

Towards the Development of an STM Regime: Opportunities and Barriers for Europe

*Christina Giannopapa and Ntorina Antoni**

Abstract

Space Traffic Management (STM) is addressed by the global space community for more than a decade. The United States have set up the Space Policy directive on STM and a proposal for a set of “Space Traffic Coordination and Management” standards. These developments intensified dialogue around STM and led to the further development of initiatives and programmes in Europe on STM, SST and SSA, recognizing its importance for the safety and sustainability of space activities. The recently published Action Plan on Synergies between civil, defence and space industries of the European Commission defines an action item on STM and refers to the “EU strategy for Space Traffic Management.” This paper provides an overview on the STM evolutions and status. It follows with the provision of space policies and programmes in the EU, ESA and selected member states. An outlook for the development of a common European approach is provided.

1. Evolution and Status of Space Traffic Management

International space law embodies the five UN space treaties and five sets of UN principles governing outer space.

The Space Traffic Management (STM) concept appeared first in the 1980s. STM evolved in discussions of the American Institute of Aeronautics and Astronautics (AIAA). Space Traffic Management is considered a ‘concept that provides a framework for the safety, stability and sustainability of space activities’^{1,2} and it is defined by the 2006 IAA Cosmic Study and the 2018 as:

* Christina Giannopapa, Eindhoven University of Technology.
Ntorina Antoni, Eindhoven University of Technology.

1 Schrogl K.-U., Jorgenson C., Robinson J., Soucek A. (2018) Space Traffic Management - Towards a Roadmap for Implementation, Paris, International Academy of Astronautics (IAA).

2 Perak L. Traffic Rules for Outer Space, International Colloquium on the Law of Outer Space (IISL), 1982, 82-IISL-09.

‘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 and radio-frequency interference.’³

The objective of STM’s concept to provide for the safety, stability and sustainability of space activities is aligned with the peaceful purposes of the Outer Space Treaty. Applying the principle of international cooperation to STM would entail among others ensuring the effective and appropriate cooperation between commercial and non-commercial actors, such as commercial/civil and non-commercial/military actors. In this line, the 2018 IAA study revisited and adjusted the STM topic to the increasing challenges the space sector experiences by providing a roadmap for its implementation. The Legal Subcommittee (LSC) of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) has acknowledged STM to be regarded as topic, which is appropriate for formal consideration and deliberation at intergovernmental level. LSC added space traffic management in 2016 as a regular agenda item in its subsequent sessions for debate and negotiation.^{4,5}

In addition, the Scientific and Technical Subcommittee (STS) agreed on the first set of guidelines for the long-term sustainability of outer space in 2016 and approved another set of nine guidelines in June 2019; comprising 21 in total.^{6,7}

Space Traffic Management gained even more relevance and prominence at UNISPACE+50 process prepared by the United Nations Office of Outer Space Affairs in 2018.⁸ The Space2030 vision aims at strengthening

-
- 3 Jorgenson C., Lála P., Schrogl K.-U. eds. (2006) *Cosmic Study on Space Traffic Management*, Paris, International Academy of Astronautics (IAA).
 - 4 United Nations General Assembly - UNGA. (2015) *International cooperation in the peaceful uses of outer space*, Resolution adopted by the General Assembly on 9 December 2015, Seventieth session Agenda item 53 A/RES/70/82, 15 December 2015.
 - 5 United Nations General Assembly. (2016a) *Draft Report Status and application of the five United Nations treaties on outer space*, Committee on the Peaceful Uses of Outer Space Legal Subcommittee Fifty-fifth session Vienna, 4-15 April 2016, A/AC.105/C.2/L.298/Add.1, 7 April 2016.
 - 6 United Nations General Assembly - UNGA. (2016b) *Annex: Guidelines for the long term sustainability of outer space activities: first set of guidelines*, Report of the Committee on the Peaceful Uses of Outer Space, Doc. A/71/20, Fifty-ninth session, 8-17 June 2016.
 - 7 United Nations General Assembly - UNGA. (2019a) *Guidelines for the Long-term Sustainability of Outer Space Activities*, Working paper by the Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, Doc. A/AC.105/C.1/L.366, Scientific and Technical Subcommittee Fifty-sixth session, Vienna, 11-22 February 2019.
 - 8 UNISPACE+50 was held in Vienna in 20-22 June 2018. Previous UNISPACE conferences were held in Vienna, in 1968, 1982, and 1999.

