial community. The winner gets $10,000 in *nova*NAIT services. To learn more about how to answer the challenge, contact David Burry at 780.378.6187, email dburry@nait.ca or visit the *nova*NAIT website.

2.2.3.3 Youth Technopreneurship Program HATCH Contest

Hatch your business with a $20,000 grant!

HATCH is a business plan challenge open to full time students between 18 and 35 years of age in their last year of study at NAIT or who have recently graduated from NAIT. HATCH gives NAIT students and recent graduates a chance to make their business plan

a reality with $20,000 in seed money, including access to space and services at the Duncan McNeill Centre for Innovation.

NAIT entrepreneurs are invited to submit business plans with a technology, science, or knowledge-based focus. Successful applicants will be invited to present their business plans to a panel of judges made up of members from Students in Free Enterprise (SIFE) NAIT, *nova*NAIT, and the business community. In addition to the $20,000 seed money, the winner will have access to a panel of advisors from industry and the investment community to assist with commercial strategy development. To learn more about how to apply for HATCH, contact Sandra Spencer by email sspencer@sifenait.com or David Burry at 780.378.6187, email dburry@nait.ca or visit the YTP-HATCH website.

2.2.3.4 Innovation Seminar Series

Offered in partnership with The Business Link, *nova*NAIT presents information to Alberta's entrepreneurs to help them understand the innovation process. The series is broadcast throughout Alberta through The Business Link's videoconference nodes in both urban and rural communities. Topics for these one-hour free seminars include:

- Innovator's Tool Box – learn and understand the steps required to move a product or service into the market
- Business Valuation – how to determine the value of your business, its brand and intellectual property holdings
- Pitching your Product – learn to perfect the art of persuasion
- Incubate your Business for Success – learn how a business incubator can help your early-stage company.

This well-received series is currently in its second year of delivery. Contact Monique Mackay at 780.378.6168, email moniquem@nait.ca or visit the *nova*NAIT website to learn more and register to attend the seminar series.

2.2.3.5 novaNAIT Incubation Program

The novaNAIT Incubation Program which includes the DMCI and novaNAIT St. Albert is a key resource for students, faculty, alumni and industry seeking to start a company or engage in applied research.

The DMCI is a business incubator designed to help entrepreneurial start-ups become sustainable high-growth companies. The DMCI is a purpose-built centre offering incubation facilities, meeting rooms, offices, and support services to assist innovators and entrepreneurs in taking their ideas to full commercial success. The DMCI was established in 2004 and has provided business incubation services to ten companies so far. Offering 4,769 square feet (443 square metres) of office incubation space, the DMCI celebrated the successful graduation of its first four clients.

As of January 2010 NAIT has opened a second facility, novaNAIT St. Albert with more than 8,600 square feet (800 square metres) of laboratory and office incubation space. The flexible suites vary in size to accommodate between one and five persons are fully furnished and equipped with high-speed internet connections and telephone services. As a dual purpose applied research and incubation facility, novaNAIT St. Albert will provide

a venue for entrepreneurs, companies and NAIT faculty, staff and students to collaborate and innovate.

The novaNAIT Incubation Program offers a supportive environment for inventors and entrepreneurs to develop their business ideas into profitable enterprises. Preferred consideration for space and support is given to NAIT faculty, staff and students. This program offers the right mix of opportunities and connections to help businesses grow stronger and faster. Client companies obtain flexible leasing terms, business guidance, support and access to NAIT's expertise, facilities and common areas.

novaNAIT's Entrepreneur in Residence (ENIR) Program has engaged a proven entrepreneur who will coach incubator clients and other novaNAIT supported entrepreneurs and companies in all aspects of their business development needs. This unique program will not only assist novaNAIT's clients, but it will allow novaNAIT to focus its efforts and the efforts of the NAIT community to more effectively support the companies that we are already working with.

Clients also benefit from *nova*NAIT's partnerships with the Edmonton Research Park, the National Institute for Nanotechnology (NINT), TEC Edmonton the Northern Alberta Business Incubator (NABI) and the Business Link which provide additional services and business support, including access to shared expertise, business coaching and a larger network base. In addition, novaNAIT hosts a National Research Council - Industrial Research Assistance Program (NRC-IRAP) Industrial Technology Advisor (ITA) to assist entrepreneurs develop their technology and grow their company ideas.

For more information on the novaNAIT Incubation Program, including a list of current and former clients, contact the David Burry at 780.378.6187, email dburry@nait.ca or visit the *nova*NAIT website.
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2.2.4. NAIT Applied Research & Innovation Venues

2.2.4.1 NAIT Shell Manufacturing Centre

The NAIT Shell Manufacturing Centre provides training and manufacturing solutions.

The NAIT Shell Manufacturing Centre (NSMC) offers a unique combination of manufacturing solutions and productivity enhancement services to industry to reduce operating costs, improve productivity and enhance competitiveness. Supported by the federal and provincial governments, industry and NAIT, the centre provides an environment where organizations can embrace innovation, generate ideas, and improve their productivity. *nova*NAIT plays a direct role in arranging NSMC services for internal and external clients.

The NAIT Shell Manufacturing Centre's unique $14.6 million multi-disciplinary facility is dedicated to helping the Alberta manufacturing industry become globally competitive. The 2,850-square-metre facility houses nine laboratories with $4.4 million in new equipment and $5.2 million in new software. The centre has dedicated operating staff and draws upon NAIT faculty with specific expertise to conduct both training and applied research projects.

Key services include:

- Productivity Enhancement
  - Offers a series of programs leading to a Project Leadership Certificate
  - customized training solutions to grow workforce skills in project management, lean manufacturing practices, group facilitation, occupational health and safety leadership skills, and Six Sigma[19] certification
- Manufacturing Solutions
  - Provides access to various modern laboratories and a large pool of NAIT faculty experts
  - Offers unbiased, vendor-neutral solutions to develop innovative products and processes
  - Projects often involve product design, prototype development and testing.

The NSMC offers access to laboratories and facilities that include advanced hydraulics and pneumatics, mechanical computer assisted design, computer integrated manufacturing (CIM), advanced manufacturing and operations, advanced computer applications, programmable logic controller and metrology/inspection labs.

For more information on the NAIT Shell Manufacturing Centre, contact NSMC Operations Manager Mave Dhariwal at 780.471.7500, email maved@nait.ca or visit the NSMC website.

[19] Six Sigma is a method of analyzing business and manufacturing practices to optimize performance.

2.2.4.2 novaNAIT Boreal Research Institute

The novaNAIT Boreal Research Institute (nBRI) is a partnership between the private sector, the education system and the community. The nBRI promotes research collaboration, public awareness, technology transfer and educational priorities in the boreal region of north-western Alberta. The institute is based in Peace River, Alberta.

The nBRI acts as a bridge between researchers and the forestry and oil and gas sectors, communities and students by providing seminars, workshops, field tours and public information sessions. It also provides administrative and technical services to a number of research and development initiatives including the Boreal Reclamation Program, Manning Forestry Research Fund, Ecosystem Management Emulating Natural Disturbance (EMEND), and the Alberta Forest Extension Network (AFEX).

2.2.4.3.1 Boreal Reclamation Program

The mission of the Boreal Reclamation Program is to provide cost-effective reclamation methods, products, and education to enable industry to meet the new reclamation standards on forest lands. The program:

- conducts applied research on the reclamation of well sites and other industrially disturbed sites
- provides demonstration sites, procedures, and education technologies.

To manage boreal forest resources wisely, the Boreal Reclamation Program depends on cutting edge scientific information. In response, forest companies and related organizations in northwest Alberta are sponsoring world-class environmental and wood product research. Many of the research projects are large-scale and receive funding from a variety of partners. The Boreal Reclamation Program is driven by a consortium of interested organizations.

For more information on the Boreal Research Institute and the Boreal Reclamation Program, contact Hugh Seaton at 780.618.2623, email hseaton@nait.ca or visit the nBRI website.

2.2.4.3 Other Centres under Development

Other applied research centers that are in consideration and/or development:

- Green Chemistry and Engineering Applied Research Centre
- Digital Simulation and Visualization Centre
- Tactical Robotics Centre
- Alternative Energy Centre
- Sustainable Building and Development Centre

2.3.0 Partnerships and Affiliations

Alberta Association of Colleges & Technical Institutes (AACTI) provides a single voice for Alberta's 17 public colleges and technical institutes.

Alberta Centre for Advanced MNT Products (ACAMP) is a not-for-profit organization that provides specialized business services to micro-systems and nanotechnology (MNT) clients. ACAMP's services bridge the gap between researchers, small start-up companies and established firms that have a potentially viable product, and the help needed in developing it into a profitable business opportunity.

Association of Canadian Community Colleges (ACCC) is a national organization that represents Canada's colleges and institutes to government, business and industry, both in Canada and internationally. ACCC interacts with the federal departments and agencies on members' behalf, participates in the development of studies and reports and provides conferences and workshops to facilitate networking for members.

Association of University Technology Managers (AUTM) is a global network of members involved in managing and licensing innovations derived from academic and non-profit research. AUTM provides resources to members including survey reports, professional development courses, a peer-reviewed journal and a worldwide community of peer experts.

The Business Link is a not-for-profit organization supported by the Government of Canada and the Government of Alberta. The Business Link provides support and advice to help entrepreneurs succeed in business.

Canadian Association of Business Incubation (CABI) is a national organization whose members are dedicated to creating employment and economic activity through the development of enterprises supported by the business incubation industry.

Canadian Association of University Research Administrators (CAURA) is the national voice for research administrators in Canada. CAURA provides a critical interface between all stakeholders in the management of the research enterprise and fosters cooperation between sister organizations, such as NCURA (National Council of University Research Administrators), SRA (Society of Research Administration), AUTM, CAUBO (Canadian Association of University Business Officers), CAREB (Canadian Association of Research Ethics Boards) and RAGnet (Research Administrator's Group Network).

Edmonton Research Park (Edmonton Economic Development Corporation) The companies in the Edmonton Research Park are engaged in advanced research in medicine, biotechnology, electronics, telecommunications, software, petroleum research and cold-climate engineering.

National Business Incubation Association (NBIA) is the world's leading organization advancing business incubation and entrepreneurship. It provides information, education, advocacy and networking resources to bring excellence to the process of assisting early-stage companies.

National Institute for Nanotechnology (NINT) is an integrated, multi-disciplinary institution involving researchers in physics, chemistry, engineering, biology, informatics, pharmacy and medicine. It is operated as a partnership between the National Research Council and the University of Alberta, and is jointly funded by the Government of Canada, the Government of Alberta and the University of Alberta.

Northern Alberta Business Incubator (NABI) has been serving the needs of Northern Alberta business owners for almost 20 years. NABI offers coaching, training, seminars and administrative support services to help grow existing businesses and kick-start new business ideas.

TEC Edmonton is a joint venture of the University of Alberta and the Edmonton Economic Development Corporation (EEDC). TEC Edmonton helps inventors, entrepreneurs, companies and investors access expertise, facilities, management and financing to succeed in technology ventures.

WestLink Innovation Network Ltd. is an organization working to address the innovation gap within Canada and beyond. WestLink works to connect its members with industry experts through a range of programs and services.

3.0.0 NAIT Policies, Guidelines and Procedures

***The following discussion summarizes a cohort of policies, guidelines and procedures relevant to applied research at NAIT*.** Faculty, staff and students are encouraged to read these documents for a more comprehensive discussion of how applied research is managed and governed at NAIT. Details of how these policies are put into practice are described in section 4.0.0 Applied Research at NAIT.

Relevant policies (and their affiliated guidelines and procedures) include:

Academic Relations (AR)
External Relations (ER)
Industrial Research (IR) ≡ *nova*NAIT
Operations and Administration (OA)

- IR.1 Policy: Academic Freedom in Research
  - IR.1.1 Guideline: Academic Freedom in Research
  - IR.1.2 Procedure: Academic Freedom in Research
- IR.2 Policy: Academic Integrity and Responsibility in Research
  - IR.2.1 Guideline: Academic Integrity and Responsibility
  - IR.2.2 Procedure: Academic Integrity and Responsibility
- IR.3 Policy: Conflict of Commitment in Research
- IR.4 Policy: Conflict of Interest in Research
- IR.5 Policy: Intellectual Property in Research
  - IR .5.1 Guideline: Intellectual Property
  - IR .5.2 Procedure: Intellectual Property
- IR.6 Policy: Research Administration
- IR.7 Policy: Yukon NWT and Nunavut
- IR.8 Policy: Approval to Forward an Application for Research Funds to an External Sponsor
- IR.9 Policy: Recovery of Costs of Research
- IR.10 Policy: Research Involving Human Subjects
  - IR.10.1 Guideline: Research Involving Human Subjects
  - IR.10.2 Procedure: Research Involving Human Subjects
- IR.11 Policy: Student Rights in the Conduct of Research
- IR.12 Policy: Use of Animals in Teaching and Research
  - IR.12.1 Guideline: Use of Animals in Teaching and Research
  - IR.12.2 Procedure: Use of Animals in Teaching and Research
- IR.13 Policy: Biohazards Research
- IR.14 Policy: Radio Active Materials
- IR.15 Policy: NAIT Business Organizations
  - IR.15.1 Guideline: NAIT Business Organizations (NBOs)
- IR.16 Policy: Post-doctoral Fellows (under development)
  - IR 16.1 Guideline: Post-doctoral Fellows (under development)
  - IR 16.2 Procedure: Post-doctoral Fellows (under development)
- OA.5 Policy: Intellectual Property
  - OA.5.1 Guideline: Intellectual Property
  - OA.5.1 Procedure: Intellectual Property
- AR. 3.0 Policy: Scholarly Activity
- AR.8.0 Policy: Access to NAIT Staff and Students by External Researchers

- AR.8.1 Guideline: Access to NAIT Staff and Students by External Researchers
- AR.8.2 Procedure: Access to NAIT Staff & Students by External Researchers

3.1.0 *Roles, Rights and Responsibilities*

3.1.1 Faculty and Staff

The Board of Governors supports scholarly activity as is consistent with NAIT's mission and mandate. The institute recognizes that scholarly and applied research activities are important contributors to:

- teaching excellence
- the development of quality programming
- the development of faculty and students
- the creation and application of new knowledge
- the betterment of the community.

To that end, all faculty members at NAIT are:

- expected to demonstrate ongoing disciplinary expertise and currency within their teaching and other related activities
- encouraged to participate in the discovery, integration, and/or application of knowledge.

NAIT faculty and staff engaged in scholarly and applied research activities are responsible for:

- conducting their activities with academic responsibility and integrity[20]
- following appropriate institute policies
- ensuring that conflicts of interest and commitment are avoided
- working with *nova*NAIT to obtain institute approval before submitting an application for funding to an external sponsor by honouring internal submission deadlines
- seeking approval from appropriate ethics committees for teaching or research protocols involving human subjects, animals, biohazards, radioactive materials and/or research occurring in the North
- protecting confidential or personal information belonging to third parties, per the terms of written agreements and any relevant legislation that may apply
- implementing measures to ensure the health and safety of student researchers by providing adequate supervision and training
- disclosing the generation of any form of intellectual property to *nova*NAIT
- retaining all primary research data, for a minimum of five years following publication of research results
- providing clear guidance to student researchers regarding research duties and expectations, and the extent to which the work will contribute to the student's academic program
- recognizing and acknowledging others, including students, who have contributed to the research in a manner that is commensurate with relative contributions.

3.1.2 Students

NAIT students interested in engaging in applied research are responsible for:

- conducting their activities with academic responsibility and integrity

[20] Academic Responsibility is an adherence to respect for evidence, impartial reasoning and honesty in evaluation and reporting. Academic Integrity is a commitment, even in the face of adversity, to five fundamental values: Honesty, Trust, Fairness, Respect and Responsibility.

