Mitacs
Inspiring innovation
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# Mitacs Accelerate Proposal

## INSTRUCTIONS

- Please make sure you are using the latest version of this form posted on **www.mitacs.ca/en/programs/accelerate/apply-now.** This link also provides an Accelerate Guide with detailed information on how to write your proposal.
- Please **do not modify, remove** text or instructions in each section/subsection **or reformat** this form in any way. A modified form will result in a delay in the internship evaluation process.
- Send your draft proposal to your Mitacs Business Development Representative **prior** to obtaining all signatures and submitting.
- The proposal should be written and submitted **at least eight (8) weeks prior to the planned start date of the internship. For international travel, a minimum 16 weeks lead time is required.**
- The start date of the internship has to be **after** research approval and the **receipt** of the partner funds at Mitacs.
- Partner funds can be sent directly to Mitacs in Canadian dollars prior to approval to expedite the process.
- If applicable, proposals with a not-for-profit partner must seek partner and project eligibility approval before proceeding. Please contact a Mitacs Business Development Representative to discuss the eligibility of an NFP organization **BEFORE** submitting your application (see section 2.7).
- If applicable, academic supervisor conflict of interest documentation must be submitted with your application (see section 4.1.1 for details). For more information, see Mitacs' Conflict of Interest policy: http://www.mitacs.ca/en/conflict-interest-policy. If applicable, intern conflict of interest declarations must be received by Mitacs before submitting your application (see section 4.3.2).
- If you cannot see the items listed in the drop downs, please refer to Appendix C: Options and type the corresponding answer in the space provided.

**Please note:** If required, your **Mitacs Business Development Representative** can assist you with:

- Identifying your Office of Research Services (ORS) or equivalent representative.
- Assessing the eligibility and completeness of the proposed research.

## APPLICATION CHECKLIST

**A complete internship application package must include the following:**

- The proposal **completed and signed** by all parties in Word form
  - *The Mitacs Accelerate Memorandum* (Section 7) with signatures must be submitted as a scanned PDF
  - Appendix A - Accelerate Intern Consent Form signed
- Intern(s) CV (Any format is allowed. A CV template is available on the Mitacs website)
- Lead Academic Supervisor's CV **only** for projects with **6+ IUs** (CCV as per Tri-Council or other CV format)
- Accelerate budget and invoicing schedule (excel spreadsheet)
- Any supplementary documents (as applicable)

**If your application involves an Accelerate International component please note:**

- You must complete Appendix B – *Accelerate International* in addition to this entire application
- International Pre-Departure Form and Code of Conduct and Ethics form may be forwarded to Mitacs after submission of your application; however, funds cannot be released and internship may not begin until Mitacs receives these forms
- Visit the Accelerate International website to determine if there is any additional required documentation for the country you intend to work with

* **An incomplete application or a modified form will result in a delay in the internship evaluation process.**

# Mitacs Accelerate Proposal

## 1. Research Proposal Summary

| | | | | |
|---|---|---|---|---|
| 1. | **Title of project:** | Personal Health Wallet | | |
| 1. | **Type of project:**<br>Please indicate (x)<br>Select all that apply | ( X ) Accelerate | | |
| | | (_) Accelerate Fellowship | | |
| | | (_) Accelerate Entrepreneur | | |
| | | (_) Accelerate International (Please also complete Appendix B) | | |
| 1. | **Number of Internships:** | 1 | | |
| 1. | **Keywords to identify reviewers:**<br>(5-10 specific keywords; 50% technically related, 50% discipline-related) | Blockchain and Machine Learning | | |
| 1. | **Academic discipline:** | Electrical and Computer Engineering | | |
| 1. | **Project priority sectors:** | 1st Priority Sector | 2nd Priority Sector | 3rd Priority Sector |

1. **List of participants:**

| **Academic Supervisor** | **Department** | **Academic Institution** | **City and Country location of academic institution** |
|---|---|---|---|
| Victoria Lemieux | School of Information | University of British Columbia | Vancouver, Canada |
| | | | |
| **Partner organization(s)** | **Contact name at partner organization** | **City and Country location of organization** | **Partner Legal Status** |
| Molecular You | Rob Fraser | Vancouver, Canada | Select Legal Status |
| | | | Select Legal Status |

### 1. Proposed work plan for internship unit(s) (IU):

Please summarize the work plan for the project by showing which intern will work when. Each IU corresponds to one 4-6 month internship. This table provides a high level overview of the proposed research project and information about intern(s) to the reviewers. Please refer to the **Accelerate Guide: Writing your proposal** to assist you.

| Years | | | Year 1 | | | Year 2 | | | Year 3 | | | Year 4 | | | Year 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Months | | | 1-4 | 5-8 | 9-12 | 1-4 | 5-8 | 9-12 | 1-4 | 5-8 | 9-12 | 1-4 | 5-8 | 9-12 | 1-4 | 5-8 | 9-12 |
| **Intern Name** | **Degree Program** | **IU** | | | | | | | | | | | | | | | |
| Jiaqi Zhang | Meng | 1 | X | X | | | | | | | | | | | | | |
| **Total Internships** | | 1 | | | | | | | | | | | | | | | |
| **Total Project Funding** | **$ 15,000** | | | | | | | | | | | | | | | | |

## 2. Description of Proposed Research

### 2.1. Project title:

Personal Health Wallet

### 2.2. **Research Abstract** (Approx. 200 words):

Please include: Research problem to be addressed and its significance, objectives, and proposed methodology. This section will be used to recruit reviewers; it differs from section 7.2. (Public Project Overview) and must clearly summarize the research proposed.

The health records in Canada are currently unconnected, which means that doctors can hardly see all the medical history of a patient, and researchers lack health data to conduct their research. When we try to integrate health records, however, we often face technical challenges and privacy concerns such as who can access and how to access the data. A methodology to solve this privacy issue is to utilize open-source blockchain technology to give individuals complete control over their health data. Furthermore, doctors and researchers must get authorization from their patients before accessing the data. As such, patients will feel comfortable about uploading and sharing their health data. Integrating health data also brings technical challenges because medical reports are often organized in text-free form. To overcome this problem, we can design a new model to extract biomarker information from pathology reports. In this project, we mainly focus on two types of medical reports: Next Generation Sequencing (NGS) lab reports and Electrical Health Reports (EHRs). A context-free grammar is utilized to parse NGS reports, while EHRs are parsed using a tree-like structure. In this way, we can extract important biomedical information from pathology reports.

