PROPOSED ORBITAL SPACE MISSION

UNOOSA CALL FOR INTEREST

Summary

The United Nations Office for Outer Space Affairs (UNOOSA) is partnering with the Sierra Nevada Corporation (SNC) to offer United Nations Member States the opportunity to participate in an orbital space mission utilizing SNC's Dream Chaser® space vehicle. The mission will be open to all Member States of the United Nations, and developing countries are particularly encouraged to participate. The mission will carry experiments, payloads, or satellites provided by institutions in the participating countries.

The purpose of this Call for Interest (CFI) is to provide a summary of the proposed mission and to solicit information from Member States interested in providing experiments, payloads, or satellites that could be flown on this mission. The CFI also has the objective of gathering information on the interested countries so that UNOOSA may better understand the demand for this type of mission.

This mission will be the first space mission devoted to addressing the Sustainable Development Goals.

Introduction

The mission of UNOOSA is to promote international cooperation in the use of outer space to achieve development goals for the benefit of humankind. There is no better example of UNOOSA's vision 'to bring the benefits of space to humankind' by showing space's importance in the realization and implementation of the 17 Sustainable Development Goals shown in Figure 1.

Figure 1: Sustainable Development Goals

UNOOSA intends to capitalize on the technological and innovative skills of the private sector to benefit developing countries and to deliver the Access to Space initiative to address all 17 Sustainable

Development Goals. For the proposed Orbital Space Mission, UNOOSA has been working with SNC under an agreement signed in 2016 to define a dedicated Dream Chaser space mission that could carry 20-30 experiments/payloads developed by institutions in United Nations Member States, with particular attention to developing and emerging countries. In addition to addressing the 17 Sustainable Development Goals, a key aspect of the mission is to provide training and facilitate development of know-how at the national level in the practical applications of space technology, in particular for developing countries.

What type of experiments can be carried out?

The Dream Chaser provides enormous flexibility in terms of access to space. The Dream Chaser can carry out microgravity experiments in a pressurized environment protected from the rough outer space environment, as well as experiments that involve exposure to the extreme conditions of temperature, pressure and radiation of outer space. Experiments carried out in the pressurized environment will return to Earth after a gentle landing at a licensed airport (to be designated) and can be directly accessed immediately after the landing of the spacecraft. During the orbital flight, the Dream Chaser can provide experiments data in real time.

Many resources are available to better understand what kind of experiments, payloads, and satellites can be carried out and/or deployed by the Dream Chaser in low-Earth orbit. Some examples of resources include:

- United Nations Office for Outer Space Affairs Human Space Technology Initiative
- European Space Agency (ESA) Experiment Archive, where experiments can be searched by platform (e.g. space station or space shuttle)
- National Aeronautics and Space Administration (NASA), International Space Station experiments list

The mission will last 2-3 weeks. The experiments, payloads, and satellites to be deployed are required to address at least one of the 17 Sustainable Development Goals.

More detailed information on the Dream Chaser can be found in the annex.

Who should answer this call?

This CFI targets institutions from all Member States of the United Nations. Institutions from developing and emerging countries are strongly encouraged to participate. Teams incorporating multiple entities or countries are very welcome.

In light of Sustainable Development Goal 17, “Partnership for the Goals”, UNOOSA also encourages entities in developed countries to partner with interested institutions in developing and emerging countries as a way to broaden participation in the mission through triangular co-operation. Additionally, any institution or partner in a developed country could also potentially offer facilities/platforms developed for conducting experiments in microgravity conditions for use by developing and emerging countries, either bilaterally or via UNOOSA.

CFI Submission/Important Dates

UNOOSA Orbital Free-Flying Space Mission Schedule	Date	2017				2018		
		Sep	Oct	Nov	Dec	Jan	Feb	Mar
Call For Interest (CFI) Issued	30-Sep-17	☆						
CFI Responses Due	1-Nov-17			★				
Payload Providers Briefing (UN Vienna)	14-Dec-17				☆			
Release of Announcement of Opportunity (AO)	30-Mar-18							☆

UNOOSA asks that Member States of the United Nations and their institutions interested in participating in this initiative submit a completed CFI response form to oosa@un.org by 1 November 2017.

