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A Certain Flexibility: A Comparative Analysis of UK and EU Space Debris Mitigation Regulation

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Abstract

With the rapid development of large-scale commercial space activity in what is being called the New Space era, regulators are having to grapple with an escalating threat to the orbital environment: the accumulation of space debris. Debris-related risks are self-reinforcing as collisions between debris and other objects themselves generate more debris. The result is a non-linear risk profile with projected tipping points known as Kessler events.[2] In such an event, cascading collisions result in clouds of debris that have the potential to render entire areas of orbital space unusable. This paper analyses how regulatory tools are used to determine, structure, and assess debris mitigation and its broader operational and environmental trade-offs, as well as how these choices affect the certainty of sustainability outcomes and the flexibility to develop and incorporate new understandings in space.

Keywords: civil aviation authority, debris mitigation, European Union, orbital environment, space debris, space regulation, space sustainability, United Kingdom

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[2] Kessler DJ and Cour-Palais BG, *Collision Frequency of Artificial Satellites: The Creation of a Debris Belt* (1978) 83(A6) Journal of Geophysical Research 2637 https://doi.org/10.1029/ja083ia06p02637.

Introduction

Orbital space is a global common, the governance of which was developed to negotiate between state actors, rather than private operators.[3] As a result, there is an absence of private liability mechanisms that limits the potential for market-driven solutions to debris mitigation regulation. In the short term, the economic benefit of satellite proliferation outweighs the diffuse cost of debris hazards. The result is that debris mitigation becomes a matter of regulation, with international standards developed for interagency agreements being applied as 'soft law' guidelines to private operators.[4]

Approaches to the regulation of emerging technologies must strike a balance between regulatory certainty and flexibility. Regulation must provide certainty to operators in what compliance requires, certainty in the risk mitigation it produces, and certainty in the future direction of regulation. At the same time, it must provide the flexibility to accommodate technological developments, flexibility to ensure proportionality, and flexibility to adapt to new understandings of risk. This article builds on the comparative analysis of two regimes trying to resolve this central certainty-flexibility tension, undertaken in *Debris Mitigation Regulation for the EU and the UK*,[5] a report completed as part of the Wayfarer Programme for Sustainability of Space.[6] The UK regulatory regime uses a principles-based approach, and requires operators to show that they have reduced risk 'As Low As Reasonably Practicable' (ALARP).[7] Enforced and regulated by the UK's Civil Aviation Authority ("CAA"), the UK's licensing requirements are non-prescriptive, and compliance is determined through case-by-case assessment (as opposed to being defined in advance). The proposed EU Space Act[8] takes a prescriptive approach to space regulation. The Act details technically specific thresholds and methodologies as compliance requirements, all of which fall under the EU Commission's ownership.

The compromises that each regulatory regime makes regarding this balance reveal gaps where neither fully provides the certainty or flexibility required for the challenge of space debris. In attempting to cover these gaps within the UK regime, the report makes four recommendations for reform. Taken as a package, the recommendations

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[3] P Jankowitsch, *The Background and History of Space Law*, Handbook of Space Law (2015), Edward Elgar Publishing https://www.elgaronline.com/edcollchap/edcoll/9781781000359/9781781000359.00010.xml.

[4] ibid

[5] Joshua Goodland and Andrew Iwanoczko, Debris Mitigation Regulation for the EU and the UK (Sustainability of Space 2026) https://www.sustainabilityof.space/post/debris-mitigation-regulation-for-the-eu-and-the-uk accessed 14 September 2026.

[6] Sustainability Of Space, Wayfarer Programme, https://www.sustainabilityof.space/post/wayfarer-programme-professional-development-for-early-career-graduates.

[7] Civil Aviation Authority, 'Guidance for Orbital Operator licence applicants and licensees' CAP2210 3rd edn (2026), <https://www.caa.co.uk/publication/download/18909> accessed 27 May 2026.

[8] European Commission, 'Proposal for a Regulation of The European Parliament and of The Council on the Safety, Resilience and Sustainability of Space Activities in The Union', COM 335 final (2025) <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:52025PC0335> accessed 27 May 2026.

represent a furthering of the UK's outcomes-based proportional approach to space regulation that reveals a broader question: what are the appropriate legal and regulatory tools for enacting agile and adaptive regulatory frameworks at the scale of national licensing? Importantly, the recommendations of the report emerge from the comparative analysis itself, rather than from an application of a pre-existing framework. This article aims to surface the questions the report raises in its attempt to address the gaps identified in the UK regime's existing approach.

