

Written evidence submitted by Dr Adam Bower (SSS0026)

Scottish Affairs Committee, United Kingdom Parliament Inquiry regarding Scotland's Space Sector

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Biography

Dr Adam Bower is a Senior Lecturer in International Relations at the University of St Andrews.¹ His research examines the development, implementation, and transformation of international law and norms regulating the use of armed violence. He is currently studying the international governance of military space activities. Dr Bower is a member of the Scottish Space Academics Forum and a Fellow of the Outer Space Institute (OSI), a global network of transdisciplinary space experts committed to promoting safe and sustainable space operations.

Summary

Earth-orbiting satellites provide vital services ranging from navigation and communications to environmental monitoring and advanced warfare. These space systems—satellites, ground stations, and the data links between them—have expanded rapidly in recent years, largely driven by a growing transnational commercial industry. Scotland is positioning itself to be a leader in small satellite manufacturing, space launch, and downstream data analytics.² The United Kingdom and Scottish governments aim to stimulate the growth of the commercial space sector including through the coordination of targeted investments in advanced technologies and skills training.³

Ensuring access to, and use of, Earth orbital space is now recognised as a key component of national security and prosperity.⁴ This author previously submitted written and oral evidence to this Committee in relation to its inquiry on Defence in Scotland: The North Atlantic and the High North.⁵ This written submission focuses on a narrower issue: **the implications of commercial contributions to national security space capabilities, specifically in the context of military operations involving third states.**⁶

While private space companies have contributed to national space programs since the dawn of the Space Age, two recent developments are especially notable. First, the rapid growth of the commercial space sector has led to much greater commercial involvement in national security missions both within established space powers and in emerging spacefaring nations. Space companies now offer advanced “off-the-shelf” capabilities and services—especially Earth observation and remote sensing, and telecommunications—to a range of customers including governments and national agencies. Second, the ongoing war in Ukraine provides a dramatic example of Western space companies providing services to support one side in a foreign armed conflict, where the companies’ home states are not officially at war. The growing entanglement between commercial and national space systems

¹ <https://adam-bower.wp.st-andrews.ac.uk/>

² <https://www.sdi.co.uk/business-in-scotland/find-your-industry/digital-and-technology-industries/space-tech>.

³ <https://www.gov.uk/government/publications/national-space-strategy> and <https://www.gov.scot/news/scottish-space-strategy-launched/>

⁴ <https://www.gov.uk/government/publications/defence-space-strategy-operationalising-the-space-domain> and <https://www.gov.uk/government/publications/national-space-strategy>

⁵ <https://committees.parliament.uk/writtenevidence/116675/pdf/>

⁶ Dr Bower and Outer Space Institute colleagues organised a stakeholder workshop on commercial space operators and national security, held in Edinburgh in July 2023. The present evidence draws upon the author’s forthcoming report for the Scottish Council on Global Affairs. A podcast recording on the subject is available at <https://shows.acast.com/scga-scot/episodes/commercial-space-systems>.

has in turn raised difficult questions concerning the responsibilities—and potential vulnerabilities—of space companies and their home governments in times of war.

Thus far, UK—and specifically Scottish—space companies do not appear to be actively contributing capabilities and services to the ongoing war in Ukraine. Yet this could well change, either in current or future conflicts. The experiences of other Western governments and companies are therefore relevant when thinking about the national security implications of Scotland’s space sector. **This submission suggests that careful consideration is needed now, not least because of the special political and economic context that characterises Scotland’s place within the United Kingdom.**

Deliberations are undoubtedly ongoing within the UK government and agencies. For example, DSIT, DEFRA, MOD, and the UK Space Agency all have vested interests in the development of the commercial Earth observation sector to enable civilian and national security objectives in line with the National Space Strategy. In November 2022, the government announced a strategic investment of up to £200 million in the UK Earth observation sector.⁷ The British government remains a part-owner of commercial satellite telecommunications company Eutelsat OneWeb. The MOD has a stated intention to expand its partnerships with space companies.⁸ The UK Government’s “own, collaborate, access” framework provides a relevant policy context for these efforts.⁹

