

State of and Options for UK Space Safety, Security and Sustainability Engagement in Europe Post-Withdrawal from the EU

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Abstract

Viewing Space Safety, Security and Sustainability as highly topical fields and aiming to promote an informed debate about the future of the United Kingdom (UK)'s participation in the European space sector after its withdrawal from the European Union (EU), this Article discusses the UK's beneficial options to participate in core EU and European Space Agency (ESA) engagements concerning Space Safety, Security and Sustainability as of December 2021. It finds that, post-withdrawal, UK participation options in EU Space Safety and Security engagements are now much more restricted. The UK still has various notable participation options in ESA Space Safety engagements. The Article points out several developments that might restrict UK participation in ESA and EU Space Safety and Security engagements, and provides various recommendations to the UK in this regard.

Keywords: ESA; EU; Safety; Security; Sustainability; UK

1. Introduction¹

1.1. Definitions

In the absence of any consistent Space Safety, Security and Sustainability definition this Article considers the following interpretation of these fields as analytically useful, while keeping close to the political and legal reality in the United Kingdom (UK), the European Union (EU) and at the European Space Agency (ESA).

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1 Updated IAC 2021 article. If not specified otherwise, references last accessed on 22.09.2021.

Space Safety concerns natural and unintentional human-caused hazards, categorised into five core subject areas:

- Terrestrial Environmental Impacts of Space Activities (TEISA);
- Space Debris;
- Planetary Defence;
- Space Weather;
- Space Traffic Management (STM).²

Space Security comprises intentional human-caused threats in two core subject areas:

- Space Weaponisation;
- Protection and Resilience of Space Infrastructure.

Space Sustainability refers to conditions that enable “humanity to continue to use outer space for peaceful purposes and socioeconomic benefit”.³ It is a recommended function of Space Safety and Security.

References to ‘policy’ in this Article mean government objectives and intentions in a specific field.

1.2. Article Scope

UK Space Safety, Security and Sustainability have been in transition for several years. Many positions are now articulated in the National Space Strategy (NSS)⁴ and the UK Severe Space Weather Preparedness Strategy (UKSSWPS),⁵ released in September 2021. The UK is also establishing the regulations necessary to fully implement the Space Industry Act 2018 (SIA) that covers aspects of safety, security and sustainability.⁶ Between 2020 and 2021 the UK further created a National Space Council, joined the Artemis Accords, formed the UK Space Command, invested in a satellite

2 C. Beischl, Contribution of Evidence Based Information By Imperial College London Informing UK Space Safety Policy, ISPL and Imperial College London, 31.03.2020, 6, https://www.space-institute.org/app/uploads/1603297587_Informing_UK_Space_Safety_Policy_ICL-ISPL_Final_Report_20201007.pdf

3 Space Sustainability, Secure World Foundation, 05.04.2019, <https://swfound.org/our-focus/space-sustainability>

4 HM Government, National Space Strategy, 09.2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1034313/national-space-strategy.pdf, (accessed 14.01.2022).

5 Department for Business, Energy & Industrial Strategy, UK Severe Space Weather Preparedness Strategy, 09.2021, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1020551/uk-severe-space-weather-preparedness-strategy.pdf, (accessed 14.01.2022).

6 ISPL expertise; Space Industry Act 2018, <https://www.legislation.gov.uk/ukpga/2018/5/contents>

mega-constellation together with foreign investors,⁷ and has declared its intention to take practical steps to implement the Guidelines for the Long-Term Sustainability of Outer Space Activities of the United Nations Committee on the Peaceful Uses of Outer Space.⁸ Following withdrawal from the EU on 31 January 2020 the UK has to additionally give special attention to its changed relationship with European partners in all its space policy and strategy.⁹

Viewing Space Safety, Security and Sustainability as highly topical fields and aiming to promote an informed debate about the future of UK participation in the European space sector post-withdrawal, this Article addresses the following question:

*What are the UK's options to participate in core EU and ESA Space Safety, Security and Sustainability engagements as of December 2021?*¹⁰

The available options are examined in two analytical steps, with separate sections for each of the three fields: First, the Article identifies the policies that drive UK engagement concerning each field. Second, the Article identifies the core EU and ESA engagements regarding each field. It only considers those engagements that can significantly benefit the UK in pursuit of its policies. For these cases the Article further examines potential limitations in determining the UK's participation options with the EU and in ESA as of December 2021, respectively.

