

Centre des Compétences futures

Targeted call for FSC Project Partners

Instructions to complete the application form

Please refer to the Future Skills Centre's (FSC) <u>Targeted Call for FSC Project</u> <u>Partners Guidelines</u> document when preparing your application.

This application form is structured to help you address the selection criteria for this call and give reviewers easy access to your project information. This form is divided into the following sections:

- Part 1 General information
- Part 2 Project summary
- Part 3 Project details
- Part 4 Project work plan and budget
- Part 5 Declaration

If you would like to request accommodations or other types of support, please contact Maysa Mourad by email at <u>targetedcall@fsc-ccf.ca</u> or by phone at 437-331-0613.

If you have any questions while compiling your application, you may contact our team at <u>targetedcall@fsc-ccf.ca</u>. We would be happy to answer any questions.

PART 1 - GENERAL INFORMATION

1. Lead organization

Name of lead organization

The Michener Institute of Education at UHN

Name of project lead

David Wiljer, Mohammad Salhia

Project lead's preferred method of contact (email address and/or phone number)

Email: <u>david.wiljer@uhn.ca</u> <u>msalhia@michener.ca</u> and PM email: <u>dalia.almouaswas@uhn.ca</u>

2. Proposed project

Project title

Accelerating the Appropriate Adoption of AI in Healthcare

Project start and end dates

March 2022 – September 2023

Projects must end no later than September 30, 2023.

Amount requested from FSC (total)

1,897,626.14

Project partners and their location

Vector Institute – Toronto, Canada

PART 2 - PROJECT SUMMARY

1. Proposed project "one-liner"

How would you describe your new project in one sentence?

This project further advances innovative workplace education by building diverse skills and capabilities, accelerating the appropriate and equitable adoption of AI technologies, and delivering better, more accessible healthcare for Canadians.

(30 words maximum)

2. Proposed project summary

How would you describe your new project and how it builds on the testing and learning of your current project to date?

We suggest that this summary covers the main information about how your new project addresses all selection criteria of this targeted call.

Our partners and needs assessment data indicated that education tailored to specific practice and care settings is essential to improve AI adoption. Patients also expressed a need for AI and digital health education. Enhanced education will support learning in specific health domains such as mental health, cancer care and for patients and the public. Our findings also highlighted limited education on the principles of inclusion, diversity, equity and accessibility (IDEA) for AI implementation. To eliminate bias and discrimination and enable equitable and accessible care through AI, it is important for clinicians and leaders to understand IDEA principles and how AI practice can impact equitable, compassionate care [1]. We will develop a competencies and capabilities framework to drive our programming and provide an adaptable and accessible toolkit for healthcare professionals. The Healthcare AI Incubator (HAI) program will be leveraged to create an action-oriented playbook to inform and guide AI implementation. We will also implement an innovative approach to skill development using a questionbased learning app, "AI by the Minute", that will broadly disseminate and reinforce new knowledge through longitudinal interactions (in reference to Appendix A). The spread and scale of our existing initiatives will allow us to leverage the current grant, realize efficiency, build on the strengths and experiences of the new team and partners, capitalize on our current momentum, and extend the value of the existing investment. Finally, we will continue to build robust knowledge exchange networks across Canada, ensuring minimal duplication of effort and maximum capacity building through collaborations.

(250/250 words maximum)

3. Additional scope

How does your new project go beyond the scope of your current FSC-funded project?

The additional scope may include expanding or extending a project model, its principles and/or components. For example, it may include expanding the project to new regions or jurisdictions, including new or larger target populations, and testing different delivery formats to understand what works to address demands. This would assume the potential for bringing additional partners to deliver the project at a broader scale. The additional scope must be grounded in new concrete learning questions to contribute to your work and of others in the skills ecosystem.

The new scope will further support clinicians and leaders by tailoring our current programs to practice-specific environments that face unique operational or careoriented problems requiring unique AI interventions. We will also develop additional educational programs targeted to patients and the public to enhance their understanding and involvement with AI-enabled healthcare. The current Healthcare AI Incubator Program will include an action-oriented playbook that can functionally guide project teams. In addition, a framework of skills, competencies, and capabilities in IDEA principles will build upon our initial work and serve as an operational and practical guide to ameliorating bias and inequity in AI. Using action-oriented interventions, we will put the knowledge into practice through symposia, more intentionally building communities of excellence, and a novel knowledge translation application to consolidate learning over time. Finally, this scope will further facilitate our network of partners required to achieve transformational change.