Commercial activities in the Russia-Ukraine war

Since the initiation of Russia’s full-scale invasion of Ukraine in February 2022, commercially owned and operated satellites have proven vital in enabling Ukraine’s civilian government and military operations. US companies including BlackSky, Maxar, and Planet have provided vast amounts of optical imagery to Ukraine via international aid packages and long-term contracts with US intelligence agencies (who in turn share imagery with Ukrainian partners).¹⁰ Canadian company MDA¹¹ and ICEYE¹² from Finland have provided synthetic aperture radar (SAR) imagery through arrangements with the Canadian government and a Ukrainian philanthropic organisation.¹³ These capabilities have been utilised by Ukrainian armed forces for reconnaissance and targeting of Russian military formations and infrastructure. Some imagery is also released to news agencies and non-governmental organisations, which has aided public understanding of the conflict and may be used as evidence in future war crimes trials.¹⁴

Additionally, SpaceX’s Starlink satellite internet constellation has become the vital communications backbone for Ukrainian government and society. This system is also utilised extensively by the

⁷ <https://www.gov.uk/government/publications/earth-observation-investment>

⁸ <https://spacenews.com/as-satellites-become-targets-u-k-military-seeks-closer-ties-with-space-industry/>

⁹ <https://www.gov.uk/government/publications/uk-science-and-technology-framework/the-uk-science-and-technology-framework> and https://assets.publishing.service.gov.uk/media/61f8fae7d3bf7f78e0ff669b/20220120-UK_Defence_Space_Strategy_Feb_22.pdf

¹⁰ <https://spacenews.com/as-russia-prepared-to-invade-u-s-government-and-satellite-imagery-suppliers-teamed-up-to-help-ukraine/> and <https://spacenews.com/maxar-receives-192-million-contract-to-supply-imagery-to-u-s-allies/>

¹¹ <https://www.newswire.ca/news-releases/mda-to-provide-satellite-imagery-for-international-efforts-in-ukraine-808234058.html>

¹² <https://www.iceye.com/press/press-releases/iceye-signs-contract-to-provide-government-of-ukraine-with-access-to-its-sar-satellite-constellation>

¹³ <https://www.canada.ca/en/department-national-defence/campaigns/canadian-military-support-to-ukraine.html> and <https://www.iceye.com/press/press-releases/iceye-signs-contract-to-provide-government-of-ukraine-with-access-to-its-sar-satellite-constellation>

¹⁴ <https://blog.maxar.com/earth-intelligence/2023/new-documentary-on-ukraine-underscores-the-importance-of-maxars-commercial-satellite-imagery-and-capabilities> and <https://www.bbc.co.uk/news/60981238>

Ukrainian military to support command and control, piloting of drones, and the transmission of audio and video to coordinate forces and direct attacks.¹⁵

To this author's knowledge, the UK government has not officially included commercial satellite services as part of its military aid to Ukraine.¹⁶ Moreover, there is no publicly available information to indicate that UK and Scottish space companies are actively working with the Ukrainian government or armed forces. Nonetheless, the experiences of the UK's close allies and partners highlight the need for careful planning in light of existing and anticipated challenges.

Entanglement between commercial and national security space systems

This growing use of commercial space systems to augment or even replace national security capabilities makes it harder to distinguish between civilian and military activities. This is especially challenging as most space technologies are inherently dual-use. For example, a single communications satellite may handle both civilian and military communications traffic and an observer may not be able to determine the end-user at a given moment in time. Similarly, Earth observation data (such as optical or SAR imagery) can be used to document environmental change or identify military forces in the field. Moreover, the space launch facilities being developed in Scotland are envisioned as commercial entities but are attractive options for launching national intelligence satellites into sun-synchronous Low Earth Orbits.¹⁷

The use of commercial space systems to support allies or partners in a foreign armed conflict can allow Western governments to avoid committing their own sensitive intelligence and military space assets. This provides a politically beneficial buffer for states keen to avoid becoming a direct participant in hostilities. Despite hostile rhetoric, both the Russian Federation and NATO allies have sought to avoid escalation leading to direct military conflict in Ukraine. Engaging commercial capabilities can thus potentially help to manage relations during times of heightened hostility.