### 2.3. **Background** and review of relevant prior work (minimum 500 words):

There is a growing trend of precision medicine worldwide, where each patient is treated differently based on their specific biology information. Tumors are traditionally classified on the grounds of their histological characteristics. However, with the help of precision medicine, the biological behavior of a tumor is understood not only by its histological appearance but also by its genomics.

Currently, pathologists are heavily relied on NGS reports for customized diagnosis, since they provide clues about genetic characteristics based on relevant biomarkers [1]. Biomarkers are important indicators of tumor biological activity. Therefore, it is crucial to obtain statistical data from pathology reports for comparable patients to ensure a reliable diagnosis. It may be achieved by reviewing relevant studies presenting biomarker results, cancer stages, and cytologic traits of tumors retrospectively.

Previous studies [2,3] have focused primarily on biomedical literature when it comes to the automatic extraction of biomarkers. The system proposed by Yonesi et al. [2] for better biomarker names identification in the literature has been implemented in ProMiner [3] and provides a rule-based approach to gene name normalization.

However, due to inherent differences between clinical documents and published scientific articles, that system is insufficient to process pathology documents. For clinical reports, formal grammar rules are rarely followed, and instead, pathology reports are structured with line breaks, white spaces, and hyphens to increase readability. As a consequence, it is difficult to automatically detect the boundary of a sentence and normalize variation of terms, which is essential for biomarker data extraction, because context is an integral part of current solutions.

Clinical reports, unlike biomedical literature, often contain specific jargons and spelling mistakes [4], which makes the identified medical terms more difficult to normalize. We should make sure that medical phrases with the same meaning are classified to the same terms. The cTAKES technique [5] can detect most clinical words and normalize these terms to their Unified Medical Language System (UMLS) [6] accurately. UMLS, however, does not cover all biomarker-related terms used in NGS reports. Although cTAKES can use different dictionaries for normalization, there are still difficulties in customizing cTAKES to work with keyword-based reports such as NGS. As a result, we should build our own biomarker dictionary to normalize all the biomedical terms.

There are some useful online resources, too. Pathpedia (www.pathpedia.com) [7] is a pathology resource website that provides a wide range of biomedical information from statistical data about biomarker levels to clinical pathology features. A large amount of manual editing data and an enormous number of information sources are the two key features of Pathpedia. In contrast, utilizing journal articles as the primary source of reference material has drawbacks. Certain biomarkers, in particular, are covered in a small number of scientific publications, which makes data verification difficult.

Researchers from Seoul National University extracted biomarker names from real-world reports and built a web-based information system [7] to compute and show statistics of clinical data derived from pathology reports. The system aims to discover potential relationships between various biomarkers and pathologic diagnoses. Our work is based on that web system but extended by including more biomarker terms from NGS reports and EHRs reports. We will present how to extract biological information from pathology reports by using our method.

**2.4. General objective** of the research project broken down into sub-objectives, activities, themes, or subprojects, as applicable:

The main part which Jiaqi will contribute to this project is to extract biomedical data from different kinds of reports. This is fundamental for building machine learning models in later stages.

1) Extract information from NGS Reports:

   NGS stands for Next-Generation Sequencing. Each NGS Report is an important reference for tumor diagnosis. There are many biomarker names contained in the NGS Reports. Our aim is to build a system which could automatically extract all the biomarker information and test results from the NGS reports and normalize those biomarker terms and test results.

2) Extract information from EHR Reports:

   EHR stands for Electronic Health Record. There is some important information contained in the EHR reports, such as the examined organ, the diagnosis results, and any other vital biology information. We aim to build a tree-style tool which can distill medical data and diagnosis results from the EHR reports and store these data in a tree structure.

3) Merge results from the two reports:

   After extracting biology information from two kinds of reports, we will merge the results. To merge results of NGS and EHR reports, we need to find an attribute which appears both in NGS and in EHR reports and can associate the findings of NGS with those of EHR reports. As a result, we may choose tissue slides (TS_ID) because they are unique and can be found regularly in both kinds of reports.

We will implement and validate the above extraction systems. We will also test two extraction systems and evaluate the results merged by the two systems. We may do more research and make some adjustments to improve our extraction system.

### 2.5. Details of internships or subprojects:

**For each intern or subproject, provide the following mandatory information:**

**a.** **Name of intern.**

Jiaqi Zhang

**b.** **Specific objectives of the internship or subproject**. Clearly state your [sub-] objectives so reviewers can assess if they are achievable.

**c.** **Methodologies**. Provide enough detail so reviewers can determine if the proposed methodology is appropriate and sufficient to achieve the [sub-] objectives.

There are two internship units (4 months each) in this research project taken by Jiaqi Zhang, a first-year MEng student from the Electrical and Computer Engineering department at UBC. Jiaqi will take the first internship unit at UBC, and the other 4-month internship at Molecular You.

This research project consists of four major activities: literature review, building two systems to extract biology information from NGS and EHR reports, testing systems, and writing up results. It took us about two months for literature review and research on biomarker extraction methods. We then review and compare different data extraction methods. At the end of the first stage, we will finalize our biomedicine information extraction strategy. In the next four months, we will build our biomarker dictionaries used to search for different biomarker names. In the last four months, we will test and correct our system with more real-world data and write final reports. The following sections describe the objectives, methodologies, and further details of the pathology report approach.

1) Information Extraction from NGS reports

For summarizing NGS findings, we plan to adopt a semi-structured approach which is further characterized as a list-based or table-based style. To ensure parsing accurately with simplicity, we intend to create the information extraction system with this semi-structured approach in mind. We plan to construct a context-free grammar to determine biomarker names that tokens represent. Similarly, we also use context-free grammar to identify test results based on tokens. The boundary of each tissue slide paragraph labeled with the corresponding tissue slide will also be recorded by the parser. Items processed from the NGR reposts are paired with relevant microscopic results extracted from EHR records based on tissue slides.

