

## **PRIOR INFORMATION NOTICE AND MARKET ENGAGEMENT ACTIVITY – 3<sup>rd</sup> July 2023 – Informing UK launch insurance policy, and assessing risk to civil aviation from re-entry debris arising from UK spacecraft and launch vehicle debris**

The Spaceflight Team within the Department for Transport (DfT) is looking to inform the procurement of the following:

- 1. Upper Insurance and Liability Caps;** informing policy options for setting upper caps on UK spaceflight launch insurance and liability by assessing the likely upper insurance requirements for a range of launches from potential launch sites in the UK to inform development of policy options for setting future launch operator liability and insurance.
- 2. Re-entry Risk;** assessing the risk to civil aviation from re-entry debris arising from spacecraft and launch vehicle debris through a rapid, feasibility study to understand the benefits of tracking space debris during re-entry and modelling its destructive entry to address the issue of how Government can better gauge the potential safety risk to civil aviation (aircraft and airports) in the UK from space debris generated following the launch stage and life expired satellites.

We are publishing this Prior Information Notice (PIN) seeking feedback from suppliers to establish the current capabilities, capacities, and appetite of the market in relation to these two workstreams.

### **Upper Insurance and Liability Caps**

HMG policy is that all spaceflight operators will have a cap on their liability and insurance requirement in their licence – so that no operator will face unlimited liability. Following consultation, and as set out in the [Government response](#), the liability and insurance amount for launch operators will be calculated on a case by case basis by the regulator using a [modelled insurance requirement determination process](#) (MIR). This is similar to the US maximum probable loss calculation – but uses UK values. This approach was chosen because initial modelling indicated that, in most cases, the MIR approach should lead to lower insurance costs for launch operators compared to the c£50m (€60m) flat rate approach applied to licensing in-orbit spaceflight from the UK, and by France for launch. However, this bespoke approach adds complexity to the licensing process and means that launch operators will not know their insurance and associated costs until quite late in the licensing process.

The Department for Transport is looking develop policy proposals, including a single and/or class-based set of upper caps on liability and insurance that may help simplify the licensing process and enable launch operators to develop more informed investment decisions and pricing for payload customers in advance of licensing.

Requiring launch operators to obtain a specified amount of insurance and indemnify HMG (as opposed to requiring unlimited insurance) is a risk sharing arrangement between HMG and the launch operator. A critical factor is that using the MIR process will mean that the insurance amount should be set at the level of loss arising in 1 in 10 million ( $1 \times 10^{-7}$ ) launches. This means that HMG's risk of incurring any cost is extremely low, but potential losses could be extremely high. The

Department requires a credible evidence base to support proposals for upper caps on liability that maintain appropriate levels of risk sharing between HMG and industry.

The UK will naturally build its evidence base on likely upper insurance amounts over the coming years through the licensing of launch activities. However, the Department of Transport is seeking to accelerate our understanding of what the likely upper levels of insurance and liability might be, ahead of detailed modelling that will be done through licensing.

The outcomes we are seeking from this work are:

- inform the feasibility and development of options to replace or supplement the current policy of calculating bespoke launch insurance requirements for each licence. This could include a single flat rate or upper cap on launch insurance requirement covering all launch types, or flat rates or upper caps for different types (class) of launch vehicle that UK spaceports are likely to host.
- In addition to informing longer-term policy development, this work should benefit businesses looking to launch from UK spaceports by indicating the likely upper level of their insurance costs ahead of the detailed calculations that will be performed during licensing process. This will help launch operators develop more informed investment decisions and pricing for payload customers.

We anticipate that this work could involve:

- a. Assessing likely upper insurance amounts for potential UK launches based on information and analysis from overseas launches.
- b. Working with companies who are looking to launch from UK spaceports and applying the MIR process based on the operator's flight safety analysis to calculate indicative insurance requirements.

We have been working with the Civil Aviation Authority (CAA) to understand the capabilities that may be needed to conduct this work, which are at Annex A, but we would also welcome input from respondents.

### **Re-entry Risk**

The Department for Transport is interested to understand the potential safety risk to civil aviation, particularly commercial aircraft, and civil airports from debris from either spacecraft which are life expired or controlled and uncontrolled launch vehicle debris as a result of UK and other launches now and in the future.

In the UK, launch vehicle debris that is discarded during launch is usually tracked by the launch vehicle operator and exclusion zones are predicted and controlled. DfT would be interested in exploring this aspect of potential risk. Most of the re-entering objects which would affect UK airspace are from uncontrolled re-entering debris from other nations. UKSA already reports on uncontrolled re-entry risk from other nations to the DfT and CAA if there is a risk above 1% for information, where a NOTAM would be considered, or above 5% for action where a NOTAM would be sent and airspace closure considered. However, we are not aware of any analysis of the risk and impact to civil aviation from controlled or uncontrolled space debris. The study

should focus on how we can better assess the risks from all re-entering debris and the mitigations we might consider in the future to offset the potential danger.

