



AUDIT OF THE LUNAR EXPLORATION ACCELERATOR PROGRAM (LEAP)
AUDIT REPORT



PREPARED BY
AUDIT AND EVALUATION DIRECTORATE

AUDIT OF THE LUNAR EXPLORATION ACCELERATOR PROGRAM (PAEL/LEAP)

Audit of the Lunar Exploration Accelerator Program

June 2, 2023

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TABLE OF CONTENTS

1.0	SUMMARY	1
1.1	Audit objective	1
1.2	Audit opinion	1
1.3	Statement of assurance	1
1.4	Summary of findings.....	1
2.0	AUDIT REPORT	3
2.1	Background	3
2.2	Audit objective, scope and approach.....	3
2.3	Findings, recommendations and management response.....	4
	APPENDIX A – TERMS OF REFERENCE	11



1.0 SUMMARY

1.1 AUDIT OBJECTIVE

The objective of this audit was to determine whether the existing management framework allows the Lunar Exploration Accelerator Program (LEAP) to achieve its objectives and to comply with relevant acts, policies, regulations and guidelines issued by the Canadian Space Agency (CSA) and the central agencies.

1.2 AUDIT OPINION

In our opinion, the program has established a management framework that allows it to achieve its objectives and to comply with all relevant policies, directives and guidelines issued by the CSA and the central agencies.

1.3 STATEMENT OF ASSURANCE

As Chief Audit Executive, I am of the opinion that sufficient and appropriate auditing procedures were followed and that evidence was gathered to establish the accuracy of the opinion provided in this report. This opinion is based on a comparison of the conditions as they existed at the time of the audit and the pre-established audit criteria that were agreed upon with management. This opinion applies to the assessed entity only. The evidence was gathered in compliance with the Treasury Board's internal auditing policy, guidelines and standards. The procedures followed comply with the professional standards of the Institute of Internal Auditors. The evidence gathered is sufficient to convince senior management of the validity of the opinion derived from the internal audit.

1.4 SUMMARY OF FINDINGS

The audit demonstrate that the LEAP established sound mechanisms to ensure that activities are planned and controlled effectively. The activities were established following a consultation process with international partners and the Canadian space sector, and are aligned with the priorities of the Space Strategy for Canada. The LEAP is at the halfway point of its implementation period, spanning from 2019 to 2027. The data indicate that the expected results are on track. The majority of the \$150 million budget is committed, and activities are in progress. Further, they are carried out in accordance with relevant policies and directives, especially with respect to awarding and managing procurement contracts, as well as grants and contribution agreements.

In terms of implementation, we found that the activities are tracked individually within the LEAP's portfolio of activities, and the project risks are monitored on a continual basis. In fact, some project risks have materialized and adjustments have been made to planning. The closing of activities initially expected in 2025 has been postponed to 2027. The main cause of this change is the alignment of activities with those of international partners. Financial and human resources planning have been adjusted accordingly.

Although we noted good identification and management of project risks in the LEAP, we have identified an opportunity for improvement in regard to the documentation of the thought and decision-making process for integrating the corporate risk profile into activity and project planning. One recommendation has been made for all CSA activities.

Chief Audit Executive signature

Audit team members

Johanna Gailer and Jérémy Poulin

2.0 AUDIT REPORT

2.1 BACKGROUND

When the Space Strategy for Canada was presented, the Government of Canada and the CSA announced the creation of the LEAP. This represents a \$150 million investment starting in 2019 and ending in 2027. The program is designed to foster innovation in areas of strength for Canada, like artificial intelligence, robotics, science and health. The LEAP's objectives are as follows:

- Enable the Canadian space sector to develop and conduct science experiments designed for lunar conditions, to help prepare for robotic and human missions.
- Advance and demonstrate innovative technologies in lunar orbit, on the Moon's surface and beyond.
- Begin to develop technologies that will be required as part of future deep-space missions.

