



# Annual Report

## International Space Exploration Coordination Group – ISECG

ISECG was established in response to the “The Global Exploration Strategy: The Framework for Coordination” (GES) which was released in May 2007. This GES Framework Document articulated a shared vision of coordinated human and robotic space exploration focused on solar system destinations where humans may one day live and work.

The purpose of ISECG is to provide a forum to discuss interests, objectives and plans in space exploration and to support promotion of interest and engagement in space exploration activities throughout society. The work of ISECG results in documents, papers, findings, and recommendations that are critical in informing individual agency decision making. Since its beginnings, ISECG’s membership has grown from the original 14 to now 27 international space organisations, demonstrating the increasing global importance of space exploration.



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# 1 Executive Summary

At the start of 2023 the Canadian Space Agency (CSA) transitioned the leadership of ISECG to the European Space Agency (ESA), assuming the role chair of ISECG.

Against the backdrop of a dynamic exploration prospects, ISECG embarked on an ambitious workplan spanning a diverse array of subjects with the primary objective of laying the foundation for an updated Global Exploration Roadmap. Activities encompassed revisiting the Global Exploration Strategy (GER), conducting in-depth technical analyses, scrutinising commercialisation trends, and facilitating knowledge exchange, particularly with emerging space agencies. Notably, a Tiger Team was convened to revise the ISECG Benefits white paper, documenting the impact and benefits of exploration on Earth.

ISECG agency experts in advanced technologies completed a comprehensive assessment of space nuclear power and propulsion systems for future human exploration missions on the Moon and Mars. Conducted by the Technology Working Group over approximately 18 months, the assessment involved reviewing mission architectures, determining technology needs, and evaluating the status of space nuclear technologies to identify gaps.

The year culminated in a face-to-face meeting hosted by the Korean Aerospace Research Institute (KARI) in Songdo, South Korea, attended by Senior Agency Managers representing 20 Space Agencies. In a pivotal meeting of the International Space Exploration Coordination Group (ISECG) on December 7th and 8th, 2023, SAMs underscored the crucial role of international cooperation and coordination and the support for the development of an updated Global Exploration Roadmap, expected for release in the second half of 2024.

ISECG also released five web news articles covering the publication of the 2022 Annual Report, updates on the international space agencies meeting in Montréal, Canada for coordinated efforts in Moon and Mars exploration, and a focus on space nuclear power and propulsion technology gap assessment. The articles collectively underscored the ISECG's commitment to advancing global collaboration in space exploration.

The articles can be viewed through the dedicated page online.

# 2 Highlights and Achievements

## Review of the Global Exploration Strategy and Planning for the Publication of the 2024 Global Exploration Roadmap

In 2023, based upon its age and the increased number of ISECG participating agencies, ISECG took the action to review and re-confirm the validity of the Global Exploration Strategy. Following detailed review and discussions, the strategy's validity and significance were reaffirmed. As part of the preparations for the Global Exploration Roadmap 2024 (GER 2024), two ISECG-level workshops were convened on 28 June and 12 July. These workshops allowed agencies to present their space exploration strategies and contribute to the development of the next roadmap.

Presentations were delivered by 16 agencies, and their input, along with feedback from designated chapter leads, informed the draft content outline of the 2024 Global Exploration Roadmap. This draft outline was presented to Senior Agency Managers in December 2023, receiving their approval and defining a pathway towards the publication of an updated Global Exploration Roadmap in 2024.



# Highlights and achievements

- Formation and commencement of the Benefits Tiger Team
- Publication of the High-Level Analysis Report providing an overview of development and collaboration areas to close the critical gaps. (Technology Working Group)
- Nuclear Power and Propulsion Gap Assessment Report Published (Technology Working Group)
- Updating the Critical Technology List (2019) with the focus on the GER 2024 release (Technology Working Group)
- Life Support Systems Gap Assessment team started (Technology Working Group)
- Investigated common communication and navigation architecture working with IOAG & ICG (International Architecture Working Group)
- Comm-PNT workshops, review of Lunar Surface Exploration Scenario needs (International Architecture Working Group)
- Several commercialisation case studies presented from agencies (Commercialisation working group)
- Templates under development to capture Commercialisation Enablers (Commercialisation working group)
- Work on insights around Commercial LEO destinations (Commercialisation working group)

# 3 Outlook for 2024

## ISECG Working Groups

### **Exploration Roadmap Working Group (ERWG) and International Architecture Working Group (IAWG)**

The ERWG will lead continued agency collaborative work related to strategic elements impacting future partnerships and collaborations. In particular, the ERWG in close cooperation with other ISECG working groups, will release an updated Global Exploration Roadmap in 2024.

