

REQUEST FOR PROPOSALS (RFP) FOR THE REQUIREMENT OF:

BEYOND LOW EARTH ORBIT (LEO) EXPLORATION MISSION CONTRIBUTION STUDY

FOR THE:

CANADIAN SPACE AGENCY



Bid Submission Deadline:
January 27th, 2016 at 2:00 PM (EST)

Submit Bids to:

Canadian Space Agency
TENDERS RECEPTION OFFICE/MAILROOM
Receiving/Shipping (between 8:00 am and 4:30 pm)*
6767 Route de l'Aéroport
Saint-Hubert QC
Canada J3Y 8Y9

* Note: closed between 12:00 pm and 1:00 pm

Attention: Robert Kardum

Reference: CSA File No. **9F052-150518/A**

December 24th, 2015



TABLE OF CONTENTS

PART 1 - GENERAL INFORMATION	3
1. INTRODUCTION.....	3
2. SUMMARY	3
3. COMMUNICATIONS NOTIFICATION	4
4. DEBRIEFINGS.....	4
PART 2 - BIDDER INSTRUCTIONS	5
1. STANDARD INSTRUCTIONS, CLAUSES AND CONDITIONS.....	5
2. SUBMISSION OF BIDS	5
3. ENQUIRIES - BID SOLICITATION	6
4. APPLICABLE LAWS	6
5. BASIS FOR CANADA'S OWNERSHIP OF INTELLECTUAL PROPERTY.....	6
6. MAXIMUM FUNDING.....	6
PART 3 - BID PREPARATION INSTRUCTIONS.....	8
1. BID PREPARATION INSTRUCTIONS	8
ATTACHMENT 1 TO PART 3 PRICING SCHEDULE	11
ATTACHMENT 2 TO PART 3 OUTLINE AND CONTENT OF TECHNICAL/MANAGERIAL BID.....	12
PART 4 – EVALUATION PROCEDURES AND BASIS OF SELECTION	15
1. EVALUATION PROCEDURES.....	15
2. BASIS OF SELECTION	15
ATTACHMENT 1 TO PART 4 TECHNICAL AND FINANCIAL CRITERIA	17
PART 5 - CERTIFICATIONS	24
PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS	27
1 SECURITY REQUIREMENTS.....	27
PART 7 - RESULTING CONTRACT CLAUSES	28
1. STATEMENT OF WORK.....	28
2. STANDARD CLAUSES AND CONDITIONS.....	28
3. SECURITY REQUIREMENTS	28
4. TERM OF CONTRACT	29
5. AUTHORITIES.....	29
6. PAYMENT	29
7. INVOICING INSTRUCTIONS	30
8. CERTIFICATIONS	31
9. FOREIGN NATIONALS (CANADIAN CONTRACTOR).....	31
10. INSURANCE.....	31
11. DIRECTIVE ON COMMUNICATIONS WITH THE MEDIA.....	31
12. DISCLOSURE CERTIFICATION	33
13. PROACTIVE DISCLOSURE OF CONTRACTS WITH FORMER PUBLIC SERVANTS	33
14. CONTRACT ADMINISTRATION.....	33
15. DISPUTE RESOLUTION SERVICES	33
16. APPLICABLE LAWS	33
17. CONTRACTOR PERFORMANCE.....	34
18. PRIORITY OF DOCUMENTS	34
ANNEX A STATEMENT OF WORK	35
ANNEX B SECURITY REQUIREMENTS CHECK LIST	86
ANNEX C INTEGRITY FORM	90



PART 1 - GENERAL INFORMATION

1. Introduction

The bid solicitation and resulting contract document is divided into seven parts plus attachments and annexes, as follows:

- Part 1 General Information: provides general description of the requirement;
- Part 2 Bidder Instructions: provides the instructions, clauses and conditions applicable to the bid solicitation and states that the Bidder agrees to be bound by the clauses and conditions contained in all parts of the bid solicitation;
- Part 3 Bid Preparation Instructions: provides bidders with instructions on how to prepare their bid;
- Part 4 Evaluation Procedures and Basis of Selection: indicates how the evaluation will be conducted, the evaluation criteria that must be addressed in the bid, if applicable, and the basis of selection;
- Part 5 Certifications: includes the certifications to be provided;
- Part 6 Security, Financial and Other Requirements: includes specific requirements that must be addressed by bidders; and
- Part 7 Resulting Contract Clauses: includes the clauses and conditions that will apply to any resulting contract.

The Attachments include:

[ATTACHMENT 1 to PART 3: PRICING SCHEDULE](#)
[ATTACHMENT 2 to PART 3: OUTLINE AND CONTENT OF TECHNICAL/MANAGERIAL BID](#)
[ATTACHMENT 1 to PART 4 TECHNICAL AND FINANCIAL CRITERIA](#)

The Annexes include the:

[ANNEX A STATEMENT OF WORK](#)
[ANNEX B SECURITY REQUIREMENTS CHECK LIST](#)
[ANNEX C INTEGRITY FORM](#)

2. Summary

The Space Exploration Development of the Canadian Space Agency is seeking bids from qualified suppliers in order to conduct a Mission Contribution Study for Beyond LEO Exploration.

Requirement Development is part of the Space Exploration Development of the Canadian Space Agency. Through Requirement Development, Space Exploration Development supports CSA's exploration planning activities and defines the science and technology developments most likely to be required in future space exploration missions of interest to Canada, and assesses potential contributions that Canada could make to such missions. Science Definition, Science Maturation, Mission Contribution and Concept Studies are part of the Requirement Development activity.

This requirement requests Mission Contribution Study (MCS) proposals in the following areas of space exploration:

MCS 1 Advanced Crew Medical System (ACMS)



MCS 2	Beyond LEO Relative Navigation System
MCS 3	Deep-Space Exploration Robotics (DSXR)

The complete description of the work to be completed under this requirement is in the Statement of Work provided in [Annex "A"](#).

It is intended to result in the award of up to three (3) contracts, one for each category, for a period of six (6) months each commencing on the date of contract award.

Interested bidders are required to submit their proposals in accordance with the instructions provided in this RFP.

Bids can be submitted in either of Canada's official languages.

3. Communications Notification

As a courtesy, the Government of Canada requests that successful bidders notify the Contracting Authority in advance of their intention to make public an announcement related to the award of a contract.

4. Debriefings

After contract award, bidders may request a debriefing on the results of the bid solicitation. Bidders should make the request to the Contracting Authority within 15 working days of receipt of notification that their bid was unsuccessful. The debriefing may be provided in writing, by telephone or in person.



PART 2 - BIDDER INSTRUCTIONS

1. Standard Instructions, Clauses and Conditions

All instructions, clauses and conditions identified in the bid solicitation by number, date and title are set out in the *Standard Acquisition Clauses and Conditions* Manual issued by Public Works and Government Services Canada (PWGSC): <https://buyandsell.gc.ca/policy-and-guidelines/standard-acquisition-clauses-and-conditions-manual>.

The [2003 \(2015-07-03\) Standard Instructions - Goods or Services - Competitive Requirements](#), are incorporated by reference into and form part of the bid solicitation. Please note that this solicitation and any resulting Contract(s) are being issued directly by the CSA and not by PWGSC acting as Contracting Authority on the CSA's behalf. As a result, the Standard Instructions 2003 (2012-03-02) - Goods or Services - Competitive Requirements, is amended as follows:

1. Subsection 5.2.d. is deleted in its entirety.

2. In subsection 5.4,

Delete: sixty (60) days

Insert: one hundred and twenty (120) days.

3. In Sections 06 and 07,

Delete: PWGSC

Insert: Canada.

4. Section 08 is deleted in its entirety.

5. In subsections 12.1.a. and 12.1.b.,

Delete: "Vendor Performance Corrective Measure, under the Vendor Performance Corrective Measure Policy"

Insert: "corrective measure under the CSA's Contractor Performance Evaluation policy".

6. Subsection 20.2. is deleted in its entirety.

For the purposes of this RFP, all references to "Canada", "Crown", "Her Majesty" or "the Government" in the clauses and conditions herein, including those incorporated by reference, shall designate the Canadian Space Agency.

If there is a conflict between the provisions of 2003 and this document, this document prevails.

Bidders who submit a bid agree to be bound by the instructions, clauses and conditions of this bid solicitation and accept the clauses and conditions of the resulting contract.

1.1 SACC Manual Clauses

[A7035T \(2007-05-25\) List of Proposed Subcontractors](#)

2. Submission of Bids

Bids must be submitted only to the CSA's Tenders Reception Office/Mailroom and Shipping/Receiving bay area located at the rear of the John H. Chapman Space Centre in St-Hubert, QC, by the date, time and at the address



indicated on the front page of this bid solicitation. A Bid is considered received only when it reaches this area and nowhere else at the Agency.

Due to the nature of the bid solicitation, bids transmitted by facsimile or electronic mail will not be accepted.

3. Enquiries - Bid Solicitation

All enquiries must be submitted in writing to the [Contracting Authority](#) no later than **five (5) calendar days** before the bid closing date. Enquiries received after that time may not be answered. Bidders should reference as accurately as possible the numbered item of the bid solicitation to which the enquiry relates. Care should be taken by bidders to explain each question in sufficient detail in order to enable Canada to provide an accurate answer. Technical enquiries that are of a proprietary nature must be clearly marked "proprietary" at each relevant item. Items identified as "proprietary" will be treated as such except where Canada determines that the enquiry is not of a proprietary nature. Canada may edit the questions or may request that the Bidder do so, so that the proprietary nature of the question is eliminated, and the enquiry can be answered with copies to all bidders. Enquiries not submitted in a form that can be distributed to all bidders may not be answered by Canada.

4. Applicable Laws

Any resulting contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the **Province of Quebec**.

Bidders may, at their discretion, substitute the applicable laws of a Canadian province or territory of their choice without affecting the validity of their bid, by deleting the name of the Canadian province or territory specified and inserting the name of the Canadian province or territory of their choice. If no change is made, it acknowledges that the applicable laws specified are acceptable to the bidders.

5. Basis for Canada's Ownership of Intellectual Property

The Canadian Space Agency has determined that any intellectual property rights arising from the performance of the Work under the resulting contract will belong to Canada, on the following grounds:

(6.4.3) the main purpose of the contract, or of the deliverables contracted for, is to deliver a component or subsystem that will be incorporated into a complete system at a later date, as a prerequisite to the planned transfer of the complete system to the private sector, through licensing or assignment of ownership, for purposes of commercial exploitation.

6. Maximum Funding

The maximum funding available, Goods and Services Tax (GST) or Harmonized Tax (HST) and/or Quebec Sales Tax (QST) extra as appropriate, for a study resulting from the bid solicitation is \$300,000 per contract, including all expenses, excluding Applicable Taxes (GST/QST/HST) as detailed in table below. Bids valued in excess of this amount will be considered non-responsive, as per [PART 4- Evaluation Procedures and Selection Process, section 1.2 Financial Evaluation](#). This disclosure does not commit Canada to pay the maximum funding available.

Category MCS #	Study Category	Maximum Funding per Contract
MCS 1	Advanced Crew Medical System (ACMS)	\$300,000
MCS 2	Beyond LEO Relative Navigation System	\$300,000



Category MCS #	Study Category	Maximum Funding per Contract
MCS 3	Deep-Space Exploration Robotics (DSXR)	\$300,000

In the event that funding priorities change during or after the bidding process but before the contract award, the CSA may at its sole discretion elect to award fewer or more contracts than advertised ([see section 2.1.8 of PART 4](#)). The number of contracts awarded will depend on the value of the awarded contracts and the availability of funds.



PART 3 - BID PREPARATION INSTRUCTIONS

1. Bid Preparation Instructions

Canada requests that bidders provide their bid in separately bound sections as follows:

Section I: Technical/Managerial Bid, 1 hard copy and 1 soft copy on CD or DVD;
 Section II: Financial Bid, 1 hard copy and 1 soft copy on CD or DVD;
 Section III: Certifications, 1 hard copy.
 Section IV: Additional Information 1 hard copy

The acceptable electronic formats are:
 Microsoft Word™, Microsoft Excel™, Adobe PDF™ and HTML.

If there is a discrepancy between the wording of the soft copy and the hard copy, the wording of the hard copy will have priority over the wording of the soft copy.

Prices must appear in the financial bid only. No prices must be indicated in any other section of the bid.

Canada requests that bidders follow the format instructions described below in the preparation of their bid:

- (a) the total number of pages for Section I and Section II should not exceed 60 pages, including bid appendices;
- (b) font size should be at least 11pt, including bid appendices;
- (c) use 8.5 x 11 inch (216 mm x 279 mm) paper;
- (d) use a numbering system that corresponds to the bid solicitation;
- (e) each electronic file should be named by using the Bid reference number and the applicable Bid Section;
- (f) the cover pages of the Bid (Sections I, II and III) should include the following table duly filled:

Company Name	Company Address
Project Title	
Project Summary (8 lines of text)	

In April 2006, Canada issued a policy directing federal departments and agencies to take the necessary steps to incorporate environmental considerations into the procurement process [Policy on Green Procurement](http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ecologisation-greening/achats-procurement/politique-policy-eng.html>). To assist Canada in reaching its objectives, bidders are encouraged to:

- 1) use paper containing fibre certified as originating from a sustainably-managed forest and/or containing minimum 30% recycled content; and
- 2) use an environmentally-preferable format including black and white printing instead of colour printing, printing double sided/duplex, using staples or clips instead of cerlox, duotangs or binders.

Section I: Technical/Management Bid

- A) In their technical bid, bidders should demonstrate their understanding of the requirements contained in the bid solicitation and explain how they will meet these requirements. Bidders should demonstrate their capability and describe their approach in a thorough, concise and clear manner for carrying out the work.

The technical bid should address clearly and in sufficient depth the points that are subject to the evaluation criteria against which the bid will be evaluated. Simply repeating the statement contained in the bid solicitation is not sufficient. In order to facilitate the evaluation of the bid, Canada requests that bidders address and present topics in the order of the evaluation criteria, and under the same headings. To avoid



duplication, bidders may refer to different sections of their bids by identifying the specific paragraph and page number where the subject topic has already been addressed.

The technical bid will be assessed using evaluation criteria R1, R2, and R3.

- B) In their management bid, bidders should describe their capability and experience, the project management team and provide client contact(s).

The management bid will be evaluated using evaluation criteria M3 and R4.

[Attachment 1 to Part 4, Technical and Financial Criteria and Evaluation Procedures](#), contains additional instructions that bidders should consider when preparing their technical/managerial bid. The structure and content requested for Section I is detailed in [Attachment 2 to Part 3, Outline and Content of the Technical/Managerial Bid](#).

Section II: Financial Bid

- 1.1** Bidders must submit their financial bid in Canadian funds and in accordance with the pricing schedule detailed in [Attachment 1 to Part 3](#). The total amount of Goods and Services Tax (GST), Harmonized Sales Tax (HST), Quebec Sales Tax (QST) is to be shown separately, as applicable.
- 1.2** Bidders must submit their prices and rates FOB destination, as applicable, Canadian customs duties and excise taxes included, as applicable, and GST/HST/QST excluded.
- 1.3** When preparing their financial bid, bidders should review clause [1.2, Financial Evaluation, of Part 4](#) and [Section 1.1 of Attachment 1 to Part 4](#).
- 1.4** Bidders are requested to detail the cost elements for each work package of the Contract Work Breakdown Structure (CWBS). At a minimum, the following information shall be provided for each work package for the price quoted in response to the pricing schedule detailed in [Attachment 1 to Part 3](#):
 - 1- Professional fees: For each individual and (or) labour category, bidders should indicate: a) the quoted hourly rate, inclusive of overhead and profit, if any; and b) the estimated corresponding time (i.e., hours). If daily or monthly rates are proposed, bidders should specify the number of hours included in a working day or month, exclusive of meal breaks.
 - 2- Equipment, if applicable: Bidders shall specify each item required for purchase and provide the pricing basis for each one.
 - 3- Materials and Supplies, if applicable: Bidders shall identify each category of materials and supplies required for purchase and provide the pricing basis of each one. Bidders shall indicate, on a per category basis, whether the items are likely to be consumed during the performance of the contract.
 - 4- Travel and Living Expenses: Indicate the number and cost of journeys, together with the basis of these costs. Refer to Appendices B, C and D of the National joint Council Travel Directive (<http://www.njc-cnm.gc.ca/directive/travel-voyage/index-eng.php>), and with the other provisions of the directive referring to "travellers", rather than those referring to "employees".
 - 5- Subcontracts, if applicable: Bidders shall identify any proposed subcontractor and provide in their financial bid for each one a price breakdown in accordance with this section.
 - 6- Other Direct Charges, if applicable: Bidders shall identify any category of other direct charges anticipated, such as long distance communications and rentals, providing the pricing basis for each and explaining the relevance to the work.



7- Applicable value added taxes: any applicable GST/QST/HST is/are to be shown separately.

The bidder should use a Microsoft Excel™ spreadsheet to present the cost breakdown for each of the work packages.

1.5 Cash flow Estimates:

The Bidder shall provide in its proposal a Cash Flow estimates for the work to be carried out based on the Table 1 below:

Milestones	Fiscal Year	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
	2015-2016				
	2016-2017				

1.6 Bidders should include the following information in their financial bid:

- 1 Their legal name;
- 2 Their Procurement Business Number (PBN) and GST number; and
- 3 The name of the contact person (including this person's mailing address, phone and facsimile numbers and email address) authorized by the Bidder to enter into communications with Canada with regards to:
 - a) their bid; and
 - b) any contract that may result from their bid.

1.7 SACC Manual Clauses

[C3011T \(2013-11-06\), Exchange Rate Fluctuation](#)

Section III: Certifications

Bidders must submit the certifications required under [Part 5](#).

Section IV: Additional Information

1. Bidder's Proposed Site(s) or Premises Requiring Safeguarding Measures

- 1.1 As indicated in Part 6 under Security Requirements, the Bidder must provide the full address(es) of the Bidder's and proposed individual(s)' site(s) or premises for which safeguarding measures are required for Work Performance:

Street Number / Street Name, Unit / Suite / Apartment Number
 City, Province, Territory / State
 Postal Code / Zip Code
 Country

- 1.2 The Company Security Officer (CSO) must ensure through the [Industrial Security Program \(ISP\)](#) that the Bidder and proposed individual(s) hold a valid security clearance at the required level, as indicated in Part 6 – Security, Financial and Other Requirements.



**ATTACHMENT 1 to PART 3
PRICING SCHEDULE**

The Bidder must provide a pricing schedule for each bid in the following format and include it in its financial proposal.

The schedule of milestones for which payments will be made in accordance with the Contract is as follows:

Milestone	Title	Description of the deliverable	Schedule of the delivery	Firm Amount
1	Specify			\$ _____
2	Specify			\$ _____
3	Specify			\$ _____
Etc.				\$ _____
*Evaluated Price (GST and QST excluded):				\$ _____
				* not to exceed \$300,000.00
Applicable taxes (GST/QST/HST) :				\$ _____



ATTACHMENT 2 to PART 3 OUTLINE AND CONTENT OF TECHNICAL/MANAGERIAL BID

The required outline and content of Section I Part 3 - Bid Preparation Instructions, is detailed herein. Should clarification be required, it is the responsibility of the Bidder to contact the Contracting Authority prior to submitting the bid.

Section I should address only one project and be contained within a single document/file, not exceeding 30 pages, excluding 6) Bid Appendices. The information should be organized in the following order:

- 1) Title / Project Identification Page;
- 2) Executive Summary;
- 3) Table of Contents;
- 4) Technical Bid;
- 5) Managerial Bid;
- 6) Bid Appendices:
 - 6.1) List of acronyms used in the Bid;
 - 6.2) Bidder's Criteria Substantiation (refer to section 3 of [Attachment 1 to Part 4](#));
 - 6.3) Résumés or NSERC form 100 or equivalent (including résumés of subcontractors); and
 - 6.4) List of Contacts.

If applicable:

 - 6.5) Corporate literature;
 - 6.6) Relevant technical papers published by team members;
 - 6.7) Any other Bid appendices deemed appropriate by the Bidder.

Note: The structure of Section I and subsections are described below. Some of the subsection headings are followed by numbers in brackets. These numbers represent the Evaluation Criteria (see [Attachment 1 to Part 4](#)) that are applicable to that specific section/subsection.

1. Title / Project Identification Page

This is the first page of the Bid. It should be laid out in accordance with the requirements specified in Part 3 and should clearly state:

- 1) RFP file number;
- 2) The company's name and address;
- 3) The Category of the proposed project;
- 4) The title of the proposed project (the use of acronyms in the title is discouraged, unless they are described);
- 5) A short summary of the Bid summarizing the Bid in 8 lines (maximum).