2.2 AUDIT OBJECTIVE, SCOPE AND APPROACH

OBJECTIVE

The objective of the audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.

SCOPE

The audit concerned all activities related to the LEAP. Projects, contracts, agreements and payments made between when the program started in 2019 to present were selected and examined.

APPROACH

The audit criteria were established according to best practices in management and the requirements of the applicable acts, regulations and policies. The criteria and sub-criteria were discussed with the audited entity ahead of time and are presented in Appendix A. The audit involved various processes, including interviews and a review of documents.

We reviewed:

- 7 procurement contracts
- 2 grant agreements
- 5 contribution agreements

The selection criteria for audit samples were based on monetary value, the various activities and payments made from 2019 to present.

2.3 FINDINGS, RECOMMENDATIONS AND MANAGEMENT RESPONSE

Expected outcomes

To determine whether the existing management framework enabled the program to meet its objectives and comply with the relevant acts, policies, regulations and guidelines issued by the CSA and central agencies, we expected to find the following:

- Activities are planned appropriately, meaning:
 - ✓ Strategic and operational planning of activities is carried out based on priorities and expected results.
 - ✓ Effective financial and human resources planning is carried out.
- Activities are controlled appropriately, meaning:
 - ✓ The projects (activities) are planned, implemented and monitored effectively, in accordance with the Investment Governance and Monitoring Framework (IGMF).
 - ✓ Contracts and contribution agreements are awarded and controlled in accordance with CSA program terms and conditions, and applicable acts, regulations, policies and directives.
- Activities are reported.

2.3.1 Activity planning

Audit objective	The objective of this audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.
FINDINGS	<p>Criterion 1. Activities are planned appropriately.</p> <p>Conclusion about the criterion</p> <p>We found strategic and operational activity planning is carried out based on the priorities and expected results for the LEAP. One opportunity of improvement was identified in regard to the documentation of the thought and decision-making process for integrating the corporate risk profile (CRP) into activity and project planning.</p> <p>Activity planning</p> <p>At the beginning of the planning process, a consultation was conducted with stakeholders in order to identify the needs of the space industry and academia. An analysis was done based on expected results, costs, implementation, capacity, risk and heritage. Various options were identified in the analysis and some were selected for the LEAP’s activity portfolio.</p> <p>A large proportion of the budget, that is approximately \$136 million, is split among six activities under a science and technology component, and the remainder, that is \$14 million, is allocated to the health component. The six elements of the science and technology component include the following:</p>

- Approximately \$65 million is allocated to developing a Canadian lunar rover.
- Approximately \$20 million is allocated to a scientific instrument that will eventually be used on the moon.
- Approximately \$20 million is allocated to a contribution for a partner's mission to return a sample from Mars.
- Approximately \$31 million is awarded in contracts, grants and contributions to the space industry and academic community, to increase the market potential of Canadian businesses and to support various scientific research initiatives that will help develop key capabilities in research areas sought after for future lunar missions.

In line with this, we found that the areas of expertise targeted by the program (artificial intelligence, robotics, science and health) are integrated into the implementation of portfolio activities. More precisely, the themes are taken into consideration for the evaluation used to select procurement contracts, as well as grants and contribution agreements. We have also found that the program remains open to opportunities. For example, we found that two new activities were added in August 2022 for the purpose of allowing the CSA to obtain experience in developing and implementing deep-space health care. In our opinion, the LEAP's objectives are in line with the Space Strategy for Canada. The LEAP's activities support the Canadian commercial sector in order to spur economic growth and job creation, support Canadian leadership in scientific excellence and help inspire the next generation.

We paid special attention to the Canadian lunar rover development project, considering the scope of this activity. We found that effective planning is carried out for this activity. Various concepts were studied in collaboration with two companies during the project planning phase. Although this approach required a heavier work load, it presented an opportunity for properly identifying the advantages and disadvantages of each option. Following a request for proposals, one of the concepts was chosen, and a fixed-price contract was awarded for developing and manufacturing the rover. The fixed-price contract limits the risks of cost overruns.

