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LETTER OF INTEREST
LETTRE D'INTÉRÊT

Comments - Commentaires

The participants must register in order to participate in the industry days and/or One-on-One Meetings. Refer to Annex "A". / Les participants doivent s'enregistrer pour participer aux journées de l'industrie et aux rencontres individuelles. Veuillez consulter l'annexe « A ».

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Science Procurement Directorate/Direction de l'acquisition de travaux scientifiques
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Gatineau, Québec K1A 0S5

Title-Sujet R&D requirements for electro-optical and infrared technologies. / Besoins en recherche et développement pour les technologies électro-optiques et infrarouges.	
Solicitation No. - N° de l'invitation W7701-145859/D	**Date** 06-07-2015
Client Reference No. - N° de référence du client	
GETS Reference No. - N° de référence de SEAG PW-15-00691216	
File No. – N° de dossier W7701-145859	**CCC No./N° CC – FMS NO. / N° VME**
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Canada

Public Works and Government Services Canada | Travaux publics et Services gouvernementaux Canada

REQUEST FOR INFORMATION FOR

Requirements on Electro-Optics and Infrared Technology for Defence Research and Development Canada

THIS DOCUMENT IS *NOT* A REQUEST FOR PROPOSAL, REQUEST FOR QUOTATION OR CALL FOR TENDER. NOTICE

Canada

TABLE OF CONTENTS

1. INTRODUCTION

Public Works and Government Services Canada (PWGSC), on behalf of Defence Research and Development Canada (DRDC), is issuing this Request for Information (RFI) as the first stage in informing industry members about changes in the procurement strategy for requirements regarding electro-optics and infrared technology (EO-IR) that was published and presented in the spring of 2014.

The publication of the RFI in the spring of 2014 was for the purpose of distributing a draft of the procurement strategy for the purchase of products and services in EO-IR technology and obtaining formal feedback from the industry on aspects to be improved upon.

The first phase of the engagement process included a Letter of Interest, published on the Government of Canada Buyandsell.gc.ca website and also included in Annex G of this document, an Industry Day, held on May 1, 2014, and one-on-one meetings.

During the publication of the first RFI, industry members provided crucial comments and recommendations calling for the development of an innovative procurement strategy based on industry concerns. This information prompted Canada to revise the procurement strategy initially proposed, in order to better respond to the concerns expressed by industry and the operational needs of DRDC.

The current engagement process thus offers industry members the opportunity to present their points of view in response to the requirements proposed by Canada regarding EO-IR technology needs, as well as to provide comments on the new procurement strategy.

The second phase of the engagement process will begin with the publication of this RFI on the Buyandsell.gc.ca website and will end upon the release of the findings report on this second RFI. This engagement process will include Industry Days (Quebec City area in French, and National Capital Region in English), one-on-one meetings with industry members, the presentation of a report and additional one-on-one meetings, as needed.

Canada will assess feedback received to determine if the previously identified concerns were addressed and if the methods envisaged for EO-IR technology supply are in line with industry best practices, while ensuring that the procurement strategy meets the needs of DRDC.

With the aim of maximizing the benefits that come from this Request for Information and giving industry members the opportunity to prepare clear and concise answers, the following documents are included in this RFI:

1- First Request for Information published on March 18, 2014;
2- First Request for Information findings report published on February 5, 2015;
3- Sample statements of requirements for each of the EO-IR streams; and
4- Sample evaluation criteria for the various qualifying stages.

In order to understand the consultation rules and officially register with this engagement process, respondents are asked to complete and return the Participant Form identified in Annex A of this RFI.

2. BACKGROUND

Science and technology (S&T) plays a critical role in contributing to Canada's defence and national security, providing the technological and knowledge advantage necessary to develop the right military capabilities and prepare for an uncertain and potentially dangerous future. Defence Research and Development Canada (DRDC) has a unique expertise in a number of activity sectors, bringing together certain scientific sectors within the organization: Combat Systems, Information Systems, Optronic Systems and S&T Support. Research

work carried out in support of the science program is guided by DRDC's strategic objectives and by the Defence and Security S&T Strategy. Requirements for electro-optical and infrared (EO-IR) services include the needs of the DRDC S&T Support and Optronic Systems sections, and specifically involve the following sections: Spectral and Geospatial Exploitation (SGE), Electro-Optical Warfare (EOW), Tactical Surveillance and Reconnaissance (TSR) and Defence Engineering Valcartier (DEV).

The different types of services sought involve multiple aspects of various fields associated with EO-IR, such as: characterization, design, simulation, manufacturing and operation of EO systems or their components, development and manufacturing of EO software and electronics, and integration, testing and analysis services. These EO systems consist of, but are not limited to, wide-band, hyperspectrale or multispectral imaging or non-imaging systems, laser systems, of one or several spectral bands covering the ultra violet, visible, near, shortwave, midwave and long-wave infrared.

One of DRDC's mandates is to support the Canadian Forces (CF) in its electro-optical system acquisition process by technically translating their operational needs, evaluating sensor performance or evaluating the potential of emerging technologies. DRDC also studies EO systems for protecting military platforms (air, land or sea) and their occupants. These EO technologies require proximity electronics to be integrated into them in order to evaluate them or extend their capability, and EO systems to be integrated into the platforms. EO systems can also be improved by developing algorithms and technical solutions to facilitate the use of EO systems data and transmitting tactical data in real time or near-real time. To carry out these mandates, DRDC must be able to operate EO systems with various technology levels (TRL1 to TRL9). The development of new concepts for instruments in support of research programs involves expertise in hyperspectrale spectrometry. Since 1998, DRDC has been working to develop new passive infrared sensors to improve detection, recognition and identification capacity. We are particularly interested in new capacities for soldiers. The majority of the work requires the generation of laser signals, which is why our EO-IR acquisition strategy includes this field. Information improvement also involves the fusion of images from various systems; research is required in this field (for example, night vision). Finally, since 1985, DRDC has been involved in measurement campaigns for aircraft infrared signatures and their protection systems. DRDC is currently developing a set of tools and algorithms to exploit these signatures.

In spring 2014, an initial Request for Information (RFI) was issued, and an industry day and individual meetings were held. With respect to the EO-IR strategy, it was suggested that Canada consider alternatives to task authorization contracts for certain types of work, such as system development, to ensure better value for Canada, greater competitiveness and to increase economic benefits, while promoting innovation and support for the development of intellectual property. The purpose of the second RFI is to inform players in the EO-IR field of DRDC's wish to equip itself with procurement tools for professional and R&D services via a Standing Offer approach for firm requirements in terms of labour, equipment and certain predetermined services, as well as pre-qualification to obtain a pool of suppliers (educational institution, industry, other government organization, consultant, etc.) under a Supply Arrangement; suppliers will be called to submit bids within the next five (5) years.

3. RFI ADDITIONAL CONTENT

The following annexes are an integral part of this RFI:

Annex A—Participation Form

Annex B—Questions to Industry

Annex C—Evaluation Criteria Examples – Request for Standing Offer (RFSO)

Annex D—Evaluation Criteria Examples – Request for Supply Arrangement (RFSA)

Annex E—Operational Needs Examples – Standing Offer (SO)

Annex F—Operational Needs Examples – Supply Arrangement (SA)

Annex G—Documents published under the first Engagement Process

4. REQUEST FOR INFORMATION

"Respondents" refer to businesses, business consortiums, legally incorporated persons and/or academic organizations with the capacity to meet the requirements specified in this document.

Respondents that wish to take part in the engagement process must complete and sign the Annex A—Participation Form and return it before the date specified in section 11.1 to the Contracting Authority identified in section 15 below.

Respondents that have provided the Participation Form will receive information on Industry Days, one-on-one meetings and updates on the engagement process. It is important to register in order to access this information. An electronic mailing list will be created to communicate any subsequent information to respondents.

Information regarding the locations of the Industry Days will be communicated by email when available, as well as being posted on the Buyandsell.gc.ca website. In addition, Canada will assign a date and time for each one-on-one meeting (one per participating organization). Once assigned, respondents requiring a change in the date and/or time of their one-on-one meeting must make a request to the Contracting Authority at least 72 hours before the date and scheduled time.

Canada may use the information provided by respondents to improve the current requirement, the procurement strategy or the budget allocation for the project. Canada may also use information collected in the engagement process to improve all subsequent requests for competitive proposals.

In order to optimize the results of this RFI, respondents are encouraged to respond to each of the subjects listed in Annex B—Questions to Industry.

4.1. Recommendations, suggestions and comments

Respondents are invited to comment or to make recommendations and/or present data (including technical data and/or financial data) that could help Canada improve the procurement strategy.

4.2. Contractual information and the procurement process

If Canada decides to proceed with the bidding process, following the closing of this current engagement process, requests for proposals for a standing offer and/or supply arrangement and/or contract or a combination of these will include all details and necessary documents. Any request for proposals will be posted on the Buyandsell.gc.ca website. Further details on the procurement strategy are identified in section 6, below.

4.2.1. Basis for payment and anticipated payment terms

It is expected that the resulting contract(s) will include labour rates at a firm all-inclusive price (hourly or daily rates). It is also expected that Canada will make monthly payments, milestone payments or single payments as required. Non-routine work that may arise from time to time could fall under a Task Authorization Process, subject to a maximum limit.

4.3. Security requirements

The security requirements associated with EO-IR projects have not been determined. It is expected that security clearance up to SECRET will be required for facilities and/or the contractor's employees. To meet these requirements, respondents are asked to provide details of their abilities and their current and future facilities. Respondents are encouraged to be aware of any security provisions. More information on this can be found at the following address: http://www.tpsgc-pwgsc.gc.ca/services/secinfo-eng.html.

5. DESCRIPTION OF REQUIREMENTS

DRDC has a requirement for professional and research and development in the electro-optical and infrared field. These services cover all spectrums involved, and range from design, development and manufacturing to characterization, software development and operations. DRDC provides these services to the Canadian Armed Forces (CAF) for operational needs, for which response time is critical. The ability to quickly and punctually add scientific resources to DRDC teams is essential to deliver the mandates entrusted to them. Thus, the establishment of contractual mechanisms that can support the complexity and magnitude of all services identified in Annexes "E" and "F" is a priority. Specifically, the services required are divided into 13 streams:

1. Technical and engineering support for the characterization of electro-optic systems
2. Development of methodologies for the characterization of electro-optic systems
3. Characterization of electro-optic systems
4. Opto-mechanical
5. Electronic
6. Architecture, programming, software engineering and systems engineering
7. Operating EO systems
8. Hyperspectrale systems
9. Electro-optical support integration
10. Airborne platform
11. Laser and LIDAR
12. Image fusion
13. Aircraft signatures

For more details and to obtain examples of tasks and / or work that may be required, please refer to Annex "E" and Annex "F".

6. PROPOSED PROCUREMENT STRATEGY

During the course of the first engagement process, Canada had proposed to industry members a procurement strategy that met the needs of the thirteen (13) EO-IR technology streams at DRDC but that was not in perfect alignment with industry best practices. Several members raised concerns about the procurement strategy originally proposed. These concerns were analyzed by Government of Canada representatives. The results of this analysis were used to reshape the procurement strategy to meet DRDC's needs and the expectations of industry members. In order to get feedback and suggestions for improvement, Canada would like to introduce the new procurement strategy to all organizations participating in this RFI. Canada's preferred option would be to use a Standing Offer (SO) and a Supply Arrangement (SA).

The basis of payment will be determined according to the complexity of the requirement before call-up or resulting RFPs are issued. We foresee the use of one of the following basis of payment:

A. A firm all-inclusive price, for labour requirements;
B. Cost Reimbursable for expenses subject to a ceiling price or limitation of expenditure price; or
C. A combination of the options referred in A and B.

The SAs and SOs could be reviewed every twelve (12) months to provide the opportunity to register new qualified respondents. A comprehensive refresh, including changes in monetary or technical elements, will be made at the same time for pre-qualified bidders. The refresh will provide an opportunity for pre-qualified bidders to review their hourly rates in order to be more competitive.

These requirements will be subject to the Agreement on Internal Trade (AIT). The North American Free Trade Agreement (NAFTA) and the World Trade Organization Agreement on Government Procurement (WTO-AGP)

will not apply to these requirements, as research and development services are excluded from those agreements. The policy on Canadian content will apply to these requirements.
The provisions of "Comprehensive Land Claims Agreements (CLCAs)" will not apply to these requirements as the goods or services will not be provided in an area covered by one of those CLCAs.

In regard to intellectual property rights, the Contractor will own all rights. However, as Canada will contribute to the costs related to the development of some of the foreground information (meaning any intellectual property first conceived, developed, produced or reduced to practice as part of the work performed under the resulting contract), the Contractor will grant Canada a licence authorizing it to exercise all intellectual property rights on foreground information created as part of the activities under the SO and SA. Subject to any exception described in call-ups or resulting contracts, this licence will allow Canada to do anything that it could do if it were the owner of the foreground information, other than to exploit it commercially and transfer or assign ownership of it. The Contractor will also grant Canada a licence to use the background information (meaning all intellectual property that is not foreground information but that is incorporated into the work or necessary for the performance of the work and that is proprietary to the Contractor, its subcontractors or any other third party) to the extent that it is reasonably necessary for Canada to exercise fully its rights.

6.1 National Individual Standing Offer (SO)

The SO is not a contract. It is an offer from a potential supplier who offers to provide, as required, goods or services at prearranged pricing, under pre-established terms and conditions. There is no contract unless the government issues an SO. The issuing process for an SO is subject to policies and regular contracting procedures. When an SO is issued to an organization (qualified), it undertakes to provide the goods or services at set prices for a specific amount of time. If the government issues a call-up, it is at that point that a contract is entered into for the amount specified in the call-up. The SO will be used mainly for obtaining scientific resources.

The lifespan of an SO is defined according to the nature of the requirements of the client department(s). For the purposes of DRDC, Canada would like to issue an SO for a period of five (5) years, with extension options for up to an additional five (5) years, for a total of ten (10) years.

Canada would like to establish lists of pre-qualified businesses and/or organizations for each of the scientific resource categories. Contractors can qualify under one or more categories, where applicable. To ensure that everyone is treated fairly, Canada would favour a two-step evaluation method for the requested requirements of an SO. The first step would be to assess, during the solicitation process, the bidder’s abilities and corporate experience. The second stage would take place before a call-up was issued. At this stage, Canada would assess the proposed resource(s) before issuing a call-up. So, bidders would not be required to propose one or more "specific" resources at the pre-qualification stage but only to certify that the resource(s) will be available when requested later.

Examples of qualification and selection criteria (technical and financial criteria) for the SO are identified in Annex C.

6.1.1 Selection for call-up

Canada would have the authority to issue a call-up to pre-qualified respondents of its choice, if the value of the call-up is less than $25,000. That said, the selection would also be based on the pre-qualified respondent meeting the evaluation criteria and the timeline indicated to provide the requested resource(s). Furthermore, Canada would require a minimum of three (3) pre-qualified respondents to submit a proposal for the requested call-up. Canada would conduct an analysis and select a winner based on these criteria.

If the value of the call-up is greater than $25,000 Canada could use one of the following options:

Option 1: Selection according to the lowest cost per point (note that the selection would be made among those pre-qualified under the same resource category). The lowest cost per point is determined by dividing the bid price by the result (in points) obtained in the evaluation step- 2.

The technical authority would submit a Request for Proposal (RFP) to everyone on the same list that pre-qualified. The pre-qualified respondents that meet all the criteria and that offer the "lowest cost per point" will be issued a call-up.

Option 2: Best resource based on highest score (note that the selection would be made among those that pre-qualified under the same resource category).

Call-ups will be automatically issued to pre-qualified respondents that provide the most experienced resources who have received the highest rating. Canada will make a resource assessment prior to the issuance of the call-up to determine the final scores.

Option 3: Option provided by industry. If a respondent provides a viable option, this option could be distributed to all respondents for further evaluation or even used, if it does not restrict the level of competition from other suppliers.

6.2 Supply Arrangement (SA)

The second mechanism would be used for solution-based and for ad hoc requirements. Given the scope and complexity that could be required in the delivery of the work, Canada plans to develop a supply arrangement (SA). The contracting process through an SA has two (2) distinct stages, namely, the pre-qualification stage and the stage when resulting requests for proposal (resulting RFP) are issued. Like standing offers, an SA is not a contract and does not legally bind any of the parties following its signature. The SA includes a set of predetermined terms and conditions that will apply to the resulting RFP and/or contracts. The SA allows for the issuance of resulting RFPs to pre-qualified bidders under specific streams.

An SA is issued following a Request for Supply Arrangement (RFSA) process. The RFSA will be open to all bidders interested in responding to the thirteen (13) streams of expertise in EO-IR technology requirements and the resulting RFPs. These bidders will be invited to submit a proposal to become a pre-qualified bidder. Only pre-qualified bidders will be eligible to bid on a resulting RFP, resulting in the award of contracts.

In general, SA documents comprise resulting RFP templates, including contract terms, a brief work description that may be required, as well as the evaluation and selection criteria. For EO-IR technology requirements for DRDC, an initial qualification phase will be in place during the issuance of the RFSA, in order to create lists of pre-qualified bidders in each of the thirteen (13) streams. As described in the section of the SO, bidders will be evaluated on their abilities and corporate experience. How to select and pre-qualify bidders will be finalized after the assessment of the results obtained from this RFI.

To promote discussions on these important procurement strategy elements, respondents are invited to comment on the following pre-qualification option:

The first phase of the SA process will be to pre-qualify bidders under each of the streams of expertise to create up to thirteen (13) lists of pre-qualified suppliers. To be considered pre-qualified under a specific stream; bidders will have to meet the qualification criteria for that stream (examples of criteria are identified in Annex D). Bidders will be able to pre-qualify for more than one stream, if applicable. When a resulting RFP is issued to perform work under a specific stream, only pre-qualified bidders under that stream will be invited to submit a proposal. There will be no obligation to be pre-qualified for all identified streams in a resulting RFP in order to submit a proposal. If a resulting RFP includes work in several streams (e.g. work in streams 1,

3 and 6), only pre-qualified bidders in streams 1 and/or 3 and/or 6 will be invited to submit a proposal. There will be a possibility to sub-contract during this phase.

The second phase of the SA process is to submit resulting RFPs to pre-qualified bidders in order to get bids. Subsequently, Canada will evaluate the bids received and select the winner according to the selection method identified in those resulting RFPs (e.g. the lowest cost, the lowest cost per point, the highest technical bid). The use of task authorization contracts could be favoured in resulting RFPs. Those resulting RFPs will also include all the terms and conditions of its resulting contract. The total number of resulting RFPs to be issued has not yet been determined, but it is estimated that the total will exceed two hundred (+200).

Examples of qualification and selection criteria (technical and/or financial) for an SA are identified in Annex D.

7. REQUESTED INFORMATION

Respondents are asked to refer to Annex B—Questions to Industry, to present their responses to information requested.

To facilitate the review of responses, respondents are asked to provide the information requested in the order presented.

8. NOTES FOR INTERESTED RESPONDENTS

The RFI is not a Request for Proposal nor does not constitute a commitment, implied or otherwise, based on which the Government of Canada would launch a procurement process. The publication of this RFI does not commit Canada to publish one or more resulting Request for proposals and does not carry any legal or other obligations in Canada to enter into an agreement or accept suggestions from respondents. Canada reserves the right to accept or reject, in whole or in part, any comments received.

In addition, the Government of Canada will not reimburse the costs incurred by respondents to participate in this consultation process, nor to present their responses.

A review team composed of representatives of Canada will be responsible for assessing responses on behalf of the Government of Canada. Canada can also call upon an external consultant or any other government resources deemed necessary to evaluate responses. Each response will not necessarily be assessed by all members of the review team. If necessary, the external consultant(s) will sign a non-disclosure agreement prior to the assessment of responses. Canada will provide information through an intermediary for any amendment to this RFI or by sending an email to the electronic mailing list.

A shortlist of businesses for the delivery of future work following this current RFI will not be drawn up. Similarly, participation in this RFI is neither a condition nor a prerequisite to respond to any future Request for Proposal.

8.1. Confidentiality

Respondents should be aware that Canada can use any information transmitted to it in preparing a competitive request for proposal. However, the government is obliged neither to accede to any statement of interest nor to take it into account in any related document.

All consultations with industry members will be documented. The information collected is governed by the *Access to Information Act*. If necessary, respondents are asked if the information they provided should be treated as confidential or proprietary. Canada will not disclose any information designated as confidential or proprietary to the public or to third parties, except for external consultants who could be called in to assess responses to the RFI.

9. INDUSTRY DAYS AND ONE-ON-ONE MEETINGS

9.1. Format and dates for Industry Days

Industry Days will be held at the locations specified in section 9.4 below, in the Quebec City area in French only and in the National Capital Region (NCR) in English only. The Quebec City area Industry Day will be held on August 4, 2015 from 9:00 a.m. to 10:00 a.m. EDT. The NCR Industry Day will take place on August 6, 2015 from 9:00 a.m. to 10:00 a.m. EDT. During these Industry Days, it will be possible to ask questions or seek clarification regarding future EO-IR technology requirements. The primary goal of these Industry Days is to promptly disclose the new procurement strategy in order to better manage one-on-one meetings. Respondents are asked to refrain from using Industry Days as a forum for marketing purposes.

9.2. One-on-one meetings

One-on-one meetings with representatives of Canada will be for a maximum duration of an hour and will be held on the date and at the time indicated by the Contracting Authority following respondent registration. Respondents are responsible for confirming the date and time of their meeting and to confirm their attendance.

These fixed-time meetings will allow respondents to seek clarification and/or present technical data for future requirements. As requested for the Industry Days, respondents are asked to kindly refrain from using one-on-one meetings as a forum for marketing purposes.

The number of authorized representatives is limited to four for each respondent. Once registration is complete, the one-on-one meeting times will be set for each registered respondent on a first come, first served basis. To register, please complete and sign the Participation Form, including its annexes, which are attached as Annex A to this RFI.

It is not required to participate in the Industry Days or one-on-one meetings in order to present a response to the RFI, or any other resulting request for proposals.

9.3. Additional meetings as needed

Canada may request holding additional one-on-one meetings, in person or by teleconference, in order to invite respondents to present or clarify their responses. In-person meetings will be held at a government facility in Quebec City area or in the National Capital Region. The meetings could be organized at the respondent's facilities, at the sole discretion of Canada. In addition, Canada reserves the right to hold such meetings after the closing date specified in this notice, or until further notice.

All substantive questions and answers that are discussed during these meetings could be documented and made available to the respondents participating in the engagement process.

9.4. Location of Industry Days and one-on-one meetings

9.4.1 Industry Days will be held at the following locations:

Quebec City area: Information will be posted on the RFI notice on the Buyandsell.gc.ca website.
National Capital Region: Information will be posted on the RFI notice on the Buyandsell.gc.ca website.

9.4.2 One-on-one meetings will be held at the following locations (note that meetings can be conducted via teleconference if necessary):

Quebec City area: Information will be sent to respondents via email.
National Capital Region: Information will be sent to respondents via email.

10. MAILING ADDRESS AND RESPONSE FORMAT

Responses to questions regarding this RFI are to be sent by email to the Contracting Authority identified in section 15. Respondents are responsible for ensuring that their responses to the RFI have been received by Canada.

The electronic file containing the responses must be submitted in portable document format (PDF)™ or in a readable format using Microsoft Office 2003™ or a more recent version. The email capacity for sending and receiving is unfortunately limited to a maximum of five (5) Mb.

The submission of an electronic copy will facilitate the distribution of responses to the members of the project team at DRDC and complies with the *Policy on Green Procurement* of the Government of Canada.

11. IMPORTANT DATES TO REMEMBER

11.1 Registration deadline for the engagement process

The deadline for registration to participate in Industry Days and/or one-on-one meetings is set at August 4, 2015 - 09:00 a.m.. Any request to participate received after that date may not be considered.

11.2 Deadline for sending responses

Responses to this RFI should be submitted to the Contracting Authority, in electronic format, before 02:00 p.m. (EDT) on August 14, 2015.

11.3 Closing date of the engagement process

The engagement process will close on the date indicated on the notification page of the Buyandsell.gc.ca website. The process will remain open to allow Canada to publish the findings report on this second RFI and/or ask additional questions, if needed.

12. ASSESSMENT OF RESPONSES AND INDUSTRY FOLLOW-UP

Once responses to this RFI are received, an evaluation will be made to determine whether improvements can be made to the procurement strategy. In order to keep respondents apprised of this requirement, PWGSC will issue a document containing the results of this RFI.

This document could include, without being limited to, the following:

- the number of contractors that participated in the process;
- the names of contractors that submitted responses;
- a collective assessment of the responses received, including anticipated changes, if any. Proprietary information shall not be disclosed;
- the final procurement strategy;
- an approximate timetable for the resulting procurement process, if applicable; and
- next steps.

The document containing the results of the RFI will be sent to respondents that submitted a response to this RFI and will be published on the Buyandsell.gc.ca website.

13. INQUIRIES

Inquiries and other communications regarding this RFI are to be sent exclusively to the Contracting Authority indicated in section 15. We request that respondents that anticipate responding to this RFI inform the Contracting Authority. This way, they can be informed of any changes to the notice published on the Buyandsell.gc.ca website.

Canada

14. LANGUAGE

Communication and/or responses can be made in one of the two official languages of Canada (English or French).

15. CONTRACTING AUTHORITY

All inquiries and other communications related to this RFI are to be directed to the Contracting Authority at the following address:

Ian Potvin
Acquisitions Branch
Public Works and Government Services Canada
11C1, Phase III, Place du Portage
11 Laurier Street, Gatineau, Quebec
K1A 0S5 Canada

Telephone: 819-956-9489
Email: ian.potvin@tpsgc-pwgsc.gc.ca

Canada

ANNEX A—PARTICIPATION FORM (1/3)

To participate in this Engagement process, respondents must complete and sign the Participation Form, including its appendices, and return them to the Contracting Authority identified in section 15, above.

Name of Main Participant	**Name of Business**

Title of Main Participant	**Business Address**

Preferred Language of Communication

English ☐ French ☐

Do you wish to attend:

Industry Day			
Yes	☐	**No**	☐
Region Preferred			
Quebec City area in French:	☐	**National Capital Region in English:**	☐
Number of Participants:			

One-On-One Meeting			
Yes	☐	**No**	☐
Region Preferred			
Quebec City area:	☐	**NCR:**	☐
Preferred Language:			
Teleconference (Yes) (No)			

For networking purposes, I authorize Canada to distribute my contact information to all other participants in this Engagement Process:

YES ☐ **NO** ☐

By signing this document, the participant declares to have full binding authority for the above-mentioned business and agrees on the business's behalf to be bound by the terms and conditions set out in Annex A—Participation Form, including its appendices.

_____ _____

Signature
(I have the authority to bind the company)

Date

_____ _____

Name (Block Letters)

Title or Position (Block Letters)

Canada

Appendix 1 to Annex A—Participation Form (2/3)

Rules of Engagement

One of the fundamental principles of an engagement process is that it is to be conducted according to the highest standards of justice and fairness between all parties. No person or organization shall enjoy or give the impression of having benefited from any unusual or unfair advantage over others.

The engagement process will begin after publication of the notice relating to a Request for Information (RFI) on the Buyandsell.gc.ca website and will end on the release of the document containing the results of the RFI or on the date indicated on the Buyandsell.gc.ca website, whichever comes first. The engagement process will include the following activities:

- distribution of the RFI publication notice through Buyandsell.gc.ca;
- Industry Days (English and French sessions, as appropriate);
- one-on-one meetings;
- evaluation of responses to the RFI;
- additional meetings following the submission of responses, as necessary; and
- transmission and publication of the RFI findings report

The activities listed above and the schedule may change at any time during the engagement process. Notwithstanding cases where changes are caused by unforeseen events, participants will be notified of any change within three (3) calendar days prior to the change. Industry Days and one-on-one meetings will be held in the Quebec City area and/or the National Capital Region.

After publication of the RFI, the written information provided by Canada on this engagement process will be transmitted only to groups that have signed the terms and conditions of engagement set out below.

Terms and conditions of the rules of engagement

a) Participants who wish to take part in the engagement process must register in advance for each of the activities mentioned above, as appropriate.

b) Participants will discuss the different views on the requirement and provide positive solutions to the issues raised. Participants should all have the opportunity to exchange information and to submit questions.

c) Participants should NOT divulge to THE MEDIA OR TO NEWSPAPERS any information regarding this requirement during the engagement process. If a media representative asks questions, they should be referred to Public Works and Government Services Canada's Media Relations office at 819-956-2313.

d) Participants must submit their requests or their comments to the Contracting Authority only, who is the only authorized representative of Canada. Canada waives all responsibility for any damage or loss caused to third parties for information provided by one or more participants to an unauthorized representative of Canada.

e) Participant groups (business, consortium, team of bidders, joint venture, and universities) registered for Industry Days, one-on-one meetings or additional meetings following the submission of responses may not consist of more than four (4) persons.

f) Media representatives may not participate in the engagement process.

g) Canada is not required to issue a request for proposal or to negotiate any contract with respect to the requirements or phases that will be referred to during the engagement process.

h) Throughout the engagement process, all industry questions, exchanges of information and feedback from the industry must be provided in writing to the Contracting Authority. Pursuant to and subject to the provisions of the *Access to Information Act*, *L.R., 1985, c. A-1* and any other legislative requirement or law, all third party information provided by a participant and clearly designated as "proprietary" will be neither shared nor disclosed.

i) The minutes of one-on-one meetings with industry will be recorded. The questions and answers arising from these meetings can be summarized and presented to all participants. To establish better communication between Canada and industry and increase the accuracy of the information collected during one-on-one meetings, respondents are required to prepare a list of questions and send this list to the Contracting Authority no later than five (5) working days before or after the meeting.

j) If Canada issues an RFP, terms and conditions will be determined at the sole discretion of Canada.

k) Canada will not reimburse costs incurred by the participants to take part in the engagement process.

l) Participation in this engagement process will not be mandatory for the submission of a Resulting Request for Proposal. No group will be excluded from a Resulting Request for Proposal on the grounds that it was not a participant in the engagement process.

m) A group refusing to provide a Participation Form will not participate in the engagement process and will not receive updates on RFI documentation.

n) Participants must follow a dispute resolution process to deal with impasses throughout this engagement process, in accordance with Appendix 2 to annex A, Participation Form, below. All requests for use of the dispute settlement process must be submitted to the Contracting Authority, who will undertake the necessary arrangements.

o) At any time during the process, the participant may indicate to the Contracting Authority that it no longer wishes to participate in the engagement process. The moment the Contracting Authority is informed of this by the participant, it will no longer be registered for subsequent events and will not receive updates.

p) If authorized by the participant, Canada will distribute its contact information to all other participants. Canada disclaims all liability for the use of and/or subsequent distribution of this contact information after the information has been officially sent. Canada will not be held responsible for the misuse of information by participants.

q) Participation in Industry Days, one-on-one meetings and additional meetings following the submission of responses is subject to the formal acceptance of all the rules of engagement noted above by the participant. In this regard, the Participation Form must be signed by an agent that has been duly authorized by the participant.

r) The RFI findings report will be distributed to all participants, including those who have already indicated that they no longer wish to participate in the engagement process.

_____ _____

Signature
(I have the authority to bind the company)

Date

_____ _____

Name (Block Letters)

Title or Position (Block letters)

_____

Business (Block Letters)

Canada

Appendix 2 to Annex A—Participation Form (3/3)

Dispute Resolution Process

1. In the context of informal discussions and in good faith, each party must make every reasonable effort to settle disputes and claims, or to end the controversies arising from this engagement process.

2. Any dispute between parties arising from this process, or related to it in some way, will be resolved by following the process outlined below:

   a) Any dispute must first be submitted to the participant's manager and the manager at Public Works and Government Services Canada (PWGSC) responsible for the public engagement process. The parties will have three (3) business days to resolve the dispute.

   b) In the event that the parties' representatives specified in paragraph 2a) above are not able to resolve the dispute, it must be submitted to the senior director of PWGSC's division responsible for the engagement process. The parties will have three (3) business days to resolve the dispute.

   c) If the representatives of the parties specified in paragraph 2b) above are not able to resolve the dispute, it must be sent to the principal representative of the participant who is responsible for this project and the Director General at PWGSC , who will have three (3) business days to resolve the dispute.

   d) If the representatives of the parties listed in paragraph 2c) above are not able to resolve the dispute, it must be forwarded to the participant's CEO and the Assistant Deputy Minister of the PWGSC Acquisitions Branch, who will have ten (10) business days to resolve the dispute.

   e) If the representatives of the parties indicated in paragraph 2d) above are not able to resolve the dispute, the Procurement Authority will, within five (5) working days, issue a written decision that must include a detailed description of the dispute and the grounds for the decision taken by the Contracting Authority. The Contracting Authority must send a signed copy of that decision to the participant.

_____ _____

Signature
(I have the authority to bind the company)

Date

_____ _____

Name (Block Letters)

Title or Position (Block Letters)

_____

Business (Block Letters)

Canada

ANNEX B—QUESTIONS TO INDUSTRY

In order to better respond to industry concerns, adhere to best practices and develop a procurement strategy that is better aligned to the requirements, we ask respondents to respond to the questions below.

In addition, respondents are asked to inform the Contracting Authority of any additional topic that in their opinion should have been considered in developing the procurement strategy and/or tender documents.

For any negative responses, we invite respondents to provide suggestions for improvements and/or constructive feedback so that Canada can take the necessary measures to amend the negative item(s) identified, where appropriate.

Questions to Industry on the Procurement Strategy	
1.0	**General questions about the procurement strategy and previously raised concerns**
1.1	Do you have any concerns, comments or suggestions for improvement in relation to the new procurement strategy? Please explain your answer.
1.2	Do you think the new procurement strategy takes into account the concerns of industry members raised during the first public consultation? If not, can you tell which one(s) that has/have not been addressed? The concerns are identified in the findings report, included at Annex G.
1.3	***Refers to Section 6.0:*** Does the new procurement strategy promote access to competition for all members of this industry?
1.4	***Refers to section 6.1:*** Do you have concerns about the fact that Canada wants to issue call-ups to a pre-qualified bidder of its choice, for low dollar value requirements (less than $25,000)? If so, do you think that reducing that amount would be appropriate?
1.5	***Refers to section 6.0:*** SO/SA – At what time should we make revisions to SOs and SAs in order to allow new businesses to participate and / or to allow pre-qualified bidders to modify their offers (every 3 months, 6 months, 12 months)?
1.6	***Refers to section 6.0:*** Do you have any concerns about the terms of use of intellectual property rights by Canada?
1.7	Are all the requirements related to EO-IR technologies covered under the thirteen (13) streams proposed?
1.8	You are invited to provide any additional comments, suggestions or concerns that may have not been raised through these questions.
2.0	**Selection and/or qualification method for the SO (RFSO)**
2.1	***Refers to Section 6.1 and Annex C:*** Is the way in which bidders are pre-qualified reasonable, and does it meet your expectations?
2.2	***Refers to Section 6.1:*** Is the two (2) step qualification for the OC, described in section 6.1, a viable option, or should we use another method? Please explain your answer.
2.3	How should we capture and evaluate competing work experience of a resource? (e.g. two (2) different work experiences acquired during the same time period accounts for 2 experiences; and two (2) experiences of similar work, acquired during the same time period, account for only 1 experience)
2.4	What type of modality could we use in the SO to limit the use of the same pre-qualifiers when issuing a low value call-up (less than $25,000)? Should we use a rotation of suppliers' clause? You are invited to provide suggestions, if applicable.
2.5	In the context where scientific resources will be required only during the call-up process, what would be a reasonable period, given to a selected pre-qualified bidder, to provide the resource(s) (e.g. 3 days for a junior technician, 10 days for a specialized engineer, and 30 days for a highly specialized resource)? Please explain your answer.
2.6	***Refers to Section 6.1.1:*** Can you comment on the selection options proposed in section 6.1.1 above? In addition, we invite you to submit one or more options that have not been presented in this section.
2.7	***Refers to Annex C:*** Can you comment on the criteria for SO pre-qualification identified in Annex C—EVALUATION CRITERIA – STANDING OFFER?

3.0	**Selection and/or qualification method for the SA (RFSA)**
3.1	Does the option of pre-qualifying bidders by stream seem reasonable?
3.2	Should we review the pre-qualification process to make it more general to EO-IR technology (qualification for requirements as a whole rather by stream)?
3.3	***Refers to Annex D, Section B:*** Should we be requiring bidders to meet more than one mandatory requirement in order to qualify under each stream (minimum of 2 or 3 mandatory criteria per stream)?
3.4	***Refers to Annex D, Sections A and B:*** Do you have any concerns about the examples of pre-qualification criteria for the SA (generic mandatory criteria and those for each stream) presented in Annex D that would be used in the RFSA?
3.5	If the proposed options do not meet your expectations, can you suggest alternative prequalification options?
4.0	**Financial qualification criteria and basis of payment for the SO, SA and/or resulting contracts**
4.1	If Canada decided to add a financial qualification criterion to reject financial bids that have prices above or below a certain percentage of the median or average price, would you have any concerns? ***Example: Median Price + 40% = X, Median Price - 40% = Y. Financial bids higher than "X" or below "Y" would be automatically rejected.***
4.2	For scientific resource requirements under the SO, should we ask for fixed hourly rates or an hourly rate with a ceiling price and negotiate rates when issuing a call-up?
4.3	Do you have any concerns about the various bases of payment that have been used in Government of Canada contracting documents and that may have caused you problems in the past? Please explain your answer.
Questions to industry concerning DRDC operational needs	
5.0	**Standing Offer**
5.1	Are resource categories identified in Annex E representative of the EO-IR technology requirements?
5.2	Are banked hours that are capped conducive to meeting service requirements such as classifying EO-IR systems through as an SO?
6.0	**Supply Arrangement**
6.1	***Refers to the criteria identified in Annex F:*** Do the evaluation criteria examples for the resulting RFPs seem reasonable, and do they meet your expectations?
6.2	Do you see it as a constraint the fact that Canada determines the number and/or categories of resources required to perform one or more specific tasks? Would it be more advantageous to let the pre-qualified bidders determine this information in order to obtain lower prices, while maintaining the same quality of deliverables?

ANNEX C—EVALUATION CRITERIA EXAMPLES – REQUEST FOR STANDING OFFER

If comments received during the Engagement Process are positive, Canada could issue an RFSO for the provision of scientific resources. A two (2) phase evaluation would be used to acquire scientific resources. The first phase of the evaluation would consist of pre-qualifying bidders on their corporate experience (technical, financial and management). The second phase would be to evaluate the proposed resources before issuing a call-up. You will find below, examples of technical, financial and/or management criteria that could be used in the RFSO:

Phase 1 – Examples of Mandatory Criteria (MC) for RFSO Qualification

Type	Criterion title	Description of mandatory criterion	Additional details
MC1	Number of business years supplying EO-IR technology service	The bidder must have provided at least one of the EO-IR technology services identified under one of the thirteen (13) streams, for a period of at least twelve (12) months during the last sixty (60) months.	If the bidder proposes a partnership, the experience of all members within the partnership will be considered only if the main bidder has more than 30% of that experience.
MC2	Experience providing scientific resources *Note that the information in Annex E is given by way of example only as all of the services identified for each resource category will be included in the RFSO.*	For each resource category for which an offer is submitted, the bidder must provide evidence that it has previously supplied this type of resource in past projects, closely linked to the provision of professional services in EO-IR technology, as described for this resource category in Annex E below.	These professional services in EO-IR technology must have been previously provided to an incorporated third party (including all levels of government) in the last three years preceding the closing date of the invitation to tender.
MC3	Earned revenue dedicated to the supply of EO-IR technology services	The bidder must have earned at least C$50,000 for the period not exceeding twelve (12) months preceding the closing date of the invitation to tender.	To meet this criterion, revenue earned must have been in conjunction with EO-IR technology.
MC4	Security clearances for the contractor and its resources	At the time the standing offer is issued, the bidder must hold at least a Designated Organization Screening (DOS), issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).	Note that this clearance level could be revised up to the "SECRET" level, for the contractor and/or for any resources provided later.
MC5	Other	Possibility of adding Mandatory Technical Criteria, provided by industry members, deemed to be fair for all potential bidders.	