The analysis builds on information and data provided in publicly available material and inferences from UK, EU and ESA actions.

2. Space Safety options

2.1. UK Policies

NSS, UKSSWPS, other material and observable actions allow the following conclusions about UK Space Safety policies.

7 HM Government (n4), 16,29,32-34,37,40-42.

8 UK General Statement, Scientific and Technical Sub-Committee of COPUOS, GOV.UK, 03.02.2020, <https://www.gov.uk/government/speeches/uk-general-statement-scientific-and-technical-sub-committee-of-copuos>

9 K. Rawlinson, A. Topping, S. Murphy, Brexit day: end of an era as United Kingdom leaves EU – as it happened, The Guardian, 03.02.2020, <https://www.theguardian.com/politics/live/2020/jan/31/brexit-day-britain-prepares-leave-eu-live-news-updates>

10 Original IAC 2021 paper: August 2021.

2.1.1. **TEISA Policies**

NSS indicates that the UK TEISA policy is to “mitigate the negative environmental impacts of our space activities” and “support our rapidly expanding space sector to integrate net zero thinking into its growth, monitor its environmental impact and encourage low-carbon and sustainable development.”¹¹ Information in the 2021 guidance given by the Secretary of State under SIA section 2(2)(e) supports this finding.¹²

2.1.2. **Space Debris Policies**

The current UK Space Debris policies arguably are:

- a) improving the UK’s Space Domain Awareness, including Space Debris detection, identification and tracking; and
- b) mitigating the creation of space debris and establishing effective space debris removal technology.

This emerges from references in NSS,¹³ a statement in the context of the G7 summit in June 2021,¹⁴ information in a 2021 guidance given by the Secretary of State under SIA section 2(2)(e),¹⁵ UK funding for space debris tracking and removal-related activities over the past year,¹⁶ and information presented in the UK’s Integrated Review of Security, Defence, Development and Foreign Policy (Integrated Review).¹⁷

11 HM Government (n4), 23-24.

12 Department for Transport, Guidance to the regulator on environmental objectives relating to the exercise of its functions under the Space Industry Act 2018. Given by the Secretary of State under section 2(2)(e) of the Space Industry Act 2018, 2021, 11 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/995153/guidance-to-the-regulator-on-environmental-objectives-relating-to-the-exercise-of-its-functions-under-the-space-industry-act-2018.pdf

13 HM Government (n4), 10,13-14,16,29,34,36.

14 G7 nations commit to the safe and sustainable use of space, GOV.UK, 13.06.2021, <https://www.gov.uk/government/news/g7-nations-commit-to-the-safe-and-sustainable-use-of-space>

15 Department for Transport (n12).

16 E.g.: Government fund will support new ideas for cleaning up space, GOV.UK, 13.07.2021, <https://www.gov.uk/government/news/government-fund-will-support-new-ideas-for-cleaning-up-space>

17 HM Government, Global Britain in a competitive age. The Integrated Review of Security, Defence, Development and Foreign Policy, CP 403, 03.2021, 58, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age_the_Integrated_Review_of_Security_Defence_Development_and_Foreign_Policy.pdf

2.1.3. **Planetary Defence Policies**

NSS does not provide for a distinct Planetary Defence policy. A likely reason is that while the UK is aware that a large Near Earth Object (NEO) hitting Earth could considerably affect the country,¹⁸ it regards such an event of low probability.¹⁹

Building on the fact that NSS refers to the UK “pursuing a lead role in a new comet interceptor mission” through ESA,²⁰ the findings of an ISPL Study from 2020 can be considered to remain valid. The Study concluded that the UK currently has the two interlinked Planetary Defence “polic[ies ...] of:

- a) improving the UK’s available space surveillance capabilities and capacities to detect, track, identify, analyse, catalogue and predict NEOs and associated hazards; and
- b) developing capabilities and capacities to solve or at least mitigate such hazards.”²¹

2.1.4. **Space Weather Policies**

NSS addresses space weather directly.²² Moreover, severe space weather receives attention in the National Risk Register of December 2020²³ and the UKSSWPS.