- following appropriate institute policies
- disclosing the generation of any form of intellectual property, created in the course of their employment with NAIT, to *nova*NAIT
- protecting confidential or personal information belonging to third parties, per the terms of written agreements and any relevant legislation that may apply.

Whether or not a student is assigned a salary or other payment by the principal investigator (for example, from an operating grant or similar fund controlled by the principal investigator), a clear written agreement should be made as to the duties expected of the student, and the extent to which the work will contribute to the student's academic program. In no instance shall research work contributing to the student's academic program be subject to undue publication restrictions by an external sponsor.

In cases where there is an agreement that the student may use the results of his/her research on the project toward an academic program, the work completed must be clearly identified as that of the contribution of the student.

3.1.3 NAIT

NAIT is responsible for:

- nurturing and maintaining a culture of academic freedom at NAIT[21]
- providing the structures and supports necessary to facilitate applied research at the institute
- evaluating funding proposals from the viewpoint of general institute policy and strategic direction, and making timely decisions to provide Institutional support for proposals
- assessing the commercial potential of disclosed intellectual property and working with creators and sponsors to transfer technology to maximize societal and economic benefits.

[21] Academic Freedom is the freedom to teach, conduct research, publish the results of research, produce and perform creative works, responsibly challenge prevailing opinion and participate in academic or civic bodies without interference, censure or retribution from the institute or its management.

3.2.0 Research Integrity, Ethics and Conflict of Interest

In accordance with the institute's expectation that scholarly and applied research activities are carried out with the highest standards of academic conduct, NAIT has established several policies relevant to these areas:

IR 2.0 Academic Integrity and Responsibility in Research
IR 3.0 Conflict of Commitment in Research
IR 4.0 Conflict of Interest in Research
IR 7.0 Research in the Yukon, Northwest Territories and Nunavut
IR 10.0 Research Involving Human Subjects
IR 12.0 Use of Animals in Teaching and Research
IR 13.0 Research Involving Biohazards
IR 14.0 Research Involving Radioactive Materials
OA 2.0 Conflict of Interest

3.2.1 Research Involving Human Subjects

Research involving human subjects is premised on a fundamental commitment to advance human welfare, knowledge and understanding, and to examine cultural dynamics. Research involving human subjects is undertaken for many reasons. All research involving human subjects must be guided by two moral imperatives:

- the selection and achievement of morally acceptable ends
- the selection of morally acceptable means to achieve those ends.

All research projects involving human subjects undertaken at NAIT – including students carrying out research as part of class assignments – shall fall within the jurisdiction of a committee called the **NAIT Research Ethics Board (REB)**, irrespective of the source of financial support and the location of the project. Projects conducted by researchers from outside NAIT who access institute resources (either equipment or personnel), will also fall within the jurisdiction of the NAIT REB.

NAIT policies adhere to the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans[22].

For more information on the mechanics of gaining human ethics approvals or human ethics in general, see section 4.1.9. Getting Ethics Approvals.

3.2.2 Research Involving Animals

NAIT requires that all procedures in teaching, research and testing that involve the use of live animals be conducted in strict compliance with the standards of the Canadian Council on Animal Care (CCAC). NAIT also requires that all aspects of animal husbandry comply with CCAC guidelines. All protocols involving the use of live animals, whether intended for teaching, research or testing, shall be submitted for approval to the **NAIT Animal Care Committee**. This requirement applies even to procedures of a non-

[22] Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, Social Sciences and Humanities Research Council of Canada (1998, with 2000, 2002, 2005 amendments). *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans*. Ottawa, ON.

terminal nature. No protocols involving live animals shall be enacted without the approval of the NAIT Animal Care Committee.

For more information on the mechanics of animal ethics approval, see section 4.1.9.2 Animal Ethics.

3.2.3 Research Involving Other Special Considerations

NAIT requires that all research involving the use of radioactive or bio-hazardous material or with the potential to have an environmental impact adhere to the appropriate standards and be disclosed to appropriate supervisory personnel. All NAIT researchers who intend to do research in the Yukon, the Northwest Territories and Nunavut must be licensed.

For more information on the mechanics of research involving other special considerations, see section 4.1.9.3 Use of Controlled Substances.

3.2.4 Conflicts of Interest and Commitment

A conflict of commitment occurs where the external or personal activities and undertakings of a staff member are so substantial or demanding or organized in such a manner as to interfere with the staff member's obligation to the institute. The primary responsibility for avoiding conflicts of commitment rests with the individual NAIT employee. This responsibility can be addressed, by full disclosure of relevant information on external activities to an employee's supervisor.

The possibilities for conflict of interest and its resolution are almost limitless, therefore, members of the NAIT community are expected to conduct themselves at all times according to the highest ethical standards, in a manner that will bear the closest scrutiny, and they are responsible for seeking guidance from an appropriate source before embarking on activities which might raise questions about conflict of interest.

The institute views unresolved conflicts of interest in the conduct of research to be a serious breach of academic responsibility. Such alleged breaches are investigated under the Academic Integrity and Responsibility Policy.

For more information on research ethics considerations, see section 4.1.8 Understanding Ethical Research Conduct.

3.3.0 Academic Freedom, Authorship and Intellectual Property

Academic freedom offers faculty the opportunity and protection for reflective thought and open dialogue which are crucial to the social vitality of the institute, the pursuit of truth and the advancement of knowledge. The principles of academic freedom are valued by NAIT and extend to academic endeavours related to thoughtful inquiry, responsible challenge to prevailing opinion, open debate, teaching, curriculum development, research and publication. Accordingly, NAIT has responsibility to nurture and maintain a culture of academic freedom. The privilege of academic freedom is extended in the context of academic integrity and responsibility in the conduct of research, inquiry and other scholastic pursuits.

3.3.1 Authorship

To support academic freedom, the institute encourages authorship of books (including textbooks), articles, posters, presentations, and media that may be subsequently publicly disclosed. Reasonable freedom to publish research results in the open literature must exist for students and employees to complete their academic mission. The principle authors of any works are responsible for recognizing and acknowledging others, including students, who have contributed to the scholarly content or research in a manner that is commensurate with the relative contributions of each collaborator. In cases where there is any dispute regarding creatorship (e.g. authorship), the decision of the Provost and VP Academic is final.

For sponsored research, the institute's employees and students may be required to secure written approval from the research sponsors and other owners of confidential information prior to publication or any other form of public disclosure. NAIT employees and students are responsible for protecting confidential information belonging to third parties, such as corporate research sponsors, by respecting the terms of the respective contracts, and other agreements in place, such as Non-Disclosure Agreements. Employees and students are also required to protect personal information, respecting the requirements of Alberta's Freedom of Information and Protection of Privacy Act (FOIP Act).

To learn more about FOIP and how it relates to research, see section 4.1.9.1 Human Ethics.

In cases where there is an agreement that the student may use the results of his/her research on the project toward an academic program, the work completed must be clearly identified as that of the contribution of the student, and the criteria for shared authorship explained to the research team in advance. In no instance shall research work contributing to the student's academic program be subject to undue publication restrictions by an external sponsor.

3.3.2 Intellectual Property

As noted in section 3.3.1 NAIT faculty and staff are assured of an environment of academic freedom, including the ability to disseminate their knowledge. NAIT faculty and staff (the creator) also have an ability to benefit from the commercialization of intellectual property (IP), generated in the course of their employment. IP is any form of knowledge or expression created with one's intellect. It includes such things as inventions, processes, computer software, trademarks, literary, artistic musical or visual works and even "know-how." To learn more about the different types of IP, see section 4.3.1 Intellectual Property Basics

As specified in IR.5 Policy: Intellectual Property in Research, NAIT has initial ownership in the IP, if the creator has received consideration from NAIT in its development, whether created on the employee's own initiative or at the institute's direction. IP developed by individual student(s) as part of their education at NAIT, for which they do not receive any consideration, is owned by the individual student(s). However, in instances where a student becomes an employee of NAIT and develops IP, that ownership resides with NAIT.

NAIT faculty and staff are encouraged to pursue their applied research and commercialization interests. NAIT's intentions are to pursue commercialization when possible and the net revenue accruing from the commercialization of IP is shared proportionately between the creators and the institute (at least 40% share to the creator). For more details on the split of commercialization proceeds, please see section 4.3.4 The Rewards of Commercialization.

It is the obligation of all employees to disclose any form of IP in a timely manner. Timely disclosure protects the rights of all parties involved. Disclosures of invention must be submitted to *nova*NAIT. It is essential that invention disclosures be made prior to any public disclosure (presentations, posters, papers). Failing to do so may imperil patentability of your IP. *nova*NAIT will manage the commercialization process and represent both the institute and the creators. NAIT inventors are required to complete and submit an **Invention Disclosure Form** to *nova*NAIT. For more information on the mechanics of this process, please see section 4.3.3 The Commercialization Process.

The institute recognizes that IP may also be released into the public domain, or available through non-remunerative copyleft (creative commons) licenses. The institute shall not unreasonably deny any requests for release of copyright or any assignment to third-parties that may be required to support such activity. A Copyright Release Form signed by the Dean/Director will suffice to document such approval. The institute may also choose to waive any royalties or honoraria arising from the production and commercialization of such scholarly works.

4.0.0 Applied Research at NAIT

4.1.0 Getting Started

There are many resources available to faculty, staff and students to support them in applied research. *nova*NAIT is the central source of support and information to guide interested faculty members through the process and connect them with internal and external resources.

If you have any questions about any of these steps, the first point of contact should be *nova*NAIT. Their team of applied research and technology transfer professionals can help you navigate the processes and procedures and facilitate the steps required to engage in applied research and scholarly activities.

> ***nova*NAIT – Centre for Applied Research and Technology Transfer**
> W207, NAIT HP Centre
> 10504 Princess Elizabeth Ave
> **Phone:** 780.378.6170
> **Email:** novaNAITinfo@nait.ca
> **Web:** www.novanait.ca

4.1.1 What is Applied Research?

Applied research uses new or existing knowledge to solve real-world challenges. It focuses on finding usable solutions to specific or targeted problem areas. This is different from pure research, which is more exploratory. Applied research is conducted to discover new knowledge and strategies with an identifiable and immediate practical application. It is aligned with industry needs and addresses practical real-world problems. For a more detailed discussion of applied research at colleges and institutes, see sections 1.0.0 Introduction and 1.3.1 The Role of Applied Research and Scholarly Activities at Colleges.

4.1.2 Finding Applied Research Mentors and Resources at NAIT

In addition to the institutional services provided by *nova*NAIT, there are many different groups that are dedicated to supporting scholarly and applied research activities at NAIT.

4.1.2.1 Research Liaison Committees

Several Schools at NAIT have developed research liaison committees or sub-committees to coordinate and champion the applied research activities of their faculty. These are school-led committees, and involve novaNAIT support, either directly or indirectly. For more information on these committees and how they support research in their schools, please contact the committee chairs.

JR Shaw School of Business Research Committee
Dean: Kevin Nagel, 780.471.7641, kevinn@nait.ca

School of Health Sciences Research Liaison Committee
Co-chairs: Ann Ripley, 780.491.3071, annr@nait.ca
Sarah Pearce, 780.471.8459, sarahp@nait.ca

School of Resources and Environmental Management (REM) Research Subcommittee
Chair: Laurie Hunt, 780.491.3936, laurieh@nait.ca

4.1.2.2 Scholarship of Teaching and Learning (SoTL) Committee
All instructors at NAIT are expected to integrate ongoing disciplinary expertise and currency with pedagogical best practices. Therefore, instructors are encouraged to inquire into the processes of teaching and learning to discover, integrate, apply, and share knowledge. As such, SoTL is aimed at connecting the learning of individual instructors with other instructors within and outside of NAIT.

SoTL activities at NAIT include fostering research related to teaching and learning, and active contribution to knowledge about teaching and learning in a particular field of education. "The purpose of the SoTL committee is to foster a supportive environment that will help nurture and build a culture that embraces and values scholarship as it relates to the improvement of teaching practice and student learning experience at NAIT"[18].

The Committee runs a monthly discussion group on SoTL activities at NAIT and oversees the SoTL Grants and Awards. For more information on these programs, see section 2.2.1 NAIT Programs for Applied Research specifically the SoTL grants (2.2.1.6) and awards (2.2.1.7) content. Contact Annemarieke Hoekstra at 780.471.7862, email annemarh@nait.ca or visit the SoTL website.

4.1.2.3 Library Resources & Services
NAIT's McNally Library offers a host of resources in print and electronic formats for prospective researchers, including approximately 100 databases covering thousands of journals and other publications. The library collection includes books, ebooks and reference materials that provide subject background, methodologies, etc. as well as information on how to set up research projects, write proposals and format research reports. The Library can be an active partner in your applied research.

Library services include:

- **Literature searches:** Library staff search relevant databases and other resources purchased or licensed by the Library as well as resources available to the public such as government websites. (Searching is available for NAIT staff only and must comply with licenses which may restrict use to academic and scholarly pursuits). The Library staff can also search any of over 400 commercial databases through Dialog search service on a charge-back basis.
- **Research consultations:** The Library staff can recommend databases and other resources, discuss search strategies and work with you to combine your subject expertise with our knowledge of information resources. We can also assist you in setting up Database Alerts to automatically notify you of new articles published in your area of interest.
- **Demonstrations of resources and search tools:** The Library staff provide individual or group demonstrations tailored to needs of specific groups or interests. Demonstrations may include: relevant licensed databases, catalogues, patent search tools, or RefWorks citation management software.

- **Acquisition of new resources:** Library staff can acquire (based on faculty, staff, and student recommendations) and manage new resources to support research within budgetary constraints.
- **Access to information in other libraries:** Library staff can identify where the information that you require is located and help you obtain it via interlibrary loan, document delivery, or direct borrowing from Alberta's public libraries (through the TAL card)
- **RefWorks:** The Library provides assistance in using this online tool designed to help researchers gather, manage and store and share information, and to generate citations and bibliographies in a variety of styles.
- **Referrals:** When a request cannot be accommodated within NAIT Library's resources or mandate The Library provides referrals to external resources.
- **Information Literacy Instruction:** The Library staff can develop and deliver customized information literacy classes for specific courses or research groups. Classes can include topics covered in research consultations and demonstrations in addition to fundamental research concepts.

Contact Harriet Arnold 780.471.8796, e-mail harrieta@nait.ca or specifically,

- to make an appointment for a tailored one-on-one demonstration of relevant resources in the collection, contact Karen Schlegl 780.491.3974, kschlegl@nait.ca

- to suggest resources for addition to the Library collection, contact Liz Pegoraro 780.471.8715, lizp@nait.ca.

- to learn more about information literacy and book classes for your students or research teams contact Isobel Rancier, 780.471.7853, isobelr@nait.ca.

See Appendix 5 for a list of resources related to research available at the NAIT Library.

4.1.2.4 Introduction to Applied Research E-Learning Course

In partnership with the Department of Teaching and Academic Development, AACTI, and Agriculture and Agri-Food Canada, *nova*NAIT is developing this online course to introduce faculty and staff to applied research. The course will be piloted in May 2010.

For more information on this course and how to apply, contact the Program Manager, Kirsty Dunlop at 780.378.6175, email kirstyd@nait.ca or visit the *nova*NAIT website.

4.1.2.5 Applied Research Methods Course (BTE 300)

The BTE 300 Applied Research Methods Course is part of the Bachelor of Technology in Technology Management (BTech) degree program and will focus on guiding learners through the research process.

For more information on this course and when it is offered, contact David Schmaus at 780.471.8983, or e-mail davids@nait.ca.