(144/150 words maximum)

4. Importance of the additional scope

Why is the additional scope of your project important to your organization, sector and target populations? Why is it timely?

Health professional education reform is needed to focus on knowledge management, effective use of AI, improved communication, and empathy cultivation. As the applications of Artificial Intelligence (AI) continue to rise in healthcare, the need for education, training, and innovative knowledge exchange programs is critical to support the adoption of AI to safely and appropriately advance healthcare and practices that are co-created with clinicians. All streams within the new project are focused on appropriate clinician and leadership capacity building for the future of work in the healthcare sector and on empowering healthcare professionals to continue using data and AI appropriately and equitably. This will, in turn, provide better and safer care to patients and work towards making healthcare more sustainable. In addition, we must facilitate constructive conversations with our clinicians, researchers, patients, and the public to

ensure the appropriate use of new technologies in the transformation of healthcare across Canada.

(149/150 words maximum)

PART 3 - PROJECT DETAILS

In this section, please provide information about how your new project supports each of the selection criteria of this targeted call.

We provide prompting questions to help you address all criteria in the application guidelines. You may prepare this section following the prompting questions in sequence or using your own sections and narrative.

Although you have flexibility regarding the format for this section, please make sure that you address all criteria according to the prompting questions. Reviewers will assess your application by scoring each criterion individually.

This section should not exceed <u>seven</u> pages. We anticipate that most proposals will present this section in <u>five</u> pages.

Relevance

The rapid increase in the applications of AI in healthcare underscores the need for relevant and adaptive education and training programs to support its appropriate and responsible adoption. In alignment with the FSC strategic areas of focus, we are seeking to develop new and innovative approaches to ensure that the healthcare workforce is adequately prepared for the transformational changes that AI will bring through new data, process automation, new treatments, and new ways of working in order to minimize workforce disruption. In addition, we seek to develop systemic change enablers by fostering unique collaborations and engagement across the healthcare ecosystem, bringing together healthcare providers, leaders, researchers, industry partners and AI experts, and building partnerships that will allow healthcare organizations and providers to be more agile and coordinated in responding to this transformational change. According to Fountaine and colleagues, in order to be Alenabled, organizations will need to educate everyone in new ways of working to achieve the significant culture change that is required [2]. We can only achieve this goal by building innovative approaches and new partnerships, working together across the ecosystem.

Innovation and Evidence

Innovation

Current medical education focuses on clinical knowledge and application to patient care but does not prepare clinicians and leaders for new technologies that are integrated into healthcare delivery. This can lead to potential knowledge gaps and weaknesses when AI systems are implemented and therefore have a negative impact on patient safety and the quality of care. As AI becomes more commonplace to improve clinical decisionmaking and workflows, it is prudent to create new educational interventions that focus on AI implementation sciences and deployment. The literature on AI implementation suggests that common barriers to success and sustainability include the inability of the workforce to keep up with developments in AI [3], inefficient access to formal and informal education in AI [4], and a lack of understanding of how AI is used to improve patient outcomes [5].

The training and engagement opportunities in the current grant lay the groundwork in building AI capacity within healthcare. We recognize through our work, including extensive scoping reviews and needs assessments, that shepherding implementation efforts nationally requires upskilling to AI translation into practice. The new grant will therefore incorporate knowledge translation activities that critically focus on decision support and AI implementation. In other words, it will more intentionally target activities that build the "toolset". We plan to do this by diversifying the ways in which information is consumed, using just-in-time and longitudinal programming to optimize success and sustainability of AI projects [4].