Information in these documents indicates that the UK policies are:

- a) improving the UK’s available capabilities and capacities to observe, forecast and understand space weather and its associated hazards with the potential to impact the UK’s available terrestrial and space-based infrastructure and services; and
- b) building relevant national resilience, response and recovery capabilities and capacities.

18 Natural Hazards Partnership, Hazard Overview Near Earth Objects, 04.2016, http://www.naturalhazardspartnership.org.uk/wp-content/uploads/NEO_Hazard_Overview.pdf

19 M. Stock, J. Wentworth, Evaluating UK natural hazards: the national risk assessment, POSTbrief 31, POST, 04.2019, 8, <https://researchbriefings.files.parliament.uk/documents/POST-PB-0031/POST-PB-0031.pdf>

20 HM Government (n4), 28.

21 C. Beischl (n2), 17.

22 HM Government (n4), 10,31,34,38,41,42.

23 HM Government, National Risk Register 2020 edition, 2020, 33-36, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/952959/6.6920_CO_CCS_s_National_Risk_Register_2020_11-1-21-FINAL.pdf

2.1.5. STM Policies

A prominent STM definition reads: “the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference.”²⁴

High-level UK documents do not provide evidence of distinct STM policies. That being said, there are statements indicating that the UK is aware of the benefits of a mature global STM system to enable the long-term stable use of outer space.²⁵

2.2. UK-EU and UK-ESA Participation Options

2.2.1. UK-EU Options

Nothing in the available material suggests that the UK is no longer interested in participating in EU Space Safety engagements if these can significantly benefit the pursuit of UK Space Safety policies. However, withdrawal from the EU curtails the UK’s participation options in core EU Space Safety engagements.

2.2.1.1. Horizon Europe

The UK’s most notable post-withdrawal participation in an important EU engagement linked to Space Safety is in Horizon Europe, the EU’s complex and wide-ranging research and innovation funding programme for 2021-2027, successor of Horizon 2020.²⁶

UK Space Safety policies could significantly benefit from this participation. It allows the UK to share the – often high – funding burden for lengthy, large scale Space Safety projects. Moreover, it enables UK entities to access relevant scientific and technological expertise in the EU and other participating states, most of which have an excellent scientific and technological foundation.

Horizon Europe’s coverage of the Space Safety field is evident from inclusion of space weather as part of the programme’s (forthcoming) space-related calls.²⁷ The coverage of further Space Safety subject areas is likely considering that the Horizon 2020 Work Programme 2018-2020 involved calls for Planetary Defence, Space Weather and STM-related research. Additionally, some space-related calls under Horizon 2020 required TEISA-oriented

24 As cited in: S. Moranta, T. Hrozensky, M. Dvoracek, Towards a European Approach to Space Traffic Management, ESPI Report 71, ESPI, 01.2020, 3, <https://espi.or.at/publications/espi-public-reports/send/2-public-espi-reports/494-espi-report-71-stm>

25 G7 nations... (n14).

26 Horizon Europe, EC, https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en

27 Funding & tender opportunities, EC, <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search>

consideration of environmental impacts and health risks.²⁸ The Space Debris subject area is also probably to be taken up by Horizon Europe given that space debris is an evermore growing concern of spacefaring states and the UK Space Agency-licensed RemoveDebris mission, launched in 2018, was a demonstration mission under the EU's Seventh Framework Programme, precursor of Horizon 2020.²⁹

Due to its withdrawal from the EU and subsequent negotiation outcomes the UK's option to participate in Horizon Europe is and will remain more restricted than in the precursor programmes, as outlined below:

As of December 2021, the UK has formally expressed its interest in becoming an associated country to Horizon Europe.³⁰ Consequently UK entities are allowed to partake in Horizon Europe calls for proposals under the same conditions as EU participants. However, they cannot, at least for the moment, sign grant agreements until the protocol officially confirming the UK's associated country status is adopted. Furthermore, the current UK-EU framework allows UK entities to apply only for grants and not for loans or equity under specific parts of the EU's EIC Accelerator as the UK does not participate in relevant financial instruments. There is no indication in the available material that the UK would reconsider this self-imposed restriction. The current post-withdrawal framework also prevents UK entities entering calls under the European Defence Fund, which is somewhat connected to Horizon Europe. Again, there is no evidence that the UK and the EU ponder changing this situation. Lastly, the UK must take note of the EU's reserved right "[i]n duly justified exceptional cases for actions related to Union strategic assets, interests, autonomy or security," to limit participation in Horizon Europe work programmes to legal entities established in Member States or specified third countries. In certain cases, this limitation can extend to "legal entities established in the Union or in associated countries directly or indirectly controlled by non-associated third countries or by legal entities of non-associated third countries".³¹

2.2.1.2. **EUSST**

The situation concerning the EU Space Surveillance, Tracking programme (EUSST), another *core EU Space Safety-related programme*, is much more restrictive.

28 Horizon 2020 Work Programme 2018-2020, EC Decision C(2020)1862, 25.03.2020, https://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-leit-space_en.pdf

29 A Low Cost Active Debris Removal Demonstration Mission, EC, <https://cordis.europa.eu/project/id/607099>

30 International cooperation, EC, https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/europe-world/international-cooperation_en

31 EC, Q&A on the UK's participation in Horizon Europe, 25.02.2021, https://ec.europa.eu/info/sites/default/files/research_and_innovation/strategy_on_research_and_innovation/documents/ec_rtd_uk-participation-in-horizon-europe.pdf

Citation on 3.

EUSST offers “a set of SST services to all EU countries, EU institutions, spacecraft owners and operators, and civil protection authorities.” In particular, “[t]he SST services assess the risk of in-orbit collisions and uncontrolled re-entry of space debris into the Earth’s atmosphere, and detect and characterise in-orbit fragmentations.”³²

Active participation in the programme by the UK would be highly beneficial for the pursuit of its Space Debris policies. It would allow exchange of scientific and technological expertise with other sophisticated states involved in the development of SST services, an important activity for any state engaged in an evermore congested space environment and interested in active space debris removal.

Moreover, UK participation in developing EUSST’s re-entry service element could aid the UK in the pursuit of its TEISA policy.

Ultimately, the European Commission’s decision in 2020 to reduce the UK’s post-withdrawal access to EU security-related sensitive information has eliminated the UK’s option to directly contribute to EUSST,³³ even though the UK was an initial contributor.³⁴ With no indication that this situation will be reverted any time soon, the UK has to accept that, for the foreseeable future, UK entities can merely request to receive EUSST services approved for users, following a prescribed procedure.³⁵

2.2.2. UK-ESA Options

ESA has various notable Space Safety engagements, in particular under its Safety and Security pillar that includes a Space Safety Programme.³⁶ The ESA Agenda 2025 further indicates that the agency wants to continue its Space Safety involvement.³⁷

32 What is EU SST?, EUSST, <https://www.eusst.eu/>

33 COMMISSION DECISION on the application of Article 127(7)(b) of the Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community to certain information exchanges, procedures and programmes which grant access to security-related sensitive information, EC Decision nC(2020)6634, 02.10.2020, [https://ec.europa.eu/transparency/documents-register/detail?ref=C\(2020\)6634&lang=en](https://ec.europa.eu/transparency/documents-register/detail?ref=C(2020)6634&lang=en)

34 About us, EUSST, <https://www.eusst.eu/about-us/>

35 UK involvement in the EU Space Programme, GOV.UK, 27.08.2021, <https://www.gov.uk/guidance/uk-involvement-in-the-eu-space-programme>