2. Executive Summary

The Executive Summary of Section I of the Bid should be a stand-alone document suitable for public dissemination, for example, through the CSA web site, if the Bid is successful. It should not exceed one page in length (8.5" x 11") and should highlight the following elements:

- 1) Project objectives;
- 2) Targeted Technology;



- 3) Main technical innovations;
- 4) Major milestones and deliverables; and
- 5) Relevance to CSA strategy and programs;

3. Table of Contents

The table of contents should be formatted such that its headings are linked to their respective location in the Bid for ease of reference when using the Bid's electronic version.

4. Technical Bid

The Bid should describe the proposed project as outlined in the following subsections. The bidder should strive to address all items under the letter "D" of each criterion.

4.1 Technical Criteria

4.1.1 Understanding the Mission Requirements and Technical Principles (Rated Evaluation Criterion R1)

This section should identify some preliminary existing concepts and substantiate in detail the underlying mission requirements and technical principles of those concepts. This section should thoroughly demonstrate an understanding of these requirements and principles as stated in Appendices 3 to 5 of Annex A – Statement of Work.

4.1.2 Merit of the concepts (Rated Evaluation Criterion R2)

In this subsection the Bidder should elaborate on the relevance and merit of the proposed concepts relative to the mission requirements presented in Annex A – Statement of Work and its Appendices 3 to 5.

4.1.3 Scope of the Study (Rated Evaluation Criterion R3)

The section should provide a detailed description and substantiation of a relevant approach for the following elements of the Statement of Work: developing mission cost estimates; developing a mission schedule; performing a technology readiness and developing a technology development plan; developing an overview of the development and manufacturing approach; performing a mission risk assessment; identifying potential collaborations; performing an identification of intellectual property that could be generated; developing an overview of a Canadian capabilities development strategy; and developing a business case development outline.

5. Managerial Bid

The Managerial Bid should demonstrate the effectiveness and commitment of the Bidder in delivering the project on time and budget. Its sub-sections should address in detail: key-personnel qualifications, team organisation and arrangements, and previous project experience.

5.1 Managerial Criteria

5.1.1 Corporate Experience with Space Projects (Mandatory Evaluation Criterion M3) and Project Team Capability (Rated Evaluation Criterion R4)

This subsection should identify the project team capability including education, knowledge, experience, expertise and completeness of skill-sets in engineering and management of the personnel assembled (i.e. contractor, sub-contractors, or academia) to carry out the management and engineering elements of the proposal.



6. Bid Appendices

The following items should be addressed in individual appendices as part of the Bids.

Required Bid Appendices

- 6.1) List of acronyms used in the Bid
- 6.2) Bidder's Criteria Substantiation (refer to Section 3 of [Attachment 1 to Part 4](#)).
- 6.3) Résumés: The Bid should include résumés (and/or NSERC form 100) of all key personnel including those of subcontractors and these should be appended to Sections I and II.
- 6.4) List of Contacts: The list of contacts should be appended to Section I, in a format suitable for distribution and should include all of the Bidder's points-of-contact involved in the Bid development and/or contract negotiations. The following example format should be used:

Table 3: Sample List of Contacts

Role	Name	Telephone	Fax	E-mail
Project Manager				
Project Engineers/ Principal Investigator				
Contracting Authority				
Claims officer				
Communications (for press release)				
Etc.				

Applicable Bid Appendices

The following Bid appendices are to be provided, *if applicable*, with Section I:

- 6.5) Corporate literature: Only literature that is relevant and will be useful to support the Bid.
- 6.6) Relevant technical papers published by team members.
- 6.7) Any other Bid appendices deemed appropriate by the Bidder.

Bidders are reminded that there are a limited number of pages that the bid must not be exceed. If the number of pages of Sections I, as described herein, is exceeded, the evaluation will strictly be based on the first 60 pages submitted, including appendices.



PART 4 – EVALUATION PROCEDURES AND BASIS OF SELECTION

1. Evaluation Procedures

- (a) Bids will be assessed in accordance with the entire requirement of the bid solicitation including the technical, management and financial evaluation criteria.
- (b) An evaluation team composed of representatives of Canada will evaluate the bids.

1.1 Technical and Financial Criteria

1.1.1 Mandatory Technical and Financial Criteria

Refer to [Attachment 1 to Part 4](#).

1.1.2 Point Rated Technical Criteria

Refer to [Attachment 1 to Part 4](#). Point-rated technical criteria not addressed will be given a score of zero.

1.2 Financial Evaluation

- 1.2.1 For bid evaluation and contractor(s) selection purposes only, the evaluated price of a bid will be determined in accordance with the Pricing Schedule detailed in [Attachment 1 to Part 3](#).

2. Basis of Selection

2.1 Basis of Selection - Highest Combined Rating of Technical Merit 70 % and Price 30 %

- 2.1.1 To be declared responsive, a bid must:
- (a) comply with all the requirements of the bid solicitation;
 - (b) meet all the mandatory evaluation criteria; and
 - (c) obtain the required minimum number of points specified in [Attachment 1 to Part 4](#) for the point rated technical and managerial criteria.
- 2.1.2 Bids not meeting (a) or (b) or (c) will be declared non-responsive. Neither the responsive bid obtaining the highest number of points nor the one with the lowest evaluated price will necessarily be accepted.
- 2.1.3 The lowest evaluated price (LP) of all responsive bids will be identified and a pricing score (PS), determined as follows, will be allocated to each responsive bid (i): $PS_i = LP / P_i \times 30$. P_i is the evaluated price (P) of each responsive bid (i).
- 2.1.4 A technical merit score (TMS), determined as follows, will be allocated to each responsive bid (i): $TMS_i = OS_i \times 70$ OS_i is the overall score (OS) obtained by each responsive bid (i) for all the point rated technical and managerial criteria specified in [Attachment 1 to Part 4](#), determined as follows: total number of points obtained / maximum number of points available.
- 2.1.5 The combined rating (CR) of technical merit and price of each responsive bid (i) will be determined as follows: $CR_i = PS_i + TMS_i$.

Date: December 24th, 2015

- 2.1.6 The responsive bid with the highest combined rating of technical merit and price will be recommended for award of a contract. In the event two or more responsive bids have the same highest combined rating of technical merit and price, the responsive bid that obtained the highest overall score for all the point rated technical criteria detailed in [Attachment 1 to Part 4](#) will be recommended for award of a contract.
- 2.1.7 The table below illustrates an example where the selection of the contractor is determined by a 70/30 ratio of the technical merit and price, respectively.

Basis of Selection - Highest Combined Rating of Technical Merit (70%) and Price (30%)			
Bidder	Bidder 1	Bidder 2	Bidder 3
Overall Technical Score	92%	82%	88%
Bid Evaluated Price	C\$60,000	C\$55,000	C\$50,000*
Calculations	Technical Merit Points	Price Points	Total Score
Bidder 1	$92 \% \times 70 = 64.4$	$50,000^* / 60,000 \times 30 = 25$	89.4
Bidder 2	$82 \% \times 70 = 57.4$	$50,000^* / 55,000 \times 30 = 27.3$	84.7
Bidder 3	$88 \% \times 70 = 61.6$	$50,000^* / 50,000 \times 30 = 30$	91.6 (winning bidder)

* represents the lowest evaluated price

- 2.1.8 In the event that there are no responsive bids in one particular Category, Canada may at its sole discretion elect to award an additional contract under another Category where there are sufficient responsive bids. The responsive bid(s) with the next highest number of points will be recommended for award of a contract, provided that the total evaluated price does not exceed the budget available for this requirement. If there are two or more bids not yet recommended for award with the same highest overall number of point, the bid with the highest score in the Technical Criteria group identified in Table 1 in [Attachment 1 to Part 4](#) will have precedence for recommendation of award of a contract.



ATTACHMENT 1 TO PART 4 TECHNICAL AND FINANCIAL CRITERIA

1. Mandatory Criteria

The bid must meet the mandatory technical and financial criteria specified below. The Bidder must provide the necessary documentation to support compliance with this requirement.

Bids which fail to meet the ALL mandatory criteria will be declared non-responsive. Each mandatory criterion should be addressed separately.

To be compliant, the bidder's proposal must meet the following mandatory criteria:

M1. Separate Bid for each Category

The Bidder must bid on at least one of the categories (MCS 1, MCS 2 & MCS3) identified in the SOW and may bid on up to all of them. If bidding on more than one category, the Bidder must prepare a separate bid for each as per the instructions in part 3 of this RFP. Each bid will be evaluated separately. The Bidder must clearly identify which category is the subject of the proposed study it is bidding on in each bid package sent.

M2. Compliance with Established Budget

The financial proposal for each bid must respect the maximum established overall budget of \$300,000.00 per study, this includes all expense, Goods and Services Tax, Quebec Sales Tax, Harmonized sales Tax are extra, if applicable. This disclosure does not commit Canada to pay the maximum funding available.

No points are awarded for the mandatory criteria, but they must be met in order for the bidder's proposal to be considered for further evaluation according to the point rated criteria.

M3. Corporate Experience with Space Projects

This criterion assesses the Bidder's experience and expertise in similar projects and how the Bidder has been active in the business related to the technology being studied.

1) The Bidder must demonstrate that they have been active in business related to the technologies in the category that they are bidding for and have at least ten (10) years of aggregate experience within the last fifteen (15) years from bid closing gained as a contractor, as a sub-contractor or as a research partner. The Bidder must also demonstrate experience in design, manufacture and test of systems and/or software rated for operations in a human space flight program. The Bidder must provide a description of one or more projects along with justification to demonstrate that the projects are similar or related to the technologies being studied.

2) The Bidder must demonstrate that they have been active in producing concepts and in evaluating those concepts against top-level user/mission requirements and have at least five (5) years of aggregate experience within the last fifteen (15) years from bid closing. The Bidder must provide a description of one or more projects along with justification to demonstrate that the projects are similar or related to its overall ability to deliver similar systems rated for operations in a space flight program.

Bidders are required to provide a description of at least two (2) projects. In the event that the same project is used for both criteria, the Bidder must provide a description of at least one other project that meets either criteria 1) or 2). The referenced projects must have design, manufacturing and testing phases completed.

The experience described in the bid must be the experience of one or more of the following:

- 1) The Bidder itself; or
- 2) The Bidder's affiliates or partners; or
- 3) The Bidder's subcontractors.



For the purpose of assessing the years of experience, the experience of 1), 2), and 3) above will be aggregated.

2. Point Rated Technical and Management Criteria

Proposals meeting all the mandatory criteria will be evaluated and scored as specified in the table inserted below.

Proposals which fail to obtain the required minimum number of points specified will be declared non-responsive. Each point rated technical criterion should be addressed separately.

The Bidder should achieve the minimum score requirements as indicated in Table 1: “List of Evaluation Criteria and Associated Ratings”. Bids will be evaluated according to the point-rated criteria as specified in Table 1 and at subsection 4 of this document: “Evaluation Criteria and Benchmark Statements”. The criteria are grouped under the following divisions:

- 1) Technical; and
- 2) Management.

“Evaluation Criteria and Benchmark Statements” contains a series of evaluation criteria, each supported by a set of benchmark statements (0, A, B, C, D). Each of these statements has a corresponding relative value:

- 0 = 0% of the maximum point rating
- A = 25% of maximum point rating
- B = 50% of maximum point rating
- C = 75% of maximum point rating
- D = 100% of maximum point rating

As an example, the maximum point rating for the “*Understanding the Mission Requirements and Technical Principles*” criterion is 25 points. If a Bid receives a “C” for this criterion in the evaluation process, the score attributed will be:

$$75\% \text{ of } 25 \text{ points} = 18.75 \text{ points (score)}$$

Table 1 identifies:

- 1) The maximum point rating assigned to each criterion;
- 2) The maximum point rating possible for each division (Technical and Management);
- 3) The maximum point rating possible for the overall score;
- 4) The minimum point rating required for the overall score.

Table 1: List of Evaluation Criteria and Associated Ratings

Evaluation Criteria and Ratings	
	Ratings
Technical Criteria	
R1. Understanding the Mission Requirements and Technical Principles	25
R2. Merit of the concepts	25
R3. Scope of the Study	20
	Minimum Score
	40
	Maximum Score
	70
Management Criteria	
R4. Project Team Capability	30



Maximum Score	30
Maximum Overall Score	100
Minimum Overall Score Requirement	60

3. Bidder’s Criteria Substantiation

The Bidder is requested to provide a substantiation, which should be submitted as an appendix to their Section I. For each of the applicable criteria, provide the substantiation and summarized cross-reference(s) to the bid.

The substantiation should be concise yet sufficiently comprehensive to ensure that the evaluators get a good overall appreciation of the bid's merit relative to the specific criterion. Cross-references to appropriate sections of the bid should be provided and the essence of the referenced information should be summarized in the substantiation.

For convenience, a template for the Self-Evaluation Table is provided in Table 1. Enter each technical/management section number, and the substantiation. It is expected that approximately 300 words (half a page) or less should be sufficient to make the Bidder’s case for the rating chosen in the substantiation column.

Table 1: Bidder's Criteria Substantiation.

Company:		
Project Title:		
Criteria		Cross ref.:
Substantiation		
<i>Ex.: 1 (criterion number)</i>	<i>Criterion substantiation and Bidder’s bid cross-reference. It is expected that 300 words or so should be sufficient to make your case.</i>	<i>Ex.: Page 45 or section 4.6.3</i>

4. Evaluation Criteria and Benchmark Statements

TECHNICAL CRITERIA

R1. UNDERSTANDING THE MISSION REQUIREMENTS AND TECHNICAL PRINCIPLES

This criterion assesses the degree to which the Bid identifies some preliminary existing concepts and substantiates in detail the underlying mission requirements and technical principles of those concepts; and also to what extent it thoroughly demonstrates an understanding of these requirements and principles as stated in Appendices 3 to 5 of Annex A – Statement of Work

- 0)
 - The preliminary concepts do not address the requirements, OR
 - Does not identify the technical principles driving the proposed concept.



- A)
- The proposal includes an incomplete overview of the main mission requirements;
 - The proposal demonstrates incomplete knowledge of the technical principles relevant to the goal of the mission;
 - The bid does not identify how the objectives will help in further defining these mission requirements;
 - The proposal does not include an adequate review of the existing literature or that of previous relevant studies.
- B)
- The proposal includes only an overview of the main mission requirements;
 - The proposal exhibits a general understanding of these mission requirements and principles;
 - The proposal demonstrates a basic knowledge of the technical principles relevant to the goal of the mission;
 - The proposal includes a cursory review of and references to existing literature or that of previous relevant to the central theme of the proposed concept.
- C)
- The proposal demonstrates identification and understanding of the main mission requirements;
 - The proposal demonstrates knowledge of the technical principles relevant to the goal of the mission;
 - The proposal includes a presentation of the proposed concept and operations requirements that will be addressed by the proposed activities and objectives;
 - The proposal includes references to and a discussion of other work or previous activities relevant to the central theme of the proposed concept.
- D)
- The proposal includes an exhaustive identification of the mission requirements;
 - The proposal demonstrates a comprehensive knowledge of the technical principles relevant to the goal of the mission;
 - The proposal includes a presentation of proposed concept and operations requirements that will be addressed by the proposed activities and objectives, and their relationship to overall mission objectives;
 - The proposal includes references to and a thorough discussion of the existing literature relevant to the central theme of the proposed mission concept is provided.

R2. MERIT OF THE CONCEPTS

This criterion evaluates the relevance and merit of the proposed concepts relative to the mission requirements presented in Annex A – Statement of Work and its Appendices 3 to 5.

- 0)
- The relevance and merit of proposed concepts is not addressed.
- A)
- The relevance and merit of the proposed concepts are only partially addressed and not substantiated. The proposal does not include a substantiation that the proposed existing concepts can meet or can be adapted to meet the Mission Requirements.
- B)
- The relevance and merit of the proposed concepts are addressed and substantiated, but gaps exist. The proposal provides a cursory substantiation that the proposed existing concepts can meet or can be adapted to meet the Mission Requirements.
- C)



- The relevance and merit of the proposed concepts are addressed and substantiated and no gap exists. The proposal provides a substantiation that the proposed existing concepts can meet or can be adapted to meet the Mission Requirements.

D)

- The relevance and merit of the proposed concepts are addressed in detail and well substantiated and no gaps exist. The bid provides a thorough substantiation that the proposed existing concepts can meet or can be adapted to meet the Mission Requirements.

R3. SCOPE OF THE STUDY

This criterion assesses the description, the approach, the overall scope of the proposed Study and the completeness of their considerations concerning the following elements of the SOW: developing mission cost estimates; developing a mission schedule; performing a technology readiness and developing a technology development plan; developing an overview of the development and manufacturing approach; performing a mission risk assessment; identifying potential collaborations; performing an identification of intellectual property that could be generated; developing an overview of a Canadian capabilities development strategy; and developing a business case development outline.

O)

- The bid does not provide a description of the approach for performing the study described in the SOW;
- The bid does not include approaches for the above considerations.

A)

- The bid does provide a description of the approach for performing the study, but follows an ill-defined methodology and does not take into account any significant requirements in the SOW;
- The bid includes an unpractical/unrealistic approach or is missing approaches for ¾ of the considerations mentioned above.

B)

- The bid provides a description of the approach for performing the study, but either gaps exist, is not relevant, or follows an identified methodology that takes into account only the most significant requirements of the SOW;
- The bid includes a somewhat credible approach but is missing ½ of the considerations mentioned above.

C)

- The bid provides a description and substantiation of a credible approach for performing the study, following a rigorous methodology and taking into account most requirements of the SOW;
- The bid includes credible approach and has most of the elements necessary for the study, but are still missing a few of the considerations mentioned above.

D)

- The bid provides a detailed description and substantiation of a relevant approach for performing the study, following a highly rigorous methodology and taking into account all possible requirements of the SOW;
- The bid includes a complete approach for all of the considerations mentioned above.

MANAGEMENT CRITERIA

**R4. PROJECT TEAM CAPABILITY**

This criterion assesses the capability (education, knowledge, experience, expertise and completeness of skill-sets in engineering and management) of the personnel assembled (i.e. contractor, sub-contractors, or academia) to carry out the management and engineering elements of the proposal based on the information provided in support of mandatory criteria M3, Corporate Experience Space Projects

0)

- The proposed team does not have the required expertise;
- The proposal does not address this criterion.

A)

- The proposed team has no experience in conducting work similar in complexity and scope to what is requested in the SOW;
- The proposed team lacks expertise and may not be capable of fulfilling the statement of work (SOW);
- The roles and responsibilities of the team members are not defined.

B)

- The key personnel identified in the proposed team has been involved in at least one project similar in complexity and scope to what is requested in the SOW;
- The proposed team is lacking some expertise but demonstrates that it is capable of fulfilling the statement of work (SOW);
- The team may have deficiencies in the completeness of the skills of its members;
- Some team members have experience in the design and development of space flight hardware in a similar environment as described in the relevant SOW or space software.

C)

- The key personnel identified in the proposed team has been involved in at least two projects similar in complexity and scope to what is requested in the SOW;
- The expertise of the proposed team demonstrates that it is highly capable of fulfilling the statement of work (SOW);
- The completeness of the team is very well demonstrated through the complementarities of skills of its members and by the roles / tasks that they are assigned during the study;
- The roles and responsibilities for most of the team members, including sub-contractors, are defined;
- Most of the required key personnel are identified and there are qualified back-up personnel identified for most of them;
- The key personnel have experience in the design and development of space flight hardware in a similar environment as described in the relevant SOW or space software;
- The Bidder must demonstrate that one of the team members has a Project Management Certification. (e.g. PMP, PgMP) or that one of the team members has a professional accounting designation . (e.g. CA, CGA, CPA, CMA)

D)

- The key personnel identified in the proposed team has been involved in more than two projects similar in complexity and scope to what is requested in the SOW;
- The expertise of the proposed team demonstrates that it is highly capable of fulfilling the statement of work (SOW) with the potential of delivering an authoritative study;
- The completeness of the team is very well demonstrated through the complementarities of skills of its members and by the roles / tasks that they are assigned during the study;
- The roles and responsibilities of all the team members, including all sub-contractors, are defined;
- All required key personnel are identified and there are qualified back-up personnel identified for all of them;



- The key personnel have significant experience in the design and development of space flight hardware in a similar environment as described in the relevant SOW and space software;
- The Bidder must demonstrate that one of the team members has a Project Management Certification. (e.g. PMP, PgMP) and that another one of the team members has a professional accounting designation. (e.g. CA, CGA, CPA, CMA);
- The Bidder must demonstrate that the proposed resources worked on both referenced projects submitted in M2.



PART 5 - CERTIFICATIONS

Bidders must provide the required certifications to be awarded a contract. Canada will declare a bid non-responsive if the required certifications are not completed and submitted as requested. Bidders should provide the required certifications in Section III of their bid.

The certifications provided by bidders to Canada are subject to verification by Canada at all times. Canada will declare a bid non-responsive, or will declare a contractor in default, if any certification made by the Bidder is found to be untrue whether during the bid evaluation period or during the contract period.

