

Space Launch and Orbit Group

Launch Session

March 2023



Welcome

Agenda



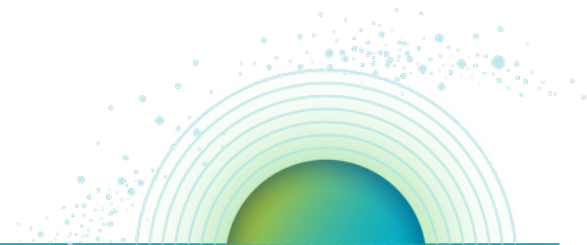
Welcome
Regulator's vision 2023

Current Challenges
CAA applications update
Safety case review

Future Opportunities
Intro to opportunities
CAA upcoming events

Hot Topics
First launch lessons
Licence publication
Cap 1616 Review Consultation

AOB

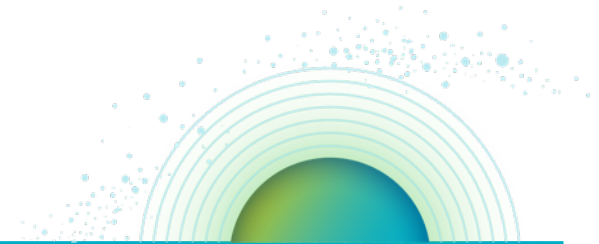


Welcome



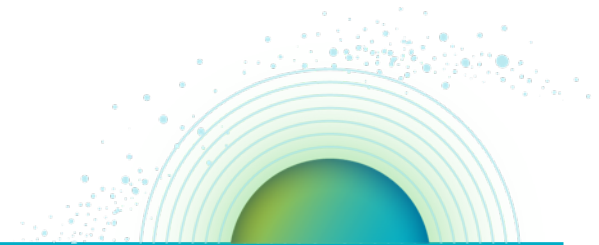
Housekeeping

- Please mute microphones
- Please use chat or raise Teams hand to ask any questions.
- We will publish the slides and actions from this meeting, not verbatim minutes, on our website at caa.co.uk/space



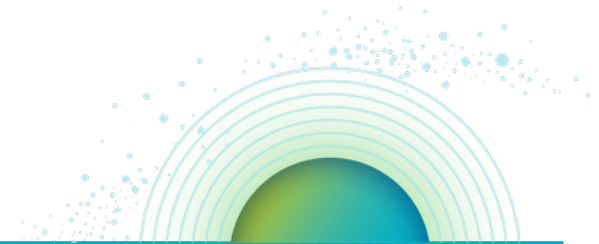
Regulator's Vision, 2023

Colin Macleod, Head of UK Space Regulation



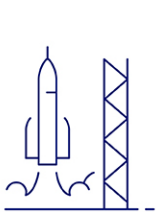
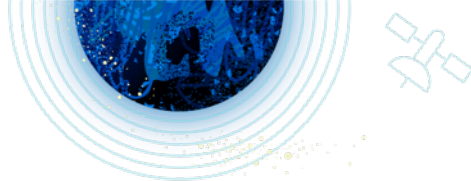
Applications Update

Adelle Roberts, Space Licensing & Oversight Manager



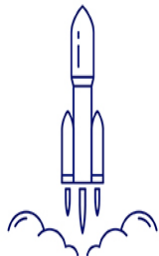
Licensed operators

All active licences under our oversight



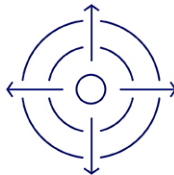
Spaceport

1



Launch

1



Range

1

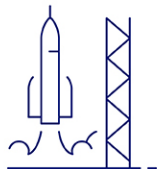


Orbital

669 active
licences across
19 operators

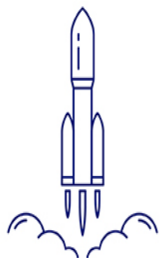
Work ongoing

Current active application assessments and ongoing support



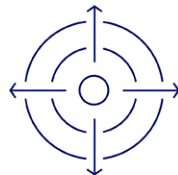
Spaceport

1



Launch

4



Range

1



ANO

2



Orbital

78

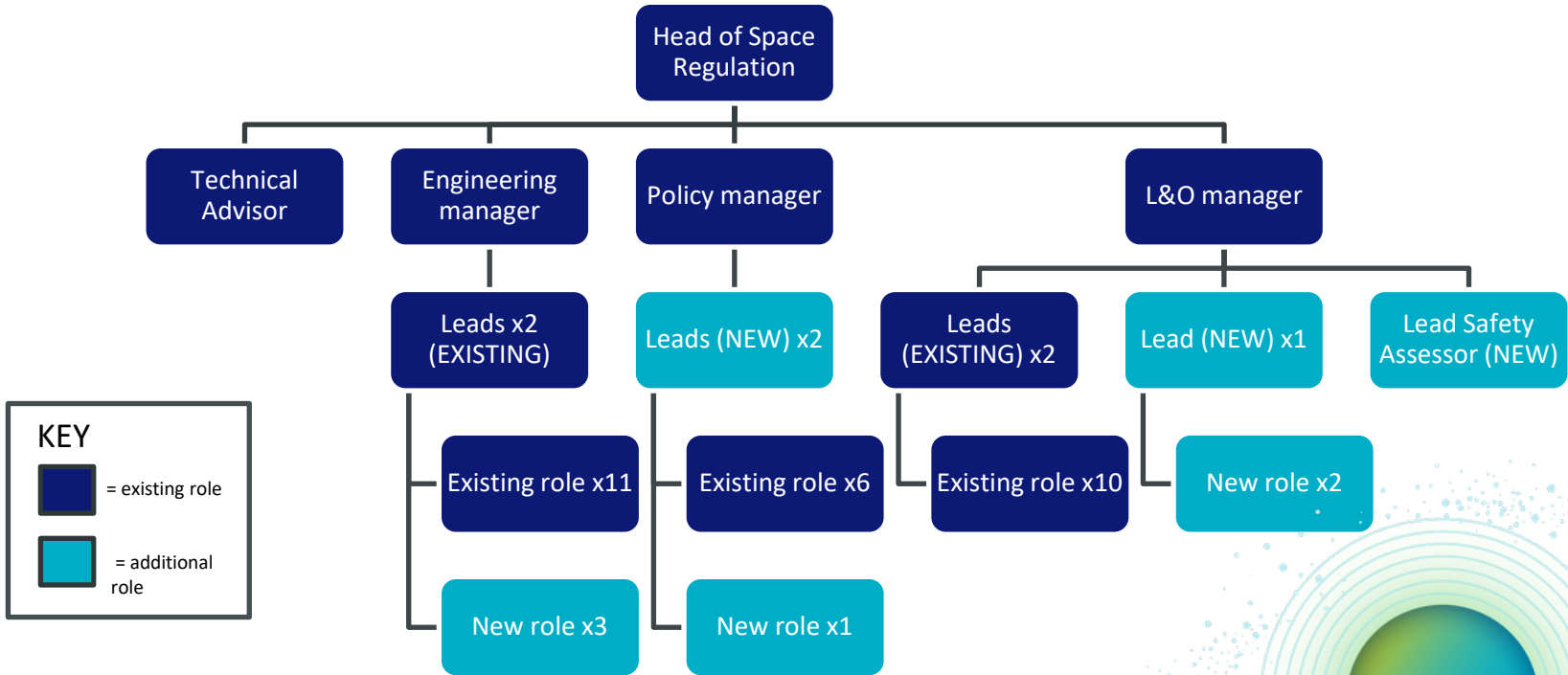
We are also offering ongoing support to industry on:

Pre-applications, workshops on safety case and AEE, oversight and monitoring of active licences, licence variation & transfers etc.