international cooperation in the peaceful uses of outer space through a comprehensive and inclusive long-term strategy for global governance.⁹ Space traffic management constitutes a significant condition for the sustainability of space activities as included under thematic priority 2 on governance.¹⁰

In addition to the UN system, there has been a number of STM related initiatives at regional and intergovernmental level. Responding to the UN calls for concrete proposals on Transparency and Confidence Building Measure (TCBMs) in Outer Space Activities, the EU proposed in 2008 the International Code of Conduct for Outer Space Activities (ICoC) with the objective to enhance the safety, security and sustainability of space activities.

Aside the international and regional efforts, space traffic management is considered an immediate necessity at national level as particularly reflected in the 2018 US Space Policy Directive 3 (SPD-3) regulating space traffic management.¹¹ The 2019 Space Policy Directive 4 establishes the United States Space Force as a sixth branch of the United States Armed Forces within the Department of the Air Force.¹² In August 2019 the US Space Command – other entity than the Space Force – was set up as ‘the military’s unified combatant command in charge of the country’s defense operations in space’.¹³

The Space Policy Directive 3 on Space Traffic Management aims for the US leadership in space by stipulating the need to ‘set priorities for space situational awareness (SSA) and STM innovation in science and technology (S&T), incorporate national security considerations, encourage growth of the U.S. commercial space sector, establish an updated STM architecture, and promote space safety standards and best practices across the international community.’

9 United Nations General Assembly - UNGA (2018) Report of the Legal Subcommittee on its fifty-seventh session, held in Vienna from 9 to 20 April 2018, Committee on the Peaceful Uses of Outer Space, Sixty-first session, Doc. A/AC.105/1177, Vienna, 20-29 June 2018.

10 United Nations General Assembly - UNGA (2017b) Thematic priority 2. Legal regime of outer space and global governance: current and future perspectives, Committee on the Peaceful Uses of Outer Space, A/AC.105/1169, 13 November 2017.

11 United States Federal Register - U.S.F.R. (2018) Space Policy Directive-3, National Space Traffic Management Policy, Presidential Document, Memorandum, Executive Office of the President, 83 FR 28969, 21 June 2018.

12 United States Federal Register - U.S.F.R. (2019) Space Policy Directive-4, Establishment of the United States Space Force, Executive Office of the President, 84 FR 6049, 25 February 2019.

13 United States Federal Register - U.S.F.R. (2018) Space Policy Directive-3, National Space Traffic Management Policy, Presidential Document, Memorandum, Executive Office of the President, 83 FR 28969, 21 June 2018.

Further, the SPD-3 attributes the responsibility for providing space situational awareness (SSA) data for civil use to the Department of Commerce (DoC), while the Department of Defense (DoD) will focus on maintaining access to and freedom of action in space. In particular, the Department of Commerce becomes the agency responsible for SSA data sharing and timely warning of collision avoidance, including conjunction assessments and maneuver plans, available to the public through the publicly releasable portion of DoD authoritative catalogue. The availability of the data is and will remain to be free of direct user fees. The Department of Defense, therefore, shifts the civilian part of its responsibilities to DoC and will be in charge of the military part of authoritative catalog of space objects. The implementation of the proposed changes, however, is to be determined by Congress who has not taken action yet. Although the creation of a Bureau of Space Commerce under the DoC seems to be well under progress, it is still questioned whether 'the SPD-2 and SPD-3 authorities should be assigned to DOC or the Department of Transportation's Office of Commercial Space Transportation. Managing STM ultimately boils down to balancing between to seemingly contradictory objectives; one being the safety and sustainability of outer space activities, and the other one being the national security concerns of the government as further depicted in the proposal for the creation of a space force.

In Europe the European Union and Member States have been engaging also in various activities in building up space traffic management.

2. Space Traffic Management Dimensions of European Policies and Programmes

The increased need for security in Europe and for Europe's space activities had led to a number of policies and programmes developed by the space actors, towards the strengthening of European security and defence.