The second tension explored in the report involves the integration or isolation of debris mitigation within licensing/approval submissions and assessments. While secondary in this article, it has its own implications for the certainty and flexibility of each regime.

The Two Regimes

The proposed EU Space Act and the current UK regulatory regime offer a productive comparison for identifying how different approaches to resolving the tension of certainty and flexibility impact a specific environmental risk. The proposed Act aims to incorporate prescriptive requirements, defined timelines and ex-post data collection to ensure regulatory certainty. The current UK regime uses a principles-based approach, enacted through case-by-case assessments of ALARP risk reduction, to ensure regulatory flexibility. Comparing the two reveals what each loses in choosing to prioritise either certainty or flexibility at the expense of the other, as well as the gaps that both regimes leave open in their approach to debris mitigation.

The European Union

Proposed in June 2025, the draft EU Space Act intends to harmonise space regulation at the bloc level, unifying fragmented national regimes. Its compliance requirements are prescriptive, in some cases going as far as committing to detailed technical specifications and assessment methodologies. To adapt these requirements as the industry and its technologies develop, the Act empowers the EU Commission to produce implementing acts that amend the regulation without reopening primary legislation. [9] Prescriptive requirements of this kind provide certainty to operators about what constitutes compliance. The compromise is that in such a nascent industry, prescriptive requirements could prematurely restrict innovative technologies and novel operations. The implementing acts have the potential to mitigate this, though they depend on the Commission keeping pace with industry and as of writing, are applied on an ad hoc basis. The result is that the proposed Act risks inflexibility, which could prematurely restrict an emerging industry or even leave novel activity to operate outside of regulation.

[9] ibid, Article 104.

Debris mitigation consists of three standalone submissions, which include: a Debris Control Plan, an End-of-Life Disposal Plan and a Failure Response Plan, each with formal baseline requirements.[10] Structured this way, the three plans frame debris mitigation as a regulatory priority and ensure a consistent application of compliance standards. These submissions are likely to create more certainty in compliance and outcomes of the risk mitigation produced. Adding to this is the requirement for launch operator applicants to produce an Environmental Footprint Declaration ("EFD"), which assesses the environmental footprint of the activities being approved.[11] Datasets produced as part of this submission will be collated in a central database used to inform future policy and regulatory reform. However, the EFD gives no input into approval decisions. In fact, as of writing (May 2026) compliance only requires applicants to carry out the assessment with the Commission's chosen methodology rather than meeting specific environmental impact metrics. This risks blinding application assessments to the systems-level trade-offs that debris mitigation involves, as where the EFD data may identify them, its status as a reporting requirement means that it has no input on approval decisions. Such trade-offs could include the atmospheric effects of an end-of-life disposal mechanism or light pollution created by a tracking enabling instrument, among others. The structure of debris considerations within the Act positions the EU regime to respond to these trade-offs and the risks they may produce reactively, after approval has been granted, undermining the certainty of its risk mitigation.

Finally, the Act's compliance requirements are projected by the EU Commission's impact assessment reporting to raise upstream compliance costs to operators by three to ten percent, with the higher end of the estimate falling on small and medium sized enterprises.[12] The justification for these costs is that they are outweighed by the benefits to operators from debris mitigation, which under an illustrative scenario of 50% reduction in total space debris, the Commission projects at ~€675 million annually.[13] These benefits largely come from conserved fuel as a result of undertaking fewer avoidance manoeuvres and cybersecurity resilience leading to reduced attacks. Both benefits come during the operational phase, while the increased costs are largely imposed on manufacturing. The result is that in compromising on flexibility through proportionality, the Act risks imposing disproportionate barriers to entry on upstream SMEs.