Tracking of space debris during re-entry and its prediction is generally focused on large objects where there is a likelihood of debris reaching the ground. Therefore, this analysis will enhance our understanding by using supplier's data, tools and methodologies to recognise the level of risk and the potential impact of space debris that could impact civil aviation now and in the future. Additionally, the results of the work package could be used to form the basis of a project to consider other modes of transport such as the UK strategic road and rail networks, and marine shipping vessels.

Work could involve:

- a. Assessing and using data and modelling techniques to investigate the statistical level of risk to aircraft and forecast future levels of risk given increasing UK launch rates and associated satellite population increase.
- b. Assessing the number of objects coming down, what the specific risks are to civil aviation from those objects and what mitigations may be put in place.
- c. The project will deliver its capability through analysis using scenarios and vignettes to allow a range of situations and debris size and types to be assessed.

### **Next Steps:**

This PIN is intended to:

- a. Explore what suppliers are present in this sector, who they work with and how services are/can be delivered.
- b. Obtain views and advice on the future delivery of these two areas of work.
- c. Obtain considerations and feedback on how and when work can be delivered, including if there is appetite to work with the DfT on this.

Suppliers who are able to offer advice/solutions relevant to this requirement are invited to respond to complete the below Supplier Questionnaire and email to [spaceteam@dft.gov.uk](mailto:spaceteam@dft.gov.uk) by 24<sup>th</sup> July 2023. All responses will be treated as confidential.

Following the collation of all responses, the DfT may host a market event to discuss the proposed solutions and subsequent next steps. A further PIN may also be published to request additional information from all respondents directly.

However, please note that the DfT reserves the right not to run a procurement or any further events.

## Supplier Questionnaire

### Contact details

Organisation name: Future Flight Division, Aviation Directorate, Department for Transport

1. Informing policy options on setting upper caps on UK launch insurance and liability

Point of contact name: Jeremy Ketley

Point of contact email and telephone number: jeremy.ketley@dft.gov.uk & 07818015805

2. Assessing the risk to civil aviation from re-entry debris arising from UK spacecraft or launch vehicle debris

Point of contact name: Tyler Davies

Point of contact email and telephone number: tyler.davies@dft.gov.uk & 07785353410

### Capability

**Please explain your organisation's capability to deliver on either/both areas of work?**

### Capacity

**What capacity do you have to bid for either/both areas of work? Please include when you will have capacity, your view on a suitable timeline and what value of contracts you could bid for.**

**What other Government bodies do you deliver spaceflight services for? Please include the nature of the service and delivery model (for example via a Framework, Prime Contractor, Sub-Contractor, Small-Medium Enterprise etc)**

**Appetite**

**Would you work with the DfT on any potential future procurement in this area? Please provide supporting information.**

**Delivery Method**

We are considering whether to run separate procurements or combine the two areas of work and award as one contract. Please provide feedback and your preference on this, such as the potential benefits, risks, constraints, creating a consortium, the use of sub-contractors etc.

**Additional Information**

Finally, please provide any further information that will be worthwhile for us to consider.

## ANNEX A

### Informing policy options on setting upper caps on UK launch insurance and liability – Indicative skills/capabilities

Requisite data and capabilities:

- Access to a wide range of appropriate launch vehicle & launch site data, including:
  - Vehicle types
  - Mission definitions (e.g., launch azimuths, frequency of launch activities)
  - Propellant types
  - Possible failure modes
  - Probability of failure for launch vehicles
  - Debris catalogues & fragmentation models appropriate to the propellant and structure
  - Appropriate margins and uncertainties on aforementioned items
- Access to geospatial data, including:
  - Population models representative of spaceport surroundings and downrange
  - Commercial, residential, and agricultural property data as appropriate
  - High value infrastructure data
  - Historical and predicted maritime activity (e.g., vessel density)
  - Historical and predicted aviation activity (e.g., aircraft density)
- Access to computing resources, including:
  - Launch vehicle trajectory modelling software
  - Flight Safety Analysis (FSA) tools
  - Appropriate computing resources, e.g., High Performance Computing (HPC) if a high-fidelity approach is to be undertaken

Required knowledge and skills:

- Appropriately experienced aerospace engineers/analysts
- Appropriate statistical and mathematical proficiency
- Appropriate competence with Flight Safety Analysis (FSA)
- Desirable: Prior working experience of Modelled Insurance Requirement (MIR)