Phase 2—Sample evaluation criteria for obtaining scientific resources:

The second phase of the evaluation will include mandatory and point-rated technical evaluation criteria for obtaining specific scientific resources. Canada could evaluate the proposed resources, for call-up purposes, on the basis of mandatory and/or point-rated technical criteria examples, as identified in Table 1.2, Evaluation Criteria for Call-up, at Annex E.

Canada

ANNEX D—EVALUATION CRITERIA EXAMPLES – SUPPLY ARRANGEMENT

If comments received during the engagement process are positive in this regard, Canada could qualify bidders by stream. To be qualified in a particular stream, bidders must meet at least one of the mandatory criteria from those identified for the said stream. Bidders may qualify under more than one stream, where applicable. In addition to the qualification criteria by stream, bidders must also meet the generic mandatory criteria.

The first step of the evaluation will focus on the corporate experience of bidders (technical, financial and management). You will find below examples of technical, financial and management criteria that could be used in the RFSA, in addition to the mandatory technical criteria for qualification under each stream:

EVALUATION STAGE 1 – FOR RFSA PRE-QUALIFICATION

A) Example of Generic Mandatory Criteria (MC)

Criterion	Criterion Title	Description of generic criterion	Comment
MC1	Number of business years supplying EO-IR technology service	The bidder must have been in business in the EO-IR technology field for a period of at least twelve (12) months during the last sixty (60) months (may be non-consecutive).	If the bidder proposes a partnership, the experience of all members within the partnership will be considered, only if the main bidder has more than 50% of that experience.
MC2	Experience in administrative, technical and financial project management	The bidder must have successfully managed and administered the technical and financial aspect of at least three (3) projects related to EO-IR technology in the last 48 months.	Client references may be requested to confirm the success of the projects presented. Note that any project directly or indirectly connected to EO-IR technologies will be accepted.
MC3	Financial stability	The bidder must have earned at least C$50,000 for the twelve (12) months preceding the closing date of the invitation to tender, for providing EO-IR technology services that fall under one of the thirteen (13) streams.	
MC4	Security clearances for the contractor and its resources	At the time the standing offer is issued, the bidder must hold at least a Designated Organization Screening (DOS), issued by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).	Note that this clearance level could be revised up to the "SECRET" level for the contractor and/or for any resources provided later.
MC5	Technical experience	In addition to the generic criteria identified above, the bidder must qualify for a minimum of one (1) stream, as shown below.	

Subsequently, Canada will evaluate the bids received and select the winner according to the selection method identified in the Resulting RFP (e.g. lowest cost, lowest cost per point, highest technical bid).

B) Example of mandatory criteria for pre-qualification for each stream

To be qualified under one or more streams, bidders will have to meet at least one of the mandatory criteria from those identified for the said stream(s).

STREAM 1 TECHNICAL AND ENGINEERING SUPPORT FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

Canada

- ***Task S1T1*** *Characterization of image intensifiers or their components (e.g. I2 tubes)*

  C1. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, in the characterization of image intensifiers or their components for performance evaluation. Each project must have involved at least six of the eight main parameters (will be identified in the Request for Supply Arrangement (RFSA)).

- ***Task S1T2*** *Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation*

  C2. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, in the characterization of infrared sensors (0.9 µm to 15 µm) or their components for performance evaluation. Each project must have involved at least five of the eight main parameters (will be identified in the RFSA).

- ***Task S1T2*** *Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation*
- ***Task S1T3*** *Characterization of UV/visible-light sensors or their components and performance evaluatio*

  C3. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, in the characterization of UV/visible-light sensors or their components for performance evaluation. Each project must have involved at least five of the seven main parameters (will be identified in the RFSA).

- ***Task S1T4*** *Characterization of sensor performance during field tests*

  C4. The bidder must have completed three projects in the last five years in the characterization of sensor performance during field tests. Each project must have been at least one week long.

- ***Task S1T5*** *Detection/recognition/identification performance prediction tools*

  C5. The bidder must have completed two projects in the last 10 years, with a value of at least $5,000.00 each, involving the use and improvement of sensor detection, recognition and identification performance prediction tools.

- ***Task S1T6*** *Hardware and/or software development, improvement and modification of test and characterization equipment*

  C6. The bidder must have completed three projects in the last five years, with a value of at least $20,000.00 each, in software development, improvement and modification of test and characterization equipment, and must have completed three projects in the last five years, with a value of at least $10,000.00 each, in hardware development, improvement and modification of test and characterization equipment. A single project can involve hardware and software; in that case, it must have a value of at least $30,000.00, i.e. $20,000.00 for the software component and $10,000.00 for the hardware component.

STREAM 2 DEVELOPMENT OF METHODOLOGIES FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

- ***Task S2T1*** *Development of test methods for image intensifiers or their components (e.g. I2 tubes) to more accurately evaluate performance in an operational environment*

C1. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, in the development of characterization methods to evaluate the performance in an operational environment of image intensifiers or their components.

- ***Task S2T2*** *Development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to more accurately evaluate performance in an*

C2. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, in the development of characterization methods to evaluate the performance in an operational environment of infrared sensors (0.9 µm to 15 µm) or their components.

- ***Task S2T3*** *Development of test methods for day/night vision sensors to evaluate performance in an operational environment*

C3. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, in the development of characterization methods to evaluate the performance in an operational environment of day/night vision sensors or their components.

- ***Task S2T4*** *Software development for data analysis*

C4. The bidder must have completed three projects in the last five years, with a value of at least $20,000.00 each, in the development of software (C++/MATLAB in Windows) to process and analyze data from electro-optical systems.

- ***Task S2T5*** *Development of image processing algorithms*

C5. The bidder must have completed three projects in the last five years, with a value of at least $20,000.00 each, in the development of algorithms (C++/MATLAB in Windows) to enhance images to improve the performance of vision systems.

STREAM 3 CHARACTERIZATION OF ELECTRO-OPTICAL SYSTEMS

- ***Task S3T1*** *Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation*

C1. Must possess or have access to the necessary devices to measure six of the eight main parameters (will be identified in the RFSA).

Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation

- ***Task S3T2*** *Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation*

C2. Must possess or have access to the necessary devices to measure five of the seven main parameters (will be identified in the RFSA).

- ***Task S3T3*** *Characterization of UV/visible-light sensors or their components and performance evaluation*

C3. Must possess or have access to the necessary devices to measure five of the seven main parameters (will be identified in the RFSA).

- ***Task S3T4*** *Development of testing and evaluation methodologies for UV/Visible sensors (0.2 µm to 15 µm) including the merging of multiple sensors*

  C4. The bidder must have completed three projects in the last five years, with a value of at least $20,000.00 each, in the development of characterization methods to evaluate the performance in an operational environment for UV/Visible sensors (0.2 µm to 15 µm) including the merging of multiple sensors.

- ***Task S3T5*** *Calibration of laboratory equipment*

  C5. The bidder must have completed five projects in the last two years involving the calibration of photometers and luminance/radiance sources.

STREAM 4 OPTO-MECHANICAL

- ***Task S4T1*** *Optical design services* et Task S4T2 Opto-mechanical design

  C1. The bidder must have at least one of the following four licences: Zeemax, Oslo, Code V and ASAP.

- **Task S4T3** Fabrication of optical components

  C2. The bidder must have or have access to the equipment and personnel required for operation, in order to produce spherical, a spherical and freeform optics.

- ***Task S4T4*** *Optical component assembly services*

  C3. The bidder must have or have access to the equipment and personnel required for operation, in order to assemble optical and opto-mechanical components.

- **Task S4T5** Quality assurance

  C4. The bidder must have or have access to the equipment and personnel required for operation, in order to carry out five of the seven main tests on optical components (will be identified in the RFSA).

STREAM 5 ELECTRONICS

- ***Task S5T1*** *Designing high-speed support electronics*

  C1. The bidder must have completed three projects in the last five years in designing high-speed support electronics (frequency higher than 600 MHz) in support of digital/analog signal acquisition activities and/or control.

  Task *S5T1 Designing high-speed support electronics*

- ***Task S5T2*** *Placing and routing mixed signals on schematics of high-speed electronics*

  C2. The bidder must have completed three projects in the last five years involving switching signals on electronic schematics with high-speed restrictions (frequency higher than 600 MHz), and must have designed, three times in the last five years, eight-layer circuits with a high density of components involving an inability to switch traces on the main layer.

- ***Task S5T3*** *Assembling/reworking electronic components on a developed or existing printed circuit*

C3. The bidder must have completed ten projects in the last five years in assembling electronic components (i.e. surface-mount connectors, microchips or electronic chips with small footprints: FBGA, BGA, FLGA, BCC, QFN, TQFP, TSSOP) on printed circuits or reworking developed or existing printed circuits.

- ***Task S5T4*** *Designing and integrating opto-mechanics support*

C4. The bidder must have completed two projects in the last five years in designing and integrating opto-mechanics and components required for assembly.

- ***Task S5T5*** *Designing and integrating mechanics into developed or existing electronics/optronics*

C5. The bidder must have completed two projects in the last five years in designing and integrating mechanics (i.e. support bracket for electronic circuit or lens) into electronics/Optronic.

- ***Task S5T6*** *Processing high-speed digital signals via FPGA to support developed or existing electronics*

C6. The bidder must have completed ten projects in the last five years in designing code in Virtual Hardware Descriptive Language (VHDL), which will be ported to a field programmable gate array (FPGA) to support high-speed electronics. The unit value of projects submitted must be at least $15,000.00.

- ***Task S5T7*** *Processing video signals to support developed or existing electronics*

C7. The bidder must have completed three projects in the last five years in developing algorithms and/or interfaces to process video signals and validate image fusion.

- ***Task S5T8*** *Designing embedded software on DSPs and/or microcontrollers to support developed or existing electronics*

C8. The bidder must have completed three projects in the last five years in designing embedded software on DSPs and/or microcontrollers: development of algorithms or control interfaces (web interface on DSP processor).

Task S5T9 *Designing software to support developed or existing electronics*

C9. The bidder must have completed three projects in the last five years in developing control or intercommunication algorithms or graphic control interfaces in C++/.NET.

- ***Task S5T10*** *Designing firmware based on MATLAB/Simulink or LabVIEW*

C10. The bidder must have completed three projects in the last five years in developing firmware to support pre- or post-processing of data or data acquisition in MATLAB/Simulink or LabView.

STREAM 6 Architecture, PROGRAMMING, SOFTWARE ENGINEERING AND SYSTEMS ENGINEERING

- ***Task S6T1*** *Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies*
- *Task* ***S6T2*** ***Software*** *development for EO/IR systems* and ***Task S6T3*** *Development, production and maintenance of avionics systems for EO/IR systems*

C1. The Bidder must have a quality control system, a configuration management tool and a development process in line with DO-178C level D or higher (C, B or A) certification requirements, and must meet all requirements for CMMI level 2 or higher (3, 4 or 5) certification.

STREAM 7 Operating EO systems

- ***Task S7T1*** *Develop software, firmware and GUI for operating electro-optical systems*

C1. The bidder must have completed ten projects in the last five years, with a value of at least $10,000.00 each, in developing software, firmware and graphical user interfaces (GUIs) for operating electro-optical systems.

- ***Task S7T2*** *Prepare electro-optical systems*

C2. The bidder must have completed three projects in the last five years, with a value of at least $10,000.00 each, involving the preparation (modifying, enhancing or adding capabilities) of electro-optical systems and their optical, electronic and mechanical components.

- ***Task S7T3*** *Collect data in the laboratory and during testing using electro-optical systems*

C3. The bidder must have completed three projects in the last five years involving the collection of data in the laboratory and during field testing.

- ***Task S7T4*** *Reduce and analyze data collected using electro-optical systems*

C4. The bidder must have completed three projects in the last five years, with a value of at least $2,000.00 each, involving the reduction and analysis of data collected using electro-optical systems.

STREAM 8 HyperspectraL SYSTEMS

- ***Task S8T1*** *Maintenance and repair of hyperspectral systems*

C1. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, involving the maintenance and repair of hyperspectrale systems. Manufacturing projects will also be considered.

- ***Task S8T2*** *Design and development: Hyperspectral systems*

C2. The bidder must have completed two projects in the last five years, with a value of at least $200,000.00 each, involving the design and development of hyperspectrale systems.

- ***Task S8T3*** *Software for hyperspectral systems*

C3. The bidder must have completed two projects in the last five years, with a value of at least $100,000.00 each, involving the development of software and algorithms for hyperspectrale systems.

- ***Task S8T4*** *Characterization of hyperspectral spectrometry systems*

C4. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, involving the characterization of hyperspectrale spectrometry systems, and must possess or have access to the necessary devices to measure five of the seven main parameters (will be identified in the RFSA).

- ***Task S8T5*** *Measurement and analysis: Hyperspectral systems*

C5. The bidder must have completed three projects in the last five years in characterizing sensor performance during field tests. Each project must have been at least one week long.

STREAM 9 ELECTRO-OPTICAL SUPPORT INTEGRATION

- ***Task S9T1*** *Optimization studies*

C1. The bidder must have completed three optimization studies in the last five years, with a value of at least $10,000.00 each, on the interior and exterior layout of electro-optical system components, e.g. imaging system, active protection system, high-energy laser, etc.

- ***Task S9T2*** *Power management and wiring studies*

C2. The bidder must have completed three projects in the last five years involving power and wiring management.

- ***Task S9T3*** *Management studies for cooling components*

C3. The bidder must have completed two projects in the last five years, with a value of at least $5,000.00 each, involving management studies for cooling electro-optical components.

- ***Task S9T4*** *Integrating electro-optical systems into military platforms*

C4. The bidder must have completed two projects in the last five years, with a value of at least $25,000.00 each, involving integrating electro-optical systems into actual platforms.

- ***Task S9T5*** *Support for performance testing*

C5. The bidder must have completed five projects in the last five years, with a value of at least $10,000.00 each, involving performance testing (from preparing to conducting experiments).

1. STREAM 10 AIRBORNE PLATFORM

- **Task description for Stream 10 Task 1 (S10T1):** *Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications*

C1. The bidder must have completed two projects in the last five years, with a value of at least $50,000 each, involving the integration of a multi-sensor system with telecommunication components deployed on an airborne platform used in flight.

- ***Task S10T2*** *Integration of turrets and pods for Canadian Armed Forces (CAF) aircraft*

C2. The bidder must have completed two projects in the last five years, with a value of at least $50,000 each, involving the integration of a multi-sensor system with telecommunication components deployed on an airborne platform having been used for at least 50 flight hours in total.

- ***Task S10T3*** *Renting of turrets and pods for CAF test campaigns, exercises, demonstrations and missions*

C3. The bidder must have completed two projects in the last five years, with a value of at least $25,000 each, involving renting a multi-sensor system with telecommunication components deployed on an airborne platform having been used for at least 25 flight hours in total.

- ***Task S10T4*** *Temporary integration of turrets, pods and operator consoles (roll-on-roll-off mission kit) into civilian aircraft, renting and operation of equipment for*

C4. The bidder must have completed two projects in the last five years, with a value of at least $50,000 each, involving renting an aircraft equipped with a multi-sensor system with telecommunication components having been used for at least 50 flight hours in total.

STREAM 11 Laser AND LiDAR

- ***Task S11T1*** *Generation of laser signals*

C1. The bidder must have completed three projects in the last five years involving the generation of laser signals (design, characterization and maintenance of Optronic systems that generate laser signals).

- ***Task S11T2*** *Propagation of laser signals*

C2. The bidder must have completed three projects in the last five years involving the propagation of laser signals (design, characterization and maintenance of Optronic systems that generate laser signals with modes of operation that are based on phenomena related to laser signal propagation).

- ***Task S11T3*** *Detection of laser signals*

C3. The bidder must have completed three projects in the last five years involving Optronic systems with modes of operation that are based on laser signal detection (design, characterization and maintenance of such Optronic systems).

- ***Task S11T4*** *Electronics support for optical assembly and laser circuitry*

C4. The bidder must have completed three projects in the last five years involving the maintenance or improvement of electronic circuits for laser system composition.

- ***Task S11T5*** *Laser/laser signal programming support*

C5. The bidder must have completed three projects in the last five years involving the development of algorithms, routines or computer programs to support laser systems.

- ***Task S11T6*** *Testing support*

C6. The bidder must have completed three field test campaigns, at least one week long, in the last five years.

STREAM 12 IMAGE FUSION

- ***Task S12T1*** *Develop and maintain software to support image capture, representation, fusion and analysis*

C1. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, involving the development of image fusion software.

- ***Task S12T2*** *Process, reduce, fuse and analyze images and video sequences*

  C2. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, involving perceptual analyses, correlation analyses and performance metrics analyses of video sequences.

- ***Task S12T3*** *Take measurements with electro-optical instruments*

  C3. The bidder must have completed three projects in the last five years, with a value of at least $20,000.00 each, involving the preparation, manipulation and collection of data using electro-optical equipment.

STREAM 13 AIRCRAFT SIGNATURES

- ***Task S13T1*** *Aircraft signatures - Develop software to support control of spectroradiometric measurement instruments*

  C1. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, involving the development of software to support control of spectroradiometric measurement instruments.

- ***Task S13T2*** *Develop software to support the saving, organization and representation of spectroradiometric data*

  C2. The bidder must have completed two projects in the last five years, with a value of at least $10,000.00 each, involving the development of software to support control of spectroradiometric measurement instruments.

- ***Task S13T3*** *Develop software to support control of spectroradiometric measurement instruments*

  C3. The bidder must have completed two projects in the last five years, with a value of at least $20,000.00 each, involving the development of software to support processing and analysis of spectroradiometric data.

- ***Task S13T4*** *Process, analyze and exploit spectroradiometric data*

  C4. The bidder must have completed two projects in the last five years, with a value of at least $5,000.00 each, involving the processing, analysis and exploitation of spectroradiometric data.

- ***Task S13T5*** *Take measurements with spectroradiometric instruments*

  C5. The bidder must have completed two projects in the last five years, with a value of at least $15,000.00 each, involving collecting data with spectroradiometric instruments.

ANNEX E—OPERATIONAL REQUIREMENTS EXAMPLES – STANDING OFFER

DRDC would like to implement an SO to obtain scientific resources that can fill temporary needs. These needs could be of a technical, engineering, scientific support or other nature. The required services may support the design, development, manufacture and/or operation of electro-optics systems.

The list of resource categories that may be requested as well as a simulation exercise with examples of evaluation criteria for these resources is included below:

LIST OF SCIENTIFIC RESOURCES CATEGORIES:

Technician in: physic, electronic, electrical, computer, mechanic, electro mechanic, electro-optics.

Bachelors degree or Greater in: physics, engineering physics, optical physics, electrical, electrical engineering, computer science, computer engineering, mechanical engineering, mechanical engineering, mathematics.

Examples of resources and their potential tasks under the SO:

Table 1.1 - Resources and associated tasks

Resource Type	Potential Tasks	
Mechanic engineer	Participate in the characterization of image intensifiers or their components (e.g. I2 tubes)	Participate in the design and development of hyperspectrale systems
	Participate in the characterization of UV/visible sensors or their components	Participate in the characterization of infrared sensors (0.9 µm to 15 µm) or their components
	Participate in the characterization of sensor performance during field tests	Participate in the characterization of hyperspectrale spectrometry systems
	Participate in hardware and/or software development, improvement and modification of test and characterization equipment	Participate in the taking of measurements and analysis of data obtained using hyperspectrale systems
	Participate in the development of test methods for image intensifiers or their components (e.g. I2 tubes)	Participate in optimization studies to integrate EO systems into platforms
	Participate in the development of test methods for infrared sensors (0.9 µm to 15 µm) or their components	Participate in power management and wiring studies
	Participate in the development of test methods for day/night vision sensors	Participate in management studies for cooling components
	Participate in opto-mechanical design	Participate in the integration of EO systems into military platforms
	Participate in the assembly of optical components	Participate in performance testing for EO systems on military platforms
	Participate in the design and integration of opto-mechanics support	Participate in the generation of laser signals
	Participate in the design and integration of mechanics into developed or existing Electronics/Optronic	Participate in the propagation of laser signals
	Participate in the development, production and maintenance of avionics systems for EO/IR systems	Participate in the detection of laser signals
	Participate in the preparation of electro-optical systems	Participate in the design of electronics support for optical assembly and laser circuitry
	Participate in the collection of data in the laboratory and during testing using electro-optical systems	Participate in software and algorithm development in laser source/laser signal programming
	Participate in the maintenance and repair of hyperspectrale systems	Participate in laser and LIDAR testing and in measurements with electro-optical instruments
Electronic technician	Participate in the characterization of image intensifiers or their components (e.g. I2 tubes)	Participate in the design of software to support developed or existing electronics
	Participate in the characterization of UV/visible sensors or their components	Participate in the design of firmware based on MATLAB/Simulink or LabVIEW
	Participate in the characterization of sensor performance during field tests	Participate in the preparation of electro-optical systems
	Participate in hardware and/or software development, improvement and modification of test and characterization equipment	Participate in the collection of data in the laboratory and during testing using electro-optical systems
	Participate in the development of test methods for	Participate in the reduction and analysis of data

	image intensifiers or their components (e.g. I2 tubes)	collected using electro-optical systems
	Participate in the development of test methods for infrared sensors (0.9 µm to 15 µm) or their components	Participate in the characterization of hyperspectrale spectrometry systems
	Participate in the development of test methods for day/night vision sensors	Participate in the taking of measurements and analysis of data obtained using hyperspectrale systems
	Participate in the design of high-speed support electronics	Participate in optimization studies to integrate EO systems into platforms
	Participate in the placing and routing of mixed signals on schematics of high-speed electronics	Participate in power management and wiring studies
	Participate in the assembling/reworking of electronic components on a developed or existing printed circuit	Participate in management studies for cooling components
	Participate in the design and integration of opto-mechanics support	Participate in the integration of EO systems into military platforms
	Participate in the design and integration of mechanics into developed or existing electronics/Optronic	Participate in performance testing for EO systems on military platforms
	Participate in the processing of high-speed digital signals via FPGA to support developed or existing electronics	Participate in the taking of measurements with electro-optical instruments
	Participate in the processing of video signals to support developed or existing electronics	Participate in the taking of measurements with spectroradiometric instruments
	Participate in the design of embedded software on DSPs and/or microcontrollers to support developed or existing electronics	Participate in the characterization of infrared sensors (0.9 µm to 15 µm) or their components

Scenario (call-up)

Here is an example of a scenario that includes the evaluation criteria for scientific resources in the technician category. *Criteria for information purposes only; the evaluation criteria used in the official Request for Standing Offer (RFSO) and all call-ups could be different.*

DRDC has a requirement for professional and research and development services for field trials for a minimum duration of two weeks, focusing on the assessment of image intensifier performance. The resources required are two electronics technicians (at a minimum, one intermediate and one senior) and one mechanical engineer (intermediate level). The estimated level of effort for the intermediate technician is 100 hours, for the senior technician, 100 hours, and for the engineer, 90 hours.

Mandatory criterion (MC), point-rated criterion (PRC)

Table 1.2 – Evaluation Criteria for Call-Up

Criterion	Criterion Title	Description	Comment
MC1	Number of years of expertise in handling and calibrating EO systems	Each proposed resource must have a minimum of 12 months' experience gained over the last 48 months in handling and calibrating EO systems	This experience can be from a field test or in a laboratory. In the case where the resource's experience was acquired on projects that occurred simultaneously, the length of time for each project will not be counted more than once.
MC2	Experience of resources in the **Physics Technician** category	One of the resources must have at least 6 months of experience in the handling of an image intensifier.	This experience can be from a field test or in a laboratory.

MC3	Security clearance for resources	At the time the call-up is issued, one of the two resources from the technician category and the resource from the engineer category must have a SECRET level security clearance issued by the Public Works and Government Services Canada Industrial Security Program. The third resource must hold at least a RELIABILITY level of security clearance, issued by the Public Works and Government Services Canada Industrial Security Program.	
PRC1	Experience, in terms of field test projects, of the proposed resources	For each continuous period of 4 days in EO systems field testing in the last 36 months for each proposed resource, the bidder will get 2 points to a maximum of 20 points for all resources.	Will take into account the days where a minimum of 4 hours was spent taking measurements.
PRC2	Experience in terms of field testing projects in winter conditions for the proposed resource in the engineer category	For each continuous period of 3 days in EO systems field testing in winter conditions over the last 48 months, the bidder will get 5 points up to a maximum of 15 points.	Field testing in winter conditions means any field testing involving EO systems executed north of the 49th parallel with maximum temperatures of -15^{o} C. Will count the days where a minimum of 4 hours were spent taking measurements.
PRC3	Experience in integration of opto-mechanical modules on Canadian Armed Forces platforms	For each opto-mechanical module integrated with a military platform by any of the proposed resources, within the last 36 months, 2 points per module will be awarded with a maximum of 20 points.	A single module integrated at the same time by one or more of the proposed resources will count for only 2 points.

Only the pre-qualified bidders will be invited to submit a proposal to supply scientific resources. Those who meet the criteria identified above will proceed to the selection stage. Selection will be made as follows:

Selection method: Lowest cost per point (example only)

	Bidder 1	**Bidder 2**	**Bidder 3**	**Bidder 4**
Mandatory criteria met	Yes	Yes	Yes	Yes
Result obtained for point-rated criteria (maximum of 55 points)	40	28	46	42
Total bid price	$2,000	$1,300	$2,200	$1,800
Price divided by number of points (final score)	50	46.43	47.83	42.86

In this scenario, the winner of the call-up would be Bidder 4.

ANNEX F—OPERATIONAL REQUIREMENTS EXAMPLES – SUPPLY ARRANGEMENT

Here are examples of tasks, including scientific resource requirements, deliverables and examples of evaluation criteria that may be required when issuing resulting RFPs stemming from the Supply Arrangement (excerpts of tasks from the 13 streams). In addition to the evaluation criteria listed in Annex D, resulting RFPs will include generic evaluation criteria such as the level of understanding of the objectives, the quality of the technical proposal, and project management and administrative management experience.

1. STREAM 1 TECHNICAL AND ENGINEERING SUPPORT FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

1.1. Task description for Stream 1 Task 2 (S1T2): *Task S1T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation*

1.1.1. The Contractor shall characterize infrared sensors (0.9 µm to 15 µm) or their components and evaluate their performance in accordance with the criteria set out in the statement of work. Infrared sensors include, but not are limited to: photonic sensors, thermal sensors and microbolometers. This task includes taking measurements in DRDC laboratories in accordance with the methodology developed by DRDC and data analysis. The methodology shall be specified in the statement of work. The main parameters to be measured are:

(1) Impulse response (moderation transfer function (MTF))
(2) Resolution response (minimum resolvable temperature differential (MRTD))
(3) Image noise (3D-noise and noise equivalent temperature difference (NETD))
(4) Transfer function (signal transfer function (SiTF))
(5) Dynamic range
(6) Spectral response
(7) Field of view
(8) Electricity consumption

1.2. Deliverables for *Task S1T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation*

(1) Report describing:
  (a) methodology used
  (b) experimental results obtained, in the form of tables and/or graphs
  (c) data analysis
(2) Raw data in the output format of the measurement instruments delivered on a CD or DVD
(3) Processed experimental data in the form of tables and/or graphs in a format that can be incorporated into a document written in Microsoft Office format

1.3. Examples of potentially required resource's categories for *Task S1T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation* in a Subsequent Request for Proposals

Technician Category**
Level 1 Junior physics or electronics technician
Level 2 Intermediate physics or electronics technician
Level 3* Senior physics or electronics technician

Technician/Engineer Category
Level 1* Junior mechanical technician or engineer

Level 2 Intermediate mechanical technician or engineer
Level 3 Senior mechanical technician or engineer

Engineer/Physicist Category
Level 1 Bachelor's degree or higher in physics or engineering physics, junior level
Level 2* Bachelor's degree or higher in physics or engineering physics, intermediate level
Level 3 Bachelor's degree or higher in physics or engineering physics, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

1.4. Examples of evaluation criteria for *Task S1T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed two projects in the last 24 months, with a value of at least $15,000.00 each, in characterization of infrared sensors (0.9 µm to 15 µm) or their components for the purpose of evaluating their performance. Projects must have involved, at a minimum, the following parameters:

  a) Impulse response (MTF)
  b) Resolution response (minimum resolvable temperature (MRT))
  c) Image noise (3D-noise and noise equivalent temperature difference (NETD))
  d) Dynamic range

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

- Technician** resources must have at least 12 months of experience in handling, measuring, calibrating and characterizing electro-optical systems.

- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For every 12 months of experience a Technician** has in handling, measuring, calibrating and characterizing electro-optical systems in addition to the minimum 12 months, the Technician** resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

- For every 12 months of experience a Technician/Engineer has in handling, measuring, calibrating and characterizing electro-optical systems, the Technician/Engineer resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

- For every 12 months of experience an Engineer/Physicist has in handling, measuring, calibrating and characterizing electro-optical systems, the Engineer/Physicist resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

1.5. **All tasks** included in STREAM 1 TECHNICAL AND ENGINEERING SUPPORT FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

a) Task S1T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation
b) Task S1T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation
c) Task S1T3 Characterization of UV/visible-light sensors or their components and performance evaluation
d) Task S1T4 Characterization of sensor performance during field tests
e) Task S1T5 Detection/recognition/identification performance prediction tools
f) Task S1T6 Hardware and/or software development, improvement and modification of test and characterization equipment

2. STREAM 2 DEVELOPMENT OF METHODOLOGIES FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

2.1. ***Task description for Stream 2 Task 3 (S2T3):*** *Task S2T3 Development of test methods for day/night vision sensors to evaluate performance in an operational environment*

2.1.1. The Contractor shall participate in the development of characterization methods to evaluate performance in an operational environment of day/night vision sensors or their components. Day/night vision sensors include, but not limited to: complementary metal–oxide–semiconductor (CMOS) sensors, charge-coupled device (CCD) sensors, electron-multiplying CCD (EMCCD) sensors, and sensors that function in UV and day sights, such as binoculars, sights or telescopes. The Contractor's role includes:

(1) Reviewing literature
(2) Developing data acquisition systems
(3) Helping to collect and save data
(4) Provide services for data analysis and reduction
(5) Participating in conferences and/or workshops on topics associated with electro-optics

2.2. **Deliverables** for *Task S2T3 Development of test methods for day/night vision sensors to evaluate performance in an operational environment*

(1) A literature review report
(2) A written report on conferences and/or workshops attended
(3) A data acquisition system
(4) A report on performance evaluation and characterization describing:
    (a) methodology used
    (b) experimental results obtained in table and/or graph format
    (c) a data analysis

(5) Raw data in the output format of the measurement instruments delivered on a CD or DVD

(6) Processed experimental data in the form of tables and/or graphs in a format that can be incorporated into a document written in Microsoft Office format

2.3. Examples of potentially required resource's categories for *Task S2T3 Development of test methods for day/night vision sensors to evaluate performance in an operational environment* in a Subsequent Request for Proposals

Technician/Engineer Category**
Level 1* Junior technician or engineer in mechanics, physics or engineering physics
Level 2 Intermediate technician or engineer in mechanics, physics or engineering physics
Level 3 Senior technician or engineer in mechanics, physics or engineering physics

Engineer/Computer Scientist Category***
Level 1 Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Engineer/Computer Scientist Category*** resources can have Bachelor's degrees or higher in Science, with a minimum of 60 months of experience in programming.

Engineer/Physicist Category
Level 1 Master's degree or higher in physics or engineering physics, junior level
Level 2* Master's degree or higher in physics or engineering physics, intermediate level
Level 3 Master's degree or higher in physics or engineering physics, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

2.4. Examples of evaluation criteria for *Task S2T3 Development of test methods for day/night vision sensors to evaluate performance in an operational environment* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed one project in the last 24 months, with a value of at least $10,000.00, in development of characterization methods to evaluate performance in an operational environment of day/night vision sensors or their components.

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

- Technician** resources must have at least 12 months of experience in handling, measuring, calibrating and characterizing electro-optical systems.

- Resources must detain a security clearance up to: RELIABILITY

(2) Rated criteria

- For every 12 months of experience a Technician/Engineer** has in handling, measuring, calibrating and characterizing electro-optical systems in addition to the minimum 12 months, the Technician/Engineer** resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

- For every 12 months of experience an Engineer/Computer Scientist has in handling, measuring, calibrating and characterizing electro-optical systems, the Engineer/Computer Scientist resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

- For every 12 months of experience an Engineer/Physicist has in handling, measuring, calibrating and characterizing electro-optical systems, the Engineer/Physicist resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

2.5. All tasks included in STREAM 2 DEVELOPMENT OF METHODOLOGIES FOR THE CHARACTERIZATION OF ELECTRO-OPTIC SYSTEMS

a) Task S2T1 Development of test methods for image intensifiers or their components (e.g. I2 tubes) to more accurately evaluate performance in an operational environment
b) Task S2T2 Development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to more accurately evaluate performance in an operational environment
c) Task S2T3 Development of test methods for day/night vision sensors to evaluate performance in an operational environment
d) Task S2T4 Software development for data analysis
e) Task S2T5 Development of image processing algorithms

3. STREAM 3 CHARACTERIZATION OF ELECTRO-OPTICAL SYSTEMS

3.1. Task description for Stream 3 Task 1 (S3T1): *Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation*

3.1.1. The Contractor shall characterize image intensifiers or their components (e.g. I2 tubes) and evaluate their performance in accordance with the criteria set out in the statement of work. This task includes taking measurements at the Contractor's facilities and analyzing data. The system characterization shall be consistent with recognized methodology in this field, accepted by DRDC and performed using the Contractor's equipment. The image intensifiers or their components will be specified in the statement of work. The primary parameters to be measured are as follows:

(1) Impulse response (Modulation Transfer Function (MTF)) on axis and off-axis
(2) Resolution response (Minimum Resolvable Temperature (MRT))
(3) Image noise (Signal-to-Noise Ratio (SNR)
(4) Equivalent Background Illumination (EBI))

(5) Luminous gain
(6) Dynamic range
(7) Spectral response
(8) Response to flashes of light
(9) Field of view

3.2. Deliverables for *Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation*

(1) A report describing:
  (a) methodology used
  (b) experimental results obtained in table and/or graph format
  (c) a data analysis
(2) Raw data in the output format of the measurement instruments delivered on a CD or DVD
(3) Processed experimental data in the form of tables and/or graphs in a format that can be incorporated into a document written in Microsoft Office format

3.3. Examples of potentially required resources' categories for *Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation* in a Subsequent Request for Proposals

Technician Category**
Level 1 Junior physics or electronics technician
Level 2 Intermediate physics or electronics technician
Level 3* Senior physics or electronics technician

Technician/Engineer
Level 1* Junior mechanical technician or engineer
Level 2 Intermediate mechanical technician or engineer
Level 3 Senior mechanical technician or engineer

Engineer/Physicist Category
Level 1 Bachelor's degree or higher in physics or engineering physics, junior level
Level 2* Bachelor's degree or higher in physics or engineering physics, intermediate level
Level 3 Bachelor's degree or higher in physics or engineering physics, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

3.4. Examples of evaluation criteria for *Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation* in a Subsequent Request for Proposal

(1) Mandatory criteria

- Upon contract award, the contractor must possess or have access to the necessary devices to measure the following parameters:

    a) Impulse response (Modulation Transfer Function (MTF))
    b) Resolution response (Minimum Resolvable Temperature (MRT))
    c) Luminous gain
    d) Dynamic range
    e) Spectral response
    f) Field of view

- The Contractor must propose resources whose combined experience (one or more resources) demonstrate that the proposed team carried out the measurement of all parameters cited in the mandatory criteria. These experiences must have been gained in five (5) different image intensifiers in the last 24 months.

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

- Technician** resources must have at least 12 months of experience in handling, measuring, calibrating and characterizing electro-optical systems.

- Resources must detain a security clearance up to: SECRET

- Contractor's facilities must have a security clearance up to: SECRET

(2) Rated criteria

- For every 12 months of experience a Technician** has in handling, measuring, calibrating and characterizing electro-optical systems in addition to the minimum 12 months, the Technician** resource category is granted two points, up to a cumulative maximum of 6 points for the entire category.

3.5. All tasks included in STREAM 3 CHARACTERIZATION OF ELECTRO-OPTICAL SYSTEMS

a) Task S3T1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation
b) Task S3T2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation
c) Task S3T3 Characterization of UV/visible-light sensors or their components and performance evaluation
d) Task S3T4 Development of testing and evaluation methodologies for UV/Visible sensors (0.2 µm to 15 µm) including the merging of multiple sensors
e) Task S3T5 Calibration of laboratory equipment

4. STREAM 4 OPTO-MECHANICAL

4.1. **Task description for Stream 4 Task 1 (S4T1):** *Task S4T1 Optical design services*

4.1.1. The Contractor must provide the following in-house optical design services:

(1) Design of optics systems with spherical, a spherical and freeform lens, and mirrors using computer-aided design (CAD)
(2) Simulation of optical performance for parameters such as MTF, PSF, OPD, brightness distribution, tolerances analysis, and thermos-structural stress analysis

4.2. **Deliverables** for *Task S4T1 Optical design services*

(1) Letter report containing:

a) the lens design and its associated digital file (Zeemax type)
b) the lens prescription
c) the MTF
d) the PSF
e) the OPD
f) the distortion
g) the tolerance analysis
h) the thermos-structural analysis
i) any other measured parameter

4.3. **Examples of potentially required resources' category** for *Task S4T1 Optical design servicesTask S4T1 Optical design services* in a Subsequent Request for Proposals

Optical designer Category
Level 1 Master's degree or higher in physics or engineering physics, with specialization in optics, junior level
Level 2* Master's degree or higher in physics or engineering physics, with specialization in optics, intermediate level
Level 3 Master's degree or higher in physics or engineering physics, with specialization in optics, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

4.4. **Examples** of evaluation criteria for *Task S4T1 Optical design services* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have a licence for the following software: Zeemax and ASAP.
- The contractor must propose at least one resource for the level identified by a * (or of a higher level).

- The resources from the Optical designer's category must have at least six months of experience, within the last 48 months, in designing optics systems with spherical lenses.

(2) Rated criteria

- For each resource of the Optical designer's category with a Doctorate degree in physics/engineering physics with specialization in optics will receive two points each, up to a cumulative maximum of 4 points for the entire category.

- For every 12 months of experience for a resource from the Optical designer's category has in optic design in addition to the minimum 36 months, the Optical designer resource category is granted two points, up to a cumulative maximum of 4 points for the entire category.

4.5. All tasks included in STREAM 4 OPTO-MECHANICAL

a) *Task S4T1 Optical design services*
b) Task S4T2 Opto-mechanical design
c) Task S4T3 Fabrication of optical components
d) Task S4T4 Optical component assembly services
e) Task S4T5 Quality assurance

5. STREAM 5 ELECTRONICS-FINAL

5.1. **Task description for Stream 5 Task 1 (S5T1):** *Task S5T1 Designing high-speed support electronics*

5.1.1. The Contractor shall design high-speed electronics (frequency higher than 600 MHz) in support of digital/analog signal acquisition activities and/or control. This task involves conducting an analysis based on the stated requirements proposing a solution in the form of a report including the functional and technical specifications, and choosing selected components to be integrated into the circuit. The Contractor shall then design electronic schematics and test them with functional simulations, if initially required.

5.2. Deliverables for *Task S5T1 Designing high-speed support electronics*

(1) Preliminary analysis and specifications report
(2) Source diagram of validated electronics (in a format compatible with Protel)
(3) Technical operating manual
(4) End-of-task report (including list of all components selected, and simulation report if necessary)

5.3. Examples of potentially required resources' categories for *Task S5T1 Designing high-speed support electronics* in a Subsequent Request for Proposals

Technician category
Level 1 Junior electronics, physics or computer science technician
Level 2* Intermediate electronics, physics or computer science technician
Level 3* Senior electronics, physics or computer science technician

Engineer category
Level 1 Bachelor's degree or higher in electronics, physics or computer science, junior level
Level 2* Bachelor's degree or higher in electronics, physics or computer science, intermediate level
Level 3* Bachelor's degree or higher in electronics, physics or computer science, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 60 months
Level 3 60 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

5.4. Examples of evaluation criteria for *Task S5T1 Designing high-speed support electronics* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed one project in the last 24 months in designing high-speed electronics (frequency higher than 600 MHz) in support of digital signal acquisition and control activities.