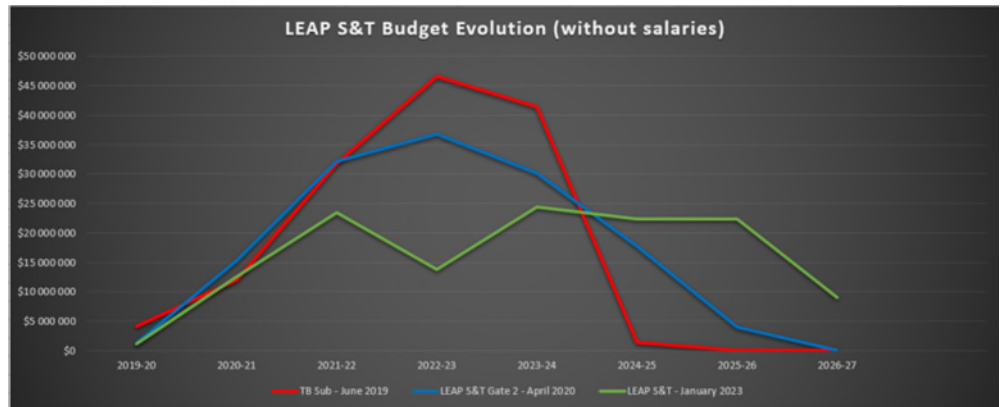
In terms of risk management, we found that the project risks are identified and analyzed through risk registers, and are followed up monthly through dashboards. A monetary risk reserve was established for unforeseen events. Some deadline-related risks materialized and had an impact on the LEAP. The completion of the LEAP, which was originally scheduled for 2025 under initial planning, is now expected in 2027. This can be explained by the realignment of activities with those of international partners, such as the delay to 2027 of the lunar rover's launch. The proposal to develop a Canadian science instrument under an international competitive process was not selected and required some adjustments. Alternatives were identified ahead of time so the program could quickly adjust and reduce the impact of the identified risk.

Beyond project risks, we found it difficult to identify the thought and decision-making process for integrating the corporate risk profile (CRP) into LEAP activity planning. We did not find any analysis documents showing how organizational

risks were taken into consideration for decision making, namely for risk taking to generate innovation and accept potential related failures. In our opinion, in order to prevent risk management silos, a systematic and continuous process at all levels would provide a coherent and structured organization-wide perspective.

Financial planning

Our review of LEAP activities showed that financial resources planning is based on planned activities and expected changes. Financial resources planning was revised following the deadline adjustments previously mentioned, and the funds were carried over to 2027. On March 31, 2023, the program will have spent approximately \$51 million. The graph below shows the evolution of the financial planning between the Treasury Board submission in 2019, the approval of the CSA governance committee in 2020 and current data for 2023.



Monthly financial forecasts are approved for the LEAP as a whole in accordance with the CSA’s Financial Resources Management Guide. Some funds are released or added based on needs throughout the year. Requests for financial changes to the portfolio’s activities are analyzed to identify impacts on costs and timelines. Some requests for changes are submitted to the Integrated Investment Review Board (IIRB) for approval when required under the CSA governance framework. Tracking documents were created using Excel spreadsheets. They are updated according to need and reflect the differences between actual and forecasted expenditures.

We also found that the portfolio management strategy makes it easier to reallocate the program’s available funds to its internal projects in progress. However, stakeholders have mentioned that portfolio management may present monitoring challenges for financial authorities and lead to cumbersome governance because each activity is run by the IIRB twice. The first time is for the portfolio as a whole and the second is for the individual approval of each activity.