36 *ESA Council*, Resolution on ESA programmes: addressing the challenges ahead, ESA/C-M/CCLXXXVI/Res.3 (Final), 28.11.2019, https://esamultimedia.esa.int/docs/corporate/Resolution_3_Space19+Final-28Nov-12h30.pdf ; ESA Council, Subscription to optional programmes at Space19+ Council meeting at ministerial level, ESA/C-M(2019)100, rev.6, 02.12.2019, https://www.rymdstyrelsen.se/contentassets/4ed71c0d31e240eda75cd3a0518a78b3/esa_cm_2019_100rev.6_en.pdf

37 ESA, ESA Agenda 2025, 31.03.2021, https://esamultimedia.esa.int/docs/ESA_Agenda_2025_final.pdf

ESA is an intergovernmental organisation and not an EU institution. Therefore, the UK's withdrawal from the EU does, at first glance, not stop the UK from participating in ESA's core Space Safety engagements in the pursuit of UK Space Safety policies. According to a statement in mid-2021, and thus post-withdrawal, the UK even considers itself as "the leading contributor to the European Space Agency's Space Safety programme which provides collaboration and funding opportunities for UK scientists and industry."³⁸

As outlined below, the UK's options to participate in core ESA Space Safety engagements are presently mostly hampered by its willingness to promote and invest in them. The main limitation is likely regarding ESA Space Safety engagements that are implemented on behalf or heavily funded by the EU. This might become a more serious issue for the UK's participation option if ESA links itself more closely to the EU. A transformation of ESA into an EU entity would not only mean the end of any extensive beneficial involvement of the UK in core ESA engagements, but maybe also result in severe negative impacts to its academic research and development capabilities and capacities in the following decade.

A related consideration is that the UK will in the future have to deal with the fact that certain ESA activities will require participants to abide by EU regulations, while having left the EU and having no part in such regulatory development. One need only look at the 2021 ESA Clean Space Industrial Days website that reads that ESA's "EcoDesign for space missions means to design missions [...] that will be compliant with European environmental legislation such as REACH."³⁹

2.2.2.1. Space Debris Engagements

ESA's core Space Debris-related activities are mainly linked to its Clean Space initiative.⁴⁰ The overarching objective is to "preserv[e] Earth's orbital environment as a safe zone, free of debris."⁴¹

The UK knows that it can benefit significantly from participating in these two branches in pursuit of its Space Debris policies. Notably, it has promoted and made considerable commitments to the two cornerstone missions named ADRIOS (Active Debris Removal/ In-Orbit Servicing) and CREAM (Collision

38 G7 nations... (n14).

39 2021 *Clean Space Industry Days*, ESA, <https://indico.esa.int/event/321/>

40 ESA, Space Safety, https://esamultimedia.esa.int/docs/corporate/Space19+flyers_SSA_LR.pdf

41 ESA, clean space. Safeguarding Earth and Space, 2016, https://esamultimedia.esa.int/multimedia/publications/Clean_Space/offline/download.pdf

Risk Estimation and Automated Mitigation). The reported commitment is €12 million and €1 million, respectively.⁴²

2.2.2.2. Space Weather Engagements

The UK is also rightly convinced that its Space Weather policies can benefit significantly from participation in ESA's core Space Weather engagements. For example, over the past years the UK has promoted and provided funding of around £20 million for ESA activities enhancing space weather forecasting, including the Solar Orbiter satellite mission,⁴³ and reportedly committed around €70 million and wants to play a leading role in the development of the Lagrange mission through ESA. The latter is now another ESA cornerstone mission.⁴⁴

2.2.2.3. Planetary Defence Engagements

ESA's Planetary Defence activities aim at "observ[ing] NEOs, predict[ing] their orbits, produc[ing] impact warnings when necessary and [... getting] involved in potential mitigation measures."⁴⁵

Taking into account the complexity and long mission timelines, as well as the regional and global risks of a NEO hitting Earth, participation in ESA's core Planetary Defence engagements could considerably benefit the UK in the pursuit of its Planetary Defence policies. The UK seems especially interested in "pursuing a lead role in a new comet interceptor mission" through ESA.⁴⁶

2.2.2.4. TEISA Engagements

The TEISA-related EcoDesign branch of ESA's Clean Space initiative is directed at "design[ing] missions taking into account their environmental impact and fostering the use of green materials and manufacturing processes".⁴⁷

Arguably, the UK could significantly benefit from participating in ESA's EcoDesign in the pursuit of its TEISA policy leading to a faster development cycle of eco-friendly technology enabling UK entities to become early adopters. That being said, there is a lack of UK references evidencing any noteworthy participation in recent years.

