



# Open Call for Proposals

## Unmanned Aerial Systems BVLOS Capability Development

LOOKNorth is soliciting proposals from Canadian small and medium sized enterprises (SMEs) for projects that demonstrate and evaluate procedures and technologies for the safe operation of Unmanned Aerial Systems (UAS) operating Beyond Visual Line of Sight (BVLOS).

The call for proposals addresses various requirements for progressing BVLOS applications. The following table summarizes the categories under which proposals will be considered, along with available per-project funding.

Stream	Description	Overview	Individual Project Support Limit	Submission Date	Decision Date
1	Risk Model Development	Integrate UAS risk model into BVLOS cluster risk assessment framework	\$100,000	May 14, 2018	June 15, 2018
2	Trial Risk Assessment*	Support for BVLOS trial risk assessment	\$25,000	May 14, 2018*	June 15, 2018
3	Application Validation	BVLOS based application demonstration	\$50,000 (based on matching funds)	August 03, 2018	September-October 2018, (date TBD)
4	Business Case Assessment	Support for BVLOS market/business assessment	\$25,000	August 03, 2018	September-October 2018 (date TBD)

\* This project category will remain open throughout 2018, with new projects assessed approximately on a quarterly basis.

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This call is aligned with the announcement by Transport Canada on 1 February 2018 for a call for Canadian companies to submit Concepts of Operations leading to the approval of up to four BVLOS demonstration projects in 2018.

<http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/NPA-APM/actr.aspx?id=33&aType=1&lang=eng>

*“Transport Canada (TC) invites innovators in Unmanned Aircraft Systems (UAS) to propose beyond visual line-of-sight (BVLOS) operations for proof-of-concept trials in 2018 that will advance Canada into the next frontier of UAS. Consistent with the Government of Canada’s Budget 2017 commitments to work with industry to establish pilot projects to evaluate new UAS technologies, TC is seeking to collaboratively explore the safe deployment of UAS in BVLOS operations, and is suggesting four use-cases to inform industry’s development of Concepts of Operations.”*

Project opportunities 1 and 2 address the requirement that successful TC proposals include a risk assessment of the BVLOS trial operations. LOOKNorth/USC is seeking proposals for two aspects of the risk assessment process for decision in June 2018.

### **1. UAS BVLOS Risk Assessment Model**

As part of the BVLOS testbed, LOOKNorth/USC are creating a comprehensive risk assessment framework that will accommodate a variety of BVLOS test scenarios and provide a standardized methodology for risk assessment. The framework will incorporate both a secure data management system as well as a risk modelling process.

LOOKNorth/USC is seeking proposals from Canadian suppliers of operational grade UAS risk modelling solutions to adapt their solutions into the LOOKNorth/USC risk model for integration into the risk assessment framework. The budget for this work is \$100K.

A full description of the requirements is provided in Annex A.

### **2. Risk Analysis Support for BVLOS Demonstrations**

An essential element of the BVLOS cluster is that partner trials will include a risk assessment of the various trial elements.

This call for proposals provides assistance for Canadian SMEs utilizing the LOOKNorth/USC risk assessment framework. Companies may apply for financial and technical support to undertake the risk assessment aspect of a BVLOS trial.

Risk assessment will be conducted in conjunction with the successful supplier of the risk model and LOOKNorth/USC. Consequently, the scope and level of support for successful requests will be determined following discussion with the successful supplier and LOOKNorth



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/ USC. Up to \$25,000 is available per project to cover the cost of the risk assessment process associated with a BVLOS trial.

## ***Eligibility***

Proposals will be accepted from Canadian SMEs with an interest in accelerating the commercialization of BVLOS operations.

Priority will be given to support for projects that were approved by Transport Canada from the February 2018 call for Concepts of Operations.

Beyond support for TC trials, LOOKNorth/USC also has an interest in proposals across a variety of geographic characteristics with priority given as follows:

- Priority 1: BVLOS trials/demos conducted "off range"
- Priority 2: BVLOS on-range trials
- Priority 3: Internationally conducted trials

## **3. Applied BVLOS Validation**

LOOKNorth is entertaining proposals specifically oriented to the demonstration of technologies and solutions pertaining to BVLOS UAS applications. The objective of the Applied BVLOS Validation program is to demonstrate and validate technology applications as a precursor to long-term implementation in an operational environment. Sectors of interest include resource development, forestry, agriculture, public safety, transportation and infrastructure.

LOOKNorth invites Canadian SMEs and organizations to submit proposals on priority themes or technical areas of interest that address information needs of the resource sector.

Interested applicants are strongly encouraged to consult with LOOKNorth to determine suitability of the project and optimize the submission process. Contact information is provided on at the end of this document.

## ***Eligibility***

Proposals for BVLOS application validation projects will be accepted from Canadian SMEs, R&D organizations and academic researchers.

**Validation projects** target technology solutions at a technology readiness level in the range of (TRL) 5 - 7 ([http://esto.nasa.gov/files/trl\\_definitions.pdf](http://esto.nasa.gov/files/trl_definitions.pdf)).

To be considered for funding, proposed projects must **demonstrate a strong commercialization component**.