Human resources planning

The audit found that effective human resources planning has been carried out. The program maintains a human resources management plan for the LEAP as a whole, which details the level of effort and skills required to deliver the portfolio’s projects. The plan is based on a detailed analysis of the level of effort required that was carried out with consideration for internal capacity and availability of human resources to ensure that allocated resources are enough to meet the program’s

AUDIT OF THE LUNAR EXPLORATION ACCELERATOR PROGRAM (LEAP)

	<p>objectives. Generally, the program has depth of talent. However, one risk was identified under the science component at the start of the program and an additional resource was hired to mitigate this risk. The LEAP’s manager also changed during the audit, and we saw the transition unfold quickly and efficiently.</p> <p>We noted that the entity considered the impact of the LEAP on diverse population groups, especially the composition of the science, technology, engineering and mathematics (STEM) space-related workforce. Concretely, the Gender-based Analysis Plus (GBA Plus) carried out during program planning has demonstrated how the LEAP facilitates job creation for women and under-represented groups in the STEM sector. We also found that diversity reporting requirements were included in the program’s procurement approaches and that an assessment criterion was added under grants for science research in order to encourage universities to establish equity and diversity plans.</p>		
RECOMMENDATIONS	<p>1. For the CSA as a whole, properly document the thought and decision-making process for integrating the corporate risk profile into activity and project planning.</p>		
RESPONSIBILITY IDENTIFIED	Organization	Programs and Integrated Planning	
	Function	Executive Director, Programs and Integrated Planning	
MANAGEMENT RESPONSE	Management agrees with the recommendation		
MANAGEMENT ACTION PLAN	Action plan details		Deadline
	<p>Edit CSA’s project risk register template so that it can identify project-level risks that have an impact on the corporate risk profile (CRP) and vice versa, develop work instructions and best practices intended to the project managers in order to assure that the CRP is taken into account during risk identification activities, offer information sessions to the members of the project management community of practice regarding the integration of the CRP in planning activities, establish a communication channel in order to inform Governance and Performance group (responsible for CRP) about project aspects that have impacts on the CRP.</p>		Dec 2023

2.3.2 Monitoring of activities

<p>Audit objective</p>	<p>The objective of this audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.</p>
<p>FINDINGS</p>	<p>Criterion 2. Activities are controlled appropriately.</p> <p>Conclusion about the criterion</p> <p>Effective controls are in place and facilitate adequate monitoring of activities.</p> <p><i>Activities are monitored and controlled effectively.</i></p> <p>Our projects review found that effective controls are in place and facilitate adequate monitoring of LEAP activities. Project management practices are consistent with the IGMF. The CSA’s project management office (PMO) is also consulted during decision and review points under the governance process. We found that a manager is assigned to each LEAP project and is responsible for monitoring and controlling it. The project managers report to the portfolio manager on a monthly basis to report the progress of their respective activities and discuss all issues and actions to be taken, if necessary.</p> <p>We have selected a sample of procurement contracts and reviewed the controls applied. We found that the controls in place make it possible to adequately monitor contractors, and ensure deliverables meet the expected deadlines and comply with established specifications. Payment requests and any documentation relevant to the request (activity reports, time sheets, purchase invoices, consultant invoices) are verified. Should an issue arise, a more in-depth verification is carried out. With respect to grant and contribution agreements, a recipient risk assessment is carried out in order to determine which level of control to apply. Tours of recipient facilities were planned and, despite challenges brought on by the pandemic, at least one audit visit to a recipient’s facilities took place in November 2022.</p> <p><i>Contracts and contribution agreements are awarded and administered in accordance with CSA program terms and conditions and applicable acts, regulations, policies and directives.</i></p> <p>We found in a review of sample awards for six (6) contracts that the monitoring process meets the requirements of the Policy on the Planning and Management of Investments. We also found that lessons learned are written down after contracts are issued. Managers can refer to them for future contract awards with a view to continual improvement.</p> <p>We also reviewed the awarding of a sample of two (2) grants and five (5) contributions. In our review, we found that the award process for grants and contributions complies with the CSA’s grant and contribution program terms and conditions. Announcements of Opportunity (AOs) are prepared, and proposals are received, analyzed, evaluated and selected in accordance with procedures. We also found that the CSA’s Grant and Contribution Centre of Expertise is consulted for</p>