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- The resources from Engineer category with a Master's degree or higher in electronics, physics or computer science will receive two points, up to a cumulative maximum of six points for the entire category.

5.5. All tasks included in STREAM 5 ELECTRONICS

a) Task S5T1 Designing high-speed support electronics
b) Task S5T2 Placing and routing mixed signals on schematics of high-speed electronics
c) Task S5T3 Assembling/reworking electronic components on a developed or existing printed circuit
d) Task S5T4 Designing and integrating opto-mechanics support
e) Task S5T5 Designing and integrating mechanics into developed or existing electronics/optronics
f) Task S5T6 Processing high-speed digital signals via FPGA to support developed or existing electronics
g) Task S5T7 Processing video signals to support developed or existing electronics
h) Task S5T8 Designing embedded software on DSPs and/or microcontrollers to support developed or existing electronics
i) Task S5T9 Designing software to support developed or existing electronics
j) Task S5T10 Designing firmware based on MATLAB/Simulink or LabVIEW

6. STREAM 6 ARCHITECTURE, PROGRAMMING, SOFTWARE ENGINEERING AND SYSTEMS ENGINEERING

6.1. **Task description for Stream 6 Task 1 (S6T1):** *Task S6T1 Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies*

6.1.1. The work related to this task will be typically used by DRDC for TIES (technical investigations and engineering support) activities. The work will consist mainly of preliminary studies to be used by DRDC to plan certain activities. The Contractor shall:

(1) Carry out comprehensive analyses of technical or IT problems and develop strategies to overcome technological challenges.
(2) Carry out various technological risk mitigation activities (studies, evaluations, testing or prototyping, modelling and simulation (M&S)) to better define the spectrum of solutions to consider.
(3) Carry out enterprise architecture and system design work.
(4) Carry out investigations, minor fixes and system optimization (e.g. impact analyses, resolution of software problems requiring less than a week of work, technical advice to support the definition of solutions, optimization work).

6.2. **Deliverables** for *Task S6T1 Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies*

(1) Recommendations and technical advice
(2) System architecture and capability architecture
(3) Engineering reports
(4) M&S solutions
(5) Prototypes of systems used as tools for clarifying or validating technical requirements or mitigating risks

6.3. **Examples** of potentially required resources' categories for *Task S6T1 Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies* in a Subsequent Request for Proposals

Technician category**
Level 1 Network programmer/analyst or technician or telecommunications technician (wireless/radio, satellite, data links and gateways), junior level
Level 2 Network programmer/analyst or technician or telecommunications technician (wireless/radio, satellite, data links and gateways), intermediate level
Level 3* Network programmer/analyst or technician or telecommunications technician (wireless/radio, satellite, data links and gateways), senior level

Engineer category***
Level 1 Junior computer science (networks or systems), electrical or electronics engineer
Level 2* Intermediate computer science (networks or systems), electrical or electronics engineer
Level 3 Senior computer science (networks or systems), electrical or electronics engineer

Engineer/Scientist category***
Level 1 Master's degree or higher in computer engineering, electrical engineering, mechanical engineering or engineering physics (optics and radiofrequency), junior level)

Level 2 Intermediate Master's degree or higher in computer engineering, electrical engineering, mechanical engineering or engineering physics (optics and radiofrequency), intermediate level
Level 3* Senior Master's degree or higher in computer engineering, electrical engineering, mechanical engineering or engineering physics (optics and radiofrequency), senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree or DESS (graduate diploma: Diplôme d'étude supérieure spécialisée) will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

6.4. **Examples** of evaluation criteria for *Task S6T1 Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.
- Resources form Technician category** must have at least 36 months of experience in programming or scripting for execution in x86 architecture.
- Resources from Engineer category*** must have performed programming work on real-time systems for electro-optical sensors or other avionics components.
- Resources must detain a s security clearance up to: SECRET

(2) Rated criteria

- For each 36-month period of experience a resource from Technician** category has in IP (Internet Protocol) network management using CISCO equipment, two points are granted per resource per period, up to a cumulative maximum of 6 points for the entire category.
- For each resource form the Engineer*** category with experience in designing or programming real-time systems for electro-optical sensors or other avionics components in the military field (for sensors or avionics components), two points are granted for every six months of experience, up to a cumulative maximum of six points for the entire category.

6.5. **All tasks** included in STREAM 6 Architecture, PROGRAMMING, SOFTWARE ENGINEERING AND SYSTEMS ENGINEERING

a) *Task S6T1 Technical investigations and software engineering support for the electro-optical and infrared (EO/IR) systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies*
b) *Task S6T2 Software development for EO/IR systems*
c) *Task S6T3 Development, production and maintenance of avionics systems for EO/IR systems*

7. STREAM 7 OPERATING EO SYSTEMS - FINAL

7.1. **Task description for Stream 7 Task 1 (S7T1):** *Task S7T1 Develop software, firmware and GUI for operating electro-optical systems*

7.1.1. The Contractor shall be able to develop software, firmware and graphical user interfaces (GUIs) for operating electro-optical systems. The material developed by the Contractor will generally be low-level programming, such as programming in Assembler, C, C++, Verilog, VHDL, VB or LabVIEW.

(1) The Contractor shall develop GUIs and acquisition software to control the systems. For example, the Contractor may be required to develop a MATLAB GUI to operate a TRL (1–3) system, or an application coded in C to give robustness and speed to a more advanced prototype (TRL 5+).
(2) The Contractor shall validate the software / firmware / GUIs developed by interfacing the EO system for which they were developed. Validation can be done in the laboratory or in testing.
(3) The Contractor shall develop drivers to control EO instrumentation in a measurement system. For example, a camera might operate only with the manufacturer's dedicated software, but we want it to operate with our dedicated software. Therefore, a driver would need to be developed so that the camera can interface with our dedicated software.

7.2. **Deliverables** for *Task S7T1 Develop software, firmware and GUI for operating electro-optical systems*

(1) A technical report containing:
  (a) a summary and an executive summary
  (b) objectives
  (c) a description of the work performed (methodology, equipment used, results, analysis of the results, and conclusion/recommendations)
  (d) difficulties encountered and solutions applied to continue the work
  (e) references to previous work
(2) A summary report (Contractor's report): The summary report describes the work done during a task. It shall contain an introduction, the technical material worked on, and a conclusion.
(3) Software / source code / firmware / drivers / GUIs developed / training
  (a) Software: All software developed and its source code
  (b) Firmware: All firmware developed and its source code
  (c) Drivers: All drivers developed and their source code
  (d) GUIs: All GUIs developed and their source code
  (e) Training: Training on the developed software may be required in order to be able to operate it correctly
(4) Validation data: A task may require a scientific conclusion to be reached. Contractors who present a scientific conclusion in a report may be asked for the data or data manipulation process that enabled them to reach this conclusion.

7.3. **Examples of potentially required resources' categories** for *Task S7T1 Develop software, firmware and GUI for operating electro-optical systems* in a Subsequent Request for Proposals

Technician/technologist category
Level 1 Junior computer technician/technologist
Level 2* Intermediate computer technician/technologist
Level 3 Senior computer technician/technologist

Technician/technologist category
Level 1 Junior electrical technician/technologist
Level 2* Intermediate electrical technician/technologist
Level 3 Senior electrical technician/technologist

Electrical engineer category
Level 1 Bachelor's degree or higher in electrical engineering, junior level
Level 2* Bachelor's degree or higher in electrical engineering, intermediate level
Level 3 Bachelor's degree or higher in electrical engineering, senior level

Engineer/computer scientist category
Level 1 Bachelor's degree or higher in computer science or computer engineering, junior level
Level 2* Bachelor's degree or higher in computer science or computer engineering, intermediate level
Level 3 Bachelor's degree or higher in computer science or computer engineering, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

7.4. **Examples** of evaluation criteria for *Task S7T1 Develop software, firmware and GUI for operating electro-optical systems* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed five projects in the last 60 months, with a value of at least $20,000.00 each, in the development of software, firmware and GUIs for operating electro-optical systems.

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

(2) Rated criteria

- For each project in addition to the mandatory five, with a value of at least $5,000.00, one point is added per project up to a maximum of six points.

- For each proposed resource of level 3 from the Engineer/computer scientist category, two points are granted up to a maximum of four points for the entire category.

- For each project completed in the last 24 months, with a value of at least $50,000.00 each, in the development of software, firmware and GUIs, two points are granted up to a maximum of six points.

7.5. **All tasks** included in STREAM 7 Operating EO systems - Final

a) *Task S7T1 Develop software, firmware and GUI for operating electro-optical systems*
b) *Task S7T2 Prepare electro-optical systems*
c) *Task S7T3 Collect data in the laboratory and during testing using electro-optical systems*
d) *Task S7T4 Reduce and analyze data collected using electro-optical systems*

8. STREAM 8 HYPERSPECTRAL SYSTEMS

8.1. **Task description for Stream 8 Task 2 (S8T2):** *Task S8T2 Design and development: Hyperspectral systems*

8.1.1. The Contractor shall be able to develop new instrument designs. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

(1) Design and/or model optical components for hyperspectrale spectrometry instruments
(2) Develop and/or manufacture opto-mechanical modules for hyperspectrale spectrometry systems and/or instruments
(3) Develop and/or manufacture electronic modules and/or associated software for hyperspectrale spectrometry systems and/or instruments

8.2. **Deliverables** for *Task S8T2 Design and development: Hyperspectral systems*

(1) A technical report describing system developments and including:
  (a) a user's manual or additions to the user's manual
  (b) mechanical, electrical and/or optical diagrams
  (c) reference measurements that can be used to adjust, calibrate and repair systems
  (d) all technical information necessary for maintenance
(2) For software, the report shall include a user's manual. It shall include a description of algorithms and models. It shall include, where applicable, the results of the validation studies.
(3) All optical and/or opto-mechanical and/or electronic components manufactured

8.3. **Examples of potentially required resources' categories** for *Task S8T2 Design and development: Hyperspectral systems* in a Subsequent Request for Proposals

Technician/electronics category
Level 1 Junior electronics technician
Level 2* Intermediate electronics technician
Level 3 Senior electronics technician

Technician/mechanics category
Level 1 Junior electro-mechanics technician
Level 2* Intermediate electro-mechanics technician
Level 3 Senior electro-mechanics technician

Technician/optics category
Level 1 Junior electro-optics technician
Level 2* Intermediate electro-optics technician
Level 3 Senior electro-optics technician

Engineer/Physicist category
Level 1 Bachelor's degree or higher in physics or engineering physics, junior level
Level 2** Bachelor's degree or higher in physics or engineering physics, intermediate level
Level 3 Bachelor's degree or higher in physics or engineering physics, senior level

Electrical engineer category
Level 1 Bachelor's degree or higher in electrical engineering, junior level
Level 2** Bachelor's degree or higher in electrical engineering, intermediate level
Level 3 Bachelor's degree or higher in electrical engineering, senior level

Mechanical engineer category
Level 1 Bachelor's degree or higher in electrical engineering, junior level
Level 2** Bachelor's degree or higher in electrical engineering, intermediate level
Level 3 Bachelor's degree or higher in electrical engineering, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

8.4. Examples of evaluation criteria for *Task S8T2 Design and development: Hyperspectral systems* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed one project in the last 36 months, with a value of at least $350,000.00, in designing and developing hyperspectral systems.
- The contractor must propose at least two resources for each level identified by a * (or of a higher level), in each resource category.
- The contractor must propose at least two resources for each level identified by a ** (or of a higher level), in each resource category. At least one of these resources must have at least 24 months of experience in systems engineering.
- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For each project submitted (including the mandatory project), one point is granted for every $50,000.00 above the $350,000.00 value, up to a cumulative maximum of 10 points.

- For each proposed resource identified by a ** in addition to the mandatory resource, two points are granted up to a cumulative maximum of 4 points per category.

8.5. **All tasks** included in STREAM 8 HYPERSPECTRAL SYSTEMS

a) *Task S8T1 Maintenance and repair of hyperspectral systems*
b) *Task S8T2 Design and development: Hyperspectral systems*
c) *Task S8T3 Software for hyperspectral systems*
d) *Task S8T4 Characterization of hyperspectral spectrometry systems*
e) *Task S8T5 Measurement and analysis: Hyperspectral systems*

9. STREAM 9 ELECTRO-OPTICAL SUPPORT INTEGRATION

9.1. **Task description for Stream 9 Task 4 (S9T4):** *Task V9T4 Integrating electro-optical systems into military platforms*

9.1.1. The Contractor shall integrate an EO system into a military platform. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

(1) Rent a military platform in accordance with the terms defined by the statement of work.
(2) Determine the impact of the integration on the initial performance of the platform.
(3) Consider electromagnetic compatibility and interferences.
(4) Determine the impact of integration on the mobility of the platform.
(5) Determine the impact of integration on the signature.
(6) Determine the impact of environmental effects on the integrated system.

9.2. **Deliverables** for *Task S9T4 Integrating electro-optical systems into military platforms*

(1) Report describing:
  (a) methodology used
  (b) experimental results obtained, in the form of tables and/or graphs
  (c) data analysis
  (d) conclusions
(2) Models developed in a computer language (e.g. MATLAB) specified in the statement of work. The storage medium will be specified in the statement of work (CD, DVD or USB key depending on requirements).
(3) System integrated onto a platform chosen by the scientific authority. In some cases, components may have been developed under other R&D, support, purchase or rental contracts.

9.3. **Examples of potentially required resources' categories** for *Task S9T4 Integrating electro-optical systems into military platforms* in a Subsequent Request for Proposals

Technician category**
Level 1 Junior electronics technician
Level 2* Intermediate electronics technician
Level 3 Senior electronics technician

Technician/Engineer category**
Level 1 Junior mechanical technician or engineer
Level 2* Intermediate mechanical technician or engineer
Level 3 Senior mechanical technician or engineer

Engineer/Computer Scientist category***
Level 1 Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 Bachelor's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Engineer/Computer Scientist category*** resources may have Bachelor's degrees or higher in Science with at least 60 months of experience in programming.

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

9.4. **Examples** of evaluation criteria for *Task S9T4 Integrating electro-optical systems into military platforms* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed two projects in the last 96 month, with a value of at least $50,000.00 each, in integrating electro-optical systems into actual platforms.
- The contractor must propose at least two resources for each level identified by a * (or of a higher level), in each resource category.
- Technician/Engineer category** resources must have at least 18 months of experience in handling, measuring, calibrating and characterizing electro-optical systems.
- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For every six months of experience a Technician/Engineer** has in addition to the mandatory 18 in handling, measuring, calibrating and characterizing electro-optical systems, the Technician/Engineer resource category is granted two points, up to a cumulative maximum of six points for the entire category.

- For each proposed Level 3 Technician/Engineer** resource, two points are granted per resource up to a cumulative maximum of 4 points for the entire category.

9.5. **All tasks** included in STREAM 9 ELECTRO-OPTICAL SUPPORT INTEGRATION

a) Task S9T1 Optimization studies
b) Task S9T2 Power management and wiring studies
c) Task S9T3 Management studies for cooling components
d) Task S9T4 Integrating electro-optical systems into military platforms
e) Task S9T5 Support for performance testing

10. STREAM 10 AIRBORNE PLATFORM

10.1. **Task description for Stream 10 Task 1 (S10T1):** *Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications*

10.1.1. The Contractor shall integrate several optical sensors with other sensors within a given physical medium external to military aircraft (e.g. multi-sensor pods or stabilized turrets according to task requirements) to correlate data from various sources and to facilitate control of the narrow field of view sensor for the operator based on signals obtained from sensors with wider fields of view. The Contractor shall ensure that it is possible to distribute a subset of data through various communication media. In some cases, aircraft protection systems must also be integrated into the pod (e.g. DIRCM, Chaff, Flares, Jammers, etc.). This may include the following tasks (this is not an exhaustive list):

(1) Integrate several sensors into one or more pods or stabilized turrets belonging to CAF, the service provider or a third party (Canadian manufacturer of pods or turrets). These sensors may include technologies such as EO, IR, WAMI, static imaging/photography, LiDAR, multispectral imagers, hyperspectral imagers, Radar, magnetic anomaly detectors (MAD), electronic warfare (EW) systems, threat detectors (e.g. MAWS, LWR), Lasers (Laser Range Finder (LRF), Laser Spot Tracker (LST), Laser Target Designator (LTD), Spotter, Marker), etc.
(2) Integrate communication systems into pods.
(3) Integrate aircraft protection systems into pods.
(4) Carry out feasibility studies.
(5) Carry out studies to obtain the necessary certification for flight tests (airworthiness, IT security, etc.).
(6) Make subcontracting arrangements to obtain the necessary subcomponents for integration.

10.2. **Deliverables** for *Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications*

(1) Technical reports providing details on methodology and tools used, summary of work completed, results obtained and recommendations for potential next steps [Word format]
(2) Progress review presentations (summary review of requirements, work progress, accomplishments since the last progress review, upcoming priorities, risk update, schedule, WBS, resource allocation, summary of actions to be taken) [PowerPoint format]
(3) Feasibility studies [MS Word format]
(4) Demonstrations of prototypes, subsystems or final systems [in laboratory or in flight]

10.3. Examples of potentially required resources' categories for *Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications*

Technician category**
Level 1 Junior technician in electronics, electrical, mechanical, computer science, telecommunications or networks, or junior Bachelor's degree in physics or computer science
Level 2* Intermediate technician in electronics, electrical, mechanical, computer science, telecommunications or networks, or intermediate Bachelor's degree in physics or computer science
Level 3 Senior technician in electronics, electrical, mechanical, computer science, telecommunications or networks, or senior Bachelor's degree in physics or computer science

Engineer category***
Level 1 Bachelor's degree or higher in electrical engineering, mechanical engineering, engineering physics (optics or radiofrequency) or computer engineering, junior level
Level 2* Bachelor's degree or higher in electrical engineering, mechanical engineering, engineering physics (optics or radiofrequency) or computer engineering, intermediate level
Level 3 Bachelor's degree or higher in electrical engineering, mechanical engineering, engineering physics (optics or radiofrequency) or computer engineering, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

10.4. Examples of evaluation criteria for *Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed one project in the last 24 months with a value of at least $30,000.00 in integrating electro-optical systems into military platforms.
- The contractor must propose at least two resources for each level identified by a * (or of a higher level), in each resource category.
- The resources from Engineer category*** must have at least six months of experience in handling, measuring, calibrating and characterizing electro-optical systems.
- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For every 12 months of experience a resource from Technician category** has in handling, measuring, calibrating and characterizing electro-optical systems, the Technician resource category is granted two points, up to a cumulative maximum of 4 points for the entire category.
- For each proposed Level 3 Engineer category*** resource, two points are granted per resource up to a cumulative maximum of 4 points for the entire category.

10.5. All tasks included in STREAM 10 AIRBORNE PLATFORM

a) Task S10T1 Multi-sensor integration, protection suite and communication equipment in turrets and pods for airborne C5ISR applications
b) Task S10T2 Integration of turrets and pods for Canadian Armed Forces (CAF) aircraft
c) Task S10T3 Renting of turrets and pods for CAF test campaigns, exercises, demonstrations and missions
d) Task S10T4 Temporary integration of turrets, pods and operator consoles (roll-on-roll-off mission kit) into civilian aircraft, renting and operation of equipment for test campaigns, exercises and demonstrations

11. STREAM 11 LASER AND LIDAR

11.1. *Task description for Stream 11 Task 5 (S11T5):* *Task S11T5 Laser/laser signal programming support*

11.1.1. The work includes, but is not limited to, the following tasks:

(1) Develop algorithms for detecting laser sources according to the specifications set out in the statement of work.
(2) Develop algorithms for modelling atmospheric propagation of laser signals.
(3) Develop algorithms for modelling diffuse and specular reflection of laser signals.
(4) Develop image acquisition routines for single or multiple laser sources and target tracking algorithms.
(5) Design computer programs that are compatible with DRDC software to automate measurement taking and data analysis (e.g. LabVIEW, MATLAB, C).
(6) Develop Windows applications for the human-machine interface; program microcontrollers, FPGAs, sensor interface circuits, and test routines to validate signal processing algorithms.
(7) Validate software / programs / algorithms developed.
(8) Write operating instructions for the programs.

11.2. Deliverables for *Task S11T5 Laser/laser signal programming support*

(1) Electronic file created using computer-assisted design software as specified in the statement of work. The storage medium will be specified in the statement of work (CD, DVD, USB key depending on requirements)
(2) Documented programs (source code and executables) and operating instructions
(3) Report describing:
(4) methodology used
(5) experimental results obtained, in the form of tables and/or graphs
(6) data analysis
(7) conclusions

(8) Developed models in a computer language (e.g. MATLAB) specified in the statement of work. The storage medium will be specified in the statement of work (CD, DVD or USB key depending on requirements)
(9) Prototype that meets the requirements of the statement of work
(10) Electrical, mechanical or software interfaces as defined in the statement of work
(11) Raw experimental data in the output format of the measurement instruments delivered on a CD or DVD, for example
(12) Processed experimental data in the form of tables and/or graphs written in English in a format that can be incorporated into a report written in Microsoft Office format

11.3. Examples of potentially required resources' categories for *Task S11T5 Laser/laser signal programming support* in a Subsequent Request for Proposals

Engineer category
Level 1 Bachelor's degree or higher in electrical engineering, engineering physics/physics (optics) or computer engineering, junior level
Level 2* Bachelor's degree or higher in electrical engineering, engineering physics/physics (optics) or computer engineering, intermediate level
Level 3 Bachelor's degree or higher in electrical engineering, engineering physics/physics (optics) or computer engineering, senior level

Scientist category
Level 1 Master's degree or higher in electrical engineering or engineering physics/physics (optics), junior level
Level 2 Master's degree or higher in electrical engineering or engineering physics/physics (optics). intermediate level
Level 3* Master's degree or higher in electrical engineering or engineering physics/physics (optics), senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

11.4. Examples of evaluation criteria for *Task S11T5 Laser/laser signal programming support* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed two projects in the last 60 months in the development of algorithms for detecting laser sources.

- The contractor must propose at least two resources for each level identified by a * (or of a higher level), in each resource category.

- The resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For each proposed resource identified by a * in addition to the mandatory resource, two points are granted up to a cumulative maximum of four points per category.

- For each resource proposed in the Scientist category with a Doctorate degree or higher, two points are granted per resource up to a maximum of four points for the entire category.

- For each proposed resource of Level 3 in the Engineer category, two points are granted up to a maximum of four points for the entire category.

11.5. All tasks included in STREAM 11 Laser and LiDAR

a) Task S11T1 Generation of laser signals
b) Task S11T2 Propagation of laser signals
c) Task S11T3 Detection of laser signals
d) Task S11T4 Electronics support for optical assembly and laser circuitry
e) Task S11T5 Laser/laser signal programming support
f) Task S11T6 Testing support

12. STREAM 12 IMAGE FUSION

12.1. **Task description for Stream 12 Task 2 (S12T2):** *Task S12T2 Process, reduce, fuse and analyze images and video sequences*

12.1.1. This task includes perceptual analyses, correlation analyses and performance metrics analyses of video sequences subject to image fusion. The Contractor must be able to:

(1) Complete literature reviews on topics related to image fusion
(2) Assemble, structure and organize video sequences
(3) Apply treatments (e.g. luminosity, contrast, tone balance) to modify and improve video sequences
(4) Conduct statistical measurements on video sequences
(5) Apply existing or developed digital processing algorithms (e.g. filtering, enhancing, harmonic analysis, extracting characteristics, shape recognition, correlation analysis)
(6) Measure the performance of processing algorithms
(7) Apply fusion algorithms (e.g. principal component analysis (PCA), Laplacian, discrete wavelet transform, contrast ratio)
(8) Carry out performance measurements and analyses of fusion algorithms (e.g. performance metrics such as root mean square, entropy, mutual information, Petrovic, Pielle, Wang & Bovik)

12.2. Deliverables for *Task S12T2 Process, reduce, fuse and analyze images and video sequences*

(1) Methodology used
(2) Raw data in the output format of the measurement instruments delivered on a CD or DVD
(3) Experimental results obtained, in the form of tables and/or graphs
(4) Data analysis

12.3. **Examples of potentially required resources' categories** for *Task S12T2 Process, reduce, fuse and analyze images and video sequences* in a Subsequent Request for Proposals

Technician category
Level 1 Junior computer science technician
Level 2* Intermediate computer science technician
Level 3 Senior computer science technician

Engineer/Computer scientist category
Level 1 Bachelor's degree in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Bachelor's degree in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 Bachelor's degree in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Scientist/Computer scientist category
Level 1 Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Engineer/Physicist category
Level 1 Bachelor's degree or higher in engineering physics, electrical engineering, physics or mathematics, junior level
Level 2* Bachelor's degree or higher in engineering physics, electrical engineering, physics or mathematics, intermediate level
Level 3 Bachelor's degree or higher in engineering physics, electrical engineering, physics or mathematics, senior level

Scientist/Physicist category
Level 1 Master's degree or higher in engineering physics, electrical engineering, physics or mathematics, junior level
Level 2* Master's degree or higher in engineering physics, electrical engineering, physics or mathematics, intermediate level
Level 3 Master's degree or higher in engineering physics, electrical engineering, physics or mathematics, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

12.4. **Examples** of evaluation criteria for *Task S12T2 Process, reduce, fuse and analyze images and video sequences* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed one project in the last 24 months, with a value of at least $15,000.00, in perceptual analyses, correlation analyses and performance metrics analyses of video sequences.
- The contractor must have developed at least five (5) image fusion algorithms in the last 36 months.
- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.
- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For each resource form Scientist/Physicist category that has developed image fusion algorithms, two points are granted per algorithm developed, up to a cumulative maximum of 6 points for the entire category.

12.5. **All tasks** Included In STREAM 12 IMAGE FUSION

a) Task S12T1 Develop and maintain software to support image capture, representation, fusion and analysis
b) Task S12T2 Process, reduce, fuse and analyze images and video sequences
c) Task S12T3 Take measurements with electro-optical instruments

13. STREAM 13 AIRCRAFT SIGNATURES

13.1. **Task description for Steam 13 Task 3 (S13T3):** *Task S13T3 Develop software to support control of spectroradiometric measurement instruments*

13.1.1. This task includes the development of C++ applications in the Windows environment and MATLAB and Python test applications. The Contractor must be able to:

(1) Develop drivers that enable spectroradiometric instruments to interface with a computer
(2) Develop modules that enable multiple instruments to interface with each other within a joint communications network
(3) Develop tools for capturing spectroradiometric data

13.2. **Deliverables** for *Task S13T3 Develop software to support control of spectroradiometric measurement instruments*

(1) A functional software program with the source code on CD
(2) A PDF of the software documentation on CD
(3) A user manual written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD

13.3. **Examples of potentially required resources' categories** for *Task S13T3 Develop software to support control of spectroradiometric measurement instruments* in a Subsequent Request for Proposals

Technician category
Level 1 Junior computer technician
Level 2* Intermediate computer technician
Level 3 Senior computer technician

Engineer/Computer Scientist category
Level 1 Bachelor's degree in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Bachelor's degree in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 bachelor's degrees in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Scientist/Computer scientist category
Level 1 Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, junior level
Level 2* Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, intermediate level
Level 3 Master's degree or higher in computer engineering, computer science or electrical engineering specializing in computer science, senior level

Experience level means number of months worked in the education field or in the field of the technology in question; this will be specified in the Subsequent Request for Proposals.

Level 1 12 to 36 months
Level 2 over 36 months and under 120 months
Level 3 120 months or more

Proposed resources with a Master's degree will have their months of experience increased by 12 months.
Proposed resources with a Doctorate degree or higher will have their months of experience increased by 36 months.

13.4. **Examples** of evaluation criteria for *Task S13T3 Develop software to support control of spectroradiometric measurement instruments* in a Subsequent Request for Proposals

(1) Mandatory criteria

- The contractor must have completed three projects in the last 60 months, with a value of at least $10,000.00 each and totalizing $70,000.00, in the development of software to support control of spectroradiometric measurement instruments.

- The contractor must propose at least one resource for each level identified by a * (or of a higher level), in each resource category.

- Resources must detain a security clearance up to: SECRET

(2) Rated criteria

- For each proposed Level 3 resource, two points are granted per resource up to a cumulative maximum of 6 points per category.

- For each project to develop modules that enable multiple instruments to interface with each other within a joint communications network, two points are granted up to a cumulative maximum of six points.

13.5. **All tasks** included in STREAM 13 AIRCRAFT SIGNATURES

a) Task S13T1 Aircraft signatures - Develop software to support control of spectroradiometric measurement instruments
b) Task S13T2 Develop software to support the saving, organization and representation of spectroradiometric data
c) Task S13T3 Develop software to support control of spectroradiometric measurement instruments
d) Task S13T4 Process, analyze and exploit spectroradiometric data
e) Task S13T5 Take measurements with spectroradiometric instruments

ANNEX G—DOCUMENTS SUBMITTED DURING FIRST ENGAGEMENT PROCESS

The following documents were provided to the industry during the first engagement process held from March 2014 to February 2015.

List of documents

a) First request for information; and

b) Findings of the first request for information, including a list of participants and Microsoft PowerPoint presentations.

If there is conflicting information between past documents and this RFI, the information included in this RFI shall prevail.

Canada

Public Works and Government Services Canada

Travaux publics et Services gouvernementaux Canada

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:

Réception des soumissions - TPSGC / Bid Receiving - PWGSC
1550, Avenue d'Estimauville
1550, D'Estimauville Avenue
Québec
Québec
G1J 0C7

LETTER OF INTEREST

First Request for Information

Title - Sujet Request for information EO-IR	
Solicitation No. - N° de l'invitation W7701-145859/A	**Date** 2014-03-17
Client Reference No. - N° de référence du client W7701-14-5859	**GETS Ref. No. - N° de réf. de SEAG** PW-$QCL-025-15869
File No. - N° de dossier QCL-3-36265 (025)	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2014-04-17**	**Time Zone** **Fuseau horaire** Heure Avancée de l'Est HAE
F.O.B. - F.A.B. **Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐	
Address Enquiries to: - Adresser toutes questions à: Lemay, Hélène	**Buyer Id - Id de l'acheteur** qcl025
Telephone No. - N° de téléphone (418) 649-2974 ( )	**FAX No. - N° de FAX** (418) 648-2209
Destination - of Goods, Services, and Construction: **Destination - des biens, services et construction:** R & D POUR LA DÉFENSE CANADA - VALCARTIER BATIMENT 53 2459 ROUTE DE LA BRAVOURE QUÉBEC Québec G3J1X5 Canada	

Comments - Commentaires

Previous RFI - For information only

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée VOIR DOC.	**Delivery Offered - Livraison proposée**
Vendor/Firm Name and Address **Raison sociale et adresse du fournisseur/de l'entrepreneur** **Telephone No. - N°de téléphone** **Facsimile No. - N° de télécopieur**	
Name and title of person authorized to sign on behalf of Vendor/Firm (type or print) **Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)** **Signature** **Date**	

Issuing Office - Bureau de distribution
TPSGC/PWGSC
601-1550, Avenue d'Estimauville
Québec
Québec
G1J 0C7

Canada

This Request for Information (RFI) is not a request for Proposal (RFP) and no contract will be awarded following receipt of information.

TITLE

Electro-Optic and Infrared (EO-IR) Procurement Strategy

INTRODUCTION

Public Works and Government Services Canada (PWGSC), through its responsibilities as a central, shared and common services organization, provides departments and federal agencies with services in support of their programs. In addressing this mandate, PWGSC is responsible for developing and implementing all stages of the procurement process. This is in inquiry for general information regarding Defence Research and Development Canada (DRDC) to address electro-optic and infrared (EO-IR) needs. DRDC and PWGSC cannot guarantee that a request for proposals will be issued as a result of this RFI.

OBJECTIVES OF THE RFI

The objectives of this RFI are to gather industry concerns regarding the proposed procurement strategy and to give industry an opportunity to raise issues related to the information provided and propose possible solutions.

DRDC is considering establishing, through a competitive process, task authorization (TA) contracts, explained in Appendix D, in order to meet its EO-IR requirements, outlined in Appendix A. The EO-IR service requirements are for several DRDC sections, including Spectral and Geospatial Exploitation (SGE), Electro-optical Warfare (EOW), Tactical Surveillance and Reconnaissance (TSR) and Defence Engineering Valcartier (DeV). The various types of services sought encompass various aspects of EO-IR, such as, for example, engineering, design, architecture, programming, support, assistance and test data analysis.

DRDC wishes to obtain information on the various technical, financial and contractual aspects of the stated needs. The information provided will be used to better define the needs, the strategy structure, the cost estimate, the schedule estimate and the requirements associated with the needs, in the event that a competitive call for proposals is issued. To gather this information, questions were raised in the "Requirements Regarding Responses to the RFI" section of this letter.

The appendices contain the statements of work and an example of the criteria considered, on which we would like feedback.

PROCUREMENT STRATEGY

The proposed procurement strategy consists of a single RFP comprising 13 technical specialties representing DRDC's EO-IR needs. That RFP would lead to 13 possible TA contracts, i.e. one for each specialty. The proposed contract term would be five (5) years, for a total value, for the 13 specialties, of $55M. The work requested would require various levels of security clearance, up to SECRET. Security clearance will be required at the time of bid closing. A sponsorship request could be made to the supply specialist, Hélène Lemay, whose contact information is provided at the end of this RFI. The contractor must also be able to demonstrate its capacity to work with controlled goods (http://ssi-iss.tpsgc-pwgsc.gc.ca/dmc-cgd/apropos-about/inscrptn-rgstrtn-eng.html). The description of needs is appended to this RFI, and is broken down by specialty. The points in common are listed in a separate document and apply to all specialties.

The 13 technical specialties and their estimated financial breakdown are as follows:

- EO characterization (engineering and technical): $5M
- EO characterization (development of new methodologies): $5M
- EO testing capability: $5M
- Optical design: $4M
- Electronic design: $4M
- Architecture, programming and software engineering: $5M
- Systems operation: $3M
- Hyperspectral and optical: $6.5M
- System(s) engineering and integration: $2.5M
- Micromanufacturing: $3.5M
- Laser and lidar: $5M
- Fusion : 3.5M$
- Aircraft signature and protection systems: $3M

BASIS OF SELECTION

Thirteen contracts could result from a potential RFP. However, a given contractor could be awarded a maximum of three (3) contracts, for three of the above technical specialties. The purpose of this approach is to ensure greater competitiveness in the various technical specialties, to ensure better processing capacity and work progress, and help maintain a strong, diversified and competitive industrial sector in the field of electro-optics. The proposed basis of selection is the highest combined rating of technical merit and price. Neither the responsive bid that receives the highest number of points nor the one that proposed the lowest price will necessarily be accepted. The responsive bid with the highest combined rating of technical merit and price will be recommended for award of a contract. Should a single contractor be successful in three specialties, they will be covered in a single contract. Priority will be given to technical specialties for which there is only one responsive bid. After that, contracts would be awarded in a given order to the various specialties. To obtain a contract, each contractor selected according to the above criteria must also have the financial capacity, following its validation by a PWGSC cost analyst, as stipulated in the "Financial capability" clause in Appendix C.

OTHER INFORMATION

In addition to this RFI, Canada intends to implement various measures in order to obtain most of the information from the industry and to obtain the industry's involvement, including holding an industry day following this RFI, scheduled for May 1, 2014. A notice will be posted on Buy and Sell with details on this industry day and how it will be structured. Its purpose will be to inform companies of the various elements of the procurement strategy, the timelines and the objectives.

Canada must also ensure that the procurement process is fair, transparent and competitive. An independent fairness monitor (FM) will be used as part of the proposed contracting process. Using an FM provides the various players in a process, including client departments, government suppliers and Canadians, with independent assurance that PWGSC's procurement activities are conducted in a fair, open and transparent manner. The FM is an independent third party whose role consists in observing the activities for which he/she is required in order to provide an impartial opinion on the procurement activities and their fairness, openness and transparency. The objective is to identify and solve fairness issues as they arise and to provide assurance that the interests of DRDC and of Canadians are protected.

ADDITIONAL INFORMATION

Responding to the Request for Information (RFI) is not a prerequisite to receiving a request for proposal in the event of a call for proposals. However, we encourage potential respondents to indicate their level of interest to facilitate a better understanding of requirements and capabilities from both DRDC's and the industry's perspective.

This RFI should not be construed as a request for proposals. No contract or other form of commitment will be entered into with any vendor on the basis of the responses to this RFI. This RFI does shall in no way be considered as authorization by DRDC or PWGSC for vendors to undertake any work that would result in costs to DRDC Valcartier. Canada shall not be liable, nor shall it reimburse any costs, fees or expenses incurred in the preparation or submission of responses to this RFI.

Nothing in this RFI shall be interpreted as a commitment to solicit bids. DRDC and PWGSC reserve the right to change, at any time, any or all parts of the requirement. Vendors are advised that any information submitted in response to this RFI may be used in the development of a subsequent request for proposals.

All responses to this RFI shall be received on or before the stipulated date and time, and will become the property of Canada and not be returned. All responses will be treated as confidential, subject to the provisions of the *Access to Information Act* (R.S. 1985, c. A-1) and the *Privacy Act* (R.S., 1985, c. P-21).

DRDC and PWGSC is seeking feedback from all interested parties who meet all the conditions listed and who can be involved in the work described in Appendix A.

REQUIREMENTS REGARDING RESPONSES TO THE RFI

Responses and related documentation are to be submitted in writing to Hélène Lemay, PWGSC Supply Specialist, no later than the closing date of the RFI. Mailing information follows, below.

In addition to the comments, concerns and solutions considered as part of the elements provided herein, we ask respondents to include in the documents submitted as part of this RFI, answers to the following questions:

1) Does the proposed procurement strategy create technical, commercial or other issues that would prevent you from bidding?

2) What contract management, implementation and execution issues could the TA contracts, as explained in Appendix D, create?

3) As part of the required expertise, are there any elements that would prevent the provision of services considered in the needs, as set out in Appendix A?

4) Are there any issues related to the sample criteria listed in Appendix B?

5) What technical challenges do you anticipate encountering in a need such as this one?

6) Are there any other major technical aspects that will need to be considered in implementing a request for proposals that would lead to TA contracts?

7) With such a need, how do you see supervising this type of project, in terms of project management and financial management? Can this type of project pose management issues with subcontractors? If so, what kind of issues, and how would you suggest addressing them?

8) Are there issues involved in meeting the various technical specialties listed in Appendix A?

9) Are there conflicting elements, or elements that are difficult to carry out, with respect to the contract clauses set out in Appendix C?

10) Should you be interested in the creation of a consortium, what are the anticipated issues, in particular with respect to the clauses specified in Appendix C?

We invite you to present any other issue, comment, or element you question or wish to raise as part of this RFI.

CLOSING DATE AND DOCUMENT SUBMISSION

Suppliers interested in responding should send their responses (preferably by email) to Hélène Lemay before the closing date and time indicated on the first page of this RFI. All responses and requests for information are to be addressed to:

Hélène Lemay
Suppy Specialist
PWGSC
1550 Avenue D'Estimauville, 6th Floor
Quebec City, QC
G1J 0C7
Telephone: 418-649-2974
Fax: 418-648-2209
Email: helene.lemay@tpsgc-pwgsc.gc.ca

Documents may be submitted in either official language of Canada (English or French).

