

# ANNEX “A” – CONTEXT

## 1. CANADIAN SPACE AGENCY’S HEALTH BEYOND INITIATIVE

The Health Beyond Initiative (HBI) (<https://www.asc-csa.gc.ca/eng/health/health-beyond-initiative.asp>) aims to leverage the synergies in healthcare expertise, barriers, and opportunities between deep space exploration and remote Canadian communities.

The New Space Strategy for Canada (<https://www.asc-csa.gc.ca/pdf/eng/publications/space-strategy-for-canada.pdf>) aims to create the right conditions for the growth of the space sector while fully realizing benefits of space for Canadians. In alignment with this, HBI is leveraging Canada’s health and medical research, expertise, experience, and technologies to advance autonomous medical systems for astronauts in space while addressing key issues regarding equitable access to healthcare for Canadians. The technologies envisioned to manage astronaut health in deep space can be used and improved on Earth to i) prepare the products for future space application, ii) increase company buy-in due to the larger market, and iii) address analogous healthcare needs and challenges across the country. Technological capabilities of dual benefit to remote communities and space missions may enhance the monitoring, prevention, diagnosis and treatment of injuries and illnesses. The CSA and international space exploration partners do not yet have experience designing, building and deploying an advanced medical system or autonomous medical operations in space. CSA recognizes the need to learn from and collaborate with health partners in analogous environments in Canada, such as northern communities, as they are better positioned to advance Canadian healthcare for space. This understanding was reinforced by the Advisory Council (AC) on Deep Space Healthcare.

The AC was a group of experts from across the country assembled by the CSA. Their 2021 Report ([AC Report](#)) insists on pursuance of Canadian leadership of healthcare delivery for astronauts in deep space missions and the significant impact that HBI can have on healthcare in medically underserved communities. Of particular relevance to this RFI, the AC report recommends the establishment of a demonstration site program “as a means to test and evaluate remote clinical approaches and innovations, and to nurture fruitful relations with Indigenous communities and other critical stakeholders.” This RFI is one step towards enacting this recommendation.

In line with the Space Strategy and the AC Report, HBI aims to provide a platform for collaboration between innovators, health organizations and remote communities in Canada that may face similar healthcare barriers to those faced in space. Examples of these barriers could include increased distance to access healthcare services and expertise, altered external communication with limited bandwidth capacity, and a lack of access to in-situ technology-based resources such as diagnostic imaging and laboratory services. Understanding that the previous list is not exclusive, input will be sought from collaborating communities and allied organizations on assets, barriers, and possible parallels prior to technology selection and demonstration. HBI will aid in guiding innovators to develop scalable and sustainable health solutions for future deep space missions that simultaneously make an impact in the lives of Canadians today. These solutions target increasing capacity of local Healthcare Practitioners (HCPs) resulting in:

- improving the timely, quality, and continuity of care;
- refining clinical decision-making;
- empowering remote healthcare professionals;
- reducing reliance on medical evacuations to tertiary care centers; and,
- fostering community autonomy and the development of local expertise.

## **2. DEEP SPACE MISSIONS**

The CSA HBI recognizes that the maintenance and care of astronaut health during a space mission is complex. The challenges of deep space missions will require a shift in astronaut healthcare delivery, including reduced reliance on Earth, a shift from synchronous to asynchronous communication, and eventually complete medical autonomy for the crew. This calls for the development of an integrated medical system to empower crewmembers in the management of their health. As Canada positions to be a leader in healthcare for deep space missions, it is essential to establish sustainable and scalable infrastructure to support this goal. The astronaut healthcare system will need to be robust and will be comprised of a mix of autonomous, semi-autonomous, and virtual care innovations, such as smart medical devices and applications to empower the Crew Medical Officer (CMO, i.e., the crewmember in charge of the overall health management of the crew). The system will include a variety of technologies that enhance and broaden the CMO's medical capabilities, such as data analysis systems, AI-based decision support system, and a medical supply inventory system. Astronauts on a deep space mission will also need access to just-in-time training and simulation to retain medical skills. Personnel involved in the definition, design, use and maintenance of the medical system for deep space missions will include a wide variety of experts such as the flight surgeon (physicians support the missions from the ground), behavioural scientist, biomedical engineer, researchers, innovators, ground based healthcare practitioners, and astronauts.