Interested Member States and their institutions are also asked to include any additional pertinent information or requests related to this proposed Orbital Space Mission that are not addressed in the CFI response form. Responses to this CFI are critical in shaping the mission to maximize the benefits of this unique opportunity to Member States, in particular for developing countries, and will be used to help shape the Announcement of Opportunity, which is planned to be released in March 2018.

Response Form

Proposed Orbital Space Mission

UNOOSA Call for Interest

Name:	
Mailing Address:	
Phone Number:	
Email:	
Member State:	
Organization/Agency/Company:	

Are you interested in participating in this opportunity?	☐ Yes ☐ No ☐ Need more information
If "**Yes**", please describe what about this opportunity is of greatest interest to you.	
If "**No**", please describe why this opportunity is not of interest to you, and if there are any changes to the opportunity that would influence your decision.	
If "**Need more information**", please describe what additional information would be most beneficial to you.	

Which Sustainable Development Goals do you anticipate furthering with this opportunity? (Check all that apply)	☐ SDG1: No Poverty ☐ SDG2: Zero Hunger ☐ SDG3: Good Health and Well-Being ☐ SDG4: Quality Education ☐ SDG5: Gender Equality ☐ SDG6: Clean Water and Sanitation ☐ SDG7: Affordable and Clean Energy ☐ SDG8: Decent Work and Economic Growth ☐ SDG9: Industry, Innovation, and Infrastructure	☐ SDG10: Reduced Inequalities ☐ SDG11: Sustainable Cities and Communities ☐ SDG12: Responsible Consumption and Production ☐ SDG13: Climate Action ☐ SDG14: Life Below Water ☐ SDG15: Life on Land ☐ SDG16: Peace, Justice, and Strong Institutions ☐ SDG17: Partnerships for the Goals ☐ Unknown
What mission capabilities related to this opportunity interest you the most? (Check all that apply, and feel free to explain)	Payload locations: ☐ Pressurized **Powered** Payload (Internal, Returned) ☐ Pressurized **Unpowered** Payload (Internal, Returned) ☐ Unpressurized **Mounted** Payload (External, Not Returned) Mission capabilities ☐ Long Duration Flight ☐ Flexibility to Land on Commercial Runways ☐ Low-G (Soft) Landing ☐ Immediate Access to Payloads Upon Return ☐ Real-Time Data Downlink ☐ Orbit Flexibility Other: Explain:	
Do you currently have a payload in mind for this opportunity?	☐ Yes ☐ No	

	Explain:
Do you need assistance in developing your payload for this opportunity?	☐ Yes ☐ No ☐ Unknown Explain:
Do you already have an international partnership (developing-developed country) in place?	☐ Yes ☐ No ☐ Unknown Explain:
Do you have an anticipated funding source for this opportunity?	☐ Yes ☐ No ☐ Unknown Explain:
Do you already have governmental support or support from a relevant institution?	☐ Yes ☐ No ☐ Unknown Explain:

Do you have any other questions or comments?	

Any other information...

ANNEX: Technical information

Knowing more about the Dream Chaser: Dream Chaser Description

Sierra Nevada Corporation's (SNC) Space Systems, a business area of aerospace and defense company SNC, is the owner and developer of the Dream Chaser spacecraft, a multi-mission, reusable, Space Utility Vehicle (SUV).

The Dream Chaser space vehicle has been developed by SNC to be a crewed or uncrewed space vehicle that can access low-Earth orbit (LEO). In 2016, NASA selected SNC to use an uncrewed version of the vehicle to carry cargo to and from the International Space Station (ISS) under the Commercial Resupply Services contract that provides for cargo missions to the ISS from 2019 to 2024. The vehicle is capable of carrying both pressurized and unpressurized cargo, including powered payloads, to the ISS, and of returning science payloads to Earth, implementing a runway landing, similar to the space shuttle, allowing immediate access to payloads. The figure below displays the major elements of the Dream Chaser spacecraft, specifically the lifting body vehicle, which is the portion that returns to Earth, and the Cargo Module (CM), which can carry an array of pressurized and unpressurized payloads to space and is disposed of during reentry.