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[10] (n8) Articles 61(2A) & Article 70(2)
[11] (n8) Article 96.
[12] The EU Commission "Impact Assessment Report Accompanying the Document Proposal for a Regulation of the European Parliament and of the Council on the Safety, Resilience and Sustainability of Space Activities in the Union", SWD 335 final (2025), Section 6.1.8, Manufacturing cost to operators. <https://defence-industry-space.ec.europa.eu/document/download/18cb5e4d-c060-4ca8-b15c-00a45cd5f61a_en?filename=SWD-Impact-assessment-report-part1.pdf> accessed 27 May 2026.
[13] ibid Table 19, Projected benefits to operators under 50% total debris reduction illustrative scenario.

The United Kingdom

The UK regulatory regime takes a principles-based ALARP approach to determining compliance, with licensing and regulation carried out by the Civil Aviation Authority (CAA).[14] Applications are assessed on a case-by-case basis, with the methodology for submissions remaining open-ended. This approach prioritises flexibility, ensuring proportionality through ALARP. It also accommodates emerging technologies and novel mission operators through case-by-case assessment. However, industry feedback shows that this flexibility comes at the cost of certainty. In 2024, the Space Regulatory Review found that operators considered the definition of 'acceptable' under ALARP 'unclear and subjective', leading to 'costs, time and delay for applicants'.[15] In 2025, the Regulatory Sandbox for Rendezvous and Proximity Operations found that novel mission operators experienced limited clarity around approvable standards, which made it difficult to navigate the licensing process.[16] Concern reached the House of Lords, who in the same year released a report calling for greater clarity and stronger strategic direction,[17] to which a 2026 government response acknowledges the need to deliver 'clarity, certainty and confidence' for space regulation.[18]

The UK regime is actively attempting to address this uncertainty. In fact, the British Standards Institution is in the process of developing two BSI Flex Standards, with more planned for the future. One sets out principles for space sustainability[19] and the other provides guidance on the environmental impacts of launch activities.[20] Unfortunately, these remain voluntary standards and are likely to be deferred to in the same way as the international standards currently suggested to operators, as outlined below. Published in December 2025, a response from the Chief Executive (CE) of the

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[14] (n7) CAA, CAP2210, Annex 1, Outlines ALARP and case-by-case assessment.
[15] Department for Science, Innovation, and Technology, 'Space Regulatory Review 2024', Annex 4.1.1, May 2024, <https://assets.publishing.service.gov.uk/media/6644d26fb7249a4c6e9d3597/space_regulatory_review_2024.pdf> accessed 27 May 2026.
[16] RPO Operators Consortium (Astroscale, ClearSpace, and D-Orbit), "Regulatory Sandbox for Rendezvous and Proximity Operation: Stage 1 Independent Report", August 2025, <https://www.gov.uk/government/publications/regulatory-sandbox-for-rendezvous-and-proximity-operations-stage-1/regulatory-sandbox-for-rendezvous-and-proximity-operations-stage-1-report>, accessed 27 May 2026.
[17] House of Lords UK Engagement with Space Committee, "The Space Economy: Act now or Lose Out", (HL 2024-2026,190), <https://publications.parliament.uk/pa/ld5901/ldselect/ldukspace/190/190.pdf> accessed 27 May 2026.
[18] Department for Science, Innovation, and Technology, 'Government Response to the House of Lords UK Engagement with Space Committee Report: The Space Economy: Act Now or Lose Out' (CP 1478, 2026), <https://www.gov.uk/government/publications/government-response-to-the-house-of-lords-uk-engagement-with-space-committee-report-the-space-economy-act-now-or-lose-out/government-response-to-the-house-of-lords-uk-engagement-with-space-committee-report-the-space-economy-act-now-or-lose-out> accessed 27 May 2026.
[19] British Standards Institution, "Space Sustainability: Overarching Principles and Framework" (BSI Flex 1969 v2.0, March 2026), <https://standardsdevelopment.bsigroup.com/projects/9026-13265> accessed 27 May 2026.
[20] British Standards Institution, Space Sustainability: Launch (BSI Flex 1971 v2.0, March 2026), <https://standardsdevelopment.bsigroup.com/projects/9026-13264> accessed 27 May 2026.

CAA to the Chair of the Regulatory Innovation Office agreed to provide commitments for the regulatory regime of the UK in 6 areas,[21] to be carried out in 2026. One of the commitments directly targets uncertainty in order to consider where clarity and transparency may aid operator compliance with licence conditions. This is to be achieved through:

- Reviewing and improving orbital licence terms, conditions and reporting requirements, and publishing licence templates for orbital activities.
- Publishing its regulatory objectives.
- Working with His Majesty's Government to embed mechanisms to get timely HMG policy clarity on issues which can cause regulatory delays.