2.1. Member States

A number of European Member States respectively have developed a dedicated space and security/defence strategy or policy. Such strategy or policy takes into consideration the specificities of each Member. According to Euroconsult, France, United Kingdom, Italy, Germany, Spain, Poland, Norway, Greece, Luxembourg, The Netherlands, Belgium and Denmark are the ESA and EU Member States with a dedicated government budget for defence space programmes.¹⁴

¹⁴ For additional information on national space strategy, policy, programmes and governance, consult for ESA Member States i.a.: M. Adriaensen, C. Giannopapa, D. Sagath and A. Papastefanou, Priorities in National Space Strategies and Governance of the Member States of the European Space Agency, *Acta Astronautica*, Volume 117, December 2015, p. 356-367.

2.1.1. **France**

In September 2019, France had announced the creation of a new military space command following similar moves by the US and reflects France's renewed military focus on space as a national security issue.¹⁵ This new military strategy depicts a doctrine that becomes 'offensive' allowing thus France to go on the attack. Given the dual use of space assets and the importance of space, and the general acceptance of the use of military capabilities for civilian objectives in France, the French DGA (Direction générale de l'armement) and the General Staff work closely with CNES.

Concerning the role of STM in particular, the 2017 Defense and National Security Strategic Review emphasizes 'the need to develop space situational awareness and to ensure the resilience of space capabilities'. It also refers to space as: 'A provider of essential navigation, communication, meteorological and imagery services, while also a domain of confrontation'.¹⁶ The French dual use operational SSA activities are organized on 3 levels. At the programmatic and decision-making level, CNES and the French Ministry of Defense closely cooperate to define policy, capabilities and priorities. At the sensors level, the French Ministry of Defense operates the GRAVES survey radar and several tracking radars that CNES uses on a regular basis. CNES together with CNRS (National Centre for Scientific Research) also operates three TAROT telescopes located at Calern, in Chile and in La Réunion for survey and tracking purposes.

2.1.2. **Germany**

The 2010 German Space Strategy encompasses space-based systems for Earth observation, communication, navigation and the observation of the Sun and near-Earth asteroids as aspects of national security. The strategy recognises the need for creating synergies between civil and military space research and stresses the need to building up a national competence for space situational awareness through the use of existing resources.¹⁷

15 Financial Times, *France follows US to set up military space command – Emmanuel Macron announces new doctrine ahead of Bastille day*, 14 July 2019; retrieved from: <https://www.ft.com/content/a479bcb6-a628-11e9-984c-fac8325aaa04>; La France va préciser sa nouvelle stratégie spatiale militaire - Doctrine, investissements, réorganisations: le ministère des armées va prochainement décliner les annonces faites le 13 juillet par le chef de l'Etat, *Le Monde*, 15 July 2019; retrieved from: https://www.lemonde.fr/international/article/2019/07/15/la-france-va-preciser-sa-nouvelle-strategie-spatiale-militaire_5489589_3210.html. [Accessed 1 September 2019].

16 République française. (2017) *Defence and National Security Strategic Review*, Ministry of Armed Forces.

17 BMWI, *Making Germany's space sector fit for the future - The space strategy of the German Federal Government*, http://www.dlr.de/rd/en/Portaldata/28/Resourcen/dokumente/Raumfahrtstrategie_en.pdf (last accessed on 6 September 2017).

Germany developed its space surveillance radar called Tracking and Imaging Radar (TIRA) and operated by the Research Establishment for Applied Science. TIRA is a unique system that offers space agencies the possibility to measure the orbit with high precision or produce a high resolution image of objects such as satellites. The system is therefore used to gain precise measurements of space debris, prevent evasive manoeuvres for operative satellites or create an image of an object.¹⁸