The programs created in the current grant for clinician champions and healthcare leaders will form the basis of the first deliverable. Building on these programs' strong foundational knowledge, the new grant will further customize and enhance their relevance and applicability to practice-specific clinical environments that have unique operational or care-based problems and can be ameliorated with AI. We will identify 1-2 clinical domains such as mental health, cancer care, virtual care, or long-term care that can benefit from AI given pandemic-induced challenges to providing care. We will also identify implementation considerations for different practice environments, such as academic health science centres versus community hospitals or tertiary versus primary care, in order to identify use cases representing distinct implementation challenges and opportunities. Using a similar methodology as the existing grant, the enhanced programs will delve further into specific topics and emerging needs pertaining to AI in those fields and will be interprofessional in nature so that different professional perspectives are considered in these practice/discipline-specific cohorts. Additionally, our scoping review identified the need for patient education about AI and its impact on

care. We will therefore leverage our current foundational programming to generate a patient/public-specific webinar series to enhance their understanding of, and involvement in, AI-enabled healthcare.

Current research suggests that traditional "face-to-face" education interventions show only modest outcomes on clinicians' knowledge retention and clinical behavior change [6, 7]. In the continuing education literature, micro-learning is used to teach targeted information in small units by using just-in-time learning (learning within minutes or seconds) through shorter lessons and activities [8, 9]. Question-based learning (QBL) is a type of micro-learning and can be accompanied with interactive spaced education (ISE), which is characterized by multiple-choice questions spaced out and repeated over time, with detailed, immediate feedback. Psychology literature suggests that the presentation and repetition of information over time lead to more efficient learning and improved retention, compared with massed distribution at a single time-point [10, 11] and multiple-choice questions play a critical role in retrieval practice and material consolidation. Therefore, this project will include the scaling of a progressive, webbased application called CPD by the Minute (see Appendix A) to AI by the Minute, which will operate as an interactive app employing QBL and ISE principles. The app will deliver two, one-minute questions per week about various AI-related topics, including but not limited to, types of AI, ethical implications, interprofessional collaboration, and translating AI knowledge into practice. Questions included in the app will be developed to foster clinical problem-solving and stimulate the curiosity of practicing clinicians and leaders in Canada. The questions will be developed in an iterative manner by AI experts in the field of medical education and digital healthcare informatics. The data collected via this app can also elucidate for the project team knowledge domains that may require more or less focus in the specialized curricula above, or as part of the new toolkit contemplated below.

Further to this, we wish to build on the work of the Healthcare AI Incubator Program (HAI) by providing implementation support resources. To do this, we propose the creation of a digital toolkit or playbook that enables participants to translate designs for responsible AI solutions to action. The toolkit would focus on conducting operational readiness assessments, investigations into regulatory and organizational deployment requirements, and creating implementation roadmaps. Participants of the HAI Program can opt to evolve their projects using this toolkit, while continuing to access the support of AI experts for 1-2 selected projects with high potential for success. This formal articulation of the "toolset" is a critical step toward integrating the knowledge, skills and attitudes required to drive successful AI implementation in healthcare organizations. This knowledge translation work is reinforced in the Royal College of Surgeons and Physicians of Canada's Task Force Report on Artificial Intelligence and Emerging

Digital Technologies, which highlights clinicians' desire to be more involved in the deployment of AI technologies.

All of these programming components will consider equity, diversity and inclusion as a key competency domain for data literacy, machine learning, and project implementation. The needs assessment and scoping review addressed this by way of bias in AI and machine learning. In their Quintuple Aim, the National Academy of Medicine (NAM) urges the prioritization of equity and inclusion as clear goals when developing, deploying, and measuring the impact of AI [12]. It is therefore essential for developers and implementation leads to assess data being used, identify underlying biases, consider where and how AI tools will be deployed, and who these interventions may potentially impact or exclude. An additional study being proposed in this grant is to develop a framework of competencies and capabilities that can shift mindsets, and build toolsets and skillsets to identify and mitigate implicit bias throughout all phases of AI development, from ideation to implementation. These competencies would aim to espouse equitable and compassionate practice in the creation of AI. The study would turn to key frameworks including, but not limited to, cultural humility, and reference the Socio-Technical Framework identifying barriers to, and enablers of, inclusion and equity at the organizational and system-wide level [13]. These two approaches, therefore, allow the emergent framework to examine individual, institutional, and system-wide capabilities to engender IDEA in practice [14]. To further enhance our offerings, additional modules, titled Enabling Equity and Access to Care through AI, will be added to the clinician champions and leadership programs. Also, an international symposium focusing on AI and Equity, will be hosted to seed an international community of excellence and further develop the discourse of AI and equity with experts from around the world.

