Space Export Control Law and Regulations 11

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Abstract

The world continues to face an increasing demand for dedicated space applications. Global partnerships and cooperation provide the baseline for numerous space missions. International cooperation entails peaceful exploration, exploitation, and use of outer space since the early post-Cold War years. Space technology is dual-use by nature as it is serving scientific or even commercial interests on

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the one hand and strategic, defense-related objectives on the other. A functioning and reliable system for space export controls is a prerequisite for a well-functioning international space industry. This contribution sheds light on the relevant international, regional, and national legal mechanisms and their respective effects on the space industry.

Introduction

Since the inception of space activities, with the launch of Sputnik 1, enduring scientific and technological development ensured the success of outer space activities.

Outer space developed as an enabler and outer space activities, and their applications are tremendously important tools to answer the needs of modern society. The strategic and political objectives of outer space activities have always been intrinsically linked to the economic success and social returns (ESA Space Economy 2019). The Satellite Industry Association detected a global growth of satellite industry revenues of $ 268.6 billion (SIA 2019), and Europe's space sector is facing an extraordinary long series of growing sales, with a growth of sales to European customers of € 703 million (Aerospace and Defence Industries Association of Europe (ASD) EUROSPACE 2018). "Taking together Europe's defense and civil aeronautics, exports are at the same order of magnitude as the US" (ibid.). Export control systems are closely connected to the realm of international cooperation and foreign policy, to national security, and, as for the technical aspects, to space technology and its underlying technical knowledge. Understanding the logic behind the export control systems necessitates considering all four of these areas and their respective interconnections. While space technology determines the object of export controls and its practical scope, national security and international cooperation form the nature of the rules with their political impact. At the same time, it is precisely space technology and its characteristics that influence the national approaches toward its export controls and the willingness to cooperate on an international level. Although these interrelations are apparent and recognized, an analysis revealing their structure and inner functioning is necessarily multifaceted. The tangled connections give rise to rather complex and very heterogeneous systems of export control rules and its further development.

Terminology

Export control regulations are considered to be part of foreign trade law (Wegner et al. 2006, p. 21). More precisely, export controls can be understood as segment of commercial administrative law (Tietje 2009, aup.681). Governments exercise export controls as a means to promote foreign policy and commercial interests and to protect strategic industrial sectors as well as national security and the

nonproliferation of sophisticated weapons and weapons of mass destruction (WMD) (Hertzfeld and Jones 2011).

For the sake of this chapter, we define *export controls* as the restriction on the export of goods or services imposed by the exporter's own country. Export controls apply to a variety of items: chemical, biological, nuclear, military, and dual-use in nature (Aubin and Idiart (2011), pp. 1–18). The laws and regulations governing export controls are in fact posing an exception to the free trade principles of international commercial exchanges. Thus, entities involved in trade of controlled goods and services are obliged to follow and comply with the applicable regulations articulated by national and international regimes. The right to exercise export controls belongs to the sovereign rights of states to control and regulate cross-border transfer of goods and services (Pezzullo 2014). And it has to be noted that each state performs export controls of space technologies unilaterally. Export control regulations are in fact a reaction to the need to control items – the hardware, the software, or the technology and services leaving their territory – for the reason of security and technology protection.

In accordance with numerous relevant laws and regulations, *export* may be defined as the transfer (note that the term transfer is used for intra-European Union exports, for more details see below) of an item from one country (the country of exportation) to a foreign country (the country of destination) regardless of the method that is used for this transfer. Laws apply based on the nationality of the item. The term *item* may encompass hardware, software, technology, and even know-how. Export is also considered to have occurred if the item leaves the country only temporarily or as an item which is not for sale. Other forms of temporary exports are a wholly owned subsidiary in a foreign country or the transfer of an item with foreign origin from the exporting country to the country of origin (Aubin and Idiart 2011, p. 4). Also, the release of information regarding controlled technology to a foreign entity while the item itself remains on the soil of the country of exportation is considered an export. National export control regimes, such as in the United States (the US export control regime will be further examined below), have a broader scope of application and include deemed exports and the re-transfer inside the same territory of a product to another consignee. Export controls typically focus on strategic items, but some controls on embargoed countries can apply to the export of any item. Further, it is worth noting that more than one set of rules may apply to a single transaction.