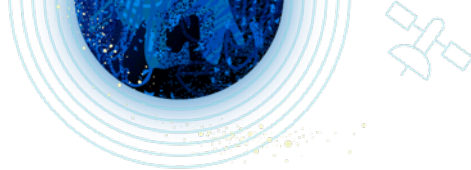
commercialspaceflight@caa.co.uk

Our Space Regulation team

We have welcomed new team members into 10 additional roles since the last SPLOG



Application timelines



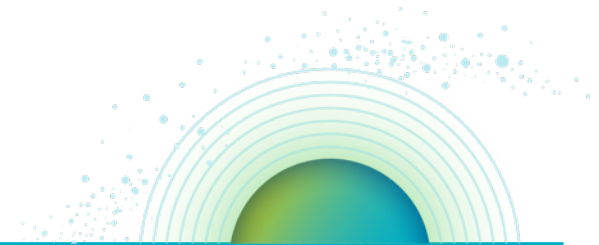
Good quality documents and evidence for an application takes time

	Start			Submit application						Total Time
Launch	Document & evidence preparation 3-6 months	Licensing process 9-18 months			1-2 months	Planned activity				13-26 months
Spaceport	Document & evidence preparation 3-6 months	Licensing process 6-18 months			1-2 months	Planned activity				10-26 months
Range	Document & evidence preparation 2-4 months	Licensing process 6-18 months			1-2 months	Planned activity				9-24 months
Orbital	Document & evidence preparation 2-4 months (New Operators)	Licensing process 6-12 months			1-2 months	Planned activity				9-18 months

- The licensing processing time only begins upon submission of **ALL** documents required by the Regulator’s Licensing Rules. However, we expect some iteration of those documents, and do not, in this stage, require documents needed for *licensees* only (e.g. Spaceport Manual).
- Licensing processing time is a guide only, dependent on complexity and quality of submission. Ensure you factor into your planning when you need your licence, not just planned activity date.

Safety Case Review

Ron Macbeth, Lead Safety Case Assessor



Safety Case

Why is there a safety case regime?

UK approach since the 1960s / 70s to manage major accident hazards

- Nuclear (*Windscale*)
- Chemical processing and storage (*Flixborough, Seveso*)
- Offshore oil and gas (*Piper Alpha*)
- High-rise buildings (*Grenfell*)

**Those that create risks are best placed
to manage those risks**



1



2

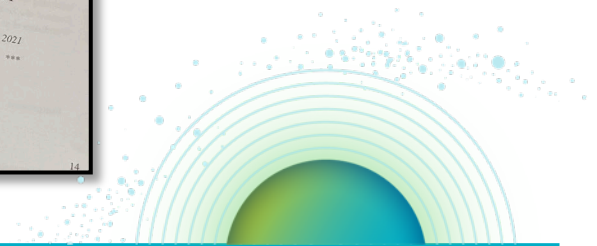
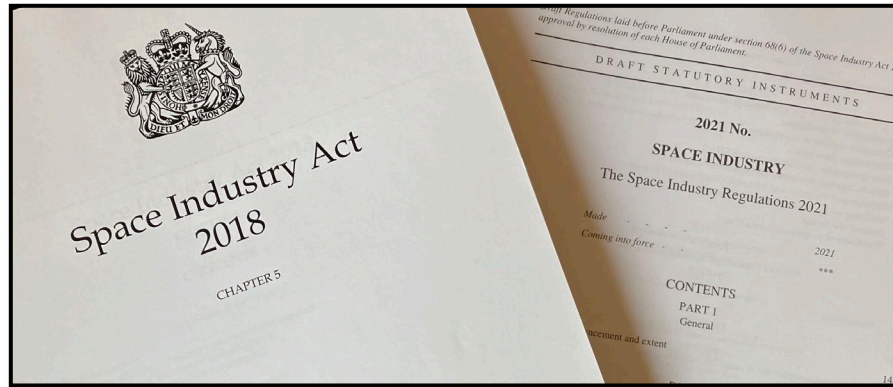
1 By Unknown author – <https://www.corriere.it/extra-per-voi/2016/07/04/icmesa-cronistoria-un-disastro-1a6b4de4-4200-11e6-91d1-c0b7aa8f545f.shtml>, Public Domain, <https://commons.wikimedia.org/w/index.php?curid=113057682>

2 British Broadcasting Cooperation (BBC) - <https://www.bbc.co.uk/news/uk-scotland-22840445>.

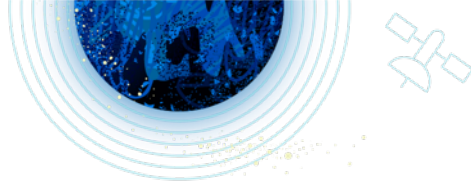
Safety Case

Why is there a safety case regime?

Space Industry Act 2018 (SIA) and **Space Industry Regulations 2021 (SIR)** outline safety requirements for spaceport and launch related activities



Safety Case



What is it? Why is it important?

Allows the risk owner to fully understand their risks and how best to manage them