### **Technology Working Group (TWG)**

For 2024, the TWG will continue to advocate for coordination and collaboration in technology development efforts of individual ISECG space agencies in support of the updated GER. TWG also plans to conclude its Life Support Systems Gap Assessment.

### **Strategic Communications Working Group and Tiger Team (SCWG-TT)**

The SCWG remains committed to executing and harmonising strategic communication efforts related to ISECG initiatives, deliverables, and offerings. In the upcoming year, we plan to collaborate closely with agencies to understand their communication and promotional requirements, particularly in the context of ISECG. This involves facilitating the publication and promotion of the GER 2024 and the forthcoming document outlining the Benefits Stemming from Space Exploration. Moreover, a new, mobile-friendly version of the ISECG website will be released.

Additionally, the SCWG will provide support to the various working groups in producing their essential documents, ensuring a cohesive and effective communication strategy across all aspects of ISECG activities.

### **Science Working Group (SWG)**

In 2022, the SWG took significant steps to enhance the integration of scientific goals and objectives within the ISECG community by appointing chairs and establishing a community of agency scientists. Following its re-establishment during the same year, the SWG will actively promote coordination and collaboration in the science programme aspects of individual ISECG space agencies. This effort aims to support the GER mission scenario by facilitating the exchange of scientific interests, plans, and activities among member countries engaged in space exploration.

Aligned with the approach adopted by other working groups, the SWG will contribute scientifically to the revised GER 2024 and play a crucial role in defining thematic science challenges that aid emerging space agencies. This underscores the SWG's commitment to fostering a collaborative environment that propels scientific advancements within the ISECG framework.

### **Emerging Space Agencies Working Group (ESAWG)**

In May 2021, the ESAWG attained official recognition as an ISECG Working Group, following the establishment of an emerging space agencies tiger team. This team was formed to explore methods for integrating activities of both small and large agencies, further advancing the objectives of space exploration and GER goals. In the upcoming year, the ESAWG will primarily focus on contributing to the drafting of GER 2024.

Additionally, the ESAWG will assess the feasibility of an ISECG-coordinated space exploration challenge. Collaborative efforts with the SWG will be undertaken to define and prioritise thematic science challenges and opportunities, thereby facilitating the involvement of emerging space agencies in exploration activities. Furthermore, the ESAWG will collaborate with the BTT by offering perspectives and inputs from emerging/smaller agencies for the development of the 'Benefits Stemming from Space Exploration' white paper. These initiatives underscore the ESAWG's dedication to promoting collaboration and inclusivity within the ISECG framework.

### **Commercialisation Working Group (CWG)**

The CWG's primary focus is identifying pathways for government space agencies to engage with private space sector stakeholders. Comprising members from emerging to established space agencies, the CWG leverages a diverse range of experience and perspectives crucial for navigating the evolving landscape of space exploration involving both public and private sectors. Its objectives include mapping current and future commercialisation activities among space agencies, sharing lessons learned to foster cross-agency collaborations, and specifically:

- Completing the Commercialisation Enabler's database.
- Categorizing 'commercialisation' definitions/understandings among agencies.
- Analysing LEO commercialisation case studies to identify trends and risks.

Additionally, the CWG aims to develop a strategy for disseminating information, identifying stakeholders both within and outside the CWG and ISECG, and contributing to GER 2024. These efforts align with the CWG's commitment to promoting collaboration and facilitating the commercialization of space activities.

## **Benefits Tiger Team (BTT)**

The BTT, established in Q3-2022, functions as an ISECG tiger team with the primary goal of transforming the 2013 ISECG white paper, "Benefits Stemming from Space Exploration," into a dynamic document scheduled for publication in Q4 2024. This updated document aims to serve as a tool for space agencies, facilitating the dissemination of the manifold benefits arising from space exploration.

Key initiatives for the upcoming period include providing input to GER 2024 and working in tandem with the SCWG on the publication and outreach aspects of the document.

These efforts underscore the BTT's commitment to enhancing the understanding and communication of the extensive benefits associated with space exploration.