The Contracting Authority will have the right to ask for additional information to verify the Bidder's certifications. Failure to comply with this request will also render the bid non-responsive or will constitute a default under the Contract.

1. Certifications Required with the Bid

Bidders must submit the following duly completed certifications as part of their bid.

1.1. Declaration of Convicted Offences

As applicable, pursuant to subsection Declaration of Convicted Offences of section 01 of the Standard Instructions, the Bidder must provide with its bid, a completed [Declaration Form](http://www.tpsgc-pwgsc.gc.ca/ci-if/formulaire-form-eng.html) (<http://www.tpsgc-pwgsc.gc.ca/ci-if/formulaire-form-eng.html>), to be given further consideration in the procurement process.

2. Certifications Precedent to Contract Award and Additional Information

The certifications and additional information listed below should be submitted with the bid but may be submitted afterwards. If any of these required certifications or additional information is not completed and submitted as requested, the Contracting Authority will inform the Bidder of a time frame within which to provide the information. Failure to provide the certifications or the additional information listed below within the time frame specified will render the bid non-responsive.

2.1 Integrity Provisions – List of Names

Bidders who are incorporated, including those bidding as a joint venture, must provide a complete list of names of all individuals who are currently directors of the Bidder.

Bidders bidding as sole proprietorship, as well as those bidding as a joint venture, must provide the name of the owner(s).

Bidders bidding as societies, firms or partnerships do not need to provide lists of names.

2.2 Federal Contractors Program for Employment Equity - Bid Certification

By submitting a bid, the Bidder certifies that the Bidder, and any of the Bidder's members if the Bidder is a Joint Venture, is not named on the Federal Contractors Program (FCP) for employment equity "[FCP Limited Eligibility to Bid](http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml)" list (http://www.labour.gc.ca/eng/standards_equity/eq/emp/fcp/list/inelig.shtml) available from [Human Resources and Skills Development Canada \(HRSDC\) - Labour's](#) website.

Canada will have the right to declare a bid non-responsive if the Bidder, or any member of the Bidder if the Bidder is a Joint Venture, appears on the "[FCP Limited Eligibility to Bid](#)" list at the time of contract award.



2.3 Former Public Servant Certification

Contracts with former public servants (FPS) in receipt of a pension or of a lump sum payment must bear the closest public scrutiny and reflect fairness in spending public funds. In order to comply with Treasury Board policies and directives on contracts with FPS, bidders must provide the information required below.

Definitions

For the purposes of this clause,

For the purposes of this clause, "former public servant" is any former member of a department as defined in the [Financial Administration Act](#), R.S., 1985, c. F-11, a former member of the Canadian Armed Forces or a former member of the Royal Canadian Mounted Police. A former public servant may be:

- a) an individual;
- b) an individual who has incorporated;
- c) a partnership made up of former public servants; or
- d) a sole proprietorship or entity where the affected individual has a controlling or major interest in the entity.

"Lump sum payment period" means the period measured in weeks of salary, for which payment has been made to facilitate the transition to retirement or to other employment as a result of the implementation of various programs to reduce the Public Service. The lump sum payment period does not include the period of severance pay, which is measured in a like manner.

"pension" means a pension or annual allowance paid under the [Public Service Superannuation Act](#) (PSSA), R.S., 1985, c.P-36, and any increases paid pursuant to the [Supplementary Retirement Benefits Act](#), R.S., 1985, c.S-24 as it affects the PSSA. It does not include pensions payable pursuant to the [Canadian Forces Superannuation Act](#), R.S., 1985, c.C-17, the [Defence Services Pension Continuation Act](#), 1970, c.D-3, the [Royal Canadian Mounted Police Pension Continuation Act](#), 1970, c.R-10, and the [Royal Canadian Mounted Police Superannuation Act](#), R.S., 1985, c.R-11, the [Members of Parliament Retiring Allowances Act](#), R.S., 1985, c.M-5, and that portion of pension payable to the [Canada Pension Plan Act](#), R.S., 1985, c.C-8.

Former Public Servant in Receipt of a Pension

As per the above definitions, is the Bidder a FPS in receipt of a pension? **YES () NO ()**

If so, the Bidder must provide the following information:

- a) name of former public servant,; and
- b) date of termination of employment or retirement from the Public Service.

By providing this information, Bidders agree that the successful Bidder's status, with respect to being a former public servant in receipt of a pension, will be reported on departmental websites as part of the published proactive disclosure reports in accordance with [Contracting Policy Notice: 2012-2](#) and the [Guidelines on the Proactive Disclosure of Contracts](#).

Work Force Reduction Program

Is the Bidder a FPS who received a lump sum payment pursuant to the terms of a work force reduction program?



YES () NO ()

If so, the Bidder must provide the following information:

- a) name of former public servant,;
- b) conditions of the lump sum payment incentive,;
- c) date of termination of employment,;
- d) amount of lump sum payment,;
- e) rate of pay on which lump sum payment is based,;
- f) period of lump sum payment including start date, end date and number of weeks,; and
- g) number and amount (professional fees) of other contracts subject to the restrictions of a work force reduction program.

For all contracts awarded during the lump sum payment period, the total amount of fee that may be paid to a FPS who received a lump sum payment is \$5,000, including Applicable Taxes.

2.4 Status and Availability of Resources

The Bidder certifies that, should it be awarded a contract as a result of the bid solicitation, every individual proposed in its bid will be available to perform the Work as required by Canada's representatives and at the time specified in the bid solicitation or agreed to with Canada's representatives. If for reasons beyond its control, the Bidder is unable to provide the services of an individual named in its bid, the Bidder may propose a substitute with similar qualifications and experience. The Bidder must advise the Contracting Authority of the reason for the substitution and provide the name, qualifications and experience of the proposed replacement. For the purposes of this clause, only the following reasons will be considered as beyond the control of the Bidder: death, sickness, maternity and parental leave, retirement, resignation, dismissal for cause or termination of an agreement for default.

If the Bidder has proposed any individual who is not an employee of the Bidder, the Bidder certifies that it has the permission from that individual to propose his/her services in relation to the Work to be performed and to submit his/her résumé to Canada. The Bidder must, upon request from the Contracting Authority, provide a written confirmation, signed by the individual, of the permission given to the Bidder and of his/her availability.

2.5 Education and Experience

The Bidder certifies that all the information provided in the résumés and supporting material submitted with its bid, particularly the information pertaining to education, achievements, experience and work history, has been verified by the Bidder to be true and accurate. Furthermore, the Bidder warrants that every individual proposed by the Bidder for the requirement is capable of performing the Work described in the resulting contract.

2.6 Certification

By submitting a bid, the Bidder certifies that the information submitted by the Bidder in response to the above requirements is accurate and complete.

Signature of Bidder's Authorized Representative

Date



PART 6 - SECURITY, FINANCIAL AND OTHER REQUIREMENTS

1 Security Requirements

1. Before award of a contract, the following conditions must be met:
 - (a) the Bidder must hold a valid organization security clearance as indicated in Part 7 - Resulting Contract Clauses;
 - (b) the Bidder's proposed individuals requiring access to classified or protected information, assets or sensitive work site(s) must meet the security requirements as indicated in Part 7 - Resulting Contract Clauses;
 - (c) the Bidder must provide the name of all individuals who will require access to classified or protected information, assets or sensitive work sites;
 - (d) the Bidder's proposed location of work performance and document safeguarding must meet the security requirements as indicated in Part 7 - Resulting Contract Clauses;
 - (e) the Bidder must provide the address(es) of proposed site(s) or premises of work performance and document safeguarding as indicated in Part 3 - Section IV Additional Information.
2. Bidders are reminded to obtain the required security clearance promptly. Any delay in the award of a contract to allow the successful Bidder to obtain the required clearance will be at the entire discretion of the Contracting Authority.
3. For additional information on security requirements, Bidders should refer to the [Industrial Security Program \(ISP\)](http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html) of Public Works and Government Services Canada (<http://ssi-iss.tpsgc-pwgsc.gc.ca/index-eng.html>) website.



PART 7 - RESULTING CONTRACT CLAUSES

1. Statement of Work

The Contractor must perform the Work in accordance with the Statement of Work at [Annex A](#) and the technical and management portions of the Contractor's bid entitled _____, dated _____.

2. Standard Clauses and Conditions

All clauses and conditions identified in the Contract by number, date and title are set out in the [Standard Acquisition Clauses and Conditions](#) Manual issued by Public Works and Government Services Canada.

For the purposes of this contract, all references to "Canada", "Crown", "Her Majesty" or "the Government" in the clauses and conditions herein, including those incorporated by reference, shall mean Her Majesty the Queen in right of Canada as represented by the Canadian Space Agency;

2.1 General Conditions

[General Conditions – Higher Complexity – Services 2035 \(2015-07-03\)](#) apply to and form part of the Contract with the following modification:

2.2 Supplemental General Conditions

[Supplemental General Conditions 4007 \(2010-08-16\) Canada to Own Intellectual Property Rights in Foreground Information](#), apply to and form part of the Contract.

3. Security Requirements

The following security requirements (*SRCL and related clauses provided by ISP*) apply and form part of the Contract.

1. The Contractor must, at all times during the performance of the Contract, hold a valid Designated Organization Screening (DOS) with approved Document Safeguarding at the level of **PROTECTED B**, issued by the Canadian Industrial Security Directorate, Public Works and Government Services Canada.
2. The Contractor personnel requiring access to PROTECTED information, assets or work site(s) must EACH hold a valid **RELIABILITY STATUS**, granted or approved by the Canadian Industrial Security Directorate (CISD), Public Works and Government Services Canada (PWGSC).
3. The Contractor MUST NOT utilize its Information Technology systems to electronically process, produce or store PROTECTED information until the CISD/PWGSC has issued written approval. After approval has been granted or approved, these tasks may be performed up to the level of **PROTECTED B**.
4. Subcontracts which contain security requirements are NOT to be awarded without the prior written permission of CISD/PWGSC.
5. The Contracto must comply with the provisions of the:
 - a. Security Requirements Check List and security guide (if applicable), attached at Annex _____;
 - b. *Industrial Security Manual* (Latest Edition).



4. Term of Contract

4.1 Period of the work

Duration of six (6) months from Contract Award.

5. Authorities

5.1 Contracting Authority

The Contracting Authority for the Contract is:

Robert Kardum
Canadian Space Agency
6767 Route de l'Aéroport
Saint-Hubert, QC
Canada J3Y 8Y9

Telephone: (450) 926-4875
Facsimile: (450) 926-4969
E-Mail: robert.kardum@asc-csa.gc.ca

The Contracting Authority is responsible for the management of the Contract and any changes to the Contract must be authorized in writing by the Contracting Authority. The Contractor must not perform work in excess of or outside the scope of the Contract based on verbal or written requests or instructions from anybody other than the Contracting Authority.

5.2 Project and/or Technical Authority

To be identified at contract award.

The Project and/or Technical Authority is the representative of the department or agency for whom the Work is being carried out under the Contract and is responsible for all matters concerning the technical content of the Work under the Contract. Technical matters may be discussed with the Project Authority; however, the Project Authority has no authority to authorize changes to the scope of the Work. Changes to the scope of the Work can only be made through a contract amendment issued by the Contracting Authority.

5.3 Contractor's Representative

(to be specified at contract award)

6. Payment

6.1. Basis of Payment – Firm Price

6.1.1 Professional Fees

In consideration of the Contractor satisfactorily completing all of its obligations under the Contract, the Contractor will be paid a firm price of \$_____ (to be specified at contract award). Customs duties are included and Goods and Services Tax, Harmonized Sales Tax, Quebec Sales Tax are extra, if applicable.



6.2. Limitation of Price

Canada will not pay the Contractor for any design changes, modifications or interpretations of the Work unless they have been approved, in writing, by the Contracting Authority before their incorporation into the Work.

6.3 Method of Payment – Milestone Payments

Canada will make milestone payments in accordance with the Schedule of Milestones detailed in the Contract and the payment provisions of the Contract if:

- (a) an accurate and complete invoice and any other documents required by the Contract have been submitted in accordance with the invoicing instructions provided in the Contract;
- (b) all such documents have been verified by Canada;
- (c) the Work performed has been accepted by Canada.

The schedule of milestones for which payments will be made in accordance with the Contract is as follows:

(See [Attachment 1 to Part 3](#))

6.4 T1204 Supplementary Slip Requirement - Invoicing Procedures

1. Pursuant to paragraph 221 (1)(d) of the Income Tax Act, R.S. 1985, c.1 (5th Supp.), payments made by departments and agencies to contractors under applicable services contracts (including contracts involving a mix of goods and services) must be reported on a T1204 Government Service Contract Payments slip.
2. To enable departments and agencies to comply with this requirement, the Contractor must provide the following information:
 - (a) the legal name of the Contractor, i.e. the legal name associated with its business number or Social Insurance Number (SIN), as well as its address and postal code;
 - (b) the status of the Contractor, i.e. an individual, a sole proprietorship, a corporation, or a partnership;
 - (c) the business number of the Contractor if the Contractor is a corporation or a partnership and the SIN if the Contractor is an individual or a sole proprietorship. In the case of a partnership, if the partnership does not have a business number, the partner who has signed the Contract must provide its SIN;
 - (d) in the case of a joint venture, the business number of all parties to the joint venture who have a business number or their SIN if they do not have a business number.
3. The information must be sent with the first invoice to the [invoicing address](#) specified herein. If the information includes a SIN, the information should be provided in an envelope marked "PROTECTED".

7. Invoicing Instructions

1. The Contractor must submit invoices in accordance with the section entitled "Invoice Submission" of the general conditions. Invoices cannot be submitted until all work identified in the invoice is completed.



Each invoice must be supported by a copy of the applicable progress report(s).

2. Invoices must be distributed as follows:

(a) The original and one (1) copy must be forwarded to the following address for certification and payment.

9F052: FINANCIAL SERVICES
EXPLORATION DEVELOPMENT
6767 ROUTE DE L'AÉROPORT
ST-HUBERT, QC
CANADA J3Y 8Y9

Or by e-mail at: facturationASC.CSAinvoicing@asc-csa.gc.ca

Note: The Government of Canada is phasing out paper cheques in favour of Direct Deposit for all payments issued by the Receiver General. Direct Deposit is a secure and reliable method of receiving payment, eliminating the risk of lost or stolen cheques. You will find all the information to enrol in direct deposit with Canadian Space Agency at: <http://www.asc-csa.gc.ca/eng/forms/vendor-direct-depot-form.asp>

8. Certifications

8.1 Compliance

Compliance with the certifications provided by the Contractor in its bid is a condition of the Contract and subject to verification by Canada during the term of the Contract. If the Contractor does not comply with any certification or it is determined that any certification made by the Contractor in its bid is untrue, whether made knowingly or unknowingly, Canada has the right, pursuant to the default provision of the Contract, to terminate the Contract for default.

9. Foreign Nationals (Canadian Contractor)

The Contractor must comply with Canadian immigration requirements applicable to foreign nationals entering Canada to work temporarily in fulfillment of the Contract. If the Contractor wishes to hire a foreign national to work in Canada to fulfill the Contract, the Contractor should immediately contact the nearest Service Canada regional office to enquire about Citizenship and Immigration Canada's requirements to issue a temporary work permit to a foreign national. The Contractor is responsible for all costs incurred as a result of non-compliance with immigration requirements.

10. Insurance

The Contractor is responsible for deciding if insurance coverage is necessary to fulfill its obligation under the Contract and to ensure compliance with any applicable law. Any insurance acquired or maintained by the Contractor is at its own expense and for its own benefit and protection. It does not release the Contractor from or reduce its liability under the Contract.

11. Directive on Communications with the Media

1. DEFINITIONS



“Communication Activity(ies) ”: means public information and recognition, the planning, development, production and delivery or publication, and any other type or form of dissemination of marketing, promotional or information activities, initiatives, reports, summaries or other products or materials, whether in print or electronic format that pertain to the present contract, all communications, public relations events, press releases, social media releases, or any other communication directed to the general public in whatever form or media it may be in, including but without limiting the generality of the preceding done through any web site. This excludes scientific publications, scientific presentations, scientific demonstrations, and media-initiated communications of a strictly scientific nature on contracts that have already been announced by the CSA, including the results of the project funded under this contract.

2. COMMUNICATION ACTIVITIES FORMAT

The Contractor must coordinate with the Canadian Space Agency (CSA) all Communication Activities that pertain to the present contract.

Subject to review and approval by the CSA, the Contractor may mention and/or indicate visually, without any additional costs to the CSA, the CSA’s participation in the contract through one or both of the following methods at the complete discretion of the CSA:

- a. By clearly and prominently labelling publications, advertising and promotional products and any form of material and products sponsored or funded by the CSA, as follows, in the appropriate official language:

“This program/project/activity is undertaken with the financial support of the Canadian Space Agency.”

“Ce programme/projet/activité est réalisé(e) avec l’appui financier de l’Agence spatiale canadienne.”

- b. By affixing CSA’s corporate logo on print or electronic publications, advertising and promotional products and on any other form of material, products or displays sponsored or funded by the Canadian Space Agency.

The Contractor must obtain and use a high resolution printed or electronic copy of the CSA’s corporate identity logo and seek advice on its application, by contacting the Project Authority.

3. COMMUNICATION ACTIVITY COORDINATION PROCESS

The contractor must coordinate with the CSA’s Directorate of Communications and Public Affairs all Communication Activities pertaining to the present contract. To this end, the contractor must:

- a. As soon as the Contractor intends to perform a Communication Activity, send a Notice to the CSA’s Directorate of Communications and Public Affairs. The Communications Notice must include a complete description of the proposed Communication Activity. The Notice must be in writing in accordance with Article 44 of the General Conditions 2040 contract titled Notice. The Communications Notice must include a copy or example of the proposed Communication Activity.
- b. The contractor must provide to the CSA any and all additional document in any appropriate format, example or information that the CSA deems necessary, at its entire discretion to correctly and efficiently coordinate the proposed Communication Activity. The Contractor agrees to only proceed with the proposed Communication Activity after receiving a written confirmation of



coordination of the Communication Activity from the CSA's Directorate of Communications and Public Affairs.

- c. Should the Contractor proceed with the Communication Activity without having previously received the written confirmation of coordination from the CSA's Directorate of Communications and Public Affairs, subject to giving Notice to the Contractor, Canada is entitled to exercise its right under section 155 of the *Financial Administration Act* and retain from payment to the Contractor or recover from the Contractor the amount of damages that may be due to Canada as a result of the release of information by the Contractor.

12. Disclosure Certification

On completion of the Work, the Contractor must submit to the Project Authority and to the Contracting Authority a copy of the Disclosure Certification attached as Annex "_____" stating that all applicable disclosures were submitted or that there were no disclosures to submit under section 02 of supplemental general conditions [4007](#).

13. Proactive Disclosure of Contracts with Former Public Servants

By providing information on its status, with respect to being a former public servant in receipt of a [Public Service Superannuation Act](#) (PSSA) pension, the Contractor has agreed that this information will be reported on departmental websites as part of the published proactive disclosure reports, in accordance with [Contracting Policy Notice: 2012-2](#) of the Treasury Board Secretariat of Canada.

14. Contract Administration

The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1(1) of the Department of Public Works and Government Services Act will review a complaint filed by the Contractor respecting administration of this contract if the requirements of Subsection 22.2(1) of the Department of Public Works and Government Services Act and Sections 15 and 16 of the Procurement Ombudsman regulations have been met, and the interpretation and application of the terms and conditions and the scope of the work of this contract are not in dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa.opo.gc.ca.

15. Dispute Resolution Services

The parties understand that the Procurement Ombudsman appointed pursuant to Subsection 22.1(1) of the Department of Public Works and Government Services Act will, on request, and consent of the parties, to participate in an alternative dispute resolution process to resolve any dispute between the parties respecting the interpretation or application of a term and condition of this contract and their consent to bear the cost of such process, provide to the parties a proposal for an alternative dispute resolution process to resolve their dispute. The Office of the Procurement Ombudsman may be contacted by telephone at 1-866-734-5169 or by e-mail at boa.opo@boa.opo.gc.ca.

16. Applicable Laws

The Contract must be interpreted and governed, and the relations between the parties determined, by the laws in force in the Province of Quebec.



17. Contractor Performance

1) Canada will evaluate the Contractor's performance during and upon completion of the work. If the Contractor's performance is determined to be unsatisfactory on more than one contract, the Contractor's bids on future work may be inadmissible for a period of 18 months or 36 months thereafter.

2) The Contractor Performance Evaluation Report Form used to record the performance is attached to the contract at Appendix ___.

18. Priority of Documents

If there is a discrepancy between the wording of any documents that appear on the list, the wording of the document that first appears on the list has priority over the wording of any document that subsequently appears on the list.