Of the above, the public record shows that only one has come to fruition as of May 2026. The CAA released its spaceflight regulatory objectives in March 2026, which clarify how licensing applications are assessed (rather than what constitutes acceptable practice).[22] The objectives make clear that they are not to be used as a checklist for compliance and do not undermine the case-by-case assessment of licensing applications. This maintains a compromise of flexibility over certainty, with the CAA taking no ownership of standards in order to uphold a case-by-case approach as the default.

On a more fundamental level, the guidance offered by the CAA itself occupies a legal middle-ground. For instance, in The Space Legislation of the UK, Simmonds outlines cases from previous litigation in the UK involving guidance in other industry contexts.[23] These cases characterise the legal status of guidance as, in his words, "whilst not legally binding, guidance should be adhered to unless there is some objectively justifiable reason which legitimises departure".[24] This is effectively an ALARP approach at the level of legal instrumentation, that compounds the uncertain character of the UK regime's compliance requirements. Within the UK's licensing framework, the structure of debris mitigation submissions subordinates the "Debris Mitigation Plan" to a broader "Technical Question Set"[25] that operators are required to produce. For their contents and structure, operators are referred to non-binding

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[21] Civil Aviation Authority, "Letter from the Chief Executive of the Civil Aviation Authority to Chair of the RIO", October 2025, <https://www.gov.uk/government/publications/exchange-of-letters-between-chair-of-the-regulatory-innovation-office-and-the-chief-executive-of-the-civil-aviation-authority-21-and-22-october-2025/letter-from-the-chief-executive-of-the-civil-aviation-authority-to-chair-of-the-rio> accessed 27 May 2026.
[22] Civil Aviation Authority, 'Spaceflight Regulatory Objectives "CAP 3227, March 2026, <https://www.caa.co.uk/data-and-publications/publications/documents/content/cap3227/> accessed 27 May 2026.
[23] Alexander Simmonds, *The Space Legislation of the UK*, Studies in Space Law Vol.28, Brill, <https://discovery.dundee.ac.uk/en/publications/the-space-legislation-of-the-united-kingdom/> accessed 28 May 2026.
[24] ibid, 34.
[25] Civil Aviation Authority, "Technical Question Set (TQS): Guidance and Checklist", CAA19252, Version 2.1, 16 February 2024, <https://www.caa.co.uk/publication/download/19252> accessed 27 May 2026.

international standards, specifically the ISO 24113[26] and IADC "Debris Mitigation Guidelines".[27] Beyond this, the "Spaceflight Regulatory Objectives" are heavily weighted in their contents towards reducing the harm of launch activities. Within the objectives,[28] environmental considerations for space operators constitute one bullet point under "safety", whereas for launchers, they have a separate section. Satellite operators, therefore, do not appear to be required to deliver the same depth of operational detail needed to evidence the high bar of environmental compliance that launch operators are. The result is that debris mitigation is under-signalled as a regulatory priority and debris considerations are isolated from the trade-offs they involve. As explained above, debris mitigation practices often involve their own environmental or operational impacts. These trade-offs depend on still developing understandings and assessing them within a broader environmental assessment of licensing applications would allow the CAA to ensure that compliance aligns with genuine sustainability before licence approval. Additionally, the reliance on case-by-case assessments of non-binding international standards, while reflective of the early-stage national industry, means that the CAA risks upholding an inconsistent standard of practice and obscuring aggregate assessments of its sustainability outcomes. The result of this is a regulatory approach that creates uncertainty for operators, uncertainty in its direction and uncertainty of its outcomes.

What the Comparison Revealed

The Gaps

The comparative analysis of the report revealed gaps not only in the regulatory approach to debris mitigation of the UK regime as compared to the proposed EU Space Act but also gaps that neither regime covers. The UK's deference to international standards, assessed on a case-by-case basis in legally uncertain guidance, leaves debris mitigation regulation in a place where its direction, expectations, enforcement and assessment remain uncertain. The proposed EU Space Act provides certainty in debris mitigation through a clear regulatory direction and binding prescriptive requirements. However, its adaptive measures, the implementing acts and the EFD database, provide only a reactive mechanism for flexibility.