Evidence

Evidence for the success of the new interventions will be generated through an integrative knowledge translation approach. The work will leverage a Knowledge to Action (KTA) framework to integrate new knowledge of AI into clinical practice and ultimately enhance the delivery of patient care. Specific practice contexts will be determined based on knowledge creation activities including partnership engagement, scoping review, environmental scan, and needs assessment findings developed as part of our current grant. Programs from the current grant can be nuanced with additional engagement of discipline-specific healthcare workers, and patients or other community members with lived experience. A multi-method evaluation approach will be guided by the RE-AIM framework to understand the efficacy of the customized programs and the digital toolkit and assess whether the learning has been translated into practice. Pread post-evaluations will be structured based on the different educational outcomes of

Moore's framework and the Non-adoption, Abandonment, and Challenges to Scale-up, Spread, and Sustainability (NASSS) framework. NASSS enables us to further explore the contextual factors that influence the successful implementation of the programs as well as the adoption of AI initiatives in healthcare. Semi-structured interviews will also be conducted upon completion of the program to understand learners' and instructors' experiences with the programs, the relevance of the content, and any barriers to engagement or access. We will conduct a preliminary assessment of the toolkit and pilot test its applicability with selected participants of the HAI program. Given our existing REB approvals, we have the ability to amend existing protocols to enable the rapid generation of new knowledge. The evidence generated through this initiative will inform our curriculum and delivery and will provide others doing this work with practical and pragmatic solutions rooted in evidence.

Randhawa and Jackson (2020) argued that the integration of technology within clinical care practices will not be effective without equipping clinicians with the necessary knowledge, skills, and attitudes to shape the future of their practice for accelerating compassionate, high-quality care within the digital ecosystem [4]. We anticipate that new knowledge generated through this work is a curation of best practices for translating knowledge and awareness of AI into tangible, action-oriented practice and implementation. The extent and adequacy of knowledge translation efforts in AI for care providers and leaders have potential implications on overall patient outcomes, wait times, data and digital literacy, and improved decision-making and planning, including human resourcing. The education interventions proposed as part of the new grant will therefore integrate evidence-based curriculum strategies to enhance the digital capabilities of healthcare professionals to overcome any operational and systemic turbulences related to these outcomes. We will make a unique contribution by building a competency framework for equity-seeking AI deployment.

Learning

Our current grant work has generated important information about the learning ecosystem for AI. The needs assessment and scoping review conducted revealed a number of AI programs that do not wholly address or fully understand the needs of the healthcare workforce in their content and delivery format. The scoping review highlighted pivotal gaps with existing AI education programs and stressed the importance of developing curricula that are targeted towards specific disciplines. The review further identified the need for a competency-based curriculum, a multidisciplinary approach to curriculum (re)design, and an emphasis on patient-clinician interaction. Data from our needs assessment activities (e.g., patient interviews) and work with our patient partners revealed the desire for increased patient involvement and empowerment in their care decisions. Patients also expressed a need for AI education,

particularly when such technologies and tools are used by their clinicians. One of the patient partners interviewed emphasized, "well if it's something in their toolbox that they are going to be using, like, then it would be my expectation that they have received appropriate training to use the tools. Similarly, like if they don't have the training, then I don't think I would be OK with him just using a random tool, he doesn't know about it."

While working on the current grant, themes related to bias in AI and the need for operational readiness have emerged as essential to the success of the work. Findings from our own scanning, direction from our stakeholders and partners, and their articulation of emergent skills gaps, are drivers for the proposed program expansion to focus on implementation and organizational readiness, with equity and inclusion as a fundamental ethos for how capacity is built in this area. The questions therefore emerging from this grant include: 1) how can we build competence/capacity in the healthcare professionals in their specific practice domains; 2) how can institutions better enable AI across their organizations; and 3) how can we enable patients and their caregivers to be empowered in AI-enabled care settings?

Equity, Diversity and Inclusion

In addition to innovations highlighted above, the project incorporates the perspective of various stakeholders in its design by virtue of our multi-stakeholder and multi-modal scanning and scoping. Our community of partners, endorsers and advisors reflect various practice environments, and clinical/operational needs in the system. We also integrate the patient perspective by including Patient Partners as equal contributors on advisory and partnership panels in the current grant, which will continue in this expanded work. These structures are intentionally designed to reflect diversity of professions, associations, practice environments. The project team is also tending to include representation of equity-seeking groups in these various forums. In designing program expansion, subject matter experts will bring their unique lenses to inform our customized curriculum and toolkit to consider groups and geographies that might experience barriers to educational access or equitable care with AI.