## **3. ESTABLISHMENT OF A DEMONSTRATION SITE**

The Health Beyond Initiative intends to establish an innovation lab at CSA HQ in Saint-Hubert, QC, to perform demonstration, simulation and early testing of technologies in order to advance our understanding of the integrated medical system's requirements and inform decision making to accelerate innovation. Collaboration with experts will also be essential to ensure best practices are used to further evaluate the technologies. The HBI team will be looking for collaborators/contractors to help in the establishment of demonstration and technology testing capabilities to support innovation in the healthcare sector for the benefits of remote populations, whether in space or on Earth. This could also include the development of, or use of, collaborators' facilities to serve as a technology testing site for the establishment of a demonstration hub. An option could be a first phase of demonstration and technology testing at the CSA with local collaborators and eventually multiple hubs located remotely.

More specifically, the CSA is seeking to evaluate healthcare technologies at different stages of development in order to contribute to the following objectives:

- advance solutions that increase astronauts' medical autonomy to support their maintenance of health during deep space missions;
- build technical capacity and competitiveness of the health and biomedical sector to solve shared space and terrestrial challenges; and,
- create new and strengthen existing innovation pathways between space and terrestrial healthcare needs to contribute to improved access to healthcare for medically underserved populations.

Demonstration and evaluation of remote healthcare technologies will also guide technology developers in terms of usability and impact on clinical decisions etc. This will help to improve technologies based on real world use and confirm market fit, so that the technologies reach market and help improve health outcomes in medically isolated communities and in deep space missions.

The evaluation of remote healthcare technologies can take place in:

- laboratory settings and
- medically isolated communities.

The evaluation of technologies in a demonstration site will allow these technologies to be demonstrated and adapted to needs in the laboratory and/or remote community and will allow CSA to engage with allied healthcare organizations, as well as members of remote communities. This sets the stage for technology innovators to continue work with remote communities and stakeholders for the uptake and integration of those technologies that may be deemed valuable by the communities and stakeholders.

#### **4. HEALTH CARE TECHNOLOGIES TO BE DEMONSTRATED**

The demonstrated technologies are to be developed outside the scope of the Demonstration Project and may be selected from a pool of technologies developed under the HBI.

An example of one of the HBI's current activities is the Deep Space Healthcare Challenge. In collaboration with Impact Canada, the CSA is challenging innovators of the biomedical industry to develop diagnostic and detection solutions to support frontline health workers in remote settings. Stage 1 of the Challenge launched in December 2021 with a call to Canadian innovators for the submission of a design for remote health care technology. Twenty teams were selected to continue to Stage 2 by the Challenge Jury in March 2022. Information on the proposed technologies can be found here: <https://www.asc-csa.gc.ca/eng/health/deep-space-healthcare-challenge.asp>. In Stage 3, five selected finalists will build a prototype that meets technology readiness level (TRL) 6. These prototypes will undergo evaluation in a simulated or remote environment in the fall of 2023.

NOTE: The subject of the current RFI is not related to the Deep Space Healthcare Challenge. Information on the Challenge is provided as an indication of the types of healthcare technologies that may be selected for demonstration at the demonstration site(s).

#### **5. RFI SPECIFIC GAP**

This RFI serves to assess the interest and capacity of Canadian organizations to establishing healthcare technology demonstration site(s), whether through the use of their current infrastructure or via the development of new ones, for the demonstration and evaluation of remote healthcare technologies in collaboration with CSA. This RFI does not encompass the entirety of any future project.

# ANNEX “B” – QUESTIONS

## **Section A: Information on your organization**

### Type of organization

- Post-secondary institution
  - Private entity
  - Public body. Please specify:
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- Other. Please specify (e.g. non-profit company, foreign company, etc.):
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### Size of organization

- < 10 employees
- 10-50 employees
- 51-100 employees
- 101-200 employees
- 201-500 employees
- > 500 employees

City and Province or territory of your head office (For statistical purposes):

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**Section B: Working with remote communities, including First Nations, Métis and Inuit communities**

Q1: Does your organization have a mechanism in place to engage directly with remote communities (including First Nations, Métis or Inuit communities) with regard to healthcare and/or innovation?

- Yes
- No

If yes, please describe:

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Q2a: Besides better telecommunication, can you identify the greatest technological challenges to improving healthcare in remote communities (including First Nations, Métis and Inuit communities), specifically as it relates to the integration of medical innovation or technologies?

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Q2b: Describe your organisation's current or potential role in developing potential solutions to the challenges identified in Q2a.