The impact is that, despite different compromises the two regimes create a similar disproportionality for SMEs and operators of novel missions, both are often credited with making valuable contributions to space sector innovation. Providing SMEs and

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[26] International Organization for Standardization, "Space Systems - Space Debris Mitigation Requirements", ISO 24113:2023, 4th edition. (2023), <https://www.iso.org/standard/83494.html> accessed 27 May 2026.
[27] Inter-Agency Space Debris Committee, IADC, 'Space Debris Mitigation Guidelines', (IADC-02-01 Rev 4, January 2025); CAA Technical Question Set Guidance (n25), Pg4, Section Guidance 6) Sustainability.
[28] (n22).

operators of novel missions with proportional and efficient compliance pathways has the potential to enable them to grow into established market actors that drive the development of critical debris mitigation technologies forward.

The Recommendations

In attempting to resolve the identified gaps, four recommendations emerge from the comparative analysis that aim to balance the flexibility of the UK regime with the certainty required for meeting both the challenge of space debris and the needs of operators.

1. Adopt a presumed baseline standard with CAA oversight

To provide certainty around compliance requirements and ensure consistent application, the CAA should adopt presumed baseline standards into its licensing framework. While these could be adopted from the third-party standards currently deferred to, they would fall under CAA ownership. This would make the standards nationally-binding and allow them to be changed independent of international practice. To maintain flexibility, case-by-case assessment would be retained for novel missions where the presumed standards may be inapplicable. For example, thresholds for maintaining distance between satellites may not be appropriate for satellites designed for in-orbit repairs.

2. Articulate a formal regulatory trajectory and responsive reform structure

The second recommendation argues for the development of a formal regulatory trajectory, one that remains flexible and responsive to the developing industry. This may be achieved through a structured cycle of feedback and reform such as an annual forum. Doing so would enable the CAA to monitor international best practice, communicate changes in compliance requirements to the industry in advance, and respond to emerging technologies without losing strategic direction. Creating a planned and regular cycle of reform means that operators can build patterns of feedback with regulators that grow the CAA's tacit industry understanding. Combined with Recommendation 1, this approach uncouples the UK's compliance standards from the pace of international development, providing flexibility that has the potential to position the UK as a leader of international best practice, while maintaining the certainty necessary for operators to undertake long-term planning.

3. Introduce a standalone debris mitigation submission to the licensing requirements

The UK regime's debris requirements are currently too fragmented and subordinated within licensing submissions to frame debris mitigation appropriately as a regulatory priority. This recommendation proposes elevating the current "Debris Mitigation Plan" into a standalone submission that covers the full mission lifecycle, complete with presumed baseline requirements outlined in Recommendation 1. Flexibility is

maintained by leaving the technologies and methodologies for achieving its requirements open and keeping standards up to date through Recommendation 2. The certainty of a baseline standard enables the aggregate assessment of sector-scale mitigation outcomes and allows the UK to demonstrate the efficacy of its principles-based approach. This is further enabled by integrating the standalone plans output into an assessment of the broader environmental trade-offs that mitigation involves, as outlined in Recommendation 4. In practice, this approach ensures that where current understanding considers one mitigation practice preferable (such as atmospheric burnup for disposal), its impacts are identified and best practice can change as understandings develop (if burnup is discovered to have unacceptable atmospheric effects).

4. Develop a systems-level environmental impact assessment within licensing decisions

Assessing debris mitigation in isolation risks obscuring existing systemic challenges that emerge from its broader environmental and operational impacts. This recommendation proposes integrating debris considerations within a system-level environmental assessment that weighs them holistically against the operational and environmental trade-offs they involve. Unlike the proposed EU Space Act, which limits such an assessment to reporting, this approach enables the CAA to act pre-emptively against system-level risks, as the assessment informs licensing decisions. Through ALARP methodology, the acceptability of trade-offs can be adapted for various mission architectures, with the CAA releasing guidance on how trade-offs are weighed against one another. This preserves principles-led flexibility, while ensuring that debris mitigation neither overrides nor becomes subordinated to other operational and environmental considerations, ultimately ensuring certainty in the regime's sustainability outcomes.