4.1.3 Identifying an Applied Research Idea

Applied research projects can be driven by both internal and external factors. Internal drivers include NAIT faculty, staff, students and/or Institutional priorities and external drivers include research sponsors (industry and funding agency priorities).

To identify opportunities for research in your field, it is important to consider the needs of the marketplace. Some examples of what needs to be considered are:

- Where do your research interests and passions lie?
- Are there systems, processes, products or prototypes that could be developed or improved to meet a market need?
- Are there opportunities to build upon existing knowledge to provide a broader understanding for an industry, community, or its participants?
- Could the applied research benefit policy makers (such as in the government) in shaping programs and regulations?

It is important to do a literature search at this stage: to identify research that has already been done, solutions that may already exist, research that can be built upon, and relevant methodology and to identify publications that will support your research proposal.

- Can you identify an unmet need?
- Is there a simpler or alternative way to complete tasks that achieve a particular aim?
- Can you apply technologies used in one field to another field to gain better outcomes or efficiencies?
- Can you apply your expertise/perspective to solve challenges in other industries in a novel way?
- Listen to industry partners: can you identify a solution to their technical problem?

Applied research uses new or existing knowledge to create or adapt solutions to real world challenges. To be considered applied research, it is important that your projected research goal or outcome have links to real needs of industry or society. In many cases, applied research projects are industry-driven and already have a validated market need. However, not having an industry end-user partner in place at the beginning of a project does not imply that a research idea is invalid. This is common, and most applied research projects will take time to develop before an industry partner is engaged. In some cases, the receptor may be a not-for-profit or public service entity and for our purposes here we are defining these under the term “industry,” or under a broader term “community.”

4.1.4 Connecting Your Idea with a Market-Relevant Need

If you think you have a viable research idea, complete *nova*NAIT’s **Applied Research Engagement Form**, to describe your idea and any potential sources of funding you have identified. The form will also help assess what sort of research ethics reviews or supports might be required to complete your research activities. By providing this information, *nova*NAIT can provide customized coaching to assist you through the research process.

The research project that you have in mind may be at a very preliminary stage. By alerting *nova*NAIT early in your planning process, *nova*NAIT can help you secure the necessary ethical approvals and access the necessary faculty release time. In addition,

the *nova*NAIT team will work with you to determine the market relevance of your research, identify funding sources and if necessary, help connect you with potential industry sponsors to support your activities.

*nova*NAIT will facilitate your application(s) for research funding by providing grant writing resources and expertise to help develop a comprehensive funding strategy by finding leveraging funds from multiple sources when and where necessary.

*nova*NAIT has a copy of the latest Subsidy Directory available to NAIT researchers. The book profiles direct and indirect subsidies, grants and loans available from Canadian government departments, agencies, foundations, associations and organizations.

A copy of the **Applied Research Engagement Form** is/will be available on the NAITRix eForms Repository or online on novaNAIT's website.

4.1.5 Writing the Research Proposal

Once your applied research idea has been validated, you will need to determine the internal and/or external source of funding to support your work. This often requires the development of a research proposal, to be submitted to internal funding programs, and/or to external sponsors (including industry). It is important to note that every funding source has specific rules for applying for funding. It is essential that these rules are carefully adhered to.

A great resource describing critical grant writing skills is Dr. Jacob Kraicer's 1997 article, "*The Art of Grantsmanship."* While the advice and statements in the document seem simple enough, many researchers fail to incorporate these basic recommendations into their grant applications or their research activities.

Another useful reference that provides guidance on effective and efficient written communications is The Elements of Style by William Strunk, Jr.

A useful tool when gathering information and writing both the research proposal and your final report is RefWorks. This online tool is designed to help researchers gather, manage and store and share information. It can generate in-text citations and bibliographies as you write and allows you to select different styles as needed. To learn more contact the Library or go to www.nait.ca/library/858.htm.

The key element of any research proposal is developing a coherent research plan and related budget. The individual that will carry out the research activities should be the principle applicant and author of the research proposal. *nova*NAIT can provide assistance and support in the proposal development process by facilitating and coordinating grant writing resources and expertise.

For more information, contact the Contracts and Grants Manager, Guru Chinnasamy at 780.378.6171, or email gurusamc@nait.ca or visit the *nova*NAIT website.

4.1.6 Developing a Budget

In parallel with developing the research plan, you will have to develop an appropriate budget for the direct costs of research. Direct costs include labour, materials and

supplies, travel and accommodation, dissemination of results, equipment and other tangible expenses that can be directly linked to the research activity. Applicants should note that in addition to complying with the funding agencies policies and rules for use of funds, NAIT's policies and procedures for purchasing and human resources must also be respected.

Note: For commercial research, include the cost of literature searches when detailing tangible expenses. The Library acquires database access via academic licenses which limit use to academic and scholarly pursuits. Academic licenses work well when faculty are doing pure research or research for scholarly publication, but restrict use in a commercial research environment. Before finalizing your budget consult Library staff to determine your literature search requirements, identify relevant databases and develop an estimate of the cost at commercial rates.

Sometimes conflicts between the funding agency and NAIT policies will occur. One potential pitfall area where this can arise is in labour costs. A funding program might have an upper funding limit for certain research positions, whereas NAIT has policies and contracts that set market competitive wage rates and benefit expenses for NAIT staff. When these amounts are in disagreement, special consideration needs to be taken to ensure that all policies and rules are respected. In some instances, third party funding may be required to make up a salary shortfall. Contact *nova*NAIT for help navigating this issue, if and when it arises.

4.1.6.1 Indirect costs

Wherever grants and contracts allow for the recovery of indirect costs (sometimes called the hidden or overhead costs) of research, researchers must include them in their proposals. Indirect costs include institutional and facilities expenses. Many funding agencies have specific rules regarding how this amount can be calculated and request inclusion as either a separate budget item or as a function of the total budget. It should be recognized that NAIT's ability to subsidize contract research through the absorption of indirect costs is limited. If possible the full cost of research, including both direct and indirect expenses, should be recovered.

If you neglect to include the indirect cost of research in your budgetary requests, please note that NAIT reserves the right to deduct overhead from the awarded grant. For assistance with calculating an appropriate amount of indirect costs for your research and determining whether indirect expenses are allowed, please contact *nova*NAIT's Contracts and Grants Manager, Guru Chinnasamy, 780.378.6171 or email gurusamc@nait.ca.

4.1.7 Pre-sponsorship Legal Agreements

For research involving industrial sponsors, it is often necessary to enter into legal agreements to establish the terms of the relationship between the company and the researchers. Open sharing of information is necessary to facilitate successful outcomes, however, companies may have certain business practices or technologies that they need to protect to retain their competitive advantage. One of the mechanisms to address these concerns is by entering into legal documents, such as Non-Disclosure (NDA) (sometimes called Confidentiality), Non-Compete, or Intellectual Property Agreements.

In some instances when external agencies are providing research materials, equipment or samples to NAIT for research use, there may be a request to complete a Material Transfer Agreement (MTA). MTA will also need to be used with research materials, equipment, or samples are outbound from NAIT.

These agreements may be stand-alone documents put in place at the beginning of a relationship with a sponsor or a collaborator, or they may be specified in a funding contract.

If you are ever asked to sign any of these types of agreements, it is very important to obtain advice from *nova*NAIT to ensure that you maintain and retain your rights. Contact *nova*NAIT's Enterprise Development and Technology Transfer Manager, David Burry, 780.378.6187 or email dburry@nait.ca for help with these agreements.

Access NAIT template agreements in Appendix 4 – Forms and Agreement Templates.

4.1.8 Understanding Ethical Research Conduct

NAIT researchers are expected to demonstrate the highest standards of academic responsibility. Academic Responsibility is an adherence to respect for evidence, impartial reasoning and honesty in evaluation and reporting. Academic Integrity is a commitment, even in the face of adversity, to five fundamental values: Honesty, Trust, Fairness, Respect and Responsibility.

Understanding the risks and potential ethical pitfalls that can arise during the research enterprise is not innate knowledge. To better understand the importance of ethical conduct, The National Academies video "On Being a Scientist" is a good start. The companion to this video is The National Academies Press' book "On Being a Scientist: Third Edition". This free e-book was designed to provide case studies of common ethical dilemmas faced by researchers. It covers topics ranging from authorship, violations in professional standards, sharing research results, research errors, omissions and mistakes and human and animal ethical issues. Hard copies of the book can be ordered from The National Academies Press.

4.1.9 Getting Ethics Approvals

When you have submitted your research idea to *nova*NAIT using the **Applied Research Engagement Form**, you may have identified parts of your research plan that require an ethics review. Research involving human subjects, animals, radioactive or bio-hazardous material or with the potential to have an environmental impact must adhere to ethical standards and be disclosed to appropriate supervisory personnel. All NAIT researchers who intend to do research in the Yukon, the Northwest Territories and Nunavut must also be licensed.

*The **Applied Research Engagement Form*** in available in Appendix 4 – Forms and Agreement Templates.

Once the ethics requirements are identified and the research plan is established, it is important to submit applications for ethics approvals to the appropriate NAIT committees and external organizations. NAIT cannot release research funding until all appropriate ethics approvals are in place.

4.1.9.1 Human Ethics

The **NAIT Research Ethics Board** (REB) governs all research involving human subjects at NAIT. The REB only meets six times per year, so it is imperative that this process occurs early in the research preparation process. If ethics approvals are not in progress or in place you may not be able to submit your funding proposal and will not receive research funding. The Tri-Council funding agencies require that institutions have processes in place to withhold research funding if ethical approvals are not completed or up-to-date. If NAIT fails to comply with these requirements, the agencies reserve the right to withdraw ALL research funding from the institution (not just the funds requiring ethics reviews).

All research projects involving human subjects undertaken at NAIT (including students carrying out research as part of class assignments) irrespective of the source of financial support and the location of the project require human ethics approval. Projects conducted by researchers from outside NAIT who access institute resources (either equipment or personnel), will also require human ethics approval. For more information see section 3.2.1 Research Involving Human Subjects.

To obtain Human Ethics approvals, researchers must submit an **Ethics Proposal** and a **Request for Ethics Review** to the REB. In these documents the applicants must indicate that they will comply with NAIT's policies governing research involving humans and the Tri-Council policy statement on ethical conduct for research involving humans.

To view an online tutorial on human ethics, visit http://pre.ethics.gc.ca/english/tutorial/. It is also imperative that researchers understand the implications of Alberta's *Freedom of Information and Protection of Privacy Act* (the FOIP Act). For a tutorial on FOIP, visit http://foip.alberta.ca/training/onlinetraining.cfm.

Navigating the steps:

1. Determine the potential ethics needs of research in the **Applied Research Engagement Form.**
2. Develop a research funding strategy and write funding proposals.
3. Assess the research plan to determine whether human ethics approvals are required.
4. If yes, identify the next REB meeting deadline that suits your research timeline.
5. Prepare a **Request for Ethics Review** and an **Ethics Proposal** and submit the appropriate number of copies to the REB. Many of the elements of your research funding proposal can be used for the Ethics Proposal and the elements required in the Ethics Proposal will be essential tools in your research activities, such as developing your Informed Consent Form.
6. Attend the REB meeting where your proposal will be discussed to answer any outstanding questions.
7. Obtain human ethics approval.

Generally, human ethics certification approvals last for a specified term. If research is ongoing at the expiry of ethics certification, researchers must resubmit their ethics proposal and request an extension. If research projects or protocols change from the ethics proposal submission, revised documentation must be provided to the REB for review and approval.

If research studies have received primary approval from the REB of a collaborating institution, NAIT researchers must submit the ethics proposal and REB certification to the NAIT REB with a request for expedited approval.

If you have any questions on the process or how to write your research methodology to adhere to ethical standards, contact Dr. Randy Dreger, Chairman of NAIT's Research Ethics Board, 780.491.3098, or email rdreger@nait.ca.

4.1.9.2 Animal Ethics

NAIT requires that all procedures in teaching, research and testing that involve the use of live animals be conducted in strict compliance with the standards of the Canadian Council on Animal Care (CCAC). NAIT also requires that all aspects of animal husbandry comply with CCAC guidelines. All protocols involving the use of live animals, whether intended for teaching, research or testing, must be submitted for approval to the **NAIT Animal Care Committee (NACC)**. This requirement applies even to procedures of a non-terminal nature. No protocols involving live animals shall be enacted without the approval of the NACC.

To obtain animal ethics approvals, researchers must submit an **Animal Use Protocol Form** to NACC. For more information on animal ethics visit the website of CACC. The CCAC has several training modules available to address the core objectives of ethical animal care and use: http://www.ccac.ca/en/CCAC_Programs/ETCC/Intro-coretopics-Web11.htm.

Navigating the steps:

1. Determine the potential ethics needs of research in the **Applied Research Engagement Form.**
2. Develop a research funding strategy and write funding proposals.
3. Assess the research plan to determine whether animal ethics approvals are required.
4. If yes, identify the next NACC meeting deadline that suits your research timeline.
5. Prepare an **Animal Use Protocol Form** and submit the appropriate number of copies to NACC.
6. NACC will either approve, conditionally approve, defer or reject your protocol.
7. If conditionally approved or deferred, revisions to the **Animal Use Protocol Form** must be made and resubmitted to the NACC within 30 days for re-review.
8. Obtain animal ethics approval.

The NACC reviews all active protocols annually, therefore researchers must submit a **Short Protocol Form** on the anniversary of their approval. If animal use protocols are continuous over three consecutive years, a long form review using the full **Animal Use Protocol Form** must be submitted. The NACC has the right to request a protocol review or revision at any time while the protocol is active.

If unanticipated problems or complications arise during the course of research, researchers are required to report these issues to NACC using the NACC Incident Report, which includes outlining any protocol modifications or steps taken to address the problem(s).

If you have any questions on the process or how to write your animal use protocol to adhere to ethical standards, contact the NACC Chair, Dr. Greg Woodard, 780.378.5337, gregw@nait.ca or the NACC Coordinator, Colleen Cope, 780.491.3077, coleenc@nait.ca.

4.1.9.3 Use of Controlled Substances

The NAIT Occupational Health and Safety (OHS) Committee governs the use of radioactive, biological (including controlled pharmaceuticals) and hazardous materials and lasers at NAIT. NAIT OHS has assigned an OHS Consultant to each area. Contact information for the Consultant for your area is available on NAITrix.

The NAIT Manager for Health and Safety is Lawrence LeMesurier, 780.471.7540, lawrencl@nait.ca.

4.1.10 Submitting Research Proposals for Funding

Once your proposal is ready to submit and all research ethics approvals are in place, you are ready to send your proposal for institutional approval. You will also need to complete a **Research Proposal Submission Form** and summarize key information from the proposal.

Your Program Chair and Dean will have to sign off on the **Research Proposal Submission Form** prior to submitting your package to *nova*NAIT for institutional approval. *nova*NAIT requires **a minimum of five business days** to review and approve your application to submit a proposal for funding. The proposal will be formally evaluated from the viewpoint of general institute policy and strategic direction and a decision made for approval, rejection or recommended revisions.

NAIT approval is required whether or not the sponsor requires such approval. Co-investigators participating in multi-institutional research projects that receive funding from external sponsors shall provide a copy of the proposal to *nova*NAIT.

Once institutional approval is place, your application for funding will be submitted to the appropriate funding agency. Then the hardest part – waiting for the outcome – begins.

4.1.11 Post-Feedback Debriefing

Once the funding results and proposal feedback is available, schedule a debriefing session with *nova*NAIT to discuss the outcome of the funding submission. This discussion will help set goals for future funding submissions and perhaps identify funding opportunities that will help bridge the research idea into a more funding-ready concept.