However, states do not necessarily maintain continuous oversight of commercial space assets. The examples noted above presumably required governmental approval.¹⁸ Yet a space company could conceivably act without the clear knowledge and authorisation of its home state. In future, there will certainly be instances where Western governments adopt more ambiguous positions concerning an armed conflict or political dispute. Commercial imperatives to gain market access and/or expand sales could in turn lead to space companies acting in ways that diverge from—and even contravene—the official or unofficial policy of their home government. In so doing, commercial actors may undermine foreign policy and risk inadvertently drawing states into direct conflict.

At the same time, the reliance on commercial services can generate dependencies that provide space companies with forms of economic and political influence. In one prominent example, Elon Musk has previously threatened to stop Starlink coverage over Ukraine due to the allegedly high costs being borne by SpaceX, which caused considerable concern in Kyiv and Washington.¹⁹ More recently, SpaceX has sought to limit the Ukrainian armed forces' use of Starlink for "offensive" military purposes.²⁰

¹⁵ <https://www.politico.com/news/2022/06/09/elon-musk-spacex-starlink-ukraine-00038039> and <https://www.economist.com/briefing/2023/01/05/how-elon-musks-satellites-have-saved-ukraine-and-changed-warfare>

¹⁶ <https://researchbriefings.files.parliament.uk/documents/CBP-9477/CBP-9477.pdf>

¹⁷ <https://committees.parliament.uk/writtenevidence/116675/pdf/>

¹⁸ <https://www.canada.ca/en/department-national-defence/news/2022/10/minister-anand-announces-new-canadian-military-aid-to-ukraine-at-ukraine-defense-contact-group-meeting.html>

¹⁹ <https://edition.cnn.com/2022/10/13/politics/elon-musk-spacex-starlink-ukraine/index.html>

²⁰ <https://spacenews.com/shotwell-ukraine-weaponized-starlink-in-war-against-russia/> and <https://www.bbc.co.uk/news/world-europe-66752264>

The use of commercial space systems for critical military and intelligence capabilities during an armed conflict thus blurs the line between combatants and non-combatants and raises the prospect that commercial operators may be targeted. Civilian actors and assets would normally be protected from attack under the law of armed conflict (international humanitarian law). However, this protection is forfeited if an actor or object “by their nature, location, purpose or use make an effective contribution to military action and whose total or partial destruction, capture or neutralization... offers a definite military advantage.”²¹ Such a judgement inherently depends on the specific context and the potentially lawful targeting of a civilian satellite or ground station would still be governed by legal principles of distinction and proportionality.²²

Space companies that aide one side in an armed conflict may open themselves up to potential attack. Indeed, Russian diplomats have warned that commercial contributions to Ukrainian armed forces “constitute indirect involvement in military conflicts. Quasi-civilian infrastructure may become a legitimate target for retaliation.”²³ While Russia has not acknowledged specific efforts, we already have examples of hostile attacks that have been attributed to actors associated with the Russian state.²⁴

Space companies face very real risks to their infrastructure and employees. Concerns for physical safety and/or financial prospects may compel commercial actors to withdraw or modify services. There are also risks to other spacefaring actors and the international community more broadly. Attacks and interference against commercial space systems have thus far not permanently disabled or destroyed satellites themselves. Yet a cyberattack could turn a satellite into a piece of inoperable space junk. More seriously, the use of a ground-based ballistic missile to destroy a satellite would create long-lived debris, much of it too small to be detected, which would increase the risk of collisions and make highly utilised zones of low-Earth orbit more dangerous for operators of the very systems on which we have become so dependent.²⁵ The negative consequences of attacks against satellites may perversely increase the incentives to strike against Earth-based infrastructure, such as satellite ground stations and the subsea cables which transport telecommunications data around the world.²⁶

Potential policy responses

Integrating civilian commercial technologies into defence systems thus raises challenging questions concerning the responsibilities of commercial actors – and their home states. The assessment of a business case would have to take into account the possible risks to company assets and personnel. These are also policy dilemmas that governments must weigh. In light of the above, there is a clear need for new and creative mechanisms to effectively govern commercial space actors’ contributions to national security, especially in the context of foreign armed conflicts.