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Q3: If you identified challenges in the previous question, how do you think the Canadian government, specifically the CSA's Health Beyond initiative, could help address those challenges?

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**Section C: Medical Technology Assessment**

Q4: What expertise, resources, infrastructure, or capacities would be needed to carry out a mandate that would include demonstration of one or more medical technology(ies) provided by CSA?

- Financial resources
- Access to expertise and technology expert/developers
- Participation of third-party organizations such as: health authority (e.g. an Indigenous healthcare delivery organization, provincial authority, universities), specialized accelerators, provincial or territorial government, etc.
- Access to medical simulation infrastructures, technology test sites, etc.. Please specify:

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- Other. Please specify:

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Q5a: What other expertise, resources, infrastructure, or capacities would be needed to carry out the mandate identified in Q4?

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Q5b: Does your organization have the necessary expertise, resources, infrastructure, or capacities in place as identified in Q5a?

- Yes
- No

Q5c: If you selected “No” in Q5b, please describe how one could procure the expertise, resources, infrastructure, or capacities required to facilitate the demonstration of remote medical technologies such as those selected by the Deep Space Healthcare Challenge?

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Q6: If your organization has led or is leading a project on the assessment of a medical technology intended for isolated communities, can you please describe the experience? Example: What healthcare challenge was the project addressing? How was the challenge identified? How was the solution identified? Who participated? Who funded? Who did the assessment? What were the results (i.e. was the solution adopted)?

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Q7a: Could and would your organization be interested in providing technical expertise and resources to facilitate medical technology assessments in the CSA laboratories located in Longueuil, QC?

- Yes
- No

Q7b: If you selected "No" in Q7a, please describe why and mention if there is something that the CSA could do or offer that might change your mind.

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Q8a: In your opinion, what types of organizations are best positioned to facilitate collaborative medical technology assessment in remote communities (including First Nations, Métis and Inuit communities)?

- a. Post-secondary institution
- b. Private company
- c. Public body
- d. Other(s) (ie. Partnerships). Please specify :

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Q8b: For what reasons?

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Q8b: Where possible, please provide name(s) of proposed organization(s):

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Q9a: In your opinion, what types of organizations are best positioned to facilitate collaborative medical technology assessment in a laboratory setting?

- a. Post-secondary institution
- b. Private company
- c. Public body
- d. Other(s) (ie. Partnerships). Please specify :

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Q9b: For what reasons?

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Q9c: Where available please provide name(s) of proposed organization(s):

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**Section D: Schedule/Timeline**

Q10a: What would be a reasonable time frame to begin the mandate to demonstrate five remote health care technologies in a laboratory once the agreement is signed?

- < 1 month
- 1-2 months
- 2-4 months
- 4-6 months
- > 2 years

Q10b: What would be a reasonable time frame to begin the mandate to demonstrate five remote health care technologies in a remote community once the agreement is signed?

- < 1 month
- 1-2 months
- 2-4 months
- 4-6 months
- > 2 years

Q10c: What would be a reasonable time frame to begin the mandate to demonstrate five remote health care technologies in a laboratory AND remote community once the agreement is signed?

- < 1 month
- 1-2 months
- 2-4 months
- 4-6 months
- > 2 years

Q11a: In your opinion, are there existing organizations that would be able to achieve such a mandate within 18 months from today?

- Yes
- No

Q11b: For what reasons?

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Q11c: If yes, which ones?

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**Section E: Working with the Government of Canada**

Q12: In your opinion, what will be the benefits of working with the Government of Canada for your organization?

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Q13: In your opinion, what will be the benefits of such a collaboration for the Government of Canada?

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Q14a: In your opinion, are the benefits mutual and equal for the Government of Canada and for your organization?

- Yes
- No

Q14b: For what reasons?

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Q14c: How would this collaboration align with your organization's strategic and funding priorities?

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Q15a: Has your organization collaborated with the federal government in the past?

- Yes
- No

Q15b: If so, what type of collaboration arrangement was used? How was the project funded?

- Grant/Contribution
- Contract
- Other

Please specify:

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Q15c: If you have not collaborated with the federal government in the past, what type of mechanism would allow you to do so?

- Grant/Contribution
- Contract
- Other

Please specify:

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Thank you for taking the time to review, reflect, and respond to our questions. We sincerely appreciate and value all responses from our Canadian community, and look forward to reviewing the information you provide to inform our next steps and upcoming RFP.