Aids emergency planning

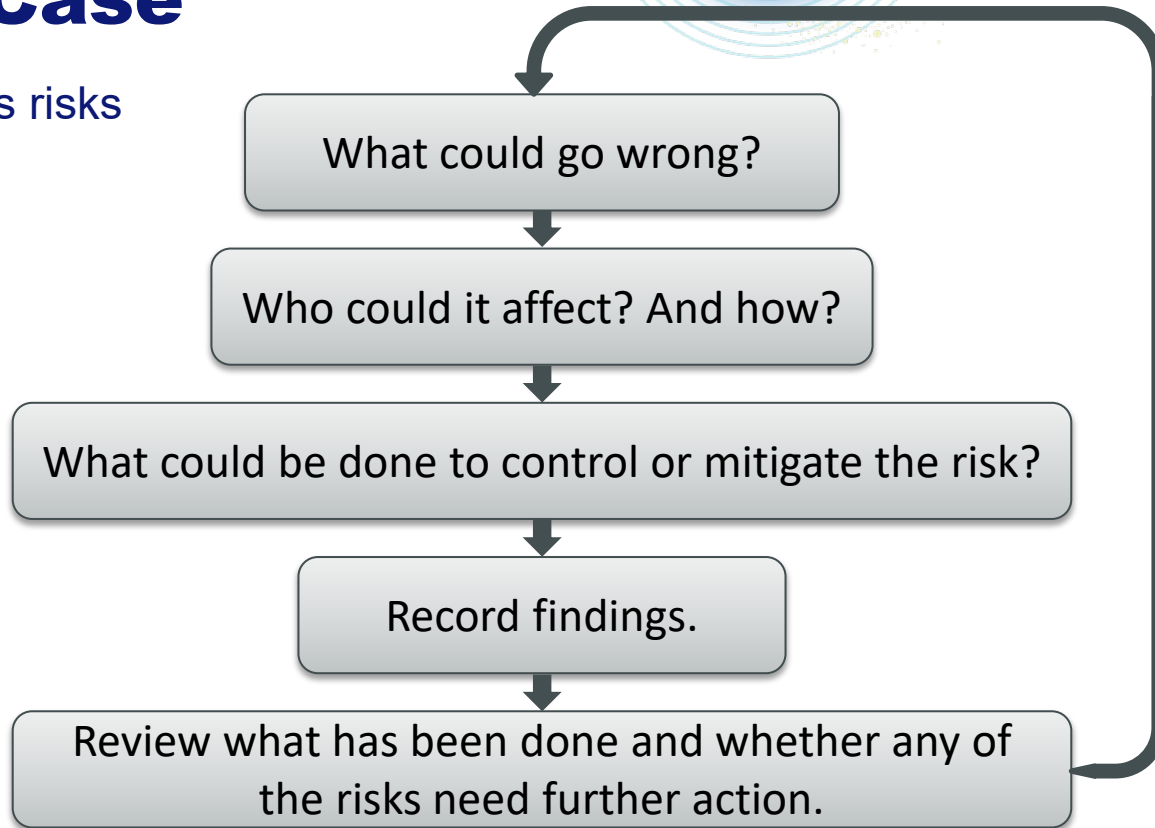
The risk owner owns the safety case process

Assurance

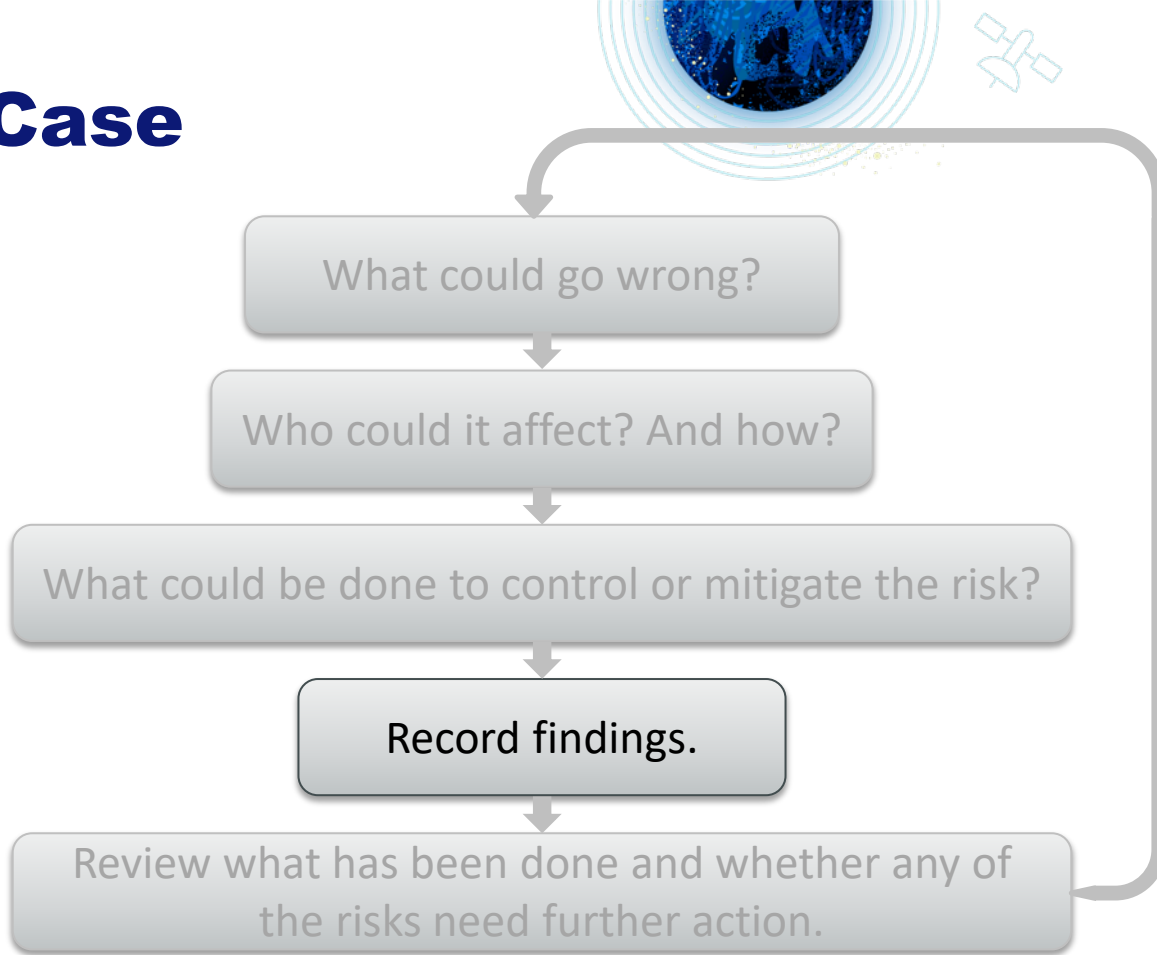
- Demonstrates that all reasonable measures are being taken to manage risks
 - Demonstrates that the risk owner understands how to operate safely
-

Safety Case

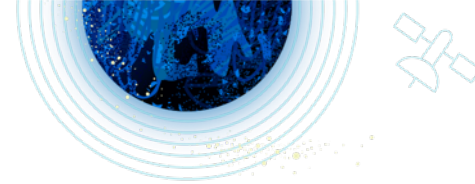
Steps to assess risks



Safety Case



Safety Case



Record findings.