42 ESA Council, Subscription... (n36); UK commits new funding to combat space debris, GOV.UK, 26.05.2020, <https://www.gov.uk/government/news/uk-commits-new-funding-to-combat-space-debris>

43 UK-built spacecraft captures closest ever images of the Sun, GOV.UK, 16.07.2020, <https://www.gov.uk/government/news/uk-built-spacecraft-captures-closest-ever-images-of-the-sun>

44 ESA Council, Subscription... (n36) ; Department for Business, Energy & Industrial Strategy (n4), 18.

45 Near-Earth Objects - NEO Segment, ESA, https://www.esa.int/Safety_Security/Near-Earth_Objects_-_NEO_Segment

46 HM Government (n4), 18.

47 2021 Clean Space Industry Days (n39).

2.2.2.5. STM Engagements

The ESA Agenda 2025 suggests that the agency is interested in making progress towards STM and points to STM as a candidate for a new EU-ESA flagship programme.⁴⁸

The UK could benefit considerably in the pursuit of any future UK STM policy from participation in an ESA STM programme. It requires strong international effort to establish and maintain a comprehensive STM system.

3. Space Security Options

3.1. UK Policies

Several high-level UK documents address aspects of Space Security, e.g. NSS and the Integrated Review.

3.1.1. Space Weaponisation Policies

The available material points towards a UK policy of preventing an arms race in outer space.

For example, according to a statement in 2018, the UK is “pleased to engage in the Group of Government Experts on Preventing an Arms Race in Outer Space.” Pending a solution to a variety of political, technical and other challenges, the UK does not necessarily stand against entering a related legally binding agreement.⁴⁹ Also, the Integrated Review states that the UK wants to “[p]revent the proliferation of technologies that pose a threat in space, such as ballistic missile technologies, through robust export controls”.⁵⁰ NSS reads that the UK “will support global stability through arms-control and non-proliferation regimes and will work with allies to deter hostile activity against space systems including the use of weapons in space.”⁵¹

Naturally, none of the above means that UK weapons, e.g. cyber-attack capabilities, might not be used against adversaries’ space assets and related terrestrial infrastructure in time of conflict. Wording in the Integrated Review and NSS suggests that the UK considers space as an operational and war-fighting domain. Reportedly, a more detailed UK Defence Space Strategy is in the making.⁵²

48 ESA (n37), 15.

49 UK Statement to the UNGA 73 First Committee on Outer Space, GOV.UK, 25.10.2018, <https://www.gov.uk/government/news/uk-statement-to-the-unga-73-first-committee-on-outer-space>

50 HM Government (n17), 58.

51 HM Government (n4), 30.

52 HM Government (n17), 58; HM Government (n4), 12-14,18-19,25-26,30,32-34,37.

3.1.2. Protection and Resilience of Space Infrastructure Policies

Information presented in NSS, the Integrated Review and an official statement indicates that the UK's interlinked policies concerning the Protection and Resilience of Space Infrastructure are to

- have independent national capability and capacity to detect and protect against hostile actions in and from space, considering space infrastructure as part of its Critical National Infrastructure;
- actively advance UK space capability and capacity resilience in this context; and
- ensure UK access to space as an integral part of the two points above, especially through establishment of UK launch capabilities.⁵³

3.2. UK-EU and UK-ESA Participation Options

3.2.1. UK-EU Options

There are only a few EU Space Security engagements that deserve attention here. EU member states undertake Space Security activities mostly at a national level and through bi- or multilateral collaboration outside the EU.

Overall, the Integrated Review allows arguing that the UK is, in general, open to participating in EU Space Security engagements if it suits the pursuit of UK Space Security policies.⁵⁴ However, the potential for such participation is rather limited following the UK's withdrawal from the EU.