1.1) Build BN dictionary

Terminology variation of Biomarker name should be taken into consideration. As a result, normalizing biomarker terms is an important step. For example, 'Wilms' tumor 1 protein', 'WT-1′, 'Wilms tumor 1-protein', and 'WT1 (4)' should be all transformed to the same representative form 'Genes, Wilms' through biomarker term normalization. We will build a biomarker name dictionary to look up biomarker names. With the BN dictionary, we do not need to look through all the pathology reports to find biomarker names manually and greatly improve research efficiency. Building BN dictionary is a crucial step in the whole research project because all the later research works are based on data extracted by BN dictionary. The accuracy and coverage of BN dictionary we built influence the results of the research directly. The dictionary is based on a list of official biomarker names created by SNUH, which has already included more than one hundred biomarker names. However, the official list of biomarker names does not contain sufficient terminology variation of biomarker names that appear frequently in the pathology reports, so we need to expand our own dictionary by adding more biomarker names and terminology variations. The BN dictionary could be dynamically enlarged by adopting certain prescribed criteria to cover minor notational changes like the insertion of white space or commas. The dictionary expansion will allow us to find more matches of biomarker names.

1.2) Build TR dictionary

Similar rules can be applied to test results normalization. There are three normalized test result terms in total, which are “Negative”, “Positive” or “Error”. If test results contain “positive” or “negative”, then we normalize those test results to “Positive” or “Negative”, otherwise to “Error”. We can build a test result dictionary based on the rules stated above and use it to look up test results. With TR dictionary, we can quickly get test results from Pathology reports without scanning through reports manually. It can save us a lot of time to find test results. Furthermore, test results are important references of the later research.

2) Information extraction from EHR reports

In general, EHR could be processed in a similar way as the NGS report. Most EHR reports summarize microscopic results grouped by the anatomical position of the examined tissue sample, rather than by tissue slides (TS_ID), following CAP recommendations. EHR report is more challenging because of its less structured report style compared to NGS. Therefore, the context-free parsing technique utilized in the NGS report is insufficient to resolve EHR reports. Luckily, the organ from which tissue originated is usually stated in the first few lines of EHR reports. And pathology findings for that tissue [8] are usually explained in detail in the following few lines. For the purpose of improving the accuracy of the parser, we will design the parser with this behavioral tendency in mind. We plan to design a tree-style parser for the EHR reports, in which the tree nodes are defined by organ names.

To put it in another way, different organ names should be identified correctly by the parser in order to generate a tree with organ names as nodes. Before implementing such a tree-style parser, we will first create a dictionary to look up all the organ names. The system will follow a similar method to distinguish and normalize disease names with their Unified Medical Language System names while analyzing SP reports. If a node linking with a disease name is found to have a subtree, then all its sub-nodes are assumed to indicate comprehensive microscopic results for that illness. Finally, we will double-check and manually add a collection of patterns to the parser.

3) Merge information from reports

We observed that pathology findings of tissue slides can be displayed both in an appendix of NGS and EHR reports. Therefore, diverse microscopic findings for distinct tissue slides could be found in the patients’ EHR reports when implementing the data model.

We will assume that the tissue slide (TP_ID) stands for the smallest unit when presenting a pathology result to link the biomarker extracted from NGS reports and findings taken from EHR reports. The assumption is supported by the fact that the first few lines of each NGS report contain the serial number of the target tissue slide. This finding was also confirmed by the College of American Pathologists (CAP) [9, 10].

Furthermore, many EHR reports clearly state some findings are derived from tissue slides. As a result, we can link NGS findings with EHR results based on the same tissue slides. In addition, we will also introduce a tissue slide paragraph (TS_P) to refer to a collection of NGS results associated with a single tissue slide (TS_ID).

Based on the above findings, we will integrate the information extracted from NGS and EHR reports according to tissue slides (TS_ID). Biomarker names taken from NGS reports can be matched with relevant microscopic results taken from EHR reports in terms of tissue sliding. We can also build KNN, CNN models to train data obtained from NGS and EHR reports.

**d)** **Timeline**. We suggest using a Gantt chart to provide a timeline showing which task will be done when to achieve each objective.

| | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug |
|---|---|---|---|---|---|---|---|---|---|---|---|

| | '20 | '20 | '20 | '21 | '21 | '21 | '21 | '21 | '21 | '21 | '21 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Literature review** | ✓ | ✓ | | | | | | | | | |
| **NGS reports** | | | ✓ | ✓ | ✓ | | | ✓ | | | |
| **EHR reports** | | | | | ✓ | ✓ | ✓ | ✓ | | | |
| **Writing up results** | | | | | | | | | ✓ | ✓ | ✓ |
| **Documentation** | | ✓ | | | | | ✓ | | ✓ | ✓ | ✓ |

e) **Expected deliverables.** Each project requires the submission of a completed Mitacs Final Report and Mitacs survey at the end of the project**.** Please describe the additional expected deliverables of the project i.e. expected outcomes, results, documents (intern's thesis, peer-reviewed journal, conference presentation).

1) **Writeups**. In addition to a Mitacs final report and Mitacs survey, the deliverables of the project will include the intern's proposals and thesis. These writeups will comprise literature reviews, methodology description, test results and evaluation.

2) **Code.** Many software deliverables will result from our project. We will implement a Biomarker names dictionary and a test result dictionary to extract biomarker information and test result respectively from NGS reports. We will also design a tree-style parser to extract organ and disease information from EHR reports.

f) **Benefit to the intern.**

There are several benefits that the intern could get from this research project. Firstly, Jiaqi could learn valuable research skills, such as reading and analyzing papers, finding a possible methodology to the problem. Secondly, Jiaqi could improve her coding skills during the project. Thirdly, Jiaqi could gain important work experience by working in a large team in the industry. Finally, the intern could apply what she learned on Blockchain and Machine Learning courses to the project and in return expand her expertise in those areas.

g) **Interaction**. Indicate the percentage (%) of time during the project that the intern will spend on-site at the partner's location and at the academic institution(s). Research should be carried out equally (50%) in the premises of the partner and the academic institution(s), if different, please include a **justification**. NOTE: The minimum interaction at either site is 25

% with a maximum of 75%.% of partner interaction: _50___ % + % of academic interaction: _50___ % = 100%

The project will be carried out equally both at the academic institutions (UBC) and the Partner location, Molecular You. Therefore, the percentage of time spent at the partner's location will be 50% and the percentage of time spent at the academic institution will also be 50%. Hopefully, COVID will not be an issue next year, so the intern can be on-site at the partner's location rather than remote work.

h) **Partner Interaction.**

a. Provide a detailed description of the activities that will be performed on-site at the partner organization and the expected interaction with and supervision by employees of the partner organization.

One regular activity is the project meetings held once a week to report the project progress or some new findings of the data extraction methods. The intern may also join the meeting with Molecular You employees, like software engineers and project managers, and learn from them. For the practical side of the project, Jiaqi will implement the Biomarker names dictionary and Test results dictionary which are important to biomarker information extraction from the NGS report. Jiaqi will also write Unit Tests to ensure the proper functionality of the two dictionaries. Jiaqi will also evaluate the performance of the data extraction strategy.