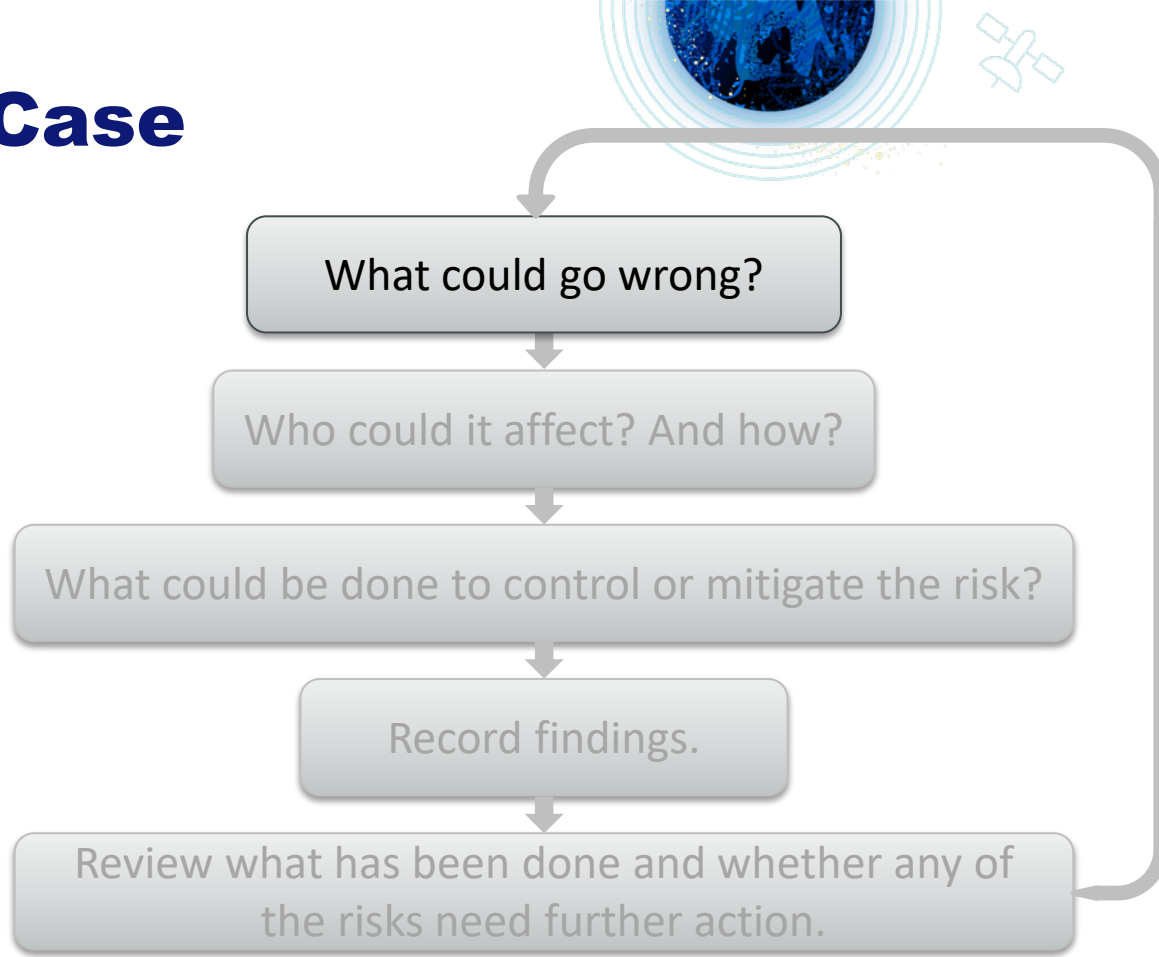
The safety case needs “to tell a story” – it should deliver a safety narrative

- It provides evidence to support safety-related decisions
- It needs to set out arguments and reasoning for safety-related decisions
- It needs to draw conclusions

There should be an ongoing process of continuous improvement.

The Safety Case should be regularly reviewed and updated as more knowledge and data is accrued.

Safety Case



Safety Case

What could go wrong?

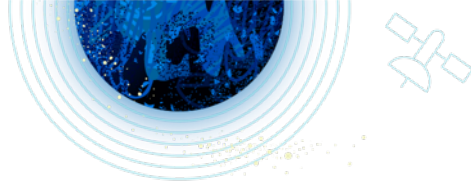
Regulations 26 to 28 in the SIR ask that applicants identify major accident hazards relating to flight safety and to ground safety.

Major Accident Hazard (MAH):

something with the **significant potential** to cause **harm**, such as
“death or serious injury to, or destroy or seriously damage the property of, persons who are members of the public...”

- the consequences can significantly impact many people
 - the likelihood can be difficult to quantify when assessing the risk
-

Safety Case



What could go wrong?

SIR Schedule 1 highlights a range of potential hazards that should be considered.

Flight safety analysis

18.—(1) The hazards mentioned in regulation 26(2) which the applicant must consider in carrying out the flight safety analysis are—

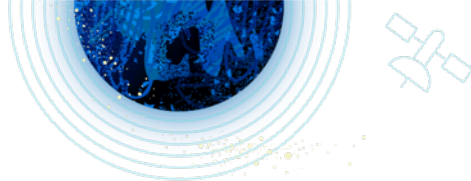
- (a) blast overpressure;
- (b) fragmentation debris;
- (c) thermal radiation;
- (d) toxic release;
- (e) major accident hazards arising from—
 - (i) any discarded part of the launch vehicle and any object, including any payload, released or separated from the launch vehicle;
 - (ii) collision with a space object;
 - (iii) meteorological or environmental conditions;
 - (iv) the use of a carrier aircraft, if applicable;
 - (v) re-entry of the launch vehicle, or any part of it, from orbit, if applicable.

Ground safety analysis

19. The hazards mentioned in regulation 27(5) which the applicant must consider in carrying out the ground safety analysis are—

- (a) blast overpressure;
- (b) fragmentation debris;
- (c) thermal radiation;
- (d) toxic release;
- (e) major accident hazards arising from—
 - (i) hazardous material;
 - (ii) contamination of hazardous material intended for use in the launch vehicle;
 - (iii) impact damage and mechanical damage;
 - (iv) meteorological or environmental conditions;
 - (v) sources of electrical discharge.

Safety Case



What could go wrong?

Give an outline of the hazard identification processes and who was involved

- reflects reality and expertise/buy in of those who do the work

All MAHs identified should be listed

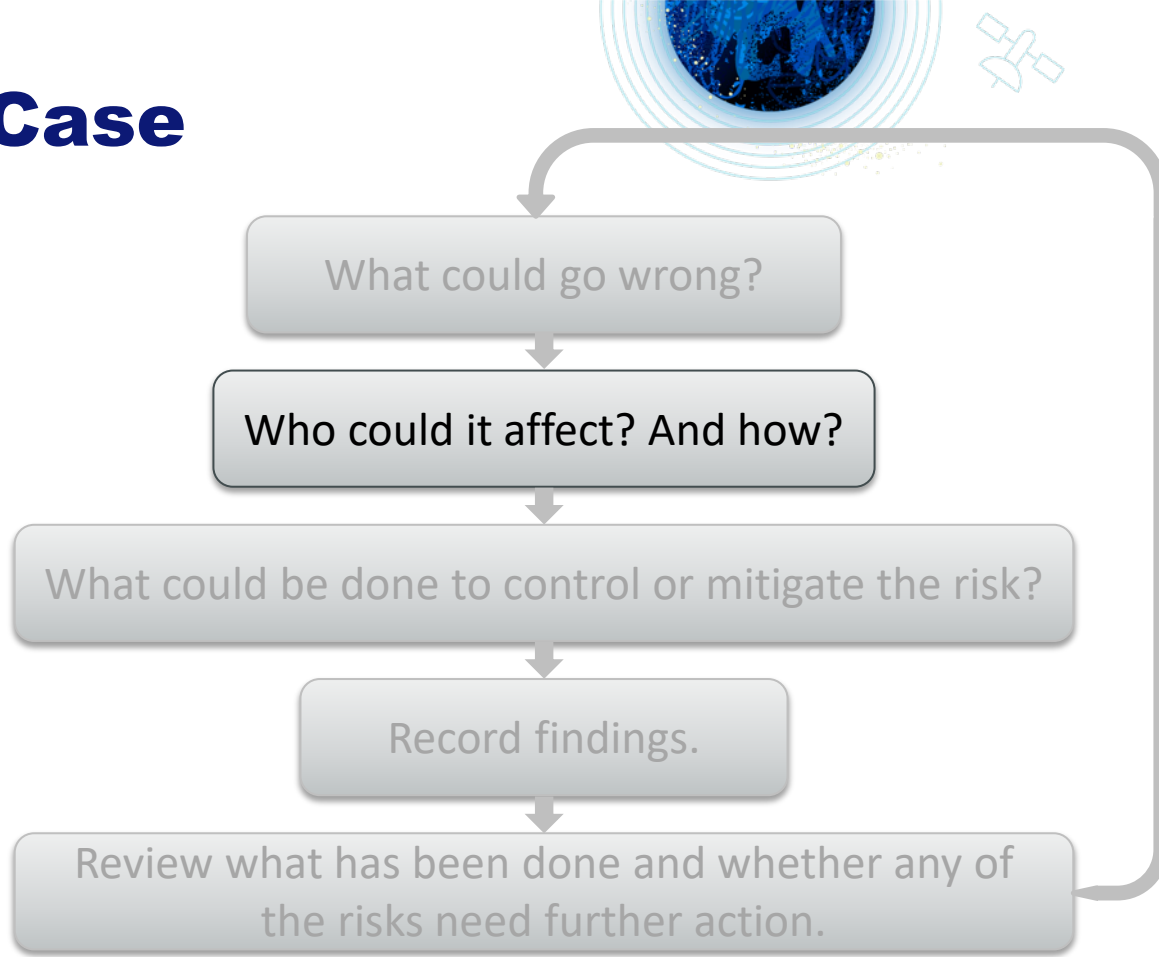
- including those for which controls have already been identified or implemented
- including those that are not evaluated further / have been discarded