The export control systems are often being implemented in the form of licensing authorization processes. In order to estimate whether a license can be granted, several factors are taken into consideration by the relevant administration. First, the goods and the technology submitted to the licensing process have to be examined with regard to their nature. In addition, the end user, the intended end use, and the destination have to be determined. Classification of goods and their placement on such a list derives from their characteristics. Although no consolidated definition of the term *space technology* can be offered, it can be described as a systematic application of engineering and scientific disciplines to the exploration and utilization of outer space (McGraw-Hill Science & Technology Dictionary). Within the export

control laws and regulations, the term often has a very specialized meaning which is applied in the range of the concerned legal or regulatory text. The export control system typically deals not only with the physical item itself but also with the specific information required for the development, production, or use of an item classified commonly as technical data or technical assistance. The term *space technology* refers simultaneously to the physical item as well as to the technical knowledge the item is built upon.

However, the close link between the Fourth Industrial Revolution, also known as Industry 4.0, and new space developments enables the rapidly increasing amount of new space entities to make use of material and technology originally used on Earth in outer space. This kind of technology might not yet fall under the given definitions of *space technology*, which is also varying between the existing export control regimes (see, e.g., EAR and EU Council Regulation 428/2009). In some cases, these items may then be classified as commercial. In the United States, *exempli causa*, these items fall under the jurisdiction of the US Department of Commerce and are designated as EAR99, as the majority of commercial products, which will not require a license to be exported or reexported as long as not exported to an embargoed or sanctioned country, to a party of concern, or in support of a prohibited end use. Nonetheless, the classification of such items has of course to be made on a case-by-case basis and might not be straightforward, where innovative technology is used for the first time in the harsh space environment. Therefore, the expression *technology used in space* might be more suitable in view of the export control classifications than merely *space technology* as the former encompasses a broader range of items than the latter.

The technical characteristics of the space item are a crucial factor in this whole process. If an item intended for export is referenced by a specific export control legal or regulatory text, the prescribed necessary measures in order to obtain a license for its export have to be taken.

The space industry covers a wide range of activities, such as design, construction, and assembling of complete spacecrafts, major subsystems and electronical systems such as earth observation technologies (Rhodes et al. 2015). Consequently, space export-controlled items range from satellites, launching pads to component parts, such as lasers and sensors as well as imagery and high-sensitive data.

Controls are usually conducted on exports of nuclear, chemical, biological, military, or dual-use goods, technology, or services. Virtually, the majority of controlled exports relate to military and dual-use goods and services. *Dual-use goods* are goods that may be used for both nonmilitary and military applications. Dual-use technology can then be described as those products, technologies, and services that can address and serve the needs of the civil and military fields. The military application can be either proven or even potential (Wetter 2009 xv).

As a matter of fact, all space items and technologies, *exempli causa* launch vehicles and satellites, are inherently dual-use since outer space as such is militarily strategic. While some early launch vehicles, such as the launch of Sputnik 1 on the Russian 8K71PS rocket (Konyukhov 2003) or the launch of the first US satellite "Explorer 1" on Army Jupiter-C (Angelo 2006), were converted military ballistic

missiles with almost identical technology which may then have undergone further technological developments, it holds true also for contemporary launch vehicles that are most of the time independent system developments and that they still share many characteristic features and technological bases. Therefore, they are, together with ballistic missiles, classified as delivery mechanisms for weapons of mass destruction. Satellites and their components are modified according to their intended use, which means that they can also be adapted to the requirements imposed by a military purpose. Satellites as well as satellite components are therefore generally categorized as dual-use and may be considered militarily sensitive.

The swings of technology in the aerospace industry, from military to civil applications after the era of the Cold War and back, prove that both areas benefit from a cross-fertilization. Items developed strictly for civil or commercial purposes might still be used for military purposes and vice versa.

The possibility to provide support and strategic advantages to military and intelligence operations is regarded as one of the most important export control characteristics of space technologies. Space technologies have already become an essential element of military and intelligence activities and play an important role in their future planning and structures. These characteristics are not based on the technical qualities of the space technologies but result from their potential use and the benefits they bring.

Therefore, the question that needs to be asked is not how to prevent this inherent dual-use nature, as the solution would be clearly beyond the regulatory or even technical possibilities. The question is what the export control regulations concerning these items should look like (Mineiro 2012, pp. 3–12).

In contrast to export controls, sanctions can be defined as restrictions on transactions with other countries, persons, or entities based on security or policy concerns, which do not necessarily involve items. Instead of the nationality of the item, the nationality of the person involved in the transaction gains central importance in the context of sanctions. Sanctions are not only limited to items, software, or technology and can also encompass financial transactions, related agreements, or services (Wolf, How U.S. Export Controls and Sanctions Affect the Work of the European Space Agency, p. 2.).