Appendix A

Statement of Work for each Technical Speciality

STATEMENT OF WORK – GENERAL

TABLE DES MATIÈRES

1. **SCOPE OF THE WORK:**

The scope of the work and services requested to the Industry encompasses the following list of 13 technical specialities related to the Electro-Optical and Infra-Red technologies:

- EO Caracterisation (Technical and Engineering);
- EO Caracterisation EO (Development of new methodologies);
- EO Testing Capacity;
- Optical Design;
- Electronic Conception;
- Architecture, software development and software engineering;
- System Operations
- Hyperspectral et optic
- Integration and System Engineering;
- Micro-fabrication
- Laser and lidar;
- Data Fusion;
- Protection System and Signature Systems.

Each of these technical specialities is described in a specific statement of work and encompasses all the related services that could be requested by DRDC for the next 5 years.

2. PROJECT MANAGEMENT

2.1 Contract Activities Reporting
2.1.1 Meetings
2.1.1.1 Kick-off Meetings

The contractor will have to prepare for and attend a kick-off meeting with the DRDC Project Team. The contractor will have to prepare the agenda, the minutes and action log for this meeting. The agenda will have to include at a minimum, the following items:

Review of the contract objectives for the first stage of the project;

Methodology used to execute the work and monitor the first stage of the project;

Procedures, formats and standards to be used to produce documentation;

Financial management;

Contingency plan for replacement of personnel resources.

Associated deliverables: Agenda, minutes and action log of kick-off meeting.

2.1.1.2 Project Review Meetings

The purpose of this activity is to adequately manage the authorized tasks of the project and to ensure the required level of planning and control of the several tasks of the project.

Every month (or at the Technical Authority request), the contractor must prepare for and attend a project review meeting with the DRDC project team. These meetings must be held in the Quebec City, at DRDC. The contractor must prepare the agenda, minutes and action log for these meetings. Whenever required, the contractor will need to adjust the work plan at each progress review meeting. The agenda must be submitted to the Project Authority for approval no later than two (2) working days before each meeting. The minutes and the action log document must be submitted to the Project Authority for approval no later than two (2) working days after each meeting. Once the Project Authority has submitted modifications or approved the minutes and the action log document, the contractor must submit final versions of the minutes and the action log document no later than two (2) working days thereafter. Each project review meeting will address at a minimum the following items:

Progress report by the contractor (results, problems, documentation, etc.);

Project management report by contractor (financial & manpower);

Contractor's work plan for the next period (overview of the expected progress and the challenges for the upcoming period);

Review of pending issues or action items.

Face-to-face meetings at DRDC Valcartier should be privileged for the project review meetings, although video-teleconference could be used as a complementary communication channel. Informal meetings and communications are encouraged and may be held at any time to discuss and resolve specific issues.

3. PUBLICATION:

Any manuscript for publication in magazines, scientific journals or other publications, as well as any abstract of an oral presentation or any other form of public disclosure will have to first be submitted to the DRDC Project team for approval ninety (90) days in advance of presentation or publication. An explicit reference to federal government funding will have to be mentioned in a statement indicating that the content is exclusively the responsibility of the authors. The Technical Authority will provide a written objection if there are any specific elements (e.g., audience) falling outside the best interests of the federal government.

4. GOVERNMENT SUPPLIED MATERIAL:

Upon contract award, DRDC Valcartier will provide background information on the work conducted by DRDC team. If additional documents (property of the Government) are identified relevant for this work, they will be made available to the contractor upon the Project Authority approval and subject to distribution restriction. The contractor is required to keep track of all furnished documents, which will have to be returned to the Government of Canada upon work completion. Chaque document fourni sera spécifié, lorsque requis, lors de al mise en place de l'autorisation de tâches.

5. GOVERNMENT FURNISHED EQUIPEMENT:

The equipment furnished will be specified in each task authorization.

Task 1 - Characterization

1. GENERAL

1.1 Title

Technical and Engineering Support for Characterization of Electro-Optical (EO) Systems

1.2 Background

The Canadian Forces (CF) is regularly required to select equipment to support their operations. Sensors are an integral part of the electro-optical systems used to detect and locate threats. One of DRDC's mandates is to support the CF in its electro-optical system acquisition process by technically translating their operational needs, evaluating the performance of sensors currently in use, evaluating the potential of sensors from emerging technologies, analyzing options and issuing recommendations.

Sensor performance is evaluated in four ways, depending on time and objectives:

a) Laboratory characterization of basic sensor parameters via quantitative measurements;

b) Exterior testing to emulate sensor performance in conditions similar to those encountered in operation (e.g. low light, natural spectral content, difficult environment, etc.);

c) Sensor performance modelling; and

d) Laboratory application of comparative evaluation methods to measure performances similar to those encountered in operation.

1.3 Objective

The objective of this statement of work is the provision of technical and engineering services for the prediction/characterization of the performance of EO systems covering spectral bands from ultraviolet (UV) to infrared (IR) and including image intensifier systems (I2). The Contractor shall meet the following objectives:

1. Characterize EO sensors in the laboratories of Defence Research and Development Canada (DRDC) Valcartier;

2. Support testing for the characterization of sensor performance in the field in

3. Conditions similar to those encountered in operation (e.g. low light, natural spectral content, difficult environment, etc.);

4. Improve detection/recognition/identification (DRI) performance prediction tools for laboratory-characterized sensors; and

5. Support hardware and/or software development, improvement and modification of test and characterization equipment.

The nature of the services required will cover applied research program tasks and direct Canadian Forces support tasks.

1.4 Acronyms

CCD	Charge-coupled device
CF	Canadian Forces
CMOS	Complementary metal–oxide–semiconductor
DRDC	Defence Research and Development Canada
EBI	Equivalent background illumination
EMCCD	Electron-multiplying CCD
EO	Electro-optical
I2	Image intensifier
MRC	Minimum resolvable contrast
MRT	Minimum resolvable temperature
MTF	Modulation transfer function
NETD	Noise equivalent temperature difference
SNR	Signal-to-noise ratio
SiTF	Signal transfer function
UV	Ultraviolet

2. APPLICABLE DOCUMENTS (references)

3. SCOPE OF WORK

3.1 Characterization of image intensifiers or their components (e.g. I2 tubes) and performance evaluation

The Contractor shall characterize image intensifiers or their components (e.g. I2 tubes) and evaluate their performance in accordance with the criteria set out in the task authorization. This task includes taking measurements in DRDC Valcartier laboratories in accordance with the methodology developed by DRDC Valcartier and the data analysis. The methodology shall be specified during the implementation of task authorizations. The main parameters to be measured are:

a) Impulse response (modulation transfer function (MTF));
b) Resolution response (minimum resolvable contrast (MRC));
c) Image noise (signal-to-noise ratio (SNR) and equivalent background illumination (EBI));
d) Luminous gain;
e) Dynamic range;
f) Field of view; and
g) Spectral response and electricity consumption.

3.2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components and performance evaluation

The Contractor shall characterize infrared sensors (0.9 µm to 15 µm) or their components and evaluate their performance in accordance with the criteria set out in the task authorization. Infrared sensors include photonic sensors, thermal sensors and microbolometers. This task includes taking measurements in DRDC Valcartier laboratories in accordance with the methodology developed by DRDC Valcartier and data analysis. The methodology shall be specified during the implementation of task authorizations. The main parameters to be measured are:

a) Impulse response (MTF);
b) Resolution response (minimum resolvable temperature (MRT);
c) Image noise (3D-noise and noise equivalent temperature difference (NETD));
d) Transfer function (signal transfer function (SiTF));
e) Dynamic range;
f) Spectral response; and
g) Electricity consumption.

3.3 Characterization of UV/visible sensors or their components to evaluate Performance.

The Contractor shall characterize day/night vision sensors or their components and measure their performance. Day/night vision sensors include:

a) Complementary metal–oxide–semiconductor (CMOS) sensors;
b) Charge-coupled device (CCD) sensors;
c) Electron-multiplying CCD (EMCCD) sensors;
d) Sensors that function in UV; and
e) Day sights, such as binoculars, sights or telescopes.

This task includes taking measurements in DRDC Valcartier laboratories in accordance with the methodology developed by DRDC Valcartier and data analysis. The methodology shall be specified during the implementation of task authorizations. The main parameters to be measured are:

a) Impulse response (MTF);
b) Resolution response (MRC);
c) Image noise;
d) Luminous gain;
e) Dynamic range;
f) Spectral response; and
g) Energy consumption.

3.4 Characterization of sensor performance during field tests

The Contractor shall characterize sensor performance during tests performed outside the laboratory in a natural environment. Depending on the nature of the sensor to be tested, the purpose of the measurement and the time available for characterization, the Contractor shall:

a) Develop test plans;
b) Set up and handle equipment involved in testing;
c) Help adjust data acquisition systems to achieve test objectives;
d) Help collect and save data; and
e) Help reduce and analyze data.

3.5 Detection/recognition/identification performance prediction tools

The Contractor shall use and/or improve detection/recognition/identification performance prediction tools for laboratory-characterized sensors as set out in tasks 3.1 through 3.3. The Contractor's role includes:

a) Reviewing literature;

b) Improving/modifying the interfaces of detection performance prediction models;

c) Programming and interfacing new modules or modifying existing modules to improve the validity of prediction tools. Modules include but are not limited to: optics, sensors, image processing, atmosphere, target, background and eye model; and

d) Using detection/recognition/identification performance prediction tools for laboratory-characterized sensors.

3.6 Hardware and/or software development, improvement and modification of test and characterization equipment

The Contractor shall support hardware and/or software development, improvement and modification of test and characterization equipment. The Contractor's role includes:

a) Improving/modifying control hardware and/or software for laboratory acquisition instruments;

b) Developing control hardware and/or software for laboratory acquisition instruments;

c) Improving/modifying data analysis software; and

d) Developing data analysis software.

3.7 Relative frequencies

In order to meet objectives, efforts shall be distributed as follows:

Task 3.1 – 20%
Task 3.2 – 20%
Task 3.3 – 15%
Task 3.4 – 10%
Task 3.5 – 20%
Task 3.6 – 15%

4. REPORTS AND OTHER DELIVERABLES

For each task, documents and reports shall be written in English using the Microsoft Office suite. As required, one hard copy and/or one electronic copy on CD or DVD shall be submitted.

4.1 Deliverables for tasks 3.1 through 3.4

A report describing:

a) Methodology used;
b) Experimental results obtained in table and/or graph format; and
c) A brief data analysis.

4.2 Deliverables for task 3.5

Depending on the nature of the work, the deliverables shall be:

a) Functional software with the source code on CD;
b) A user manual;
c) A literature review; and
d) Experimental data processed in a table and/or graph format that can be incorporated into a Microsoft Office suite document.

4.3 Deliverables for task 1.6

Depending on the nature of the work, the deliverables shall be:

a) Functional software with the source code on CD;
b) Documentation for the functional software in PDF format submitted on a CD; and
c) A user manual.

RESOURCE CATEGORIES

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted tothe various needs set out in each task.

a) The needs set out in each task require expertise in the following six fields:
Characterization of electro-optical systems (I2, IR and Vis)

b) Tasks 3.1, 3.2, 3.3, in support of task 3.4
Electro-optical measurements (I2, IR and Vis)

c) Task 3.4, in support of tasks 3.1, 3.2, 3.3
Performance modelling of electro-optical systems (I2, IR and Vis)

d) Task 3.5, in support of tasks 3.1, 3.2, 3.3
Software development

e) Task 3.6, in support of tasks 3.4, 3.5
Mechanical and opto-mechanical design

f) Task 3.6, in support of tasks 3.1, 3.2, 3.3, 3.4
Image processing

Resources shall have the associated education and experience set out in the following list:

a) Characterization of electro-optical systems (I2, IR and Vis)
Education

a1 Technical
- Physical technician; or
- Technical electronics

a2 Bachelor's degree
- Physics, engineering physics

a3 Master's degree
- Physics, engineering physics
- Mandatory experience

At least 12 months of experience in handling, measuring, calibrating and characterizing electro-optical systems

b) Electro-optical measurements (I2, IR and Vis)
Education

b1 Technical
- Physical technician; or
- Technical electronics

b2 Bachelor's degree
- Physics, engineering physics

b3 Master's degree
- Physics, engineering physics
- Mandatory experience

At least 12 months of experience in handling, calibrating and measuring usingelectro-optical systems

c) Performance modelling of electro-optical systems (I2, IR and Vis)
Education

c1 Bachelor's degree
- Physics, mathematics; or
- Engineering physics

c2 Master's degree or higher
- Physics, mathematics; or
- Engineering physics

d) Software development
Education

d1 Bachelor's degree
- Computer science, computer engineering; or
- Electrical engineering specializing in computer science

d2 Master's degree
- Computer science, computer engineering; or
- Electrical engineering specializing in computer science

e) Mechanical and opto-mechanical design
Education

e1 Technical
- Mechanical technician; or
- Physical technician

e2) Bachelor's degree
- Mechanical engineering

f) Image processing
Education

f1 Bachelor's degree
- Physics, mathematics; or
- Engineering physics, electrical engineering

f2 Master's degree or higher
- Physics, mathematics; or
- Engineering physics, electrical engineering

The Contractor shall identify a group of at least four (4) key resources. The group shall be composed of at least:

a) 2 intermediate engineers/scientists
b) 1 senior engineer/scientist
c) 1 intermediate technician

In that group, there shall be at least one (1) key resource with a Master's degree (or higher) in physics or engineering physics, at least one (1) key resource with a Bachelor's degree (or higher) in electrical engineering or computer engineering and at least one (1) key resource with a technical diploma in physics or engineering physics.

The role of the key resources is to:

a) Help accomplish tasks as a specialist;
b) Be involved as a key resource responsible for most of the work (over 50% of the time) of the task;
c) Attend project meetings with the scientific authority;
d) Propose solutions; and
e) Act as project manager and manage a group of resources made up of technicians, engineers and/or physicists.

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

a) The experience of the proposed resources is defined as follows:
b) Junior resource: between 1 and 3 years of experience
c) Intermediate resource: between 4 and 12 years of experience
d) Senior resource: over 12 years of experience

Note: The number of years of experience associated with the "junior, intermediate and senior" levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a Master's degree corresponds to one year of work experience, and a Doctorate corresponds to three.

Task 2 - Characterization Methodology

1. General

1.1 Title

Development of Characterization Methodology for Electro-Optical Systems

1.2 Background

The Canadian Forces (CF) are regularly required to select equipment to support their operations. Sensors are an integral part of the electro-optical systems used to detect and locate threats. One of Defence Research and Development Canada (DRDC)'s mandates is to support the CF in its electro-optical system acquisition process by technically translating their operational needs, evaluating the performance of sensors currently in use, evaluating the potential of sensors from emerging technologies, analyzing options and issuing recommendations.

Sensor performance is evaluated in four ways, depending on time and objectives:

1. Laboratory characterization of basic sensor parameters via quantitative measurements;
2. Exterior testing to emulate sensor performance in conditions similar to those encountered in operation (e.g. low light, natural spectral content, difficult environment, etc.);
3. Sensor performance modelling; and
4. Laboratory application of comparative evaluation methods to measure performances similar to those encountered in operation.
5. The last method is included in activities that aim to develop new methodologies for performance characterization representative of those encountered in an operational environment.

Another DRDC mandate is to find methods for improving vision system performance. This field includes the development of image processing algorithms that modify the local dynamic or contrast mapping, or that compress images to make them easier to transmit on a network. The performance of the algorithms developed is then evaluated using processing and image analysis software.

1.3 Objective

The objective of this statement of work is the provision of scientific and engineering services to:

1.3.1 Develop new characterization methods to more accurately evaluate performance in operating environments of electro-optical systems covering spectral bands from ultraviolet (UV) to infrared and including image intensifier systems (I2); and

1.3.2 Develop image processing algorithms to improve the performance of vision systems and measure their impact on image quality.

The work shall be completed at the DRDC Valcartier site.

1.4 Acronyms

AGC	Automatic gain control
CAD	Computer-aided design
CCD	Charge-coupled device
CMOS	Complementary metal–oxide–semiconductor
DRDC	Defence Research and Development Canada
EMCCD	Electron-multiplying CCD
EO	Electro-optical
CF	Canadian Forces
I2	Image intensifier
UV	Ultraviolet

2. APPLICABLE DOCUMENTS (references)

3. SCOPE OF WORK

Tasks 3.1 through 3.3, focus on test method development and improvement. Tasks 3.4 through 3.6 support the design of computer tools and assemblies for the measurement, analysis and improvement of images.

Development of test methods for image intensifiers or their components (e.g. I2 tubes) to more accurately evaluate performance in an operational environment.

3.1 The Contractor shall participate in the development of innovative characterization methods to evaluate performance in an operational environment of image intensifiers or their components (e.g. I2 tubes). The Contractor's role includes:

a) Reviewing literature;
b) Developing data measurement and acquisition systems;
c) Helping to collect and save data;
d) Participating in data analysis and reduction; and
e) Participating in conferences and/or workshops on topics associated with electro-optics.

3.2 Development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to more accurately evaluate performance in an operational environment.

The Contractor shall participate in the development of innovative characterization methods to evaluate performance in an operational environment of infrared sensors (0.9 µm to 15 µm) or their components. The Contractor's role includes:

a) Reviewing literature;
b) Developing data measurement and acquisition systems;
c) Helping to collect and save data;
d) Participating in data analysis and reduction; and
e) Participating in conferences and/or workshops on topics associated with electro-optics.

3.3 Development of test methods for day/night vision sensors to more accurately evaluate performance in an operational environment.

The Contractor shall participate in the development of innovative characterization methods to evaluate performance in an operational environment of day/night vision sensors or their components. Day/night vision sensors include:

a) Complementary metal–oxide–semiconductor (CMOS) sensors;
b) Charge-coupled device (CCD) sensors;
c) Electron-multiplying CCD (EMCCD) sensors;
d) Sensors that function in UV; and
e) Day sights, such as binoculars, sights or telescopes.

The Contractor's role includes:

a) Reviewing literature;
b) Developing data acquisition systems;
c) Helping to collect and save data;
d) Participating in data analysis and reduction; and
e) Participating in conferences and/or workshops on topics associated with electro-optics.

3.4 Support for optical and opto-mechanical design and assembly

The Contractor shall provide support for optical and opto-mechanical design and assembly. The Contractor's role includes:

a) Designing and carrying out optical assemblies; and
b) Designing and carrying out opto-mechanical assemblies.

3.5 Software development for data analysis

The Contractor shall develop software for processing and analyzing data drawn from the development of characterization methodologies for electro-optical systems.

The Contractor's role includes:

a) Developing data validation tools for analysts;
b) Developing data processing and analysis tools; and
c) Developing data classification tools.

According to needs, software shall be developed in C++, MATLAB or Python in the Windows environment (XP, Win7). A user interface may also be required.

Software shall be developed in versions that are compatible with DRDC versions or using DRDC Valcartier commercial licences.

3.6 Development of image processing algorithms

The Contractor shall develop image-processing algorithms to improve the performance of vision systems. The Contractor's role includes:

a) Reviewing literature;
b) Developing image processing algorithms to improve the performance of vision systems (e.g. AGC, tone mapping, improvement of contrast and brightness, noise suppression, image compression while minimizing the loss of image quality to facilitate network transport, etc.);
c) Implementing the algorithms developed; and
d) Testing the algorithms developed.

According to needs, software shall be developed in C++, MATLAB or Python in the Windows environment (XP, Win7). A user interface may also be required.

Software shall be developed in versions that are compatible with DRDC versions or using DRDC Valcartier commercial licences.

3.7 Relative frequencies

In order to meet objectives, efforts shall be distributed as follows:

Task 3.1 – 30%
Task 3.2 – 20%
Task 3.3 – 10%
Task 3.4 – 10%
Task 3.5 – 15%
Task 3.6 – 15%

4. REPORTS AND OTHER DELIVERABLES

For each task, documents and reports shall be written in English using the Microsoft Office suite. As required, one hard copy and/or one electronic copy on CD or DVD shall be submitted.

4.1 Deliverables 3.1, 3.2 and 3.3

Depending on the nature of the work, the deliverables shall be:

a) A literature review report; or
b) Raw data in the output format of measurement instruments delivered on a CD or DVD; or
c) Experimental data processed in a table and/or graph format that
d) Can be incorporated into a Microsoft Office suite document; or
e) A report on performance evaluation and characterization describing
- methodology used;
- experimental results obtained in table and/or graph format; and
- a brief data analysis.

4.2 Deliverables for task 3.4

Depending on the nature of the work, the deliverables shall be:

a) A drawing of the optical design; or
b) Graphs of optical design performance; or
c) A CAD mechanical drawing; or
d) Experimental data processed in a table and/or graph format that can be incorporated into a Microsoft Office document.

A report describing:

- methodology used;
- experimental results obtained in table and/or graph format; and
- a brief data analysis.

4.3 Deliverables for task 3.5

Depending on the nature of the work, the deliverables shall be:

a) Functional software with the source code; or
b) Documentation for the functional software; or
c) A user manual.

4.4 Deliverables for task 3.6

Depending on the nature of the work, the deliverables shall be:

a) A literature review report; or
b) An algorithm with the source code; or
c) Documentation for the functional software; or
d) A user manual.

5. RESOURCE CATEGORIES

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted to the various needs set out in each task.

The needs set out in each task require expertise in the following five fields:

a) Software development
Tasks 3.5, 3.6, in support of tasks 3.1, 3.2, 3.3

b) Optical design
Task 3.4, in support of tasks 3.1, 3.2, 3.3

c) Mechanical and opto-mechanical design
Task 3.4, in support of tasks 3.1, 3.2, 3.3

d) Image processing
Tasks 3.5, 3.6, in support of tasks 3.1, 3.2, 3.3

e) Characterization of electro-optical systems (I2, IR and Vis)
Tasks 3.1, 3.2, 3.3, in support of tasks 3.4, 3.5, 3.6

Resources shall have the associated education and experience set out in the following list:

a) Software development
Education
a1 Bachelor's degree
- Computer science, computer engineering; or
- Electrical engineering specializing in computer science.
a2 Master's degree
- Computer science, computer engineering; or
- Electrical engineering specializing in computer science.

b) Optical design
Education
b1 Bachelor's degree
- Physics, engineering physics.
B2 Master's degree or higher
- Physics, engineering physics.
Mandatory experience
- At least 12 months of experience in designing and using optical design software.

c) Mechanical and opto-mechanical design
Education
c1 Technical
- Mechanical technician; or
- Physical technician.
c2 Bachelor's degree
- Mechanical engineering.

d) Image processing
Education
d1 Bachelor's degree
- Physics, mathematics; or
- Engineering physics, electrical engineering.
d2 Master's degree or higher
- Physics, mathematics; or
- Engineering physics, electrical engineering.

e) Characterization of electro-optical systems (I2, IR and Vis)
Education
e1 Technical
- Technical physics; or
- Technical electronics.
e2 Bachelor's degree
- Physics, engineering physics.
e3 Master's degree
- Physics, engineering physics.
- Mandatory experience

At least 12 months of experience in handling, measuring, calibrating and characterizing electro-optical systems.

The Contract shall identify a group of at least four (4) key resources. The group shall be composed of at least:

a) 2 intermediate engineers/scientists
b) 1 senior engineer/scientist
c) 1 intermediate technician

In that group, there shall be at least two (2) key resources with a Master's degree (or higher) in physics or engineering physics.

The role of the key resources is to:

a) Help accomplish tasks as a specialist;
b) Be involved as a key resource responsible for most of the work (over 50% of the time) of the task;
c) Attend project meetings with the scientific authority;
d) Propose solutions; and
e) Act as project manager and manage a group of resources made up of technicians, engineers and/or physicists.

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

The experience of the proposed resources is defined as follows:

a) Junior resource: between 1 and 3 years of experience
b) Intermediate resource: between 4 and 12 years of experience
c) Senior resource: over 12 years of experience

Note: The number of years of experience associated with the "junior, intermediate and senior" levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a Master's degree corresponds to one year of work experience, and a Doctorate corresponds to three.

Task 3 - Test Capacity EO

1. GENERAL

1.1 Title

Characterization of electro-optical (EO) systems

1.2 Background/History

The Canadian Forces (CF) must regularly select equipment to support operations. Sensors are an integral part of the EO systems used to detect and locate threats. One of Defence Research and Development Canada (DRDC)'s mandates is to support the CF in its EO system acquisition process by technically translating their operational needs, evaluating the performance of sensors currently in use, evaluating the potential of sensors from emerging technologies, analyzing options and issuing recommendations.

Sensor performance is evaluated in four ways, depending on time and objectives:

a) Laboratory characterization of basic sensor parameters using quantitative measurements;

b. Outdoor testing to emulate sensor performance in conditions similar to those encountered on operations (e.g. low light, natural spectral content, difficult environment);

c. Modelling of sensor performance; and

d. Laboratory application of comparative evaluation methods to measure performances similar to those encountered on operations.Because the capacity of DRDC Valcartier laboratories is limited, it cannot respond to all requests for testing and characterizing EO systems.

1.3 Objective

The objective of this statement of work is the provision of technical and engineering services to predict/characterize the performance of EO systems covering spectral bands from ultraviolet (UV) to infrared (IR), including image intensifier (I2) systems.

1.4 Acronyms

CCD	Charge-Coupled Device
CMOS	Complementary metal–oxide–semiconductor
EBI	Equivalent Background Illumination
EMCCD	Electron-multiplying CCD
EO	Electro-optical
CF	Canadian Forces
I2	Image Intensifier
MRC	Minimum Resolvable Contrast
MRT	Minimum Resolvable Temperature
MTF	Modulation Transfer Function
NETD	Noise Equivalent Temperature Difference

DRDC	Defence Research and Development Canada
SNR	Signal-to-Noise Ratio
SiTF	Signal Transfer Function
UV	Ultraviolet

2. APPLICABLE DOCUMENTS (references)

3. SCOPE OF WORK

3.1 Characterization of image intensifiers or their components

The Contractor shall characterize image intensifiers or their components (e.g. tubes) and evaluate their performance in accordance with the criteria set out in the task authorization. This task includes taking measurements at the Contractor's facilities and analyzing data. The system characterization shall be consistent with recognized methodology in this field, accepted by DRDC Valcartier and performed using the Contractor's equipment. The image intensifiers or their components will be specified in the task authorization. The primary parameters to be measured are as follows:

a) impulse response (Modulation Transfer Function (MTF));
b) resolution response (Minimum Resolvable Temperature (MRT));
c) image noise (Signal-to-Noise Ratio (SNR) and Equivalent Background Illumination (EBI));
d) luminous gain;
e) dynamic range; and
f) spectral response.

3.2 Characterization of infrared sensors (0.9 µm to 15 µm) or their components

The Contractor shall characterize infrared sensors (0.9 µm to 15 µm) or their components and evaluate their performance in accordance with the criteria set out in the task authorization. Infrared sensors include but are not restricted to photonic sensors, thermal sensors and microbolometers.

This task includes taking measurements at the Contractor's facilities and analyzing data. The system characterization shall be consistent with recognized methodology in this field, accepted by DRDC Valcartier and performed using the Contractor's equipment. The infrared sensors or their components will be specified in the task authorizations. The primary parameters to be measured are as follows:

a) impulse response (MTF);
b) resolution response (Minimum Resolvable Contrast (MRC));
c) image noise (3D-Noise and Noise Equivalent Temperature Difference (NETD));
d) transfer function (Signal Transfer Function (SiTF));
e) dynamic range;
f) spectral response; and
g) power consumption.

3.3 Characterization of UV/visible-light sensors

The Contractor shall characterize UV/visible-light sensors or their components and evaluate their performance. UV/visible-light sensors include:

a) Complementary metal–oxide–semiconductor (CMOS) sensors;
b) Charge-Coupled Device (CCD) sensors;
c) Electron-multiplying CCD (EMCCD) sensors;
d) Sensors that function in UV light; and
e) Day sights, such as binoculars, sights or telescopes.

This task includes taking measurements at the Contractor's facilities and analyzing data. The system characterization shall be consistent with recognized methodology in this field, accepted by DRDC Valcartier and performed using the Contractor's equipment. The UV/visible-light sensors or their components will be specified in the task authorizations. The primary parameters to be measured are as follows:

a) impulse response (MTF);
b) resolution response (MRC);
c) image noise;
d) luminous gain;
e) dynamic range;
f) spectral response; and
g) power consumption.

3.4 Development of testing and evaluation methodologies for UV/Visible sensors (0.2 to 15 µm) including the merging of multiple sensors

The criteria to be selected shall provide the maximum capabilities of night vision sensors. The Contractor's role will be to:

a) Complete literature reviews;
b) Develop metrics for measuring image quality;
c) Develop data acquisition systems;
d) Help collect and save data;
e) Assist with reducing and analyzing data; and
f) Attend conferences and/or workshops on EO-related topics.

3.5 Calibration of laboratory equipment

The Contractor's role will be to:

a) Calibrate the photometer; and
b. Calibrate the luminance/radiance source.

3.6 Support for optical design and assembly

The Contractor shall provide support for optical design and assembly. The Contractor's role will be to:

a) Develop optical designs to support the preparation of optical assemblies; and
b. Create optical assemblies.

3.7 Relative frequencies

In order to meet objectives, efforts are planned to be distributed as follows:

Task 3.1 – 20%
Task 3.2 – 20%
Task 3.3 – 15%
Task 3.4 – 15%
Task 3.5 – 15%
Task 3.6 – 15%

4. REPORTS AND OTHER DELIVERABLES

For each task, documents and reports shall be written in English using the Microsoft Office suite. One hard copy and/or one electronic copy on CD or DVD shall be submitted as required.

4.1 Deliverables for tasks 3.1 to 3.3 and 3.5

A report describing:
a) the methodology used;
b) experimental results obtained in table and/or graph format; and
c) a brief analysis of the data.

4.2 Deliverables for Task 3.4

Depending on the scale of the task, the deliverable for Task 3.4 shall be:

a) A literature review;
b) A conference report;
c) Metrics for measuring image quality;
d) Processed experimental data in tables and/or graphs written in English in a format that can be incorporated into a report written using the Microsoft Office suite; and

A report on performance characterization and evaluation describing:

a) the methodology used;
b) experimental results obtained in table and/or graph format; and
c) a brief analysis of the data.

4.3 Deliverables for Task 3.6

Depending on the nature of the work requested, the deliverables shall be:

a) A drawing of the optical design;
b) Graphs of optical design performances;
c) A vision system; and
d) Processed experimental data in tables and/or graphs written in English in a format that can be incorporated into a report written using the Microsoft Office suite.

A report describing:

a) the methodology used;
b) experimental results obtained in table and/or graph format; and
c) a brief analysis of the data.

5. RESOURCE CATEGORIES

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted to the various needs set out in each task.

The needs set out in each task require expertise in the following five fields:

a) Characterization of EO systems (I2, IR and Vis)
Tasks 3.1, 3.2 and 3.3, in support of tasks 3.4 and 3.5

b) Methodology for characterizing EO systems (I2, IR and Vis)
Task 3.4, in support of tasks 3.1, 3.2 and 3.3

c) Calibration of laboratory equipment
Task 3.5, in support of tasks 3.1, 3.2 and 3.3

d) Optical and opto-mechanical design
Task 3.6, in support of tasks 3.1, 3.2 and 3.3

e) Software development
In support of tasks 3.1, 3.2 and 3.3

Resources shall have the associated education and experience set out in the following list:

a) Characterization of EO systems (I2, IR and Vis)
Education
a1 Technical diploma
- Physical technology; or
- Electronics technology

a2 Bachelor's degree
- Physics, engineering physics

a3 Master's degree
- Physics, engineering physics
- Mandatory experience

At least 12 months of experience in handling, measuring and characterizing EO systems

b) Methodology for characterizing EO systems (I2, IR and Vis)
Education
b1 Bachelor's degree
- Physics, engineering physics

b2 Master's degree
- Physics, engineering physics

c) Calibration of laboratory equipment
Education
c1 Technical diploma
- Physical technology; or
- Electronics technology

c2 Bachelor's degree
- Physics, engineering physics

d) Optical and opto-mechanical design
Education
d1 Technical diploma
- Mechanical technology; or
- Physical technology

d2 Bachelor's degree
- Physics, engineering physics

d3 Master's degree or higher
- Physics, engineering physics

Mandatory experience
- At least 12 months of experience in performing optical design and using optical design software

e) Software development
Education
e1 Bachelor's degree
- Computer science, computer engineering; or
- Electrical engineering with specialization in computer science

e2 Master's degree
- Computer science, computer engineering; or
- Electrical engineering with specialization in computer science

The Contractor shall identify a group of at least four (4) key resources. The group shall be composed of at least:

a) 2 intermediate engineers/scientists
b) 1 senior engineer/scientist
c) 1 intermediate technician

In this group, there shall be at least two (2) key resources with a Master's degree (or higher) in physics or engineering physics, and at least one (1) resource with a diploma in physical technology or engineering physics.

The role of the key resources is to:

a) Help accomplish tasks as a specialist;
b) Be involved as a key resource who accomplishes most of the work (over 50% of the time) in the task;
c) Attend project meetings with the scientific authority;
d) Propose solutions; and
e) Act as project manager and manage a group of resources made up of technicians, engineers and/or physicists.

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

The experience of the proposed resources is defined as follows:

a) Junior resource: between 1 and 3 years of experience
b) Intermediate resource: between 4 and 12 years of experience
c) Senior resource: over 12 years of experience

Note: The number of years of experience associated with the "junior, intermediate and senior" levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a Master's degree corresponds to one year of work experience, and a PhD corresponds to three.

Task 4 – Opto-mechanical

BACKGROUND

Optic devices and systems are among the most important elements of all electro-optical, optical surveillance and soldier devices and systems in military operations. These optical systems consist of, but are not limited to, wide-band, hyperspectral or multispectral imaging or non-imaging systems, laser systems, of one or several spectral bands covering the ultra violet, visible, near, shortwave, midwave and long-wave infrared. In addition to studying the optics and optical system characteristics and the assessment of the performance of such systems, it is equally important to study optical properties of novel optical devices and components, such as electro-optical detectors and arrays, optical filters and gratings.

OBJECTIVE

The Statement of Work consists in the design, simulation, fabrication, characterization and integration of optics, optical and opto-mechanical systems that support research and development of custom and/or innovative optical systems in the field of electro-optics.

ABBREVIATIONS

MTF	Modulation Transfer Function
DRDC	Defence Research and Development Canada

TASKS

Task 02 – Design and development of optical and opto-mechanical systems

1.1 Optical design

The Contractor shall design optical systems that support research and development of custom and/or innovative optical systems in the field of electro-optics. This task includes the design of refractive elements (lenses) and reflective elements (mirrors) as well as the analysis of their assembly in a single complete optical system solution. The task also includes the analysis of solutions created from existing optical elements as well as the blended solutions. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Description of optical surfaces for refractive and/or reflective systems;
- Optimization calculation of optical surfaces;
- Visual representation of 2D and 3D optical surfaces;
- Graphic calculation and representation of sequential and non-sequential ray traces;
- Graphic calculation and representation of circled energy;
- Graphic calculation and representation of aberrations;
- Graphic calculation and representation of the modulation transfer function (MTF);
- Visual calculation and representation of image quality;
- Optical prescription with tolerance calculation; and
- Search for optical components and material.

1.2 Optical system performance simulation

The Contractor shall conduct performance simulation calculations of the optical systems used in the field of electro-optics. This task includes performance simulations of systems under development and simulation supporting the analysis of solutions related to a proof of concept. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Stray light analysis;
- Illumination calculation;
- Thermal analysis;
- Colorimetric analysis;
- Polarized light chip analysis; and
- Analysis of the addition of thin layer filters.

1.3 Optical system characterization

The Contractor shall characterize the optical systems used in the field of electro-optics. This task includes the characterization of simple lenses, objectives and/or complex optical systems. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Focal Distance;
- Magnification;
- MTF;
- Distortion;
- Spectral transmission;
- Scattered and stray light analysis; and
- Measurement comparison using optical simulation.

1.4 Opto-mechanical design

The Contractor shall be capable of doing and/or supervising the opto-mechanical design, in whole or in part, of optical systems in the field of electro-optics. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Propose a choice of material;
- Propose a concept that is within the tolerances;
- Propose a stable concept;
- Propose mounts that provide optimum positioning; and
- Propose an assembly that can be adjusted and aligned.

1.5 Fabrication and integration

The Contractor shall be able to fabricate some or all of the parts of the optical system. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Fabricate and/or supervise the fabrication of optical elements (lenses, mirrors);
- Fabricate and/or supervise the fabrication of parts of the opto-mechanical assembly (mounts, adjustments); and
- Integrate and/or supervise the integration of optical elements (lenses, mirrors) in the opto-mechanical assembly of the final optical system.

DELIVERABLES

Deliverables for task 1.1

Depending on the nature of the work requested, the deliverable may be:

- A technical note containing the optical system drawings (lenses, mirrors), the results of the calculations (ray traces, energy, aberration, MTF) and the optical prescription;
- The optical design file;
- The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for task 1.2

A technical note providing the results of the simulations in table or graphic format.
The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for task 1.3

A technical note providing the results of the characterizations in table or graphic format.
The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for task 1.4

Depending on the nature of the work requested, the deliverable may be:

- A technical note providing the opto-mechanical system drawings;
- The opto-mechanical design file; or
- The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for task 1.5

Depending on the nature of the work requested, the deliverable may be:

- The optical elements;
- The opto-mechanical assembly parts; or
- The fully integrated and assembled optical system

TYPES OF RESOURCES REQUIRED

- 1 intermediate opto-mechanical technician
- 1 senior opto-mechanical engineer
- 1 intermediate engineer/scientist
- 1 senior optical designer
- 1 intermediate optical designer

Task 5 - Electronic

ACRONYMS

BCC	Bump Chip Carrier
BGA	Ball Grid Array
DSP	Digital Signal Processor
EO	Electro-optical
FBGA	Fine Pitch Ball Grid Array
FLGA	Fine Pitch Land Grid Array
FPGA	Field Programmable Gate Array
GPU	Graphics Processor Unit
IR	Infrared
MHz	Megahertz (1 million cycles per second)
PC	Personal Computer
QFN	Quad Flat No-Lead
DRDC	Defence Research and Development Canada
TSSOP	Thin Shrink Small Outline Package
TQFP	Thin Quad Flat Pack
VHDL	Virtual Hardware Description Language
VIS	Visible

BACKGROUND

DRDC Valcartier is studying a variety of electro-optical (EO) technologies for protecting military platforms (air, land or sea) and their occupants. These EO technologies often require proximity electronics to be integrated into them in order to evaluate them or extend their capability. Very often, the technology already exists and needs to be extended with auxiliary electronics or electro-mechanical support. Other times, the technology is in its raw state and requires electronics or embedded software to be developed to operate the EO portion. In other cases, the electronics are in development and require special expertise to bring them to maturity or make them operational.

OBJECTIVE

The objective of this statement of work is to provide overall support to the electronics sector by developing proximity electronics, electromechanical equipment, embedded software and avionics systems.

PREFACE

The tasks described in this statement refer to "developed or existing electronics." Developed electronics have been produced for or by DRDC; this means that the Contractor has access to the existing design and can, if necessary, make improvements to it. Existing electronics refers to electronics that have been purchased from a supplier or merchant. For these electronics, DRDC has less documentation, would not be able to reproduce them and would be limited in the modifications that could be made.

TASKS

Task 1 – Designing high-speed support electronics

The Contractor shall design high-speed electronics (frequency higher than 600 MHz) in support of digital/analog signal acquisition activities and/or control. This task involves conducting an analysis based on the stated requirements proposing a solution in the form of a report including the functional and technical specifications, and choosing selected components to be integrated into the circuit. The Contractor shall then design electronic schematics and test them with functional simulations, if initially required.

Task 2 – Placing and routing mixed signals on schematics of high-speed electronics

The Contractor shall switch signals on electronic schematics within the restrictions imposed by high speed (frequency higher than 600 MHz: impedance control, layers, materials/density of traces, electrical isolation, etc.) to plan the manufacture of an electronic circuit based on existing electronic schematics. This task requires routing each signal on an electronics schematic provided as a source file compatible with Protel, adhering to the restrictions imposed by high speed as well as impedance control. The circuit design may require up to eight (8) layers, with a high density of components (i.e. involving an inability to switch traces on the main layer), consisting of mixed signals (analog and digital), the creation of component patterns and the use of multiple design voltages in the form of sub-layers. A preliminary specifications report shall be submitted showing the number of layers necessary for manufacturing, the approximate dimensions required, and a preliminary layout of the components. The Contractor shall then perform the final layout and routing on the circuit. If required, a simulation will be run of the final model in order to validate its functioning and the restrictions related to high speed before final delivery. Depending on operational requirements, a printed circuit may need to be produced.