## **Major International Events Related to Space Exploration in 2023**

38th Space Symposium (April 17-20, 2023)

The IAC 2023 in Baku, Azerbaijan, 2-6 October 2023

# Annexes

## Annex I - Publications

### ISECG Webnews 2023

- [ISECG Annual Report 2022 published](#)
- [International space agencies meet in Montréal, Canada to advance coordination in space exploration of Moon and Mars](#)
- [International space agencies meet to advance coordination in space exploration of Moon and Mars through the Global Exploration Strategy](#)
- [Space nuclear power & propulsion: a technology gap assessment](#)
- [Advancing space exploration: ISECG meeting highlights global collaboration](#)

### ISECG Publications 2023

[ISECG Annual Report 2022](#)

[Report of the Nuclear Power and Propulsion Gap Assessment Team](#)

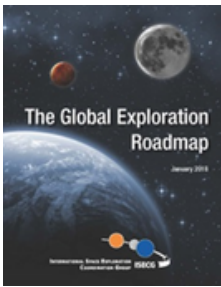
# Major ISECG Documents



[Global Exploration Roadmap, Supplement October 2022 – Lunar Surface Exploration Scenario Update](#)



[Global Exploration Roadmap, Supplement August 2020 – Lunar Surface Exploration Scenario Update](#)

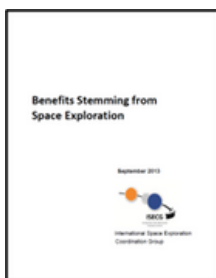


[The Global Exploration Roadmap \(GER\), January 2018](#)



[Scientific Opportunities enabled by Human Exploration beyond Low Earth Orbit – The Summary](#)

[Scientific Opportunities enabled by Human Exploration beyond Low Earth Orbit – A ISECG Science White Paper \(Full version\)](#)



[Benefits Stemming from Space Exploration](#)



[ISECG Terms of Reference](#)

Further ISECG documents and published papers can be found at ISECG Publications.

# Annex II - ISECG Members (Status March 2023)





**Australia**



Australia Australian Space Agency (ASA)  
Commonwealth Scientific and Industrial Research Organisation (CSIRO)

**Brasil**



Agência Espacial Brasileira (AEB)

**Canada**



Canadian Space Agency (CSA)

**China**



China National Space Administration (CNSA)

**Europe**



European Space Agency (ESA)

**France**



Centre National d'Études Spatiales (CNES)

**Germany**



German Aerospace Center (DLR)

**India**



Indian Space Research Organisation (ISRO)

**Italy**



Agenzia Spaziale Italiana (ASI)

**Japan**



Japan Aerospace Exploration Agency (JAXA)

**Luxembourg**



Luxembourg Space Agency (LSA)

**Mexico**



Agencia Espacial Mexicana (AEM)

**Norway**



Norwegian Space Agency (NOSA)

**New Zealand**



New Zealand Space Agency (NZSA)

**Poland**



Polish Space Agency (POLSA)

**Portugal**



Portugal Space (PT Space)

**Republic of Korea**



Korea Aerospace Research Institute (KARI)

**Romania**



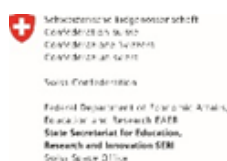
Romanian Space Agency (ROSA)

**Russia**



State Space Corporation (Roscosmos)

**Switzerland**



State Secretariat for Education, Research and Innovation (SERI)

**Thailand**



Geo-informatics and Space Technology Development Agency (GISTDA)

**Ukraine**



State Space Agency of Ukraine (SSAU)

**United Arab Emirates**



United Arab Emirates Space Agency (UAE Space Agency)

**United Kingdom**



United Kingdom Space Agency (UKSA)

**United States of America**



National Aeronautics and Space Administration (NASA)

**Vietnam**



Vietnamese National Space Center (VNSC)

# Annex III - Working groups

## Exploration Roadmap Working Group (ERWG)

The ERWG leads the human spaceflight road-mapping effort, which is intended to establish a common roadmap, and common framework to promote partnerships in realising exploration missions. A summary of their work is communicated in regular updates of the GER.

## International Architecture Working Group (IAWG)

The IAWG leads multilateral reference architecture work, develops shared requirements, identifies critical functions and technologies and shares innovative architectural concepts. The IAWG is currently building concepts to augment the GER mission scenario, focusing specifically on characterising human missions to the lunar surface based on robust international partner contributions.