To be considered for funding, proposed projects must **demonstrate a confirmed commitment from an end user industry partner to support the project**. At a minimum, the industry sponsor



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should recognize the information gap and the need for the proposed solution, as well as commit to supporting the proposed field validation with some combination of cash and support in kind.

Preference will be given to projects where the industry sponsor indicates willingness to adopt the technology within their operations if it is successfully validated and where LOOKNorth can play a role in marketing the technology.

Successful proposals should **address “benchmarks” for expected and desired outcomes**. This should include but not be limited to new products / services, incremental revenue, new employment and investment potential from a successful demonstration.

For **BVLOS Validation** projects, the following conditions apply:

- LOOKNorth will fund up to 50% of eligible costs, to a maximum of \$50,000 of LOOKNorth funds per project.
- Projects should be no more than 12 months duration.
- Successful proponents must demonstrate that they have obtained a Special Flight Operations Certificate (SFOC) for the project.
- Successful proposals must demonstrate a confirmed commitment from an end user industry partner. Co-funding can be a combination of end user sponsor and SME cash and in-kind contributions. Preference will be given to projects with end user co-sponsorship, as this indicates strong end-user interest and commercialization potential.
- Preference will be given to projects where the industry sponsor indicates interest and willingness to adopt the technology within their operations if it is successfully validated and where LOOKNorth/USC can play a role in marketing the technology.

## 4. BVLOS Market Assessment Support

Proposals are sought for **Market Assessment Studies** that support technology commercialization through better definition of specific market requirements, complementary technologies, market sector access strategies or product definition for specific markets. Proponents must demonstrate strong subject matter expertise and industry participation. Please feel free to consult with LOOKNorth for further discussion.

For **Market Assessment Studies** led by Canadian SMEs, the following conditions apply:

- LOOKNorth will fund up to a maximum of \$25,000 of LOOKNorth funds per project.
- Projects should be no more than 6 months duration.
- Studies must demonstrate how they will involve the engagement of end user organizations in addressing the proposed market questions being addressed. As an example, a study may incorporate the direct survey of a group of end users that can address key study questions.



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## General Instructions

### *Data and Intellectual Property*

Any intellectual property developed as a result of a funded project shall belong exclusively to the Proponent. There is, however, an explicit requirement to share safety case data for the collective benefit of developing evidence-based recommendations to TC for BVLOS regulations.

- All applicants must agree to make the results of their tests available for input into the testbed and risk evaluation tools.
- All applicants must agree that their results may be shared among Transport Canada and industry cluster participants; commercial proprietary information will remain protected.
- All proposed projects considered for funding must demonstrate a strong commercialization component.
- LOOKNorth reserves the right to access the data and results created by the project for audit purposes.

### *Submission Instructions*

Interested proponents must complete the Proposal template, located as follows: Instructions are included as an Appendix the Proposal template.

[https://www.looknorth.org/cms\\_content/files/TVPPProposalForm2.pdf](https://www.looknorth.org/cms_content/files/TVPPProposalForm2.pdf)

As well, proponents must complete a preliminary Environmental Assessment Checklist, located here: [https://www.looknorth.org/cms\\_content/files/files/LN-EAP&Checklist-Fillable.pdf](https://www.looknorth.org/cms_content/files/files/LN-EAP&Checklist-Fillable.pdf) on the LOOKNorth website.

Proposals for time critical validation projects should be identified as such and will be assessed on an individual basis.

### *Questions or Clarifications*

Please submit any requests for clarifications to the LOOKNorth Program Director at [neil.cater@LOOKNorth.org](mailto:neil.cater@LOOKNorth.org).

LOOKNorth will respond to respond to all questions. Only clarifications relevant to all submitters will be published on the website at the address above.



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## ***Program Context***

LOOKNorth is a national Centre of Excellence for Commercialization and Research (CECR) under the Government of Canada's Network of Centres of Excellence program ([www.nce-rce.gc.ca](http://www.nce-rce.gc.ca)). LOOKNorth networks Canadian remote sensing innovators and provides a bridge to commercial markets through a combination of:

- remote sensing technology expertise,
- project management support,
- continuous engagement with end users to understand market needs,
- business development support, and
- investment in technology demonstration and validation project to accelerate the development and implementation of monitoring technologies that support responsible, sustainable natural resource development, operations and transportation.

Unmanned Systems Canada is a national not-for-profit association founded in 2003, which represents the unmanned vehicle systems community. A key role in the context of this funding opportunity, is the role that USC has as the co-chair with Transport Canada of the Industry/Government Working Group which develops UAS regulations.

LOOKNorth and Unmanned Systems Canada are collaborating to lead a national cluster of industry and academia to develop the UAS industry in Canada, with a focus on accelerating the commercialization of UAS-based remote sensing applications. This funding is intended to promote collaboration amongst Canadian companies to utilize a common risk model for all flight trials. Over time, the aggregation of data and the resulting analyses will support evidence-based recommendations to Transport Canada for BVLOS regulations.