2.1.3. United Kingdom

The United Kingdom has three space surveillance systems, two radar systems (Fylingdales and Chilbolton) and one optical system (Starbrook). The primary role of RAF Fylingdales is to maintain an uninterrupted missile warning service, thereby demonstrating that a surprise missile attack could not succeed. The Unit's secondary role is space surveillance, which forms an essential element of the primary task.¹⁹ Chilbolton is the largest steerable meteorological radar in the world. It is able to remotely determine the shape and orientation of cloud and precipitation particles in the atmosphere.²⁰ Starbrook, located in Cyprus, is a ground-based optical sensor system for the surveillance of space. Designed and implemented in 2006, Starbrook has an added experimental survey sensor and is one of a new class of wide field of view telescopes that scan near-Earth space to discover and catalogue objects. In September 2021 the "National Space Strategy" was published. Reference is made to Space Domain Awareness (SDA) and in orbit servicing and manufacturing.²¹

2.1.4. Italy

The 2010 Italian Space Strategy recognises the relevance of space in support of national security objectives.²² The Italian Space Agency issued its ASI Strategic Vision for Space 2020-2029 setting out its implementation plan for

18 Space observation radar TIRA <https://www.fhr.fraunhofer.de/en/the-institute/technical-equipment/Space-observation-radar-TIRA.html> (last accessed 25 September 2017).

19 RAF Fylingdales <https://www.raf.mod.uk/raffylingdales/aboutus/whywearehere.cfm> (last accessed 25 September 2017).

20 Chilbolton Facility for Atmospheric and Radio Research (CFARR) Chilbolton Advanced Meteorological Radar (CAMRa) 3 GHz S-Band Radar <http://catalogue.ceda.ac.uk/uuid/364bb67ddd8a439eaf648bc9d183c906> (last accessed 25 September 2017).

21 HM Government, National Space Strategy https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1020617/national-space-strategy.pdf.

22 ASI, Strategic Vision 2010-2020, http://www.asi.it/sites/default/files/ASI_DVS_2010_2020_ENG_0_0.pdf (last accessed on 6 September 2017).

the years to come.²³ The 2015 Italian White paper for International Security and Defence puts forward the relevance of ability to access and use of outer space. Space is considered a strategic asset that contributes to the safety of the “national system” and increase the solidity of the political, economic and social structures.²⁴ Additionally, in the National Security Strategy of Italy, the “National Security Strategy for Space” was published in 2019 as a sectorial strategy. STM is explicitly mentioned supporting international initiatives, recognizing the commercial dimension and emergence of in-orbit service technologies.²⁵

2.1.5. Spain

Spain houses two major European sites relevant for SSA/SST: The Space Surveillance Test and Validation Centre (SSTC) located at ESA’s European Space Astronomy Centre (ESAC) and the EU Satellite Centre (EU Satcen). As reflected in the Spanish strategy for ESA and EU space programmes released in 2011,²⁶ both entities have grown through their role as reference centres for SSA among other reasons. The finalisation of SSA as a main running programme is included into its priorities for the preparation of the Spanish space sector for the new challenges in times of budgetary restrictions. Additionally, Spain, represented by CDTI, is a Member of EU SST Consortium which implements EU SST Support Framework.²⁷

2.2. The European Union (EU)

The main EU stakeholders in space and security matters include the European Commission, the Council of the EU, the European Council, the European Parliament, the European Defence Agency (EDA), the EU Satellite Centre (SatCen), the European Union Agency for the Space Programme (EUSPA), and the European External Action Service (EEAS). Recent security and defence related policy developments in Europe carried out by the said stakeholders demonstrate the increasing importance of space and security.

23 ASI, Documento di visione strategica per lo spazio 2020-2029. https://www.asi.it/wp-content/uploads/2020/04/DVSS-2020-2022-Finale_compressed_compressed.pdf

24 Italian Ministry of Defence, White Paper for International security and defence, July 2015, https://www.difesa.it/Primo_Piano/Documents/2015/07_Luglio/White%20book.pdf (last accessed 6 September 2017).

25 Presidency of the Council of Ministers, National security strategy for space, https://presidenza.governo.it/AmministrazioneTrasparente/Organizzazione/ArticolazioneUffici/UfficiDirettaPresidente/UfficiDiretta_CONTE/COMINT/NationalSecurityStrategySpace.pdf.

26 The national Security Strategy of Spain, http://www.lamoncloa.gob.es/documents/estrategia_seguridad_baja_julio.pdf (last accessed on 6 September 2017).