**b.** Indicate the resources the partner organization will be providing to support the intern's work at their premises. Include information about (1) space, (2) resources and (3) expertise that will be provided by the organization to the intern.

The partner organization, Molecular You, will provide first-hand real-world data, both NGS reports and EHR reports obtained from clinics. Molecular You will also provide technical assistance to explain their project and drive the initiative towards greater effect.

### 2.6. Relevance to the partner organization and to Canada:

Describe (1) the partner's proposed role in the project, (2) how the partner will benefit from participating, and (3) how the Canadian community will benefit from this research.

The partner organization, Molecular You, will be an important collaborator in this project. Molecular You will collect pathology reports from clinics and the quantity and quality of the real-world data is crucial for our project. Molecular You is the proposer of the research project and they set the direction that the research will carry on.

The partner can benefit from participating. The partner proposed the problem and the UBC research group could do research and find a possible way to solve the problem. The collaboration between Molecular You and UBC will enable a bidirectional flow of information between the basic research issues addressed in this project and Molecular You's industry research.

Canadian community can benefit from this research. By using the platform provided by this project, citizens do not need to carry hard copies of their medical history to see their doctors every time. Instead, they just upload all their medical reports to the platform and choose to share their medical history with different authorized parties whenever they need that information. And all of the patients' pathology reports would be saved safely by using blockchain technology and individuals have complete control of their medical records. It is a meaningful project which makes ordinary life easier and more convenient.

### 2.7. Project economic orientation (for submissions with an NFP organization ONLY):

Describe the economic or productivity orientation of the project. NOTE: if any partner listed in this proposal is a not-for profit (NFP) organization, please contact a Mitacs Business Development representative to discuss its eligibility before proceeding with your proposal submission.

N/A

### 2.8. Relationship (if any) to past/other Mitacs projects:

Describe whether or not the current project is related AND provide specifics about the relationship (e.g. not related because it refers to a different research area OR if related: provide information about what has been achieved in past projects and how the current application complements other submissions)

N/A

### 2.9. References:

[1] Abeloff MD, Armitage JO, Niederhuber J, Kastan M, McKenna W. Abeloff's clinical oncology. Philadelphia: Churchill Livingstone/Elsevier; 2008.
[2] Younesi E, Toldo L, Muller B, Friedrich CM, Novac N, Scheer A, Hofmann-Apitius M, Fluck J. Mining biomarker information in biomedical literature. BMC Med Inform Decision Making. 2012;12:148.
[3] Hanisch D, Fundel K, Mevissen HT, Zimmer R, Fluck J. ProMiner: rule-based protein and gene entity recognition. BMC Bioinformatics. 2005;6(Suppl 1):S14.
[4] Moon S, McInnes B, Melton GB. Challenges and practical approaches with word sense disambiguation of acronyms and abbreviations in the clinical domain. Healthc Inform Res. 2015;21(1):35–42.
[5] Moon S, McInnes B, Melton GB. Challenges and practical approaches with word sense disambiguation of acronyms and abbreviations in the clinical domain. Healthc Inform Res. 2015;21(1):35–42.

[6] Savova GK, Masanz JJ, Ogren PV, Zheng J, Sohn S, Kipper-Schuler KC, Chute CG. Mayo clinical text analysis and knowledge extraction system (cTAKES): architecture, component evaluation and applications.
[7] PathPedia http://www.pathpedia.com/. Accessed 11 July 2017.
[8] Definition of Synoptic Reporting http://www.cap.org/ShowProperty?nodePath=/UCMCon/Contribution%20Folders/WebContent/pdf/cp-synoptic-report-definition-and-examples.pdf. Accessed 28 Jan 2018.
[9] Template for Reporting Results of Biomarker Testing of Specimens From Patients With Carcinoma of the Breast http://www.cap.org/ShowProperty?nodePath=/UCMCon/Contribution%20Folders/WebContent/pdf/cp-breast-biomarker-template-14.pdf. Accessed 28 Jan 2018.
[10] Hammond MEH, Hayes DF, Dowsett M, Allred DC, Hagerty KL, Badve S, Fitzgibbons PL, Francis G, Goldstein NS, Hayes M, et al. American Society of Clinical Oncology/College of American Pathologists Guideline Recommendations for Immunohistochemical testing of estrogen and progesterone receptors in breast Cancer. J Clin Oncol. 2010;28(16):2784–95.

## 3. Declarations

**3.1 Will the proposed research be taking place outside of the lab or normal business environment?**

Yes___ **No__X_**

If yes, please complete the following section to indicate what (if any) impact there may be on the environment.

a. Main characteristics of the location (i.e. physical description & coordinates)

b. Principal activity(ies): for each activity, list the environmental elements affected

c. Are authorizations, permits, or licenses required to undertake any activity during the internship?
Yes___ No___ If yes, please list

Please note: Mitacs may request a copy of the report to ensure compliance.

**3.2 Does the proposed research involve living human participants whose data, or responses to interventions, stimuli or questions by the researcher, are relevant to answering the research question?** Yes___ **No_X__**

**Does the proposed research involve human biological materials, human embryos, fetuses, fetal tissue, reproductive materials or stem cells**?** Yes___ **No_X__**

** This applies to materials derived from living and deceased individuals.

If yes to either of the two questions above, the proposal must be approved by the participating academic institution's Research Ethics Board*, and a valid Ethics approval is required for the duration of the research project. Access to funding may be denied for projects that do not have Ethics approval.

Please note: Mitacs may request a copy of the report to ensure compliance.

**3.3 Does the proposed research involve animal subjects?** Yes___ **No_X__**

If yes, the proposal must be approved by the participating Institution's Animal Care Committee*, and a valid approval from the committee is required for the duration of the research project.

Please note: Mitacs may request a copy of the report to ensure compliance.

**3.4 Does the proposed research involve the use of biohazards?** Yes___ **No_X__**

If yes, the necessary review/report must be conducted in accordance with your academic institution's policies*, and a valid biohazards approval is required for the duration of the research project.

Please note: Mitacs may request a copy of the report to ensure compliance.