It should be clear that a hazard has not just been forgotten

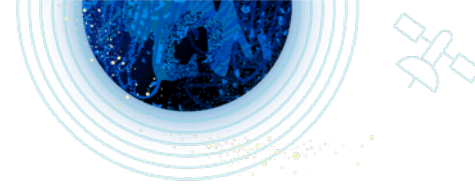
Domino effects?

Compound risks?

Safety Case



Safety Case



Who could it affect? And how?

Who can be affected?

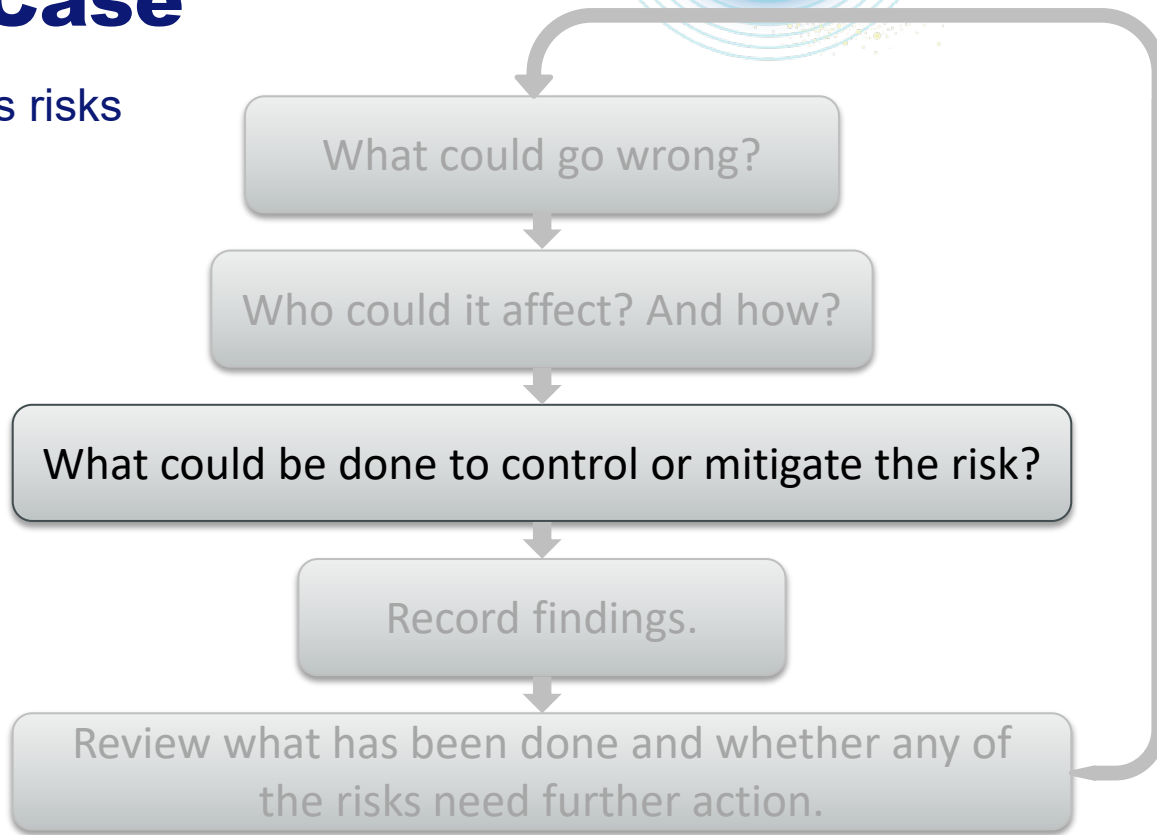
- All populations that could be impacted should be identified
 - Public, Launch operator personnel, Spaceport personnel, Payload personnel, other contractors, *etc.*
- Helps identify suitable controls and mitigation measures

In what way are they affected? How severe are the impacts?

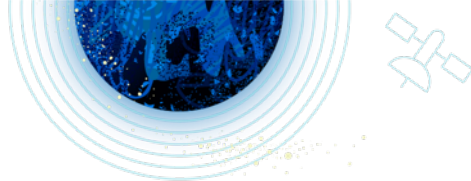
- Highlight the *harm criteria* used to ascertain impacts
-

Safety Case

Steps to assess risks



Safety Case



What could be done to control or mitigate the risk?

What could be done to:

Preventative controls/barriers

- Prevent the hazard from occurring?
- Reduce the likelihood of the hazard occurring?