- (a) the Articles of Agreement;
- (b) [Supplemental General Conditions 4007 \(2010-08-16\) Canada to Own Intellectual Property Rights in Foreground Information](#) ;
- (b) [General Conditions – Higher Complexity – Services 2035 \(2015-07-03\)](#);
- (c) Annex A, Statement of Work;
- (d) Annex B, Basis of Payment;
- (e) Annex C, Security Requirements Check List (SRCL);
- (e) Annex D, Disclosure Certification;
- (f) Annex E, Contractor Performance Evaluation
- (g) the Contractor's bid dated _____.



ANNEX A

STATEMENT OF WORK



Title: Beyond Low Earth Orbit (LEO) Exploration Mission Contribution Study

1. Introduction

1.1 Background

The exploration of space is a highly visible endeavour, a powerful driver for scientific and technical innovation, a magnet for world-class talent, and an incentive for young Canadians to pursue careers in science and technology. This study is part of the implementation of the Space Policy Framework of Canada in which the Government commits to: ensuring that Canada is a sought-after partner in the international space exploration missions that serve Canada's national interests; and continuing to invest in the development of Canadian contributions in the form of advanced systems and scientific instruments as part of major international endeavours. To determine the nature of Canada's potential contribution to future international space exploration and astronomy missions the Canadian Space Agency (CSA) engages in three types of activities: (i) requirement development; (ii) prototyping and deployment; and (iii) building and maintaining operational infrastructure required to support prototype integration and deployment. Requirement development supports CSA's exploration planning activities and defines the science and technology developments most likely to be required in future space exploration missions of interest to Canada, and assesses potential contributions that Canada could make to such missions.

The CSA is continuing its collaboration with international partners to define concepts for collaborative missions Beyond Low Earth Orbit (BLEO), as presented in the Global Exploration Roadmap (MRD-15). The goals are to expand international partnerships (IPs), develop human exploration technologies and capabilities, synergize human and robotic capabilities, foster commercial industry and economic development, and advance scientific knowledge.

1.2 Objective

This request for proposal (RFP) provides a common gateway for the study of initial concepts for potential future Canadian BLEO space exploration opportunities in global partnerships to define a bold vision for Canada's future in space. The Mission Study proposals, which will be catered to topics identified in Table 1, and detailed in Appendix 3, 4 or 5 of Annex A, will allow Canada to take its place among the top innovators of space and allow Canadians to take full advantage of the benefits space has to offer. These areas may be considered for contribution to a potential exploration mission Beyond LEO.

One contract per Category will be awarded to provide an assessment of options and develop a preliminary business case for use by the Canadian Space Agency in future planning.

The initial phases of any mission focuses on concept definition and feasibility assessment studies. As it provides an opportunity for exploring truly innovative ideas, these studies are of high importance to the Canadian Space Agency in encouraging the growth and development of an internationally competitive Canadian space community and the advancement of new ideas.

Table 2: Study Categories

Category MCS #	Study Category	Detailed SOW
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Category MCS #	Study Category	Detailed SOW
MCS 1	Advanced Crew Medical System (ACMS)	Appendix 3
MCS 2	Beyond LEO Relative Navigation System	Appendix 4
MCS 3	Deep-Space Exploration Robotics (DSXR)	Appendix 5

2. Scope

The Contractor must provide the facilities, personnel, materials, and services required to perform this BLEO mission study. It should be made clear to the contractor that this SOW is a description of the expanse of the work that the contractor will have to perform and will result in a Final Review presentation to the CSA. The nature and scope of this assessment requires an interdisciplinary team to address all aspects of this mission, including technology, space operations, financial, and future applications of this type of technology. This SOW also provides the requirements and deliverables list for the categories identified above and will enable the CSA to recommend options to the government for informed decision-making about potential future investments in Beyond LEO exploration missions. by providing:

Also, following the TRRA and TRM assessment from section 4.1.1.5, the contractor will identify the high risk items that would benefit from performing a Development Test Objective(DTO), whether on the ISS or in LEO, to raise the TRL in order to provide confidence to the CSA and our IPs in going forward to a potential full mission. It is in the interest of the Government of Canada (GoC) to retire high-level flight-critical risks as soon as possible before committing to the full missions. The contractor shall suggest which part of the technology to undergo the DTO and submit the appropriate deliverables.

The CSA has developed the preliminary mission level requirements and the work scopes for each category to allow the contractor to better analyse the needs and level of effort required for each one of the different missions. They are provided in Appendix 3, 4 and 5. Further details for these potential missions will be explained during the KOMs. However, in order to provide some context, CSA is looking at BLEO missions in the 2030-2035 timeframe, which will be considered for the purposes of this SOW.

2.1 Project Duration

The duration of the contract is six (6) months from contract award.

3. Master Reference Documents

The documents identified in Table 2 provide additional information or guidelines for all three categories that either may clarify the contents or are pertinent to the history of this document.

**Table 3: Reference Documents.**

MRD No.	Document Number	Document Title	Rev. No.	Date
MRD-1.	ESTEC TEC-SHS/5574/MG/ap	Technology Readiness Levels Handbook for Space Applications ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/	Iss. 1 /Rev. 6	March 2009
MRD-2.	CSA-SE-STD-0001	CSA Technical Reviews Standard ftp://ftp.asc-csa.gc.ca/users/TRP/pub/SE-STD/	A	Nov 7, 2008
MRD-3.	CSA-SE-PR-0001	CSA Systems Engineering Methods and Practices ftp://ftp.asc-csa.gc.ca/users/TRP/pub/SE-STD/	Rev. B	Mar 10, 2010
MRD-4.		Canada's Space Policy Framework http://www.asc-csa.gc.ca/eng/publications/space-policy/default.asp		Feb 7, 2014
MRD-5.	CSA-ST-GDL-0002	CSA Technology Tree ftp://ftp.asc-csa.gc.ca/users/TRP/pub/Technology-Tree/	IR	December 2009
MRD-6.	CSA-ST-GDL-0001	CSA Technology Readiness Levels and Assessment Guidelines ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/	B	February 2014
MRD-7.	CSA-ST-FORM-0001	Technology Readiness and Risk Assessment (TRRA) Worksheet ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/Technology_and_Risk_Assessment_Worksheets%20and_Rollup_Tool/	E	July 29, 2013
MRD-8.	CSA-ST-RPT-0002	Technology Readiness and Risk Assessment Rollup: TRRA - Data Rollup Tool.xlsm ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/Technology_and_Risk_Assessment_Worksheets%20and_Rollup_Tool/	E	Sept 11, 2013
MRD-9.	CSA-ST-FORM-0003	Critical Technology Element (CTE) Identification Criteria Worksheet ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRRA/Technology_and_Risk_Assessment_Worksheets%20and_Rollup_Tool/	A	March, 2014
MRD-10.	CSA-ST-RPT-0003	Technology Roadmap Worksheet ftp://ftp.asc-csa.gc.ca/users/TRP/pub/TRM/	A	September 2012
MRD-11.	CSEW 6 report	Canadian Scientific Priorities for the Global Exploration Strategy ftp://ftp.asc-csa.gc.ca/users/Exp/pub/Publications/CSEW6/		May 30, 2009
MRD-12.		Treasury Board Business Case Guide http://www.tbs-sct.gc.ca/emf-cag/business-rentabilisation/bcg-gar/bcg-gartb-eng.asp		Jul 22, 2009



MRD No.	Document Number	Document Title	Rev. No.	Date
MRD-13.		Visions and Voyages for Planetary Science in the Decade 2013 - 2022 - a report of the National Research Council of USA http://solarsystem.nasa.gov/multimedia/downloads/Vision_and_Voyages-FINAL1.pdf		2011
MRD-14.	PMBOK Guide	Guide to the Project Management Body of Knowledge		
MRD-15.	GER	The Global Exploration Roadmap http://www.globalspaceexploration.org/wordpress/wp-content/uploads/2013/10/GER_2013.pdf	2	2013

4. Generic Task Description

This section presents the activities that apply to all Categories listed in Table 1. The work to be performed by the Contractor under this mission study involves primarily a preliminary mission assessment, a business case development, and establishing the programmatic factors for the mission success.

4.1 Preliminary Mission Assessment

The contractor is to review the mission requirements and work scope provided in Appendix 3, 4 or 5 for the selected category and provide their preliminary mission assessment in conjunction with their concept proposals to accomplishing the mission. An assessment of the Canadian industrial capabilities and commercial potential to open continuous business lines shall be included. The work shall encompass the scopes, requirements, concepts and task descriptions for the selected category (DID-0007 – Technical Report and business case inputs for Mission Capability Assessment).

4.1.1 Engineering

4.1.1.1 Preliminary Conceptual Design

The Contractor must propose concepts based on previous work that meet the mission requirements or show how existing concepts can be adapted to meet the mission requirements.

4.1.1.2 Interfaces

The Contractor must prepare a Preliminary Interface Control Document (ICD) in which:

- 1) The principal external interfaces are identified and characterized.
- 2) The principal internal interfaces are identified and characterized between systems.

4.1.1.3 Mission Requirements Verification Matrix

The Contractor must develop the Mission Requirements Verification Matrix to identify the various requirements developed to meet the Mission requirements set forth in Appendix 3, 4 and 5 for that particular category. At this time, the CSA is not looking for the System requirements, but for a viable concept. This matrix should contain the verification strategy and/or philosophy.



4.1.1.4 Development, Manufacturing and Qualification Approach

The Contractor must provide an overview of the development approach, specifying potential subsystem providers, key subcontractors, and the general strategy best suited for this approach. The Contractor must also list the major tasks required in the development and manufacturing cycles and identify the potential long lead items. The Contractor must provide the preliminary Verification plan, qualification approach, and assumptions made.

4.1.1.5 Technology Readiness and Risk Assessment (TRRA) and Technology Roadmap

The TRRA is used to assess project status and technical risks, and to guide definition of risk reduction work in the current and following phases. The Contractor must perform a Technology Readiness and Risk Assessment (TRRA) in accordance with the requirements of the CSA Technology Readiness and Risk Assessment Guidelines (MRD-6) and ESA's Technology Readiness Levels Handbook for Space Applications (MRD-1) to formally document the technology status.

The Contractor must produce the TRRA using Technology Readiness and Risks Assessment Worksheet (MRD-7), Critical Technology Element (CTE) Identification Criteria Worksheet (MRD-9) and Technology Readiness and Risk Assessment Rollup (MRD-8).

The Contractor must also provide a Technology Development Plan, also known as Technology Roadmap (TRM), including the required technology developments to meet mission needs, and a plan and timeline to reach TRL 6 and 8. The TRM should be provided in the format of (MRD-10) and discussed at the mid-term review.

4.1.2 Operations

4.1.2.1 Preliminary Concept of Operations

The Contractor must produce a Preliminary Concept of Operations that demonstrates the feasibility of routine operations, autonomous controls, data acquisitions through-puts, communications coverage, missions operations, maintenance concepts, commissioning (and de-commissioning), and ground operations. Due to the general nature of this SOW and the fact that this caters for three different categories of technology, the SOW leaves it open to the interpretation of the contractor to insert the right information in their proposal, but also in the technical report.

4.1.2.2 Operations requirements

The Contractor must produce the Preliminary Operational Requirements, for both space and ground segments, to respond to the Mission Requirements and must also be compatible with the Concept of Operations.

4.1.2.3 Mission Operational Plan

The Contractor must produce a preliminary Operational Development Plan that meets the operational requirements. The Operational Development Plan must cover the Launch and Early Operations (LEOP), Commissioning phase, and Routine Operations phase.

4.2 Business Case inputs



Preliminary scope, requirements, and task descriptions for each category are given in Appendix 3, 4 and 5. The following subsections describe generically the work that is expected.

4.2.1 Executive summary:

Provide an executive summary (high level) that captures only the essential elements of the business case being presented. Include the business case's most pertinent facts in a clear, concise, and strategic overview.

4.2.2 Business Potential

In order to assess the return on investment (ROI) and in CSA's interest to expand the space industrial-base, the Contractor should provide information on the minimum business it would take to maintain the created expertise and industrial capacity in the long run, for the socio-economic benefits of all Canadians.

4.2.3 Business Case Model

Within a Government of Canada (GoC) context, a business case is typically a presentation or a proposal to an authority by an organization seeking funding, approval, or both for an activity, initiative, or project.

A business case puts a proposed investment decision into a strategic context and provides the information necessary to make an informed decision about whether to proceed with the investment and in what form. It is also the basis against which continued funding will be compared and evaluated.

The document provides the context for an investment decision, a description of viable options, analysis thereof, and a recommended decision. The recommendation describes the proposed investment and all of its characteristics, such as benefits, costs, risks, time frame, change requirements, impact on stakeholders, and so forth.

It is CSA's responsibility to present to the GoC substantiations for the approval and continuation of the projects it believes meets its mandate. This work, contained herein, will inform CSA's development of these substantiations.

As shown in Figure 1, the business case model proposed here seeks the development of the business case progressing through three phases and within those phases are key steps that will collectively make up a solid business case.

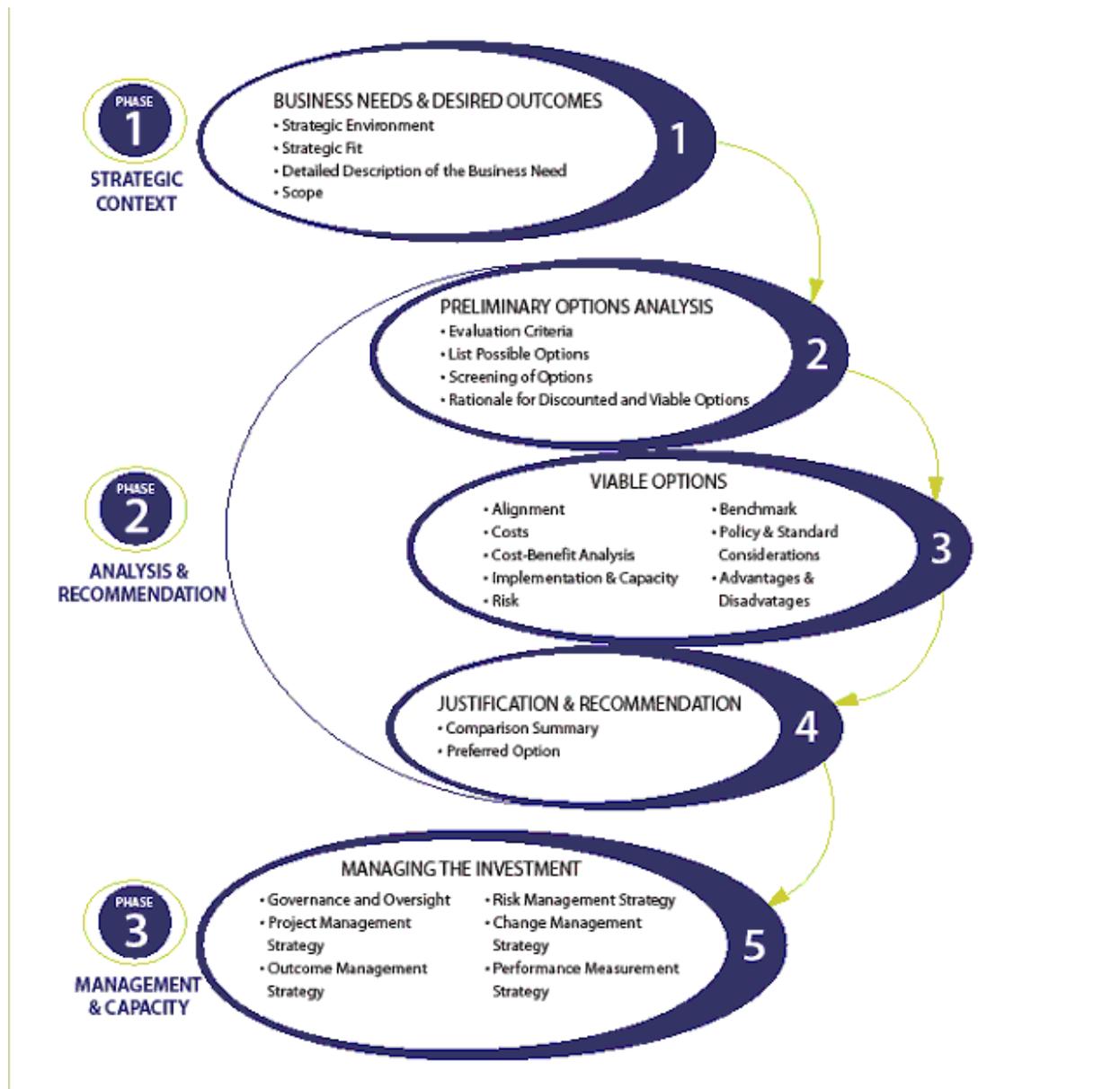


Figure 1 – Business Case Model (ref.: TB Business Case Guide)

4.2.3.1 Estimate of Canadian Content

The Contractor must provide an estimate of the anticipated percentage of Canadian content relative to the overall cost presented in **Table 4** , what options could be undertaken to maximize the Canadian content, and their corresponding impacts and benefits. For more information on how to determine the Canadian content for a mix of goods, a mix of services or a mix of goods and services, consult Annex 3.6.(9), Example 2, of the PWGSC Supply Manual.



4.2.3.2 Canadian Capabilities Development

The Contractor must provide an overview of its strategy to develop and maintain Canadian capabilities. If the overall approach of the Contractor implies technology transfer and partnership with foreign entities to develop the Canadian capabilities, the Contractor must specify teaming arrangements, Intellectual Property (IP) ownership issues, royalties, etc., as well as opportunities that this partnership would open.

4.2.3.3 Intellectual Property Management

The Contractor must complete the Contractor Disclosure of Intellectual Property CSA Form (DID-0008–Contractor Disclosure of Intellectual Property), identifying the BIP and FIP that will be generated in this contract, the owners of the BIP and how it will be managed and coordinated among the various collaborators and entities involved.

4.2.3.4 Preliminary Commercialisation Plan

The Contractor must provide a preliminary commercialization plan to support further Canadian positioning beyond the scope of the proposed CSA program to include potential spin-offs (for space and non-space applications). This must include an analysis of who the competitors are (national and international) for the proposed subsystem/technology/concept and for the overall mission. Identify who are the stakeholders and how Canada and/or the contractor are positioned. Included in this plan should be what Canada should be doing to advance the commercialisation aspect of this technology and the timing of such efforts so as to not lose the advantage.

4.3 Programmatic

4.3.1 Cost

The Contractor must provide indicative cost estimates as per **Table 4** below, for all phases leading to the development, qualification, implementation, launch, operations and disposal of the hardware/software/instruments resulting from the concept. Each cost estimate must be substantiated by providing a basis for each (e.g., bottom-up, analogous, parametric, etc.) and any assumptions made for the derivation.

Table 4: Cost

		Prior to Mission	Phase A	Phase B	Phase C	Phase D	Phase E	Phase F
Labour	Management							
	Technology Development							
	Design							
	Documentation							
	Reviews							
	Manufacturing							
	Assembly							



		Prior to Mission	Phase A	Phase B	Phase C	Phase D	Phase E	Phase F
	Testing							
	Product Assurance							
	Operations							
	Etc.							
	Science Support							
	Total Labour							
Non-Labour	HW/SW Procurement							
	Tools, equipment & facilities							
	T&L							
	Overhead							
	Total Non-Labour							
Risk	Risk Contingency							
Taxes								
Total per phase								
Total all Phases								

4.3.2 Schedule and Implementation

4.3.2.1 Schedule

The Contractor must suggest a preliminary mission schedule relative to the overall life cycle of the Concept. The timeline must include key milestones corresponding to, for instance, Preliminary Design Review (PDR), Critical Design Review (CDR), readiness for integration onto the mission, and launch. Refer to CSA Systems Engineering Technical Review Standard (MRD-2) for a full description of all possible reviews, which may vary depending on the nature of the mission architecture.

The project schedule prepared by the Contractor must provide a graphical representation of predicted tasks, milestones, dependencies, resource requirements, task duration, and deadlines. The project's master schedule must inter-relate all tasks on a common time scale and be in the form of a Gantt chart. The project schedule must be detailed enough to show each WBS task to be performed, the class and/or level of the resource (i.e. ENG-I, ENG-II, PM) responsible for completing the task, the start and end date of each task, the deliverables, the long lead items, the expected duration of the task, and finally the critical path. A starting point high level WBS is provided in Appendix 3,4 and 5.

4.3.2.2 Preliminary Mission Risk Assessment

The Contractor must provide a preliminary technical and programmatic risks assessment. For each risk identified, the Contractor should identify the phase of the mission to which the risk applies, the likelihood of occurrence, the impact should the risk occur, and any possible mitigation actions that may be taken to decrease either the likelihood or the impact before the mission or the phase starts. Specific mitigation actions must be identified for high risks at this time. Contingency plans (i.e., identifying alternative strategies) must also be developed for high risks, or when it is uncertain that mitigation plan will be



effective. This general risk assessment must also consider access to information issues, like Export Control (International Traffic in Arms Regulations (ITAR)) and others as potential risks.