4.1.12 Resubmitting Research Proposals

It is always disappointing to receive notification that a proposal was not selected for funding. Most funding agencies provide feedback to the applicants regarding the strengths and weaknesses of the individual proposals, including reports from peer reviewers. Applicants are encouraged to review this feedback with *nova*NAIT, and when possible, with the Program Officer for the funding program to gain insight into the feedback and identify key areas of concern. This feedback can guide the redevelopment

and redesign of the research proposal to create an overall strengthened funding application.

Occasionally, proposal feedback can seem biased or unconstructive. Try not to take proposal feedback personally. It is best to try to review feedback objectively and as constructively as possible. Take steps towards your future success by acting on the feedback before resubmitting. If several independent sources are sending the same or similar messages, it is essential that you address this in your resubmission.

Success rates can range from 10-70% depending on the funding agency and the funding program. It is not uncommon for first time applicants to be unsuccessful. As at every stage of the process, novaNAIT will work with you and your team to revise the application to address the weaknesses and its resubmission. A resubmission may require new ethics approvals (if the research protocols have changed) and will require new institutional approval before submission and another waiting period. Don't be discouraged by negative results, but take each round and each piece of constructive feedback as a learning experience. Resubmission often provides an opportunity to critically examine research plans based on peer feedback and can lead to new and better research ideas.

You may wish to keep a multi-year file of funding applications and feedback for your reference.

Once you have been awarded funding, what comes next?

4.2.0 Managing Research

4.2.1 Formalizing Research Agreements

With the award of funding comes the formalization of research agreements. Some funders have standing agreements with academic institutions to cover the transfer of funding, therefore the formal approval of the project and the release of funding can be quite simple. In other instances, these agreements need to be discussed and negotiated individually.

4.2.1.1 Grants versus Contracts

There are two major forms that funding agreements take: grants or contracts.

A research grant includes financial support for an investigator, or investigators, or a group/centre/institute conducting research in a particular subject area or field, without any formal detailed stipulations as to the direction or outcomes of the research.

A research contract is an agreement between legal entities, namely the sponsor and the institute, to provide financial support for an investigator or investigators to conduct research in a particular subject area or field under specific stipulations and conditions. Generally these conditions specify the scale, scope, term and deliverables for the research and establish the ownership, patent rights and future licensing arrangements.

Both types of funding arrangements are valid research funding instruments. *nova*NAIT will act on the researcher's and the institute's behalf to coordinate the formalization and finalization of these agreements.

Sometimes research contracts can also be titled collaboration agreements, service agreements or fee-for-service agreements. Essentially, these funding instruments differ in that they have graduated and more stringent expectations in the deliverables and ownership rights of the outcomes. As described earlier in section 4.1.7 Pre-sponsorship Legal Agreements, most if not all research funding agreements will qualify the terms of confidentiality, disclosure, intellectual property ownership, and material transfer rights.

Contact *nova*NAIT's Contracts and Grants Manager, Guru Chinnasamy, 780.378.6171 or email gurusamc@nait.ca for help and institutional approval for these agreements.

4.2.2 Coordinating Release Time

Since your Chair and Dean will have been aware of the development of your research project through their participation in the research proposal, including review and signature of the **Research Proposal Submission Form,** it is likely that once notification of award occurs, you and your Chair and Dean will work together to finalize/confirm the informal release time plans established during the proposal development process. If there are any concerns about this process or plans, be certain to clarify expectations with your Chair and Dean regarding release time as early as possible after funding notification.

4.2.3 Research Finances

Once NAIT receives the research funds, a restricted research project will be established on NAIT's PeopleSoft Finance System. This will allow for the isolation of financial activities for a specific research project for reporting purposes and also restrict access to funds to specific individuals such as the lead or principal investigator or other designated individuals. Financial management will be subject to audit and the procedures of Corporate Services. Please submit a copy of the fully executed Research Agreement along with a filled **Request Research Project ID Form** to the novaNAIT Financial Project Officer, Brenda Morgan, 780.378.6166 or email bmorgan@nait.ca for a restricted project to be established.

Purchases using restricted projects will still have to go through standard NAIT procurement processes and adhere to allowable expenditures as defined by the funding source and NAIT policies. This includes capital purchases (equipment valued at more than $1,000) and procurement process (sole source versus Request for Proposals) for major purchases beyond specified limits).

The Staff Training Course Catalogue has various listed courses, including Requisition Entry Training that are offered on a regular basis. Minor purchases (such as supplies) and incidental expenses can be claimed on an **Expense 2 Claim Form**, or purchased via a NAIT Purchasing card. NAIT does maintain an inventory of various items, such as in the Chemistry Stores.

4.2.4 Human Resources

In most instances you will need additional staff to complete the research project. NAIT Human Resources Consultants will help you compile a job description based on the skills required. HR will help you complete the necessary paperwork (**Appointment Authorization Form**, **Job Evaluation Form, Job Adjustment Form** and **Position Description Form**) and assess the position for classification and compensation ranges based on internal standards. All of these forms are available on the (restricted) NAITrix under the eForms Repository.

Should dedicated research personnel such as Post-doctoral Research Fellows be required, please contact novaNAIT.

Career Services will cover the costs of advertising the position on NAIT standard advertising websites, including NAIT Careers. If further advertising is required, those costs must be borne by your research grant or the department.

For more information contact the NAIT Human Resources Consultant for your area. You may also reach NAIT Human Resources at 780.471.7466, or e-mail hrs@nait.ca or their website. The Human Resources Consultants will explain and advise on the entire process, including writing position descriptions, classification, recruitment, payrolls, and performance management.

Students can participate in applied research both as part of their required curriculum (unpaid), and recruited as paid research staff. There are important differences between the two approaches, such as in the treatment of intellectual property, and dissemination of research. You are advised to contact a novaNAIT staff member to understand and

identify a suitable approach for your specific situation. Student engagement in applied research is highly encouraged. Students can be recruited on paid project assignments under three main categories:

- Co-op: Current student co-op rates are $16.00, $16.50 and $17.00 per hour. The lowest rate would be paid to a student in a program who had completed approximately one year of post-secondary studies, and was hired into a fairly straight-forward role. The mid-range rate would be paid to someone further along in their studies, and/or with a more complex role. The top rate would be paid to someone hired to do a complex role, who is in second year or beyond. These people do not pay union dues, they are excluded.
- Student employment: these are AUPE employees and as described below, there are 3 types of such employment. Students shall be employed as casual employees and shall be enrolled in high school or any post-secondary learning institution or any vocational learning institution. Any student employed under this agreement shall be paid and compensated at a rate of pay outlined in type, and the rate of pay shall apply to students hired in accordance with the conditions listed herein.
    - Category STU1: Students may be employed to perform work over the course of the summer months, and shall have a start date no earlier than April 15 and a termination date not later than the following September 30. Students hired in this category shall be paid at a rate of $10.00 per hour.
    - Category STU2: Students may be employed to perform functions in various areas of NAIT (upon approval of the Union) during the year for relief or overload purposes only. Students hired in this category shall be paid at a rate of $10.00 per hour.
    - Category STU3: Students may be employed in functions normally termed as “Laboratory/Facilities Monitors” whose work assignments normally provide the opportunity for the student to perform activities such as school assignments or personal activities during the course of employment. Students hired in this category may be employed throughout the year. Students hired in this category shall be paid the minimum wage as outlined by the Province of Alberta.
- Summer Temporary Employment Program (STEP) Program: This program is administered through Career and Counseling Services, and receives funding from the Government of Alberta. The pay rate is $10.00 per hour and pending approval, the researcher’s area would pay 30%.

In terms of potential faculty and staff collaborators, the NAIT experts guide is a useful reference.

4.2.5 Transferring Funds between Institutions

When NAIT researchers are awarded research funding and are working with collaborators at other research institutions, it is possible to arrange a transfer of research funding to the institution of the collaborator.

When NAIT researchers are collaborators on research projects hosted at other institutions, it is preferential to transfer funds to NAIT to cover the costs of the NAIT researcher’s activities.

The transferability of funds is dependent on the source of funding. Contact *nova*NAIT for more information, to assess whether such transfers are permitted and to make arrangements as necessary.

4.2.6 Sharing Biological and Non-Biological Samples with Collaborators

Employees that wish to share research materials with external parties should do so under the terms of an approved Material Transfer Agreement (MTA). MTAs define the rights of the provider and the recipient with respect to the materials and any derivatives. The most frequently transferred materials are biological materials, such as reagents, cell lines, plasmids and vectors, but MTAs may also be used for other types of materials, such as chemical compounds, data sets and even some types of software. The terms of the MTA may stipulate confidentiality or non-disclosure clauses.

It is important to ensure that an MTA is in place if you ever send or receive materials from external parties (academic researchers, consultants, companies) to protect your rights and minimize your risk. If you are interested in entering into a material transfer arrangement, Contact *nova*NAIT's Contracts and Grants Manager, Guru Chinnasamy, 780.378.6171 or email gurusamc@nait.ca for help with these agreements.

4.2.7 Research Best Practice

All research at NAIT must be undertaken with the utmost Academic Responsibility, respecting the research evidence and carrying out impartial reasoning, evaluation and reporting. In addition, research must adhere to the ethical and safety standards outlined in NAIT policies. To learn how to improve your knowledge of research methodologies and best practices, visit the NAIT McNally Library to view their collection of resources and consult with library staff or consider participating in either the Introduction to Applied Research Course, or the BTE300 Applied Research Methods Course. For more information on these resources or other avenues to discuss research best practices at NAIT, see section 4.1.2 Finding Applied Research Mentors and Resources at NAIT.

In certain fields, particularly in the study of pharmaceuticals and medical devices, pre-clinical safety research must comply with additional standards to ensure that research results can used for regulatory submissions. Good Laboratory Practice (GLP), Good Clinical Practice (GCP) and Good Manufacturing Practice (GMP) are all critical measures required to accredit a laboratory as compliant with standards. GLP focuses on the importance of process control in research, such as:

- Clear rules: standard operating procedures (SOP) and documented protocols
- Documented resources: organization, personnel, facilities and equipment
- Quality assurance: data collection, auditing, reporting and archiving
- Research quality: independent study, well characterized models and test systems and the use of standard controls.

To learn more about Good Laboratory Practice, read the World Health Organization's Handbook: Good Laboratory Practice.

4.2.8 Record Keeping

Record keeping and laboratory notebook maintenance is a very important part of carrying out research activities. If an invention or discovery is made, a well-kept

notebook can help determine how and when the invention or discovery was conceived and reduced to practice. The permanency of the lab notebook is one of its key features. Whether you use a paper or electronic laboratory notebook (ELN) to record hypotheses, methods, observations and results, it is important to identify the date of the activity and include enough detail so that a neutral observer can understand and interpret what was done. Good record keeping and lab notebooks can be crucial evidence to demonstrate research integrity in the event of an inquiry.

4.2.8.1 Lab Notebook Best Practices

An ideal lab notebook would identify the subject matter, have permanent numbered pages and dated entries completed in ink. The content of the entries should include explanatory sketches and diagrams with adequate annotation. If additional material is to be inserted into the notebook (such as photos or drawings) they should be permanently affixed to the pages. It is also useful to have someone periodically review and witness the entries by signing and dating the notebook. The witness should be someone independent of the research project. *nova*NAIT staff are willing to provide confidential notebook witnessing services to NAIT researchers.

Researchers can also use software programs to generate electronic laboratory notebooks, however, it is preferential to use a specialized software tool for record keeping, rather than a combination of word processing and spreadsheet files. Specialized ELN software provides audit and authentication trails for data entry.

For a more extensive discussion on keeping laboratory notebooks, see University of California, San Francisco Office of Technology Management's "OTM Recommended Laboratory Procedures."

NAIT policies require that principal investigators retain all primary research data for a minimum of five years following publication of research results. The completed laboratory notebooks are the property of NAIT, not the principle investigators or the individual researchers, and should remain at the institute if and when any of the researchers leave the employment of the institute.

4.2.9 Technical and Financial Reporting

Depending on the requirements of the grant or contract, principle investigators may have to submit both technical and financial reports to the funding agency or research sponsor. Reporting may be triggered by research outcomes or by key dates in the funding timeline. NAIT researchers are encouraged to ask for assistance in the review of technical reports from *nova*NAIT and the preparation of financial reports from Corporate Services.

When setting up your project management plan for the research project, it will be useful to mark these reporting deadlines in advance. This will ensure that no important reports are overlooked.

4.2.10 Research Outcomes (Publications and Inventions)

Reasonable freedom to publish research results in the open literature must exist for students and employees to complete their academic mission. NAIT researchers are encouraged to disseminate their research results though articles, posters, presentations

and other media as mandated by the research funding agreement. The principle authors of any works are responsible for recognizing and acknowledging others, including students, who have contributed to the scholarly content or research in a manner that is commensurate with the relative contributions of each collaborator.

In the event that an inventive discovery is identified, NAIT researchers are obligated to disclose such inventions to *nova*NAIT for assessment. In order to maintain the commercial value of the invention, it is essential that the invention disclosure be made prior to any public disclosure (presentations, posters, papers). Once the assessment of commercial potential is complete and necessary protections underway, NAIT researchers are encouraged to proceed with appropriate public disclosure.

4.2.10.1 Sponsor Acknowledgement

When reporting research results in any venue (such as presentations, publications, media interviews) it is essential that the research sponsors are identified and acknowledged. This is to address conflict of interest issues as well as acknowledge the contribution of the sponsor to the research activity. If you require assistance determining how to acknowledge sponsors, contact *nova*NAIT for advice and assistance.

You have identified a research outcome with commercial potential, what comes next?

4.3.0 Commercializing Research

novaNAIT acknowledges Red River College's Researcher Guide as reference for this section of the Research Handbook. The section "The Commercialization Process" including the imbedded figure are adapted (with permission) from the January 2006 version of the Red River College Researcher Guide[23].

Commercialization of research (or technology transfer) is the process of translating research outcomes into commercial products. Important parts of the process include the strategy for protecting any intellectual property that has been generated, and the assessment of the technology, the market and the opportunity itself. *nova*NAIT will work with faculty, staff and students to complete these steps and commercialize the outcomes of research.

In order to initiate the process, NAIT employees who believe that they have identified something with commercial potential are obligated to submit a report of invention using an **Invention Disclosure Form**. This form will ask you to describe your research outcome so that it can be assessed for commercial feasibility, patentability, stage of development and other factors.

4.3.1 Intellectual Property Basics

Intellectual property (IP) is any form of knowledge or expression created with one's intellect. It includes such things as inventions, processes, computer software, trademarks, literary, artistic, musical or visual works and even "know-how."

4.3.1.1 Intellectual Property Rights

The Canadian Intellectual Property Office (CIPO) recognizes six categories of IP rights, namely, patents, trademarks, copyrights, industrial designs, integrated circuit topographies and plant breeders' rights.

4.3.1.1.1 Patent

A patent is a government grant giving the right to exclude others from making, using or selling an invention. A patent is a document issued by the government that describes an invention. A patent is granted only for the physical embodiment of an idea, or for a process that produces something saleable or tangible. In Canada, patents are granted only for products or processes that meet the three criteria of novelty, utility, and ingenuity.

4.3.1.1.2 Trademark

A trademark is a word, symbol or design (or any combination of these features) used to distinguish the wares and services of one person or organization from those of others in the marketplace.

[23] Applied Research and Commercialization, Red River College (2006). *Researcher Guide*. Winnipeg, MB: Red River College.

4.3.1.1.3 Copyright

The right to produce or reproduce the work or any substantial part thereof in any material form whatever. The right to copy means that an owner is the only person who may copy his or her work or permit someone else to do so.

4.3.1.1.4 Industrial Design

An industrial design describes features of shape, configuration, pattern or ornament and any combination of those features that, in a finished article, appeal to and are judged solely by the eye (i.e. shape of a table, decoration on a plate).