**3.5 Have any academic supervisors declared a Conflict of Interest (COI)* as part of this application?**

Yes___ **No_X__**

If yes, please attach the appropriate documentation outlined in section 4.1.1

**3.6 Have any interns declared a Conflict of Interest (COI)* as part of this application?** Yes___ **No_X_**

If yes, please attach the signed conflict resolution letter.

** if you have any questions about the requirement for Research Ethics/Animal Care/Biohazards review or Conflict of Interest Policies at your institution, please contact your corresponding institution's research office.*

## 4. Participants

**If you are participating in Accelerate International, and your academic supervisor and/or partner organization is overseas, please complete Appendix B**

### 4.1. Lead academic supervisor in Canada:

| | |
|---|---|
| Name: | Victoria Lemieux |
| Academic Institution: | University of British Columbia |
| Department: | the School of Information |
| Address (at academic institution): | 470 - 1961 East Mall |
| City, Province, Postal Code: | Vancouver, BC Canada V6T 1Z1 |
| Phone: | 6048222404 |
| Permanent Email: | v.lemieux@ubc.ca |
| Alternative E-mail: | |

### 4.1.1. Is the academic supervisor:

a. An owner or a co-owner (including owning shares) of the partner organization: ___ **No**___

b. A relative of an owner or co-owner (including owning shares) or a relative of a participant in the day to day management of the partner organization: ___ **No**___

c. An employee of and/or a participant in the day-to-day management of the partner organization: _ **No**_

d. A relative of the intern and/or partner supervisors of the proposed project: __**No**___

**If yes** to any of the above, please provide a copy of your approved academic institution's Conflict of Interest declaration, or other appropriate documentation such as a letter or email from your Dean, with your application. The documents must describe the nature of the conflict and the measures in place to manage the conflict. Generally, Mitacs will accept the mitigation measures put in place by your academic institution. However, when the conflict is considered significant, Mitacs may require that the academic institution appoint an independent administrator to hold the award and to be responsible for ensuring the best interests of the intern. In such cases, the independent administrator must be included as an applicant, and must submit a declaration that they will act in the best interests of the intern(s).

**For any additional academic co-supervisors in Canada, copy and paste Section 4.1. and 4.1.1 below:**

### 4.2. Partner organization in Canada:

| | |
|---|---|
| Legal name: | |
| Operating name (if different): | |
| Contact name: | |
| Position: | |
| Department: | |

| | | |
|---|---|---|
| Address: | | |
| City, Province, Postal Code: | | |
| Phone: | | |
| Email: | | |
| Website: | | |
| Partner size (number of employees): | Select No. employees | |
| Legal status: | Select Legal Status | |
| If Not for profit Canadian Corporation | Select NFP Type | |
| **NAICS Code** (First three digits)*: | | |
| * Click here for a list of North American Industry Classification System codes. | | |
| Is this the **first time** the partner has collaborated with the academic institution? : | Select yes/no | |

**For any additional partner organization in Canada copy and paste Section 4.2. below:**

Please note that the financial contribution of organizations with permanent establishments in Canada may be subject to any applicable Goods and Services Tax (GST), Harmonized Sales Tax (HST) and/or Quebec Sales Tax (QST) (collectively VAT).

### 4.2.1 Invoicing Partner Contact

Partner contributions must be received by Mitacs BEFORE any funds are awarded to the academic institution. **Costs can only be incurred after research approval of the proposal** and the **receipt** of the partner funds at Mitacs**.**

a. Please describe any applicable **invoicing requirements** (vendor setup, PO, etc.):

| | |
|---|---|
| Invoicing contact name: | |
| Email: | |

b. **Invoicing Partner address**:

| | |
|---|---|
| | Address same as filled in Section 4.2. |
| | Address same as filled in Appendix B (Section 4.2) |
| | If invoicing address different than Section 4.2 or Appendix B (Section 4.2), please fill out the following: |

c.

| | |
|---|---|
| Legal name: | |
| Address: | |
| City, country, postal code: | |

| | |
|---|---|
| Name of contact: | |
| Phone: | |
| Email: | |

c. Have these funds been leveraged against other federal or provincial programs? Yes___ No___

**If yes,** please provide details:

#### 4.2.2 Partner Funds at academic institution. *IF APPLICABLE*

To be completed only if Partner funds were sent as an exception to the academic institution**. If no** please proceed to section 4.3.:

a. Is there a **research agreement** in place with the academic institution that governs the use of these partner funds?

Yes__ **No**___

**If yes** please speak with your BD representative, fill out the *addendum to research agreement document*, and submit that document with your completed application.

**If no** please complete the following:

b. ORS/UILO or equivalent agrees to send these funds to Mitacs: Yes___ No___

**If yes**, please provide:

| | |
|---|---|
| Academic institution account number: | |

c. The partner agrees by signing this application that the funds can be forwarded: Yes___ No___

**If yes**, please provide:

| | |
|---|---|
| Name of the consenting partner representative | |

d. **Invoicing academic institution contact** to receive Mitacs invoice:

| | |
|---|---|
| Name: | |
| Department: | |
| Email: | |

e.

e. Is the GST or HST, and QST (if applicable) to be included with invoice to academic institution? Yes___ No___

**If no**, tax(es) will be invoiced directly to the industry partner.

### 4.3. Intern(s) identified:

### 4.3.1. Intern #1 information * *MANDATORY* *

| | | |
|---|---|---|
| Name: | Jiaqi Zhang | |
| Full-time degree program during internship (college/masters/PhD/PDF): | Masters | |
| Expected year of graduation: | 01 | 2023 |
| If PDF, indicate month/year PhD received: | N/A | |
| Academic institution: | The University of British Columbia | |
| Department: | Department of Electrical and Computer Engineering | |
| Address at academic institution: | 5500-2332 Main Mall | |
| City, Province, Postal code: | Vancouver, BC Canada V6T 1Z4 | |
| Country: | Canada | |
| Phone: | 236 808 3622 | |
| Permanent phone or Cell phone | | |
| Permanent email: | mileyzha@gmail.com | |
| Alternative email: | | |
| Citizenship: | China | |
| Gender: | Female | |
| *For internships with international travel only (please complete Appendix B in addition to the full application):* | | |
| Will this intern conduct any internship units at a partner organization outside Canada? | No | |
| OPTIONAL: If known, please indicate anticipated **travel** dates | N/A | |

### 4.3.2. Conflict of interest. Is the intern:

a. An owner or a co-owner (including owning shares) of the partner organization: Yes___ No_x_

b. A relative of an owner or co-owner (including owning shares) or a relative of a participant in the day to day management of the partner organization Yes___ No_x_

c. An employee of and/or a participant in the day-to-day management of the partner organization:

Yes___ No_x_

d. A relative of the academic and/or partner supervisors of the proposed project: Yes___ No_x_

**If yes** to any of the above, please click here to complete the **Conflict of Interest Declaration** and send it to accelerate@mitacs.ca **BEFORE** submitting your application.