## Strategic Communications Working Group (SCWG)

The objectives of the SCWG are to provide a clear, consistent and coordinated communication of the ISECG mandate, its products and activities, to support the development of ISECG products, as well as to support the exchange amongst members on stakeholder engagement activities. Major activities of the SCWG include the development of ISECG webnews, the preparation of the ISECG Annual Report and the facilitation of topical exchanges amongst members. The SCWG is fostering an exchange on lessons learned and best practices among ISECG members in communicating and delivering benefits resulting from investments in space exploration.

## Science Working Group (SWG)

The Science Working Group coordinates with the international science communities on exploration planning and activities as required for the generation of ISECG products. Through the development of the Science White Paper, the SWG has established a Science Advisory Group, developed links into the global science community and coordinated activities with relevant science organisations. The SWG will continue to do so, recognising the strong role of science and the scientific opportunities in future exploration efforts.

## Annex III - Working groups

### **Technology Working Group (TWG)**

The goal of the Technology Working Group is to identify and raise awareness on critical technology gaps related to the GER, and to advocate coordination and collaboration in technology development efforts of individual ISECG members in support of the GER. The strategic nature of technology investments and the desire of members to focus investments to maximise their contribution potential while enabling meaningful and achievable opportunities for all participating ISECG members must hereby be recognised.

### **Commercial Working Group (CWG)**

The CWG will focus on identifying new pathways that Government Space Agencies can engage with private space sector stakeholders. The members of the CWG range from emerging to well established Space Agencies, allowing a wide breadth of experience, knowledge as well as different perspectives to be applied to new space age where space exploration will see contributions from both public and private sectors.

### **Emerging Space Agencies Working Group (ESAWG)**

The ESAWG will consider methods to integrate small and large agency activities to further the accomplishment of space exploration and GER goals. The ESAWG will aim to formulate collaborative exploration projects by coordinating with other ISECG WGs and exchanging new ideas and methods to promote collaboration among emerging agencies and with established agencies, and even some external organizations who will provide advice.

# Annex iV - ISECG at a Glance: Scope and Background

ISECG, the International Space Exploration Coordination Group serves as the forum where space agencies work together on means of strengthening individual exploration programs, facilitating collaborations and advancing the Global Exploration Strategy (GES) through the coordination of participating members' mutual efforts in space exploration. ISECG also supports promoting interest and engagement in space exploration activities throughout society. By the end of 2022, ISECG membership counted 27 government organisations responsible for space activities[1].

The **scope** of ISECG is broad and strategic. Its activities are based on the following **principles**:

- Open and inclusive
  - ISECG receives inputs from all interested space agencies that invest in and perform space exploration activities.
  - ISECG provides for consultations among all agencies with a vested interest in space exploration.
- Flexible and evolutionary
- Existing consultation and coordination mechanisms are considered.
- Effective
  - ISECG workshops and products provide value to individual participating members.
- Of mutual interest
  - ISECG activities benefit all participants and respect national prerogatives.
  - ISECG activities allow for optional participation based on the level of interest.
  - ISECG participants focus on developing non-binding products - findings, recommendations and other outputs as necessary – based on consensus.

[1] In alphabetical order: AEB (Brazil), AEM (Mexico), ASA and CSIRO (Australia), ASI (Italy), CNES (France), CNSA (China), CSA (Canada), DLR (Germany), ESA (European Space Agency), GISTDA (Thailand), ISRO (India), JAXA (Japan), KARI (Republic of Korea), LSA (Luxembourg), NASA (United States of America), NOSA (Norway), NZSA (New Zealand), POLSA (Poland), PT Space (Portugal), ROSA (Romania), Roscosmos (Russia), SSAU (Ukraine), SSO (Switzerland), UAE Space Agency (United Arab Emirates), UK Space Agency (United Kingdom) and VNSC (Vietnam).

## Background

In May 2007, an initial group of 14 space agencies jointly released “The Global Exploration Strategy: The Framework for Coordination”. It describes a shared vision of coordinated human and robotic space exploration focused on solar system destinations where humans may one day live and work.

The GES identifies a common set of exploration themes and benefits:

- New knowledge in science and technology
- A sustained presence – extending human frontiers
- Economic expansion
- A global partnership
- Inspiration and education

One of the many Framework document findings was the need to facilitate information exchange among individual agencies regarding their interests, plans and activities in space exploration. Therefore, the GES called for a voluntary, non-binding coordination mechanism among interested space agencies. This call led to the establishment of ISECG by the participating agencies including the formulation of Terms of Reference (ToR).

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