Task 3 – Assembling/reworking electronic components on a developed or existing printed circuit

The Contractor shall assemble electronic components on a printed circuit or rework developed or existing printed circuits in order to start up the electronics and test their functioning. This task involves performing an analysis based on the components to be assembled or reworked (i.e. surface-mount connectors, microchips or electronic chips with small footprints: FBGA, BGA, FLGA, BCC, QFN, TQFP, TSSOP), their technical specifications and their assembly profiles; reworking and/or assembling all components on the printed circuit; and performing a final inspection.

Task 4 – Designing and integrating opto-mechanics support

The Contractor shall design and/or integrate opto-mechanics support for developed or existing electronics to validate the functioning of various types of sources/transducers (photometers, IR/VIS detectors/imagers) and/or to add to their existing electronic functions. This task involves performing an analysis based on optics requirements (i.e. designing optics to collimate a beam from multiple IR diodes while meeting the requirements for the divergence, size and uniformity of the beam) and based on the limits and specifications of the targeted sources/transducers (i.e. diode divergence, size of detector, uniformity, etc.), proposing a solution and drafting a design. The necessary components for the opto-mechanical assembly will then have to be integrated.

Task 5 – Designing and integrating mechanics into developed or existing electronics/optronics

The Contractor shall design and integrate mechanics (i.e support bracket for electronic circuit or lens) into developed or existing electronics/optronics in order to validate the full functioning of the electronics/optronics or add to their functions. This task involves performing an analysis based on the stated requirements and on the specifications of the targeted electronics/optronics (i.e. heat dissipation, maximum dimensions, minimum distance required between the optics and the electronic sensor), proposing a solution and drafting a design, and producing the final drawings required for manufacturing.

Task 6 – Processing high-speed digital signals via FPGA to support developed or existing electronics

The Contractor shall design code in Virtual Hardware Descriptive Language (VHDL), which will be ported to a field programmable gate array (FPGA) to support developed or existing high-speed electronics to validate their functioning or add to their processing functions. This task involves performing an analysis based on the stated requirements and the specifications of the targeted electronics, and proposing a solution for processing digital signals adapted to the equipment. The Contractor shall then develop the digital signal processing model and test it using the initially targeted electronics.

Task 7 – Processing video signals to support developed or existing electronics

The Contractor shall develop video signal processing algorithms and/or interfaces to validate concepts (i.e. an algorithm used to validate the merging of infrared and visible-spectrum images) or add processing functionalities (i.e. an algorithm for correcting non-uniformity in images from infrared sensors) to developed or existing video equipment. This task involves performing an analysis based on the stated video processing requirements and the specifications of the targeted electronics, proposing a video signal processing solution (adapted to the processing equipment used and the type of video signal being processed). The Contractor shall then develop video signal processing algorithms and test them using the initially targeted electronics. Algorithms may be developed on a PC, using a digital signal processor (DSP) or any other video processor (GPU) of interest.

Task 8 – Designing embedded software on DSPs and/or microcontrollers to support developed or existing electronics

The Contractor shall develop control algorithms (i.e. communications algorithms for controlling a turntable that moves an electronic sensor) or interfaces (i.e. a Web interface on a DSP for entering the calibration parameters for electronic sensors) with developed or existing electronics to validate the functioning of the hardware interfaces or to add to its functions. This task involves performing an analysis based on stated interface and control requirements and on the specifications of the targeted electronics, and proposing an implementation solution. The Contractor shall then develop the control algorithms and test them using the initially targeted electronics.

Task 9 – Designing software to support developed or existing electronics

The Contractor shall develop control or intercommunication algorithms (i.e. a PC software program used to simply control a camera remotely) or graphic control interfaces (i.e. a PC graphics interface that can be used to display or select a portion of an image from a camera to be saved via a network interface) in C++/.NET to validate the functioning of the electronics being controlled or to add to its functions in the context of developed or existing electronics. This task involves performing an analysis based on stated interface, intercommunications and control requirements and proposing an implementation solution. The Contractor shall then develop algorithms/protocols and the control interfaces, then test them using the initially targeted electronics/system.

Task 10 – Designing firmware based on MATLAB/Simulink or LabVIEW

The Contractor shall develop firmware to support pre- or post-processing of data gathered when taking measurements (i.e. MATLAB firmware for searching a set of images) or acquiring data (i.e LabVIEW firmware for digitizing, saving and graphically displaying, in real time, 4-channel voltage signals from a National Instruments interface circuit), or to support the creation of rapid prototyping interfaces for monitoring, simulation or acquisition of data using equipment compatible with MATLAB or LabVIEW. This task involves performing an analysis based on stated processing, acquisition or simulation requirements, and proposing an implementation solution. The Contractor shall then develop the model or firmware, then test it using acquired data and/or initially targeted equipment.

DELIVERABLES

All documents and reports shall be written in English in Microsoft Office format and submitted as a single electronic copy on CD or DVD.

Task 1 deliverables include:

- Preliminary analysis and specifications report;
- Source diagram of validated electronics (in a format compatible with Protel);
- Technical operating manual;
- End-of-task report (including list of all components selected, and simulation report if necessary).

Task 2 deliverables include:

- Preliminary specifications and analysis report;
- Final printed circuit in electronic format (sources compatible with Protel and in Gerber/RS-274X format);
- Any part pattern created during this task (sources compatible with Protel);
- Functional simulation report; and
- Printed circuit in the quantity requested.

Task 3 deliverables include:

- Assembled/reworked printed circuit; and
- Inspection report.

The inspection report shall contain:

- photos or X-ray images (of components where welds are not visible, such as ball brid form factors) labelled with the assembled or reworked components, showing the correct assembly.

Task 4 deliverables include:

- Preliminary specifications and analysis report, which must include:
    1. the list of preferred components required in the assembly;
    2. the simulation report (if required);
    3. the functional and technical specifications
    4. the simulated models (if required initially); and the source diagram of simulations for the validated models (if applicable); and
- End-of-task report describing the integration process.

Task 5 deliverables include:

- Preliminary specifications and analysis report, which includes:
    1. the functional and technical specifications
- Validated CAD source files (in format compatible with Solid Edge); and
- Plans necessary for manufacturing the support.

Task 6 deliverables include:

- Preliminary specifications and analysis report, which must include:
  - a description of the processing to be done;
  - the model's estimated execution speed; and
  - a block diagram of the interactions between the various proposed modules (if applicable);
- VHDL source files validated and ported for the targeted FPGA; and
- End-of task report containing:
  - a description of the architecture and algorithms implemented; and
  - the functional tests performed.

Task 7 deliverables include:

- Preliminary specifications and analysis report containing:
  - a summary description of the algorithms being used or developed to process video signals;
  - the model's estimated execution speed; and
  - a summary draft of the interface (if required);
- C/C++ source files validated and ported for the targeted platform; and
- End-of-task report containing:
  - documentation of the algorithms and interfaces developed; and
  - the functional tests performed.

Task 8 deliverables include:

- Preliminary specifications and analysis report containing:
  - a summary description of the algorithms and methods being used to interface with the targeted equipment;
  - the model's estimated execution speed; and
  - a summary draft of the communications interface (if applicable);
- C/C++ source files and directories validated and ported for the targeted platform;
- Binary files ported for the targeted platform; and
- End-of-task report containing:
  - documentation of the algorithms and interfaces developed, the installation procedure followed and the functional tests performed.

Task 9 deliverables include:

- Preliminary specifications and analysis report containing:
  - a summary description of the algorithms/protocols; and
  - a draft of the graphic interface (if required);
- C/C++ source files and directories validated and ported for the targeted platform;
- Installable version of binary files ported for the targeted platform; and
- End-of-task report containing:
  - documentation of algorithms/protocols and interfaces developed, the installation procedure followed and the functional tests performed.

Task 10 deliverables include:

- Preliminary specifications and analysis report containing:
  - a description of the model to be implemented; and
  - a block diagram showing the interactions between the various modules (if required);
- MATLAB/Simulink or LabVIEW source files developed;
- End-of-task report (containing a description of the algorithms/modules and interfaces developed and the functional tests performed); and
- Data processing report (if applicable).

TYPES OF RESOURCES REQUIRED

For Task 1

- 1 senior technician
- 1 senior engineer
- 1 intermediate engineer/technician

For Task 2

- 1 senior technician
- 1 senior engineer
- 1 intermediate engineer/technician

For Task 3

- 1 senior technician
- 1 intermediate technician

For Task 4

- 1 senior technician
- 1 intermediate technician
- 1 senior engineer
- 1 intermediate engineer

For Task 5

- 1 senior technician
- 1 intermediate technician
- 1 intermediate engineer

For Task 6

- 1 senior technician
- 1 intermediate engineer
- 1 senior engineer

For Task 7

- 1 intermediate technician
- 1 intermediate engineer
- 1 senior engineer

For Task 8

- 1 intermediate technician
- 1 intermediate engineer

For Task 9

- 1 intermediate technician
- 1 intermediate engineer
- 1 senior technician
- 1 senior engineer

For Task 10

- 1 intermediate engineer
- 1 senior technician
- 1 senior engineer

Task 6 - Architecture, Programming, Software Engineering and Systems Engineering

1. GENERAL

1.1 Title

Architecture, Programming, Software Engineering and Systems Engineering

1.2 Background

Defence Research and Development Canada (DRDC) uses knowledge and technology to support defence and security operations at home and abroad, with knowledge and technology; provides S&T support to forecast, cost and deliver future readiness levels to meet operational requirements; and generates knowledge and technology for robust security/intelligence that is connected and multi-jurisdictional. DRDC supports innovation and S&T as an engine for generating solutions.

In the field of electro-optical and infrared (EO/IR) systems, the various sensors and computing equipment are an integral part of the systems used to detect, locate and neutralize threats. DRDC contributes substantially to the procurement process by providing technical and scientific expertise applied to the translation of statements of CF operational requirements into technical specifications, evaluating the performance of systems currently in use or available on the market, evaluating the potential of emerging technology systems, analyzing options and issuing recommendations.

One of DRDC's mandates is to find methods for improving system performance. This includes developing algorithms and technical solutions to facilitate the use of EO/IR systems data and transmitting tactical data in real time or near-real time.

1.3 Purpose

This Statement of Work covers the delivery of technical, scientific and engineering services to:

1. Improve and develop innovative solutions in C4ISR, Net-enabled combat systems, simulation systems, GUI systems and ergonomics, interoperability qualification systems, and methodologies for the rapid integration of the new electro-optical and infrared (EO/IR) systems that use the electromagnetic spectrum; and
2. Improve and develop a variety of software and/or algorithms, either in support of the solutions identified above or to interconnect them.

As needed, the work will be carried out at the DRDC Valcartier site.

1.4 Acronyms

AADL	Architecture Analysis & Design Language
TA	Task Authorization
FY	Fiscal Year
AFDX	Avionics Full DupleX (Ethernet applied to avionics)
ASCII	American Standard Code for Information Interchange
ATIL	Avionics Technologies Integration Laboratory
ARINC	Aeronautical Radio Incorporated (standardization body)

C4ISR	Command, Control, Communications, Computers, Intelligence Surveillance and Reconnaissance
C5ISR	Command, Control, Communications, Computers, Combat Systems, Intelligence Surveillance and Reconnaissance
CD	Compact Disc
CDL	Common Data Link
NRC	National Research Council Canada
cPCI	compact PCI
CPP	C++ Source Code
CSV	Comma-Separated Values
CF	Canadian Forces
DGAEPM	Director General Aerospace Equipment Program Management
DGLEPM	Director General Land Equipment Program Management
DGMEPM	Director General Maritime Equipment Program Management
DLL	Dynamic Link Library
DNDAF	Department of National Defence Architecture Framework
DVD	Digital Versatile Disc
ECOS	European Common Operating System
FACE	Future Airborne Capability Environment (Open Group Consortium)
FPGA	Field Programmable Gate Array
GFE	Government Furnished Equipment
H	C++ Header File
IMA	Integrated Modular Avionics
IP	Intellectual Property
IP	Internet Protocol
JS	JAVA Script Source Code
SRCL	Security Requirements Checklist
M&S	Modelling and simulation
MBA	Master of Business Administration
MIL-STD	Military Standard
DND	Department of National Defence
MOSA	Modular Open System Approach
MS	Microsoft
OSI	Open System Interconnection
NATO	North Atlantic Treaty Organization
PCI	Peripheral Component Interconnect
PDF	Portable Document Format
IP	Intellectual Property
PMC	PCI Mezzanine Card
PMP	Project Management Professional
RB	Ruby Source Code
R&D	Research and Development
DRDC	Defence Research and Development Canada
PRM	Progress Review Meeting
RTCA	Radio Technical Commission for Aeronautics (standardization body)
RUP	Rational Unified Process
SATCOM	Satellite Communication
SDR	Software Defined Radios
ADM(Mat)	Assistant Deputy Minister (Materiel)
SOCD	Statement of Operational Capability Deficiency
SysML	Systems Modeling Language
TC	Transport Canada
TCP	Transmission Control Protocol

TDL	Tactical Data Link
TIES	Technical Investigations and Engineering Support
PWGSC	Public Works and Government Services Canada
TTCP	The Technical Cooperation Program
UDP	User Datagram Protocol
UML	Unified Modeling Language
V&V	Verification and Validation
VPX	VMEbus Preformance eXtension
XMC	Switched Mezzanine Card
XML	eXtensible Markup Language

2. TASKS

Task 6 – Architecture, Programming, Software Engineering and Systems Engineering

Once a task authorization has been prepared, additional details will be provided to specify the work to be done (identify the software and systems currently in use, provide clear instructions on the work expected, the measurement of success, the constraints, etc.).

1.6 Technical investigations and software engineering support for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

The work related to this task will be typically used by DRDC for TIES (technical investigations and engineering support) activities. The work will consist mainly of preliminary studies to be used by DRDC to plan certain activities.

The Contractor shall:

- Carry out comprehensive analyses of technical or IT problems and develop strategies to overcome technological challenges.
- Carry out various technological risk mitigation activities (studies, evaluations, testing or prototyping, modelling and simulation) to better define the spectrum of solutions to consider.
- Carry out enterprise architecture and system design work.
- Carry out investigations, minor fixes and system optimization (e.g. impact analyses, resolution of software problems requiring less than a week of work, technical advice to support the definition of solutions, optimization work).

1.7 Software development for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

The work related to this task will be used by DRDC for software development activities. The work will consist mainly of translating operational requirements into technical requirements, design activities, implementation (writing source code and compiling, as necessary), integration, validation (unit testing, integration testing, independent functional testing, operational testing, documentation production and other software development artefacts, configuration management, proposals for improving the development process, results presentation and user training).

The Contractor shall:

A - Modify or create software components

- Analyze the various ways of modifying or creating the software component. Check whether there are already similar products on the market, or if a hardware component can be used.
- Design using unified markup language (UML) or other applicable language (AADL, SysML, etc.) and create a conceptual diagram of the components to be modified or created.
- Create the design and use UML tools to create a class diagram representing the component to be modified or created. The class diagram shall include the various interactions with other modules when additions are made to existing software.
- Develop software using the programming language and code editor determined by the Technical Authority. Follow the programming standards in effect and the development standards provided by the Technical Authority.
- Perform a series of tests to ensure the integrity of the software component (functional testing, regression testing and operational testing).
- Integrate the software component into an existing software architecture or suite, or into an existing system.

B - Create digital models

- Design, develop, test, and document digital models in iterative cycles until the desired degree of reliability is reached. The following development cycles must be followed by developers: the definition of DND operational requirements in terms of measurable technical specifications during validation and verification activities; the creation of the design model; the development of executable simulation models; the test phase; integration; and documentation.

The detailed specifications for the components will be defined when the tasks are authorized. The optimal reliability to be achieved will also be determined by the Technical Authority at the same time as task authorization, before the start of the development cycle.

C - Validate and verify digital models or software components

The Contractor shall validate the requirements and verify the implementation of the digital models or software components in accordance with the validation and verification (V&V) process in place. This includes preparing a V&V plan prior to developing each software component. The Contractor shall produce a V&V report during the development process. The Contractor shall interact with various stakeholders (CF operators, DRDC Technical Authority, the Quality Control Authority, members of the development team, the Documentation Specialist, test engineers, technicians, etc.) and follow the steps of the process. The Contractor shall ensure that functional and integration tests are carried out by different persons. Only unit tests may be performed by the developer. The Technical Authority must be able to observe the tests. The V&V conclusions will be used by the Technical Authority to determine whether the model or software component has attained the desired level of accuracy or if new iterations will be necessary to improve the model's accuracy.

D - Run software for analysis, testing or data collection

The Contractor shall be familiar with the software to be run (the targeted software will be identified in the task authorization). It shall then initiate a series of test runs to perform a complete analysis of the software, test its various functions, or collect data. The Contractor shall carry out preparatory work before running the software (definition of the associated execution scenarios and parameters, configuration, preparation of scripts or data acquisition tools, etc.).

E - Collect and analyze data obtained by running software or during field or laboratory systems testing

The Contractor shall participate in field or laboratory testing to collect data. The data will be used to build or validate a model or particular software component. The Contractor shall analyze the data to determine the effectiveness of the military doctrine used or the probability of success of military missions, or to qualify the performance of the platforms and their equipment. The Contractor shall document the results of the analyses, as specified in the Deliverables section.

The Technical Authority will be able to refer to one or more of the previous steps when authorizing a task, or to add one or more steps, as necessary (e.g. to clarify specific requirements with respect to independent audits relating to the application of the development process). The contractor shall ensure that the work carried out is compatible with the systems, software and models prepared earlier. This verification must be performed as early as possible.

1.8 Development, production and maintenance of avionics systems for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

The work associated with this task will typically be used by DRDC to develop software that comprises airborne elements that are interconnected with ground-based systems using secured wireless communication technologies.

The Contractor shall collaborate with a multidisciplinary team composed of engineers, scientists and technicians from various public and private organizations (the Department of National Defence (DND), the National Research Council Canada (NRC), Transport Canada (TC), contractors and subcontractors already involved in the work under way, etc.) to contribute to either the implementation or the refinement of military operational capabilities involving airborne EO sensors.

The solutions sought are typically systems of systems based on distributed, integrated and interoperable EO technologies that deliver C5ISR capabilities. The role of the resources involved shall be to ensure the integration and improvement of the various elements of the chain of technologies linking the sensors to the decision-makers.

The work will be carried out in the various component integration and test laboratories (e.g. Avionics Technologies Integration Laboratory (ATIL)) at DRDC Valcartier. The Contractor will participate in the gathering of data from CF personnel who have been identified as target users. The information will be supplemented by the orders of the DRDC Technical Authority upon issuance of a task authorization for the Contractor to prepare the technical specifications that will be used as a guide for producing the required solution. Once a technical solution has been produced and been tested in the laboratory by the targeted users, the Contractor shall provide technical assistance to facilitate the system's deployment, rollout and operation (including logistical support, training and maintenance).

3. DELIVERABLES

All files developed shall be delivered in their native format (source code in .cpp/.h, .js, .rb; configuration files in .xml; Excel worksheets in .xls; Word documents in .doc; PowerPoint presentations in .ppt; Visio diagrams in .vsd; MS Project work plans in .mmp; etc.).

All deliverables shall be written in English using Microsoft Office software (documents, reports, recommendations, etc.), or in ASCII format for source code and configuration files, and submitted in a single electronic copy on CD or DVD.

Deliverables-Task 6.1 -Technical investigations and software engineering support for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

Deliverables include:

- Recommendations and technical advice (email and other forms of correspondence or documents)
- System architecture and capability architecture
- Engineering reports (table of contents to be defined in the TA)
- M&S solutions
- Prototypes of systems used as tools for clarifying or validating technical requirements or mitigating risks

Deliverables-Task 6.2 -Software development for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

Deliverables include:

A - Modify or create software components; and B - Create digital models

- Static and dynamic UML diagrams (use cases, class diagrams, etc.) of the architecture software components, including the follow-up of requirements as demonstrated by static testing. The diagrams are to be incorporated into the existing UML diagrams;
- Source code for the software components produced or revised
- The compiled version of each software component produced, either in DLL format or in an executable format (functional and tested);
- Technical documentation on the operation of architecture software components produced.
- Digital model development artefacts
- Other modelling and simulation files, artefacts and information used or generated (Open Flight models, synthetic terrain, map data, sky boxes, equations, scripts, etc.).

Note: Technical documentation must also be incorporated into the UML diagrams and source code. The required documentation must precisely describe the use and maintenance of the software components (in Microsoft Word format). The documentation should include detailed comments for the UML diagrams and in the source code to facilitate future modifications. This documentation must include detailed information on the design, a precise description of how to use the software components, and recommendations on the sections of the code that may eventually require maintenance (i.e. highlight any shortcuts that were used and any "dirty code" that will eventually need to be corrected in order to maintain the integrity of the whole).

C - Validate and verify digital models or software components

- The verification and validation plan for each model or software component describing, among other things, the verification and validation strategy that will be used during development (in Microsoft Word format); and
- The verification and validation report describing the V&V results obtained during the application of the process (in Microsoft Word format). Besides the analysis of the verification and validation results, the report shall include but not be limited to the limitations of the model and how it should be used by future users.
- Test and quality assurance plans, integration plans, risk analyses and risk mitigation plans, feasiblity analyses, technical notes, presentations, checklists, and audit reports, in Microsoft Office format.
- Documentation on the quality control and configuration management processes, in Microsoft Office format;

D - Run software for analysis, testing or data collection

- The data collected during the software run;
- The preparatory files for running the software;
- A document describing the various manipulations and executions performed, in Microsoft Word format; and

- A document describing the tests or analyses performed on the software, in Microsoft Word format.

E - Collect and analyze data obtained by running software or during field or laboratory systems testing

- A document describing the analysis of the data from software, in Microsoft Word format.
- The data collected; and
- A document describing the various tests carried out to collect the data, in Microsoft Word format.

Deliverables-Task 6.3 - Development, production and maintenance of avionics systems for the EO/IR systems applied to military operations, including threat detection, location and neutralization, targeting, protection and C4ISR technologies.

Deliverables include:

- A brief report on each step of the spiral development process, including a description of the information obtained and the assumptions used (input), a short description of the work done and the results obtained (output), and a summary of the next steps;
- Work files (source code, configuration files, spreadsheets, databases, design and architecture documents, test plans, test procedures, test results, procedure amendments, presentations, etc.);
- End-of-task report (including documentation of the algorithms/modules and interfaces developed and the functional tests performed). As applicable, final documents requiring a signature may be submitted in Acrobat (.pdf) format using a configuration enabling text selection (i.e. only the signature page in image format). The end-of-task report should also summarize the work accomplished, the deliverables, problems encountered, lessons learned, and improvements to be made during the next task.

The task authorization will provide more information on the exact nature of the expected deliverable(s).

5. TYPES OF RESOURCES REQUIRED

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted to the various needs set out in each task.

To carry out these tasks, the Contractor shall supply resources in several of the following fields (priority fields are highlighted in bold type)

1. Scientific (master's or PhD level)

   - **Computer Engineer**
   - **Electrical Engineer**
   - Mechanical Engineer
   - Engineering Physicist (optics and radiofrequency)

2. Engineering (bachelor's level)

   - Computer Engineer
   - Systems Engineer
   - Network Engineer
   - Electrical/Electronics Engineer

3. Technical (college level)
   - Programmer/Analyst
   - Network Engineer
   - Telecommunications Technician (wireless/radio, satellite, links and gateways)

The Contractor shall identify a group of at least five (5) key resources in the priority areas identified in bold. The group shall be composed of at least:

a. 2 senior engineers/scientists (master's level)
b. 1 intermediate engineer (bachelor's level)
c. 1 junior engineer (bachelor's level)
d. 1 senior technician (college level)

The role of the key resources is to:

a. Help accomplish tasks as a specialist;
b. Be involved as a key resource who accomplishes most of the work (over 50% of the time) in the task;
c. Attend project meetings with the DND Technical Authority and Project Manager;
d. Propose technical solutions; and
e. Act as project manager and coordinate a group of resources made up of technicians, engineers and other specialists, as described above.

The experience of the proposed resources is defined as follows:

a. Junior resource: between 1 and 3 years of experience
b. Intermediate resource: between 4 and 12 years of experience
c. Senior resource: over 12 years of experience

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

The key resources shall have at least 12 years of experience in software development on the x86 architecture or in network management with CISCO components.

Note: The number of years of experience associated with the junior, intermediate and senior levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a master's degree corresponds to one year of work experience, and a PhD corresponds to three.

9. LOCATION OF WORK

As needed, the work will be carried out in the offices of DRDC Valcartier.

Task 7 - Operating electro-optical (EO) systems

ACRONYMS

DVD	Digital Video Disc
EO	Electro-optics
CAF	Canadian Armed Forces
GUI	Graphical User Interface
HDD	Hard Disk Drive
DRDC	Defence Research and Development Canada
TRL	Technology Readiness Level

BACKGROUND

One of DRDC's key mandates is to support the needs of the Canadian Armed Forces (CAF) in the area of electro-optical warfare. In order to carry out its role effectively, DRDC must be able to operate electro-optical (EO) systems with various technology levels (TRL1 to TRL9). This means that DRDC must be able to develop, study and evaluate EO systems in order to respond to the CAF's needs and provide specific guidance.

PURPOSE

The purpose of this Statement of Work is to support part of this mandate by developing software and preparing EO systems, as well as collecting, reducing and analyzing data.

TASKS

Task 5 – Operating electro-optical (EO) systems

For Contract TRL 1–7 (Contract 1):

Task 1.1: Develop software, firmware and GUI for operating electro-optical systems

The Contractor shall be able to develop software, firmware and graphical user interfaces (GUIs) for operating electro-optical (EO) systems. The material developed by the Contractor will generally be low-level programming, such as programming in Assembler, C, C++, Verilog, VHDL, VB or LabVIEW.

The Contractor shall develop GUIs and acquisition software to control the systems. For example, the Contractor may be required to develop a MATLAB GUI to operate a TRL (1–3) system, or an application coded in C to give robustness and speed to a more advanced prototype (TRL 5+).

The Contractor shall validate the software / firmware / GUIs developed by interfacing the EO system for which they were developed. Validation can be done in the laboratory or in testing.

The Contractor shall develop drivers to control EO instrumentation in a measurement system. For example, a camera might operate only with the manufacturer's dedicated software, but we want it to operate with our dedicated software. Therefore, a driver would need to be developed so that the camera can interface with our dedicated software.

Task 1.2: Prepare electro-optical systems

The Contractor shall be able to prepare electro-optical systems (by modifying, enhancing or adding capabilities) and purchase optical, electronic and mechanical components to finalize the preparation.

1.2.1 The Contractor shall make electronic, mechanical and optical modifications to EO systems.

1.2.2 The Contractor shall purchase material, when an emergency arises, in order to complete and evaluate system operation.

1.2.3 The Contractor shall characterize performance and calibrate a prototype.

Task 1.3: Collect data in the laboratory and during testing using electro-optical systems

The Contractor shall be able to support and perform the collection of data in the laboratory and during national or international testing. For example, the Contractor shall configure the prototype networking, calibrate the systems, perform debugging in the laboratory and at the test site and carry out the transfer and capture the data.

The Contractor shall operate a measurement system to collect data. For example, a measurement system may be a simple CAF thermal imager, a radio spectrometer or a TRL-4 system developed by DRDC.

The Contractor shall debug the measurement system and collect data. Systems with low TRLs may require adjustments.

- The Contractor shall calibrate the measurement system.
- The Contractor shall operate an operational CAF electro-optical system and collect the data measured.
- The Contractor shall sort and save the data.

Task 1.4: Reduce and analyze data collected using electro-optical systems

The Contractor shall reduce and analyze the data captured using the systems developed as part of DRDC work or using operational military systems. The data are collected in the laboratory or during testing.

1.4.1 The Contractor shall reduce the data and delete low-value information. For example, information from a video sequence before and after a missile is launched can be cut. Reduction will help focus efforts on the data of scientific interest.

1.4.2 The Contractor shall use software to analyze the data. Generally speaking, the Contractor shall obtain or develop software to complete this task. Commonly used mechanical, optical and mathematical processing software (Solid Edge, Zemax, MATLAB, etc.) shall be provided by the Contractor and shall remain its property. Software developed as part of a task will be the property of DRDC. Windows software will not be provided by DRDC.

1.4.3 The Contractor shall manipulate image sequences and apply algorithms to extract the desired information (e.g. tracer rounds in video sequences, the variation of the shape of a laser beam over time).

1.4.4 After analyzing the data, the Contractor shall be able to provide a scientific explanation of theresults.

DELIVERABLES

Possible deliverables for Task 1.1

Technical report

A technical report will often be required for the work done during a TA. The report shall contain a summary and an executive summary. The report shall include the task objectives, a description of the work performed (methodology, equipment used, results, analysis of the results, and conclusion/recommendations). The Contractor shall include in its technical report the difficulties encountered and solutions applied to continue the work. The Contractor shall also refer to previous work as much as possible. The number of pages in the report will depend on the context, the purpose, and the relevance of the results obtained during the task. Normally, the presentation format must meet DRDC publication standards (this will be specified in the TA).

Summary report (Contractor's report)

The summary report describes the work done during a task. It shall contain an introduction, the technical material worked on, and a conclusion. It is intended primarily for the scientist who has requested the work. The summary report is not usually published; it will be used by the scientist to write a more complete technical report.

Software / Source code / Firmware / Drivers / GUIs developed / Training

Software:
All software developed and its source code will be required when a task requires software development.

Firmware:
All firmware developed and its source code will be required when a task requires firmware development.

Drivers:
All drivers developed and their source code will be required when a task requires driver development.

GUI:
All GUIs developed and their source code will be required when a task requires GUI development.

Training:
Training on the developed software may be required in order to be able to operate it correctly. This may happen when most of a task is performed outside of DRDC.

Validation data

A task may require a scientific conclusion to be reached. Contractors who present a scientific conclusion in a report may be asked for the data or data manipulation process that enabled them to reach this conclusion, if the information is not clear or missing from the report.

Possible deliverables for Task 1.2

Technical report (same as Task 1.1)
Summary report (same as Task 1.1)
Modifications and improvements to the EO system

Possible deliverables for Task 1.3

Technical report (same as Task 1.1)
Summary report (same as Task 1.1)
Raw data gathered on DVD, HDD, description of calibration method, etc.
Test plan

Possible deliverables for Task 1.4

Technical report (same as Task 1.1)
Summary report (same as Task 1.1)
DVD or HDD containing reduced test data
DVD with validation data justifying a scientific conclusion (same as Task 1.1)

TYPES OF RESOURCES REQUIRED
(1) senior technologist
(2) intermediate technologists

(1) senior scientist / engineer
(2) intermediate scientists / engineers

Task 8 – Hyperspectral system

ACRONYMS

MTF	Modulation Transfer Function
DRDC	Defence Research and Development Canada
VNIR	Visible and Near Infrared
SWIR	Short-Wave Infrared
MWIR	Mid-wave Infrared
LWIR	Long-wave Infrared

TASKS

Background

DRDC Valcartier has expertise in hyperspectral spectrometry that has enabled it to develop new concepts for instruments and deploy them to support research programs and phenomenological studies in different areas of the light spectrum.

DRDC Valcartier is anxious to maintain this expertise and wishes to continue to support development work in this field.

Objectives

This Statement of Work covers the delivery of technical and engineering services in the field of hyperspectral spectrometry. The area of expertise ranges from maintenance to design and includes the characterization of hyperspectral spectrometry systems. In addition, the Contractor may be required to deploy spectrometry systems on a measuring campaign in the field.

Task 06 – Hyperspectral spectrometry system

We use the term "hyperspectral spectrometry systems" to refer primarily to Fourier transform spectroscopy instruments and push broom imager systems operating within known spectral bands such as VNIR, SWIR, MWIR and LWIR. We also cannot rule out the possibility of the system producing an image directly or by spatial scanning.

1.9 Maintenance and repair

The Contractor shall be able to maintain, repair and modify hyperspectral spectrometry systems. This task includes maintaining the Fourier transform spectroscopy systems, modules, parts, sensors and software associated with this type of instrument. It also includes systems using sensors that can respond within the VNIR, SWIR, MWIR and LWIR bands. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Replace mechanical, electronic and/or optical modules that are part of the hyperspectral spectrometry systems;
- Repair mechanical, electronic and/or optical modules that are part of the hyperspectral spectrometry systems;
- Modify mechanical, electronic and/or optical modules that are part of the hyperspectral spectrometry systems;
- Develop, manufacture and integrate replacement modules (mechanical, electronic and optical) to support updates toward new capabilities; and

- Update instrument control software and analysis software for the instrument.

Maintenance, repairs and modifications include the labour and purchase of parts. It is difficult to predict the cost of purchasing parts; however, it should be within 10% of the task allocation.

1.10 Design and development: Systems

The Contractor shall be able to develop new instrument designs provided by DRDC. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Design and/or model optical components for hyperspectral spectrometry instruments;
- Develop and/or manufacture opto-mechanical modules for hyperspectral spectrometry systems and/or instruments; and
- Develop and/or manufacture electronic modules for hyperspectral spectrometry systems and/or instruments.

1.11 Design and development: Software

The Contractor shall be able to develop new instrument designs and analysis software provided by DRDC. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Design algorithms, models or other exploitation software for data from the hyperspectral spectrometry system;
- Develop and validate methods and algorithms for pre-processing data (e.g. calibration, artifact correction, formatting, compression, geopositioning and correction for atmospheric effects);
- Design, develop and validate the algorithm and methods for detecting and identifying targets using hyperspectral imaging;
- Design, develop and validate techniques and methods for visualizing and integrating results into a geographical information system; and
- Model atmospheric or physical phenomena for validation and performance measurement purposes.

Note: The programming language will be specified in the task authorization (e.g. C++, MATLAB, Python…).

1.12 Characterization of hyperspectral spectrometry systems

The Contractor shall characterize hyperspectral spectrometry systems. This task includes overall characterization of the system and/or sub-elements (optics, sensor). The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Spectral and spatial calibration;
- Noise equivalent irradiance (NEI);
- Dynamic range;
- Spectral response;
- Modulation transfer function (MTF);
- Bad pixel rate; and
- Power consumption.

1.13 Measurement and analysis

The Contractor shall be able to deploy hyperspectral spectrometry systems in the field. This task includes preparing, calibrating and/or manipulating the hyperspectral spectrometry system. It also includes collecting, preparing and analyzing data. The Contractor must be able to perform the following tasks (this is not an exhaustive list):

- Prepare, calibrate and/or manipulate the equipment deployed while carrying out a deployment on a measurement campaign;
- Develop data acquisition systems to achieve the testing objectives;
- Collect and save data; and
- Reduce and analyze the data.

DELIVERABLES

Deliverables for Task 1.1

Depending on the nature of the work requested, the deliverable may be:
- A technical note describing the system replacement and/or repair;
- For a modification, a technical note describing the modification and containing drawings or other elements describing the modification;
- The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for Tasks 1.2 and 1.3

A technical report describing system developments. The report shall include, if necessary, a user's manual or additions to the user's manual. The report shall include, where applicable, mechanical, electrical and/or optical diagrams. It shall include reference measurements that can be used to adjust, calibrate and repair systems. It shall contain all technical information necessary for maintenance.
For software, the report shall include a user's manual. It shall include a description of algorithms and models. It shall include, where applicable, the results of the validation studies.
The report may be written in either English or French and submitted as a PDF on CD or DVD.

Deliverables for Task 1.4

A technical note describing the characterization results in the form of tables or graphs.
The note may be written in either English or French and submitted as a PDF on a CD or DVD.

Deliverables for Task 1.5

Depending on the nature of the work requested, the deliverable may be:
- A technical note containing the preparation and calibration processes used;
- A technical note describing the acquisition systems developed and how they are used;
- A technical note describing the structure of the data used; or
- A technical note describing the reduction and analysis methods used.
- The note may be written in either English or French and submitted as a PDF on a CD or DVD.

TYPES OF RESOURCES REQUIRED

- Senior technician
- Intermediate technicians
- Senior scientists/engineers
- Intermediate scientists/engineers

Task 9 - EO support Integration

ACRONYMS

SA	Scientific Authority
EO	Electro-optics
DND	Department of National Defence
CAD	Computer-assisted Design

BACKGROUND

DRDC Valcartier is studying a variety of electro-optical (EO) technologies for protecting military platforms (air, land or sea) and their occupants. One of the key variables that determine system performance is the process of integrating components and operational constraints. For example, a sensor's field of view may be limited by the hull shape on a platform, or an effector's performance might interfere with standard equipment.

PURPOSE

The purpose of this Statement of Work is to acquire knowledge of the requirements, compromises and costs related to integrating an EO system into a military platform.

TASKS

Task 7 – Integrating electro-optical systems into military platforms

7.1 Optimization studies

The Contractor shall conduct optimization studies on the interior and exterior layout of EO system components (e.g. imaging system, active protection system, high-energy laser). For example, the Contractor shall use the field of view characteristics of the EO sensors to determine what positioning will provide the best coverage. Decisions will be made based on the equipment already installed on the platform and on operational priorities as specified in the task authorizations. This may include, but is not limited to, the following tasks:

- Make a three-dimensional model (using drafting software) showing the location of EO system components on a pre-determined platform;
- Demonstrate the impact of integration on expected EO system performance: e.g. obstructions, dead zones;
- Make prototypes using rapid manufacturing methods (moulds, plastics, etc.) to demonstrate the selected integration solution;
- Create the mechanical design and manufacture the parts needed to adapt the EO system components to the platform; and
- Conduct market or literature reviews.

7.2 Power management and wiring studies

The Contractor shall conduct power management and wiring studies. This may include, but is not limited to, the following tasks:

- Determine power needs based on components' power consumption, operating modes, etc.;

- Determine whether compromises in performance can be made depending on the duty cycle of components;
- Determine wiring and connector requirements (direct connection to vehicle power or use of external generator);
- Determine the impact of cable routing on the integrity of the original platform (holes for wires, etc.); and
- Determine requirements for additional armour to protect wiring.

7.3 Management studies for cooling components

The Contractor shall conduct management studies for cooling components. This may include, but is not limited to, the following tasks:

- Determine cooling requirements based on components' power consumption, operating modes, etc.;
- Determine whether compromises in performance can be made depending on the duty cycle of components; and
- Determine requirements for radiators and cooling units.

7.4 Integration of EO system into a military platform

The Contractor shall integrate an EO system into a military platform. This may include, but is not limited to, the following tasks:

- Rent a military platform in accordance with the terms defined by the SA;
- Determine the impact of the integration on the initial performance of the platform;
- Consider electromagnetic compatibility and interferences;
- Determine the impact of integration on the mobility of the platform;
- Determine the impact of integration on the signature; and
- Determine the impact of environmental effects on the integrated system.

7.5 *Support for performance testing*

Prepare and supply consultation services for experimental sessions. Conduct tests that may last for several weeks at DRDC Valcartier or elsewhere in Canada or internationally. This may include, but is not limited to, the following tasks:

- Plan experiments; estimate the expected results; plan the material required; collect, save and analyze data; and present the results and lessons learned;
- Provide consultation services during the development of acquisition systems and recording of data to meet testing requirements;
- For tests conducted outside of DRDC Valcartier, the Contractor shall make its own travel arrangements;
- Develop specialized software and interfaces to record experimental data; and
- A variety of other technical tasks may also be required (supply connector wires, operate systems, modify system parameters for measurements being taken, transport material, help security officer, perform safety calculations, debug systems, etc.).

DELIVERABLES

Task 7.1

Sample deliverables:

- Electronic copy of 3D model developed using computer-assisted design software as specified in the task description. The storage medium will be specified in the task description (CD, DVD or USB key depending on requirements).
- Miniature and full-scale prototype made from material specified in the task description. For example, some work may require the creation of Styrofoam or plastic models.
- Full-scale mechanical parts manufactured from material specified in the task description.