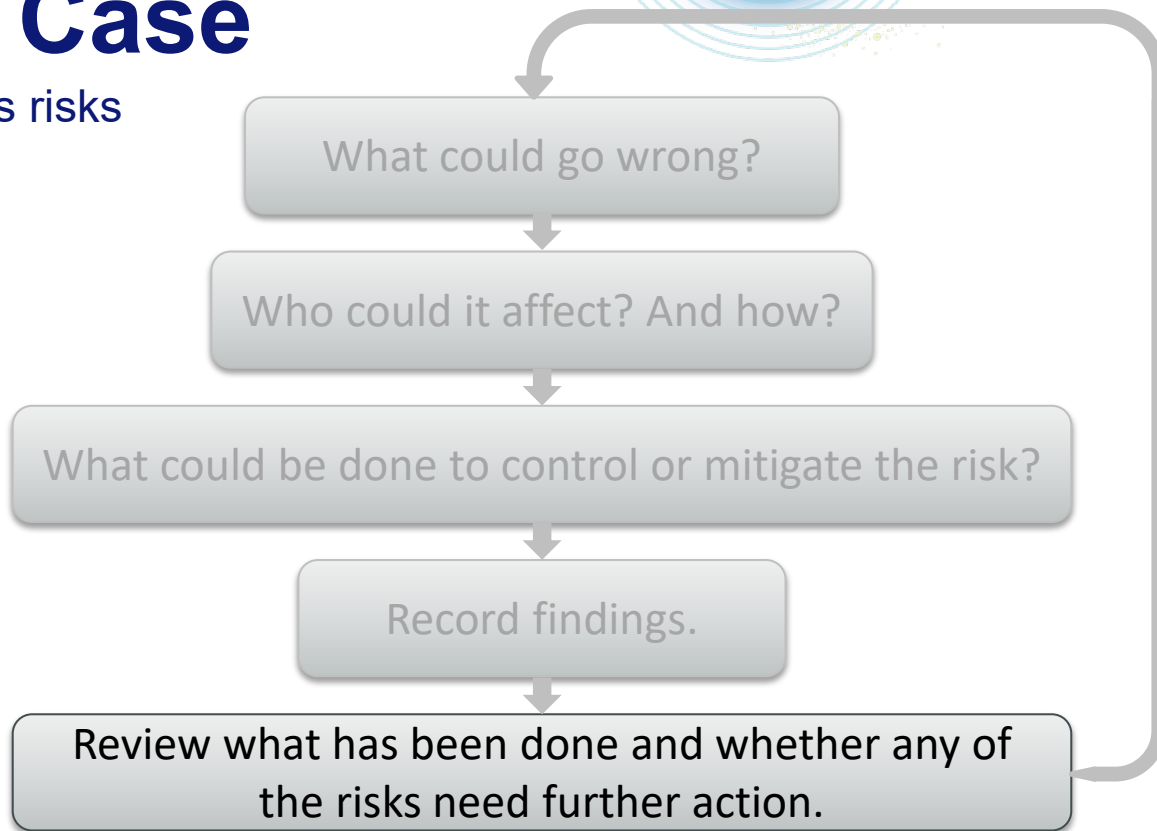
Mitigation measures/barriers

- Eliminate the consequences of the hazard?
- Reduce the impacts of the hazard if it occurred?

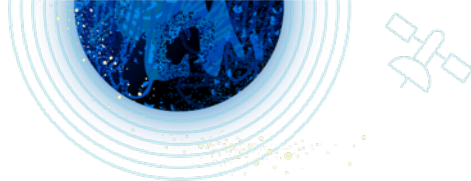
Risk controls and mitigations must be achievable
– ***how and why these work should be explained***

Safety Case

Steps to assess risks



Safety Case



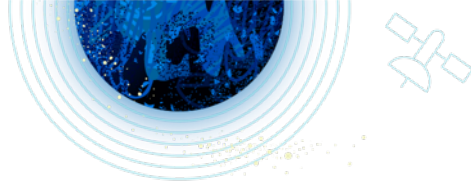
Review what has been done and whether any of the risks need further action.

The safety case should provide a demonstration that risks from the spaceport, launch, and/or return activities are as low as reasonably practicable (ALARP).

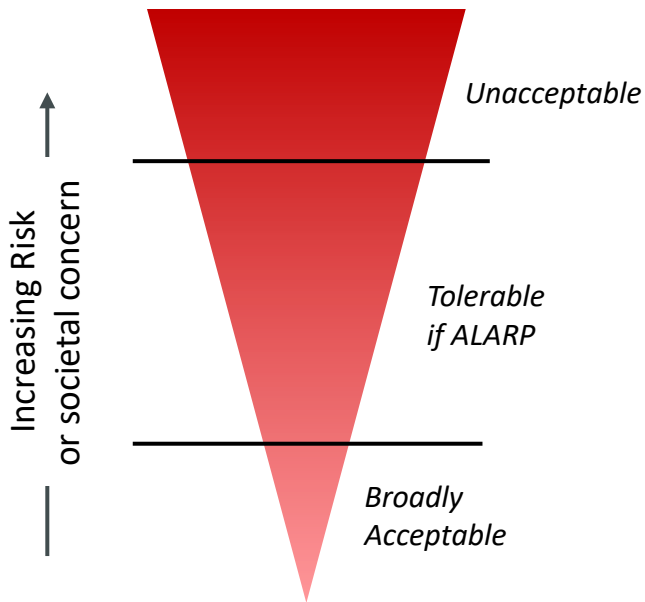
The case should help illustrate that the risk owner has:

- Identified and understood the hazards and risks from their activities
 - Implemented risk controls and mitigation measures to reduce the likelihood and/or limit the consequences to ALARP
 - Identified how to manage and monitor the risk control and mitigation measures to ensure they are in place and working effectively
-

Safety Case



Review what has been done and whether any of the risks need further action.



Justification that risks are reduced ALARP

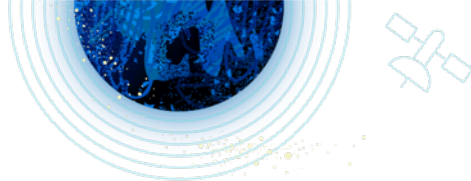
The risk owner needs to be able to prioritise risks and demonstrate that controls/mitigations are proportionate

Proportionality

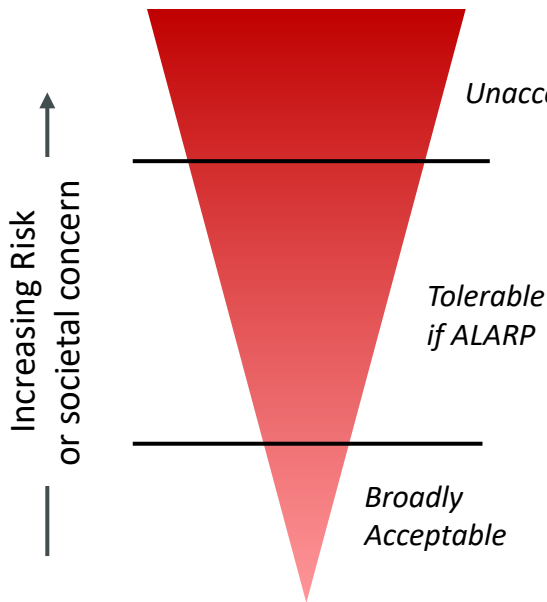
The higher the risk, the more effort, time and sacrifice is needed to reduce the risk

- more justification and explanation is needed to address and manage higher levels of risk

Safety Case



Review what has been done and whether any of the risks need further action.