International Legal Regimes

Internationally coordinated export controls can contribute to the promotion and preservation of global stability and security. Even though there are no binding multilateral agreements focusing *exclusively* on space technology export control yet, it must be highlighted that a number of multilateral agreements concerning space technology used as weapon delivery systems and documents prohibiting their deployment and operation have been agreed upon and entered into (Gerhard and Creydt 2011, p. 191). Furthermore, some bilateral agreements serving as a basis to exempt respective states from the related licensing process can be found (Mineiro 2012).

The following paragraphs will examine the general international export control regimes and their applicability to space technology. Following that, the impact of the traditional international space law, in a narrower sense, to the space export controls will be investigated.

The Melee of International Legal Instruments on Export Control

Enhancing international cooperation is a means to maintain peace and international security. "[. . .] Growing tensions between states wishing to develop their civilian space programs, on one side, and states willing to prevent the traffic of dangerous military items, on the other side, have developed" (Von der Dunk/Tronchetti, Handbook of Space Law 2017, p. 360). The dialogue between nations resulted in the establishment of a number of international legal instruments intended to balance the international law principle of protection of peace and international security with the right to legitimate self-defense as well as to development and economic freedom (Achilléas 2007, p. 20). Four separate and almost wholly independent functional regimes compose the current export control system, which supplement the provisions of other binding, multilateral treaties primarily focused on the development and possession of weapon technologies, such as the 1968 Nuclear Non-Proliferation Treaty (NPT) (Treaty on the Non-Proliferation of Nuclear Weapons 1968), the 1972 Biological Weapons Convention (BWC) (Convention on the Prohibition of the Development 1972b), and the 1993 Chemical Weapons Convention (CWC) (Convention on the Prohibition of the Development 1993; Joyner 2004).

The four functional supplier state regimes are:

- The system of the Nuclear Suppliers Group (hereinafter "NSG", http://www.nuclearsuppliersgroup.org), which governs the area of nuclear weapons and materials
- The Wassenaar Arrangement on Export Controls 1996 (hereinafter "Wassenaar Arrangement"), which sets the rules in the context of conventional weapons
- The Australia Group (The Australia Group, http://www.australiagroup.net/), which deals with chemical and biological weapons proliferation
- The Missile Technology Control Regime (hereinafter "MTCR" or "The MTCR Guidelines 2012"), which regulates the export of missile and related delivery system technologies

In addition, these regimes are complemented by provisions of the Nuclear Non-Proliferation Treaty (hereinafter "NPT"), the IAEA Comprehensive Safeguards Agreement and Model Additional Protocol (1997), the Zangger Trigger List (1974), the Limited Test Ban Treaty (hereinafter "LTBT") (Treaty Banning Nuclear Weapon Tests 1963), and the Comprehensive Nuclear-Test-Ban Treaty (hereinafter "CTBT 1996") regarding nuclear materials and tests; by the Geneva Protocol (1925), the Biological and Toxin Convention (Convention on the Prohibition of the Development 1972), and the Chemical Weapons Convention with regard to chemical and

biological weapons proliferation; by the Hague Code of Conduct (hereinafter "HCoC" or "International Code of Conduct 2002") concerning ballistic missile proliferation; and by United Nations Register of Conventional Arms (hereinafter "UNROCA 1992") in the domain of conventional weapons.

By the conclusion of bilateral or multilateral agreements, states coordinate their domestic regulations but generally do not install a specific authority to enforce these obligations. In addition to these partly soft-law instruments, there are only a few specific cases, in which international law imposes direct obligations to control space technology exports. In accordance with Article 39 of the United Nations Charter, the United Nations Security Council is entitled to take actions "to determine the existence of any threat to the peace and shall make recommendations or decide what measures shall be taken in accordance with Artt. 41 and 42, to maintain international peace and security."