Tasks 7.2, 7.3 and 7.4

Sample deliverables:

- Report describing:
  - methodology used;
  - experimental results obtained, in the form of tables and/or graphs;
  - data analysis; and
  - conclusions.
  -
- Models developed in a computer language (e.g. Matlab) specified in the task description. The storage medium will be specified in the task description (CD, DVD or USB key depending on requirements).

- All documents and reports shall be written in English in Microsoft Office format and submitted in hard copy and electronic format on CD or DVD.

Task 7.4

Example deliverable: In addition to the reports specified above, the following deliverables may be requested for Task 7.4:

- System integrated onto a platform chosen by the scientific authority. In some cases, components may have been developed under other R&D, support, purchase or rental contracts.

Task 7.5

Sample deliverables:

- Electrical, mechanical or software interfaces as defined in the task description;
- User's manual describing how to operate the developed interfaces;
- Raw experimental data in the output format of the measurement instruments delivered on a CD or DVD, for example;
- Processed experimental data in the form of tables and/or graphs written in English in a format that can be incorporated into a report written in Microsoft Office format; and
- Report on characterization and performance evaluation describing:
- methodology used;
- experimental results obtained, in the form of tables and/or graphs; and
- data analysis.

GOVERNMENT FURNISHED INFORMATION/MATERIAL

Where required, the relevant portions of a 3D CAD model of a military platform may be provided. At that time, security requirements will be described in the appropriate task descriptions.

Physical access to military platforms will be possible. The SA will coordinate this with the appropriate DND organizations. The associated requirements will be described in the appropriate task descriptions.

TYPES OF RESOURCES REQUIRED

To carry out these tasks, the Contractor shall supply resources in the following areas:

4. Project management

5. Scientific (Master's or PhD):
   - Mechanical engineering
   - Electrical engineering
   - Engineering physics / Physics (optics)

6. Engineering (bachelor's):
   - Mechanical engineer
   - Electrical engineer
   - Engineering physicist / Physicist (optics)
   - Computer engineer

7. Technical (college)
   - General technician (optics)
   - Mechanical technician
   - Electronics technician

TASK 10 - Micromanufacturing

ACRONYMS

CF: Canadian Forces
DRDC: Defence Research and Development Canada
EO: electro-optical
RF: radio frequency
UV: ultraviolet

Background

Since 1998, DRDC Valcartier has been working to develop new passive infrared sensors to improve the detection, recognition and identification capacity of the Canadian Forces. We are particularly interested in new capacities for soldiers.

Objectives

The objective of the work is to evaluate new sensor concepts and integrate them into surveillance systems to fulfil Canadian Forces needs that are not being met by existing commercial systems (e.g. high-performance, low-cost sensors, reduced electrical consumption, less cumbersome systems).

Following a literature review, a new concept is proposed. Once the design has been finalized, the micromanufacturing procedure is developed and photolithography masks are drawn and manufactured according to the design. The manufacture of electro-optical devices using appropriate techniques (sputtering, evaporation, photolithography, etc.) begins. Several iterations will be required. The device is then evaluated in a laboratory to measure its performance and make changes to the design, if necessary. Parallel to the micromanufacturing, and ideally upstream thereof, optical, mechanical and thermal modeling of the new design is done, and helps users understand the device and predict its performance.

TASKS

Task 9 - Micromanufacturing

For Contract TRL 2-6 (Contract #1):

9.1 Technology and literature review

The Contractor shall review relevant scientific documentation regarding the micromanufacturing of the devices set out in the task authorizations. The Contractor shall extract, synthesize and contextualize the following information:

- Experimental conditions and techniques for thin film deposition required for device micromanufacturing.
- Physical properties of films obtained and characterization techniques used.
- Physical properties and performances of devices obtained.
- Micromanufacturing plan adapted to available equipment.

9.2 Design and micromanufacturing activities

In accordance with the specifications set out in the task authorizations, the Contractor shall provide consultation services and design micromanufacturing procedures, devices and masks. The Contractor shall micromanufacture devices. This includes but is not limited to:

- Cutting and cleaning silicon wafers.
- Depositing and optimizing thin films (using up-to-date techniques such as RF sputtering, chemical vapour deposition, thermal evaporation, etc.).
- UV photolithography.
- Welding wires using a micro-welder.

This task shall be carried out at the DRDC Valcartier site.

9.3 Characterization of manufactured components

The Contractor shall characterize manufactured components. Measurements include but are not limited to:

- Film thickness using profilometry.
- Resistivity using a four-point probe.
- Electrical probing.
- Optical reflection and transmission using spectroscopy.
- Optical microscopy.
- Scanning electron microscopy.

Ellipsometry may be required to characterize optical constants of thin films.

This task shall be carried out at the DRDC Valcartier site.

9.4 Optical, mechanical, thermal modeling

The Contractor shall model EO devices to evaluate their optical, mechanical and thermal performance. Commercial modeling software suites such as Zemax, ANSYS, FloTHERM and Solid Edge 3D shall be used.

This task shall be carried out at the DRDC Valcartier site.

DELIVERABLES

All reports shall be provided in hard copy and/or electronic copy in Microsoft Word or Excel format on CD or DVD.

- Deliverables for task 9.1

- A report on the technology or literature review. The report shall include but not be limited to the following information:

  (a) introduction, conclusion, background;
  (b) description of task objectives;
  (c) methodology used to perform the work and meet the objectives (explicit list of all activities);
  (d) issues and problems related to the work;
  (e) all data obtained (review results);
  (f) future work suggested and expected benefits;
  (g) all other elements indicated in the task authorization.

- Deliverables for task 9.2

- An electro-optical device that meets the specific needs set out in the task authorization.

- A manufacturing process (in Microsoft Word format) for the electro-optical device developed and designs for the photolithography masks (AutoCAD or L-Edit format) with optimized design.
- For each new development or modification of electro-optical devices, the Contractor shall provide technical drawings (mechanical, optical, AutoCAD or ZEMAX format), a list of parts, and wiring diagrams and specifications, as well as supporting information, such as modeling, simulation and ray tracing data, test reports, etc. (Word or Excel format).

- A report including but not limited to the following information:

  (a) introduction, conclusion, background;
  (b) description of task objectives;
  (c) methodology used to perform the work and meet the objectives (explicit list of all activities);
  (d) description of new updated procedures (as applicable);
  (e) issues and problems related to the work;
  (f) future work suggested and expected benefits;
  (g) all other elements indicated in the task authorization.

- Deliverables for task 9.3

- A list of characterization results and information in hard copy and/or electronic copy in Microsoft Excel format on CD or DVD, or in any other format indicated in the task authorization.

- A final report including but not limited to the following information:

  (a) introduction, conclusion, background;
  (b) description of task objectives;
  (c) methodology used to perform the work and meet the objectives (explicit list of all activities);
  (d) characterization results;
  (e) issues and problems related to the work;

(f) description of new updated procedures (as applicable);
(g) future work suggested and expected benefits;
(h) all other elements indicated in the task authorization.

- Deliverables for task 9.4

- A final report including, but not limited to, the following information:

(a) introduction, conclusion, background;
(b) description of task objectives;
(c) methodology used to perform the work and meet the objectives (explicit list of all activities);
(d) modeling results;
(e) issues and problems related to the work;
(f) description of new updated procedures (as applicable);
(g) future work suggested and expected benefits;
(h) all other elements indicated in the task authorization.

TYPES OF RESOURCES REQUIRED

- 2 intermediate scientists/engineers specializing in micromanufacturing

Task 11 - Laser and Lidar

ACRONYMS

FPGA	Field Programmable Gate Array
fs	Femtosecond
IR	Infrared
DND	Department of National Defence
ns	Nanosecond
ps	Picosecond
THz	Terahertz
TW	Terawatt

TASK 10 – LASER AND LIDAR

BACKGROUND

One of DRDC Valcartier's main areas of expertise is the exploration, development, integration and evaluation of complex optronic and electro-optical systems. Department of National Defence (DND) requirements lead to multidisciplinary projects, covering a wide range of applications, ranging from imaging and detection to the development of optical countermeasures for a variety of platforms.

PURPOSE

The purpose of this Statement of Work is to support the design, development, characterization and maintenance of optronics systems, focusing on three areas of expertise related to laser beams: generation, propagation and detection. The support requested will include modelling, assembly, maintenance and evaluation activities, as well as testing support.

10.1 Generation of laser signals

Task 10.1 applies to support activities for optronic systems that generate laser signals. Laser source design, development, characterization and maintenance activities also include the development of underlying technologies in order to improve characteristics and performance.

The areas of expertise relevant to this task include ultraviolet, visible and infrared laser sources, pulsed lasers (fs, ns, ps) and continuous high-energy lasers. Technology relevant to this task includes solid-state, semiconductor and fibre laser sources. It also includes all secondary passive and/or active secondary optical systems that are part of the sources, such as lenses, mirrors and electromechanical elements.

Some optronic systems of interest include, but are not limited to, industrial welding lasers, laser designators, beam directors, laser counter-measures (dazzle), or LADAR and LIDAR sources.

The work includes, but is not limited to, the following tasks:

- Characterize, update and enhance laser systems by replacing and adding software, optical, mechanical, electronic or other components.

1) Document changes and characterize modifications where applicable.
2) Develop a plan for upgrading the laser systems in accordance with the specifications listed in the task authorizations.
3) List and obtain the components required (computer programs, optical/mechanical parts, etc.).
4) Design the components.
5) Upgrade the systems and incorporate the new components.

- Study the processes of generating secondary radiation (infrared, THz, filamentation, white light, other):

    1) Conduct theoretical studies of the parameters required to generate secondary waves using a laser beam.
    2) Design opto-mechanical assemblies to validate hypotheses.
    3) Design experimental methods to characterize and optimize the effectiveness of a conversion process.

- Develop laser countermeasures using dazzle, jamming and decoys

    1) Interface optical systems with external data from navigation or positioning instruments, such as a GPS, compass or gyroscope.
    2) Optimize laser sensor devices for countermeasures requirements.
    3) Develop hardware and software interfaces to control laser guided missile firing posts.
    4) Establish communications protocols and manufacture communications interfaces among the various system elements.

- Conduct literature reviews.

10.2 Propagation of laser signals

Task 10.2 applies to support activities for optronics systems with modes of operation that are based on phenomena related to laser signal propagation. System design, development, characterization and maintenance activities also include the modelling and simulation of atmospheric effects on laser signal propagation.

The areas of expertise relevant to this task include understanding the specific effects of laser signal propagation under various atmospheric conditions, such as absorption, diffusion and non-linear effects. The types of lasers to be studied in this task include all lasers listed in Task 10.1 (ultraviolet, visible spectrum and infrared, from fs pulses to continuous high-energy beams).

Examples of optronics systems of interest that are based on the atmospheric propagation of laser signals include, but are not limited to, long-range filament generators, active and passive atmospheric spectroscopy systems, and LIDAR and LADAR systems.

The work includes, but is not limited to, the following tasks:

- Study the propagation of continuous and pulsed laser beams.
    1) Develop assemblies that focus the wavefront of a high-energy beam to minimize spatial distortions created by turbulence and non-linear effects.
    2) Study the main parameters of the beam (energy, spectrum, diameter, deformable mirror curvature, temporal profile, etc.) to control propagation.
    3) Conduct beam propagation experiments over long distances under a variety of atmospheric conditions (humidity, temperature, precipitation, etc.).
    4) Analyze and present experiment results.

- Study the phenomenology of optical signals produced by illuminated aerosols/materials.
    1) Create and/or modify prediction models to estimate the intensity of the optical signals generated by aerosols or materials and induced by incident radiation.
    2) Compare the processed optical signals with the predictions made by the models
    3) Create and operate databases to support the experimental measurements.

Prepare literature reviews.

10.3 Detection of laser signals

Task 10.3 applies to support activities for optronics systems with modes of operation that are based on detecting laser signals. System design, development, characterization and maintenance activities also include the modelling and simulation of the response of the systems' detectors.

The areas of expertise relevant to this task include understanding the means of detecting and characterizing laser signals. The types of laser signals to be studied in this task include all those listed in Task 10.1 (ultraviolet, visible spectrum and infrared, from fs pulses to continuous high-energy beams). Examples of technology to be studied include, but are not limited to, active imaging systems (retro-reflection), opto-electronic detectors, laser threat detectors, laser beam characterization instruments, LIDAR and LADAR systems and THz imaging systems. It also includes secondary passive and active optical systems that are part of the detection systems, such as lenses, mirrors, micro-electromechanical or microfluidic elements and underlying electromechanics. Laser signal detection also includes the measurement of laser signals reflected from various targets and materials for the purposes of characterizing laser safety.

The work includes, but is not limited to, the following tasks:

- Design and develop laser threat detection and surveillance systems.

    1) Develop laser warning receivers, such as HARLID or others.
    2) Develop optical sensors that are extremely wavelength-selective and have a wide field of view.
    3) Develop laser surveillance systems based on retro-reflections for detecting optical systems.
    4) Characterize the optical augmentation of targets.
    5) Develop prototypes for detecting low-level laser sources that meet the specifications set out in the task authorization.

- Perform experimental and theoretical work to quantify degradation caused by diffusion in active imaging systems.

    1) Model the contribution of diffusion based on the optical density and the size of the aerosols.
    2) Simulate imaging for various visibility conditions and types of aerosols.
    3) Analyze the images obtained in a controlled environment.

- Prepare literature reviews.

10.4 Optical and opto-mechanical design support

The work includes, but is not limited to, the following tasks:

- Design optic modules and model their performance using commercial optical design software, such as Zemax or equivalent.
- Design mechanical components, enclosures and supports using software suites, such as Solid Edge, AutoCAD or PointWise.

10.5 Electronics support for optical assembly and laser circuitry

The work includes, but is not limited to, the following tasks:

- Maintain and enhance circuits and electronic devices in the laser systems and others.
- Design electronic circuits (analog and digital) using commercial software , such as (but not exclusively) Protel.
- Develop and manufacture electronic assemblies for the laser systems that meet the specifications set out in the task authorization.
- Design, manufacture and assemble printed circuit boards according to the layout of the electronic components.

10.6 Programming support

The work includes, but is not limited to, the following tasks:

- Develop algorithms for detecting laser sources according to the specifications set out in the task authorization.
- Develop algorithms for modelling atmospheric propagation of laser signals.
- Develop algorithms for modelling diffuse and specular reflection of laser signals.
- Develop image acquisition routines for single or multiple laser sources and target tracking algorithms.
- Design computer programs that are compatible with DRDC software to automate measurement taking and data analysis (e.g. LabVIEW, MATLAB, C).
- Develop Windows applications for the human-machine interface; program microcontrollers, FPGAs, sensor interface circuits, and test routines to validate signal processing algorithms.
- Write operating instructions for the programs.

10.7 Testing support

The work includes, but is not limited to, the following tasks:

- Conduct testing campaigns.

    1) Develop test plans, estimate the expected results; plan the material required; collect, save and analyze data; and present the results and lessons learned.
    2) Prepare and secure systems for transport to the testing sites and return them in their original condition.
    3) Provide consultation services during the development of acquisition systems and recording of data to meet testing requirements.
    4) Provide consultation services during experimental sessions.
    5) Participate in testing campaigns that may last for several weeks at DRDC Valcartier, elsewhere in Canada or in another country.
    6) Reduce and analyze the experimental data.

DELIVERABLES

The deliverable goods and services will be explicitly specified in the technical specifications for each task authorization.

Generally speaking, the deliverables for Tasks 10.1 to 10.7 may include the following:

- Electronic file created using computer-assisted design software as specified in the task description. The storage medium will be specified in the task description (CD, DVD, USB key depending on requirements).

- Documented programs (source code and executables) and operating instructions.
    - Report describing:
        - methodology used;
        - experimental results obtained, in the form of tables and/or graphs;
        - data analysis; and
        - conclusions.
    - Developed models in a computer language (e.g. MATLAB) specified in the task description. The storage medium will be specified in the task description (CD, DVD or USB key depending on requirements).
    - Prototype that meets the requirements of the statement of work.
    - Electrical, mechanical or software interfaces as defined in the task description.
    - Raw experimental data in the output format of the measurement instruments delivered on a CD or DVD, for example.
    - Processed experimental data in the form of tables and/or graphs written in English in a format that can be incorporated into a report written in Microsoft Office format.

All documents, reports, tables and publications shall be written in English only and submitted on CD or DVD in Microsoft Office format.

RESOURCES

To carry out these tasks, the Contractor shall supply resources in the following areas:

1. Project management

2. Scientific (Master's or PhD):
   - Mechanical engineering
   - Electrical engineering
   - Engineering physics / Physics (optics)

3. Engineering (bachelor's):
   - Mechanical engineer
   - Electrical engineer
   - Engineering physicist / Physicist (optics)
   - Computer engineer

4. Technical (college)
   - General technician (optics)
   - Mechanical technician
   - Electronics technician

Task 12 - Image fusion

1. General

1.1 Title

Development of tools and analysis support for image fusion

1.2 Purpose

The purpose of this statement of work is to:

a) Develop image enhancement and fusion algorithms that can be used to improvethe performance of multi-sensor vision systems.

b) Develop new characterization methods that can be used to evaluate the performance of multi-sensor image fusion systems in an operations environment.

c) Develop characterization methods for image fusion systems.

The work must be completed on site at DRDC Valcartier.

1.3 Background/History

DRDC Valcartier has experience in night vision technologies. This expertise includes image intensification systems, near infrared systems and thermal imaging systems. Research over the last few years has proven the benefits of combining images from various types of imaging systems in order to exceed the performance limits of each system taken individually.

The purpose of the research project undertaken by DRDC Valcartier is to measure the performance gains obtained by fusing outputs from several imaging systems into a single image. To do this, a multi-sensor video sequence capturing system will be developed to take outside images, and a device for viewing the merged images will also be developed. This device will make it possible to conduct tests with operators. The data gathered will be used in research on performance metrics.

Another objective of the research program is to study and evaluate the various types of emerging imaging technologies and to consider how to improve the performance of commercially available sensors.

1.4 Acronyms

AGC	Automatic gain control
CAD	Computer-aided design
CCD	Charge-Coupled Device
CMOS	Complementary metal–oxide–semiconductor
EMCCD	Electron-multiplying CCD
EO	Electro-optical
CF	Canadian Forces
I2	Image intensifier

DRDC	Defence Research and Development Canada
UV	Ultraviolet

2. APPLICABLE DOCUMENTS (references)

3. SCOPE OF WORK

3.1 Develop and maintain software to support image capture, representation, fusion and analysis. This task includes the development of:

- C++ applications in the Windows environment;
- specialized software (including but not limited to software using DSP or FPGA); and
- MATLAB and Python test applications.

- The Contractor must be able to:

  - Develop drivers that enable cameras to interface with a computer;
  - Develop video capture tools for digital images (USB, Firewire, GiGe);
  - Develop video capture tools for analog images (NTSC);
  - Develop image viewing, processing and analysis tools;
  - Implement image fusion tools; and
  - Implement metrics for measuring image quality.

Program development will be done with commercial compilers that are compatible with those used at DRDC Valcartier, in the Windows environment. The use of a user interface may also be required.

3.2 Process, reduce, fuse and analyze images and video sequences. This task also includes perceptual analyses, correlation analyses and performance metrics analyses of video sequences subject to image fusion.

The Contractor must be able to:

- Complete literature reviews on topics related to image fusion;
- Assemble, structure and organize video sequences;
- Apply treatments (e.g. luminosity, contrast, tone balance) to modify and improve video sequences;
- Conduct statistical measurements on video sequences;
- Apply digital processing algorithms (e.g. filtering, enhancing, harmonic
- analysis, extracting characteristics, shape recognition, correlation analysis);
- Measure the performance of processing algorithms;
- apply fusion algorithms (e.g. principal component analysis (PCA), Laplacian, discrete wavelet transform, contrast ratio); and
- carry out performance measurements and analyses of fusion algorithms (e.g. performance metrics such as root mean square, entropy, mutual information, Petrovic, Pielle, Wang & Bovik).

3.3 Take measurements with electro-optical instruments.

The Contractor must be able to:

- Prepare and manipulate equipment deployed during field testing at DRDC Valcartier;
- Prepare and manipulate equipment deployed during testing outside DRDC Valcartier premises;
- Collect and save data; and
- Prepare, reduce and analyze data.

3.4 Design and integrate opto-mechanical systems in support of developed or existing electronics or opto-mechanical assembly.

The Contractor must be able to:

- Analyze opto-mechanical design options;
- Propose a solution and prepare a draft design in the form of a report including the operational and technical specifications, simulated models and a list of preferred components required in the assembly;
- Create an optical design for preparing an optical assembly;
- Model the optical assemblies' performance using commercial optical design software (e.g. Zemax); and
- Design and create opto-mechanical assemblies.

3.5 Relative frequencies

In order to meet objectives, efforts are planned to be distributed as follows:

- Task 3.1 – 20%
- Task 3.2 – 35%
- Task 3.3 – 35%
- Task 3.4 – 10%

4. REPORTS AND OTHER DELIVERABLES

For each task, documents and reports shall be written in English using the Microsoft Office suite. One hard copy and/or one electronic copy on CD or DVD shall be submitted as required.

4.1 Deliverables for Task 3.1

Depending on the nature of the work requested, the deliverable may be:

- A functional software program with the source code on CD;
- A PDF of the software documentation on CD; and
- A user manual written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD.

4.2 Deliverables for Tasks 3.2 and 3.3

Depending on the nature of the work requested, the deliverable may be:

- the methodology used;
- the experimental results obtained, in the form of tables and/or graphs; and
- a data analysis.

4.3 Deliverables for Task 3.4

Depending on the nature of the work requested, the deliverable may be:

A report describing the results of the opto-mechanical design option analysis. The report shall be written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD.

A report describing the operational and technical specifications, simulated models and a list of the preferred components required for the opto-mechanical assembly. The report shall be written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD.

- An optical design drawing;
- A mechanical design drawing
- A report describing the results of modelling optical assembly performance using commercial optical design software. The report shall be written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD.
- An opto-mechanical assembly.

5. RESOURCE CATEGORIES

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted to the various needs set out in each task.
The needs set out in each task require expertise in the following four fields:

a. Software development
Task 3.1, in support of tasks 3.2 and 3.3

b. Optical design
Task 3.4, in support of Task 3.3

c. Mechanical and opto-mechanical design
Task 3.4, in support of Task 3.3

d. Image processing
Task 3.2, in support of Task 3.1

Resources shall have the associated education and experience set out in the following list:

a. Software development
Education

a1 Bachelor's degree
- Computer science, computer engineering; or
- Electrical engineering with specialization in computer science

a2 Master's degree
- Computer science, computer engineering; or
- Electrical engineering with specialization in computer science

b. Optical design
Education

b1 Bachelor's degree
- Physics, engineering physics

b2 Master's degree and higher
- Physics, engineering physics

Mandatory experience

- At least 12 months of experience in design and using optical design software.

c. Mechanical and opto-mechanical design
Education

c1 Technical diploma
- Mechanical technology; or
- Physical technology

c2 Bachelor's degree
- Mechanical engineering

d. Image processing
Education

d1 Bachelor's degree
- Physics, mathematics; or
- Engineering physics, electrical engineering.

d2 Master's degree or higher
- Physics, mathematics; or
- Engineering physics, electrical engineering

The Contractor shall identify a group of at least four (4) key resources. The group shall be composed of at least:

e. 2 intermediate engineers/scientists
f. 1 senior engineer/scientist
g. 1 intermediate technician

In this group, there shall be at least two (2) key resources with a Master's degree (or higher) in physics or engineering physics.

The role of the key resources is to:

f. Help accomplish tasks as a specialist;
g. Be involved as a key resource who accomplishes most of the work (over 50% of the time) in the task;
h. Attend project meetings with the scientific authority;
i. Propose solutions; and
j. Act as project manager and manage a group of resources made up of technicians, engineers and/or physicists.

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

The experience of the proposed resources is defined as follows:

d. Junior resource: between 1 and 3 years of experience
e. Intermediate resource: between 4 and 12 years of experience
f. Senior resource: over 12 years of experience

Note: The number of years of experience associated with the junior, intermediate and senior levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a Master's degree corresponds to one year of work experience, and a PhD corresponds to three.

Task 13 - aircraft signatures

1. General

1.1 Title

Development of tools and analysis support for aircraft signatures and protection systems

1.2 Purpose

The purpose of this statement of work is to:

1. Develop specialized software tools for manipulating hyperspectral data in order to identify spectral signatures from aircraft and their protection systems.

2. Develop analysis methods and software tools adapted to the PIRATES database, in order to study the energy behaviour of spectral signatures, perform comparative analyses and produce statistical analyses that combine different variables, such as aircraft type, decoy type, exhaust velocity, chemical content and tactical effectiveness.

The work must be completed on site at DRDC Valcartier.

1.3 Background/History

Since 1985, DRDC Valcartier has been involved in measurement campaigns for aircraft infrared signatures and their protection systems. These measurements were intended to assess vulnerability profiles and the level of self-protection of aircraft. The results of these campaigns have made it possible to identify concrete options for optimization in this ever-changing field.

It was during this period that DRDC developed PIRATES. This instrument, developed for this type of measurement, is used to generate a hyperspectral image with low spatial resolution and high spectral resolution. One of the benefits of this concept is that the various sources of energy can be spatially separated. To enhance the efficiency of the instrument, DRDC is currently developing a set of algorithms to exploit infrared spectral signatures.

1.4 Acronyms

DRDC	Defence Research and Development Canada
SQL	Structured Query Language
PIRATES	Passive Infrared Ranging and Target Evaluation System

2. APPLICABLE DOCUMENTS (references)

3. SCOPE OF WORK

1.1 Develop software to support control of spectroradiometric measurement instruments. This task includes the development of:

- C++ applications in the Windows environment; and
- MATLAB and Python test applications.

The Contractor must be able to:

- Develop drivers that enable spectroradiometric instruments to interface with a computer;
- Develop modules that enable multiple instruments to interface with each other within a joint communications network; and
- Develop tools for capturing spectroradiometric data.

Program development will be done with commercial compilers that are compatible with those used at DRDC Valcartier, in the Windows environment. The use of a user interface may also be required.

1.2 Develop software to support the saving, organization and representation of spectroradiometric data. This task includes the development of

- applications in the Windows environment using C++;
- applications in the Windows environment using SQL; and
- MATLAB test applications as well as completing literature reviews on topics related to image fusion.

The Contractor must be able to:

- Develop database management tools that can be used to save and transfer spectroradiometric data;
- Develop query tools that can be used to manipulate spectroradiometric data; and
- Develop tools for displaying spectroradiometric data.

Program development will be done with commercial compilers that are compatible with those used at DRDC Valcartier, in the Windows environment. The use of a user interface may also be required.

1.3 Develop software to support spectroradiometric data processing and analysis. This task includes the development of:

- applications in the Windows environment using C++; and
- MATLAB and Python test applications.

The Contractor must be able to:

- Develop spectroradiometric data validation tools for analysts;
- Develop spectroradiometric data analysis and processing tools;
- Develop source identification and classification tools based on spectroradiometric data; and
- Develop spectroradiometric data exploitation tools.

Program development will be done with commercial compilers that are compatible with those used at DRDC Valcartier, in the Windows environment. The use of a user interface may also be required.

1.4 Process, analyze and exploit spectroradiometric data.

The Contractor must be able to:

- Use database management tools to organize and structure data subsets from the database;
- Use processing and analysis tools to calibrate, confirm and validate spectroradiometric data; and
- Use identification and classification tools to exploit spectroradiometric data.

1.5 Take measurements with spectroradiometric instruments.

The Contractor must be able to:

- Prepare the instrument and its sub-modules that are deployed during testing on DRDC Valcartier premises;
- Prepare the instrument and its sub-modules that are deployed during testing off DRDC Valcartier premises;
- Capture and save data; and
- Prepare and analyze data.

1.6 Relative frequencies

In order to meet objectives, efforts are planned to be distributed as follows:

Task 3.1 – 20%
Task 3.2 – 20%
Task 3.3 – 30%
Task 3.4 – 20%
Task 3.5 – 10%

4. REPORTS AND OTHER DELIVERABLES

For each task, documents and reports shall be written in English using the Microsoft Office suite. One hard copy and/or one electronic copy on CD or DVD shall be submitted as required.

4.1 Deliverables for tasks 3.1, 3.2 and 3.3

Depending on the nature of the work requested, the deliverable may be:

- A functional software program with the source code on CD;
- A PDF of the software documentation on CD; and
- A user manual written in English using the Microsoft Office suite and submitted in hard copy and electronic copy on CD or DVD.

4.2 Deliverables for Task 3.4

Depending on the nature of the work requested, the deliverable may be a summary containing:

- The tools used;
- A list of data to be processed and the results obtained; and
- The methodology used.

4.3 Deliverables for Task 3.5

Depending on the nature of the work requested, the deliverable may be a summary containing:

- the methodology used;
- the experimental results obtained, in the form of tables and/or graphs; and
- a data analysis.

5. RESOURCE CATEGORIES

The Contractor shall provide or have access to a team of qualified, competent and experienced resources, with complementary expertise that may be adapted to the various needs set out in each task.
The needs set out in each task require expertise in the following three fields:

a) Software development
Tasks 3.1, 3.2 and 3.3

b) Spectrometry data processing
Task 3.4, in support of Task 3.3

c) Spectrometry measurements
Task 3.5

Resources shall have the associated education and experience set out in the following list:

a) Software development
Education

a1. Bachelor's degree
Computer science, computer engineering; or
Electrical engineering with specialization in computer science

a2. Master's degree
Computer science, computer engineering; or
Electrical engineering with specialization in computer science

b) Spectrometry data processing
Education

b1. Bachelor's degree
Physics, mathematics; or
Engineering physics, electrical engineering

b2. Master's degree or higher
Physics, mathematics; or
Engineering physics, electrical engineering

c) Spectrometry measurements
Education

c1 Technical diploma

Physical technology; or
Electronics technology

c2 Bachelor's degree

Physics, engineering physics

The Contractor shall identify a group of at least four (4) key resources. The group shall be composed of at least:

a) 2 intermediate engineers/scientists
b) 1 senior engineer/scientist
c) 1 intermediate technician

In this group, there shall be at least two (2) key resources with a Master's degree (or higher) in physics or engineering physics.

The role of the key resources is to:

a) Help accomplish tasks as a specialist;
b) Be involved as a key resource who accomplishes most of the work (over 50% of the time) in the task;
c) Attend project meetings with the scientific authority;
d) Propose solutions; and
e) Act as project manager and manage a group of resources made up of technicians, engineers and/or physicists.

The team's role is to supplement the expertise of the key resources. The team shall have the skills and expertise required for the tasks. The team shall not replace the key resources.

The experience of the proposed resources is defined as follows:

a) Junior resource: between 1 and 3 years of experience
b) Intermediate resource: between 4 and 12 years of experience
c) Senior resource: over 12 years of experience

Note: The number of years of experience associated with the junior, intermediate and senior levels corresponds to the number of years of work since obtaining the required degree on the date that the bidder's proposal is submitted. The number of years of experience of resources who have completed post-graduate studies has been adjusted as follows: a Master's degree corresponds to one year of work experience, and a PhD corresponds to three.

Appendix B

Example of Evaluation Criteria

The following is an example of the criteria that could be sought in a potential request for proposals. These criteria are provided for guidance and for obtaining comments.

TASKS

Development of Characterization Methodology for Electro-Optical (EO) Systems

For all mandatory and rated criteria, the definitions set out in the "RESOURCE CATEGORIES" section of the statement of work shall apply.

MANDATORY CRITERIA

Listing experience without providing any supporting data to describe where and how such experience was obtained will result in the experience not being included for evaluation. Failure to meet one or more of the mandatory requirements will preclude the proposal from further consideration and disqualify the proposal from any contract award.

The bidder must meet the following mandatory requirements.

MANDATORY CRITERIA	Met	Not Met
1. The bidder must propose a team of key resources composed of at least: • 2 intermediate engineers/scientists • 1 senior engineer/scientist • 1 intermediate technician Note 1: In that group, there must be at least two key resources with a Master's degree (or higher) in physics or engineering physics. Note 2: The bidder may propose more key resources than the minimum number required.		
2. The bidder must propose key resources for each of the six tasks (ref. 3.1 through 3.6 in the statement of work). Note 1: The same key resource may be associated with more than one activity. Note 2: The key resources proposed must have the expertise set out one or more resource category as described in the "RESOURCE CATEGORIES" section of the statement of work.		

2.1 Development of test methods for image intensifiers or their components (e.g. I2 tubes) to more accurately evaluate performance in an operational environment A minimum of two (2) key resources must be clearly identified for this task.		
2.2 Development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to more accurately evaluate performance in an operational environment A minimum of one (1) key resource must be clearly identified for this task.		
2.3 Development of test methods for UV/Visible sensors to more accurately evaluate performance in an operational environment A minimum of one (1) key resource must be clearly identified for this task.		
2.4 Support for optical and opto-mechanical design and assembly. A minimum of two (2) key resources, one (1) in optics and one (1) in mechanics must be clearly identified for this task.		
2.5 Software development for data analysis A minimum of one (1) key resource must be clearly identified for this task.		
2.6 Development of image processing algorithms A minimum of one (1) key resource must be clearly identified for this task.		

RATED CRITERIA

3. Evaluation of experience of key resources

Instructions

The bidder will be evaluated based on past accomplishments that demonstrate the skills and experience of the proposed team.

For activities 3.1 through 3.6 (except for 3.4), the total points for each criterion will be the sum of points for each proposed member of the key resources team.

To evaluate the relevance of the experience of the resources proposed, the bidder must provide the following information for each activity set out in the criteria:

Task x, activity x
a. Key resource involved.
b. Project title (including the client, scope in budget-time and date).
c. Project objective and association with the task.
d. Description of the key resource's involvement: effort (pers./month), skills used, systems characterized, parameters measured/analyzed or systems developed.

To facilitate the review, the use of a table is suggested, as shown below.

Task 3.2, a)			
Resource	*Project*	*Objective*	*Description of resource involvement*
Resource A	Project ABC, Client A, 6 months, $10k, 2006	MTF measure-ment assembly	Opto-mechanical design, MTF assembly manufacturing for systems A, B and C. Involvement of X pers/month.
Task 3.2, b) and c)			
Resource	*Project*	*Objective*	*Description of resource involvement*
Resource B	Project ABC, Client A, 6 months, $10k, 2006	Collection and analysis	Collection of measurements for systems A, B and C. Involvement of Y per/month.
			MTF measurement analysis. Involvement of Z pers/month.

In the *Description of resource involvement* column, the bidder must clearly describe the tasks completed by the proposed resource that are related to the activities set out in the statement of work. As applicable, the type of systems characterized must also be provided, as well as the parameters measured and/or analyzed.

To be considered in this evaluation, each project must meet both of the following conditions:

a. The project value must be $10,000 or more;
b. Only projects completed since January 1, 2000, will be considered.

	Max. points	Min. points
3.1 Development of test methods for image intensifiers or their components (e.g. I2 tubes) to more accurately evaluate performance in an operational environment. The bidder must present one or more projects associated with the development of test methods	40	28

for image intensifiers or their components (e.g. I2 tubes) to measure performance. The bidder must use projects to present work that shows the experience and skills of the key resources in the following types of activities: a. Data measurement and acquisition systems for image intensifiers or their components; o 2 pts per parameter (see Note 1) for which a data measurement and acquisition system was developed by one (1) of the key resources b. Collection and saving of data on image intensifiers or their components; o 1 pt per parameter measured (see Note 1) for each key resource (max. 2) having completed the parameter measurement c. Participation in analysis and reduction of data on image intensifiers or their components; o 1 pt per parameter analyzed (see Notes 1 and 2) for each key resource (max. 2) having completed the parameter analysis Points will be added in b) and c) based on the number of systems measured and/or analyzed (see Notes 1 and 2) by each resource involved in these activities in accordance with the following list: a. One system was measured or analyzed: 1pt b. Between 2 and 5 systems were measured or analyzed: 2 pts c. Over 5 systems were measured or analyzed: 4 pts Note 1: Only the following parameters that can be measured and analyzed in systems based on image intensifiers or their components will be considered in calculating points: a. Impulse response (modulation transfer function (MTF)) b. Resolution response (minimum resolvable contrast (MRC)) c. Image noise (signal-to-noise ratio (SNR) and equivalent background illumination (EBI)) d. Luminous gain Note 2: Analysis of simulation results will not be considered.		
3.2 Development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to more accurately evaluate performance in an operational environment. The bidder must present one or more projects associated with the development of test methods for infrared sensors (0.9 µm to 15 µm) or their components to measure performance. The bidder must use projects to present work that shows the experience and skills of the key resources in the following types of activities: a. Data measurement and acquisition systems for infrared sensors or their components: o 2 pts per parameter (see Note 1) for which a data measurement and acquisition system was developed by one (1) of the key resources proposed b. Collection and saving of data on infrared sensors or their components; o 1 pt per parameter measured (see Note 1) by one (1) of the key resources having completed the parameter measurement c. Participation in analysis and reduction of data on infrared sensors or their components; o 1 pt per parameter analyzed (see Notes 1 and 2) by one (1) of the key resources having completed the parameter analysis Points will be added in b) and c) based on the number of systems measured and/or analyzed (see Notes 1 and 2) by each resource involved in these activities in accordance with the following list: a. One system was measured or analyzed: 1 pt b. Between 2 and 5 systems were measured or analyzed: 2 pts	24	16

c. Over 5 systems were measured or analyzed: 4 pts Note 1: Only the following parameters for infrared sensors (0.9 µm to 15 µm) or their components will be considered in calculating points: a. Impulse response (modulation transfer function (MTF)) b. Resolution response (minimum resolvable temperature (MRT)) c. Image noise (3D-noise and noise equivalent temperature difference (NETD)) d. Transfer function (signal transfer function (SiTF)) Note 2: Analysis of simulation results will not be considered.		
3.3 Development of test methods for UV/Visible sensors to more accurately evaluate performance in an operational environment. The bidder must present one or more projects associated with the development of test methods for UV/Visible sensors to measure performance. UV/Visible sensors consist mainly of: a. Complementary metal–oxide–semiconductor (CMOS) sensors; b. Charge-coupled device (CCD) sensors; c. Electron-multiplying CCD (EMCCD) sensors; d. Sensors that function in UV; and e. Day sights, such as binoculars, sights or telescopes. The bidder must use projects to present work that shows the experience and skills of the key resources in the following types of activities: a. Data measurement and acquisition systems for day/night vision sensors; o 2 pts per parameter (see Note 1) for which a data measurement and acquisition system was developed by one (1) of the key resources proposed b. Collection and saving of data on day/night vision sensors; o 1 pt per parameter measured (see Note 1) by one (1) of the key resources having completed the parameter measurement c. Participation in analysis and reduction of data on day/night vision sensors; o 1 pt per parameter analyzed (see Notes 1 and 2) by one (1) of the key resources having completed the parameter analysis Points will be added in b) and c) based on the number of months of experience of a resource assigned to a given activity (see Notes 1 and 2) in accordance with the following list: a. Fewer than 3 months of relevant full-time experience: 0 pts b. Between 3 and 12 months of relevant full-time experience: 2 pts c. More than 12 months of relevant full-time experience: 4 pts Note 1: Only the following parameters for infrared sensors (0.9 µm to 15 µm) or their components will be considered in calculating points: a. Impulse response (modulation transfer function (MTF)) b. Resolution response (minimum resolvable contrast (MRC) c. Image noise (3D-noise) d. Spectral response Note 2: Analysis of simulation results will not be considered.	24	16
3.4 Support for optical and opto-mechanical design and assembly.	15	10

The bidder must present one or more projects in which it has carried out optical and opto-mechanical assemblies. For projects, the bidder must present work that shows the experience and skills of the key resources in the following types of activities (max. 1 resource per activity): a. Optical design and modelling (see Note 1); b. Opto-mechanical design (see Note 2); c. Opto-mechanical assembly. Points will be awarded for the number of months of experience of a resource assigned to a given activity in accordance with the following list: a. Fewer than 6 months of relevant experience: 1 pt b. Between 7 and 12 months of relevant experience: 3 pts c. Between 13 and 36 months of relevant experience: 4 pts d. Over 36 months of relevant experience: 5 pts Note 1: Experience in optical design and modelling will be considered if the resource has used commercial optical design software. Note 2: Experience in opto-mechanical design will be considered if the resource has used commercial opto-mechanical design software.		