3.2.1.1. Prevention of Arms Race

The EU is committed to prevent an arms race in outer space. It solicits and votes in international forums towards that end.⁵⁵

The UK can benefit from collaborating with the EU who's position fits the UK Space Weaponisation policy. The UK has previously aligned itself with related EU statements.⁵⁶

53 HM Government (n17), 58; HM Government (n4), 25,32-34,41-42; Defence Secretary's speech at the Defence Space Conference 2020, GOV.UK, 18.11.2020, <https://www.gov.uk/government/speeches/defence-secretarys-speech-at-space-conference>

54 HM Government (n17).

55 EU General Statement – United Nations 1st Committee: Cluster 3 (Outer Space), European External Action Service, 05.11.2019, https://eeas.europa.eu/headquarters/headquarters-homepage/69955/eu-general-statement-%E2%80%93-united-nations-1st-committee-cluster-3-outer-space_en

56 UN General Assembly 74, First Committee: thematic debate on outer space, GOV.UK, 04.11.2019, <https://www.gov.uk/government/news/un-general-assembly-74-first-committee-thematic-debate-on-outer-space>

3.2.1.2. **EDA, European Defence Fund and Launch**

Two notable Space Security-related engagements by the EU are its calls via the European Defence Agency (EDA) and under the European Defence Fund. For example, by 2021 there was an EDA tender call to “derive a common understanding of the challenges and opportunities offered by new space activities, help to define a military dimension with regards to STM and assist in the identification of tools, systems and sensor for an effective STM and surveillance capability.”⁵⁷ Also, there was a European Defence Fund call on “European protected waveform and accompanying technologies for resilient satellite communications against jamming”.⁵⁸

Arguably, the UK could benefit significantly in the pursuit of its Protection and Resilience of Space Infrastructure policies from participation in such calls. Yet, all such participation is either out of the question or highly limited and dependent on many factors because the UK has entered into no post-withdrawal agreement with the EU for active participation in EDA and the European Defence Fund.⁵⁹

Finally, there is the EU support for the development of launch systems to enable and maintain the EU’s independent access to space, funded through Horizon Europe.⁶⁰

While the UK wants to ensure its access to space, UK participation in the EU’s related activities is unlikely to benefit the country. Not being an EU member the UK is working on establishing UK launch capabilities to ensure access to space.

3.2.2. **UK-ESA Options**

Building on the discussion under section 2.2.2, the UK’s options to participate in core ESA Space Security engagements are presently mostly limited by its willingness to promote and invest in them. In the future, a

57 Service Framework Contract for ‘Study for a Defense Approach to Space Traffic Management and Coordination (STM) and Enabling Space-based Military Space Situational Awareness (SSA) capabilities’, 21.CAP.OP.124, EU, <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=8916>

58 European protected waveform and accompanying technologies for resilient satellite communications against jamming, EDF-2021-SPACE-D-EPW, EC, <https://ec.europa.eu/info/funding-tenders>

59 UK involvement... (n35) ; UK participation in EU funding programmes under the Trade and Cooperation Agreement, parliament.uk, 25.10.2021, <https://publications.parliament.uk/pa/cm5802/cmselect/cmeuleg/815/81505.htm>, (accessed 14.01.2022).

60 Low cost high thrust propulsion for European strategic space launchers - technologies maturation including ground tests, HORIZON-CL4-2021-SPACE-01-22, EC, <https://ec.europa.eu/info/funding-tenders> ; Reusability for European strategic space launchers - technologies and operation maturation including flight test demonstration, HORIZON-CL4-2021-SPACE-01-21, EC, <https://ec.europa.eu/info/funding-tenders>

strong EU involvement in these engagements might be a hindrance. Moreover, the UK has to recognise that it might have to apply EU regulations to participate in certain ESA Space Security activities.

ESA does not much address Space Security, as defined in this Article. This is not only because states undertake Space Security activities mainly at a national level and through bi- or multilateral activities outside of the ESA but also because, under ESA Convention, Art. II, its activities are *exclusively* peaceful.⁶¹ ESA activities do not readily lend themselves to military-linked projects.