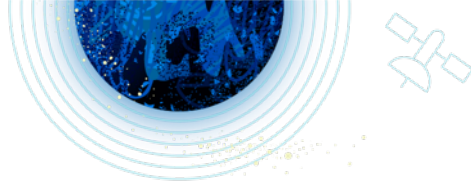


Every risk does not have to be reduced to **'Broadly Acceptable'**

- Can be dangerous as high-risks can be inadequately managed if mis-classified
- Risks assessed as *'Tolerable (if ALARP)'*:
 - Highlights an area to take extra care about
 - Can help prioritise where controls or processes should be developed/adopted over time to further reduce the risks in future

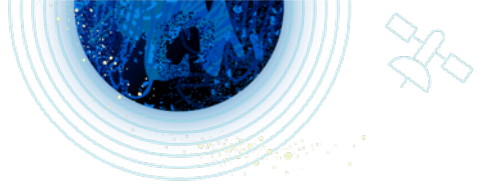
Risk Assessment

Caveat



“Risk assessment data is like the captured spy; if you torture it long enough, it will tell you anything you want to know”

William D Ruckelshaus, 1st administrator of US EPA



Summary

Overview of key 'soft' elements of a safety case

Developing a safety narrative is key in understanding safety management

It should not just be about the answer – the working out needs to be shown

Why things are done – and why some things haven't been done – should be explained

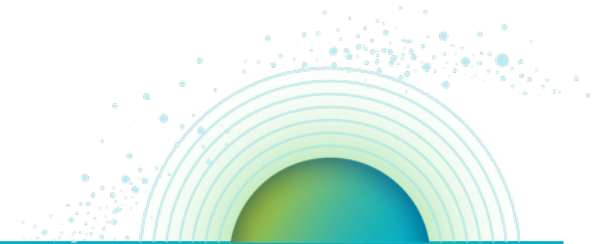
All assumptions should be listed

How conclusions were reached should be explained – there shouldn't be gaps

Hazards, risks, controls, mitigations – should all be realistic

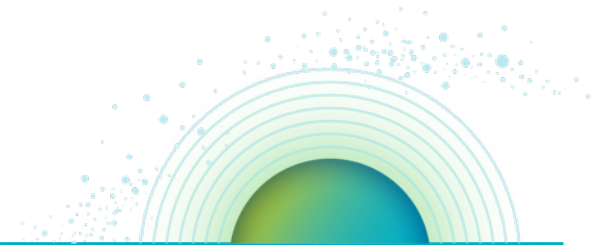
Introduction to Opportunities

Colin Macleod, Head of UK Space Regulation



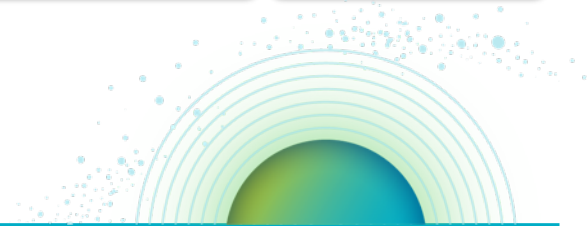
Upcoming Events

Dave Shaw, Communications Specialist (Space)



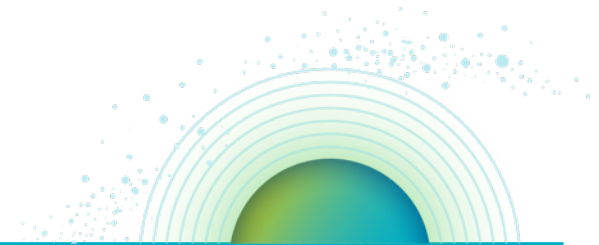
CAA Upcoming Events

We have a busy year ahead and will be visiting stakeholders in the UK and internationally throughout



First Launch Lessons

Rosie Whitbread, Space Regulatory Policy Manager



Continuous Improvement

Better pre-application

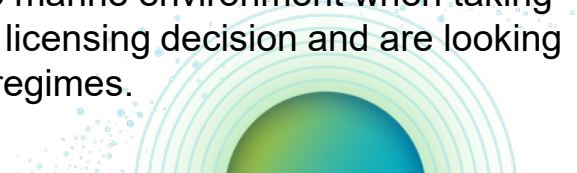
Applicants are assigned a dedicated case manager who maintains regular contact as they are developing their application. Proportionate approach has been adopted requiring information set out in the regulators licensing rules.

Environment workshops and changes to AEE timeline

Environment workshops are offered at pre-application phase to spaceport and launch applicants to help increase understanding of the purpose and scope of the Assessment of Environmental Effects (AEE) and how to draft one. Public consultation of the AEE has been bought forward so we run it parallel with full assessment to reduce overall assessment timeline.

Working with other regulators

To avoid duplication in the regulatory regimes we deferred to Marine Management Organisation's assessment of the impact to the marine environment when taking into account VO and SPC's AEE as part of our licensing decision and are looking to set up similar arrangements within Scottish regimes.



Continuous Improvement

Lead safety case assessor role	We have a dedicated lead safety case assessor in the team who is responsible for leading the safety assessment process, providing training and standardisation to the safety assessment team and assurance we are meeting our obligations.
Flexible approach to licensing vs oversight	Taken a flexible approach to run licensing assessments and mission oversight in parallel, where appropriate, to support mission timelines.
Virtual inspection approach	We carry out virtual inspections that we record to reduce the administrative burden by allowing applicants to provide oral evidence to support their submissions.
Safety Case workshops	Safety case workshops are offered at pre-application phase to applicants to help increase understanding of the purpose and scope of the safety case and how to draft one.



Lessons learned

Clearly defined process and procedures

This is the first time our processes and procedures have been put into practise so we are continually improving and evolving them as we gain experience. Some of the improvements being made include a review of our internal assessment criteria, enhancing safety assessment procedures, providing more clarity on roles and responsibilities across the teams.

Regulators Licensing Rules to be updated

We are currently making updates to the Regulators Licensing Rules to align to our experience of working on applications as they have caused confusion. The feedback from industry is that they do not understand why the information is necessary and are reluctant to provide it. This will reduce the administrative burden on applicants by being proportionate in our request for evidencesupporting their application.

Regulation review recommendations

Recommendations put forward to DfT including a review of the SIR Part 11 Security, SIA statutory consultees, occurrence reporting categories and statutory guidance for the AEE.



Continuous Improvement

More consultation information

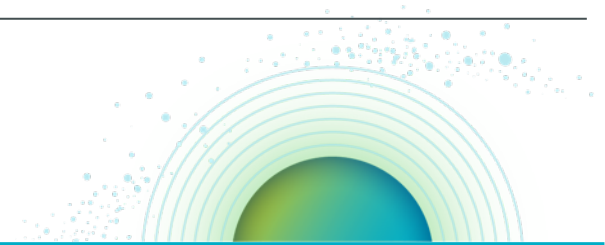
CAA can provide more, and more helpful, information on both terms and conditions, and possibly preliminary briefing session on how we arrived at the draft licence in its consultation format for consultees.

Better engagement with DfT

Better engagement with DfT prior to SoS consent to give awareness of operations so they understand the context of the proposed licence conditions to smoothen the consultation.

HMG roles and responsibilities

Government departments should stay within the boundaries of their roles and responsibilities. This was also true for applicants.



Airspace

Whole process alignment

There is a need to identify key stakeholders at project concept against all lines of development including enabling functions like airspace, security, communications etc.