3.5 Software development for data analysis.
 	
The bidder must present one or more projects associated with software development for data analysis and processing.
 	
The bidder must use these projects to present work that shows the experience and skills of the key resources in the following types of activities:
 	
a. Development of data validation tools for analyses;
  a. The project does not demonstrate that the resource has participated in developments: 0 pts
  b. The resource has participated in one or more developments: 2 pts
  c. The resource has managed one or more developments: 4 pts
b. Development of data processing and analysis tools;
  a. The project does not demonstrate that the resource has participated in developments: 0 pts
  b. The resource has participated in one or more developments: 2 pts
  c. The resource has managed one or more developments: 4 pts
c. Development of data classification tools (e.g. database);
  a. The project does not demonstrate that the resource has participated in developments: 0 pts
  b. The resource has participated in one or more developments: 2 pts
  c. The resource has managed one or more developments: 4 pts
 	
Points will be awarded for the number of months of experience of a resource assigned to a given activity in accordance with the following list:
 	
a. Fewer than 3 months of relevant full-time experience: 0 pts
b. Between 3 and 6 months of relevant full-time experience: 1 pt
c. Between 7 and 12 months of relevant full-time experience: 2 pts
d. Between 13 and 24 months of relevant full-time experience: 3 pts
e. Over 24 months of relevant full-time experience: 4 pts
	24	16

3.6 Development of image processing algorithms The bidder must present one or more projects associated with software development for processing algorithms and enhancing images to improve the performance of vision systems. The bidder must use these projects to present work that shows the experience and skills of the key resources in the following types of activities: a. Development of image processing and enhancement algorithms to improve the performance of vision systems; ○ The project does not demonstrate that the resource has participated in developments: 0 pts ○ The resource has participated in one or more standard developments of image processing algorithms (e.g. gain and contrast operator, contrast and brightness operator, noise suppression): 2 pts ○ The resource has managed one or more significant developments of image processing algorithms (e.g. automatic gain and contrast operator, local enhancement operator, dynamic adaptation (HDR), tone mapping): 4 pts b. Implementation of algorithms (e.g.: real time, microprocessor, DSP); ○ The project does not demonstrate that the resource has participated in the implementation of image processing algorithms: 0 pts ○ The resource has participated in one or more implementations of image processing algorithms: 2 pts ○ The resource has managed one or more implementations of image processing algorithms: 4 pts c. Testing and evaluation of image processing and enhancement algorithms ○ The project does not demonstrate that the resource has participated in the testing and evaluation of image processing algorithms: 0 pts ○ The resource has participated in one or more image processing algorithm evaluation tests: 2 pts ○ The resource has managed one or more image processing algorithm evaluation tests: 4 pts Points will be awarded for the number of months of experience of a resource assigned to a given activity in accordance with the following list: a. Fewer than 3 months of relevant full-time experience: 0 pts b. Between 3 and 6 months of relevant full-time experience: 1 pt c. Between 7 and 12 months of relevant full-time experience: 2 pts d. Between 13 and 24 months of relevant full-time experience: 3 pts e. Over 24 months of relevant full-time experience: 4 pts	24	16
TOTAL	151	102

RATED CRITERIA FOR EVALUATION OF THE COMPANY'S EXPERIENCE AND MANAGEMENT MODEL		
4. Experience and management model	Max. points	Min. points required
4.1 Bidder's experience in managing projects in the EO system characterization field within the past 10 years The bidder must describe its experience in managing projects in the EO system characterization field. The description must include a project title and description, value and year of completion. a. Over 4 R&D projects with a total budget (sum of projects) of over 1 million dollars: 6 pts b. Over 2 R&D projects with a total budget (sum of projects) of over 0.5 million dollars: 4 pts c. Fewer than 2 R&D projects with a total budget (sum of projects) of under 0.5 million dollars: 2 pts	6	N/A
4.2 Management tools/methods for planning and managing tasks and activities The bidder must propose appropriate project management techniques, including the production of schedules or Gantt charts, as well as risk management plans. The methods/tools proposed must be supported by concrete examples from projects completed in the past by the bidder. Tasks/activities, resources and deliverables must be clearly identified. a. The bidder proposes a ''flow chart process'' (schedule or Gantt chart): 2 pts b. The bidder already uses a ''flow chart process'' (schedule or Gantt chart) as a project management technique, and provides a sample document associated with a past project completed by the bidder's company: 5 pts c. The bidder proposes a risk management plan based on recognized standards (such as PMBOX): 2 pts d. The bidder already uses a risk management plan based on recognized standards (such as PMBOX), and provides a sample document associated with a past project completed by the bidder's company: 5 pts *Note: Points are cumulative (a or b + c or d).*	10	N/A
4.3 Quality assurance process The bidder must describe the quality assurance processes used within its company. a. The bidder submits a quality assurance process that is well documented and based on recognized standards (e.g. ISO). The process is well established in the bidder's company, and an example of the process, associated with a projected completed by the bidder's company, has been provided: 5 pts b. The bidder submits a quality assurance process. The process is not necessarily based on recognized standardized processes, but it is well established in the company, and an example of the process, associated with a projected completed by the bidder's company, has been provided: 3 pts c. The bidder does not submit a quality assurance process: 0 pts	5	N/A

4.4 Resource management systems The bidder must propose an appropriate system for resource management. The bidder must describe how it will approach project management with regard to priority assessment, work overload, resource availability and quality of services offered within the task authorization process. a. The bidder proposes the use of resource management tools: 2 pts b. The bidder demonstrates that it regularly uses resource management tools (e.g. OpenProj). The methods/tools proposed must be supported by concrete examples from projects completed in the past by the bidder: 4 pts c. The bidder demonstrates that it regularly uses resource management tools (e.g. OpenProj). The methods/tools proposed must be supported by concrete examples from projects completed in the past by the bidder. The bidder also has a plan to resolve resource management problems. In its problem management plan, the bidder must propose at least two different solutions to staff shortage problems. The solutions proposed must be relevant, effective and explained in detail in order to be taken into account in the evaluation: 8 pts	8	N/A
TOTAL	29	18

Appendix C

SAMPLE CLAUSES AND CONDITIONS

It is also anticipated that the following clauses will be an integral part of a future request for proposals. We request your feedback on any concerns and issues that could result from these elements, as well as possible solutions.

2003 (2010-01-11) **Joint Venture**

1. A joint venture is an association of two or more parties who combine their money, property, knowledge, expertise or other resources in a single joint business enterprise, sometimes referred as a consortium, to bid together on a requirement. Bidders who bid as a joint venture must indicate clearly that it is a joint venture and provide the following information:
    a. the name of each member of the joint venture;
    b. the Procurement Business Number of each member of the joint venture;
    c. the name of the representative of the joint venture, i.e. the member chosen by the other members to act on their behalf, if applicable;
    d. the name of the joint venture, if applicable.

2. If the information is not clearly provided in the bid, the Bidder must provide the information on request from the Contracting Authority.

3. The bid and any resulting contract must be signed by all the members of the joint venture unless one member has been appointed to act on behalf of all members of the joint venture. The Contracting Authority may, at any time, require each member of the joint venture to confirm that the representative has been appointed with full authority to act as its representative for the purposes of the bid solicitation and any resulting contract. If a contract is awarded to a joint venture, all members of the joint venture will be jointly and severally or solidarily liable for the performance of any resulting contract.

2003 (2012-03-02) **Conflict of Interest - Unfair Advantage**

1. In order to protect the integrity of the procurement process, bidders are advised that Canada may reject a bid in the following circumstances:
    a. if the Bidder, any of its subcontractors, any of their respective employees or former employees was involved in any manner in the preparation of the bid solicitation or in any situation of conflict of interest or appearance of conflict of interest;
    b. if the Bidder, any of its subcontractors, any of their respective employees or former employees had access to information related to the bid solicitation that was not available to other bidders and that would, in Canada's opinion, give or appear to give the Bidder an unfair advantage.

2. The experience acquired by a bidder who is providing or has provided the goods and services described in the bid solicitation (or similar goods or services) will not, in itself, be considered by Canada as conferring an unfair advantage or creating a conflict of interest. This bidder remains however subject to the criteria established above.

3. Where Canada intends to reject a bid under this section, the Contracting Authority will inform the Bidder and provide the Bidder an opportunity to make representations before making a final decision. Bidders who are in doubt about a particular situation should contact the Contracting Authority before bid closing. By submitting a bid, the Bidder represents that it does not consider itself to be in conflict of interest nor to have an unfair advantage. The Bidder acknowledges that it is within Canada's sole discretion to determine whether a conflict of interest, unfair advantage or an appearance of conflict of interest or unfair advantage exists.

Intellectual Property:

2040 27(2008-05-12) **Intellectual Property Infringement and Royalties**

1. The Contractor represents and warrants that, to the best of its knowledge, neither it nor Canada will infringe any third party's intellectual property rights in performing or using the Work, and that Canada will have no obligation to pay royalties of any kind to anyone in connection with the Work.

2. If anyone makes a claim against Canada or the Contractor concerning intellectual property infringement or royalties related to the Work, that Party agrees to notify the other Party in writing immediately. If anyone brings a claim against Canada, according to *Department of Justice Act*, R.S., 1985, c. J-2, the Attorney General of Canada must have the regulation and conduct of all litigation for or against Canada, but the Attorney General may request that the Contractor defend Canada against the claim. In either case, the Contractor agrees to participate fully in the defence and any settlement negotiations and to pay all costs, damages and legal costs incurred or payable as a result of the claim, including the amount of any settlement. Both Parties agree not to settle any claim unless the other Party first approves the settlement in writing.

3. The Contractor has no obligation regarding claims that were only made because:
    a. Canada modified the Work or part of the Work without the Contractor's consent or used the Work or part of the Work without following a requirement of the Contract; or
    b. Canada used the Work or part of the Work with a product that the Contractor did not supply under the Contract (unless that use is described in the Contract or the manufacturer's specifications); or
    c. the Contractor used equipment, drawings, specifications or other information supplied to the Contractor by Canada (or by someone authorized by Canada); or
    d. the Contractor used a specific item of equipment or software that it obtained because of specific instructions from the Contracting Authority; however, this exception only applies if the Contractor has included the following language in its own contract with the supplier of that equipment or software: "[Supplier name] acknowledges that the purchased items will be used by the Government of Canada. If a third party claims that equipment or software supplied under this contract infringes any intellectual property right, [supplier name], if requested to do so by either [Contractor name] or Canada, will defend both [Contractor name] and Canada against that claim at its own expense and will pay all costs, damages and legal fees payable as a result of that infringement." Obtaining this protection from the supplier is the Contractor's responsibility and, if the Contractor does not do so, it will be responsible to Canada for the claim.

4. If anyone claims that, as a result of the Work, the Contractor or Canada is infringing its intellectual property rights, the Contractor must immediately do one of the following:
    a. take whatever steps are necessary to allow Canada to continue to use the allegedly infringing part of the Work; or
    b. modify or replace the Work to avoid intellectual property infringement, while ensuring that the Work continues to meet all the requirements of the Contract; or
    c. take back the Work and refund any part of the Contract Price that Canada has already paid.

    If the Contractor determines that none of these alternatives can reasonably be achieved, or if the Contractor fails to take any of these steps within a reasonable amount of time, Canada may choose either to require the Contractor to do (c), or to take whatever steps are necessary to acquire the rights to use the allegedly infringing part(s) of the Work itself, in which case the Contractor must reimburse Canada for all the costs it incurs to do so.

2040 28 (2008-05-12) **Records and Disclosure of Foreground Information**

1. During and after the performance of the Contract, the Contractor must keep detailed records of the Foreground Information, including details of its creation, ownership and about any sale or transfer of any right in the Foreground Information. The Contractor must report and fully disclose to Canada all Foreground Information as required by the Contract. If the Contract does not specifically state when and how the Contractor must do so, the Contractor must provide this information when requested by the Contracting Authority or a representative of the department or agency for which the Contract is performed, whether before or after the completion of the Contract.

2. Before and after final payment to the Contractor, the Contractor must provide Canada with access to all records and supporting data that Canada considers pertinent to the identification of Foreground Information.

3. For any Intellectual Property that was developed or created in relation to the Work, Canada will be entitled to assume that it was developed or created by Canada, if the Contractor's records do not list that Intellectual Property or do not indicate that it was created by the Contractor, or by someone on behalf of the Contractor, other than Canada.

2040 29 (2008-05-12) **Ownership of Intellectual Property Rights in Foreground Information**

1. All Intellectual Property Rights in the Foreground Information belong to the Contractor as soon as they come into existence.

2. Despite the Contractor's ownership of all the Intellectual Property Rights in the Foreground Information, Canada has unrestricted ownership rights in any prototype, model, custom or customized system or equipment that is a deliverable under the Contract, including manuals and other operating and maintenance documents. This includes the right to make them available for public use, whether for a fee or otherwise, sell them or otherwise transfer ownership in them.

3. Any personal information, as defined in the *Privacy Act* , R.S., 1985, c. P-21, collected by the Contractor in the execution of the Work under the Contract becomes the property of Canada immediately upon collection and must be used only for the performance of the Work. The Contractor has no right in any such personal information.

4. If the Work under the Contract involves the preparation of a database or other compilation using information or data supplied by Canada and any personal information referred to above, the Intellectual Property Rights in the database or compilation containing such information will belong to Canada. The Contractor's Intellectual Property Rights in the Foreground Information are restricted to those capable of being exploited without the use of the information or data supplied by Canada and the personal information.

5. The Contractor must maintain the confidentiality of the information or data supplied by Canada and the personal information as required in the General Conditions. The Contractor must return all the information belonging to Canada on request or on completion or termination of the Contract. This includes returning all hard copies and electronic copies as well as any paper or electronic record that contains any part of the information or information derived from it.

2040 30 (2008-05-12) **Licenses to Intellectual Property Rights in Foreground and Background Information**

1. As Canada has contributed to the cost of developing the Foreground Information, the Contractor grants to Canada a license to exercise all Intellectual Property Rights in the Foreground Information for Canada's activities. Subject to any exception described in the Contract, this license allows Canada to do anything that it would be able to do if it were the owner of the Foreground Information, other than exploit it commercially and transfer or assign ownership of it. The Contractor also grants to Canada a license to use the Background Information to the extent that it is reasonably necessary for Canada to exercise fully all its rights in the deliverables and in the Foreground Information.

2. These licenses are non-exclusive, perpetual, irrevocable, worldwide, fully-paid and royalty-free. Neither license can be restricted in any way by the Contractor providing any form of notice to the contrary, including the wording on any shrink-wrap or click-wrap license or any other kind of packaging, attached to any deliverable.

3. For greater certainty, Canada's licenses include, but are not limited to:
    a. the right to disclose the Foreground and Background Information to third parties bidding on or negotiating contracts with Canada and to sublicense or otherwise authorize the use of that information by any contractor engaged by Canada solely for the purpose of carrying out such contracts. Canada will require these third parties and contractors not to use or disclose that information except as may be necessary to bid on, negotiate or carry out those contracts;
    b. the right to disclose the Foreground and Background Information to other governments for information purposes;
    c. the right to reproduce, modify, improve, develop or translate the Foreground and Background Information or have it done by a person hired by Canada. Canada, or a person designated by Canada, will own the Intellectual Property Rights associated with the reproduction, modification, improvement, development or translation.

d. without restricting the scope of any license or other right in the Background Information that Canada may otherwise hold, the right, in relation to any custom-designed or custom-manufactured part of the Work, to exercise such of the Intellectual Property Rights in the Background Information as may be required for the following purposes:
   i. for the use, operation, maintenance, repair or overhaul of the custom-designed or custom-manufactured parts of the Work;
   ii. in the manufacturing of spare parts for maintenance, repair or overhaul of any custom-designed or custom-manufactured part of the Work by Canada if those parts are not available on reasonable commercial terms to enable timely maintenance, repair or overhaul;
e. for Software that is custom designed for Canada, the right to use any source code the Contractor must deliver to Canada under the Contract.

4. The Contractor agrees to make the Background Information, including in the case of Software, the source code promptly available to Canada for any purpose mentioned above. The license does not apply to any Software that is subject to detailed license conditions that are set out elsewhere in the Contract. Furthermore, in the case of commercial off-the-shelf software, the Contractor's obligation to make the source code promptly available to Canada applies only to source code that is within the control of or can be obtained by the Contractor or any subcontractor.

2040 31 (2008-05-12) **Contractor's Right to Grant Licenses**

The Contractor represents and warrants that it has the right to grant to Canada the licenses and any other rights to use the Foreground and Background Information. If the Intellectual Property Rights in any Foreground or Background Information are or will be owned by a subcontractor or any other third party, the Contractor must have or obtain promptly a license from that subcontractor or third party that permits compliance with section 30 or arrange, without delay, for the subcontractor or third party to grant promptly any required license directly to Canada.

A9033T (2012-07-16) Financial Capability Requirement:

1. The Bidder must have the financial capability to fulfill this requirement. To determine the Bidder's financial capability, the Contracting Authority may, by written notice to the Bidder, require the submission of some or all of the financial information detailed below during the evaluation of bids. The Bidder must provide the following information to the Contracting Authority within fifteen (15) working days of the request or as specified by the Contracting Authority in the notice:
   a. Audited financial statements, if available, or the unaudited financial statements (prepared by the Bidder's outside accounting firm, if available, or prepared in-house if no external statements have been prepared) for the Bidder's last three fiscal years, or for the years that the Bidder has been in business if this is less than three years (including, as a minimum, the Balance Sheet, the Statement of Retained Earnings, the Income Statement and any notes to the statements).

b. If the date of the financial statements in (a) above is more than five months before the date of the request for information by the Contracting Authority, the Bidder must also provide, unless this is prohibited by legislation for public companies, the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement), as of two months before the date on which the Contracting Authority requests this information.

c. If the Bidder has not been in business for at least one full fiscal year, the following must be provided:
   i. the opening Balance Sheet on commencement of business (in the case of a corporation, the date of incorporation); and
   ii. the last quarterly financial statements (consisting of a Balance Sheet and a year-to-date Income Statement) as of two months before the date on which the Contracting Authority requests this information.

d. A certification from the Chief Financial Officer or an authorized signing officer of the Bidder that the financial information provided is complete and accurate.

e. A confirmation letter from all of the financial institution(s) that have provided short-term financing to the Bidder outlining the total of lines of credit granted to the Bidder and the amount of credit that remains available and not drawn upon as of one month prior to the date on which the Contracting Authority requests this information.

f. A detailed monthly Cash Flow Statement covering all the Bidder's activities (including the requirement) for the first two years of the requirement that is the subject of the bid solicitation, unless this is prohibited by legislation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures on a monthly basis, for all the Bidder's activities. All assumptions made should be explained as well as details of how cash shortfalls will be financed.

g. A detailed monthly Project Cash Flow Statement covering the first two years of the requirement that is the subject of the bid solicitation, unless this is prohibited by legislation. This statement must detail the Bidder's major sources and amounts of cash and the major items of cash expenditures, for the requirement, on a monthly basis. All assumptions made should be explained as well as details of how cash shortfalls will be financed.

2. If the Bidder is a joint venture, the financial information required by the Contracting Authority must be provided by each member of the joint venture.

3. If the Bidder is a subsidiary of another company, then any financial information in 1. (a) to (f) above required by the Contracting Authority must be provided by the ultimate parent company. Provision of parent company financial information does not by itself satisfy the requirement for the provision of the financial information of the Bidder, and the financial capability of a parent cannot be substituted for the financial capability of the Bidder itself unless an agreement by the parent company to sign a Parental Guarantee, as drawn up by Public Works and Government Services Canada (PWGSC), is provided with the required information.

4. **Financial Information Already Provided to PWGSC**: The Bidder is not required to resubmit any financial information requested by the Contracting Authority that is already on file at PWGSC with the Contract Cost Analysis, Audit and Policy Directorate of the Policy, Risk, Integrity and Strategic Management Sector, provided that within the above-noted time frame:

   a. the Bidder identifies to the Contracting Authority in writing the specific information that is on file and the requirement for which this information was provided; and
   b. the Bidder authorizes the use of the information for this requirement.

   It is the Bidder's responsibility to confirm with the Contracting Authority that this information is still on file with PWGSC.

5. **Other Information**: Canada reserves the right to request from the Bidder any other information that Canada requires to conduct a complete financial capability assessment of the Bidder.

6. **Confidentiality**: If the Bidder provides the information required above to Canada in confidence while indicating that the disclosed information is confidential, then Canada will treat the information in a confidential manner as permitted by the *Access to Information Act*, R.S., 1985, c.c. A-1, Section 20(1) (b) and (c).

7. **Security**: In determining the Bidder's financial capability to fulfill this requirement, Canada may consider any security the Bidder is capable of providing, at the Bidder's sole expense (for example, an irrevocable letter of credit from a registered financial institution drawn in favour of Canada, a performance guarantee from a third party or some other form of security, as determined by Canada).

Appendix D

Explanation of a Task Authorization Contract

A task authorization (TA) contract is a contract that includes all of the contract terms and requirements that the Contractor must meet. It is a service contract in which all or part of the work is carried out upon request and repetitively, according to the conditions set out in the contract. Quantities specified in the request for proposals are an approximation of requirements.

A task authorization is an administrative tool for confirming, throughout the contract term, the exact nature of the work to be done under the contract, as well as the schedules, deliverables and other specifications that are known only at the time of task authorization.

A task authorization contract helps better define tasks, determines the level of effort required for each task, and accurately determines the cost of each task, thus improving contract management. Work is authorized only upon approval of a task authorization.

RETURN BIDS TO:
RETOURNER LES SOUMISSIONS À:

Réception des soumissions - TPSGC / Bid Receiving - PWGSC
1550, Avenue d'Estimauville
1550, D'Estimauville Avenue
Québec
Québec
G1J 0C7

LETTER OF INTEREST

Findings document - First Request for Information

Comments - Commentaires

Issuing Office - Bureau de distribution
TPSGC/PWGSC
601-1550, Avenue d'Estimauville
Québec
Québec
G1J 0C7

Title - Sujet EOIR - Lettre d'intérêt	
Solicitation No. - N° de l'invitation W7701-145859/C	**Date** 2015-02-04
Client Reference No. - N° de référence du client W7701-14-5859	**GETS Ref. No. - N° de réf. de SEAG** PW-$QCL-025-16323
File No. - N° de dossier QCL-3-36265 (025)	**CCC No./N° CCC - FMS No./N° VME**
Solicitation Closes - L'invitation prend fin **at - à 02:00 PM** **on - le 2015-03-04**	**Time Zone** **Fuseau horaire** Heure Normale du l'Est HNE
F.O.B. - F.A.B. **Plant-Usine:** ☐ **Destination:** ☑ **Other-Autre:** ☐	
Address Enquiries to: - Adresser toutes questions à: Lemay, Hélène	**Buyer Id - Id de l'acheteur** qcl025
Telephone No. - N° de téléphone (418) 649-2974 ( )	**FAX No. - N° de FAX** (418) 648-2209

Destination - of Goods, Services, and Construction:
Destination - des biens, services et construction:

R & D POUR LA DÉFENSE CANADA - VALCARTIER
BATIMENT 53
2459 ROUTE DE LA BRAVOURE
QUÉBEC
Québec
G3J1X5
Canada

Instructions: See Herein

Instructions: Voir aux présentes

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Delivery Required - Livraison exigée VOIR DOC.	**Delivery Offered - Livraison proposée**

Vendor/Firm Name and Address
Raison sociale et adresse du fournisseur/de l'entrepreneur

Telephone No. - N°de téléphone
Facsimile No. - N° de télécopieur

Name and title of person authorized to sign on behalf of Vendor/Firm (type or print)
Nom et titre de la personne autorisée à signer au nom du fournisseur/ de l'entrepreneur (taper ou écrire en caractères d'imprimerie)

Signature **Date**

Canada

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This document is not a Request for Proposals and does not include any undertaking to purchase or to award future contracts.

Title: Electro-Optic and Infrared (EO-IR) Procurement Strategy – Report on Industry Days event held on May 1 and 2, 2014

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1 - Introduction

For the purposes of developing the Electro-Optic and Infrared (EO-IR) Procurement Strategy, Canada published a letter of interest in the spring of 2014 and then organized the Industry Days event with potential suppliers. The Industry Days included individual meetings between Government of Canada representatives and potential suppliers.

The objectives of these consultations were to provide the industry with a draft of the Electro-Optic and Infrared (EO-IR) Procurement Strategy and obtain feedback that the Government of Canada could use to enhance its strategy.

This report describes the highlights of these Industry Days.

2 – Status of Consultation Process

Phases	Comments
Letter of interest posted on the https://buyandsell.gc.ca/ site from March 18 to April 25, 2014 (Number W7701-145859/A)	11 potential suppliers replied to the letter of interest.
Industry Day, Thursday, May 1, 2014, at 9:00 am at 1550 D'Estimauville Avenue in Quebec City (Number W7701-145859/B)	26 suppliers participated in the Industry Day. The list of participants in the Industry Days is provided in Appendix A.
Industry Day, individual meetings with suppliers, Thursday, May 1, 2014 (afternoon) and Friday, May 2, 2014, at 1550 D'Estimauville Avenue in Quebec City.	A total of 15 meetings were held. The suppliers with whom meetings were held had an opportunity to express their concerns and make suggestions in response to the procurement strategy that was outlined.

3 – Summary of Issues Raised by the Industry

3.1 Task authorization contracts (TA contracts)

As a general rule, suppliers feel that TA contracts have a distinct advantage over standard contracts for research and development projects, particularly long-term projects. TA contracts provide the flexibility that clients need to redefine tasks based on progress made in a project or with contracts. However, the selection method used for these competitive processes is usually based on the experience and quality of proposed human resources and associated firm hourly rates. This method penalizes suppliers with high overhead costs and impairs their capacity to provide Canada with innovative solutions offering competitive value for money. With respect to the EO-IR Strategy and given the scope of the contracts, some suppliers suggested that Canada consider alternatives to TA contracts for some types of projects, such as the development of systems, to ensure better value for Canada, greater competitiveness and the potential to increase economic spinoffs, while promoting innovation and support for the development of intellectual property.

Furthermore, uncertainty with respect to the volume of business and demand planning are issues that will have to be addressed in the management of proposed human resources. It may be easier to manage resources by including firm volumes of work in the TA contracts or by raising the minimum guaranteed value, for example, to 50% from 10%.

3.2 Resources specifically assigned to the contract

It was proposed in the procurement strategy that an approach based on human resource categories be adopted and that only key persons be specifically assigned to the contract. In general, industry representatives are in favour of the proposed approach.

Some subcontractors said they were concerned that if their human resources were not specifically assigned to the contract, they would be at great risk of not being involved in the project because the prime contractors usually preferred their own employees. It is also an issue for the client because there is limited access to the cutting-edge expertise of the subcontractors.

3.3 Barriers in the way of bidders

The scope and high-value budget of each TA contract and the variety of requirements within each TA contract are barriers for the smallest suppliers. Their technical and financial capacities limit them to the role of subcontractors.

The assessment criteria based on education, articles published in scientific journals and the specialized expertise of employees are deemed to be a barrier, compared with criteria that are based instead on a bidder’s actual capacity to effectively perform the work.

The client’s operational requirements are such that part of the work must be carried out on the premises of Defence and Research Development Canada in Valcartier, Quebec. This requirement is an issue for suppliers located a long distance away, particularly suppliers in the other provinces.

3.4 Contract terms

The proposed procurement strategy provides for valid five-year terms, which gives rise to two issues:

1. A potential supplier who is not selected will be excluded for a long period. The proposed procurement strategy could result in reduced competitiveness at the end of five-year contracts;
2. The requirement that suppliers must guarantee that key employees specifically identified in the contract will be available during a five-year term is too strict and not very realistic.

3.5 Intellectual property rights in foreground information

The contractual conditions that apply to intellectual property rights in foreground information are an issue raised by several suppliers. It means that a subcontractor must provide his/her intellectual property rights to the prime contractor or the integrator. This requirement is deemed a high risk for subcontractors.

The licence to intellectual property rights in background information that is systematically granted to Canada in research and development contracts is also an issue for several industry members because this licence includes the right to disclose background information to third parties.

3.6 Joint ventures

By reason of its nature and scope, the EO-IR Procurement Strategy seemed to promote the establishment of joint ventures (consortiums). The industry's response is that it is not viable to establish a joint venture in a context where TA contracts are used, because the requirements are not known in advance. Suppliers prefer a prime contractor/subcontractor-type joint venture.

3.7 Other issues

It was proposed in the procurement strategy that a possible 13 TA contracts would result from the eventual Request for Proposal, but each supplier would be limited to a maximum of three TA contracts. The objective was to ensure greater competitiveness in the various technical specializations, ensure better capacity to handle and make progress in the work and maintain a strong, diversified and competitive industrial sector in the field of electro-optics. Industry representatives replied as follows:

- The principal uses for the expected 13 TA contracts must be clearly stated to ensure a common understanding of the client's and the suppliers' expectations;
- Given the significant amount of work involved in preparing bids simultaneously, the industry would like to be given sufficient advance notice of the call for tenders posting dates in order to have enough time to prepare bids;
- The objectives of the expected results of the EO-IR Procurement Strategy should be more detailed in order to link the use of TA contracts divided up by area of expertise to the DRDC's requirements, without the latter having to be necessarily linked to specific programs or projects.

4 – Changes Under Consideration by Canada and Next Steps

During the consultation process, industry members provided comments and key recommendations calling for the development of an innovative procurement strategy based on

their principal concerns. It was recommended in this feedback, which was well received and found worthwhile, that the initially proposed EO-IR procurement strategy should be reviewed.

To broaden the scope of this procurement strategy, the DRDC-PWGSC team is reviewing the identified concerns and suggestions in order to find new ways to develop a national procurement strategy.

In the coming months, Canada plans to hold additional public consultations with industry members and representatives of universities and other specialized organizations. These additional public consultations may include the Industry Days, individual meetings and online seminars.

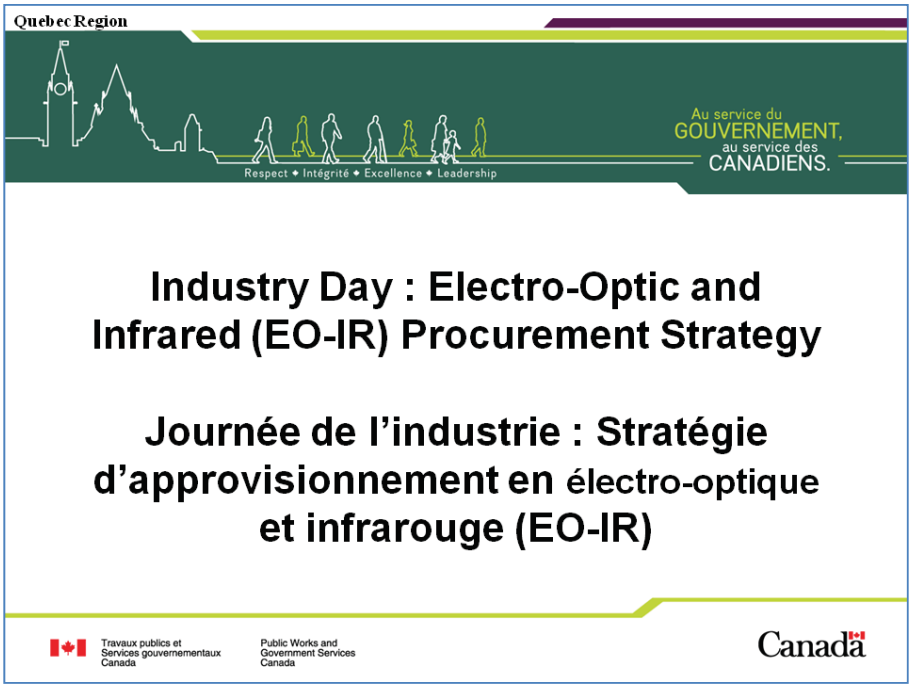
5 - Conclusion

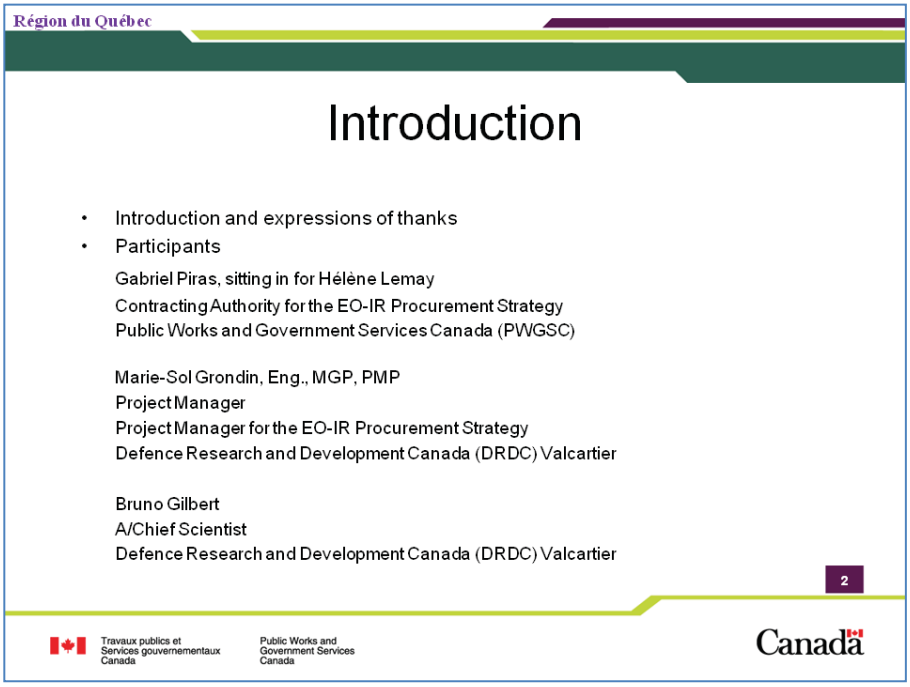
We wish to thank the suppliers who took the time to reply to the letter of interest, participate in the Industry Days and state their concerns and suggestions. These constructive discussions will help to improve the EO-IR Procurement Strategy.