Rapidly expanding commercial space capabilities in the UK and Scotland present tremendous opportunities alongside important challenges. This submission has largely focused on the international context which most directly implicates foreign affairs and national security competencies that are held by the UK government. However, in areas of high technology, security and defence considerations invariably bleed into ostensibly civilian realms. As such, it is important to stress that Scottish and UK competencies cannot be neatly separated. In the case of space launch, satellite production, and downstream data uses, deliberations concerning industrial strategy, business development, rural

²¹ <https://ihl-databases.icrc.org/en/ihl-treaties/api-1977/article-52>

²² <https://casebook.icrc.org/law/principle-distinction> and https://casebook.icrc.org/a_to_z/glossary/proportionality

²³ <https://documents.unoda.org/wp-content/uploads/2022/09/Unofficial-translation-in-English.pdf>

²⁴ <https://cyberconflicts.cyberpeaceinstitute.org/law-and-policy/cases/viasat>

²⁵ [https://outerspaceinstitute.ca/docs/RussianASAT_PrelimDiscussion_\(7_Dec\).pdf](https://outerspaceinstitute.ca/docs/RussianASAT_PrelimDiscussion_(7_Dec).pdf)

²⁶ <https://www.nupi.no/en/publications/cristin-pub/the-subsea-cable-cut-at-svalbard-january-2022-what-happened-what-were-the-consequences-and-how-were-they-managed>

development, or environmental protection will influence what capabilities are encouraged and prioritised and how space technologies are employed for national defence, and vice-versa.

This submission recommends that the UK and Scottish governments, in the context of their respective competencies, carefully reflect on the legal, political, and economic implications of public-private collaboration in national security and defence space operations. This submission does not provide a comprehensive perspective but offers a few considerations which the Committee may wish to pose to stakeholders in this inquiry.

Legal status: What is the United Kingdom’s position on the legal status of commercial space operators whose systems are utilised for national security missions during an armed conflict? Does this change in a peacetime context?

Protecting commercial space assets: How should governments seek to reassure commercial space actors and deter attacks against their infrastructure and personnel? This could come in different forms, such as identifying some commercial space capabilities as “critical national infrastructure” or preemptively declaring that an attack on a commercial satellite would be regarded as an attack on the state itself, potentially triggering a right of self-defence. While potentially valuable in signalling intent to adversaries, such policies could reduce the room for diplomatic manoeuvre in a crisis and increase the prospect of unwanted escalation. Does the United Kingdom have a national position or policy regarding the protection of commercial space assets?

Indemnification: Does the UK intend to (publicly or privately) commit to compensate commercial operators for losses incurred as a result of government-authorised uses of their assets during an armed conflict (or more broadly)? Offers of indemnification could provide helpful reassurance that would encourage companies to continue to provide valuable services in risky contexts. Yet such commitments would be financially costly and could risk drawing governments further into armed conflicts.

Regulation: Domestic oversight could take a variety of forms including more rigorous rules concerning what kinds of commercial capabilities may be provided, to whom, and in what circumstances. For example, does the UK or Scottish government have a legitimate expectation of oversight concerning what companies may operate (as launch providers and/or as hosted satellite payloads) from Scottish spaceports? Is additional legislation warranted to restrict the provision of commercial satellite imagery and telecommunications to foreign states involved in armed conflicts, especially where the recipients are not part of the same political and military alliances (Five Eyes and NATO)? This becomes more challenging, however, in the context of multinational companies which may have foreign subsidiaries and/or seek to transfer data via intermediaries. As such, enhanced transparency and monitoring of these commercial activities will also be necessary. Does growing public-private collaboration in national security and defence space operations require changes to UK regulatory structures? If so, what entities hold responsibility for this?

Conclusions

Future armed conflicts are likely to feature extensive involvement of commercial space systems. In Ukraine, Western space companies are supporting a close partner of their home governments and therefore align with a key foreign policy priority. Yet the ongoing proliferation of space technologies means that the range of commercial activities will continue to expand, possibly in ways that complicate or directly challenge government objectives. For this reason, policymakers and industry leaders need to think carefully now about how to manage the benefits and downsides of commercial involvement in national security missions and their use during armed conflicts.

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