One ESA activity that arguably falls within Protection and Resilience of Space Infrastructure is its space infrastructure cybersecurity activities.⁶²

By participating in that, the UK could benefit its respective policies. With so many attack vectors in existence, any improvement of cybersecurity can make a big difference. However, there is little public information on the current level of UK participation.

The UK is currently not involved in ESA's optional space launcher programme and it is unlikely that this changes, even though the argument could be made that involvement can provide the UK with additional expertise and technology ensuring UK access to space. The UK is focused on the development of domestic launch infrastructure.

4. Space Sustainability Options

As mentioned above, this Article considers Space Sustainability a function of Space Safety and Security as it relates to conditions that enable "humanity to continue to use outer space for peaceful purposes and socioeconomic benefit".⁶³

The UK Space Sustainability policy is consistent with that objective. NSS states the UK "will demonstrate global leadership and drive discussions on space safety, security, and sustainability and hold other nations to account for their actions in space. [... It] will promote responsible behaviours and work to avoid miscalculation, escalation, and conflict." Moreover, it holds that "[s]pace sustainability and space security must be considered alongside each other".⁶⁴

Ultimately, the UK can benefit significantly in the pursuit of its policy by participating in core EU and ESA Space Safety and Security activities, as identified in the previous sections.

61 ESA Convention, Art. II.

62 Plans for the future, ESA, https://www.esa.int/Safety_Security/Plans_for_the_future ; ESA, Technology and Engineering, https://esamultimedia.esa.int/docs/corporate/Space19+flyers_TEC_LR.pdf

63 Space Sustainability (n3).

64 HM Government (n4), 18,29-30,36. Citations on 18 and 30.

5. Synopsis and Recommendations

The above analysis shows that, the UK still has various participation options in core ESA Space Safety engagements that could significantly benefit the pursuit of UK Space Safety policies. It is actively capitalising on options in Space Debris and Space Weather programme. The UK could expand participation in ESA's TEISA and Planetary Defence activities, and probably also in developing STM. With ESA not being designed to deal with Space Security topics per se, the UK's only related relevant participation option seems to be in ESA's cybersecurity activities.

To get most benefits for its policies, it is recommended the UK maintains and broadens its respective participations. The present limitation for the UK regarding these engagements is its willingness to promote and invest in them. Such participation could also strengthen its position in guiding ESA's future development. The UK has little to win and much to lose from current deliberations about establishing a stronger ESA-EU relationship. If core ESA Space Safety engagements become progressively implemented on behalf or heavily funded by the EU, the UK could become increasingly limited in its participation options. The UK has to counter any attempt so transform ESA into an EU entity to avoid losing access to beneficial ESA engagements and seeing its academic and research and development capabilities and capacities severely impacted. In any case, the UK might be unable to ignore specific EU regulations in participating in certain ESA activities.

The analysis above further highlights the limitation or loss of UK access to some previous participation options in core EU Space Safety and Security engagements that could significantly benefit the pursuit of UK Space Safety and Security policies.

The UK is advised to at least maintain its current – and if possible seek additional – participation in core EU Space Security engagements benefiting its policies as Space Security is a growing subject area for the country and internationally.

Accordingly, it is recommended that the UK actively promotes its relevant technological and scientific expertise with European partners to advance its Space Safety and Security participation options with the EU and in ESA, especially to gain access to expertise that it lacks in exchange. The UK should, among others, study whether its OneWeb involvement can be an asset in this regard.

Additionally, the UK should not jeopardise its beneficial EU and ESA Space Safety and Security participation options through changes to its domestic regulations, as well as a growing partnership with and dependence on the USA. For example, weakening UK data protection regulations in comparison to the EU data protection regulations could result in considerable hurdles for

exchange of information in many subject areas. Some European countries might be sensitive to an increased risk of US meddling if they partner with the UK.

In conclusion, Space Safety and Security will long remain important and relevant to the UK, thus the UK will do well to establish itself as a leading European and global driving force of these fields, including together with the EU and through ESA.