#### 4.3.3. Demographic information.

**Please indicate (x):**

| | | |
|---|---|---|
| Do you identify as an Indigenous person based upon your cultural and/or ancestral background? | | |
| Yes ( ) | No ( x ) | Prefer not to answer ( ) |
| Do you identify as belonging to a visible minority group (other than an Indigenous one)? | | |
| Yes ( ) | No ( x ) | Prefer not to answer ( ) |
| Do you identify as a person with a disability? | | |
| Yes ( ) | No ( x ) | Prefer not to answer ( ) |
| Do you identify as francophone? | | |
| Yes ( ) | No ( x ) | Prefer not to answer ( ) |
| Are you the first in your family to attend college or university? | | |
| Yes ( ) | No ( x ) | Prefer not to answer ( ) |

**For any additional interns copy and paste Section 4.3. below:**

### 4.4. Intern(s) to be determined (TBD):

**TBD#1**

| | |
|---|---|
| Degree program during internship (college/masters/PhD/PDF): | |
| Academic institution: | |
| Department: | |
| *For internships with international travel only (please complete Appendix B in addition to the full application):* | |
| Will this intern conduct any internship units at a partner organization outside their home country? | Select yes/no |
| OPTIONAL: If known, please indicate anticipated **travel** dates | Start Date: DD/MM/YYYY<br>End Date: DD/MM/YYYY |

**For any additional TBD interns, copy and paste Section 4.4. below:**

## 5. Budget and Invoicing

All Accelerate projects are required to include a complete Accelerate Budget and the invoicing schedule on the Excel Budget spreadsheet template must be confirmed. Please refer to the **Accelerate Guide: Writing your proposal** to assist you

## 6. Suggested Reviewers

1. **Reviewer's comments.** Please select ONE of the following:

___ We consent to receive reviewer's comments in either official language (French or English).
_**X**__ We request to only receive reviewer's comments in the language in which this proposal is submitted.

**2.** Please provide the names and contact information of at least **SIX (6) arms-length** reviewers.

An arms-length reviewer must:

- Be a recognized expert in the research topics and technical aspects covered by the proposal;
- NOT be from the same academic institution as the intern(s) or the academic supervisor(s); and
- NOT have had any collaboration with the intern(s) or the academic supervisor(s) or the partner(s) during the past five (5) years or planned for the near future.

Please note that neglecting to suggest reviewers who qualify as arms-length will delay the review of your application.

**Reviewer 1:**

| | |
|---|---|
| Name: | |
| Academic institution: | |
| Department: | |
| Email: | |

**Reviewer 2:**

| | |
|---|---|
| Name: | |
| Academic institution: | |
| Department: | |
| Email: | |

**Reviewer 3:**

| | |
|---|---|
| Name: | |
| Academic institution: | |
| Department: | |
| Email: | |

**Reviewer 4:**

| | |
|---|---|
| Name: | |
| Academic institution: | |

| | |
|---|---|
| Department: | |
| Email: | |

**Reviewer 5:**

| | |
|---|---|
| Name: | |
| Academic institution: | |
| Department: | |
| Email: | |

**Reviewer 6:**

| | |
|---|---|
| Name: | |
| Academic institution: | |
| Department: | |
| Email: | |

**Potential conflict of interest.** ***OPTIONAL***

Please list reviewers you would prefer Mitacs not to contact.

| | |
|---|---|
| Name: | |
| Academic institution / Research Group: | |

| | |
|---|---|
| Name: | |
| Academic institution / Research Group: | |

## 7. Mitacs Accelerate Memorandum

The intern, academic supervisor, partner organization, and Office of Research Services representatives (as defined herein and collectively designated as the "participants") confirm that the information presented accurately reflects their intention to apply and participate in the Mitacs Accelerate program. The participants have also agreed to set in place an internship based upon the attached proposal. The participants acknowledge that they have read, understood and agreed to abide by and uphold the Project Responsibilities applicable to each of them, available for reference at http://www.mitacs.ca/en/programs/accelerate/project-responsibilities, which include and are not limited to the following: It is understood that the partner organization contribution shall be provided to Mitacs Inc. in Canadian dollars prior to commencement of the internship; in the event that the partner organization funds are held by the academic institution, the academic institution shall forward these funds to Mitacs. Upon research approval and the receipt of the partner organization funds at Mitacs, Mitacs shall award a research grant to the Canadian supervising professor through the Canadian academic institution, and the internship stipend/salary will be paid to the intern by the academic institution from the grant. Costs associated with this proposal as outlined in the budget can only be incurred after research approval of the proposal and the receipt of the partner funds at Mitacs.

In no event shall Mitacs be liable to any and all participant for any losses including — but not limited to —accidents, illness, travel, or other losses that may occur during the internship period. All undersigned participants agree that they are responsible for ensuring that they have appropriate insurance to assume their responsibility and obligations and meet any institutional policies regarding health, safety, and travel preparation requirements. The intern shall provide Mitacs with a final report and all participants shall complete an exit survey within one month of project completion.

Furthermore, Mitacs does not make any representations or warranties of any kind, expressed or implied, with respect to the project or the information concerning the participants before or during the project, including the feasibility of the project. The participants agree to collaborate with each other at their own risk and without any liability or responsibility for Mitacs. Although the academic credentials of the participants and the research quality of the proposal as submitted have been reviewed by Mitacs through the course of the application, the participants alone are responsible for evaluating the accuracy, integrity, quality and completeness of the application from the other participants.

The participants hereby unconditionally and irrevocably release and discharge Mitacs and its affiliates, employees, directors, officers and other representatives from any and all claims, damages, costs, losses and expenses whatsoever that the participants, their affiliates, employees, directors, officers and other representatives may have arising in connection with the project and the internship. The participants agree to indemnify, defend and hold harmless Mitacs and its affiliates, employees, directors, officers and representatives from any and all claims, damages, costs, losses and expenses from a third party as a result of the project or internship.