Discussion

The UK regime developed against a backdrop of an explicitly principles-led and outcomes-based regulatory ideology. The term "agile", used by both the Government[29] and Regulator,[30] defines the ambition for flexibility at the core of the CAA's approach to space regulation. This approach is an exemplar of "Agile regulation" as outlined by the WEF,[31] a framework that shares characteristics with "adaptive regulation"[32] and

[29] (n15), DSIT 2024 Space Regulatory Review.
[30] (n21), Letter from the Chief Executive of the CAA to ROI.
[31] World Economic Forum. 'Agile Regulation for the Fourth Industrial Revolution A Toolkit for Regulators' (2020), <https://www.weforum.org/about/agile-regulation-for-the-fourth-industrial-revolution-a-toolkit-for-regulators/> accessed 27 May 2026.
[32] T Schrepel, 'Adaptive Regulation' (March 2026) European Journal of Risk Regulation, First View, Pg.1-27, <https://www.cambridge.org/core/journals/european-journal-of-risk-regulation/article/adaptive-regulation/10984D9EE8FE563187E0F28AB31FA6EA> accessed 27 May 2026.

"adaptive governance"[33], similar frameworks with origins in policy, law and technology studies literature across a number of contexts.[34] Particularly environmental governance[35] and emerging technologies.[36] Taken as a package, the reforms recommended in the report could be placed within the literature as a Planned Adaptive Regulation framework.[37] One that aims to structurally incorporate mechanisms of feedback and reform into formal requirements that provide both the certainty and flexibility necessary to support adaptive processes. Importantly, the recommendations emerged as a result of the analysis, rather than through application of an existing framework. Adaptive regulation has been posited for space debris governance at the international level,[38] with research projects for polycentric governance of space debris currently underway.[39] What the comparative analysis of this report touches on, however, is a broader question of what the necessary regulatory and legal tools are to achieve successful governance of space debris at the national scale. In 2020, Oltrogge and Christensen[40] outlined a broad holistic view of the international space governance system, including a discussion of the US national regime, that comes close to the question. This overview explores the role of non-

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[33] S Hatfield-Dodds, R Nelson and DC Cook 'Adaptive Governance: An Introduction and Implications for Public Policy' (paper presented at the 51st Annual conference of the Australian Agricultural and Resource Economics Society, Queenstown, New Zealand, 13-16 February 2007) <https://www.researchgate.net/profile/Steve-Hatfield-Dodds/publication/23507987_Adaptive_Governance_An_Introduction_and_Implications_for_Public_Policy/links/0f31753c70b6571a3c000000/Adaptive-Governance-An-Introduction-and-Implications-for-Public-Policy.pdf> accessed 27 May 2026.

[34] BC Chaffin, H Gosnell, and BA Cosens, 'A Decade of Adaptive Governance Scholarship: Synthesis and Future Directions', (2014) Ecology & Society 19(3) Art. 56, <https://www.ecologyandsociety.org/vol19/iss3/art56/> accessed 27 May 2026.

[35] LE McCray, KA Oye, and AC Petersen, 'Planned Adaptation in Risk Regulation: An Initial Survey of US Environmental, Health, and Safety Regulation', (2010) 77(6) Technological Forecasting and Social Change, Pg.951-959, <https://www.sciencedirect.com/science/article/pii/S0040162509001942?via%3Dihub> accessed 27 May 2026.

[36] L I Brass, JH Sowell, 'Adaptive Governance for the Internet of Things: Coping with Emerging Security Risks' (2020) Regulation and Governance 15(4) Pg.1092-1110, <https://onlinelibrary.wiley.com/doi/10.1111/rego.12343> accessed: 27/05/2026; GN Mandel, "Regulating Emerging Technologies", (2015) Law, Innovation and Technology 1(1) Pg.75-92, <https://www.tandfonline.com/doi/abs/10.1080/17579961.2009.11428365> Accessed: 27/05/2026.

[37] International Risk Governance Council, 'A Short Introduction to Planned Adaptive Regulation', (IRGC, November 2015), <https://irgc.org/wp-content/uploads/2018/09/A_short_introdution_to_Planned_Adaptive_Risk_Regulation-19Nov15.pdf> accessed: 27 May 2026.