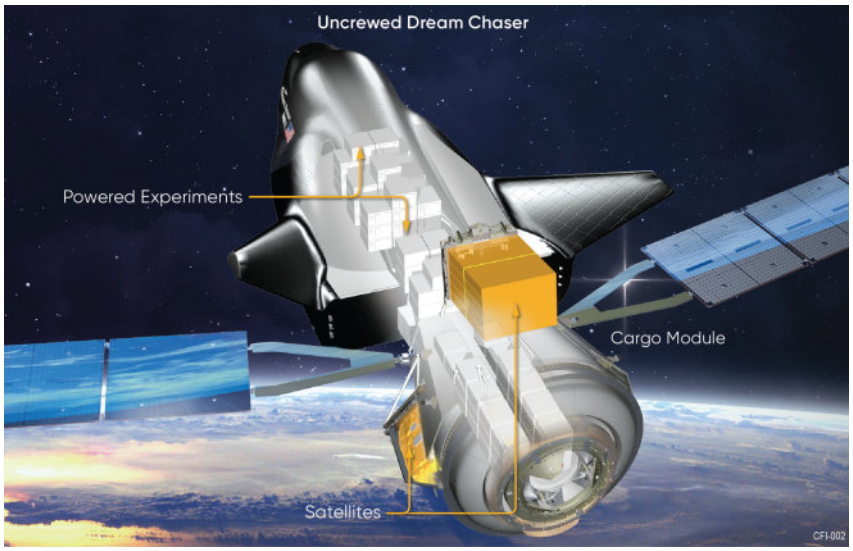


Figure A-1: Major elements of the Dream Chaser spacecraft and locations of different types of experiments and satellites that can be manifested.

SNC's Dream Chaser spacecraft is the only low-Earth orbit, reusable, lifting-body vehicle capable of a runway landing and immediate access to cargo – preserving, continuing and improving upon 40+ years of space shuttle and lifting-body heritage into a mature 21st Century system. The Dream Chaser Cargo System builds upon more than 10 years of development maturation, including more than five years as part of the public-private partnership between SNC and NASA under the Commercial Crew Program.

The innovative design of the Dream Chaser, including deployable wings, allows the spacecraft to fit inside a standard fairing. The autonomous Dream Chaser Cargo System meets all of NASA's Commercial Resupply Services 2 (CRS2) mission requirements for pressurized and unpressurized cargo delivery, disposal and accelerated return. In early 2016, SNC was awarded a contract to provide a minimum of six

missions to the ISS under CRS2. The vehicle is designed for high reusability, reducing overall cost and providing rapid turnaround for re-flight opportunities.

The advantages of the Dream Chaser spacecraft extend well beyond ISS resupply. For the purpose of this CFI, these advanced development opportunities include: free flight science missions, orbital debris removal, and serving as a test bed for exploration technologies.