Lack of government level agreements

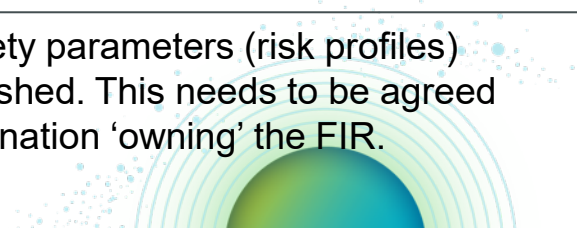
There is an important need to secure political level buy in with affected countries to support agencies at operational level to get on with operational work.

Sponsor experience and expertise

Future sponsors need to be in no doubt that they must have, or buy-in, appropriate expertise to fulfil their role.

Airspace requirements

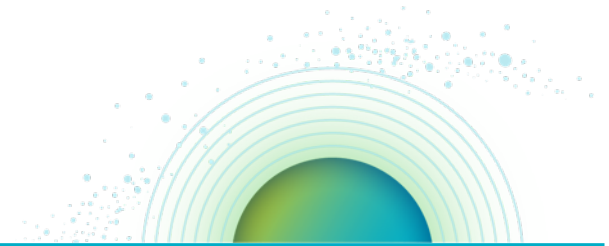
There needs to be clear guidance on what safety parameters (risk profiles) provide the threshold for airspace to be established. This needs to be agreed across all impacted airspace regardless of the nation 'owning' the FIR.



Applicants Feedback

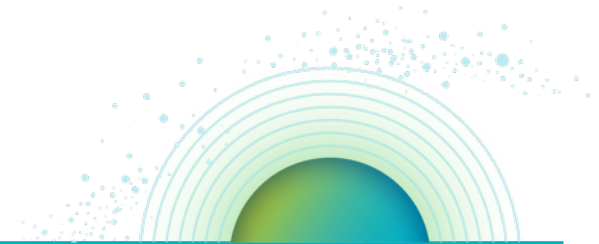
CAA

**UK legislation and
government policy**



Licence Publication

Adelle Roberts, Space Licensing & Oversight Manager



Licences published

Virgin Orbit and Spaceport Cornwall licences have now been published on the CAA website



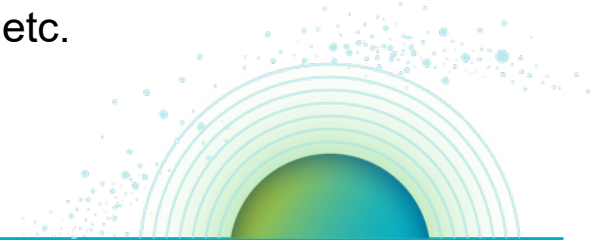
- We intend to publish the licences and Oversight & Monitoring Plans for all Launch, Spaceport and Range operators.
- It is generally our policy not to repeat requirements on licensees already set out in the Act and Regulations, so note the published licences do not detail all obligations the operator must comply with.

The screenshot shows a webpage with a dark blue header containing the text 'Licences Granted' and 'Licences granted under the Space Industry Act 2018'. Below the header is a navigation breadcrumb: 'Home / Space / Launch, Return, Range and Spaceport operators / Licences Granted'. The main content area states: 'We aim to publish the following within six weeks of a licence being granted' followed by a bulleted list: 'The Spaceport, Spaceflight Operator or Range Control Services licence' and 'The Oversight and Monitoring Plan as issued with the original licence'. It then notes 'Revisions to the Oversight and Monitoring Plan will not be published.' and 'Details of how you can find which satellites have been licensed and registered by the UK can be found by looking at the [UK registers](#).' On the right side, there is a vertical menu with items: 'Launch, Return, Range and Spaceport operators', 'Applying for a licence', 'Key requirements for all licences', 'Monitoring and oversight', and 'Licences Granted' (which is highlighted). At the bottom, there are three expandable sections: 'Spaceport', 'Launch', and 'Range Control', each with a downward arrow icon.

Oversight & Monitoring Plans

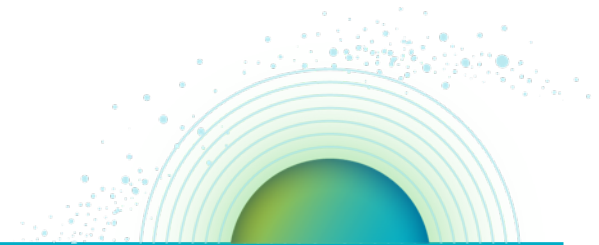
Oversight & Monitoring Plans are published in addition to the licence for each operator

- As standard, we intend to require by licence condition the compliance with an Oversight & Monitoring Plan.
- The Oversight and Monitoring Plan focuses on reporting requirements the operator must provide to us at specified instances, including periodically, before or after carrying out specific activities etc.
- In addition, we will carry out other oversight activities not detailed in the Oversight & Monitoring Plan as we see appropriate and proportionate under our duties. This may include ad hoc or periodic information requests, inspections etc.



CAP1616 Review Consultation

Mark Simmons, Principal Airspace Regulator



How to respond

How can I provide feedback on your high proposals and options?

- You can submit your feedback by completing our online survey, which can be accessed via our Citizen Space consultation hub.

- If you are unable to submit a response online, postal responses should be addressed to:

Airspace Regulation (Ref. CAP1616 Review Consultation)

CAA Safety and Airspace Regulation Group

Aviation House

Beehive Ring Road

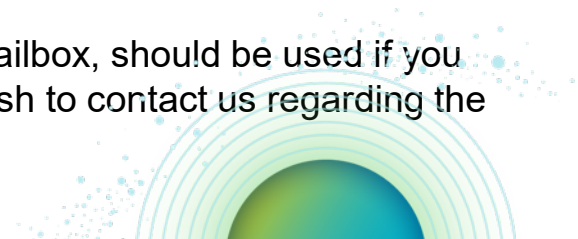
Crawley

West Sussex

RH6 0YR



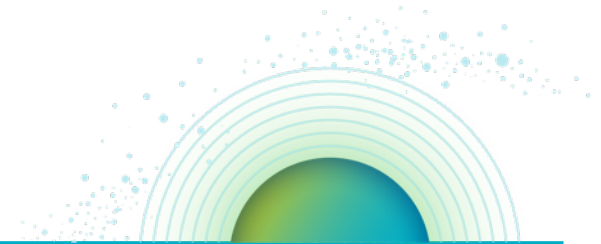
- The same address, or alternatively the airspace.policy@caa.co.uk mailbox, should be used if you require the consultation document in another format or should you wish to contact us regarding the conduct of this consultation.
- The consultation will remain open until Sunday 19th March.



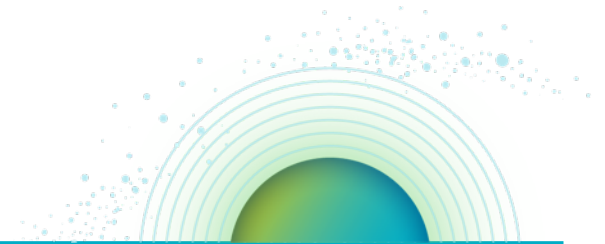
Next steps

Next steps

- Analysis of feedback and production of consultation response document
- Decide on modifications to CAP1616
- Re-write and publish V5



AOB



Thank you
caa.co.uk/space