



Satellite Launch Stakeholder Workshop
Discussion Summary

Tuesday 6 September 2016

Satellite Launch Stakeholder Workshop - Discussion Summary - 2016

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Executive Summary

The Government set out an ambition to establish an operational spaceport in the UK in July 2014. At that time a technical review of spaceplane operations was published and the Civil Aviation Authority (CAA) produced a shortlist of eight potential spaceport locations in the UK. Following a Government consultation, the shortlist was reduced to six in March 2015. The potential spaceport locations were: Newquay in Cornwall; Llanbedr in Wales; and Prestwick, Campbeltown, Stornoway and RAF Leuchars in Scotland. The ambition to establish sub-orbital commercial spaceflights and subsequently satellite launch services from the UK was re-confirmed in the Government's **National Space Policy (NSP)**, published in December 2015.

Satellite launch will drive economic growth in the UK and ensure access to space for our small satellite manufacturers and operators. The market for small satellites is expected to grow rapidly in the coming decade, driven by the 100s of small satellites that are likely to be built and launched for the new constellations of communications and imaging satellites being planned by new entrants to the sector. The combination of existing expertise in small satellite manufacturing with the early development of a small satellite launch infrastructure could put the UK at a significant commercial advantage in this growing market.

In May 2016, the Government's announced its intention to bring forward legislation through the Modern Transport Bill, to make sure that the UK is ready for the technology of the future,

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providing new regulations in a safe manner, so that the UK is at the forefront of progress on commercial spaceflight.

Since May, a cross-governmental team has been developing policy to establish the regulatory framework for future commercial spaceflight from the UK, covering a wide range of potential space operations, including horizontally and vertically launched vehicles. It will designate a regulator or regulators for these operations and ensure compatibility with applicable law including civil aviation law and the UK's international obligations under space law.

Following policy development for primary legislation, the UK Space Agency held a stakeholder consultation workshop on 6 September 2016. The event was held with the following objectives in mind:

- To share progress to date and key milestones with industry stakeholders with regard to policy development being submitted to primary legislation for the Modern Transport Bill (due for introduction in early 2017);
- To seek views from industry stakeholders as to any potential gaps or challenges in policy development for the above;
- To gather detailed feedback on policy development;

The event was attended by 30 stakeholders from various parts of the industry. The event included presentations from:

- Satellite Launch Programme Senior Responsible Officer and Director of Growth from the UK Space agency, Catherine Mealing-Jones;
- Director of Policy from the UK Space Agency, Rebecca Evernden;
- Head of Security and Regulation from the UK Space Agency, Peter Lindsay and;
- UK Space Agency Steering Board Member, Dr David Southwood

The presentations highlighted the opportunity for the UK to be first in Europe to start launch services in both satellite and sub-orbital flight markets. The advent of large constellations of small satellites is expected to create a global market that could see a £35 billion global market emerging for sub-orbital flights and launching small satellites into orbit over next 20 years. This has the potential of capturing 1/3 of global revenues and triggering additional economic growth by enabling new business clusters, manufacturing, services and tourism. In turn, this would enable UK to lead European micro-gravity research using a new sub-orbital platform, 100+ high tech jobs in rural communities by end 2019.

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Following presentations, question and answer sessions were held along with round table discussions framed by the following three topics;

1. How should government balance the role of regulator and growth?
2. Which regulatory provisions are essential to the programme's long term success?
3. What are the biggest risks and how should we manage them?

In addition, other representatives from the cross-governmental Satellite Launch Programme were available to inform discussion: Department for Transport (DfT), CAA, Department for Business, Energy and Industrial Strategy (BEIS) and the UK Space Agency.

The majority of stakeholders found the event either very useful or useful and most participants stated that the event covered a useful range of topics and that similar events should be convened in the future.

The content of this document reflects the views and experiences of stakeholders attending the event and not necessarily the views of the organisations within the cross-governmental Space Launch programme (UK Space Agency, BEIS, DfT and the CAA. Please note it is a summary and is not intended as a formal record of discussions.

Key Messages by Topic

Overall, the key message from stakeholders was that the UK has opportunity to create its own regulatory regime, learning lessons from other countries (not just replicating their regimes) and creating a responsive regulatory regime that enables a thriving commercial spaceflight sector to emerge and thrive in the UK.