We will use existing data to learn about who our current programs are reaching to optimize diversity of participants and organizations. A health equity and inclusion framework [15] developed by researchers at the Centre for Addiction and Mental Health was leveraged to create a guide mapping the dimensions of IDEA to the education design cycle, thus ensuring these principles are integrated into our work.

The value of our work, therefore, is not only to ensure that AI tools are inclusive to a variety of populations, but also that they can be used as vehicles to enable more equitable and accessible care for all Canadians. The social determinants of health

include a variety of non-medical factors that could influence access to equitable care. Algorithmic bias could impede AI tools from considering these disparities and inequities, and perhaps even reinforce existing social prejudices, which would exclude certain communities or groups from receiving adequate and relevant care. Thus, it is vital that cultural competencies and education on the social determinants of health are encouraged for care providers [16].

Capacity

Michener/UHN and Vector Institute have come together over the last two years to work on the current FSC project. Individually, we are strong at what we do, and have come together to form a unique partnership that is ideally positioned and has the capacity to make the transformational changes required to foster AI-enabled organizations and ecosystems.

This project brings together the operational strengths of these two organizations. As the only school in Canada embedded in a hospital network, Michener brings its strength and renown in healthcare entry-level and continuing education to the table as the project lead. Its tie to UHN brings its research enterprise to the fore by way of The Institute for Education Research (TIER), including cutting edge education science that can inform the design of the educational innovations. The Vector Institute, as one of three institutes under the federal government's pan-Canadian AI Strategy (PCAIS), is aptly positioned to continue partnering on this work. Vector Institute is a national leader in AI, machine learning, and deep learning, and boasts an extensive network in excess of 400 researchers, therefore enabling swift access to the depth and breadth of subject matter expertise required to expand our current work.

In the current grant, Vector Institute and Michener/UHN have achieved significant output during one of the most challenging health crises in our recent global history. Though affecting change during this pandemic has been challenging, our system is responding to the promise of, and need for, AI-enabled care to address emergent healthcare crises related to wait times and resourcing. Together, and along with our partners, we have formed a high-functioning team that brings together different perspectives to create innovative programs, while engaging partners from industry, education, research, healthcare and digital health. We held a national symposium during the pandemic with IVADO that had over 500 registrants. We are actively planning our next symposium that will focus on the critical topic of improving mental health post-pandemic using AI technologies. We have also created a clinician champions program that has quickly reached a capacity of 50 individuals for the first cohort and a wait list of 40 participants for our next offerings. Our leadership program will launch in January and the HAI program in the spring of 2022.

Our ability to mobilize partners and build a network of professionals and organizations to do this work will contribute to a cultural shift in advancing AI adoption and implementation that will enrich learning across the system through online forums, creating safe spaces to share experiences, and promoting a culture of scholarship and innovation for healthcare AI. Strengthening such a network will mitigate the current challenges of working in silos across various organizations and sectors. We now have an amazing opportunity to leverage our high functioning teams, build on our momentum and grow our community by furthering national conversations and collaboration.

Different organizations coming together as a new partnering team has not been without its challenges, especially during a global pandemic where each had multiple competing priorities. This transpired in a delay to execute a collaboration agreement and additional time for our organizations' different cultures and perspectives to align. Our common values and belief in making care better for patients have, however, provided a strong foundation to build an effective and important partnership. This was facilitated by establishing good governance, expectations for communication, a contractual and legal arrangement, team building, and an emphasis on building trust and common understanding.