4.3.1.1.5 Integrated Circuit Topography

A product that is intended to perform an electronic function. Integrated circuits, referred to as "chips," are tiny electronic devices found in everything from common appliances to robots.

4.3.1.1.6 Plant Breeders' Rights

Plant Breeders' Rights are the exclusive rights to new varieties of some plant species.

4.3.1.2 Trade Secret and Confidential Information

A formally legislated definition of Trade Secret does not exist in Alberta, nor is this covered under the six established federal statutes on IP. However, as proposed by the 1986 draft legislation by the Alberta Institute of Law Research and Reform, a Trade Secret can be defined as information including but not limited to a formula, pattern, compilation, program, method, technique, or process, or information contained or embodied in a product device or mechanism which (i) is, or may be used in a trade or business, (ii) is not generally known in the trade or business, (iii) has economic value from not being known generally, and (iv) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

The terms 'Trade Secret' and 'Confidential Information' have often been used interchangeably. Confidential Information often relates more to non-technical knowledge such as business plans or financial information. Trade Secret generally relates more to technical knowledge such as formulas or recipes.

4.3.1.3 Internet Domain Names

While not falling within the six traditional forms of IP recognized in Canada, internet domain names are analogous in many ways to trademarks.

4.3.2 Intellectual Property Management at NAIT

NAIT will collaboratively pursue commercialization of IP for the benefit of the Institute, the Creator(s) and industry. IP will be disseminated to industry in an efficient and

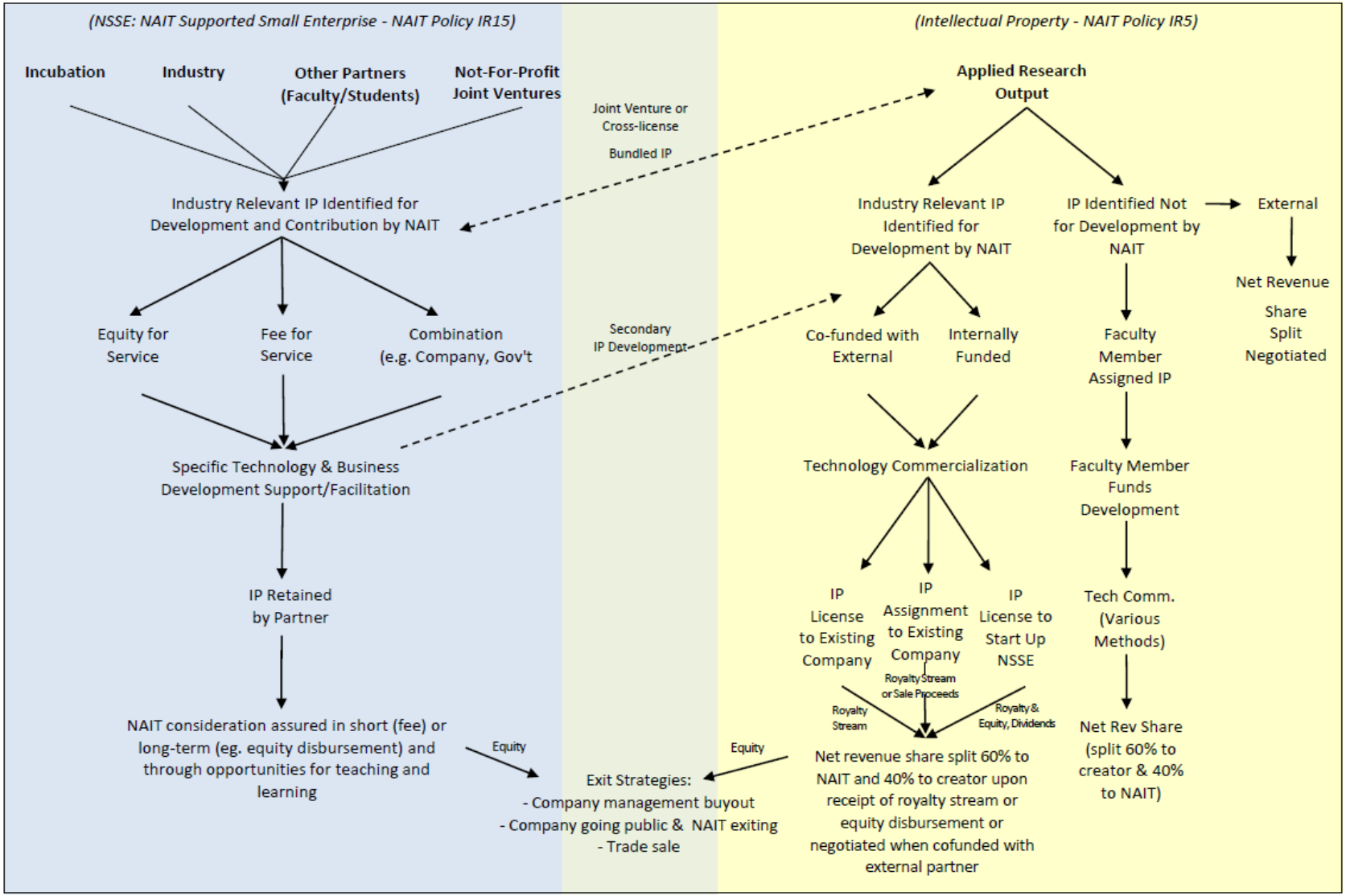
effective manner to facilitate efficient access to the marketplace. Net Revenue will be shared between NAIT and the Creator with the majority share accruing to whoever is incurring the commercialization costs. Ownership will rest with NAIT initially, and in consultation with the Creator, may be licensed or transferred based on the commercial opportunity. See section 4.3.4 The Rewards of Commercialization for further discussion of this topic.

4.3.3 The Commercialization Process

In order to facilitate efficient and effective commercialization, NAIT researchers are obligated to disclose inventions to the institute by completing an **Invention Disclosure Form.** NAIT policies require that your Program Chair and Dean sign off on the **Invention Disclosure Form** prior to submission to *nova*NAIT for assessment. The *nova*NAIT team will review the form with the innovator to better understand the invention and to prepare for the ***Initial Innovation and Market Assessment*** (see Figure 1)**.** The initial assessment will allow *nova*NAIT and the innovator to determine how to best proceed.

Figure 1. An Overview of NAIT's Technology Commercialization Process

Intellectual Property (IP) Enterprise Development



4.3.3.1 Does novaNAIT intend to commercialize?

Some innovations may have been developed as part of a contract research agreement and the intellectual property (IP) may belong to the contractor, per the contract terms.

In cases where the IP is developed independently by NAIT, where the institute does not intend to commercialize, the IP may be assigned (ownership transferred) to an external partner or directly to the creator (the decision will be made collaboratively between the institute and the creator). In either case the revenue share of commercialization proceeds will be at least 40%. If the assignment is directly to the creator, the employee would be responsible for all commercialization costs and will benefit from a revenue share of 60%, after full reimbursement (through commercial proceeds) of those costs. See the section 4.3.4 The Rewards of Commercialization.

When the institute does intend to commercialize the IP, *nova*NAIT will continue the ***Initial Innovation and Market Assessment*** process to determine if the innovation can be turned into a commercial product, and if it is at the right stage of development to do so. If the institute shares ownership in the IP with another party or parties, NAIT may require that the IP be assigned to a mutually-agreed upon party (in most cases this is likely to be the institute) in order to proceed with the commercialization process.

4.3.3.2 Is more research needed?

Some innovations will not leave the institute until they are nearly at the commercial product stage, while others will be licensed to industry at a much earlier stage of development. The timing depends largely on the industry sector and the nature of the technology. Medical devices and pharmaceuticals, for instance, tend to be licensed at a much earlier stage than in any other sector due to the long and expensive regulatory process. Other industry sectors might not even consider licensing until the innovation is at the commercial stage.

4.3.3.3 Is there commercial potential?

In determining commercial potential, the assessment will help determine commercialization strategies (e.g. licensing to an existing company, or the creation of a spin-off), market information (size, demographics, location etc.) and a myriad of other considerations required for successful commercialization.

Some innovations cannot be readily transformed into a commercial product. This may be because the innovation does not have freedom to operate, which means that in order to transform the innovation into a commercial product, one would have to infringe on the protected IP of another entity. One way to overcome this would be to secure a license from the necessary IP owners to obtain the necessary usage rights. Other products might not have a large enough market to recoup the patenting costs and/or the product development costs.

4.3.3.4 Is the IP Protected?

The final stage of the ***Initial Innovation and Market Assessment*** is determining if the innovation has been protected and, if not, the most effective way to protect it. Copyrights

provide protection for literary, artistic, dramatic, or musical work, including computer programs, and performance, sound recording, and communication signals. Patents are used to protect new inventions, or a new and useful improvement of an existing invention. As patents protect inventions only within the country of issuance, an appropriate global coverage strategy must be determined. Protected IP can be published without harming the commercial potential of the innovation.

After the initial assessment has been completed, *nova*NAIT will begin the commercialization process. At this point, *nova*NAIT may choose to conduct a more detailed technology assessment, may have some prototype development done, or may choose to license the IP as-is. Licensing options are based on whether the innovation is best served by being licensed to an existing company or to a newly created spin-off.

For any path towards commercialization, *nova*NAIT and NAIT innovators are partners and will work together to navigate the process.

4.3.4 The Rewards of Commercialization

Net revenue accruing from the commercialization of intellectual property will be shared proportionately between the creators and the institute in relation to their contributions to the costs of commercialization. In situations where the institute commercializes the IP and covers all the commercialization costs, the split of net revenue (gross revenue less the cost o commercialization) will be 60% to NAIT and 40% to the creators. In situations where the institute has declined to commercialize the IP and has assigned the IP rights to the creators, and the creators cover all the commercialization costs, the split of net revenue will be 60% to the creators and 40% to the institute. In situations where the institute has contracted an outside third party to commercialize the IP and that third party has covered the costs of commercialization, the split of net revenue will be negotiated on a case-by-case basis.

For any of the above three instances, the institute's portion of the net revenue will be distributed as follows: 34% to general revenues, 33% to the Schools/Divisions to which the creators belong, and 33% to novaNAIT.

4.3.5 Other Benefits of Applied Research and Commercialization

In addition to the potential tangible benefits of technology commercialization as noted above, there are some real and meaningful reasons why researchers should engage in applied research with a goal towards commercialization. While there are many artists, scholars and researchers that eschew this goal, commercial innovation is critical to the development and advancement of society. This does not mean that non-commercial research, scholarly or artistic pursuits are worthless, rather they are equally important in the pursuit and advancement of knowledge. However, NAIT researchers are uniquely positioned to have a significant potential impact on the local and national economy and the overall quality of life through active engagement in applied research.

Applied research creates and grows mutually beneficial relationships in the community. Applied research, technology transfer and commercialization are supportive of the community's inventors, entrepreneurs, business and industry. The results of applied research projects are visible, practical and can have direct localized effects.

4.3.5.1 Regional economic impacts

Colleges and institutes serve almost every community in Canada, delivering industry-linked programming to generate a skilled and educated workforce. With programming and applied research focused on market needs, college-based applied research and technology transfer has strong links to economic development. The British Columbia Institute of Technology (BCIT) has estimated that every dollar invested in applied research at BCIT translates into eighteen dollars of annual provincial economic impact. This equates to the generation of over $14 million in additional provincial and federal tax revenues annually[24].

4.3.5.2 Social impacts

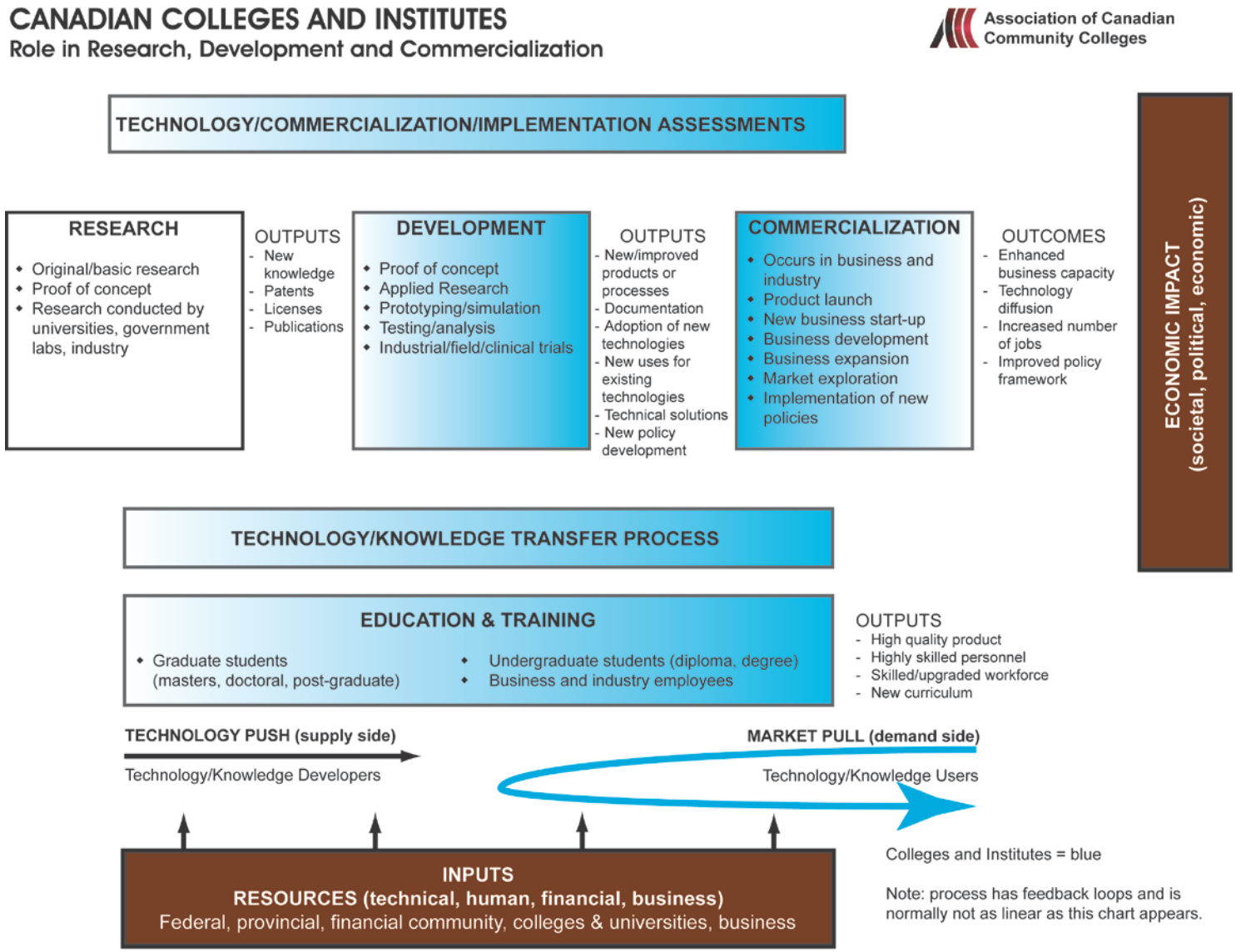
In addition to the positive economic benefits, there are obvious societal benefits to applied research. College-level innovation has influenced the application of technologies that have reduced waste generation in industrial processes, improved the way that online courses and training are delivered and demonstrated the safety and potential utility of cutting edge technologies (e.g. fuel cells). NAIT faculty work with a broad spectrum of industry partners, and can often identify problems common throughout an industry that could benefit from innovative advancements. Influencing industry practice can revitalize business, create new opportunities, and generate positive environmental and social impacts.