The topics of regulation, growth and risk were discussed by all stakeholders in attendance with discussions framed by the following questions:

1.0 How should government balance the role of regulator and growth?

1.1 Every launch service provider complies with an effective and proportionate regulatory framework. The UK is in the position to cherry pick from other countries' regimes, learning from their successes and challenges to strike a better balance. For example:

- The US regime is built on risk assessments produced 40 years ago;

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- the UK can build subsequent learning into our framework without having to take FAA-AST regulations as baseline.
- US commercial airports with spaceport capabilities require both aviation licences and space launch licences. Their regulatory frameworks operate separately, duplicating effort by the operators and the regulators. The UK has an opportunity to avoid this inefficiency.

1.2 The UK can also learn from other sectors – e.g. how the military governs its aviation activities or how the Cable Authority was formed, the predecessor of Ofcom.

1.3 The regulatory regime needs to be clearly understood by the operators and customers – for both, regulation provides important assurance to underpin a functioning commercial market. Investors view regulatory oversight as beneficial, it will also ground insurability, and therefore commercial viability.

1.4 The UK needs to reflect on the very specific market that we are regulating for and understand the nature of the risk that is being taken on – one which is dominated by a higher frequency of launch, and which needs to be responsive to customer needs (e.g. the demand for a shorter lead-in time).

1.5 It is not a matter of absolute market size, it is about the requirement and price competitiveness. In terms of marketing the national capability, having an end to end service in the UK is extremely powerful. It would be great to be able to drive to a launch site.

1.6 Safety and insurance requirements must be based on real rather than perceived risk. However, safety is the biggest risk for the operator and in the early stages of regulation the perceived risk is very big and the standards of management of that perceived risk would be very difficult to achieve. Because of the government's dual role of promoting growth and regulating safety, it should offset risk management in the early stages in order to attract operators. However, government should make it clear that it will withdraw after the early stages when spaceflight becomes successful. Similarly early costs of range safety should be borne by government

1.7 The safety framework needs to be permissive rather than restrictive and to avoid being prescriptive, work with operators to achieve high level goals. Ultimately, the UK needs a proportionate, transparent and stable regulatory regime that creates the confidence in

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the market that makes operations insurable and attractive to customers; but which also presents a differentiated market offering that sets the UK apart from our competitors.

1.8 The pragmatic starting point is aviation law for sub-orbital launch and space law for orbital. The vertical launch experience is limited. This should build on sub-orbital launch.

1.9 Government will need to be transparent about licence requirements and communicate, for example, how high the bar will be set for an approval and what level of reliable flight safety engineering will be required. This is a huge cost driver for development of systems, the difference between having to complete 10 tests and 100 tests is huge. There should be a collaborative approach to regulation.

2.0 Which regulatory provisions are essential to the programme's long term success?

2.1 The UK must create a process that is service-oriented, which drives safety. It must be responsive to the industry it regulates. There needs to be solid range protocol and government should learn from the experience of other countries and account for modern practices (GPS, UAV, auto-termination) instead of the old, cumbersome and expensive technology (radar), whilst ensuring safety.

2.2 UK satellites should be made as trackable as possible, however this may make the UK potentially uncompetitive. The capability for collaborative and non-collaborative tracking should be considered.

2.3 A key service offering, which will make the UK market unique, will be short turn-around times from commission to launch. To support this commercial offering, regulation must in turn be sufficiently flexible to permit this. A system needs to be designed so that the operator does not need to go through the same hoops every time, therefore could oversight be more rigorous for new entrants and more relaxed for experienced and trusted market participants?

2.4 A regulatory framework needs to be in place to attract operators. An example cited was the gap between the Australian Act and the implementation of regulations in practice which proved challenging and apparently deterred operators. What counts is the first mover advantage for the UK, in the future launch will proliferate.

2.5 To ensure a streamlined regulatory framework, it needs to provide a clean transition between other regulatory regimes - e.g. from ground level, to sub-

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orbital flight and orbital flight. This requires quite nuanced decisions – e.g. to define the vehicles involved both now and in the future as technologies evolve.

2.6 Underpinning the regulatory provisions, clarity and openness will be essential – there should be a two-way dialogue, so that operators understand the expectations on them and the regulator is assured that they can safely flex according to the market's needs.