Coherence

Building rapidly on our existing grant, this proposal provides an amazing opportunity to spread and scale our work, increasing the value of the initial investment by shifting our focus from changing the mindset to intensely developing the skillset and, more importantly, the toolset of the healthcare workforce. We will develop and disseminate tools to 1) ensure professionals have the **capabilities and competencies** to deliver equitable, accessible and responsible AI; 2) respond to specific clinical and leadership needs of diverse healthcare practices by **targeting content**; 3) provide **real-time access to information** about AI in the workplace through the AI By the Minute app; 4) support education through **practical toolkits** that support AI implementation; and 5) **empower patients and the public through education** to trust and be engaged in AI. Putting these concrete tools into action will exponentially increase the value of the FSC investment, capitalizing on the work we are doing to shift the current mindset and attitudes toward digital health and AI. Critically, it also focuses the work toward a more action and practice-based orientation for participants.

Our budget is designed to augment our current expert team, expanding our delivery capacity by 1) supporting the project through additional project management and coordination; 2) delivering effective education with specialists and experienced instructional designers; 3) engaging the appropriate Subject Matter Experts (SMEs) with

required specialized knowledge; 3) building on existing applications to leverage investments; 4) providing resources for rapidly and openly communicating and disseminating newly generated knowledge and learning. The budget aligns with the net new people and technology required for rapidly enhancing project deliverables.

As we emerge from the pandemic and focus on recovery and renewal, the need for global collaboration and learning and local action is critical. We are excited to meet the needs of the workforce by expanding on our current work with a focused approach to capacity building and knowledge translation. Our enhanced AI programming will cover specific topics, emerging trends and patient needs pertaining to AI in specific disciplines and practice settings. In addition, we believe that not only is it critical to develop and deploy equitable AI but to also use AI as a driver for equity, inclusion and accessibility in care. By working with subject matter experts, equity-seeking groups, and patients with relevant lived experiences we aim to develop an AI implementation toolkit and AI-based IDEA competencies framework that are relevant, accessible and meaningful to the health sector and its stakeholders.

(3,402/3,500 words maximum)

PART 4 - PROJECT WORK PLAN AND BUDGET

- Please submit a <u>one-page work plan</u> with key milestones and their timeline. <u>Do not</u> include detailed activities at this time. If your proposal is selected, we will work with you to develop a detailed work plan.
- 2. Please complete the project budget template provided to you as part of the application material.
 - a. Include only <u>new funding</u> associated with your new project and its additional scope. Please do not include the existing funding that is already part of your current funding agreement with FSC.
 - b. If applicable, identify new funding pending or confirmed for this project from other sources. <u>This funding should be included as in-kind</u> <u>contributions.</u> (Please note that funding from other federal sources cannot be counted towards in-kind contributions)
- 3. Please submit your work plan and budget by sending these files, along with this completed form, to <u>targetedcall@fsc-ccf.ca</u>.

4. You may use the space below to provide comments to accompany your work plan and/or budget.

The budget includes the resources required to achieve the deliverables in the allotted time, bringing together implementation science, instructional design, research expertise, and subject matter experts to create a unique team. Building on the existing team, the budget contemplates added resources to achieve deliverables. The budget aligns with the net new people and technology required for rapidly enhancing project deliverables. The budget supports innovative approaches to knowledge dissemination, rapidly accelerating the appropriate adoptions of new technologies to enhance the healthcare ecosystem.

(100 words maximum)

PART 5 - DECLARATION

By submitting an application, the lead organization and its partners agree to the requirements of the following sections, detailed in the guidelines outlined for this funding call, and they affirm that they comply with and/or commit to the following:

- Organization eligibility.
- Active support for co-creating and carrying out an evaluation with an FSC-approved evaluator, if FSC decides an evaluation is appropriate for this project.
- Active engagement in knowledge mobilization activities related to the project.
- Compliance with the Tri-Council Policy Statement on the Ethical Conduct of Research Involving Humans.
- Confidential due diligence inquiries from Future Skills Centre into the applicant.

Signature

BAQes

Name of signing authority

Date

Brian Hodges

November 02, 2021

APPENDICES

Appendix A: CPD By the Minute App

Link to CPD By the Minute App: CPD By the Minute App Demo - YouTube

Appendix B: Reference List

- 1. Safdar NM, Banja JD, Meltzer CC. Ethical considerations in artificial intelligence. European Journal of Radiology. 2020;122:108768.
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- 15. Agic B, Fruitman H, Maharaj A, Taylor J, Ashraf A, Henderson J, et al. Health Equity and Inclusion Framework for Education and Training. Canada: Centre for Addiction and Mental Health; 2021.
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