4.3.5.3 Personal impacts

Most importantly, why would a NAIT employee be interested in engaging in applied research and commercialization? Well, applied research can contribute to your personal professional development, allow you to explore your passions and curiosity, help you build networks and relationships with industry collaborators and engage your students in the fundamental process of learning how to apply their theoretical knowledge in a real-world setting. If an applied research project results in an outcome that can be commercialized, there is the potential for financial compensation, the opportunity to influence technology and industry, and create a lasting impact on your field of interest.

[24] BCIT (2007). *The Economic Impact of the British Columbia Institute of Technology on the Province of British Columbia.* Vancouver, BC: Institutional Research and Planning, School of Business.

Appendix 1 – The Role of Colleges in Research Development and Commercialization[25]



[25] Association of Canadian Community Colleges (2009).

Appendix 2 – ‘The Art of Grantsmanship’ by Jacob KRAICER

Available online at http://www.hfsp.org/how/ArtOfGrants.htm. Reproduced with permission from the copyright owner.

1. INTRODUCTION

"Grantsmanship is the art of acquiring peer-reviewed research funding"
The objective of these guidelines is to assist both new and veteran investigators to optimize their chances of successfully competing in a peer-reviewed grant application competition. It is a competition. With success rates falling to 50% or below, the difference between success and failure often results, not just from the quality of the science, but from the quality of the grant application. In all probability, the quality of science of the applications in the 10% below the cut-off for funding by an agency is not significantly different from that in the 10% just above the cut-off. "Grantsmanship" can make the difference.

The art of "grantsmanship" will not turn mediocre science into a fundable grant proposal. But poor "grantsmanship" will, and often does, turn very good science into an unfundable grant proposal. Good writing will not save bad ideas, but bad writing can kill good ones.

Why am I qualified to give advice? First, I was successful in obtaining peer-reviewed funding and I served on a number of national and international reviewing bodies for some 30 years. But perhaps more relevant is the fact that I was responsible for the administration of a peer-reviewed research grants program for four years. During this time some 1600 research grant applications were processed.

My comments, suggestions, and recommendations are based on this experience, plus documents and discussions listed in the acknowledgements. They are relevant to most peer-reviewed research grant applications to most granting agencies. The information required, formats, and review processes are generally similar.

2. BEFORE YOU START TO WRITE

Read the Guidebooks, Guidelines, and Application Forms carefully and follow them exactly. Make sure that you have the latest versions.

- Make sure that your proposal "fits" with the mission of the agency and that your objectives match with those of the agency. Make this "match" explicit in your written application.
- If you have any doubts or questions, contact the relevant granting agency person, who will welcome your questions and answer them. They really do want to help.
- Find out the median funding level for the agency. This will allow you to formulate a reasonable budget.

- Find colleagues who have served on, or have received grants from, the agency. They can give you "insider" information on how the agency works, and what "sells".

Begin to formulate / clarify your ideas.

- Do you have a clear, concise and testable hypothesis?
- Are your objectives and aims coming into focus?
- What questions are to be addressed?
- Can you define and design specific experiments that will test directly your hypothesis?

Start the process early (see timetable suggested by Tutis Vilis (section 3.2), which I have modified slightly).

Put together and write up your recent work and submit it to appropriate peer-reviewed journal(s). Do this well in advance so that the work can appear in your application as "published", "in press" or "a submitted manuscript". Most granting agencies will not accept a manuscript "in preparation". Your track record, as judged by publications, is an important criterion in the assessment.

Carry out appropriate preliminary (pilot) studies, so that their results can be included in the application. This is especially important for new applications. It will also establish for you, and for the reviewers, whether the experimental approaches are feasible and where the pitfalls may be.

Find and study previous grant proposals of colleagues that have been successful. Consider these as models.

Find out, if you can, who are the members of the review committee and focus accordingly.

Identify essential and appropriate investigators who wish to collaborate with you. Discuss ideas with colleagues in the same and relevant fields. Just going through the process of explanation and discussion will help to clarify and focus your ideas, and to identify possible gaps in logic.

3. THE APPLICATION

3.1 General

- Read the general instructions CAREFULLY and follow them EXACTLY.
- Successful applications must be "a joy to read" and must stand out from the ever-increasing competition.
- Make the display pleasant and attractive.
- Use appropriate type size, font, spacing and margination.
- Do not go over the maximum number of pages allowed (many agencies will not accept applications that have one page too many).
- Send the instructed number of copies.
- If attachments and/or appendices are not allowed, do not submit them. They will not be distributed to reviewers. Similarly, if reprints are not required, do not send them (they will be discarded).

- Do not submit additional information after the deadline (unless explicitly allowed).
- I was astonished to find that in one agency, about 25% of research grant applications were incomplete and required that the applicant submit additional information urgently. This does not make for a good beginning. "A sloppy application = a sloppy scientist"
- Polish your application extensively. Make the application well-focused, clear, well organized and accurate.
    - You want the reviewers to be your enthusiastic champions and advocates. A luke-warm review is fatal.
    - Remember that the reviewers are doing the reviews as a task over and above their daily mandated activities, and are often unpaid. They may be overwhelmed with applications and manuscripts requiring reviews. They often carry out the reviews under less-than-ideal conditions (evenings, weekends, holidays, at meetings, or even on the way to review committee meetings). They may wait until the last minute to begin their review.
    - Reviewers often do their reading in bits-and-pieces. Have your application so organized so that it can be read in this way. You do not want them to have to go back to the beginning after each break.
- Pay attention to the agency's objectives and criteria. It is a waste of time to apply to the "wrong" agency.
- Do not rely on your computer's spell checker. Use a dictionary. "If you can't get the spelling right, how are you expected to get the research right?"
- Avoid abbreviations, acronyms and jargon (that the non-expert may not understand). If you use abbreviations, then define them when used for the first time.
- Assume that you are writing for a reviewer in a somewhat related field, rather than for an expert directly in your area.
- Remember that many agencies, even national ones, send applications for review abroad. Use language that will be easily understood by those for whom the language is foreign.
- Aim the application at both the expert in the field and at the generalist (see subsequent sections).
- Extensive and intensive internal peer-review is essential.
- Ensure that a late draft (not an early one) is examined by at least two colleagues who have experience with, and are successful in, the peer review process : a) in your direct scientific area to check relevance, accuracy, ambiguities and quality of science, b) a "generalist" to check for clarity, and c) someone who is a good editor.
- Make sure that the (late) version they receive is free of mechanical errors (spelling, typos, grammar, etc.); it is not their task to make these kinds of corrections. If they are distracted by mechanical errors, they may fail to identify fundamental problems.
- Give the internal reviewers enough time to do a thorough job.

3.2. Timetable (from Tutis Vilis at Survival Skills with slight modifications)

1 year before the deadline:
Start thinking of interesting projects. Try to find a balance between something "sure" and something truly innovative and even risky.

- *These might be side issues of what you are currently working on.*
- *Imagine what the possible outcomes might be.*

- *Start reviewing the literature.*
- *Discuss your ideas with others. Just going through the process of trying to explain things to others is a great way to clarify things. Don't be disappointed if they do not share your enthusiasm. But listen to their criticisms.*

Complete as many of your current experiments as possible; write up the papers and submit them for publication.

- *It can easily take 6 months to have a submitted paper accepted, longer if there are several revisions.*
- *A most important element of your application is your track record.*
- *What counts most in your track record are published papers in peer-reviewed journals.*

9 months before the deadline:

Obtain preliminary data.

- *These will greatly strengthen your proposal.*
- *A reviewer can think of a hundred reasons why something that you propose will not work. These objections vanish if you can show that you have done it.*

You may need to submit a small application to your local institution to obtain funds to do the preliminary experiments.

- *Getting this support will enhance your application.*

6 months before the deadline:

Write an initial draft of the main proposal section.

- *This can take a month of very intensive work.*
- *This section may best be done in one continuous block of time; 3 to 6 hours per day each day of the week.*
- *Block this time off in advance.*
- *You will get nowhere, working a few hours a week.*

5 months before the deadline:

Obtain comments from your colleagues.

- *These are people who are willing to spend hours reading and rereading your grant, not someone who returns it with the word "fantastic" on the front cover.*
- *Sit down and talk to them about their comments.*
- *Pay attention to what they failed to understand. Revise.*
- *Get more comments. Revise, etc.*

4 months before the deadline (even earlier for some institutions):

Submit your proposed experiments for approval to local committees where appropriate: animal care, human ethics, safety, etc.

2 months before the deadline:

Reread the guidelines and your application.
Take the instructions seriously. Do what they ask.
Work on the other parts.

- *Get quotations for equipment.*
- *Get letters of confirmation from collaborators.*
- *Work out the budget.*

1 month before the deadline:

Put together what looks like the final version: on the official forms, with figures and references.

- *Give this to your colleagues for additional review.*
- *There is nothing like seeing the whole package. Obvious flaws suddenly become apparent at this stage.*

2 weeks before the deadline:

Type the final version.

- *Proof read it.*
- *Have it proof read by someone who has not seen it before.*
- *Do not trust the spell checker.*

Get all the necessary signatures.

1 week before the deadline:

Get the necessary copies made.

- *The copy machine will probably be occupied by others with the same deadline or it will have broken down.*

2 days before the deadline:

Send it out by express mail / courier.

- *Get some sleep.*

3.3 First / Title Page

Fill it in completely and accurately and ensure that all signatures are obtained (in my experience, up to 10% of applications have something missing from this page).
The TITLE of your project is important.

- It sets the first impression.
- It is often used, with the Abstract, to route the application to the appropriate review committee(s) and reviewers.
- It should be descriptive, specific and appropriate, and should reflect the importance of the proposal(s). But it should not be so specific as to require changes with each renewal (it helps to maintain the same title for renewals). One way to achieve this is to have a two part title; the first general and the second more specific (eg "The control of secretion of growth hormone: mechanism of action of somatostatin"). The phrase after the colon may then change in subsequent renewals, while the part before the colon will remain unchanged.

3.4 Abstract / Summary of Proposal

THE ABSTRACT SHOULD SERVE AS A SUCCINCT AND ACCURATE DESCRIPTION OF THE PROPOSAL EVEN WHEN IT IS SEPARATED FROM THE APPLICATION. IT MUST STAND ON ITS OWN.

- This is probably the most important section in your application. Take it seriously. Write it last. Work on it extensively after the bulk of the proposal has been fine-tuned. It is the first part that is read, and this sets the first impression.
- It is often used to route the application to the appropriate external reviewers, grants committee, and to the primary reviewer(s) in the grants committee.
- It must be understood by both experts in your field and by "generalists".
- The primary reviewer(s) read the entire application for which they are responsible, but others on the review committee **may only read the abstract**. (see also Appendix - the process in the review committee).The abstract may be the only part of the application that is read by all the members of the grants committee who are not primary reviewers, even though ALL members may have

to give their independent scores (given equal weight to the scores of the primary reviewer(s)).

- Review committee members often study the application (and prepare written reports, if required) weeks or months before the meetings. They then quickly review all the abstracts just before the meetings in order to recall the essentials.
- The contents: to include hypotheses, objectives, approaches, research plan, and significance.
  - State the hypotheses to be tested. Give the long-term objectives.
  - State the specific aims.
  - Make reference to how the proposal is directly related to the mission and objectives of the agency to which application is being made.
  - Describe concisely the research design and methods.
  - Tell why the proposal is unique, important, significant, and worth supporting.
- Stay within the allotted space. But it is not necessary to fill this space. When you have nothing more to say, then stop.

3.5 Recommended External Reviewers (if requested)

- Give this some thought. They are often used.
- They need not be of Nobel Award stature, but they should be recognized experts in the field. Also, they should be tolerant of, and sympathetic to, your hypothesis.
- If the application requests their "fields of expertise", be specific (e.g. "ion channel/patch clamp/receptor-ligand interactions" and not "cell physiology").
- They must, of course, have an "arms-length" relation with the applicant (as usually defined by the guidelines of the agency).
- Most agencies will also honour a request by the applicant that certain named reviewers NOT be used. They will usually do this without requiring specific reasons (check with the agency).

3.6 Proposed Research

3.6.1 General

- Keep the proposal confined to the space allotted.
- The proposals must be focused, original, novel, innovative, and of course feasible.
- Try to find a balance, in the proposal, between something "sure" and something new, innovative and/or risky.
- Set out alternative strategies in case the original ideas fail.
- Write and rewrite: work and rework the application.
- Use of diagrams, cartoons and figures is often helpful (a picture is worth a thousand words). But note that copies will not appear in colour.
- Again, make it a joy to read. You want the reviewers to become your advocates and not your adversaries.
- Never state or imply that a study will be carried out "because it has never been done" or "there are no data on …". This may be so because it is trivial.
- State clearly what is novel, and what is merely confirmatory.
- State explicitly how the proposal relates to the mission, objectives and priorities of the agency.
- It is useful to organize the presentation with appropriate headings and sub-headings, using a simple and obvious numerical classification.
- Don’t forget to cite potential external reviewers and committee reviewers where appropriate. But don’t be excessively flattering.

3.6.2 Specific

- A useful plan is to break the proposal into the following headings, which I will expand, in sequence.
- Hypothesis and Long-Term Objectives
- Specific Aims
- Background and Significance : Current State of Knowledge
- Progress / Preliminary Studies
- Research Design and Methods
- Timetable
- Strengths and Weaknesses

3.6.2.1 Hypothesis and Long-Term Objectives

- A testable hypothesis-driven proposal is best; a proposal that is primarily descriptive is less favourably received.
- Begin with the stated hypothesis, and tie this in with the long-term objectives. What is the proposed specific research intended to accomplish? What is the significance and relevance of the research?

3.6.2.2 Specific Aims

- Distinguish these from 3.6.2.1. The Specific Aims are the specific projects, studies and items that will be undertaken in order to fulfill the long-term objectives.
- Put them in a logical and sequential order. Indicate priorities.

3.6.2.3 Background and Significance: Current State of Knowledge

- This should answer 3 questions; what is known, what is not known, and why is it essential to find out.
- Begin with a brief outline of the highlights in the background review. State where your own previous contributions (if any) fit in.
- Then critically evaluate the relevant literature: not just an uncritical compendium or list.
- Discuss fairly all sides of a controversy, disagreement, and/or discrepancy in published results. But be careful since a participant in a controversy may be your reviewer.
- Identify specifically the gaps and contradictions that you will clarify. Carry this into the rationale for your proposal.
- Emphasize the importance and relevance of your proposal in bridging your hypotheses and long-term objectives to the background review.
- Integrate your previous findings within the background to give the reviewers a sense of your relevant contributions.

3.6.2.4 Progress (as related to Background and Significance)

- This will differ if this is a renewal or a new application.
- If a renewal:
- Remind the reviewers of the start and end dates of the previous award. You must establish your credibility of excellence in research, and that the proposal will continue the high quality of your research.
- Summarize your previous hypotheses, long-term objectives and specific aims, and give a succinct description of progress. Emphasize especially the most important and relevant findings.

- It is appropriate to describe how your specific aims may have changed as the work progressed.
- Incorporate all publications, manuscripts submitted or accepted, and abstracts (if permitted), of work carried out during the term of the grant.
- In as subtle a way as possible try to convince the reviewers that your recent contributions were outstanding and of great importance. How has your work significantly advanced knowledge in the field? And how will the proposal continue this record of achievement and excellence?
- Don't complain about previously low or inadequate funding. This is self-defeating.
- If a new application:
    - You need to convince the reviewers of your excellent and relevant training, and that you already have substantive preliminary data and/or pilot studies.
    - Summarize your relevant previous work, highlighting your unique qualifications and skills. Tell how these will assist you in the successful carrying out the proposed studies.
    - Review your preliminary studies and results. Present the actual data. This will help establish your experience, competence and credibility.
    - List your publications and manuscripts submitted or accepted (if this is permitted).
- For both:
    - If allowed, list all of your publications, abstracts and other retrievable material related to your proposal. Do not submit these if not asked for.