[38] OF Keles, 'Telecommunications and Space Debris: Adaptive Regulation Beyond Earth', (2023) Telecommunications Policy 47(3), <https://www.sciencedirect.com/science/article/abs/pii/S0308596123000289?via%3Dihub> accessed 27 May 2026.

[39] JF Morin, C Couette, 'The Missing Ingredient for a Polycentric Governance System of Orbital Debris', (2025) Global Environmental Politics 25(2), <https://direct.mit.edu/glep/article/25/2/1/128618/The-Missing-Ingredients-for-a-Polycentric> accessed: 27/05/2026; Université Laval, Ongoing Projects, <https://www.chaire-epi.ulaval.ca/en/ongoing-projects> accessed 27 May 2026.

[40] DL Oltrogge, IA Christensen, 'Space Governance in the New space Era', (2020) Journal of Space Safety Engineering 7(3) Pg.432-438, <https://www.sciencedirect.com/science/article/pii/S2468896720300550?via%3Dihub> accessed 27 May 2026.

binding international standards and national regulatory regimes, which they characterise as 'play[ing] a pivotal pre-flight role in ensur[ing] sustainable satellite designs and space operations within the international orbital debris mitigation framework'.[41] Previous work by Migaud[42] identifies policy tools for addressing debris mitigation within the US, showing a parallel example of national-scale regulatory analysis for debris mitigation, but follows it with an international application of an adaptive governance framework.[43] What appears to be absent from the literature is an assessment and analysis of the UK's regulatory regime for space (and within that, debris mitigation specifically) through the lens of agile or adaptive governance frameworks. Such a study may provide valuable insight into how these frameworks can be translated into national-scale regulatory tools and mechanisms that could help to ensure the UK's success in its approach to space debris mitigation.

Conclusion

The UK regulatory regime is currently having a reform moment. Industry, government and regulator publications make it clear that uncertainty has spurred change. What this reform should look like is the question that the comparative report provokes and that this article poses. The Chief Executive of the CAA has committed to reducing uncertainty through licensing templates, regulatory objectives and clearer licensing terms.[44] As seen with the regulatory objectives, these do not necessarily address the structural uncertainty embedded in the CAA's regulatory framework. If reforms continue to be centred around the efficiency of regulation over its certainty, then the risks to debris mitigation, operator and investor confidence, and the success of emerging technologies will remain. In more mature industries such risks may be less acute, and regulators could have time to catch up. For the space industry, emerging markets, technologies and risks are moving at a speed that demands a flexible approach to regulation that refuses to compromise on certainty.

The analysis presented in the *Debris Mitigation Regulation* for the EU and the UK, and its resulting recommendations, act as a case study in how the regulatory tools chosen to implement an agile or adaptive regulatory approach translate to specific outcomes for national-scale space debris mitigation. As it stands, the report shows that the UK's application of an agile regulatory approach has failed to deliver the certainty that both operators and the challenge of space debris require, and the four recommendations put forward identify specific regulatory and legal tools that could

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[41] ibid, Section 5.5.
[42] MR Migaud, 'Protecting Earth's Orbital Environment: Policy Tools for Combating Space Debris', (2020) Space Policy 52, <https://www.sciencedirect.com/science/article/abs/pii/S0265964619300566?via%3Dihub> accessed: 27 May 2026.
[43] MR Migaud, RA Greer, JB Bullock, 'Developing an Adaptive Space Governance Framework', (2021) Space Policy 55, <https://www.sciencedirect.com/science/article/abs/pii/S0265964620300424?via%3Dihub> accessed 27 May 2026.
[44] (n21), Letter from the Chief Executive of the CAA to ROI.

close this gap. Further study should attempt to place the UK regime's approach to space regulation within the adaptive regulation literature; drawing on established models and previous case studies to identify what policy solutions, regulatory mechanisms and legal instruments are available to effectively balance certainty and flexibility in the UK's regulatory approach. Combined, non-linear debris risk and rapid commercial expansion without clear and enforced protocols and minimum standards mean that the choices made by regulators now will shape the future of the UK space industry and the orbital environment. What the analysis outlined in this article suggests is that flexibility without certainty is not agile or adaptive, it is aimless.

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