27 EU SST Governance, <http://www.eusst.eu/project/who-we-are/> (last accessed 18 October 2017).

In June 2016 the High Representative for Foreign Affairs and Security Policy, Vice President (HR/VP), Federica Mogherini, presented the “EU global strategy on foreign and security policy (EUGS)”,²⁸ which highlights the autonomy and security of European space-based services, the need for responsible behaviour principles and the necessary investments in space systems for security. It calls for “improv[ing] the monitoring and control of flows which have security implications. The objective of responsible behaviour is in line with the EU-sponsored multilateral initiative in 2015 towards an International Code of Conduct for Space Activities seeking to achieve enhanced safety, security, and sustainability in outer space.”²⁹

In addition, in the same period the European Commission (EC) released two documents of direct relevance to space, security and defence: The Communication on a Space Strategy for Europe and a European Defence Action Plan that stress the need for Europe’s non-dependence. The Communication on Space Strategy was released in October 2016³⁰ reiterating the strategic importance of space for Europe in reinforcing its role as a stronger global player and as an asset for its security and defence.

Space’s crucial role is highlighted with regard to enabling reinforced synergies between civil and space security activities. Particular emphasis is put on the

‘growing threats also emerging in space: from space debris to cyber threats or the impact of space weather. These changes make greater synergies between civil and defence aspects increasingly relevant. Europe must draw on its assets and use space capacities to meet the security and safety needs of the Member States and the EU’.³¹

Reference is made to STM in the Space Strategy, wherein the Commission draws attention to the fact that:

‘Increased human activity in space and the rapid growth of new entrants is testing the UN conventions on outer space to the limit, including on issues of space traffic management and mining’.

28 European External Action Service, Shared Vision, Common Action, A Stronger Europe – A Global Strategy for the European Union’s Foreign and Security Policy, Brussels, 28 June 2016.

29 EEAS, Security and Sustainability in Outer Space, https://eeas.europa.eu/headquarters/headquartershomepage/8466/security-and-sustainability-outerspace_e.

30 European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions on 'Space Strategy for Europe', COM(2016) 705, Brussels, 26 October 2016.

31 European Commission, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions on 'Space Strategy for Europe', COM(2016) 705, Brussels, 26 October 2016.

In the EU, the two European flagship programmes – Galileo and Copernicus – the research ones under Horizon 2020³² and the Space Surveillance and Tracking (SST) framework,³³ include space and security/defence activities in the broader context. EU SST is regarded as one of the three main areas of SSA, the other two being Space Weather and Near-Earth Objects. The SST support framework seeks to create a partnership where MS will contribute with their existing and future assets to the SST capability at European level.

In November 2016 the Commission released the European Defence Action Plan (EDAP)³⁴ which promotes civil/military synergies within EU policies including the space sector as highlighted in the Space Strategy for Europe.

In April 2016, the European Parliament released a report on ‘Space capabilities for European security and defence’. The report among others underlines the important role of space-based capabilities and services in, among other areas, the context of European security and defence.³⁵

In July 2017 a report of the European Parliament was released on the motion for a Resolution on “a Space Strategy for Europe” proposed by the Commission. The report has stressed the vulnerability of space assets threats ranging from interference or attack from state and non-state actors to collisions with space debris or other satellites. The Parliament calls for further investments to boost the development of enhanced space capabilities and technology in order to facilitate Europe’s response to the challenges in the space sector and changing markets. Especially, the risks posed by space debris to European space infrastructure call for mitigation measures that reinforce current space surveillance and tracking (SST) services in order to avoid collisions and, in the longer term, to remove orbital debris.

In 2019 the European Commission proposed the establishment of a new EU Space program component for Space Situational Awareness (SSA), building on and extending the current EU SST framework to space weather and near-Earth objects³⁶ After the adoption of the decision establishing a

32 European Commission, Space research – Horizon 2020, https://ec.europa.eu/growth/sectors/space/research/horizon-2020_en (last accessed on 29 September 2017).

33 European Parliament and the Council of the European Union, Decision No 541/2014/EU of 16 April 2014 establishing a Framework for Space Surveillance and Tracking Support, OJ L 158/227.