One concrete example is United Nations Security Council Resolution 1540 (UN Doc. S/Res/1540 2004), which was adopted unanimously on 28 April 2004. Security Council Resolution 1540 establishes the obligation under Chap. VII of the UN Charter for all member states of the UN to develop and enforce appropriate legal and regulatory measures against the proliferation of chemical, biological, radiological, and nuclear weapons and their means of delivery, in particular, to prevent the spread of weapons of mass destruction to non-state actors (on an implementation strategy for Resolution 1540, see Heupel 2007). Thus, the UN Security Council may pass on behalf of its 15 member states a resolution, which then establishes the need for member states to adopt and enforce controls over exports insofar as materials and technologies might have the abovementioned impact so that it poses a security threat. This explicit international obligation also impacts the right of states to export space technologies, to the extent that they could be used as a means of delivery for weapons of mass destruction (Mineiro 2012, p. 21). However, so far it never passed a legally binding resolution concerning the export of satellite technology (ibid., p. 20).

In the field of soft-law agreements (on the notion of soft law, see Freeland 2012, with further references), the Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies plays a major role. Numerous space faring nations are parties to it. It is a nonbinding export control agreement aiming at "contributing to regional and international security, by promoting transparency and greater responsibility in transfers of conventional arms and dual-use goods and technologies" (Wassenaar Arrangement, paragraph 1). Certain space and satellite technologies are listed in the categories of sensitive and very sensitive dual-use goods in the annexed List of Dual-Use Goods and Technologies, and their transfer or denial must be therefore duly notified according to the rules set up by the arrangement (Mineiro 2012; Achilléas 2007, p. 53). Following increasing cybersecurity vulnerabilities, the state parties to the Wassenaar Arrangement decided already in December 2017 to include also computer network intrusion software into Category 4 of its Dual-Use List. According to the respective definition the term "Intrusion software" means software specially designed or modified to avoid detection by "monitoring tools," or to defeat "protective countermeasures," of a computer or network-capable device, and performing any of the following:

(a) The extraction of data or information, from a computer or network-capable device, or the modification of system or user data
(b) The modification of the standard execution path of a program or process in order to allow the execution of externally provided instructions (Wassenaar Arrangement Secretariat 2018, pp. 221–222)

Moreover, launch vehicle space technologies are addressed in two other non-binding instruments – in the Guidelines for Sensitive Missile-Relevant Transfers and the International Code of Conduct against ballistic missile proliferation. The MTCR is a voluntary regime (Jakhu and Wilson 2000, pp. 165–7), applicable to rocket systems, including space launch vehicles and sounding rockets whose transfer could possibly make a contribution to deliver systems other than manned aircraft for weapons of mass destruction. According to the provisions of HCOC, states exporting launch vehicle technology must promote the nonproliferation of ballistic missiles capable of delivering weapons of mass destruction and be vigilant in consideration of assistance to space launch vehicle program in any other country. MTCR and HCOC concern the export of satellite technology only indirectly through the control of items enumerated on their lists. When a satellite technology is used together with these items, these two arrangements have to be taken into consideration and complied with. The MTCR control list contains, e.g., complete rocket systems (suborbital and space launch vehicles) with a payload of 500 kg at a distance of minimum 300 km, its component parts and production facilities, etc. (MTCR, Equipment, Software and Technology Annex 2014, para 1(a); Category I 1.A.1; Category I 1. B.1.). Items listed in Category I underlie a strong presumption of denial (MTCR, Guidelines for Sensitive Missile-relevant Transfer 2003). Category II contains rocket systems with a range of minimum 300 km and dual-use satellite technologies, like flight control systems and hydrazine (ibid., Category II 10.A.1–10. A.3; Category II 4. C.2). An export is authorized if its end use is in line with the MTCR Guidelines and if this is assured by the recipient state (§§ 2,5 MTCR Guidelines; Von der Dunk 2011, p. 194). The MTCR is a nonlegally binding export control regime. To ensure its impact, the HCoC came into force in 2002. In November 2018, 139 states are signatory states of the HCoC, which is a politically binding document (HCoC 2019). It aims certainty and transparency through publication of annual reports.

The above-enumerated international legal regimes apply to export controls of space technology because of its inherent dual-use characteristics and the potential to be used or incorporated in a system of weapons, missiles, or other applications destined for non-peaceful purposes. However, the trade with space technologies falls also under the restrictions posed by specific regimes applying to outer space.

The Specificities of the Outer Space Regime

Outer space as an area beyond national control is subjected to special rules of international public law characterized by principles such as peaceful use and non-

armament (Achilléas 2007, p. 60; for an analysis of outer space law and space security, see Freeland 2012). Article III of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the moon and other celestial bodies (hereinafter "OST" or "Outer Space Treaty 1967"), stipulates that "States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding." As a consequence, Article IV paragraph 1 regulates that no objects carrying nuclear weapons or any other kinds of weapons of mass destruction shall be placed in orbit around the Earth and no such weapons shall be installed on celestial bodies or stationed in outer space in any other manner. This Article has been considered as one of the first provisions on arms control (Schrogl and Neumann 2010). As may be observed, placing of other than nuclear weapons and weapons of mass destruction in outer space is not expressly excluded; also, a transfer of weapons is not explicitly prohibited. With regard to the fact that the Earth's orbits are of an immense strategic and also military value, this loophole may serve states future interests.