Audit objective	The objective of this audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.	
	<p>advice and management tools when AOs are issued. This also ensures that proper funding mechanisms are used and decision making for scientific study initiatives is supported.</p> <p>We reviewed a sample of contract, grant and contribution payments. We found that adequate monitoring is done before payment is authorized. Expenditures are approved and incurred in accordance with the <i>Financial Administration Act</i> (sections 32 and 34). We also found that expenditures are recorded properly.</p>	
RECOMMENDATIONS	N/A	
RESPONSIBILITY IDENTIFIED	Organization	N/A
	Function	N/A
MANAGEMENT RESPONSE	N/A	
MANAGEMENT ACTION PLAN	Action plan details	Deadline
	N/A	N/A

2.3.3 Reporting

Audit objective	The objective of this audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.	
FINDINGS	Criterion 3. Activities are reported.	
	<p>Conclusion about the criterion</p> <p>The audit found that program activities are reported.</p> <p>Reporting</p> <p>We found that the LEAP complies with internal directives on reporting and, more specifically, with the CSA’s Investment Governance and Monitoring Framework (IGMF). We found that reporting is carried out at several levels for all program activities. For example, a LEAP coordination committee has been in place since the start of the program, making it possible to plan, prioritize and report the status of each project.</p> <p>We also found that reliable and complete information on the status of the program’s activities is presented in a timely manner to the Space Exploration Management Committee and the IIRB. For example, monthly dashboards are completed for the</p>	

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	<p>program’s projects, which present key facts and indicators (deadlines, costs, scope, risks). Generally, this information provides an overview of the project’s status and supports informed decision making. Furthermore, LEAP updates, including changes to the budget, risks, timelines, outputs and expected results, are periodically presented to upper management.</p> <p>The expected program results were clearly defined during planning. They are revised and updated annually, as well as during governance milestones. Contractors must supply information for the CSA’s Performance Information Profile at the end of each fiscal year, throughout the term of the agreement, thus allowing the program to assess output and the results of CSA-financed projects and to make changes as needed. Finally, our audit demonstrated that the program complies with the Treasury Board of Canada Secretariat’s Guidelines On The Proactive Disclosure Of Contracts.</p>	
RECOMMENDATIONS	N/A	
RESPONSIBILITY IDENTIFIED	Organization	N/A
	Function	N/A
MANAGEMENT RESPONSE	N/A	
MANAGEMENT ACTION PLAN	Action plan details	Deadline
	N/A	

APPENDIX A – TERMS OF REFERENCE

Audit objective	The objective of this audit was to determine whether the existing management framework allows the program to achieve its objectives and to comply with all relevant acts, policies, regulations and guidelines issued by the CSA and the central agencies.		
Audit criteria	Audit sub-criteria	Sub-criterion met Sub-criterion partially met Sub-criterion not met	● ● ●
Criterion 1: Activities are planned appropriately.	Sub-criterion 1.1: Strategic and operational planning is carried out based on priorities and expected outcomes.		●
	Sub-criterion 1.2: Effective financial resource planning is carried out.		●
	Sub-criterion 1.3: Effective human resources planning is carried out.		●
Criterion 2: Activities are controlled appropriately.	Sub-criterion 2.1: The projects (activities) are planned, implemented and monitored effectively, in accordance with the IGMF.		●
	Sub-criterion 2.2: Contracts, grants and contribution agreements are awarded and controlled in accordance with CSA program terms and conditions, as well as applicable acts, policies, regulations, directives and guidelines.		●
Criterion 3: Activities are reported.	Sub-criterion 3.1: Activities are reported.		●