The Contractor must integrate and present the top risks in a 5x5 Risk Assessment Matrix. The risk assessment process and matrix can be similar to those in the PMBoK (MRD-14).

4.3.2.3 DTO Risk Reduction Assessment

The contractor is to provide a recommendation of the DTO. The contractor shall submit these additional deliverables as a separate stand-alone package: (in essence it is similar to the full mission package but tailored (reduced) to only meet the test objective). (DID-0007)

- i) DTO Part 1 – options analysis
 1. DTO Mission description/Technology goals
 2. DTO Assessment of Canadian industrial capabilities
 3. DTO Options assessment
 4. Cost-Benefit analysis (e.g. potential to advance CSA's opportunity to perform critical full missions)
 5. WBS for DTO
- ii) DTO Part 2 –description of business need (similar to DID-0007)
 1. Executive Summary (DID-0009)
 2. DTO Considerations
 3. Options Description
 4. Project Cost Breakdown (DID-0015)
 5. Preliminary Schedule (section 4.3.2.1)
 6. Business Case Inputs
 7. Recommendations of preferred option

5. Contract Meetings and Deliverables

This section reviews and describes the contract meetings and deliverables.

5.1 Contract Meetings

The Contractor must organize the meetings listed in Table 4.

Table 5: Meeting Schedule

Meeting	Date	Location
Kick-off Meeting	No later than 2 weeks After Contract Award (ACA)	CSA
Mid-term Review Meeting	Mid-way	CSA or teleconference
Final Review Meeting	End of contract	CSA
Progress Reviews	Monthly	Teleconference



Key participants under the contract must attend all the meetings. This can be done in person or via teleconference.

The contractor must support a KOM at the CSA in the first 2-weeks after Contract award. The purpose of the KOM is to introduce the Contractor and CSA teams, review the scope of work, the schedule, the basis of payment and discuss any other topics as required. All key participants under the contract, including representatives from each major subcontractor, must attend. Attendance of some team members by teleconference is acceptable.

The Mid-term Review Meeting will analyze the list of potential options with the goal of selecting the recommended option as the go-forward plan. A further review of the technology readiness assessment and of the WBS planning to accomplish the whole mission will be reviewed at this milestone. Furthermore, the scope of the business case analysis will be reviewed and validated by CSA.

The specific intent of the Final Review Meeting will be to discuss, in detail, the results obtained and the proposed follow-on activities. This meeting is intended to provide an opportunity for the Contractor, the Project Authority (PA), and other invited attendees to review and discuss the project with the recommended option as describe in the preliminary business case. Key Contractor personnel involved in the work under review must attend the meeting. The exact date and time of the review meeting will be mutually agreed to by the PA, and the Contractor.

The Contractor may request Ad-hoc Meetings with the CSA whenever required to resolve unforeseen and urgent issues. The CSA may also request such Ad-hoc Meetings with the Contractor. The selection of participants will depend on the nature of the issue.

5.2 Documentation, Reporting and Other Deliverables

The Contractor must submit the documentation as defined and at the date stipulated in the Contract Data Requirements List (CDRL), **Table 6**, to the PA, or using the contractor format (CF) when indicated.. All diagrams must be clearly drawn and labelled. The schedules in Gantt shall be on 8 ½ x 14 format for pdf and Word documents. Milestone Professional files are acceptable to show the overall schedule and timelines.

The Contractor must provide the PA with an electronic copy in a format acceptable to the CSA. Both the PDF and original version, e.g. Microsoft Word , PowerPoint, or MS Project files, must be provided to CSA. Original versions of any figures or tables that are part of these documents must also be provided to CSA, e.g. Visio file of a figure created in Microsoft Visio, or pictures, or graphs, etc. , separately if so requested. Instructions on how to name electronic documents are provided in Appendix 1 of Annex A.

The cover page of each document must include the following text:

© **CANADIAN SPACE AGENCY** yyyy (insert year)

“RESTRICTION ON USE, PUBLICATION OR DISCLOSURE OF PROPRIETARY INFORMATION

This document is a deliverable under contract no. _____. This document contains information proprietary to Canada, or to a third party to which Canada may have legal obligation to protect such information from unauthorized disclosure, use or duplication. Any disclosure, use or duplication of this



document or any of the information contained herein for other than the specific purpose for which it was disclosed is expressly prohibited except as Canada may otherwise determine.”

Then, on all internal pages, each document must include the following text:

“Use, duplication or disclosure of this document or any of the information contained herein is subject to the Proprietary Notice at the front of this document.”

The Contractor must not publish, nor discuss verbally in public (i.e. conferences), nor have published any information contained within this, without the prior written approval of the CSA.

All documents must identify the organisation’s name, contract number, title and document name and must be structured in accordance with the Data Item Description (DID) referenced in the CDRL.

Table 6: CDRL

CDRL No.	Deliverable	Due Date	Version	DID No.
1.	Meeting Agendas	Meeting – 1 week	Final	0001 or CF
2.	Kick-off Meeting Presentation	Meeting – 1 week	Final	0002
3.	Mid-term Review Meeting Presentation	Meeting – 1 week	Final	0003
4.	Final Review Meeting Presentation	Meeting – 1 week	Final	0004
5.	Meeting Minutes	Meeting + 1 week	Final	0005 or CF
6.	Monthly Progress Reports	Monthly	Final	0006
7.	Technical Report	Draft at each milestone End of contract – 2 weeks	Draft Final	0007
8.	Preliminary Business Case Outline	Final milestone	Final	0007b
9.	Foreground Intellectual Property (FIP) Disclosure	End of contract – 2 weeks	Final	0008
10.	Executive Report	End of contract – 2 weeks	Final	0009
11.	Final Data Package	End of contract – 2 weeks End of contract	Draft Final	0010
12.	Contractor Performance Evaluation	End of contract – 2 weeks	Final	0011
13.	Action Items Log (AIL)	Meeting + 1 week	Final	0012 or CF



CDRL No.	Deliverable	Due Date	Version	DID No.
14.	Technology Readiness and Risk Assessment Worksheets and Rollup and Critical Technology Element Identification Criteria	Draft copy at each milestone End of contract – 2 weeks	Draft Final	0013
15.	Technology Roadmap Worksheet	Draft at each milestone End of contract – 2 weeks	Draft Final	0014
16.	Cost	Draft at each milestone End of contract – 2 weeks	Draft Final	0015 or CF
17.	WBS	Mid-term milestone End of contract – 2 weeks	Draft Final	0016
18.	Schedule	Mid-Term Final	Draft Final	Section A.6.3.2

6. List of Acronyms

AD	Applicable Document
CDRL	Contract Data Requirements List
CF	Contractor Format
CMO	Crew Medical Officer
CSA	Canadian Space Agency
CSEW	Canadian Space Exploration Workshop
CTE	Critical Technology Element
DID	Data Item Description
DTO	Detailed or Development Test Objective
EDU	Engineering Development Unit
E2E-iSAG	End-to-End International Science Analysis Group
FIP	Foreground Intellectual Property
FRM	Final Review Meeting
FTP	File Transfer Protocol
GoC	Government of Canada
ICD	Interface Control Document
IP	Intellectual Property
IPs	International Partners
LOE	Level of Effort
MCS	Mission Contribution Study
MTR	Mid-term Review
RD	Reference Document
RFP	Request For Proposal
ROM	Rough Order of Magnitude
SDT	Science Definition Team
SRL	Science Readiness Level
SRO	Senior Responsible Officer
STEM	Science, technology, engineering and math



TB	Treasury Board
TBC	To Be Confirmed
TBD	To Be Determined
TRL	Technology Readiness Level
TRM	Technology Roadmap
TRRA	Technology Readiness and Risk Assessment
WBS	Work Breakdown Structure
WPD	Work Package Description

7. Glossary of Terms

MoP	Measure of a system's performance (MOP) expressed as quantitative and consist of a range of values about a desired point. Several MOPs may be related to the achievement of a particular Measure of Effectiveness (MOE)
MoE	Measures of Effectiveness (MOE) are a measure designed to correspond to accomplishment of mission objectives and achievement of desired results. They quantify the results to be obtained by a system and may be expressed as probabilities that the system will perform as required.



APPENDIX 1 – Document Naming Conventions

Context

This appendix presents the naming convention to follow for any documentation generated under any resulting contract.

Documents must contain 3 main components:

Project identifier
 Contract Number
 Document title
 revision number or letter
 Date Tracking number

WXYZ-TYPE-NUM-CIE_ContractNumber document title rev no._sent2015-03-30

Project Identifier

The project identifier must contain:

WXYZ: A 4-8 letter acronym of the project

TYPE: A 2 letter acronym according for the table below.

Acronym	Description
AG	Agenda
ER	Executive Report
MN	Minutes of meeting
PR	Progress Report
PT	Presentation
TN	Technical Note
MM	Animation/Multimedia

NUM: A three digits sequential number (e.g. 001, 002, etc.)

CIE: Name of Company (no space, no hyphen)

Contract Number

For example: _9F028-07-4200-03

Date Tracking Number

_sentYEAR-MONTH-DAY_draft

The *_draft* mention should be removed on the final version of the document once approved by CSA.



Appendix 2 - Data item description (DID)

DID-0001 – Meeting Agenda

PURPOSE:

To specify the purpose and content of a meeting.

PREPARATION INSTRUCTIONS:

The Meeting Agendas must contain the following information, as a minimum:

1) DOCUMENT HEADER:

- a) Title;
- b) Type of meeting;
- c) Project title, project number, and contract number;
- d) Date, time, and place;
- e) Chairperson;
- f) Mandatory and desirable attendance; and
- g) Expected duration.

2) DOCUMENT BODY:

- a) Introduction, purpose, objective;
- b) Opening Remarks: CSA;
- c) Opening Remarks: Contractor;
- d) Review of previous minutes and all open action items;
- e) Project technical issues;
- f) Project management issues;
- g) Other topics;
- h) Review of newly created/closed action items, decisions, agreements and minutes; and
- i) Set or confirm dates of future meetings.

DID-0002 – Kick-off Meeting Presentation

PURPOSE:

To present the Contractor's plan for carrying out the project and to address all significant issues.

PREPARATION INSTRUCTIONS:

The Kick-off Meeting Presentation must contain the following information, as a minimum:

- 1) Review major assumptions for the study
- 2) Review of contract deliverables;
- 3) Work requirements, WBS status and schedule;
- 4) FIP and BIP;
- 5) Licensing issues if any;
- 6) Project's funding and expected cash-flow;



- 7) Presentation to include the required copyrights and IP disclosure;
- 8) Other items as deemed appropriate

DID-0003 – Mid-Term Review Meeting Presentation

PURPOSE:

To present the results of the work done to date in the contract, and in particular since the previous meeting. The mid-term review should discuss the options analysis in terms of the technical, financial, and programmatic issues affecting the mission success. Also, present the recommended option with the TRRA (assessment) and the technology roadmap necessary to achieve the end goal without forgetting the work scope (WBS) necessary to achieve success.

PREPARATION INSTRUCTIONS:

The Mid-Term Review Meeting Presentation must contain the following information, as a minimum:

- 1) Review current status of the work, discuss orientation and preliminary results;
- 2) TRRA and TRM results
- 3) Present options trade study and how contractor went about to select the recommended option
- 4) Proposed preliminary WBS of the recommended option as if the project gets approved.
- 5) Technical and programmatic issues if any;
- 6) Review of contract deliverables;
- 7) Work requirements, work status and schedule;
- 8) FIP and BIP;
- 9) Licensing issues if any;
- 10) Project's funding and expected cash-flow;
- 11) Other items as deemed appropriate;
- 12) Presentation's slides to include the required copyrights and intellectual property disclosure

DID-0004 – Final Review Meeting Presentation

PURPOSE:

To present the overall results of the work done under the contract. In essence, show in detail that the recommended option will be capable of achieving the mission requirements.

PREPARATION INSTRUCTIONS:

The Final Review Meeting Presentation must contain the following information, as a minimum:

- 1) Detailed presentation of the work conducted (presentation of the content of the technical and/or science report, concept, design, interface, feasibility, etc.);
 - 2) Elements of a mission goals, mission concept, operational concept, LCC estimates, etc.;
 - 3) Technical and programmatic issues if any, constraints and assumptions;
 - 4) Review of the TRRA and TRM;
 - 5) Contract deliverables;
 - 6) FIP and BIP;
-



- 7) Licensing issues if any;
- 8) Costing and cash-flow;
- 9) Discuss project management issues;
- 10) Other items as deemed appropriate;
- 11) Presentation slides to include the required copyrights and intellectual property disclosure

DID-0005 – Meeting Minutes

PURPOSE:

To provide a record of decisions and agreements reached during reviews/meetings.

PREPARATION INSTRUCTIONS:

The Meeting Minutes must contain the following information, as a minimum:

- 1) Title page containing the following:
 - a) Title, type of meeting and date,
 - b) Project title, project number, and contract number,
 - c) Space for signatures of the designated representatives of the Contractor, the CSA and the Public Works and Government Services Canada (PWGSC), and
 - d) Name and address of the Contractor;
- 2) Purpose and objective of the meeting;
- 3) Location;
- 4) Agenda;
- 5) Summary of the discussions, decisions and agreements reached;
- 6) List of the attendees by name, position, phone numbers and e-mail addresses as appropriate;
- 7) Listing of open action items and responsibility for each action to be implemented as a result of the review, numbered per the AIL;
- 8) Other data and information as mutually agreed; and
- 9) The minutes must include the following statement:

“All parties involved in contractual obligations concerning the project acknowledge that minutes of a review/meeting do not modify, subtract from, or add to the obligations of the parties, as defined in the contract.”

DID-0006 – Monthly Progress Report

PURPOSE:

To record the status of the work in progress during the previous calendar month. The Progress Report is used by the Government to assess the Contractor's progress in performance of the work.

PREPARATION INSTRUCTIONS:

The Monthly Progress Report must list each deliverable and contain the following information, as a minimum:



- 1) Current % of completion
- 2) Planned and actual completion date
- 3) Brief summary of the work performed in the current month
- 4) The work planned for the following month
- 5) A highlight of problems, if any, and the proposed corrective approach
- 6) A table showing current financial status (cash flow planned vs. actual)
- 7) Any other relevant information deemed necessary.

Based on the above, the Monthly Progress Report should not exceed 3 pages.
This report is required even in the case of a fixed firm price contract.

DID-0007 – Technical Report and business case inputs for Mission Capability Assessment

PURPOSE:

To fully describe the mission, rationale, benefits, objectives, and approaches. Presents the viable options and associated costs and benefits that will undergo detailed analysis and the evaluation criteria that ultimately will be used to determine an overall recommendation. (The author may define and organize additional sub-sections as deemed appropriate to present the comprehensive results of the study).

PREPARATION INSTRUCTIONS:

The Technical Report must contain the following information, as a minimum:

PART 1: Preliminary Technology and Mission Assessment - for the selected mission element contribution category, information shall be provided to allow selection of the best concept at the mid-term review. The advantages and disadvantages (with supporting evidence) of each option/concept should be fully explored and evaluated in terms of the following:

- Ability to contribute toward the desired business outcomes and benefits;
 - Extent to which each of the evaluation criteria are addressed;
 - Estimates of the full costs; and
 - Risks associated with each option.
- a) Mission Description (Overview for selected category): (not in any order)
 - i) Review the mission requirements in Appendix 3,4 or 5, then validate or improve with consultations with others within the space community.
 - ii) Mission/Payload system description.
 - iii) Preliminary description of system performance and functionality
 - iv) Technical approach and possible concepts to meet all mission objectives.
 - v) Provide breakdown of systems to illustrate/assess the Canadian niche capabilities.
 - vi) Mission success criteria (what would be the conditions for full and minimum success).
 - b) Assessment of Canadian Industrial capabilities
 - i) Assessment of current capabilities with respect to anticipated system performance. Can baseline and threshold performance values for the systems be established with current knowledge?
 - ii) Modifications and level-of-effort required to adapt or develop technology.



-
- iii) Assessment of technological capacity within Canada, suggest potential strategic partnerships for each option (Universities, Labs, think-tanks, consulting firms, etc.).
 - iv) Commercialization potential, i.e. other space or terrestrial applications.
- c) Realization Path: Do the options have a realistic Canadian path to success, will it need a pre-development phase, will it need to be tested on ISS (i.e. DTO or tech. demo) before being accepted by the International Partners (IPs).
- d) Viable Options Overview: for all options/concepts (approx. 2-3) in each category:
- i) List the possible options/concepts
 - ii) Describe, explain, and establish for each option
 - (a) Rough development timeline
 - (b) Rough cost estimate or range for mission Life Cycle Costs (LCC)
 - (c) Rough anticipated risks rating and Level of Complexity rating
 - (d) TRL of current systems and a general assessment of the technological risk
 - iii) Cost/Benefit Analysis
 - iv) Development and Operational timelines
 - v) Technological considerations
 1. Description of the system or instrument
 - (a) Preliminary requirements, including environmental, functional and performance
 - (b) Preliminary System budget estimates including, as appropriate:
 - (i) Mass budget
 - (ii) Power budget
 - (iii) Processing/computing budget
 - (iv) Thermal budget
 - (v) Communication budget (e.g. telemetry, WiFi)
 - (vi) Operational timeline budget
 2. Performing a preliminary TRRA at the higher system level
 3. Sub-options description (optional subsystems, add-ons, features and functionality)
 4. Design trades of proposed concepts and technologies (e.g. complexity vs returns)
 5. Software development and budget (e.g. approx. lines of code)
 6. Description of the amplitude of the qualification testing
 7. Scientific returns on investment and advancement of Canadian Science/Medical Community, if applicable
 8. Performance sensitivity
 - (a) Challenges of increasing the capability in terms of cost, level of effort, schedule and risk
 - (b) Main sources of error and uncertainty
 9. Additional information (e.g. required special facilities for testing)
 - vi) Establish the evaluation criteria (an example of which is attached in Table 6). The summary table includes examples of suggested evaluation criteria, however, the contractor has discretion to produce and define their own set of criteria. Supporting evidence should be in the documentation, with the summary in a table. The contractor may choose an approach for score and weight, in order to produce a final comparison between options, and a final recommendation.
-



1. The advantages and disadvantages (with supporting evidence) of each option should be fully explored and evaluated in terms of their costs (total or incremental) and risks.
2. Canadian Industrial capabilities.
3. The potential for a visible Canadian involvement and for inspiration, (i.e. potential for CAD involvement in frequent mission-related press releases that ensure CAD technology contributions remain visible).
4. Evaluate the option criticality to the CSA and GoC for the value proposition and visibility aspects of the mission. Will it garner public and private support. Is it aligned with CSA's strategic goals.
5. Possibility for continuation to use the technology for exploration projects to Mars, or asteroids, i.e. can CSA leverage the present technology to ensure future cooperative ventures with international partners.
6. Potential for leadership roles for Canadian scientists, if applicable.
7. Verify the strategic alignment with Canada's Space Policy Framework (MRD-4) and comment:
 - (a) Canadian Interests First: *National sovereignty, security and prosperity will be at the heart of Canada's activities in space.*
 - (b) Positioning the Private Sector at the Forefront of Space Activities: *Support Canada's space industry to bring to market cutting-edge technologies that meet national interests.*
 - (c) Excellence in Key Capabilities: *Support and advance proven Canadian competencies in telecommunications, remote sensing and robotics while being open to new technological niches.*
 - (d) Progress through Partnerships: *Continue partnerships to share the expenses and rewards of major space initiatives, including working in collaboration with international partners to pool data for mutual benefit and obtain services or technologies that would otherwise be unavailable.*
 - (e) Inspiring Canadians: *Working with industry, universities and colleges, communicate the importance of space to motivate, recruit and retain highly qualified personnel for future careers in science, technology, engineering and math (STEM).*
8. Verify alignment with mission objectives and partnership opportunities.
9. Verify alignment with desired business outcomes.
10. Explain what are the constraints of the options and any assumptions used.
11. Explain which are the essential criteria to select the option, and which are the desirable criteria used or that can be used.
12. Provide rationale for discounted and viable options.

Table 6: Example of a tabular (short) form of evaluation criteria to select recommended option.

Evaluation Criteria (EXAMPLE)		
Option A		
Criteria	Justification	Score/Weight
Cost		
Canadian Capability		



Socio-Economic Benefits for Canadians		
Supports CAD Key Industrial Capabilities		
Commercialization Potential		
Positions Canada for future exploration		
Supports multiple destinations		
Potential to Inspire Canadians		
Partnerships		
Produces new economic sphere		
Potential for spin-offs		
Programmatic Risks		
Technical Risks		
TRRA and Roadmap Showing Feasibility		
Time (will it fit with IPs expectations)		
	OVERALL SCORE:	
	RECOMMENDATION:	

PART 2: For the preferred option selected in Part 1

Once the above options have been packaged and presented appropriately for comparison, one option should stand-out as the go-forward plan which will be used to support the development of a strong business case that links investments with program results and, ultimately, with the strategic outcomes of the organization. A more rigorous analysis of the preferred option is conducted at this point by building on the previous section's analysis. Further development of that preferred option shall be expanded in its explanations and details to allow a thorough understanding.