3.6.2.5 Preliminary Data / Studies

- These should be included either in the Background, in Progress, or as a separate section and is of great importance. Tie it directly to your hypotheses and long-term objectives.
- Describe preliminary data that are relevant and pertinent. Show the actual data.
- This is especially important in a new application in order to document the credibility, experience and competence of both the proposal and the proposer.

3.6.2.6 Research Design and Methods

- The Specific Aims have stated what you propose. Now you must describe how you propose to fulfill the Aims.
- Be focused and clear. Put the Aims in a logical and sequential order. Also consider a brief opening paragraph describing the relationship of each Specific Aim to each other and to the overall Objectives. It is useful to break this section down, beginning with each stated Specific Aim (plus a one-sentence rationale for each aim?). Then outline the design and methods to accomplish each Specific Aim, and explain why the proposed approach was chosen.
- Then consider a plan something like this:
- Number the research designs and methods to correspond to the numbers of the Specific Aims.
- Use sub-numbering within each part when describing several methods applicable to the same Specific Aim.
- Distinguish clearly between overall research design and specific methods.
- Do not repeat identical procedures that apply to more than one Specific Aim.
- Reference, but do not describe well-known or standard procedures. But do describe procedures that are new or unlikely to be known to reviewers.
- For new methods, explain why they are better than existing methods.

- Discuss relevant control experiments (This is often lacking).
- Explain the processes for data collection, analysis and interpretation.
- Discuss potential difficulties and limitations of the proposed procedures and give alternative procedures to achieve the aims. This will prevent potential criticisms by reviewers and may, in fact, "save" your application. State clearly possible weaknesses and/or ambiguities and respond (i.e. preempt the criticisms).
- Provide a brief tentative sequence and timetable for the project. List them in order. Be realistic. Consider doing this using a diagram or table. Clearly define priorities.
- Document all proposed collaborative arrangements, including letters from collaborators confirming the specifics of the arrangement. The role of collaborator(s) should be clearly defined. Biographic sketches (if allowed) are useful. Otherwise relevant experience and expertise should be included in the collaborator's letter.

3.7 Budget

- In most agencies, the members of the review committee are required to recommend an appropriate budget, independent of the scientific merit of the proposal.
- The budget generally stands alone; separate from the rest of the application. Unlike the research proposal, everyone on the review committee is now an "expert", and all participate actively.
- The budget is usually considered last, after the merits of the proposal have been decided, and a score has been given.
- Often, review committee members are under an obligation to reduce the budget. Therefore, make sure the budget is well documented, realistic, appropriate and justified. Do not inflate, over budget, or under budget.
- Check carefully whether the agency supports certain items (e.g. secretariat assistance, travel, purchase of books, etc.). Do not request items that are not allowed.
- Give sufficient details for each item to make it difficult and unreasonable for the reviewers to arbitrarily suggest major cuts.
- For equipment, document convincingly why the piece is essential (not just "nice to have" or "faster and better"), and why the specified model is required.
- For personnel:
    - Make sure they are allowed.
    - Specify the unique and essential role that each will play, and state how their qualifications are matched with the role.
    - Avoid "to be named" if possible.
- For travel, specify who will travel and whether they will be presenting a paper. Also justify a request for more than one meeting per year for any one person.

3.8 Other Grants Received and/or Pending

- Be honest and complete. The agency can verify this information from independent sources.
- Be careful if stating "no overlap". It may be more accurate to state "There are certain similarities in the systems and/or methods but there is no overlap in specific aims or objectives".

3.9 Appended Documents

- Make sure that all that are required are included. If allowed, include material that is supportive but not integral to the contents of the application. But the application, without appendices, must stand on its own.
- Do not include documents if they are not required:
  - They will not be distributed to the reviewers.
  - A common ploy is to attempt to extend beyond the page limit for the "Proposal" or the "Summary of Progress" by including an Appendix. This Appendix, unless specifically allowed, will not be distributed to the reviewers. This may leave a "gap" or "hole" in your application if you refer to the Appendix in your text.

3.10 Publications

- Unfortunately many reviewers tend to "weigh" or "count" publications, rather than assess the quality, significance and contribution of the applicant.
- Aim for a good number of first authored publications in first-order peer-reviewed journals.
- A high ratio of abstracts / full-length papers is not well received
- Other kinds of publications (books, chapters, reviews, non-peer reviewed articles) may not impress the reviewers.

4. COMMON ERRORS MADE

4.1 By New Applicants

- The proposal includes a lifetime's work and is unrealistically ambitious. There are no clearly defined priorities and the timetable (if present) is unrealistic, with no sense of what can realistically be accomplished during the term of the grant.
- The literature and background reviews are uncritical. They read like an undergraduate review.
- There are no results of pilot studies or other preliminary data.
- The time listed to be spent on research should be at least 50%, and preferably over 75%. Anything less than 50% may be unacceptable (a smaller percent effort is usually acceptable for established investigators).
- The budget is unrealistic.

4.2 By Established Investigators

- The application is fragmented and disjointed. Different parts were obviously written by different junior colleagues and then hastily assembled by the applicant.
- "I don't have to go into detail. Trust me and examine my track record. Rely on my reputation". This no longer works.
- The proposals tend to be too cautious and do not venture into new and unexplored areas. They tend to be "more of the same".

5. APPENDIX

Outline of the Review Process

Granting agencies differ in the processing of applications. The following general scheme applies to most.

The cycle begins with the deadline for receipt of applications. Most agencies will reject applications that arrive after the deadline.

The secretariat then examines each application, looking for obvious irregularities including:

- Missing critical information or signatures
- Inappropriate format (type size, spacing, margins, etc...)
- Number of pages exceeding that allowed
- Application does not "fit" with the mission / objectives of the agency
- Missing sections
- Applicant does not qualify
- Extra (not required) information is included.

Depending on the seriousness of the irregularity, the application may be rejected, or further information will be solicited.

The applications are then assigned to external reviewers. These are chosen from names recommended a) by the applicants, b) by members of the review committees and c) from the database in the agency. The external reviewers are asked to submit extensive written reviews, which are made available to the members of the appropriate review committee. Both the external reviewers and review committee members (see below) are asked to follow a format such as this in their reports:

- A concise summary of the proposal (no more than a single paragraph) emphasizing the significance of the proposed research.
- An evaluation of the work done previously as presented in a progress report (if applicable).
- An assessment of the strengths and weaknesses of the proposal, including your opinion regarding:
  - originality of the hypotheses presented and the significance of the questions asked
  - feasibility
  - relationship to the previous work done by the applicants
  - appropriateness of the critical review of the literature
  - scientific and intellectual environment
  - applicant’s knowledge of the field as reflected in the literature reviewed
  - appropriateness of the research plan and methodology
  - significance of the work conducted previously and the potential of the proposed work to elucidate new and important knowledge
  - appropriateness of the budget
- Most agencies aim for at least two external reviews for each application.
- Each application is usually assigned to two members of the review committee for detailed analysis (the primary reviewers). They may or may not be experts in your field. They may not be required to submit written reports. Only the two primary reviewers may be required to study the entire application. The other members of the review committee may not receive the entire application. They may only receive the abstract/summary pages.
- At the meeting of the review committee:
  - Each application may receive no more than 15 minutes of discussion.
  - The two primary reviewers introduce each application and give their evaluations. The external reviews are analyzed and comments made. The others on the committee then participate in discussion. A Final Score and/or Rating is made, and a rank order decided on the basis of scientific excellence.
  - All then participate in the discussion of budget and a final recommendation is made.
  - The members may know the global budget available to their committee. Demands for funding often far outweigh the funds available. Thus many very

good proposals will fall below the cut-off. There will be painful discussion concerning the "trade off" of size of budget per application vs. number of applications funded.

- The recommendations of the review committee are then reported to the "higher body" which usually accepts the rank order decided by the review committee but argues further about budget. This becomes most difficult when it is seen that the cut-off is too high, with many very good applications being rejected.

6. ACKNOWLEDGEMENTS

"Stealing from one source is plagiarism, while stealing from many is research"

Ideas incorporated from a number of sources:

1. Reif-Lehrer, Liane: Grant Application Writer's Handbook, Jones and Bartlett Publishers, Boston MA, USA, 1995. This book contains excellent advice for both new and seasoned grant application writers, some of which has been incorporated herein. Although aimed primarily with the National Institute of Health and the National Science Foundation in mind, much of the advice can be applied universally.
2. Profs. Tutis Vilis and Jane Rylett in the Department of Physiology at the University of Western Ontario have prepared guidelines for applicants based on their extensive experience. Many of their suggestions are incorporated.
3. Colleagues both in Europe and North America have examined this document and have provided useful criticisms.
4. A number of applicants, external reviewers and members of review committees have provided (inadvertent?) fodder.
5. But I take full responsibility for all errors, omissions, opinions, and recommendations.

A FINAL REQUEST

This is a work in progress. If you have any criticisms, suggestions or items to be added or deleted, I welcome your comments.

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Appendix 3 – Lexicon

Acronyms

AI	Alberta Ingenuity
AR	Applied Research
ARC	Alberta Research Council
ARI	Applied Research Institute
ARIBSS	Applied Research Institute for Business and Social Studies
ARIG	Applied Research Ideas Grant
AROS	Applied Research Opportunities for Students
CAQC	Campus Alberta Quality Council
CCAC	Canadian Council on Animal Care
CFI	Canada Foundation for Innovation
CIHR	Canadian Institutes of Health Research
CIPO	Canadian Intellectual Property Office
DMCI	Duncan McNeill Centre for Innovation
DTAD	Department of Teaching and Academic Development
ELN	Electronic Laboratory Notebook
FRT	Faculty Release Time
GCP	Good Clinical Practice
GLP	Good Laboratory Practice
GMP	Good Manufacturing Practice
HQP	Highly Qualified Personnel
IP	intellectual property
IRAP	Industrial Research Assistance Program (NRC-IRAP)
ITA	Industrial Technology Advisor, NRC-IRAP
MTA	Material Transfer Agreement
NABI	Northern Alberta Business Incubator
NAIT	Northern Alberta Institute of Technology
NDA	Non-Disclosure Agreement
NINT	National Institute for Nanotechnology
NRC	National Research Council
NSERC	Natural Sciences and Engineering Research Council
NSMC	NAIT Shell Manufacturing Centre
PDP	Product Development Program
PI	Principle Investigator
REB	Research Ethics Board
S&T	Science & Technology
SIFE NAIT	Students in Free Enterprise NAIT
SME	Small and medium-sized enterprise (less than 500 employees)
SOP	Standard Operating Procedures
SoTL	Scholarship of Teaching and Learning
SSHRC	Social Sciences and Humanities Research Council
Tri-Council	CIHR, NSERC and SSHRC
WD	Western (Economic) Diversification
WestLink	WestLink Innovation Network Ltd

Glossary[26]

Applied Research – The application of new or existing knowledge to solve real-world challenges. Unlike pure research, it is focused on the identification of usable solutions or applications to align with industry needs and opportunities.

Assignment – Assignment is the complete legal transfer of all or part of the intellectual property rights from the lawful owner (called Owner) to another party (called Assignee).

Background Intellectual Property – Background IP means all IP first conceived and reduced (actually or constructively) to practice outside of the scope of the project activity and know-how, such as intellectual property owned, directly or indirectly, or licensed by a party prior to the commencement of the project.

Board – The Board of Governors of the Northern Alberta Institute of Technology.

Commercialization Cost – Includes both direct (such as initial and recurring appraisal costs, initial and recurring legal expenses, initial patent filing and approval expenses, recurring IP maintenance expenses, and ongoing business development expenses) and administrative costs (such as administrative support, office expenses, technology transfer personnel time) applicable to commercialization of Intellectual Property.

Confidential Information – Information that is received by an individual or organization from a third party under an express or implied obligation of confidence.

Confidentiality Agreement – Confidentiality agreements (CDAs), known also as non-disclosure agreements, are contracts in which the parties agree not to disclose the secret information they share and not to make unauthorized use of such information.

Conflict of Commitment – A conflict of commitment arises when an employee undertakes external commitments which burden or interfere with the employee's primary obligations and commitments to the College.

Conflict of Interest – A conflict of interest may arise when an employee of the institute has an opportunity to influence the College's business, administrative, academic or other decisions in ways that could lead to personal gain or advantage of any kind.

Contract – An agreement between legal entities (namely the sponsor and the institute) to provide financial support for an investigator or investigators, to conduct research in a particular subject area or field under specific stipulations and conditions. Generally these

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[26] Sources:

Canadian Intellectual Property Office website, accessed December 15, 2009 http://www.cipo.ic.gc.ca/eic/site/cipointernet-internetopic.nsf/eng/Home

Government of Alberta (2007). *Roles and Mandates Policy Framework for Alberta's Publicly Funded Advanced Education System.* Edmonton, AB: Ministry of Advanced Education and Technology.

NAIT Academic Regulations and Procedures: Full-time, Continuing Education, Part-Time and Apprenticeship Programs

NAIT Policy IR 5.0 Intellectual Property, 2009 revised draft.

Organization for Economic Co-Operation and Development (1997). *Oslo Manual The Measurement of Scientific and Technological Activities Proposed Guidelines for Collecting and Interpreting Technological Innovation Data Second Edition.* Oslo, Norway: OECD/Eurostat.

conditions specify the scale, scope, term and deliverables for the research and establish the ownership, patent rights and future licensing arrangements.

Copyleft – Copyleft is a vernacular term (unlike copyright, which is a legal term) and refers to forms of (permissive) licensing used to modify copyrights for works such as computer software, documents, music and art. Copyleft is a play on the word copyright to describe the practice of using copyright law to remove restrictions on distributing copies and modified versions of a work for others and requiring that the same freedoms be preserved in modified versions. Examples of copyleft licenses include various Creative Commons licenses and the GNU General Public License. Examples of creative works available under various copyleft licenses include Wikipedia, MIT's Open Courseware, and open-source software such as Linux.

Copyright – Copyright is the exclusive right to copy a creative work or allow someone else to do so. It includes the sole right to publish, produce or reproduce, to perform in public, to communicate a work to the public by telecommunication, to translate a work, and in some cases, to rent the work. Copyright applies to all original literary, dramatic, musical, and artistic works. These include books, other writings, music, sculptures, paintings, photographs, films, plays, television and radio programs, and computer programs. Copyright also applies to other subject matter including sound recordings (such as records, cassettes, and tapes), performer's performances, and communication signals.

Creator – The Creator is the person who creates Intellectual Property through his or her creative endeavour. Other synonyms (depending on the context and the type of Intellectual Property) may be Inventor, Artist, Author, Innovator, Scientist, or Researcher.

Employee - For the purpose of the intellectual policy framework (IR 5.0, 5.1, and 5.2), this refers to any person employed by the Board who is one of the following:

- Covered under the terms and conditions of the collective agreement between NAIT and NAIT Academic Staff Association (NASA)
- Covered under the terms and conditions of the collective agreement between NAIT and Alberta Union of Provincial Employees (AUPE)
- Not covered by any collective agreement, and referred to as 'Management' and 'Excluded'
- Providing their services on a salaried or hourly basis, whether for continuing education or any other purpose
- A Post-doctoral Fellow (PDF) (For the purpose of this policy framework, PDFs are considered employees of NAIT.)
- A Student (If employed and paid by NAIT in the course of developing the said IP, students will be treated as employees for the purpose of this policy.).

Foreground Intellectual Property – Foreground intellectual property means all IP first conceived or first reduced to practice (actually or constructively) under the project activity.