2.7 Resourcing the regulator will also be key, but will take time to undertake appropriate training, which will limit how responsive and scalable the regulator can be. One size will not fit all, so the regulator will need to be flexible and responsive and able to recognise and represent the state of the art of emerging technologies and work with operators who know and understand their systems best and how to achieve safety goals.

2.8 The UK needs a range capability to ensure the safety of the surrounding area. This does not necessarily need to be mandated; it will come down to the criteria we use to assess risk, and our degree of risk tolerance.

Industry suggested that self certification may be one option however such an approach is unlikely to provide adequate risk mitigation to Government.

2.9 Understanding and handling risk. Collision warning system and risk assessment must be clearly articulated. Setting out risk management will enable regulation. The safety regulatory regime must be better in fact than elsewhere with worst case scenario considered and provided for.

2.10 Sounding rockets could be used as an initial test and then work up towards orbital launches.

2.11 The management of noise and environmental issues, plus planning permissions need to be made clear, for example with regard to the former issues, will the Environment Agency handle these and how will this link to Health and Safety regulatory functions?

3.0 What are the biggest risks and how should we manage them?

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- 3.1 **Lack of skills in the marketplace:** The UK will need a highly skilled workforce to operate effectively, which takes time to create and could make rapid scalability and market responsiveness challenging.
- 3.2 **Lack of skills to implement a regulatory regime:** The UK needs to have qualified persons to be able to conduct assessments, safety management functions. It is unclear whether the UK currently has these skills.
- 3.3 **Risk of early failures, which could be catastrophic for market confidence:** The UK needs to manage this by drawing on the significant existing body of global experience.
- 3.4 **Risk of being risk-averse:** The UK government, media and public need to understand that this is an inherently risky enterprise, so communications and stakeholder engagement with other industries i.e. the oil industry, need to be managed carefully so that risks are understood and accepted.
- 3.5 **Is the market large enough and sustainable?** The question was raised as to market investment versus other opportunities and whether the market was resilient enough and sustainable.
- 3.6 **Government resource:** Risk of whether HMG/ UK Space Agency is resourced well enough and structured to deliver in collaboration with the industry.
- 3.7 **Risk of environmental impact assessment.**
- 3.8 **Risk of time factors:** Pace at which the UK can establish systems is critical and 2021 is a long way off.
- 3.9 **Risk of the impact of the International Traffic in Arms Regulation (ITAR):** A clear understanding of how the US technology transfer will work requires early engagement with the US.
- 3.10 **Risk of failing to adequately support R&D:** Technical development requires support by an active research and development (R&D) programme.

4.0 Next steps

All of the organisations involved in this event would like to thank participants for attending the event. Discussion points that were raised at the event will be reviewed by the organisations that make up the cross-governmental Satellite Launch Programme to see how views can be considered with regard to policy development.

Annex A: Workshop Participants

- Aerohub at Cornwall Airport Newquay
- Airbus Defence and Space
- Atkins Global
- Bird & Bird
- Catena Space Ltd
- Civil Aviation Authority (CAA)
- Clyde Space
- Discover Space UK
- Firefly Space Systems
- Glasgow Prestwick Airport
- Health & Safety Executive
- Highlands & Islands Enterprise
- In-Space Missions Limited
- Lockheed Martin UK Space Systems
- London Institute of Space Policy and Law
- Moog UK Westcott Limited
- Orbital Access
- QinetiQ
- Satellite Applications Catapult
- Saturn SMS Ltd
- Serco UK & Europe - Serco Group PLC
- Snowdonia Aerospace LLP (Llandbedr Airport)
- Surrey Satellite Technology Ltd
- Telespazio Vega UK Ltd
- Thales Alenia Space UK Ltd
- The Falcon Project Ltd
- Virgin Galactic

Annex B: Presentation by Catherine Mealing-Jones, Director for Growth, UK Space Agency and SRO, cross-governmental Satellite Launch Programme.