*For projects involving international travel:* The home academic institution agrees to assist the intern in meeting all academic institution requirements pertaining to research abroad. The intern understands that he/she is responsible for obtaining insurance appropriate for the travel destination. Participants in projects involving international travel acknowledge that additional project responsibilities apply to them and hereby agree to be bound by them, available for reference at https://www.mitacs.ca/en/programs/accelerate/mitacs-accelerate-international. Participants in projects involving international travel also acknowledge that the internship cannot begin and funds cannot be released until Mitacs receives the signed International Pre-Departure Form and Code of Conduct and Ethics forms.

---

All parties involved with Mitacs Accelerate are bound by the standard intellectual property (IP) terms of the academic institution where the intern is enrolled, except where intellectual property is covered by separate agreements to which the academic institution(s) and the partner organization are parties and that are effective during the internship. If such separate agreements covering IP between the partner organization and the academic institution(s) are in place, the participants shall be bound by their specific terms and conditions. Otherwise, if no separate agreement is in place, all participants are bound by the standard intellectual property terms of the

academic institution, and by signing this memorandum agree to the terms of the academic institution where the intern is enrolled. Institution-specific IP policies regarding Accelerate internships can be found at https://www.mitacs.ca/en/programs/accelerate/faq.

The participants also agree that Mitacs will post the title of the project, the public project overview, the name of the partner organization(s), the name of the intern(s), the name of supervisor(s) and the involved academic institution on www.mitacs.ca/en/projects and that this information may be used by Mitacs to promote Mitacs Accelerate. Mitacs's Privacy Policy can be found at www.mitacs.ca/en/privacy-policy.

Internship participants (intern, supervising professor, and partner) further agree to the following addendum/a:

Mitacs does not require, inspect, or enforce, nor is it bound to any additional terms as outlined by participants in the above addendum.

---

**7.1. Title of the Project:**

**7.2. Public Project Overview:**

Using simplified language understandable to a layperson; provide a general, one-paragraph description of the proposed research project to be undertaken by the intern(s) as well as the expected benefit to the partner organization. **(100 - 150 words)**

**7.3. Participant Signatures:**

Please sign, scan and save in PDF format

**7.3.1. Intern:**

| | | |
|---|---|---|
| Name: | Jiaqi Zhang | |
| Department: | Department of Electrical and Computer Engineering | |
| Academic institution: | The University of British Columbia | |
| | *For interns participating in international travel:* The intern acknowledges that additional Project Responsibilities found at www.mitacs.ca/en/programs/accelerate/mitacs-accelerate-international apply to Accelerate International travel (as outlined in the Memorandum above) and agrees to abide by these additional program rules. The intern also acknowledges that they are aware of and agree to any IP agreements related to this project. | |
| Signature: | Jiaqi Zhang | Date: Nov 22, 2021 |

**7.3.2. Academic Supervisor in Canada:**

| | |
|---|---|
| Name: | Victoria Lemieux |
| Department: | The School of Information |
| Academic institution: | University of British Columbia |

| | | |
|---|---|---|
| Signature: | | Date: |

### 7.3.3. Academic Supervisor abroad (if applicable):

| | | |
|---|---|---|
| Name: | | |
| Department: | | |
| Academic institution: | | |
| Signature: | | Date: |

### 7.3.4. Partner Organization in Canada (if applicable):

| | | |
|---|---|---|
| Name: | | |
| Department: | | |
| Title/Position: | | |
| Organization: | | |
| Financial Commitment: | $ | |
| | The partner organization commits to the funding contribution specified directly above and the payment schedules outlined in the attached *Accelerate Budget and Invoicing* schedule. These are key conditions of the application and by signing below this proposal, the partner organization agrees to these conditions. Please note that the financial contribution of organizations with permanent establishments in Canada may be subject to any applicable Goods and Services Tax (GST), Harmonized Sales Tax (HST) and/or Quebec Sales Tax (QST) (collectively VAT). | |
| Signature: | | Date: |

### 7.3.5. Partner Organization abroad (if applicable):

| | | |
|---|---|---|
| Name: | | |
| Department: | | |
| Title/Position: | | |
| Organization: | | |
| Financial Commitment: | $ | |

| | | |
|---|---|---|
| | The partner organization commits to the funding contribution specified directly above and the payment schedules outlined in the attached *Accelerate Budget and Invoicing* schedule. These are key conditions of the application and by signing below this proposal, the partner organization agrees to these conditions. Please note that the financial contribution of organizations may be subject to applicable taxes. | |
| Signature: | | Date: |

**7.3.6. Office of Research Services Representative or equivalent:**

| | | |
|---|---|---|
| Name: | | |
| Title/Position: | | |
| Academic institution: | | |
| Signature: | | Date: |

**For any additional participants include corresponding details and signature line below:**

# Appendix A – Accelerate Intern Consent Form

## USE AND DISCLOSURE OF PERSONAL INFORMATION PROVIDED TO MITACS

1. All personal information collected is subject to privacy legislation and Mitacs Privacy Policy for Program Participants. For a description of Mitacs' commitment to protect the personal information provided by program applicants, please see http://www.mitacs.ca/en/privacy-policy.
2. All the information supplied in this application will be made available to Mitacs staff responsible for managing the application, for activities including identifying appropriate peer reviewers, administering and monitoring awards, compiling statistics, and evaluating the program.
3. Information supplied in this application will be made available to internal and/or external reviewers, being composed of experts recruited from the academic, public and private sectors. All reviewers are required to commit to keep the application information confidential.
4. Contact information in this application may be used by Mitacs staff to contact you in future for:
   a. Invitations to be profiled in stories or news items, to speak at or attend events, to provide a spotlight story and/or blog post;
   b. Communications about opportunities for Mitacs alumni; and
   c. Research surveys for Mitacs alumni.

   You will have the opportunity to unsubscribe from emails sent to you, once all commitments regarding the internship that is the subject of this application are complete.
5. Your name, academic institution and department, and the title of your project may be provided to the federal, provincial and academic institution funders of the Accelerate program, to:
   a. Enable Mitacs to report on funding contract commitments; and
   b. Allow the funders to evaluate the program.

   Additional information, such as passport numbers and dates of birth, may be provided to the international funders of the program (if applicable), for adjudication and reporting purposes.
6. Your name, contact information, and other personal information as required may be provided to the academic institution(s) participating in the internship to enable the academic institution(s) to manage the award, to sign off on the pre-departure form (if applicable), and for reporting purposes.