Grant – Financial support for an investigator, or investigators, or a group/centre/institute conducting research in a particular subject area or field without any formal detailed stipulations as to the direction or outcomes of the research.

Industrial Design – An industrial design is the features of shape, configuration, pattern, or ornament (or any combination of these) applied to a finished article. It may be, for example, the shape of a table or the ornamentation on the handle of a spoon. The article can be made by hand, tool, or machine.

Innovation – An innovation is defined as the introduction of new or significantly improved goods or services to the market, or the introduction of new or significantly improved processes, including new or significantly improved ways of delivering goods or services.

Institute/Institution – Northern Alberta Institute of Technology (NAIT)

Integrated Circuit Topography – A product that is intended to perform an electronic function. Integrated circuits, referred to as "chips," are tiny electronic devices found in everything from common appliances to robots.

Intellectual Property (IP) – Very broadly, means the legal rights that result from intellectual activity in the industrial, scientific, literary and artistic fields.

Internet Domain Names – While not falling within the six traditional forms of IP recognized in Canada, Internet Domain Names are analogous in many ways to Trade-Marks.

Invention – A discovery or development that *may* be protectable under the patent laws of Canada or equivalent laws in other countries.

Invention Disclosure (Report of Invention) – An Invention Disclosure is usually made when something new and useful has been conceived or developed, or when unusual, unexpected, or unobvious research results have been achieved that may have commercial value. The disclosure is normally made via an Invention Disclosure Form.

Know-how – Know-how is not a legal term of art. It can be referred to as factual knowledge not capable of precise, separate description, but that when used in an accumulated form gives to the one acquiring it an ability to produce something that he or she otherwise would not have known how to produce with the same accuracy or precision found necessary for commercial success. Know how is often referred to as a Trade Secret.

Licensing – The transfer of a portion of the IP rights from the owner or an authorized party (called Licensor) to another party (called Licensee). It is not a complete transfer of IP rights as in the case of an assignment. Licensing is subject to a variety of terms and conditions specified in the Licensing Agreement.

Licensing Agreement – An agreement between the Licensor and a Licensee that usually permits the latter party to practice the invention or benefit from rights. A Licensing Agreement usually involves some compensation from the Licensee to the Licensor.

Material Transfer Agreement (MTA) – An MTA is a contract that governs the transfer of one or more materials from the owner or authorized licensee to another institution for research purposes. Materials may include cultures, cell lines, plasmids, nucleotides, proteins, bacteria, transgenic animals, pharmaceuticals, and other chemicals. MTAs are

used to transfer materials between institutions from all sectors of the scientific community. An MTA governs such issues as:

- ownership of the transferred materials and of modifications and derivatives made by the recipient
- limits on the use of the materials by the recipient institution
- confidentiality of information related to the materials
- rights to inventions and research results.

Moral Rights (Copyright Act) – Under the Canadian Copyright Act, Moral Rights refers to the rights that the author of a work has:
(a) to the integrity of the work
(b) where reasonable in the circumstances, to be associated with the work as its author by name or under a pseudonym and the right to remain anonymous.
Copyright can be defined as an economic right, whereas moral rights are to protect the honour and reputation of an author. While copyright in a work may be assigned, the moral rights remain with the author, and cannot be assigned, but only waived.

Net Revenue – Revenues remaining after direct and indirect costs attributed to commercialization are recovered.

Non-Disclosure Agreement – Non-disclosure agreements, known also as confidentiality agreements, are contracts in which the parties agree not to disclose the secret information they share and not to make unauthorized use of such information.

NSERC – Natural Sciences and Engineering Research Council of Canada.

Open Literature – Literature that is available to the public in exchange for money or otherwise. These include books, journals, magazines, and newspapers, whether in print or electronic means.

Patent – The primary goal of the patent system is to encourage innovation and commercialization of technological advances. To this end, the patent system offers an incentive to inventors to publicly disclose their inventions in exchange for the exclusive right to prevent others from making, using, offering for sale or selling the inventions throughout the country that issues the patent or importing the inventions into the country that issues the patent. In Canada, this exclusive protection extends for 20 years from the date of filing.

Patent Application – A formal document submitted to a patent trademarks office with a request to grant a patent. The application includes an abstract of the invention (disclosure), patent drawings, specifications, claims, oath or declaration and a filing fee payment.

Principal Investigator – The primary person responsible for a research project. This individual would be the primary researcher identified in a research grant or contract and tasked with managing the actual research activity, authorizing purchases from funding sources and supervising any project personnel.

Provisional Patent – A type of patent protection filing unique to the United States. It allows inventors to file incomplete patent documents (lacking proper claims and declarations) in order to claim priority filing dates. Applicants are allowed to file a full patent application drawing priority from the provisional patent application's filing date or

withdraw their filing at the annuity of the provisional patent application. If withdrawn or abandoned, the provisional patent application is not disclosed in the patent application database.

Public Disclosure or Publicly Disclosed – Any written or oral disclosure of an Invention or Copyrightable work to any person not under a contractual or fiduciary obligation of confidentiality to the institution.

Public Domain – The Public Domain refers to IP that is not owned or controlled by anyone. Materials in the Public Domain are available for anyone to use for any purpose. Public Domain may be subject matter specifically excluded under existing laws, or IP that have lost legal protection (due to expiration or otherwise).

Revenue – Compensation received by the IP Owner/Licensor from Assignee/Licensee.

Royalties – A sum paid to intellectual property owners in exchange for doing acts that are otherwise considered infringement. Royalties often form part of the terms and conditions of a licensing agreement.

Scholarly Work – A copyrightable work that has the primary goal of disseminating academic or scholarly knowledge or is a work of artistic expression.

Student – A person who is registered to attend a course or group of courses, which have been approved by the administration of the institute, and which are offered at any campus or location approved by the institute. Student status continues during the approved academic period for the course or group of courses and ceases upon the earlier of the date of termination for any reason or the last day of the approved academic period for the course or group of courses.

Term Sheet – A document summarizing the terms and conditions of a business or legal agreement. These terms are then translated into an official legal agreement. Term sheets can be binding or non-binding, depending on the wishes of the parties to the agreement.

Trade Secret – Information collected or created by a person for his/her use and intended to be kept secret because of some competitive advantage that the data gives to the holder. A Trade Secret can be information, including but not limited to a formula, pattern, compilation, program, method, technique, or process, or information contained or embodied in a product device or mechanism which (i) is, or may be used in a trade or business, (ii) is not generally known in the trade or business, (iii) has economic value from not being known generally, and (iv) is the subject of efforts that are reasonable under the circumstances to maintain its secrecy.

Trademark – A word or symbol which a manufacturer or merchant places on products to distinguish them from similar products. The trademark, also called a logo or brand name, can include numbers, a word or words, slogan, symbol, design or any combination of these. It indicates a product of a certain manufacture, identity, quality or consistency.

Website URLs

AACTI	http://www.aacti.ca/
AACTI	http://www.aacti.ca/
ACAMP	http://www.acamp.ca/
ACCC	http://www.accc.ca/
Alberta Foundation for the Arts	http://www.canadacouncil.ca/grants/acdi_idca/default.htm
AUTM	http://www.autm.net
CAURA	http://www.caura-acaru.ca/
CCAC	http://www.ccac.ca/
CIPO	http://www.cipo.ic.gc.ca/
DMCI	http://www.nait.ca/52501.htm
FRIAA	http://www.friaa.ab.ca/
Lab Notebooks	http://otl.stanford.edu/inventors/resources/labnotebooks.html
NAIT Library	www.nait.ca/library
NAP Book On Being a Scientist 3rd Ed	http://www.nap.edu/catalog.php?record_id=12192
NAP Video On Being a Scientist	http://www.youtube.com/watch?v=wIBjGV3OB0o
novaNAIT	www.novanait.ca
*nova*NAIT Boreal Research Institute	http://www.nait.ca/47683.htm
NRCan Canadian Forest Service	http://cfs.nrcan.gc.ca/forestresearch
NSERC CCI Program	http://www.nserc-crsng.gc.ca/Professors-Professeurs/RPP-PP/CCI-ICC_eng.asp
NSERC I2I Program	http://www.nserc-crsng.gc.ca/Professors-Professeurs/RPP-PP/I2I-INNOV_eng.asp
NSERC	http://www.nserc-crsng.gc.ca/
NSMC Manufacturing Solutions	http://www.nait.ca/26747.htm
NSMC Productivity Enhancement	http://www.nait.ca/26746.htm
NSMC	http://www.nait.ca/26738.htm
SDTC SD Tech Fund	http://www.sdtc.ca/en/funding/SD_Tech_Fund/
SoTL	www.nait.ca/sotl
SSHRC	http://www.sshrc.ca/
STEP	http://employment.alberta.ca/CES/3158.html
Tri-Council Policy Statement	http://pre.ethics.gc.ca/eng/policy-politique/tcps-eptc/
WHO GLP Handbook	http://apps.who.int/tdr/svc/publications/training-guideline-publications/good-
YTP-HATCH	http://www.nait.ca/52909.htm

Appendix 4 – Forms and Agreement Templates

All of these forms are/will be available on the eForms Repository. Until then, please contact novaNAIT personnel for assistance.

Research Funding Forms

Research Proposal Submission Form
Applied Research Ideas Grant (ARIG) Application Form
Applied Research Opportunities for Students (AROS) Grant Application Form
Applied Research Engagement Form
Application for Faculty Release Time Form
Scholarship of Teaching and Learning Grant Application Form

Post-Award Activity Forms

Research Cost Centre Creation Form

Ethics Forms

Request for Ethics Review
Ethics Proposal
Animal Use Protocol Form
Animal Use Short Protocol Form

Technology Transfer Forms

Invention Disclosure Form

Template Agreements

Mutual Non-Disclosure Agreement
Outgoing Material Transfer Agreement for Biological Materials
Outgoing Material Transfer Agreement for Non-Biological Materials

Appendix 5 - Library Resources for Research

Location	Call Number Title	Date
McNally Main Shelves		
001.42 B725 2008	Craft of research / Wayne C. Booth, Gregory G. Colomb, Joseph M. Williams.	c2008.
001.42 C554 2007	Experimental methodology / Larry B. Christensen.	c2007.
001.42 H587 2006	Practice of qualitative research / Sharlene Nagy Hesse-Biber, Patricia Leavy.	c2006.
001.42 M465 2005	Qualitative research design : an interactive approach / Joseph A. Maxwell.	c2005.
001.42 N873 2004	Interactive qualitative analysis : a systems method for qualitative research / Norvell Northcutt, Danny McCoy.	c2004.
001.42 R432 2009	Research essentials : an introduction to designs and practices / Stephen D. Lapan, Marylynn T. Quartaroli, editors.	c2009.
001.42 R643 2007	Getting the most out of the research experience : what every researcher needs to know / Brian Roberts.	2007
001.42 R938 2004	How to find information : a guide for researchers / Sally Rumsey.	c2004
001.422 B583 2007	Multilevel analysis for applied research : it's just regression! / Robert Bickel.	c2007.
001.422 N223 2006	Interpreting data : a guide to understanding research / Peter M. Nardi.	c2006.
001.433 H236 2007	Handbook of research on electronic surveys and measurements / Rodney A. Reynolds, Robert Woods Jason D. Baker [edito	c2007.
003.3 P957 2009	Principles of modeling and simulation : a multidisciplinary approach / edited by John A. Sokolowski, Catherine M. Banks.	c2009.
300.1 G558 2006	Becoming qualitative researchers : an introduction / Corrine Glesne.	2006
300.72 A885 2008	Attitude measurement / edited by Caroline Roberts and Roger Jowell.	2008
300.72 B561 2008	Best practices in quantitative methods / edited by Jason Osborne.	c2008.
300.72 B764 2004	Research process / Gary D. Bouma and Rod Ling.	2004
300.72 B916 CanEd 2005	Social research methods / Alan Bryman and James J. Teevan.	2005
300.72 C676 2005	Doing action research in your own organization / David Coghlan, Teresa Brannick.	c2005.
300.72 C923 2009	Research design : qualitative, quantitative, and mixed methods approaches / John W. Creswell.	c2009.
300.72 E56 2005	Encyclopedia of social measurement / editor-in-chief, Kimberly Kempf-Leonard.	2005
300.72 G634 2004	Social research methodology : a critical introduction / Roger Gomm.	2004
300.72 M322 2005	Essentials of research design and methodology / Geoffrey Marczyk, David DeMatteo, David Festinger.	c2005.
300.72 P184 2008	Research decisions : quantitative and qualitative perspectives / Ted Palys, Chris Atchison.	c2008.
300.72 P984 2005	Introduction to social research : quantitative and qualitative approaches / Keith F. Punch.	c2005.
300.72 S129 2004	Sage encyclopedia of social science research methods / Michael S. Lewis-Beck, Alan Bryman, Tim Futing Liao, editors.	c2004.
300.72 S129 2008	Sage encyclopedia of qualitative research methods / Lisa M. Given, editor.	c2008.
300.72 S587 2005	Doing qualitative research : a practical handbook / David Silverman.	c2005.
300.72 S587 Qua 2007	Very short, fairly interesting and reasonably cheap book about qualitative research / David Silverman.	2007.
300.72 S617 2005	Approaches to social research / Royce A. Singleton, Jr., Bruce C. Straits.	c2005.
300.72 T787 2009	Quantitative data analysis : doing social research to test ideas / Donald J. Treiman.	c2009.
300.722 Y51 2009	Case study research : design and methods / Robert K. Yin.	c2009.
300.723 B798 2004	Asking questions : the definitive guide to questionnaire design--for market research, political polls, and social and health ques	c2004.
300.723 C725 2007	Designing and constructing instruments for social research and evaluation / David Colton and Robert W. Covert.	c2007.
300.723 F499 2009	How to conduct surveys : a step-by-step guide / Arlene Fink.	c2009.
300.723 N223 2006	Doing survey research : a guide to quantitative methods / Peter M. Nardi.	c2006.
330.072 E84 2004	Research methodology in applied economics : organizing, planning, and conducting economic research / Don Ethridge.	c2004.
361 S918 2007	Action research / Ernest T. Stringer.	c2007.
370.72 T493 2005	Fundamentals of measurement in applied research / Theresa A. Thorkildsen.	c2005.
378.007 R432 2003	Research in the college context : approaches and methods / Frances K. Stage, Kathleen Manning, editors.	c2003.
610.72 D422 2005	Introduction to research : understanding and applying multiple strategies / Elizabeth DePoy, Laura N. Gitlin.	c2005.
658.0072 B979 2006	Business and management research methodologies / edited by Phil Johnson and Murray Clark.	2006.
658.0072 C776 2006	Business research methods / Donald R. Cooper, Pamela S. Schindler.	c2006.
658.0072 D878 2008	Case study methodology in business research / Jan Dul and Tony Hak.	2008.
658.0072 L244 2005	Research methods in management : a concise introduction to research in management and business consultancy / Geoff L	c2005.
658.0072 S129 2008	Sage dictionary of qualitative management research / compiled and edited by Richard Thorpe, Robin Holt.	2008.
658.0072 T367 2007	Management research methods / Phyllis Tharenou, Ross Donohue, and Brian Cooper.	2007.
690.072 F322 2008	Research methods for construction / Richard Fellows and Anita Liu.	2008.
McNally Reference Area		
001.403 S167 2007	Encyclopedia of measurement and statistics / editor Neil J. Salkind ; managing editor Kristin Rasmussen.	2007.
300.72 M484 2006	Measurement / edited by David J. Bartholomew.	2006
300.72 Q1 2007	Qualitative research 2 / edited by Alan Bryman.	2007.
300.72303 S963 2008	Encyclopedia of survey research methods / editor, Paul J. Lavrakas.	2008