This Challenge is issued under the BCIP Challenge Call for Proposals (EN578-DB1800).
Please refer to the Solicitation Documents.

Challenge Name: Machine learning and Natural language processing for Automating Systematic Review Development and Meta-analysis
Challenge Sponsor: Public Health Agency of Canada (PHAC) / Department of National Defence (DND)
Challenge Notice: EN578-DB1801
Priority Area: Military Component

Funding
This Challenge is being fully funded by PHAC.

PHASE I - 2018/2019: The available funding for Phase I is approximately $225,000 per contract. Up to two contracts could be awarded during this phase.

PHASE II - 2019/2020: The available funding for Phase II is up to $450,000. Phase II may be exercised for one of the contractors initially awarded a contract a Phase I contract.

All funding is in Canadian Dollars. This disclosure is made in good faith and does not commit Canada to contracts for the approximate funding stated above.

Background/Summary
As the Government of Canada's lead federal agency for disease prevention and management, the Public Health Agency of Canada (PHAC) is mandated to promote and protect the health of Canadians. In order to support health care professionals, policy makers and citizens in making informed decisions, PHAC must conduct timely, accurate and comprehensive analysis of evidence. To pursue its mandate, PHAC requires an increased capacity to conduct rapid (real-time) and comprehensive evidence reviews.

A machine learning (ML)/natural language processing (NLP) platform is required to support the systematic reviews of accumulating evidence related to clinical, public health policy and program decision making.

Within this context, an ML/NLP Innovation is sought to support the undertaking of systematic, structured, and transparent searching, selection, review and grading of relevant peer-reviewed published literature based on a pre-defined research question. The Innovation must have an ability to extract and export key results of published studies to pre-defined data/evidence tables.

Challenge Details
The aims of this challenge are to identify the "Innovation" (A machine learning (ML)/natural language processing (NLP) platform to enhance systematic reviews health evidence) and to test the performance of the Innovation at PHAC and DND offices, Ottawa, ON.

Note: The following elements of the challenge will be assessed in accordance with the Proposal Submission Form and the Evaluation Grid.

The Innovation <u>must</u> possess all of the following characteristics:
- The platform must be able to accommodate a variety of public health questions based on different populations, interventions, comparator groups, and outcomes of interest.
- The Innovation is required to be modular (e.g. "publication and data retrieval", "screening and selection", "data extraction" and "narrative summary" modules) and should contain the

following specific elements that will be assessed in accordance with the Proposal Submission Form and the Evaluation Grid.

- Publication/data search and selection of relevant studies ("publication and data retrieval"), filtered according to the Population, Intervention, Comparator, Outcome (PICO) framework or variations of PICO (e.g. Population, Outcome) using a combination of the following strategies
    - Process relevant open access articles retrievable in full-text HTML via publishers' application programming interface (API)
    - Process relevant full-text PDF articles that can be manually fed to the platform by the end user
- Data extraction from selected/relevant studies into data tables organised study by study according to key information that is pertinent to the query (e.g. population characteristics of each study, outcomes reported from each study)
- Transparent documentation of the systematic review process (e.g. how many studies screened for inclusion, how many studies selected, etc.), displayed graphically as an automatically-generated flowchart

The Innovation should possess as many of the following characteristics as possible:

- For the initial publication and data retrieval ("screening and selection module"), it is preferred that this module interfaces directly with publication databases (e.g. Scopus, OvidMEDLINE) to access all available titles and abstracts for relevance screening. If it is not feasible to interface directly with publication databases to scan their entire catalogues, it would be acceptable to begin relevancy screening from a pre-defined list of potentially relevant studies that was derived from keyword searching of the publication databases as directed by a Government of Canada (GoC) Health Librarian. It is also preferable that this module includes the capability to perform additional screening of references cited in the selected studies, and inclusion of those cited studies in the final analysis where relevant (i.e. reference "hand searching" or "snowballing)
- It is strongly encouraged that the modules are developed snowballing
- It is strongly encouraged that the modules are developed to in the standardized format (e.g. NLP Annotation Format or similar) to ensure interoperability with existing as well as future GoC and third party applications, in accordance with the Government of Canada Digital Standards (https://open.canada.ca/en/blog/improving-government-services-digital-age);
- Following data extraction from the selected studies, the platform should include a module with the possibility of automated text generation for a narrative summary estimate of results;
- It is preferable that the platform has the capability to perform automated study grading based on the study type and design, and relevancy to the specific PICO question, according to established standards (e.g. Cochrane risk of bias assessment for randomised trials)

Proposal

Bidders must provide technical details of the Innovation and how it meets the above targets in their proposal. The proposal submission form can be found on the **Challenge Notice**.