34 European Parliament and the Council of the European Union, Decision No 541/2014/EU of 16 April 2014 establishing a Framework for Space Surveillance and Tracking Support, OJ L 158/227.

35 European Parliament, Report on space capabilities for European security and defence (2015/2276(INI), <http://www.europarl.europa.eu/sides/getDoc.do?pu bRef=-//EP//TEXT+REPORT+A8-2016-0151+0+DOC+XML+V0//EN> (last accessed 18 October 2017).

36 European Commission. (2018) Proposal for a Regulation of the European Parliament and of the Council Establishing the space programme of the Union and the European Union Agency for the Space Programme and repealing Regulations (EU) No

framework on Space Surveillance and Tracking (SST) support in March 2014, the European Commission adopted, in September 2014, a first implementing act on the procedure for participation of Member States in the SST Support Framework. By mid-2015, a Consortium agreement on SST (EU-SST Consortium) was signed between France (CNES), Germany (DLR), Spain (CDTI), Italy (ASI) and the United Kingdom (UKSA) represented by their respective space agencies.³⁷

On 22 February 2021, the European Commission in the “Action Plan on Synergies between civil, defence and space industries” states that Based on preliminary analysis, and building on initiatives to be funded by EU instruments, the Commission is launching three flagship projects: 1) EU drone technologies, 2) EU strategy for Space Traffic Management (STM), 3) EU space-based global secure communications system. In particular regarding STM, it is stated that

“This flagship project will develop STM standards and rules, which are needed to avoid collision events that may result from the proliferation of satellites and space debris and could lead to catastrophic events for EU assets in space. STM will also avoid the risk of non-EU standards becoming the norm, as this dependence would have a negative effect on European efforts to achieve technological sovereignty. This flagship should also contribute towards building an international approach to STM.”³⁸

The EU Space Regulation adopted in 2021 introduces SSA as one of the main components of the Space programme for the years 2021 to 2027, as well as SST as a sub-component of this programme. Therefore, it establishes the basis for the development of the technical capabilities needed for STM. Additionally, according to article 54(d) of the regulation, the scope of the SST sub-component entails "monitoring and seeking synergies with the international initiatives in the area of the space traffic management." In addition, on 15 February 2022, the EC and EEAS joint communication was published with the title “An EU Approach for Space Traffic Management. An EU contribution addressing a global challenge”, with the

“objective of this Joint Communication is to lay out a concrete EU approach on STM for a safe, sustainable and secure use of space, preserving EU interests in

912/2010, (EU) No 1285/2013, (EU) No 377/2014 and Decision 541/2014/EU, COM(2018) 447 final 2018/0236 (COD), 6 June 2018, Brussels.

37 European Commission. (2014) Decision No 541/2014/EU of the European Parliament and of the council of 16 April 2014 establishing a Framework for Space Surveillance and Tracking Support, L158/227, 27 May 2014.

38 European Commission, Action plan on synergies between civil, defence and space industries, https://ec.europa.eu/info/sites/default/files/action_plan_on_synergies_en.pdf

full compliance with the respective competences of the EU and its Member States”.³⁹

2.3. European Space Agency (ESA)

The document entitled “Elements of ESA’s Policy on Space and Security”,⁴⁰ was presented in October 2016 to ESA council and subsequently in December to the ESA Security Committee. It introduced the current European context for space and security, the European goals in this domain and the specific objectives to which ESA intends to contribute and also presented the draft guiding principles for ESA’s contribution to space and security in Europe. The document defines Space and Security as a two dimensional term which includes security from space and security in space.

In addition, space and security are affected by *inter alia*: the space environment, space situational awareness (SSA), policies and laws, commercial and civil space and global utilities, space support for terrestrial military operations and space systems protection and negation.^{41,42}

The ESA Space safety programme aims to develop a European system in response to the recognized need for a SSA system at European level, and the recognized need for ESA and other European stakeholders to have access to independent SSA data and services.

In the Joint Statement on Shared Vision and Goals for the Future of Europe in Space signed on 26 October 2016,⁴³ the EU and ESA re-affirm Europe’s ambitions in space and agreed on the following overarching goals:

- maximise the integration of space into European society and economy;
- foster a globally competitive European space sector;
- ensure European autonomy in accessing and using space in a safe and secure environment.