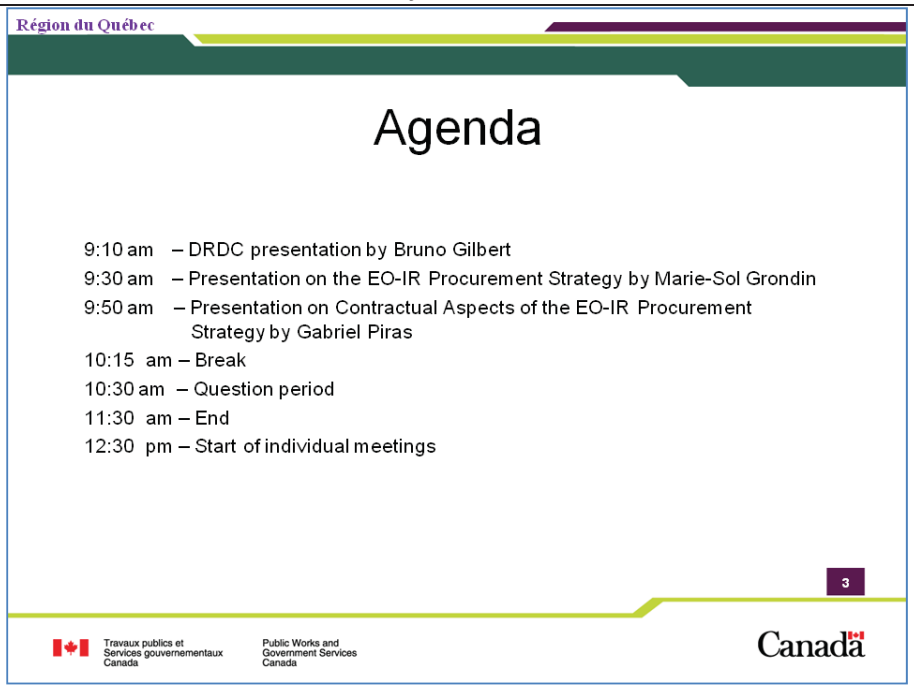
Appendix A – List of Industry Day Participants

1. A.U.G. Signals Ltd
2. ABB Inc.
3. AEREX Avionics Inc.
4. AMTEK Engineering Services Ltd.
5. CAE
6. CALIAN Ltd.
7. COM DEV
8. CPIC-CAN Photo Ind. (consortium)
9. Elbit Systems ELOP
10. FLIR
11. Inforex Inc.
12. INO
13. LTI informatique
14. MDA Systems Ltd (MDA)
15. NGC Aerospace
16. NovaSyst Inc.
17. Novo électronique
18. OPTELIS
19. Raytheon Canada Limited, Services and Support Division
20. Sagem Défense Securité
21. Salience Analytics Inc.
22. Services Précicad
23. Side by Side Optics
24. TELOPS
25. Thales Canada
26. Valley Ass. Integrated Systems

Appendix B – Overheads from Presentations During Industry Day






Région du Québec
Agenda
9:10 am – DRDC presentation by Bruno Gilbert
9:30 am – Presentation on the EO-IR Procurement Strategy by Marie-Sol Grondin
9:50 am – Presentation on Contractual Aspects of the EO-IR Procurement Strategy by Gabriel Piras
10:15 am – Break
10:30 am – Question period
11:30 am – End
12:30 pm – Start of individual meetings
3
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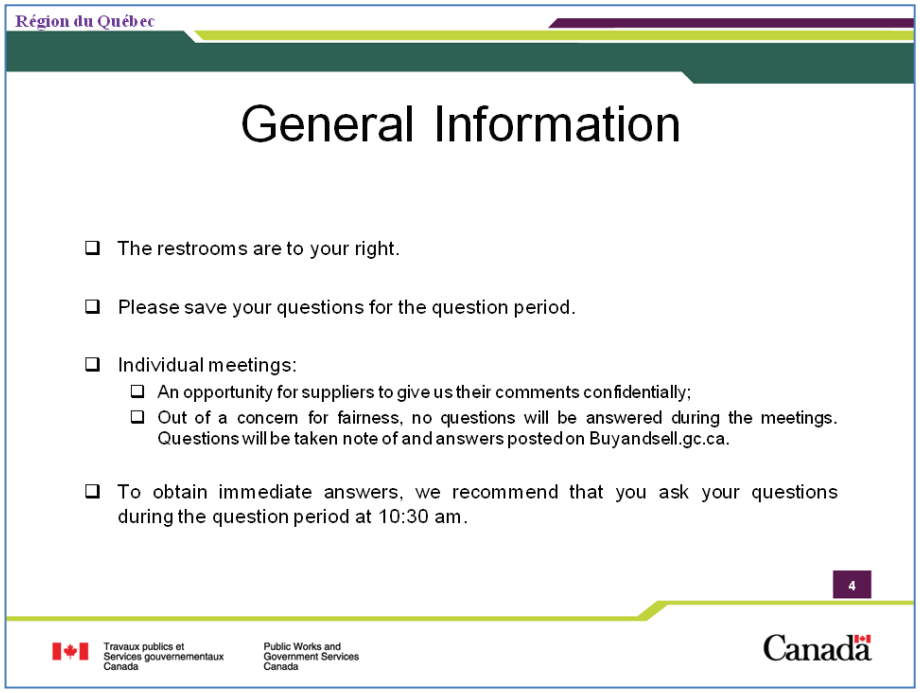
Public Works and Government Services Canada
Canada


Région du Québec
General Information
The restrooms are to your right.
Please save your questions for the question period.
Individual meetings:
An opportunity for suppliers to give us their comments confidentially;
Out of a concern for fairness, no questions will be answered during the meetings. Questions will be taken note of and answers posted on Buyandsell.gc.ca.
To obtain immediate answers, we recommend that you ask your questions during the question period at 10:30 am.
4
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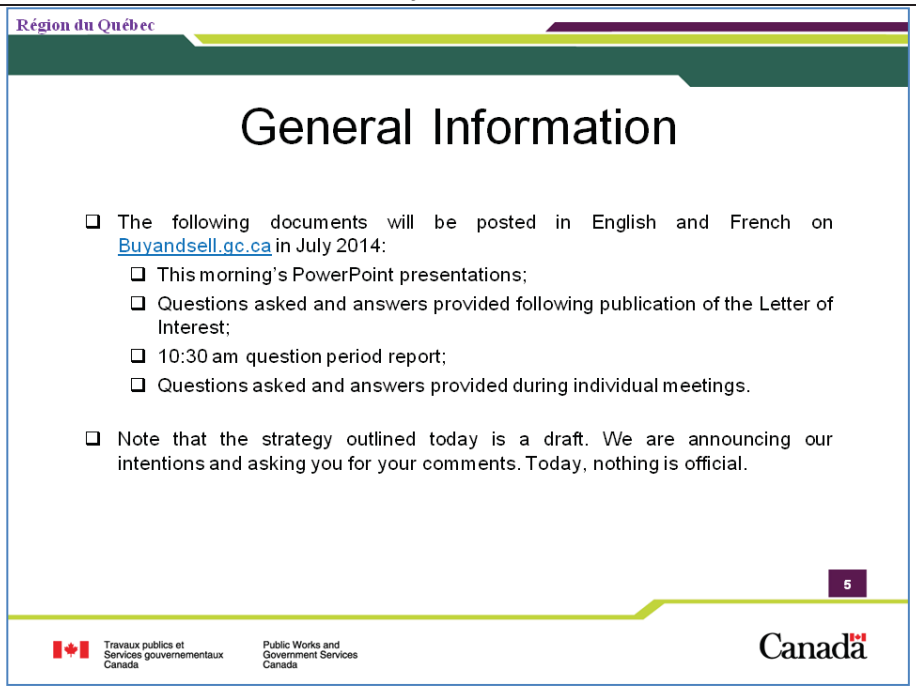
Public Works and Government Services Canada
Canada


Région du Québec
General Information
The following documents will be posted in English and French on Buyandsell.gc.ca in July 2014:
This morning's PowerPoint presentations;
Questions asked and answers provided following publication of the Letter of Interest;
10:30 am question period report;
Questions asked and answers provided during individual meetings.
Note that the strategy outlined today is a draft. We are announcing our intentions and asking you for your comments. Today, nothing is official.
5
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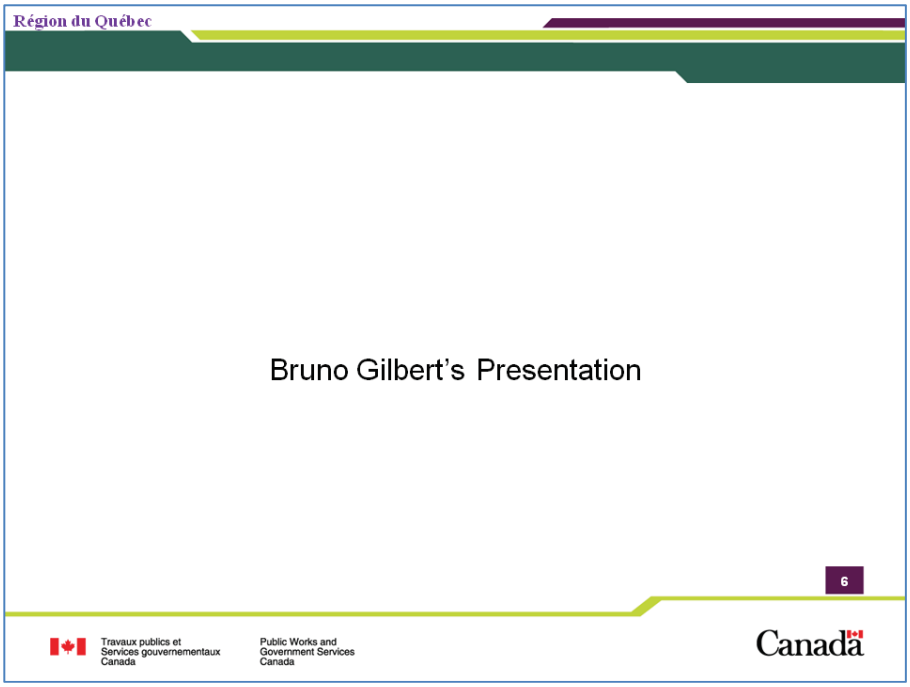
Canada


Région du Québec
Bruno Gilbert's Presentation
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Canada

Defence Research and Development Canada | Recherche et développement pour la défense Canada

Science, Technology and Knowledge for Canada's Defence and Security

DRDC | RDDC

Canada

A Renewed Context for Defence and Security S&T

- Key drivers
  - Evolving threat environment requires improved agility, responsiveness
  - Innovation system dispersed, global – accessing external capacity, solutions wherever they can be found is crucial to success
  - Need to deliver S&T more effectively – meet client requirements through focus on strategic outcomes and through increasing burden-sharing required with Allies and partners

DRDC | RDDC

1

DRDC's Mission

- Provide a strategic knowledge and technology *advantage*
- Support defence and security operations at home and abroad with knowledge and technology
- Provide S&T to forecast, cost, and deliver future readiness levels to meet operational requirements
- Generate knowledge and technology for a robust, connected and multi-jurisdictional security/intelligence environment
- Create a more networked environment that leverages other expertise, knowledge and resources
- Anticipate S&T and defence and security challenges
  - DRDC is a catalyst for an innovative defence and security in CA

Trusted advisor + Networked organization + Hub of knowledge integration and innovation

DRDC | RDDC

2

Six Strategic Priority Areas

- Build agile forces to carry out missions in complex and hostile environments
- Protect and support CF members before, during and after operations
- Enable the acquisition, sharing and use of critical information in support of situational awareness and decision-making
- Develop and implement solutions to ensure an affordable, sustainable and effective DND/CF
- Support public safety and security practitioners in their mission to protect Canadians
- Anticipate, prepare for and counter the emergence of future threats

DRDC | RDDC

3

DRDC's Strategic S&T Program

- DRDC is focused on
  - an S&T program focused on outcomes that are priority for Canada's defence and security and the Department of National Defence
  - the development of an S&T program focused on science, technology and knowledge that no other organization can perform
  - implementing a business model that supports agility internally and helps develop a robust innovation environment based on a diverse set of partners, nationally and internationally



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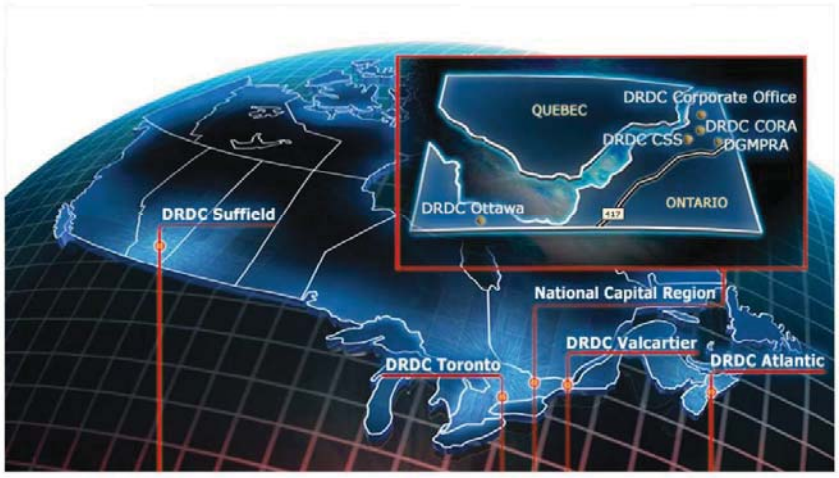
4
4

DRDC' Centres



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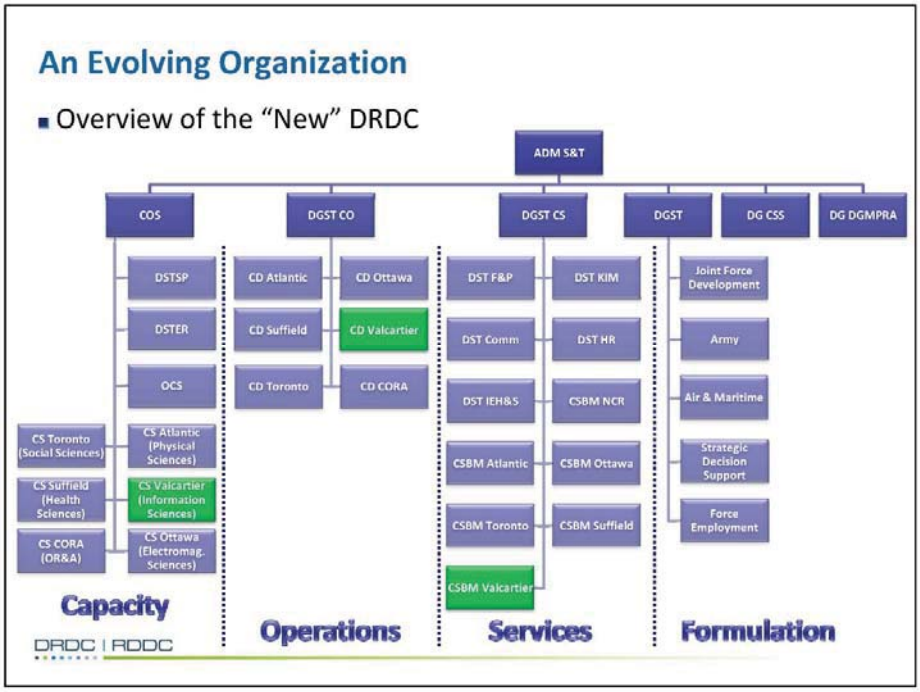
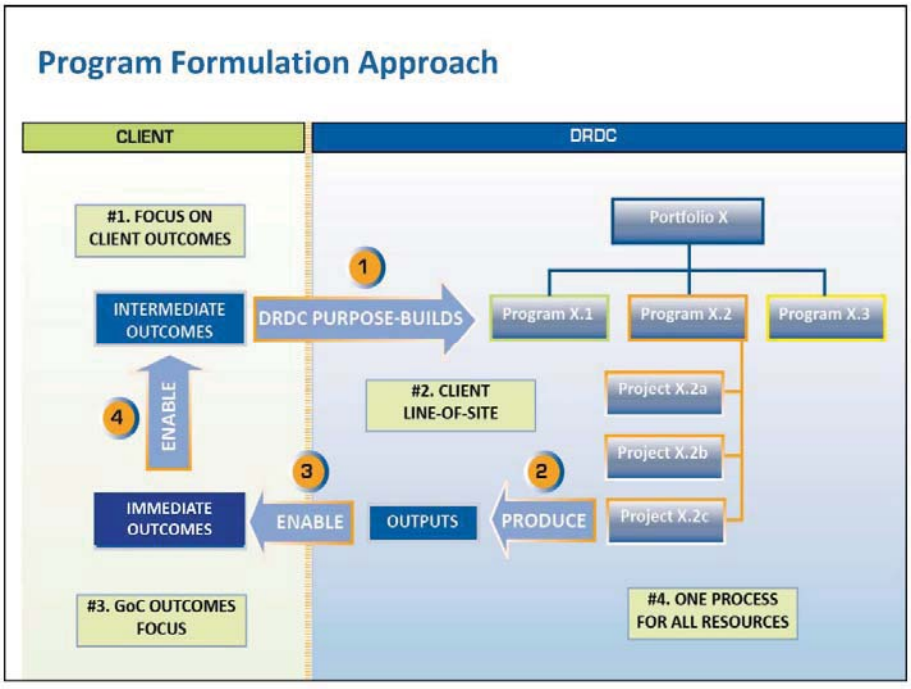

An Evolving Organization
Overview of the "New" DRDC
ADM S&T
COS
DGST CO
DGST CS
DGST
DG CSS
DG DGMPRA
DSTSP
DSTER
OCS
CS Toronto (Social Sciences)
CS Suffield (Health Sciences)
CS CORA (OR&A)
CS Atlantic (Physical Sciences)
CS Valcartier (Information Sciences)
CS Ottawa (Electromag. Sciences)
CD Atlantic
CD Ottawa
CD Suffield
CD Valcartier
CD Toronto
CD CORA
DST F&P
DST KIM
DST Comm
DST HR
DST IEH&S
CSBM NCR
CSBM Atlantic
CSBM Ottawa
CSBM Toronto
CSBM Suffield
CSBM Valcartier
Joint Force Development
Army
Air & Maritime
Strategic Decision Support
Force Employment
Capacity
Operations
Services
Formulation
DRDC | RDDC


Program Formulation Approach
CLIENT
DRDC
#1. FOCUS ON CLIENT OUTCOMES
INTERMEDIATE OUTCOMES
DRDC PURPOSE-BUILDS
1
Portfolio X
Program X.1
Program X.2
Program X.3
#2. CLIENT LINE-OF-SITE
Project X.2a
Project X.2b
Project X.2c
4
ENABLE
3
ENABLE
IMMEDIATE OUTCOMES
OUTPUTS
2
PRODUCE
#3. GoC OUTCOMES FOCUS
#4. ONE PROCESS FOR ALL RESOURCES

DRDC Supports a Networked S&T and Innovation System

- Defence and security S&T engages across the innovation system to ensure that the best solutions are generated
- DRDC will continue to access external capacity in OGDs, industry, academia and to collaborate with international, domestic partners
- Strategic engagement – partnership mechanisms will be reviewed in light of impact, alignment with priorities, return on investment
- Explore greater coordination, burden-sharing, creative solutions
- Generate new partnership models

DRDC | RDDC

8
8

DRDC – Impact for Canada

- DRDC is focused on its core strategic mission (defence and security with unique capabilities /expertise and a strategic S&T program)
- Committed to delivering impact for Canada's defence and security
- Supports innovation and S&T as an engine for generating solutions
- Accesses knowledge, builds networks and leverages capacity across a broader range of partners, nationally and internationally
- Creates innovative partnerships for new solutions to challenging problems
- Emphasizes operational simplification and efficiency, responsiveness and agility

DRDC | RDDC

9
9


DRDC | RDDC
SCIENCE, TECHNOLOGY AND KNOWLEDGE
FOR CANADA'S DEFENCE AND SECURITY
SCIENCE, TECHNOLOGIE ET SAVOIR
POUR LA DÉFENSE ET LA SÉCURITÉ DU CANADA

Defence Research and Development Canada | Recherche et développement pour la défense Canada

EO-IR Procurement Strategy

DRDC | RDDC

Canada

Objectives of the EO/IR Procurement Strategy

- Consolidate procurement requirements (various services, excluding the purchasing of goods) for Defence Research and Development Canada (DRDC);
- State the overall requirements in the electro-optic and infrared (EO-IR) fields in the same call for tenders;
- Consult the industry by sending out a letter of interest and holding an Industry Day;
- Further develop the EO/IR procurement strategy based on comments received.

Strategy details

- Budget
  - The proposed budget for the strategy is about $55 million.
- Duration
  - Firm five-year period
- Strategy scale and scope
  - This strategy will involve the potential awarding of 13 contracts (13 categories of services and requirements are described);
  - Nonetheless, when the contracts are awarded, a maximum of 3 contracts may be awarded to a contractor;
  - Firms are likely to be eligible in more than one category, making it possible to combine these categories within the same contract.

List of Categories, Requirements and Services Required

- The 13 technical specialties and their estimated financial breakdown are as follows:
  1. EO characterization (engineering and technical): $5M
  2. EO characterization (development of new methodologies): $5M
  3. EO testing capability: $5M
  4. Optical design: $4M
  5. Electronic design: $4M
  6. Architecture, programming and software engineering: $5M
  7. Systems operation: $3M
  8. Hyperspectral and optical: $6.5M
  9. System(s) engineering and integration: $2.5M
  10. Micromanufacturing: $3.5M
  11. Laser and lidar: $5M
  12. Fusion: $3.5M
  13. Aircraft signature and protection systems: $3M

Benefits of the Strategy

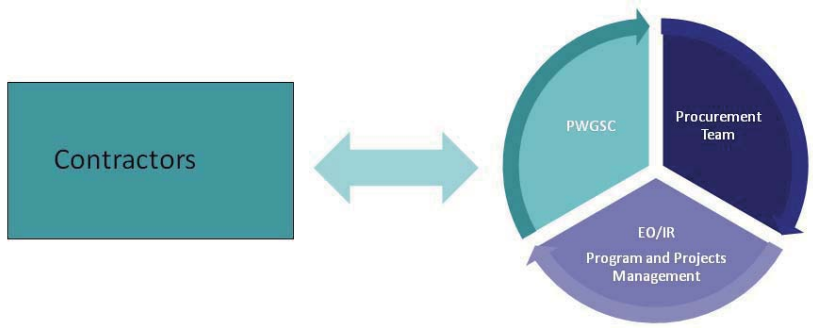
1. Requirements are combined within the same contracts to minimize the amount of time spent on drawing up and managing* contracts to meet these requirements (five-year horizon);

2. Have access to contracts and a pool of highly qualified experts in a leading-edge field of expertise;

3. Preservation of the market of EO/IR firms
   i. Firms that fail to obtain a task authorization (TA) contract are at a disadvantage, compared with other firms (many small firms with specific niche areas of activity can also have an opportunity by becoming qualified in their specific field).

**Governance (a responsible entity for managing contracts in accordance with the EO/IR Procurement Strategy)*

Governance



Schedule of meetings with contractors (for planning purposes)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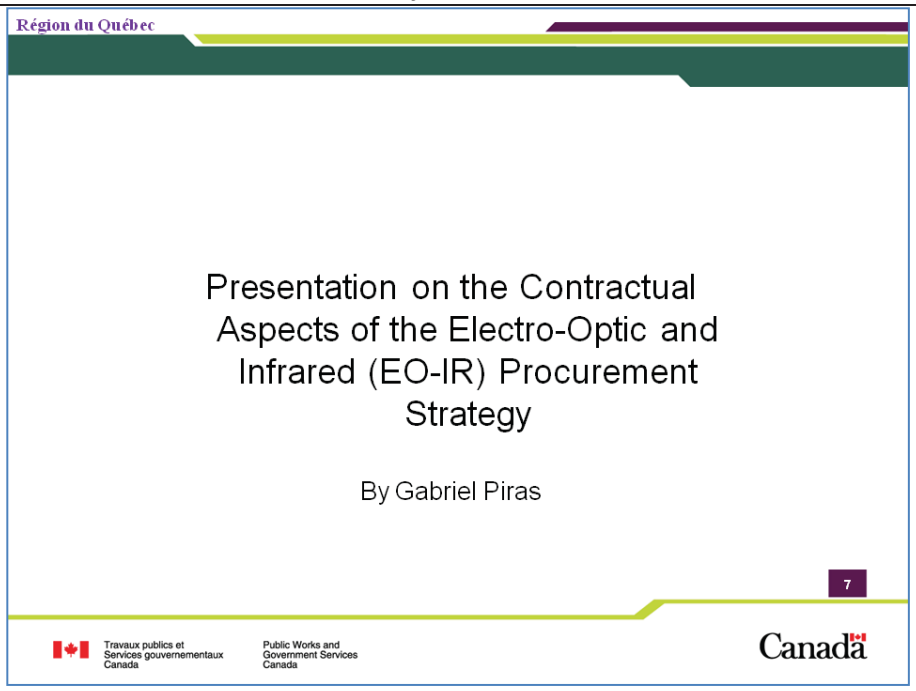
Région du Québec
Presentation on the Contractual Aspects of the Electro-Optic and Infrared (EO-IR) Procurement Strategy
By Gabriel Piras
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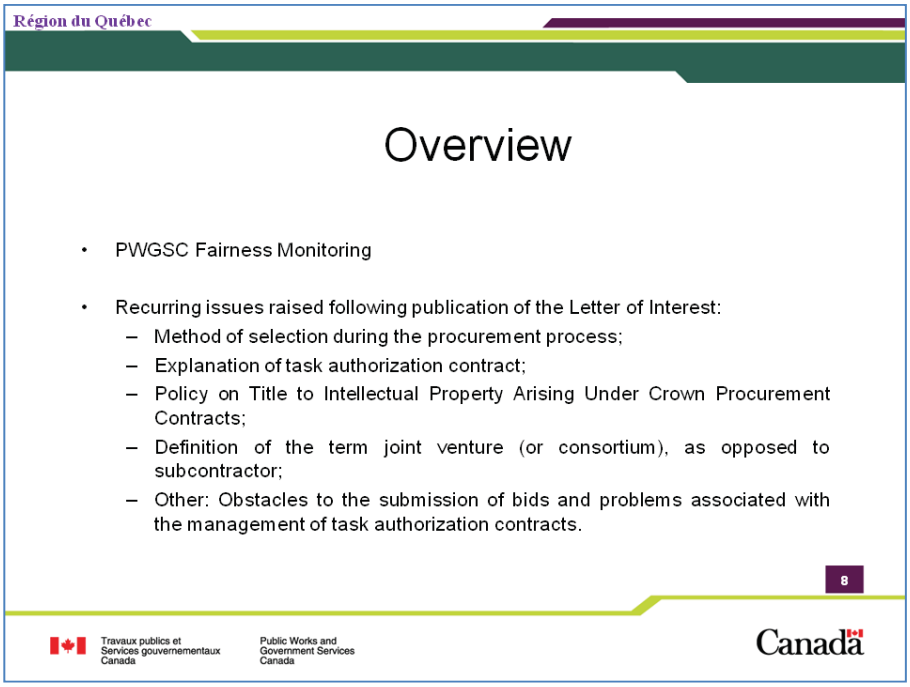
Public Works and Government Services Canada
Canada


Région du Québec
Overview
• PWGSC Fairness Monitoring
• Recurring issues raised following publication of the Letter of Interest:
– Method of selection during the procurement process;
– Explanation of task authorization contract;
– Policy on Title to Intellectual Property Arising Under Crown Procurement Contracts;
– Definition of the term joint venture (or consortium), as opposed to subcontractor;
– Other: Obstacles to the submission of bids and problems associated with the management of task authorization contracts.
8
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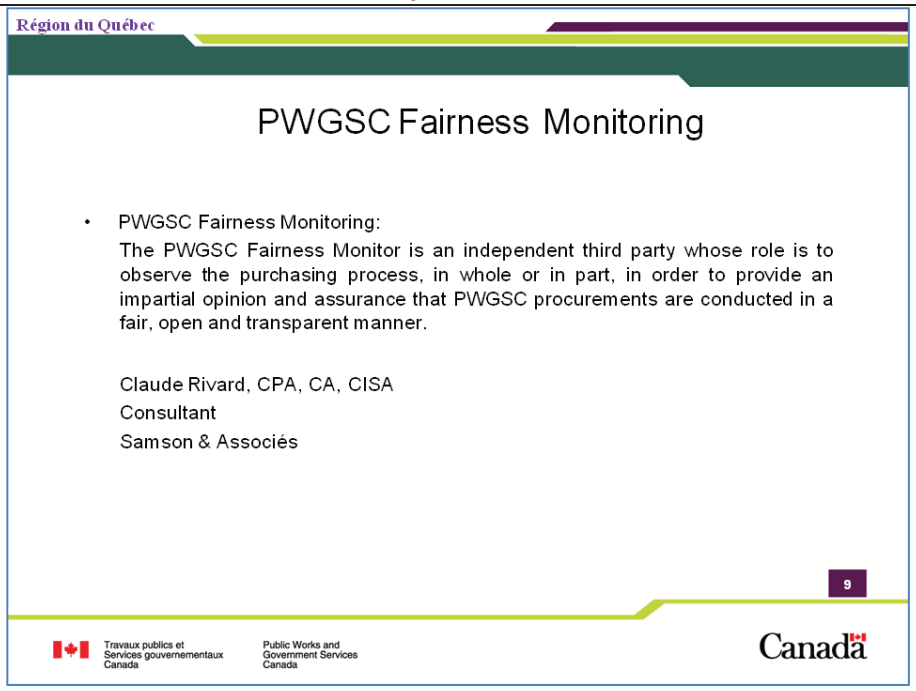
Région du Québec
PWGSC Fairness Monitoring
• PWGSC Fairness Monitoring:
The PWGSC Fairness Monitor is an independent third party whose role is to observe the purchasing process, in whole or in part, in order to provide an impartial opinion and assurance that PWGSC procurements are conducted in a fair, open and transparent manner.
Claude Rivard, CPA, CA, CISA
Consultant
Samson & Associés
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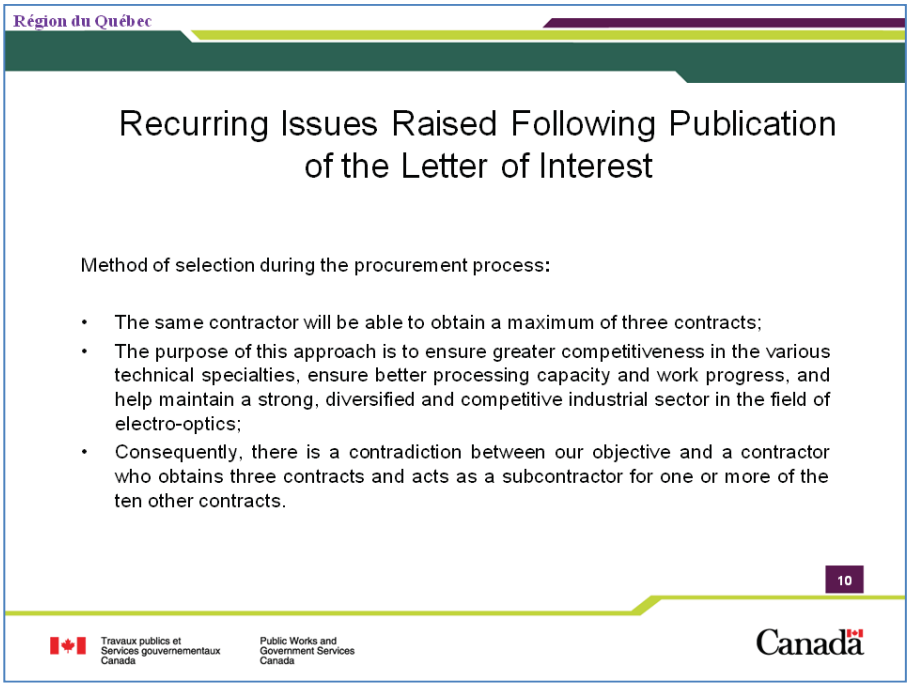
Public Works and Government Services Canada
Canada


Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
Method of selection during the procurement process:
• The same contractor will be able to obtain a maximum of three contracts;
• The purpose of this approach is to ensure greater competitiveness in the various technical specialties, ensure better processing capacity and work progress, and help maintain a strong, diversified and competitive industrial sector in the field of electro-optics;
• Consequently, there is a contradiction between our objective and a contractor who obtains three contracts and acts as a subcontractor for one or more of the ten other contracts.
10
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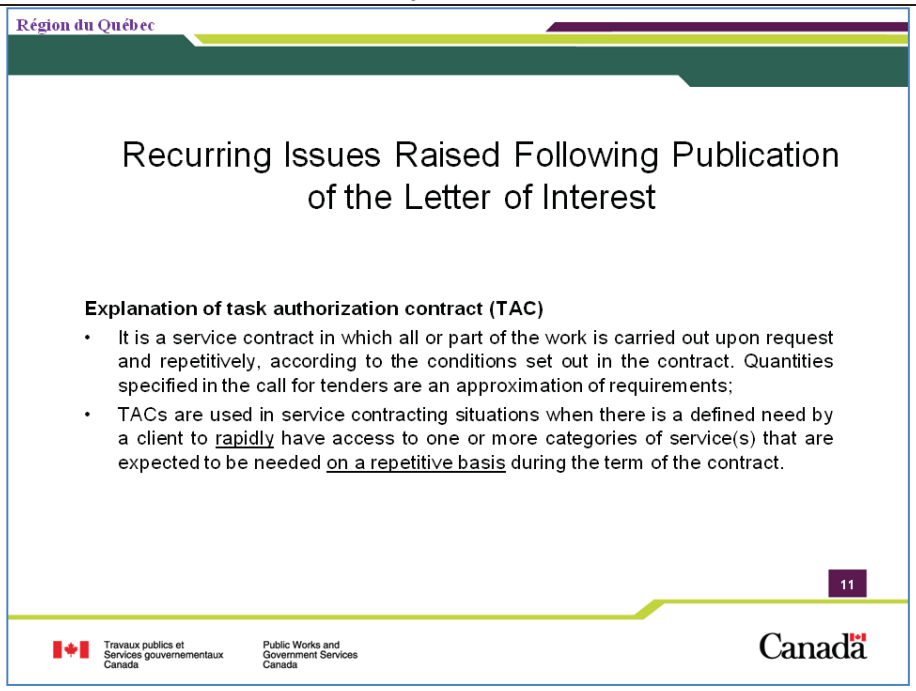
Public Works and Government Services Canada
Canada


Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
Explanation of task authorization contract (TAC)
• It is a service contract in which all or part of the work is carried out upon request and repetitively, according to the conditions set out in the contract. Quantities specified in the call for tenders are an approximation of requirements;
• TACs are used in service contracting situations when there is a defined need by a client to rapidly have access to one or more categories of service(s) that are expected to be needed on a repetitive basis during the term of the contract.
11
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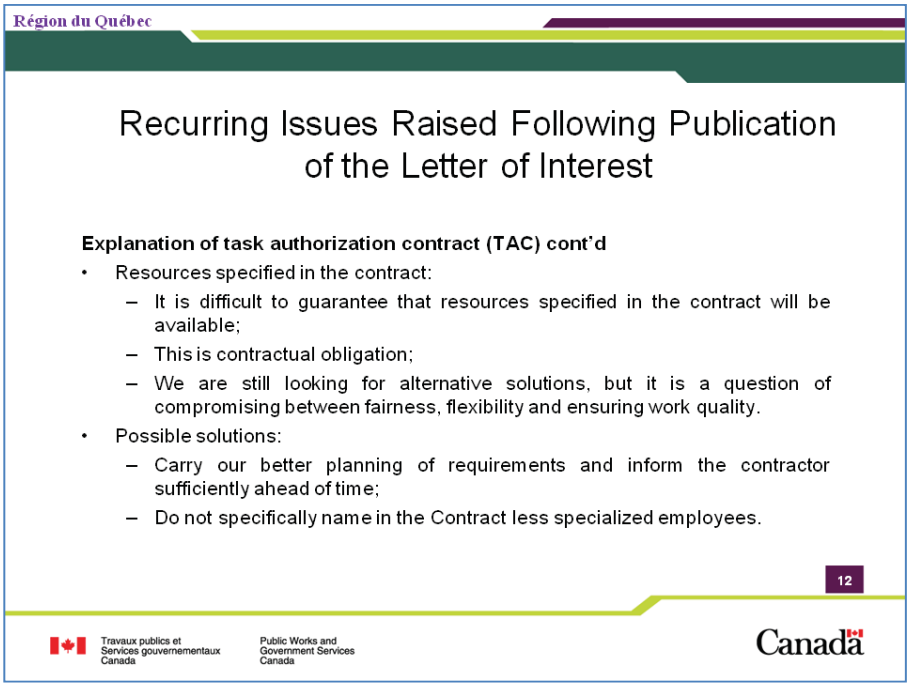
Public Works and Government Services Canada
Canada


Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
Explanation of task authorization contract (TAC) cont'd
• Resources specified in the contract:
– It is difficult to guarantee that resources specified in the contract will be available;
– This is contractual obligation;
– We are still looking for alternative solutions, but it is a question of compromising between fairness, flexibility and ensuring work quality.
• Possible solutions:
– Carry our better planning of requirements and inform the contractor sufficiently ahead of time;
– Do not specifically name in the Contract less specialized employees.
12
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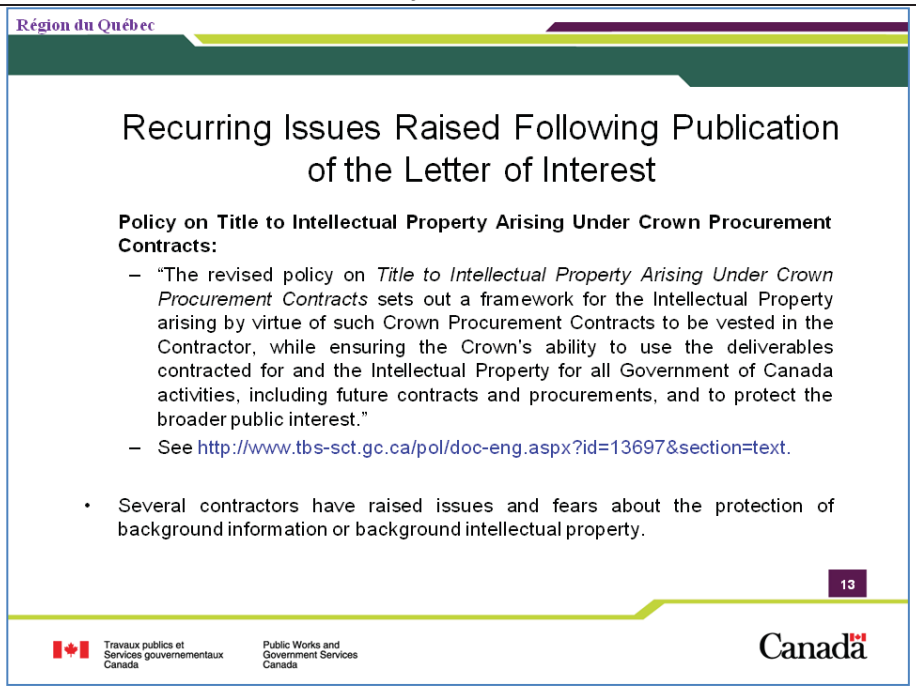
Canada


Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
Policy on Title to Intellectual Property Arising Under Crown Procurement Contracts:
– "The revised policy on Title to Intellectual Property Arising Under Crown Procurement Contracts sets out a framework for the Intellectual Property arising by virtue of such Crown Procurement Contracts to be vested in the Contractor, while ensuring the Crown's ability to use the deliverables contracted for and the Intellectual Property for all Government of Canada activities, including future contracts and procurements, and to protect the broader public interest."
– See http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=13697&section=text.
• Several contractors have raised issues and fears about the protection of background information or background intellectual property.
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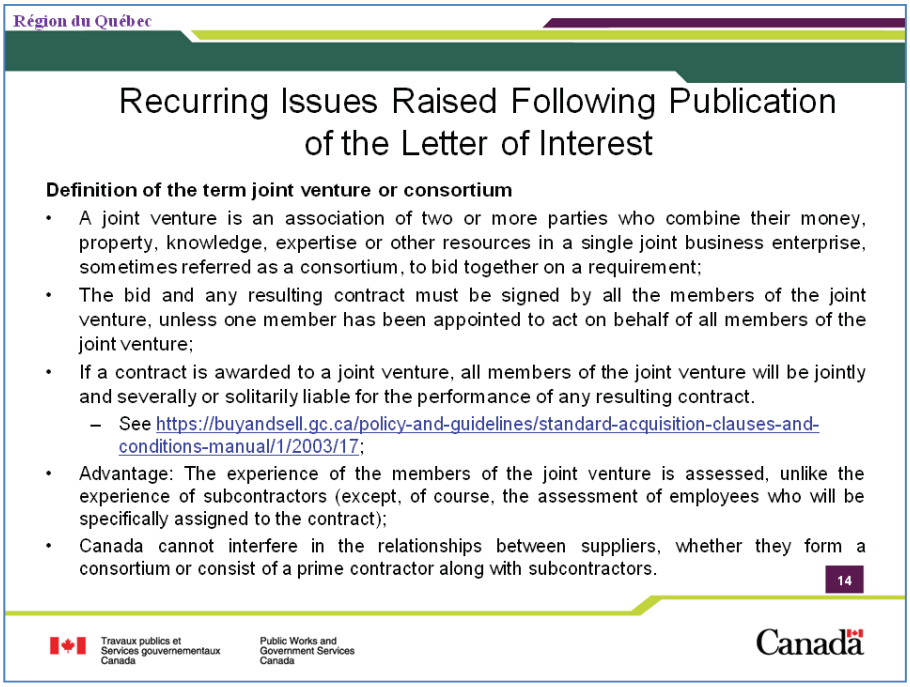
Canada


Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
Definition of the term joint venture or consortium
• A joint venture is an association of two or more parties who combine their money, property, knowledge, expertise or other resources in a single joint business enterprise, sometimes referred as a consortium, to bid together on a requirement;
• The bid and any resulting contract must be signed by all the members of the joint venture, unless one member has been appointed to act on behalf of all members of the joint venture;
• If a contract is awarded to a joint venture, all members of the joint venture will be jointly and severally or solitarily liable for the performance of any resulting contract.
– See https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual/1/2003/17;
• Advantage: The experience of the members of the joint venture is assessed, unlike the experience of subcontractors (except, of course, the assessment of employees who will be specifically assigned to the contract);
• Canada cannot interfere in the relationships between suppliers, whether they form a consortium or consist of a prime contractor along with subcontractors.
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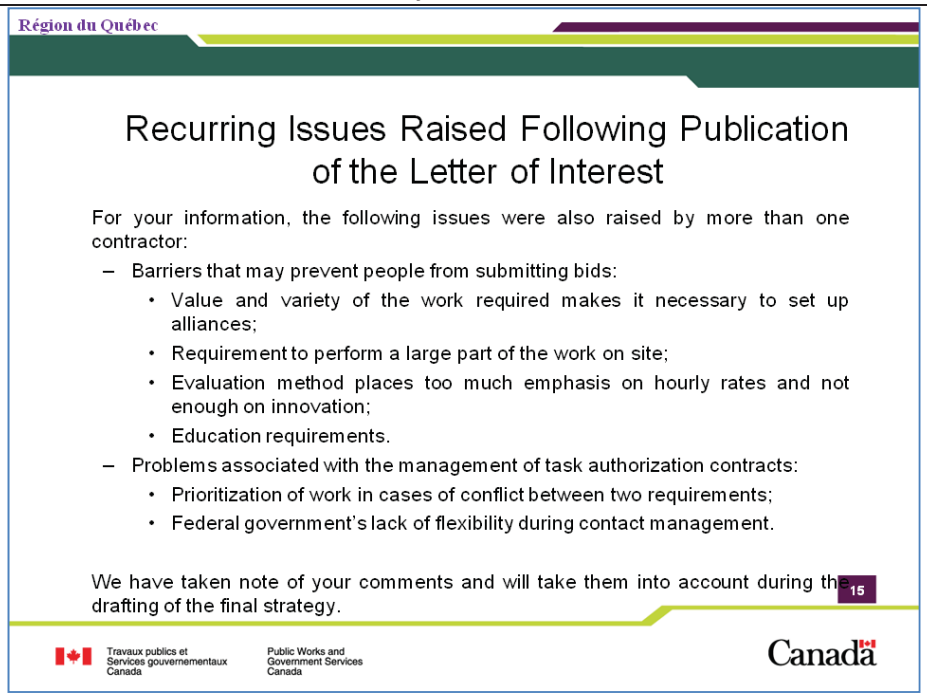
Région du Québec
Recurring Issues Raised Following Publication of the Letter of Interest
For your information, the following issues were also raised by more than one contractor:
– Barriers that may prevent people from submitting bids:
• Value and variety of the work required makes it necessary to set up alliances;
• Requirement to perform a large part of the work on site;
• Evaluation method places too much emphasis on hourly rates and not enough on innovation;
• Education requirements.
– Problems associated with the management of task authorization contracts:
• Prioritization of work in cases of conflict between two requirements;
• Federal government's lack of flexibility during contact management.
We have taken note of your comments and will take them into account during the drafting of the final strategy.
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