Nothing in the business case will be questioned or scrutinized more than the justification supporting the recommendation to adopt the preferred option. With the detailed analysis of each viable option performed in the technical report now complete, the goal here is to identify a preferred option and demonstrate why the option is deemed preferable over all others. This section leverages the Preliminary Options Analysis approach where the options are subjected to a comparative analysis. The evaluation criteria and the degree to which the key requirements of the business need are addressed will be measured alongside the findings of the viable options analysis conducted in the technical report.

- a) Executive summary (10 – 15 sentences) Include objectives, Canadian implementation approach, and emphasize alignment to the 5 Principles of the Canadian Space Policy Framework. Summarize with conclusions or recommendations, including only the essential or most significant information to support those conclusions.
- b) Mission considerations
 - i) Mission Requirements (reassessed)
 - ii) Success criteria
 - iii) Operational concept and requirements
 - iv) Enabling Scientific considerations for Canada (if any)
 - v) Enabling Canadian technology involvement and leadership



c) Preferred Option Description

- i) Concept drawings, graphics, animations; whatever is needed to illustrate concept options
 - ii) Description of the system
 - iii) Preliminary System budget estimates including, as appropriate:
 - 1. Mass budget
 - 2. Power budget
 - 3. Processing/computing budget
 - 4. Thermal budget
 - 5. Communication budget
 - 6. Operational timeline budget
 - 7. Software development and budget
 - iv) Preliminary requirements, including environmental, functional and performance.
- d) Cost: A bottom-up costing approach is to be used for all phases of mission including manpower, hardware and facilities. Results are to be delivered in the form of a linkable spreadsheet, broken down by phases, by GoC fiscal years, and by major assemblies or components depending on the ability of the contractor.
- i) Rough order of magnitude value subcontracted out
 - 1. Number of subcontractors and type of work subcontracted
 - 2. Assumptions (including sparing philosophy) and methodology must be clearly presented as well as the recommended risk reserve.
 - ii) Estimate of Canadian Content
- e) Preliminary schedule produce a high level schedule starting from the concept through all phases of the mission, including correlated sequence of development milestones from contract start date through to completion of design, implementation, integration, verification, certification, and delivery (see section 4.3.2.1)
- f) More refined TRRA (see section 4.1.1.5) and Technology Roadmap
- g) Risk assessment (technical & programmatic) and mitigations necessary. The contractor shall suggest descope options that can be implemented, if during the execution of the project, meeting the budget becomes questionable.
- h) Stakeholder Analysis
- i) Initial Measure of Effectiveness/ Measure of Performance for the mission concepts
- j) Fidelity of assessment: Uncertainty in requirements, schedules, risk and low TRL assessments at this stage are not grounds to exclude an option of potential high benefit to Canada from consideration in the Business Case Analysis, but will impact how the results of this study may be used and followed.
- i) How well are Performance and Functional requirements to meet the mission objectives known for the option? State uncertainties and resulting impacts to assessment.
 - ii) Are the challenges of increasing the capability in terms of cost, level of effort, schedule and risk well understood? What is the estimated level of effort to go between threshold



- requirements (must meet to be worth flying) to baseline requirements (expectations of actual performance in a mission context) to augmented requirements (add-ons, nice to have)? This is to gain an understanding of the limits and costs of the performance, and determine if tighter technical specifications warrant the effort.
- iii) Uncertainty in the mass, volume, power and data mission accommodation budgets.
 - iv) Are the technical challenges well understood? What is the estimated level of effort to go between known capabilities and implementations with new levels of optimizations, bearing in mind performance and functionality discussed above.
- k) Recommendations
- i) What were the deciding factors for this option.
 - ii) Recommendation of the Realization Path (e.g. is breadboarding necessary, etc.)
 - iii) Suggestions on which items will be “Long Lead”.
 - iv) Which design trades will need to be studied further and/or more in depth.
 - v) What does the contractor believe is the support from the public, industry, universities, or other government departments, for the Beyond LEO Mission Objectives and provide identification of Key Stakeholders.
 - vi) Detailed conclusions and recommendations for near term priority investments for science and technology development based on results of Business Case inputs.

DID-0008– Contractor Disclosure of Intellectual Property

PURPOSE:

To list all Foreground and Background Intellectual Property related to the project, to be reviewed at the Final Review Meeting.

PREPARATION INSTRUCTIONS:

The Disclosure must address the questions listed the document CONTRACTOR DISCLOSURE OF INTELLECTUAL PROPERTY that can be found at: <ftp://ftp.asc-csa.gc.ca/users/GPITT-IPMTT/pub/>.

DID-0009– Executive Report

PURPOSE:

To fully describe the entire project for dissemination in the public domain.

PREPARATION INSTRUCTIONS:

The Executive Report will be placed in the public domain (e.g. CSA’s library, publication and/or website). The report should not exceed ten (10) pages.



The Executive Report must contain the following information, as a minimum:

- 1) Introduction (~2 pages);
Presentation of overall concept and main objectives. Illustrative picture(s) should be included.
- 2) Concept Overview (2-3 pages);
Discussion on main user/mission requirements, feasibility and compatibility with target mission.
- 3) Technology (~1 page);
Description of the innovative technologies requiring development and summary of the application fields.
- 4) Technology Development Roadmap, Cost and Implementation (2-3 pages);
Schedule, Technology Development Roadmap with TRL and R&D3 (development degree of difficulty), overall cost category, collaboration. For the cost, the following categories must be used:
 - > \$500M
 - \$200 - \$500M
 - \$100M - \$200M
 - \$20M - \$100M
 - \$1M - \$20M
- 5) Business Potential (~1 page);
Business potential, Canadian capabilities development

Note that Canada and the Contractor, or others designated by them, have the right to unrestricted reproduction and distribution of the Executive Report. The report must include the following proprietary notice:

© CANADIAN SPACE AGENCY, yyyy (insert year)

Permission is granted to reproduce this document provided that written acknowledgement to the Canadian Space Agency is made.

DID-0010 – Final Data Package

PURPOSE:

The Final Data Package is a collection of all documents to be presented by the Contractor at the end of the contract.

PREPARATION INSTRUCTIONS:

The Final Data Package must consist of the final/revised version of all deliverables requested under the present contract (electronic copy). For example, with no limitation, the final data package should include presentations, minutes, monthly progress reports and other required deliverables in their final revision. It must also include the contractor disclosure of intellectual property and project evaluation sheet.



DID-0011 – Contractor Performance Evaluation

PURPOSE:

To provide an evaluation of the overall success of the project.

PREPARATION INSTRUCTIONS:

The Contractor Performance Evaluation must contain the following information, as a minimum:

- 1) Was the project completed on schedule (list deliverables with planned and actual delivery date)?
- 2) How many man-hours of highly qualified personnel (by category) did this work create or maintain?
- 3) New opportunities created by the work conducted under the study.

DID-0012 – Action Items Log

PURPOSE:

The Action Item Log (AIL) lists, in chronological order, all items on which some action is required, allows tracking of the action, and in the end provides a permanent record of those Action Items (AI).

PREPARATION INSTRUCTIONS:

The Action Item Log (AIL) must be in a tabular form, with the following headings in this order:

- 1) Item Number;
- 2) Item Title;
- 3) Open Date;
- 4) Source of AI (e.g. PDR meeting, RID, etc.);
- 5) Originator;
- 6) Office of Prime Interest (OPI);
- 7) Person responsible (for taking action);
- 8) Target/Actual Date of Resolution;
- 9) Status (Open or Closed); and
- 10) Remarks.

note: The date in column 8 will be the target date as long as the item is open, and the actual date once the item is closed.



DID-0013 – Technology Readiness and Risk Assessment Worksheets and Rollup

PURPOSE:

The Technology Readiness and Risk Assessment provides for all the elements of the proposed concept, as per Product Breakdown Structure (PBS), a high-level summary of the maturity of the technologies and the technology development risks.

PREPARATION INSTRUCTIONS:

The Technology Readiness and Risk Assessment be done using MRD-6 for the selected technology and rolled-up into a summary using MRD-8. The Critical Technology Element Identification Criteria should be provided in Worksheet (MRD-9). See section 4.1.1.5.

DID-0014 – Technology Roadmap Worksheets

PURPOSE:

The Technology Roadmap provides an overview of the required technology developments to meet mission needs and the plan and timeline to reach TRL 6 and 8.

PREPARATION INSTRUCTIONS:

The Technology Roadmap to be done using MRD-10.

DID-0015 – Cost

PURPOSE:

The cost and estimated Canadian content is critical for planning and implementation of potential follow on technology and mission developments.

PREPARATION INSTRUCTIONS:

The cost breakdown must provide the following elements:

- a) Labour and non-labour costs, G&A, O/H, profits, etc. (see table 3)
- b) Broken down by Phases – Phase 0-A, B-C-D, E and F
 - a. Phase E cost to include support for operations, failure support (Troubleshooting, with assumptions)
- c) Broken down by Government Fiscal Year
- d) Broken down by WBS element
- e) Rough order of magnitude value subcontracted out
 - a. Number of subcontractors and type of work subcontracted
- f) Assumptions (including sparing philosophy) and methodology must be clearly presented as well as the recommended risk reserve.



- g) A bottom-up, analogous, or parametric costing approach is to be used for all phases of mission including manpower, hardware and facilities. Results are to be delivered in the form of a linkable spreadsheet, broken down by phases, by GoC fiscal years, and by major WBS elements
- h) Assumptions (including sparing philosophy) and methodology must be clearly presented as well as the recommended risk reserve.
- i) Estimate of Canadian content

DID-0016 – WBS

PURPOSE:

The Work Breakdown Structure (WBS) is used during planning for estimating resources and scheduling the work. During the implementation phase, it is used for reporting and controlling costs and schedule.

PREPARATION INSTRUCTIONS:

The Contractor must provide an integrated Work Breakdown Structure (WBS) describing all the project elements that organise and define the total scope of the project including subcontracted work, and must be deliverable-oriented.

The Contractor must prepare and maintain a WBS Dictionary and Work Package Descriptions (WPDs) for every element to the lowest level of the WBS. Each WPD must include, as a minimum:

- a) A unique identifier traceable to the WBS;
- b) A title;
- c) The scope of the work package;
- d) The start date and duration;
- e) Required inputs and dependencies;
- f) A preliminary description of every activity covered by the WPD;
- g) Assumptions;
- h) Output and work package acceptance criteria;
- i) Issue date;
- j) Version number; and
- k) List of deliverables



Appendix 3: Category 1: Advanced Crew Medical System

1. Mission Contribution Study

1.1 Introduction

An Advanced Crew Medical System (ACMS) is a critical capability where Canada can develop a niche that will position Canada to be ready for future space exploration opportunities. Exploitation of terrestrial spin-offs will also benefit Canadian industry.

As future human spaceflight missions extend beyond Low Earth Orbit (LEO), the greater physical distances and mission durations, as well as volume and mass constraints and limited medical training will result in:

- 1) Reduced opportunity for the quick return of a sick or injured crewmember to definitive medical treatment on Earth;
- 2) Increased communications time delays making real-time telemedicine interactions impossible for much of the mission;
- 3) Limited medical resources;
- 4) Limited medical specialist expertise of crewmembers and the potential rendering of medical care by non-clinicians.

As a result, future exploration-class missions will require the development of medical support technologies that provide the crew with enhanced medical autonomy. Critical to the provision of medical autonomy, will be the requirement for:

- 1) Highly integrated medical care system allowing for:
 - a. automated health data collection (from medical devices and physician-patient encounters), as well as
 - b. data management (storage, synchronization, display and control);
- 2) Decision support capabilities to aid in:
 - a. diagnosis of medical conditions,
 - b. development of treatment plans, and the
 - c. implementation of medical procedures;
- 3) Enhanced medical monitoring of the crew.

In 2013, to address this need, a concept for an Advanced Crew Medical System (ACMS) was developed (RD-1). A simplified version of the ACMS concept diagram is shown in figure 1.

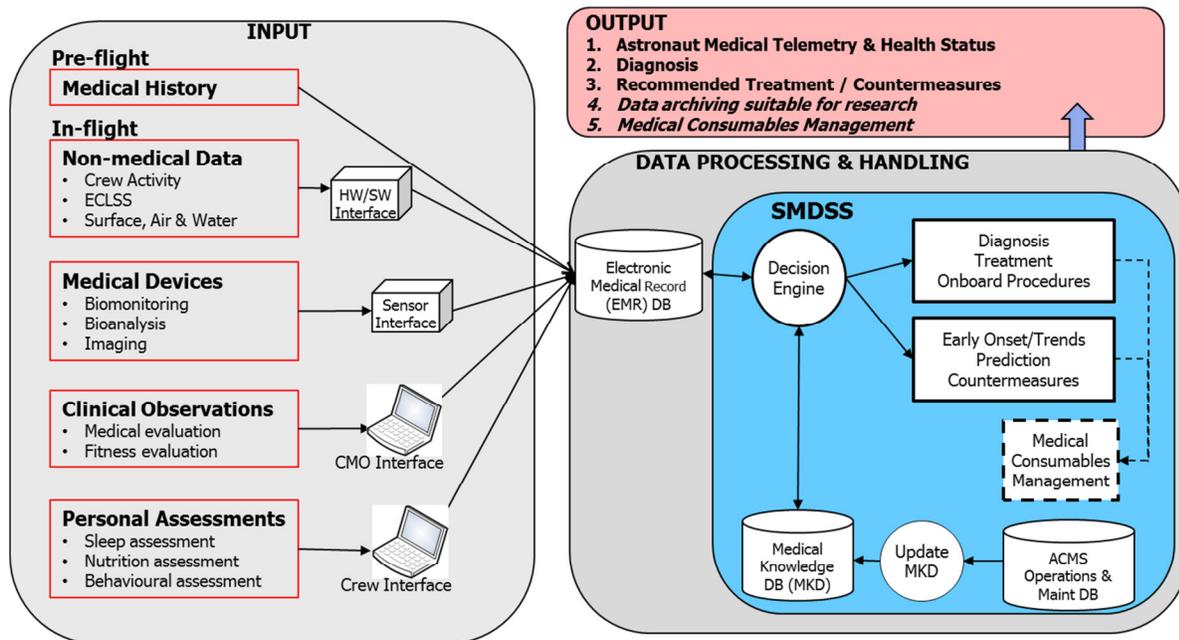


Figure 1: Conceptual diagram of an Advanced Crew Medical System (ACMS)

1.2 Reference and Applicable Documents

Table 7: Reference Documents.

RD No.	Document Title	Rev	Date
RD-1.	ACMS Technical Report , #NDG011879 (under contract 9F052-12-0307/005)	2	Nov 2013

1.3 Scope

At this stage, there is no commitment to what might be a Canadian contribution to the Beyond LEO missions, if any, and mission requirements for later phases in the campaign are not yet formulated at a detailed level. However, a high level survey and assessment of possible Canadian contributions can be extremely valuable to the Canadian Space Agency in recommending options to the government for informed decision-making about future investment.

The generic task description of Annex A – Statement of Work, provides the generic work scope envelope covering a preliminary mission assessment, development of business case inputs, as well as programmatic deliverables. **This Appendix provides other considerations to allow the bidder to better refine their concepts, to better align their systems with the mission objectives, and to better establish cost and schedule estimates based on the WBS herewith.** The ACMS Concept Study (RD-1) provided an initial concept for an advanced crew medical system as well as top-down estimates of cost and schedule. This RFP will allow for a review and refinement of RD-1, or a proposed alternate concept, as well as a more detailed bottom-up approach for cost and schedule.



1.3.1 Mission Architecture

There is an unmet need, not currently being fully addressed by other space agencies, to provide medical autonomy (health monitoring, diagnosis, treatment and management of medical resources) to astronauts on long-duration exploration-class missions (e.g. an extended sojourn in Mars space). Development of such a capability, that can be incorporated into international exploration missions, presents an opportunity for Canada to provide a mission critical element.

The ACMS is an integrated system that would assist the Crew Medical Officer (CMO) with the health management of the crew on future long-duration exploration-class missions. The ACMS would include an Electronic Medical Record (EMR) database to store health data captured from peripheral medical devices (via Sensor Interfaces), other non-traditional health-related data (crew activity, environmental data etc.), patient-encounter data such as history and physical examination results acquired by the CMO, as well as crew personal assessments (sleep, nutrition, behaviour) via user interfaces. Health data would be analyzed by a clinical Decision Support System (DSS) entitled the Space Medicine Decision Support System (SMDSS), which would include a medical knowledge repository or database (MKD) and Decision Engine (DE), in order to determine a health assessment or to assist the CMO in the diagnosis and treatment of a sick or injured crewmember. The MKD would contain coded clinical guidelines and best practices (models). The DE would process the medical knowledge models and apply them to the data stored in the EMR allowing an assessment of crewmember health, and if required, a diagnosis and prescribed treatment plan. The MKD would be maintained through regular updates to clinical best practices and clinical guidelines as they become available.

The SMDSS would also allow for the continuous monitoring of specific health metrics for the purposes of early onset detection and eventual prediction of potential disease states with the goal of early intervention, thus minimizing crew downtime and amount of medical consumables required to return the crewmember to a healthy state.

As such, the SMDSS would provide two functions:

- 1) Clinical diagnosis and treatment. Application of medical decision models to the coded medical data in the EMR resulting in a differential diagnosis which fit the observable data, and eventually a definitive diagnosis and prescribed treatment plan. By tracking medical reserves and treatment plans, the ACMS would also assist in the management of medical consumables, offering treatment options depending on availability or predicted future need of the consumables.
- 2) Health state monitoring and early detection and prediction. Early identification of changes in crewmember health status in order to allow proactive intervention. This would involve regular monitoring of key astronaut health parameters through a combination of sensors located on the astronaut, as well as additional interface devices used to capture other health related metrics (health state questionnaires) as well as non-health related metrics (environmental data). Early detection would likely require the development of individualized health state models, allow the identification and notification when health parameters are outside of normal levels, as well as recommend countermeasures to prevent or minimize the disease or injury. This continuous monitoring (medical hovering) of crewmembers would, in the least, allow the early detection of health changes, and at best, predict the development of a disease state, a process analogous to health and on-demand maintenance of machines.

The ACMS could also allow for maintenance as well as acquisition of CMO medical skills through integrated training modules.



1.3.1.1 Mission Objective and User Needs

High-level mission objectives, needs and requirements should be aligned with the Canadian Space Policy Framework objectives and priorities. Table 2 states the overall mission objective or goal for the mission as well as the user needs, which in this case can be viewed as the needs of the crew. The mission objective also lists the full and minimum success criteria in order to establish the trade space for the mission concepts. The bidder must investigate options that support the mission objective and meet the user needs.

Table 8: Mission Objective and User Needs Summary

Mission Objective	
During long duration Beyond LEO Space missions, where communications with Earth may be delayed or non-existent and where medical evacuation is not an option, the Advanced Crew Medical System (ACMS) shall autonomously assist the Crew in health management, diagnosis and recommended treatment.	
Full Success Criteria	Crew health status is monitored with <u>no ground support</u> . There is <u>no degradation in the crew's abilities to perform the space mission</u> , and medical conditions listed in the ACMS database are detected if encountered and adequate treatments are recommended.
Minimum Success Criteria	Crew health status is monitored with <u>minimal ground support</u> , and medical conditions listed in the ACMS database are detected if encountered, and adequate treatments are recommended.
User Needs	
Medical Autonomy	The crew needs assistance in maintaining health, and with the diagnosis and treatment of illness and injury in the absence of any communications with medical support personnel or infrastructure on Earth.
Relevant Medical Conditions	Depending on the medical knowledge and skills of the crew, and the potential incidence and impact of the condition, the crew will need support in the diagnosis and treatment of a predefined subset (TBD) of medical conditions. The crew will not require medical autonomy for every conceivable illness or injury.
Crew Health Monitoring & Early Detection	In order to minimize the impact of a potential illness, the crew will require continuous health monitoring (both near real-time and periodic) and assistance in predicting decrements in crew health to allow for early detection and mitigation of illness progression.
Medical Diagnosis	In the event of illness or injury, the crew will need assistance in the diagnosis of the medical condition.
Medical Treatment	In the event of illness or injury, the crew will need assistance in the prescription of an appropriate set of actions and/or treatment plan commensurate with the skill sets of the crew and available medical consumables.
Skill Maintenance and Acquisition	Due to the potential long duration of future exploration missions, the crew will need the capability (integrated training modules) to maintain their medical knowledge and skills, as well to acquire new knowledge and skills in order to manage new medical risks or to cope with an immediate medical situation.