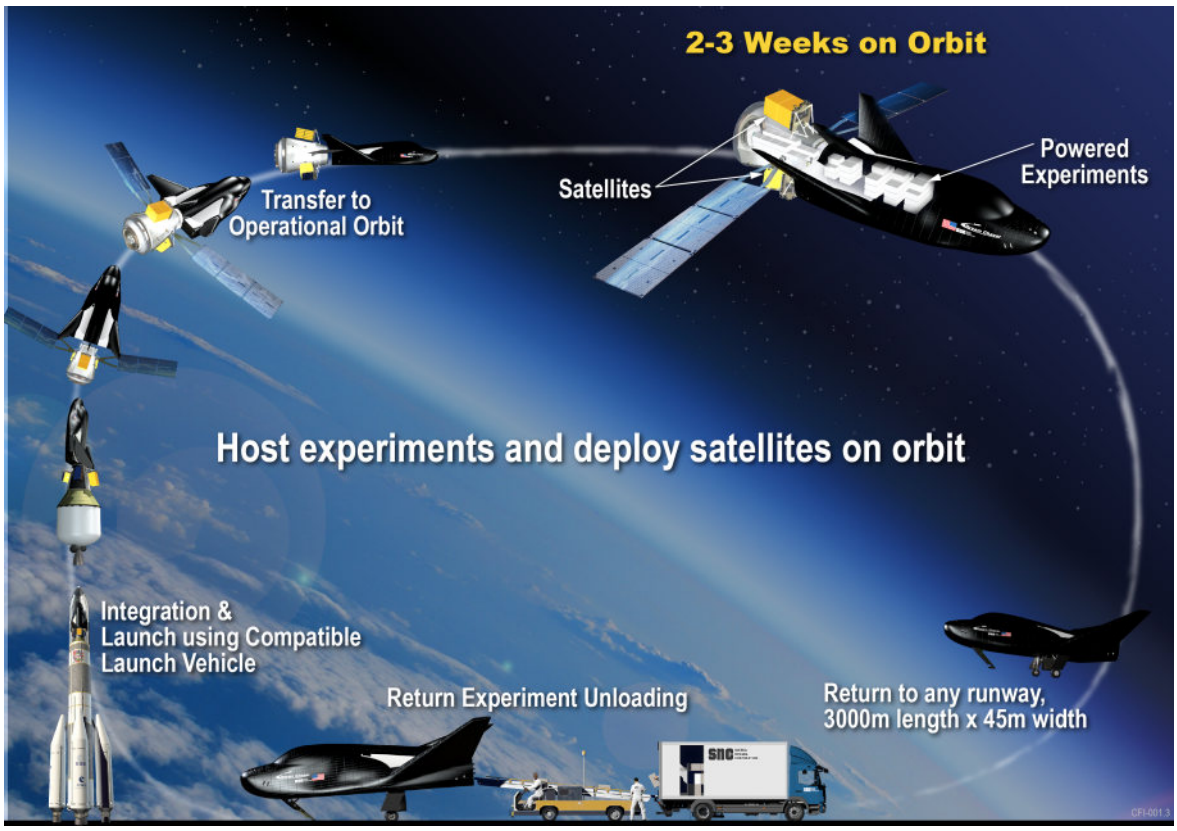
Dream Chaser Cargo System Features

- Reusable, lifting-body spacecraft with attached, disposable cargo module
- Launches inside a standard 5m fairing, allowing for easy adaptation for multiple launch providers
- Transportation of up to 5,500kg of pressurized/unpressurized upmass to LEO
- Low-g entry and gentle runway landing protects sensitive payloads from the stressful entry environment experienced by alternate vehicle concepts
- Non-toxic, non-hypergolic propulsion and fluids system allow late cargo loading and safe/rapid access to the vehicle and its payloads post landing
- Responsive capability with immediate access to payloads upon conventional runway landing, with the majority accessible in just hours and all cargo accessible within 24 hours.

The Dream Chaser is also able to deploy cubesats and small satellites from the three FRAM positions located around the Cargo Module (see fig. A-1).

Mission Description

The final Concepts of Operations (CONOPS) will be defined after the experiments/payloads/satellites are selected along with a launch vehicle and landing site. The mission is expected to last 2-3 weeks on orbit at an altitude of about 500km and an inclination between 0 and 40 degrees. The figure below depicts the notional CONOPS.



Dream Chaser provides an array of capabilities aimed to support a wide range of payloads. The major categories of payloads that Dream Chaser can support are:

- Pressurized powered payloads (Items internal to the UDC)
- Pressurized unpowered payloads (Items internal to the UDC, but self-sustaining)
- Unpressurized powered payloads (Items external to the CM and exposed to space)
- Unpressurized deployments (Items external to the CM and deployed to fly on their own)

Quantity of Experiments

This mission will support 20 to 30 powered experiments between the internal and external locations. At the external locations, deployments can also be accommodated.