In 2016 LOOKNorth, with USC support, led a survey on BVLOS applications for Transport Canada. This survey concluded that two-thirds of Canadian industry regarded BVLOS capabilities as either very important or critical to their business growth, and that both technological and regulatory challenges needed to be overcome.

In February 2017 USC published BVLOS Best Practices, in the same general timeframe as TC authorized two test ranges capable of BVLOS operations at Foremost AB, and Alma QC. The 2017 Federal Budget also provided resources to Transport Canada enabling the creation of the UAS Task Force. Accordingly, they now have the resources to move forward with approving BVLOS operations. A focus of this funding opportunity will be to promote BVLOS trials off the test ranges with end-use partners to enable both the integration of UAS operations in non-segregated airspace, and the promotion of business cases.



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LOOKNorth/USC has established a testbed for collecting relevant performance data from flight trials and to evaluate these data using a common risk assessment tool endorsed by Transport Canada. We have also enlisted the support of certified flight test ranges in Foremost and Alma to help collect data from trials completed at the respective facilities. The projects funded as a result of this call will be part of the target solution to co-develop technologies and operations in a common test and risk assessment framework.

***Specifically, the project objectives are to:***

- Evaluate technologies using a common testbed that includes a risk model approved by Transport Canada, providing a risk-based assessment
- Share the results of all technologies demonstrated with Transport Canada to provide evidence-based data to support BVLOS regulations and legislation
- Validate the safety case for integration of BVLOS capabilities into the national airspace, thereby driving the development of new applications, attracting investment capital and improving the competitive position of Canadian companies in the global marketplace.
- Support a national strategy to achieve these objectives through collective risk reduction.
- Support the development and execution of a national marketing campaign highlighted Canadian industry success in advancing BVLOS capabilities.

Of note, the Transport Canada call for Concepts of Operations specifically identifies collaboration and risk management as two of the four key themes for applicants to consider. The proposed collaborative use of a common national risk model, and associated funding are designed to specifically address these two criteria.



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## Annex A - Expression of Capability

### Unmanned Aerial Systems - BVLOS Cluster Risk Model Development

#### Background

Through consultation with industry and government, there was consensus that an industry led cluster be established to accelerate innovation for the UAS industry in Canada, led by Unmanned Systems Canada and the LOOKNorth Centre of Excellence.

The BVLOS strategy is focused on enabling demonstration of UAS technologies to validate business and safety cases via a national testbed. Participants include UAS OEMs, technology and service providers, end-users and Unmanned Traffic Management system developers. A core objective is the sharing of safety-case data in a Transport Canada-endorsed national risk model. Analysis of these data will provide evidence-based recommendations to TC for BVLOS regulations.

To address these requirements LOOKNorth/USC is developing a validation platform that will:

- Provide an environment that incorporates both simulation models and real assets enabling the validation of BVLOS related technologies, knowledge requirements and operational processes;
- Develop the models for a risk assessment methodology that captures simulated and real mission data for analysis of any safety issues that may arise. The cumulative analysis establishes the validity of the BVLOS Best Practices and identifies gaps in technology or processes; and
- Provide the assets critical for industry to develop the evidence necessary to seek product certification

The testbed will incorporate a virtual environment to reflect the best practices developed by the UAV Regulatory Working Group. The risk model incorporates an initial baseline of BVLOS operational scenarios across a broad domain of applications, integrated with a model of Canadian air traffic management, a terrain/airspace model, a Canadian-developed BVLOS visualization tool and cluster partner applications. This capability will permit virtual analysis of the safety policies described in the best practices and the implementation of the proposed risk management framework. The data gathered will enable the private sector to validate their business models and add to the national repository of flight data. These data will be analyzed to evaluate the efficacy of the best practices policies.

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## Requirements

While there is growing global consensus that a mission risk-based approach (scenarios) is desired for BVLOS operations, there are many perspectives of what this might entail. LOOKNorth/USC on behalf of the BVLOS cluster promote a common risk assessment infrastructure based on use-cases populated by BVLOS trials and demonstrations as the best means for systematically addressing safety and performance issues as well as providing a base for business case analysis. Its goal is to validate the safety case for integration of BVLOS capabilities into the national airspace, thereby driving the development of new applications, attracting investment capital and improving the competitive position of Canadian companies in the global marketplace.

LOOKNorth/USC is seeking support for the integration of a UAS suitable risk model into its validation testbed platform. Responders should:

- Demonstrate expertise in the area of UAS risk modelling
- Confirm they currently have an operational risk model that can be integrated into the cluster validation testbed
- Identify experience and projects where their model has been used operationally in previous projects
- Demonstrate a clear understanding of the Canadian BVLOS environment and the issues around BVLOS best practices in Canada
- Propose a high-level approach to tuning and integrating the proposed model for a BVLOS verification framework that incorporates multiple trials by various parties, over both on and off range test locations and potentially both Canadian and international locations
- Indicate an ability to provide ongoing model operations support in the form of test configuration, data evaluation and reporting.

Interested parties are asked to submit a high-level information proposal that addresses the above requirements. The proposal should provide an estimate of time required to deliver a solution (recognizing there are many influencing factors which have not been specified at this time) and an estimated cost for the proposed solution.