1.3.1.2 Functional Requirements as guidelines

Preliminary Functional Requirements (FR) for an ACMS are provided in Table 9. These are provided to once again allow the bidder to better hone their proposal to suit the mission. These FRs may be revisited



as the project progresses through its trade studies and/or feasibility studies. These FRs should also allow the bidder to propose better concept options to be presented in the preliminary business case. Further supporting requirements may be found in the reference listed in Table 3.

Table 9: ACMS preliminary functional requirements

	Functional Requirement
Medical Autonomy	The ACMS shall be able to medically assist the crew in the absence of any communications with medical support personnel or infrastructure on Earth.
Relevant Medical Conditions	The ACMS shall diagnose and provide treatment options for a predefined list of medical conditions (TBD) which will be determined based on the medical knowledge and skills of the crew, and the potential incidence and impact of the condition.
Crew Health Monitoring	The ACMS shall provide continuous (both near real-time and periodic) monitoring of crew health parameters.
Data Acquisition and Storage	The ACMS shall be capable of acquisition and storage of all data relevant to crew health including those from medical devices (including on-astronaut sensors, laboratory analysis, imaging etc.), crewmember or CMO clinical observations (based on CMO-patient encounter), crewmember assessments, as well as non-medical data relevant to crew health (crew activity, environmental data).
Data Standards	To the extent possible, the ACMS shall code, store and communicate medical data in a standard that is internationally recognized, and is mapped to other international standards (eg. SNOMED-CT).
Medical Diagnosis	The ACMS shall be capable of diagnosing all relevant medical conditions.
Medical Treatment	The ACMS shall be capable of prescribing an appropriate set of actions or treatment options for all relevant medical conditions.
Prediction or Early Detection	The ACMS shall be capable of correctly predicting decrements in crew health with sufficient forewarning to allow for mitigation.
ACMS Updates	Within the limits of available communications to the ground, the ACMS shall be capable of receiving and implementing periodic, or on-demand, updates. This will include software updates, revised or new medical diagnosis and treatment models, medical procedures and training modules.
Communication with Ground-based Medical Infrastructure and Personnel.	Within the limits of available communications to the ground, the ACMS shall communicate crew health status, diagnosis and treatment plans to ground-based medical personnel. This will include regular, or as requested, complete data synchronization with ground-based medical infrastructure as well as flight surgeon recommendations/diagnosis based on the crew member evolving state.
Training	The ACMS shall provide training capabilities for medical knowledge and skill maintenance and acquisition of the crew in order to maintain their proficiency, acquire new knowledge and skills to manage new medical risks, as well as just-in-time training in order to cope with an immediate medical situation.
Self-Health	The ACMS shall incorporate self-diagnostic routines and equipment to allow it to identify and isolate faults or failures, and shall maintain and forward to the ground for analysis, a log of all actions and



	interactions.
Security	The ACMS shall include data security functions commensurate with the sensitive nature of the medical information it maintains.
Open Architecture	The ACMS shall be based on an open architecture concept that allows for addition of future modules/components.
Interference with Crew Activities	To the extent possible, the ACMS shall automate data acquisition and analysis functions, such that it has minimal impact on normal crew activities.

The mission level concept assessment at this stage, although not guaranteed to go-forward, could present a compelling case to the approval authorities to contribute to the international future exploration effort.

1.3.1.3 Work Breakdown Structure

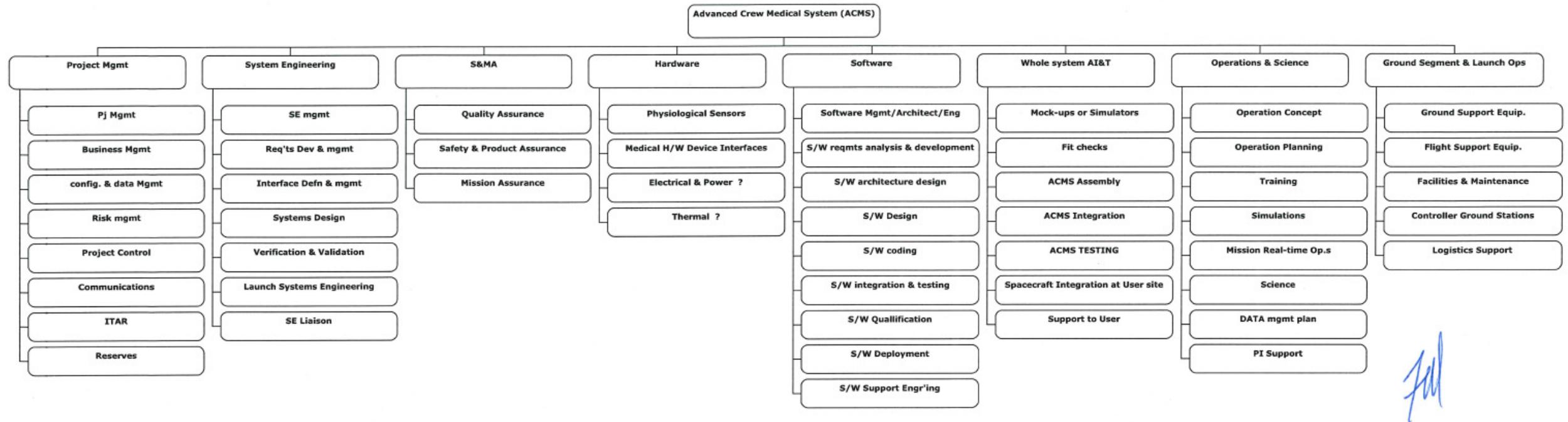
Any Project work must be planned, controlled and directed according to a Work Breakdown Structure (WBS) and associated WBS Dictionary to be provided with the proposal as per CDRL 17. The WBS Work Package Descriptions (WP) defines the work to be done against each WBS element identified in the WBS. At the mid-term review, discussion of the preliminary WBS can be held and then be further refined for the PCAR milestone at the end of the contract. This WBS can be used for the “full” mission.

CSA has included a draft WBS (see Figure 2) for the contractor to start from. This WBS may be used for the “full” mission, or a subset can be tailored for the International Space Station (ISS) Detailed Technical Objective (DTO). Variations to the proposed WBS are possible due to the contractor’s internal project management processes; however, if the contractor decides not to use this version, an explanation and an alternate WBS is expected from the contractor at the mid-term review. CSA may also provide a WBS dictionary at the KOM in order to provide a better understanding of each element in the WBS. With this more ample information as to the scope of the ACMS project, it is hoped that the contractor can then provide more detailed WP descriptions (WPD) in order to better assess the cost and schedule parameters.

The WBS must include all aspects of the system development including that of the development and validation of medical models for health assessment, diagnosis and treatment. Where science or development studies are required for model development, these must be identified, mapped, and estimates provided for cost and schedule.



Figure 2 Work Breakdown Structure for ACMS (proposal)



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1.4 List of Acronyms

ACMS	Advanced Crew Medical System
AD	Applicable Document
CDRL	Contract Data Requirements List
CMO	Crew Medical Officer
CSA	Canadian Space Agency
CSEW	Canadian Space Exploration Workshop
CTE	Critical Technology Element
DE	Decision Engine
DID	Data Item Description
DSS	Decision Support System
DTO	Detailed Technical Objective
EDU	Engineering Development Unit
EMR	Electronic Medical Record
E2E-iSAG	End-to-End International Science Analysis Group
FR	Functional Requirements
FRM	Final Review Meeting
FTP	File Transfer Protocol
ISS	International Space Station
KOM	Kick-Off Meeting
LEO	Low Earth Orbit
MKD	Medical Knowledge Database
MTR	Mid-term Review
RD	Reference Document
RFP	Request For Proposal
ROM	Rough Order of Magnitude
SDT	Science Definition Team
SMDSS	Space Medicine Decision Support System
SOW	Statement of Work
SRL	Science Readiness Level
TBC	To Be Confirmed
TBD	To Be Determined
TRL	Technology Readiness Level
TRM	Technology Roadmap
TRRA	Technology Readiness and Risk Assessment
WBS	Work Breakdown Structure
WP	Work Package



WPD	Work Package Descriptions
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Appendix 4: Category 2: Beyond LEO Relative Navigation System (BLRNS)

1 Mission Contribution Study

1.1 Introduction

For more than two decades, CSA has been investing in technologies aimed at providing robust relative navigation systems for space. More precisely, this technology has been successfully demonstrated under joint NASA/CSA funding, during 3 shuttle Detailed Test Objective (DTO) flights, namely, STS-128, STS-131 and STS-135. A direct derivative of this technology is now being used for mission critical purposes on board Orbital's Cygnus resupply vehicles. However, these demonstrations have always been operated from the Visiting Vehicle's (VV) point of view, never from the International Space Station (ISS) point of view. One can imagine a system, similar to an air traffic control system, monitoring the incoming and departing VV from the ISS. In 2011, NASA and CSA, in a joint effort, investigated the feasibility of deploying a system to monitor incoming and departing VV on the ISS. This system was envisioned to be installed at different locations on the ISS, thus covering the different approaches of the different docking and berthing ports of the orbital station. The study successfully completed Phase A with Systems Requirements Review (SRR). It demonstrated the feasibility of such a system, although the requirement to monitor the relative attitude of the VV was levied on the spacecraft. NASA and other international partners concurred that a global relative navigation system, based on the Space Station side (as opposed to a spacecraft mounted system) would be the preferred solution for the future. The planning of the next generation Space Station is therefore a good opportunity to assess the development of a relative navigation system on this new Space Station.

1.2 Scope

At this stage, there is no commitment to what might be a Canadian contribution to the Beyond LEO missions, if any, and mission requirements for later phases in the campaign are not yet formulated at a detailed level. However, a high level survey and assessment of possible Canadian contributions can be extremely valuable to the Canadian Space Agency in recommending options to the government for informed decision-making about future investment.

This appendix provides the work scope envelope and other considerations to allow the Bidders to better refine their concepts, to better align their systems with the mission objectives and to better establish cost and schedule estimates based on the WBS herewith.

1.2.1 Mission Objectives

The high-level mission objectives are as follows:

- Monitor incoming and departing visiting vehicles.
- Provide a mission critical service.
- Provide this service for a period of 10 years.
- Deployed on a Space Station part of a Beyond LEO mission.

1.2.2 Mission Requirements

This section presents the mission level requirements. Some portions of the requirements are intentionally left as to be determined (TBD) to avoid driving toward a specific technical solution. It is expected that these numbers will be jointly developed between CSA and the Contractor during this study. Moreover, these requirements are meant as a starting point for developing the concept of the mission. It is thus expected that these requirements will be reviewed, tailored and that additional requirements will be developed during this concept study.



1.2.2.1 Terminology

This specification uses specific verbs to designate requirements and goals. The following verbs are used within this document with specific intent:

- “SHALL” indicates a mandatory requirement which must be formally verified;
 - “SHOULD” indicates a preferred alternative but is not mandatory;
 - “MAY” indicates an option; and,
 - “WILL” indicates a statement of intention or fact as does the use of present indicative active verbs.
- Usage of the adverb “herein” refers to the requirements as captured in this same document.



1.2.2.2 Functional Requirements

Requirement Code	Title	Description	Rationale/Note
MRQ-FCT-BLRNS-001	Far Range Navigation Data	The BLRNS shall provide line of sight (LOS) data of the VV at long range (TBD meters).	
MRQ-FCT-BLRNS-002	Near Range Navigation Data	The BLRNS shall provide full 6 DOF information about the VV at close range (TBD meters).	
MRQ-FCT-BLRNS-003	Working Range	The BLRNS shall provide relative navigation data in the range of 2m to 40 km.	Cover the entire approach down to docking.
MRQ-FCT-BLRNS-004	Imaging Functionality	The BLRNS shall have 3D imaging capabilities	Assess safety clearance and other surveying tasks as needed.
MRQ-FCT-BLRNS-005	Automatic Acquisition	The BLRNS shall automatically acquire the VV when it becomes inside its field of view.	Minimize manual operation.

1.2.2.3 Interface Requirement

Since there is no information on interfaces at this stage, only one high level requirement capturing the intent is presented. It is expected that the Contractor further develops requirements based on the concept of operations being developed during this study.

Requirement Code	Title	Description	Rationale/Note
MRQ-INT-BLRNS-001	Beyond LEO Space Station Interface	The BLRNS shall comply to the different interfaces of the Beyond LEO Space Station: mechanical, command and control, thermal, electrical	Expected to be further developed on the concept study phase, reflecting the concept of operations.



1.2.2.4 Environment Requirements

The environment is the element of the study which presents the most uncertainty. It is expected that the Contractor will have to derive a set of requirements based on the natural environment of the Cis-Lunar orbit.

Requirement Code	Title	Description	Rationale/Note
MRQ-ENV-BLRNS-001	External Environment Survival	The BLRNS shall be designed to survive the Beyond LEO Space Station external environment, for a period of 10 years.	The assumption is that this system will be providing a mission critical service, therefore 10 years is the expected time. Note that this requirement can also be met by an appropriate sparing approach.
MRQ-ENV-BLRNS-002	Launch Vibration Environment	The BLRNS shall operate nominally after being exposed to the launch vibration environment.	
MRQ-ENV-BLRNS-003	Shock Environment	The BLRNS shall operate nominally after being exposed to the launch shock environment.	
MRQ-ENV-BLRNS-005	Environmental Lighting Conditions	The BLRNS shall be immune to environmental lighting conditions, except when the sun is in its field of view.	



1.2.2.5 Performance Requirements

Requirement Code	Title	Description	Rationale/Note
MRQ-PRF-BLRNS-001	Target Acquisition Time	The BLRNS shall automatically perform acquisition of the VV within 90 seconds when the target is in the operational field of view and range.	Minimize manual operation and operation time.
MRQ-PRF-BLRNS-002	Tracking Update Rate	The BLRNS shall provide LOS and 6DOF guidance information at least twice per second (2Hz) with a target of 4 times per second (4Hz).	Typical GNC requirement.
MRQ-PRF-BLRNS-003	Coverage Area	The BLRNS shall cover and area of TBD x TBD degrees.	The coverage area has to be large in order to cover the expected different approaches trajectories of the VV, it is expected there will be more trajectories than for the ISS (LEO).

1.2.2.6 Operations Requirements

There is currently only one operations requirement outlining the importance of having autonomous operations where possible. It is expected that additional operations requirements will be developed during the course of this study.

Requirement Code	Title	Description	Rationale/Note
MRQ-OPS-BLRNS-001	Self Calibration	The BLRNS shall have the capability to perform self-calibration.	Reduce operations.

1.2.2.7 Software Requirements

This section presents a preliminary set of software requirements, reflecting the need for standardized data and software updates from ground.



Requirement Code	Title	Description	Rationale/Note
MRQ-SW-BLRNS-001	Upgradable from Ground	The BLRNS shall have the capability to upgrade its different CSCIs, namely, software, firmware and configuration files, from ground.	Allow for growth, bug fixes, configuration of different VV as needed.
MRQ-SW-BLRNS-003	Navigation Data Format	The Navigation Data provided by the BLRNS shall consist, as a minimum, of a quaternion representing the orientation, a 3 dimensional vector representing the translation in x,y and z and a time stamp expressed in a common time reference.	

1.2.2.8 Mass Power and Volume Requirements

This section captures the mass, power and volume requirements.

Requirement Code	Title	Description	Rationale/Note
MRQ-ELE-BLRNS-001	Power Consumption	The BLRNS shall not consume more than TBD watts of power.	Realistic power consumption numbers will be developed during this study.
MRQ-PHYS-BLRNS-001	Mass	The BLRNS shall have a mass of TBD or lower.	Realistic mass numbers will be developed during this study.
MRQ-PHYS-BLRNS-002	Volume	The BLRNS shall not occupy a volume greater than TBD Liters.	Realistic volume numbers will be developed during this study.



1.2.3 Work Requirements

This section presents clarifications to the work previously defined in Annex A. Although the deliverables defined in Annex A are generic in nature, the following items are specified in more detail for the Relative Navigation concept study and must be included.

1.2.3.1 Mission Scenarios

It is expected that the Contractor develops mission scenarios (use cases) providing rationale for the concept of operations and mission requirements and also, rationale for modifying previously presented mission requirements.

1.2.3.2 Requirements Definition

It is expected that the Contractor reviews and tailors the mission level requirements presented in Section 1.2.2 and provides additional mission requirements. Additionally, it is expected that system level requirements are developed where deemed necessary and possible.

1.2.3.3 Trade offs

The trade-off analyses demonstrate that the proposed concept is the optimum choice for the mission. The Contractor must perform analyses and studies to optimize the system design, select between alternative design choices and determine the best allocation of requirements and resources between subsystems. As a minimum, the following must be considered for each trade-off study:

- a. Purpose of the study;
- b. Cases considered;
- c. Analysis description (alternatively, pros and cons);
- d. Analysis results;
- e. Decisions/Recommendations

1.2.3.3.1 Sensor Types

Rational for selecting the different types of sensors that will be part of the BLRNS is expected in order to make sure the nominal suite of sensors is selected.

1.2.3.3.2 Autonomy

Since Beyond LEO missions are expected to require a higher level of autonomy, a trade off study on the level of autonomy vs human in the loop is expected in order to provide rationale for developing and demonstrating higher autonomy.

1.2.3.3.3 Sensor Package Tradeoff

It is expected that, as part of the conceptual design exercise, a packaging tradeoff must be performed. The different options are, without being limited to:

- One sensor per docking / berthing location, possibly mounted on a pan and tilt unit.
- One robotically deployed sensor that can be used as a tool by a robotic arm.
- One robotically deployed sensor integrated in the robotic arm. Similar to the model of the current MSS cameras.

1.3 List of Acronyms

6 DOF	6 degrees of freedom
BLRNS	Beyond LEO relative Navigation System
CSCI	Computer Software Configuration Item
DTO	Detailed Test Objective
ISS	International Space Station
LEO	Low Earth Orbit
LOS	Line of Sight



MSS Mobile Servicing System
STS Space Transportation System
VV Visiting Vehicle
WBS Work Breakdown Structure



Appendix 5: Category 2: Deep Space Robotic System

1. Mission Contribution Study

1.1 Introduction

The Deep-Space Robotic System (DSXR) is a critical capability where Canada can develop a niche that will position Canada to be ready for future space exploration opportunities. Exploitation of terrestrial spin-offs will also benefit Canadian industry. **Positioning the Private Sector at the Forefront of Space Activities** - The DSXR Tech. Dev. and Demo. will keep Canadian industry in the forefront of space robotics technology for space exploration, which, in the long term, continuing the legacy of the Canadarm. It will provide high quality employment for Canadians. The private sector will also be in a position to exploit the technology for terrestrial applications. **Progress Through Partnerships** - Human exploration-class missions beyond LEO represent a major initiative and a shared goal requiring multinational collaboration and cooperation. The DSXR Tech Demo offers such an opportunity. **Excellence in Key Capabilities** - With the DSXR Tech. Dev. and Demo. Project, the Government will continue to support and advance Canadian competencies while maintaining technological niches where Canada can excel. **Inspiring Canadians** - The development of robotic technologies for space exploration missions has always received strong, positive interest from the media and the general public and would be a motivating influence to young Canadians to pursue careers in science and technology.

As such, the goal is to identify potential Canadian contribution that Canada may offer to a potential beyond LEO mission campaigns. This study is part of the implementation of the Space Policy Framework of Canada in which the Government is particularly committed to ensuring that Canada remains a sought-after partner in international space exploration missions that serve Canada's national interests; and to continue investing in the development of advanced systems and scientific instruments in the context of major international initiatives.

1.2 Scope

At this stage, there is no commitment to what might be a Canadian contribution to the Beyond LEO missions, if any, and mission requirements for later phases in the campaign are not yet formulated at a detailed level. However, a high level survey and assessment of possible Canadian contributions can be extremely valuable to the Canadian Space Agency in recommending options to the government for informed decision-making about future investment.

This appendix provides the work scope envelope and other considerations to allow the Bidders to better refine their concepts, to better align their systems with the mission objectives and to better establish a cost and schedule estimates based on the WBS herewith.

1.2.1 Canadian Contribution Options

1.2.1.1 Mission Architecture

A deep-space habitat in beyond low-earth orbit can serve a variety of functions to expand space exploration opportunities. Such a habitat could be waypoint to destinations such as the moon, Mars and asteroids. A robotics element on the deep-space habitat can valuable services to the mission, in addition providing mass savings over the life of the habitat. Development of such a capability, that can be incorporated into international exploration missions, presents an opportunity for Canada to provide a mission critical element and for a Canadian astronaut to be included as part of the exploration crew.

At present, CSA is seeking input for potential contributions to beyond LEO missions.