Satellite Launch Programme Overview

Catherine Mealing-Jones
Director for Growth

6 September 2016

gov.uk/ukspaceagency

Vision

£35 billion global market emerging for sub-orbital flights and launching small satellites into orbit over next 20 years

- opportunity for UK to be 1st in Europe to start services in both markets, capturing 1/3rd of global revenues
- additional economic growth by enabling new business clusters, manufacturing, services and tourism
- enables UK to lead European micro-gravity research using new sub-orbital platform
- 100+ high tech jobs in rural communities by end 2019
- infrastructure for both air-launch and vertical lift-off satellite launch systems to attract multiple operators
- UK competes using vibrant service sector, agile use of infrastructure and low cost base

Delivery

Challenges

- all-new activity in UK drives need for legislation, regulation, safety audit, high tech skills and novel international agreements
- international competition for sub-orbital and launch services
- international acceptance of UK as a launching state, permitting activities from tech transfer to overflight
- building the spaceport infrastructure needed on time & to budget
- secure the commitment of commercial operators to use infrastructure when built

Role for Government

- create an enabling legal & regulatory environment
- Consider incentives to stimulate operators to come to the UK
- use convening power to link up local public and private sectors to build infrastructure and forge commercial partnerships
- support operators to negotiate and secure tech transfer and licenses from US authorities
- secure the international approvals needed to launch

Strategic rationale: Satellite Launch Programme

UK National Objectives (NSP)

- grow new commercial space markets
- secure cost-effective launch for UK's small satellite businesses
- enhance national security

Success metric

- an ability to launch small satellites from the UK on a commercial basis, free of 3rd party approvals

Market Opportunities

Long-term opportunity: step-changes in rocket technology re-defines space launch & commercial air transport markets (£100bn+ global opportunity)

Sub-orbital Flights

- £10 billion global market opportunity
- 'First mover' advantage in Europe
- Deliverable by 2019

Fast growing UK space industry with ambition to accelerate:


2015 £12bn 35,000 jobs
2030 £40bn 100,000 jobs

... which requires UK to identify new high-growth markets in addition to organic growth.

Small satellite Launch

- £25 billion global market opportunity
- European small sat launch hub
- Deliverable 2021-23

Annex C: Presentation by Pete Lindsay, Head of Security & Regulation, UK Space Agency




making the UK the Place for Space

Modern Transport Bill

Why, What, When & How

Pete Lindsay
Head of Security & Regulation

London – 06 Sept 2016
<http://www.bis.gov.uk/ukspaceagency>



Why & What

Drivers

NSP 2015 → Establish a spaceport → Queen's Speech → License & Regulate

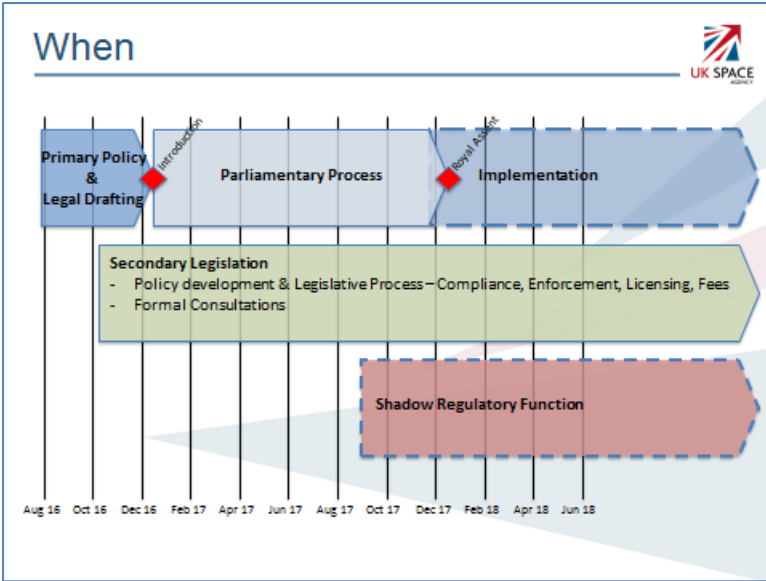
- Space Port Operations
- Launch Operations

Proposed Approach

- Amend aviation legislation to cover sub-orbital spaceflight
- Amend space legislation to regulate vertical launch from the UK launch
- Broaden space legislation to cover non UK nationals and companies

Safety & Sustainability

Powers of inspection, compliance, enforcement, charge fees, make regulations & licence



THANK YOU

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