The ESA Council at Ministerial Level in December 2016 has welcomed the efforts of the Agency. In this regard, the Council has highlighted the need to safeguard in the short-medium term the operational satellites, primarily the Agency’s spacecraft, and in the long term to aim for a safe and sustainable

39 <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022JC0004&from=EN>.

40 ESA Council, ESA’s elements of space and security policy, ESA/C(2016)106, October 2016.

41 ESA, Status Report on ESA’s security-related developments and activities, ESA/C(2017)62, 1 June 2017.

42 Schrogl K-U., Hays P., Robinson J., Moura D., Giannopapa C. (eds.) Handbook of Space Security, Springer, Vienna, 2015.

43 Joint Statement on Shared Vision and Goals for the Future of Europe in Space by the European Union and the European Space Agency, 26 October 2016.

space environment. In order to achieve this goal, it is suggested that all ESA missions follow:

- a. the United Nations Committee on the Peaceful Uses of Outer Space (UN COPUOS) Space Debris Mitigation Guidelines of 2007,⁴⁴ which address, inter alia, the sustainable utilisation of outer space, space debris and space situational awareness, space weather and regulatory regimes, and
- b. the Inter Agency Space Debris Coordination Committee (IADC) Space Debris Mitigation Guidelines of 2002, as amended,⁴⁵ which served as a basis for the development by UNCOPUOS of the UN Guidelines.

In the Ministerial Level 2019 (Space 19+), ESA in restructured its optional programs included activities on space safety and security. Space Safety covers the following three main domains: Space Weather; Planetary defense; Space Traffic Management. The latter includes the technical components of the SSA/SST segment, space debris related activities. In the next ministerial the space safety and security activities will maintained and expected to be further enhances.

3. Outlook for the Development of a Common European Approach on STM

Space actors in Europe recognize that an STM regime is essential for the security and sustainability of European space activities. Accordingly, they have stepwise developed a number of activities, strategies and policies which among others put the basis for STM development and reflect the important role of STM in space and security. In the frame of those space strategies and policies, STM is included in the broader frame of sustainable use of Outer Space. has limited technical capabilities in SSA/SST and largely depends on the United States. SSA data sharing agreements have been signed between the US Space Command and 32 countries worldwide, including 15 ESA and EU Member States (BE, DK, FI, FR, DE, GR, IT, LU, NL, NO, PL, PT, RO, ES, UK). In developing a common approach to STM in Europe challenges and barriers are posed which are technical, legal and regulatory, as well as political and economic.

44 The Guidelines were adopted by the STSC at its 44th session in 2007 (A/AC.105/890, para.99), endorsed by the Committee at its 50th session in 2007 (A/62/20, paras. 118 and 119) and subsequently submitted to the General Assembly at its session in 2007. Endorsed by the General Assembly through Resolution 62/217 of 22 December 2007.

45 IADC Document Registration List, http://www.iadc-online.org/index.cgi?item=docs_pub (last accessed 25 September 2017).

The legal and regulatory framework varies across Europe. Only a third of the Member States have adopted a national space law including Austria, Belgium, Denmark, Finland, France, Greece, Luxembourg, Netherlands, Portugal, Sweden. At EU level, TFEU article 189 prevents the EU from harmonizing national space legislation. The developments remain to be seen regarding the use of other applicable legal bases from the EU primary law and soft law alternatives that could be used for STM. Additionally, the EU has not ratified the UN Space treaties, even though it operates spacecraft which may affect the legal posture of the as a global space actor, when discussing about STM.

The political and economic challenges related to the complex political landscape in Europe for space affairs, with several stakeholders playing different roles and representing different interests. The needs and priorities of Member States differ with regard to space activities. This results in different maturity and awareness levels as far as STM is concerned; as well as to limited funding for space activities, compared to other global space actors like the United States (especially limited funding for the EU SSA programme and SST consortium).

The establishment of an STM regime is a complex procedure depending on various factors. Those could include a comprehensive and interdisciplinary approach, technical, legal and institutional framework as well as international cooperation. However, the political support constitutes the prerequisite which enables all the others.