1.2.1.2 Mission Requirements

High-level mission requirements should be aligned with the Canadian Space Policy Framework objectives and priorities. Table 2 states the primary mission requirements with supporting rationale. In short, the DSXR mission requirements support the accomplishment of the deep-space habitat mission requirements. The DSXR must accomplish the mission elements in Table 2. These mission elements are, like those of the MSS on the ISS, essential to assembly and ongoing operations and maintenance associated with an output in Beyond Low Earth Orbit (BLEO).

The contractor must investigate options that support the campaign objectives, and are compliant to these campaign requirements (or where appropriate, do not impede compliance to the requirements). The contractor may suggest additional mission requirements as part of their investigation and must provide rationale. Further supporting documents on the DSXR Mission concepts may be found in the references listed in **Table 3**.

Table 10: Deep Space Robotics Mission Requirements Summary

Mission Element	Requirement Text and Rationale
Capture	To support mobility on the DSH, the DSXR must be able to capture fixtures located on the output.
Capture Free-Flyer	One means of resupply and logistics of the DSH will be via visiting vehicles that are robotically captured. The DSXR must capture free-flying vehicles and modules when commanded. It can be assumed module mass to be between 10mT and 40mT.
Release	The DSXR must release modules when commanded. Part of the resupply and logistics cycle or other activity, modules will need to depart from the outpost and one means would be to robotically release the module. This is intended to cover both release of a berthed module, and when releasing a module at the end of un-berthing.
Berth	The DSXR must berth modules to the DSH when commanded.
Docking	The DSXR must have the capability/function to assist a vehicle onto a docking system. Some vehicles' primary means of attachment to the deep space habitat will be via direct docking (e.g. Space Shuttle to ISS, or Soyuz to ISS). However, the DSRM may be required to assist the vehicle in the case of deep space habitat. (Note that docking systems and berthing systems have different interface characteristics).
External Maintenance	Perform external maintenance activities. These may include (i) fasten/unfasten bolts, (ii) remove/replace ORU's, (iii) attach/detach utilities. The external of the DSH may require occasional maintenance or external logistics operations or preparation activities. Especially important during long periods between human presence.
Inspection/Viewing	Inspect all external DSH surfaces. The DSH and its elements are subject to wear and exposure. Periodic inspection of surfaces, mechanisms, or other elements of the DSH would be beneficial data for its maintenance and if required, repair. Inspection could be via thermal, visual (HD camera), laser or other sensor types.
EVA Support	Support EVA activities. It may be possible that astronauts will need to perform EVA. In this case, the DSRM would support by providing EVA commanded transportation, relocation and/or visual support.



1.2.1.3 Functional Requirements as guidelines

Preliminary Functional requirements for DSXR are provided in Table 9. These are provided to once again to allow the contractor to better hone their proposal to suit the mission. These FR may be revisited as the project progresses through its trade studies and/or feasibility studies and matures as a project. These FR should also allow the contractor to propose better concept options to be presented in the preliminary business case.

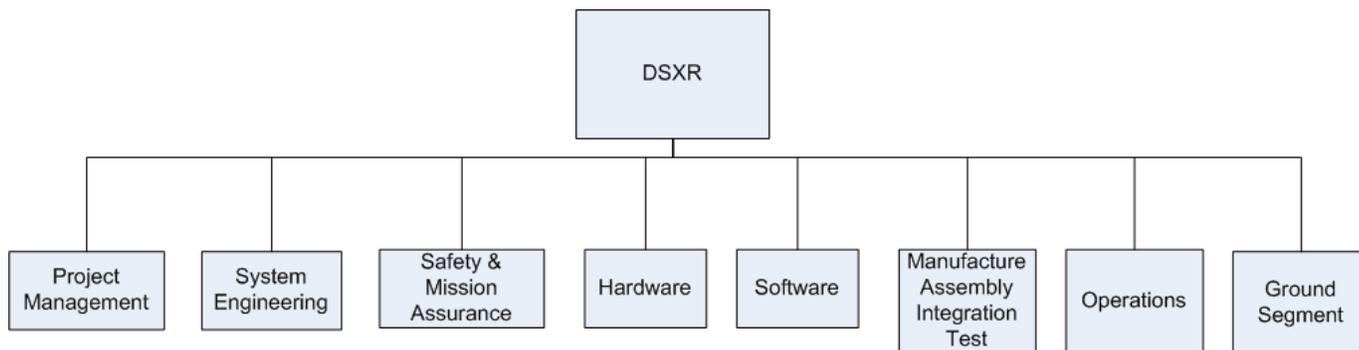
Table 11: Functional requirements for DSXR mission elements

Functional Requirement	Functional Description
Modular	The DXRS shall be composed of similar modules. These modules include: ORU's, Avionics units, Software, Internal high-speed bus. Intent is to have inter-compatibility, interchangeability, and commonality with modules. Allows for maintenance and minimization of logistics.
Situational Awareness	The DSXR must be aware of (i) it's own kinematic pose, (ii) the items it will capture, (iii) the DSH configuration to sufficient level of detail to ensure safe operations during all robotic activities. Supports automated capture, berthing and manipulation, and allows for free-space operations with long communication lags; supervised autonomy and simplifies operations, given deep-space nature.
Collision Avoidance	Detect collision with any external elements. Paramount to the safe operations of the DSH as well as the potential communications delays and/or unmanned DSH state.
Dexterous	The DSXR shall provide the following utilities to ORU's: (i) extension of DSH power, (ii) extension of DSH communication, (iii) torque. The DSRM is a conduit of the utilities. It would enable use of active tools. This does not preclude fuel transfer.
Relocatable	Relocate itself onto different modules and or compatible vehicles. Different mission elements may require the DSRM to be located at specific fixtures to accomplish its mission.
Control	Controllable from multiple locations including but not limited to: (i) Ground (ii) within the DSH, (iii) EVA. Control locations according to activity and state of the DSH (occupied or not).
Supervised Autonomy	Perform the subset of tasks identified as requiring to be performed autonomously. Ensure efficient and safe operations for those operations that can be performed autonomously. This mission element includes local path planning, ensuring loads within specifications.
Human Machine Interface	The DSXR must accomplish the mission elements without the need for a dedicated control station. As a minimum, it must be accomplished with common control station and interfaces of the DSH. Common interfaces are favored with no DSXR specific/unique HMI hardware.
Operator override	The operator shall have the ability to override control of all functions including safety features.
Ease of use	The operator shall be able to initiate any function within 1 minute. This increases operational flexibility and turnaround time. The DSRM can perform any task within its specifications without requiring long mission planning.
Maintainable	The DSXR must be maintainable on the DSH
Repairable	The DSXR must be repairable: (i) in-situ, (ii) without EVA.
Safe	The DSXR shall meet all safety requirements appropriate for its function and location.
Environment (Operational)	The DSXR shall operate in the following environments: - Deep Space - All lunar orbits



	<ul style="list-style-type: none"> - LEO - Near an asteroid - Near a comet - On the ground
Environment (Survival)	<p>The DSXR shall survive the following environments:</p> <ul style="list-style-type: none"> - Earth surface - Ground transport - Launch (SRS, Orion or CTV) - MEO - Plume impingement and effects of other non-natural occurring contamination
Life	<p>The DSXR shall function for a period of: (i) 2 years without maintenance, (ii) 15 years with periodic maintenance In essence, its life must meet or exceed duration of the mission.</p>

Figure 1 Work Breakdown Structure for DSXR (proposal)



1.3 List of Acronyms

AD	Applicable Document
CDRL	Contract Data Requirements List
CSA	Canadian Space Agency
CSEW	Canadian Space Exploration Workshop
CTE	Critical Technology Element
DID	Data Item Description
EDL	Entry, Descent and Landing System
EDU	Engineering Development Unit
EEV	Earth Entry Vehicle
ERV	ERV Earth Return Vehicle
E2E-iSAG	End-to-End International Science Analysis Group
FRM	Final Review Meeting
FTP	File Transfer Protocol
MEPAG	Mars Exploration Program Analysis Group



MSR	Mars Sample Return Mission
MTR	Mid-term Review
RD	Reference Document
RFP	Request For Proposal
ROM	Rough Order of Magnitude
SDT	Science Definition Team
SRL	Science Readiness Level
TBC	To Be Confirmed
TBD	To Be Determined
TRL	Technology Readiness Level
TRM	Technology Roadmap
TRRA	Technology Readiness and Risk Assessment



ANNEX B

SECURITY REQUIREMENTS CHECK LIST



Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat 20150518
Security Classification / Classification de sécurité

**SECURITY REQUIREMENTS CHECK LIST (SRCL)
LISTE DE VÉRIFICATION DES EXIGENCES RELATIVES À LA SÉCURITÉ (LVERS)**

PART A - CONTRACT INFORMATION / PARTIE A - INFORMATION CONTRACTUELLE		
1. Originating Government Department or Organization / Ministère ou organisme gouvernemental d'origine Canadian Space Agency	2. Branch or Directorate / Direction générale ou Direction Space Exploration Development	
3. a) Subcontract Number / Numéro du contrat de sous-traitance	3. b) Name and Address of Subcontractor / Nom et adresse du sous-traitant	
4. Brief Description of Work / Brève description du travail Space Exploration Preparatory Activities, Beyond LEO Mission Exploration Studies		
5. a) Will the supplier require access to Controlled Goods? Le fournisseur aura-t-il accès à des marchandises contrôlées?	<input checked="" type="checkbox"/> No / Non	<input type="checkbox"/> Yes / Oui
5. b) Will the supplier require access to unclassified military technical data subject to the provisions of the Technical Data Control Regulations? Le fournisseur aura-t-il accès à des données techniques militaires non classifiées qui sont assujetties aux dispositions du Règlement sur le contrôle des données techniques?	<input checked="" type="checkbox"/> No / Non	<input type="checkbox"/> Yes / Oui
6. Indicate the type of access required / Indiquer le type d'accès requis		
6. a) Will the supplier and its employees require access to PROTECTED and/or CLASSIFIED information or assets? Le fournisseur ainsi que les employés auront-ils accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS? (Specify the level of access using the chart in Question 7. c) (Préciser le niveau d'accès en utilisant le tableau qui se trouve à la question 7. c)	<input type="checkbox"/> No / Non	<input checked="" type="checkbox"/> Yes / Oui
6. b) Will the supplier and its employees (e.g. cleaners, maintenance personnel) require access to restricted access areas? No access to PROTECTED and/or CLASSIFIED information or assets is permitted. Le fournisseur et ses employés (p. ex. nettoyeurs, personnel d'entretien) auront-ils accès à des zones d'accès restreintes? L'accès à des renseignements ou à des biens PROTÉGÉS et/ou CLASSIFIÉS n'est pas autorisé.	<input checked="" type="checkbox"/> No / Non	<input type="checkbox"/> Yes / Oui
6. c) Is this a commercial courier or delivery requirement with no overnight storage? S'agit-il d'un contrat de messagerie ou de livraison commerciale sans entreposage de nuit?	<input checked="" type="checkbox"/> No / Non	<input type="checkbox"/> Yes / Oui
7. a) Indicate the type of information that the supplier will be required to access / Indiquer le type d'information auquel le fournisseur devra avoir accès		
Canada <input checked="" type="checkbox"/>	NATO / OTAN <input type="checkbox"/>	Foreign / Étranger <input type="checkbox"/>
7. b) Release restrictions / Restrictions relatives à la diffusion		
No release restrictions / Aucune restriction relative à la diffusion <input checked="" type="checkbox"/>	All NATO countries / Tous les pays de l'OTAN <input type="checkbox"/>	No release restrictions / Aucune restriction relative à la diffusion <input type="checkbox"/>
Not releasable / À ne pas diffuser <input type="checkbox"/>		
Restricted to: / Limité à: <input type="checkbox"/>	Restricted to: / Limité à: <input type="checkbox"/>	Restricted to: / Limité à: <input type="checkbox"/>
Specify country(ies): / Préciser le(s) pays:	Specify country(ies): / Préciser le(s) pays:	Specify country(ies): / Préciser le(s) pays:
7. c) Level of information / Niveau d'information		
PROTECTED A / PROTÉGÉ A <input type="checkbox"/>	NATO UNCLASSIFIED / NATO NON CLASSIFIÉ <input type="checkbox"/>	PROTECTED A / PROTÉGÉ A <input type="checkbox"/>
PROTECTED B / PROTÉGÉ B <input checked="" type="checkbox"/>	NATO RESTRICTED / NATO DIFFUSION RESTREINTE <input type="checkbox"/>	PROTECTED B / PROTÉGÉ B <input type="checkbox"/>
PROTECTED C / PROTÉGÉ C <input type="checkbox"/>	NATO CONFIDENTIAL / NATO CONFIDENTIEL <input type="checkbox"/>	PROTECTED C / PROTÉGÉ C <input type="checkbox"/>
CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>	NATO SECRET / NATO SECRET <input type="checkbox"/>	CONFIDENTIAL / CONFIDENTIEL <input type="checkbox"/>
SECRET / SECRET <input type="checkbox"/>	COSMIC TOP SECRET / COSMIC TRÈS SECRET <input type="checkbox"/>	SECRET / SECRET <input type="checkbox"/>
TOP SECRET / TRÈS SECRET <input type="checkbox"/>		TOP SECRET / TRÈS SECRET <input type="checkbox"/>
TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>		TOP SECRET (SIGINT) / TRÈS SECRET (SIGINT) <input type="checkbox"/>

TBS/SCT 350-103(2004/12)

Security Classification / Classification de sécurité





Government of Canada / Gouvernement du Canada

Contract Number / Numéro du contrat 20150518
Security Classification / Classification de sécurité

PART A (continued) / PARTIE A (suite)

8. Will the supplier require access to PROTECTED and/or CLASSIFIED COMSEC information or assets?
Le fournisseur aura-t-il accès à des renseignements ou à des biens COMSEC désignés PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui
If Yes, indicate the level of sensitivity:
Dans l'affirmative, indiquer le niveau de sensibilité :

9. Will the supplier require access to extremely sensitive INFOSEC information or assets?
Le fournisseur aura-t-il accès à des renseignements ou à des biens INFOSEC de nature extrêmement délicate? No / Non Yes / Oui

Short Title(s) of material / Titre(s) abrégé(s) du matériel :
Document Number / Numéro du document :

PART B - PERSONNEL (SUPPLIER) / PARTIE B - PERSONNEL (FOURNISSEUR)

10. a) Personnel security screening level required / Niveau de contrôle de la sécurité du personnel requis

- | | | | |
|---|---|---|--|
| <input checked="" type="checkbox"/> RELIABILITY STATUS
COTE DE FIABILITÉ | <input type="checkbox"/> CONFIDENTIAL
CONFIDENTIEL | <input type="checkbox"/> SECRET
SECRET | <input type="checkbox"/> TOP SECRET
TRÈS SECRET |
| <input type="checkbox"/> TOP SECRET- SIGINT
TRÈS SECRET - SIGINT | <input type="checkbox"/> NATO CONFIDENTIAL
NATO CONFIDENTIEL | <input type="checkbox"/> NATO SECRET
NATO SECRET | <input type="checkbox"/> COSMIC TOP SECRET
COSMIC TRÈS SECRET |
| <input type="checkbox"/> SITE ACCESS
ACCÈS AUX IMPLANTATIONS | | | |

Special comments:

Commentaires spéciaux :

NOTE: If multiple levels of screening are identified, a Security Classification Guide must be provided.
REMARQUE : Si plusieurs niveaux de contrôle de sécurité sont requis, un guide de classification de la sécurité doit être fourni.

10. b) May unscreened personnel be used for portions of the work?
Du personnel sans autorisation sécuritaire peut-il se voir confier des parties du travail? No / Non Yes / Oui
If Yes, will unscreened personnel be escorted?
Dans l'affirmative, le personnel en question sera-t-il escorté? No / Non Yes / Oui

PART C - SAFEGUARDS (SUPPLIER) / PARTIE C - MESURES DE PROTECTION (FOURNISSEUR)

INFORMATION / ASSETS / RENSEIGNEMENTS / BIENS

11. a) Will the supplier be required to receive and store PROTECTED and/or CLASSIFIED information or assets on its site or premises?
Le fournisseur sera-t-il tenu de recevoir et d'entreposer sur place des renseignements ou des biens PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

11. b) Will the supplier be required to safeguard COMSEC information or assets?
Le fournisseur sera-t-il tenu de protéger des renseignements ou des biens COMSEC? No / Non Yes / Oui

PRODUCTION

11. c) Will the production (manufacture, and/or repair and/or modification) of PROTECTED and/or CLASSIFIED material or equipment occur at the supplier's site or premises?
Les installations du fournisseur serviront-elles à la production (fabrication et/ou réparation et/ou modification) de matériel PROTÉGÉ et/ou CLASSIFIÉ? No / Non Yes / Oui

INFORMATION TECHNOLOGY (IT) MEDIA / SUPPORT RELATIF À LA TECHNOLOGIE DE L'INFORMATION (TI)

11. d) Will the supplier be required to use its IT systems to electronically process, produce or store PROTECTED and/or CLASSIFIED information or data?
Le fournisseur sera-t-il tenu d'utiliser ses propres systèmes informatiques pour traiter, produire ou stocker électroniquement des renseignements ou des données PROTÉGÉS et/ou CLASSIFIÉS? No / Non Yes / Oui

11. e) Will there be an electronic link between the supplier's IT systems and the government department or agency?
Disposera-t-on d'un lien électronique entre le système informatique du fournisseur et celui du ministère ou de l'agence gouvernementale? No / Non Yes / Oui



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PART C - (continued) / PARTIE C - (suite)

For users completing the form **manually** use the summary chart below to indicate the category(ies) and level(s) of safeguarding required at the supplier's site(s) or premises.
Les utilisateurs qui remplissent le formulaire **manuellement** doivent utiliser le tableau récapitulatif ci-dessous pour indiquer, pour chaque catégorie, les niveaux de sauvegarde requis aux installations du fournisseur.

For users completing the form **online** (via the Internet), the summary chart is automatically populated by your responses to previous questions.
Dans le cas des utilisateurs qui remplissent le formulaire **en ligne** (par Internet), les réponses aux questions précédentes sont automatiquement saisies dans le tableau récapitulatif.

SUMMARY CHART / TABLEAU RÉCAPITULATIF

Category / Catégorie	PROTECTED / PROTÉGÉ			CLASSIFIED / CLASSIFIÉ			NATO				COMSEC					
	A	B	C	CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET	NATO RESTRICTED / NATO DIFFUSION RESTREINTE	NATO CONFIDENTIAL / NATO CONFIDENTIEL	NATO SECRET	COSMIC TOP SECRET / COSMIC TRÈS SECRET	PROTECTED / PROTÉGÉ			CONFIDENTIAL / CONFIDENTIEL	SECRET	TOP SECRET / TRÈS SECRET
											A	B	C			
Information / Assets / Renseignements / Biens / Production		✓														
IT Media / Média / Informatique		✓														

11. a) Is the description of the work contained within this SRCL PROTECTED and/or CLASSIFIED?
La description du travail situé par la présente LVERS est-elle de nature PROTÉGÉE et/ou CLASSIFIÉE?

No / Non Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification".
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire.

12. b) Will the documentation attached to this SRCL be PROTECTED and/or CLASSIFIED?
La documentation associée à la présente LVERS sera-t-elle PROTÉGÉE et/ou CLASSIFIÉE?

No / Non Yes / Oui

If Yes, classify this form by annotating the top and bottom in the area entitled "Security Classification" and indicate with attachments (e.g. SECRET with Attachments).
Dans l'affirmative, classifiez le présent formulaire en indiquant le niveau de sécurité dans la case intitulée « Classification de sécurité » au haut et au bas du formulaire et indiquez qu'il y a des pièces jointes (p. ex. SECRET avec des pièces jointes).



ANNEX C

INTEGRITY FORM



To be included with certifications (Part III of bid package):

Dénomination complète de l'entreprise / Complete Legal Name of Company	
Adresse de l'entreprise/Company's address	
NEA de l'entreprise/Company's PBN number	
Numéro de la transaction/ Transaction number	
Liste de pré-qualification/Pre-Qualification List	
Valeur de la transaction (\$) /Transaction Value (\$) PLUS DE 25,000.00\$ (taxes incluses) / OVER \$25,000.00 (including taxes)	
<input type="checkbox"/> OUI / YES <input type="checkbox"/> NON / NO	
Membres du conseil d'administration (Utilisez le format - Prénom Nom) Board of Directors (Use format - first name last name) Ou mettre la liste en pièce-jointe/Or put the list as an attachment	
1. Membre / Director	
2. Membre / Director	
3. Membre / Director	
4. Membre / Director	
5. Membre / Director	
6. Membre / Director	
7. Membre / Director	
8. Membre / Director	
9. Membre / Director	
10. Membre / Director	
Autres Membres/ Other members:	
Commentaires / Comments:	