I, the undersigned, do hereby give CONSENT to the use and disclosure of the information contained in my application for the purposes as described above.

| Jiaqi Zhang | Jiaqi Zhang | Nov 23, 2021 |
|---|---|---|
| Intern Name | Signature | Date |

# Appendix B – Accelerate International

***If internship involves international travel, please complete the following:***

**B 1. Partner interaction (continued from section 2.5g)**

| | |
|---|---|
| Interaction % on site at partner location in Canada | _____% |
| Interaction % on site at partner location abroad | _____ % |
| Interaction % at academic institution in Canada | _____% |
| Interaction % at academic institution abroad | _____% |
| TOTAL (must equal 100%) | 100% |

% of partner interaction: ____ % + % of academic interaction: ____ % = 100%

**B 1.1 Do any interns expect to spend more than 12 consecutive months outside of their home country?**
Yes___ No___

If yes, Mitacs may request additional information.

**B 2. Does this project create new international collaborations?** Yes___ No___

If no, please briefly describe nature of the existing international collaboration. Include a summary of the collaboration, duration of the collaboration, and any past exchange of personnel, etc.

**B.3. IP ownership**

Any intellectual property (IP) generated from an Accelerate International project is bound by the policies of the academic institution where the student/PDF is registered, whether in Canada or abroad, unless a separate intellectual property agreement has previously been successfully negotiated between the academic institution, the industry partner, and (if applicable) the student/PDF. Mitacs makes no claim to intellectual property.

**Do the academic institution(s), partner organization(s) and/or intern (if applicable) have a separate IP agreement(s) that will be active during the dates of the internship?**
**Yes___ No___ In Development ____**

Provide an outline of the terms of any existing or planned IP agreement(s) below. A copy of the signed IP agreement must also be provided to Mitacs before a funding decision will be made about the project. Also ensure that the benefit from the project for Canada is clearly described in Section 2.6.

**B 4. Additional Participant information:**

**B 4.1 Academic Supervisor abroad (if applicable):**

| | |
|---|---|
| Name: | |
| Academic Institution: | |
| Department: | |
| Address (at academic institution): | |

| | |
|---|---|
| City, Country: | |
| Postal Code: | |
| Phone: | |
| Permanent Email: | |
| Alternative E-mail: | |

**B 4.1.1 Is the academic supervisor:**

a. An owner or a co-owner (including owning shares) of the partner organization: Yes___ No___

b. A relative of an owner or co-owner (including owning shares) or a relative of a participant in the day to day management of the partner organization: Yes___ No___

c. An employee of and/or a participant in the day-to-day management of the partner organization: Yes___ No___

d. A relative of the intern and/or partner supervisors of the proposed project: Yes___ No___

**If yes** to any of the above, please provide a copy of your approved academic institution's Conflict of Interest declaration, or other appropriate documentation such as a letter or email from your Dean, with your application. The documents must describe the nature of the conflict and the measures in place to manage the conflict. Generally, Mitacs will accept the mitigation measures put in place by your academic institution. However, when the conflict is considered significant, Mitacs may require that the academic institution appoint an independent administrator to hold the award and to be responsible for ensuring the best interests of the intern. In such cases, the independent administrator must be included as an applicant, and must submit a declaration that they will act in the best interests of the intern(s).

**B 4.2 Partner organization abroad (if applicable):**

| | |
|---|---|
| Legal name: | |
| Operating name (if different): | |
| Contact name: | |
| Position: | |
| Department: | |
| Address: | |
| City, Postal code: | |
| Country: | |
| Does the organization have a permanent establishment in Canada? | Select yes/no |
| Phone: | |
| Email: | |
| Website: | |

| | | |
|---|---|---|
| Partner size (number of employees): | Select No. employees | |
| Legal status: | Select Legal Status | |
| **NAICS Code** (First three digits)*: | | |
| * Click here for a list of North American Industry Classification System codes. | | |
| Is this the **first time** the partner has collaborated with the academic institution? : | Select yes/no | |

## Appendix C - Drop Down - Options

**Please delete if not applicable**

Please refer to the drop down of the section, and type the corresponding answer on the space provided.

**1.5. Academic discipline:**

- Business
- Computer Science
- Earth Sciences
- Engineering
- Life Sciences
- Mathematical
- Sciences Social Sciences, Arts & Humanities
- Physical Sciences

**1.6. Project priority sectors:**

- Indigenous Affairs
- Advanced Manufacturing
- Aerospace
- Agriculture & Food
- Aquaculture & Fishing
- Automotive
- Biotechnology
- Clean Technology
- Commercial Services
- Entertainment & Media
- Environmental Science & Technology
- Finance & Insurance
- Forestry
- Green/Alternative Energy
- Health and Related Sciences & Technology
- Information & Communications Technology
- Life Sciences (not health)
- Manufacturing & Construction
- Natural Resources
- New & Digital Media
- Ocean Tech
- Oil & Gas
- Pharmaceuticals
- Public Service, Policy, & Governance
- Sustainability & the Environment
- Technology
- Tourism

- Construction
- Education
- Energy & Utilities
- Mining
- Nanotechnology
- Natural Gas
- Transportation
- Water
- Other (please describe)

**1.7. List of Participants:**

**Partner Legal Status:**
- For Profit Private Corporation
- Crown Corporation
- Not for Profit Canadian Corporation

**4.2. Partner organization in Canada:**

**Partner size (No. employees):**
- 1 to 49
- 50 to 99
- 100 to 499
- 500 and higher

**Legal status:**
- For Profit Canadian Private Corporation
- Crown Corporation
- Not for Profit Canadian Corporation

**If NFP:**
- Charitable Organizations
- Economic Development Organizations
- Health Organizations
- Industry Associations
- Social Welfare Organizations
- Other

**First time collaboration with academic institution?**
- yes
- no

-

**4.3 Intern(s) identified:**

**4.3.1. Intern information:**

**Citizenship**:
- Canadian:
- Canadian Permanent Resident:
- Foreign:

**Gender**
- Female
- Male
- Other gender identity

**Will this intern conduct any internship units at a partner organization outside Canada?**
- yes
- no

**4.4. TBD**

**Will this intern conduct any internship units at a partner organization outside their home country?**
- yes
- no

**B 4.2. Partner organization abroad (if applicable):**

**Does the organization have a permanent establishment in Canada?**
- yes

- no

**Partner size (No. employees):**
- 1 to 49
- 50 to 99
- 100 to 499
- 500 and higher

**Legal status:**

- For Profit Private Corporation

- Crown Corporation

**First time collaboration with academic institution?**
- yes
- no

-