According to Article IV paragraph 2, the moon and other celestial bodies shall be used "exclusively for peaceful purposes." Since the Outer Space Treaty itself does not provide a definition of the term "peaceful," its interpretation has over the years given rise to much debate centered on the question as to whether it is to be understood as meaning "nonmilitary" or "nonaggressive," with the latter meaning seeming to have gained general acceptance (e.g., Markoff 1967; Hobe and Hedman 2010). Irrespective of the meaning attributed to the term in other provisions of the Outer Space Treaty, its combination with the term "exclusively" in Article IV paragraph 2 leads to an all-embracing prohibition of military use of the moon and other celestial bodies even if of nonaggressive nature (Schrogl and Neumann 2010). This is supported by a parallel to other international treaties and legal instruments: Article I of the Antarctic Treaty providing "for peaceful purposes only" is commonly understood as complete demilitarization of Antarctica. In addition, the United Nations Convention for the Law of the Seas (hereinafter "UNCLOS") distinguishes between "exclusively for peaceful purposes," referring to nonmilitary use of the seabed (Art. 141) and "shall be reserved for peaceful purposes" (Art. 88), allowing for military but nonaggressive use.

The establishment of military bases, installations and fortifications, the testing of any type of weapons, and the conduct of military maneuvers on celestial bodies shall be forbidden. Only scientific research and peaceful exploration may be conducted, also by military personnel.

Article III OST provides that "States Parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."

Accordingly, it may be concluded that all disarmament and nonproliferation treaties that are part of international law are also applicable to activities carried out

in outer space. This is further supported by Article 38 (1) of the Statute of ICJ; the recognized source of international law includes apart from international conventions also international custom, as evidence of a general practice accepted as law and the general principles of law recognized by civilized nations.

National and Regional Legal Regimes

In order to provide an overview of the complexities related to the legal export control regimes of space technologies, the following sub-chapters look at two prominent examples of national and regional legal regimes: the US regime on the one hand and the European Union system on the other. Following that, a sub-chapter sheds light on the additional particularities of dealing with export control issues in an international organization dedicated to the promotion of cooperation among its member states in space research and technology and their space applications, the European Space Agency (hereinafter "ESA").

The Export Control Regime of the United States

One unique characteristic of the US export control regime is the extraterritorial jurisdiction it establishes over US goods and technology. US export controls apply also when these items or technologies are located outside the territory of the United States, based on the fact that these are of US-origin or contain significant US content (for further details, Gerhard and Creydt 2011). This extraterritorial application of jurisdiction, which has given rise to criticism and debate over the years (e.g., Ress 2000; Clement 1988), is, however, a fact of law (see for more details Little et al.) and has a great impact not just on US American firms but on exporters all around the world since any foreign company seeking to re-export a product of US origin or with a certain percentage of US technology (details can be found in Part 734.4 EAR) will always have to comply with the applicable US regulations, regardless of whether they export from US territory or from any other place in the world. More precisely, § 734.4 and Supplement No. 2 to part 734 Export Administration Regulation (hereinafter "EAR") set out the scope of application of the US *De minimis* Rules and Guidelines. It applies if non-US-made commodity or software incorporates or is bundled with controlled US-origin commodities or software or in case that non-US-made technology is commingled with or drawn from controlled US-origin technology. If the abovementioned circumstances apply, the non-US-made item is subject to the EAR if the US- origin-controlled content exceeds a dedicated percentage based on destination.

In the *Nottebohm Case* (Liechtenstein v. Guatemala, I.C.J. 4 1955), the extraterritorial applicability of US export controls was fiercely discussed and finally considered to be in accordance with international law through the channel of national sovereignty under compliance with the "genuine link requirement." Failure to comply may give rise to prosecution, blacklisting, or other forms of punishment. It

is worth pointing out in this context that re-export has been elaborated as follows: "In addition, for purposes of *satellites* controlled by the Department of Commerce, the term "re-export" also includes the *transfer of registration of a* satellite *or operational control* over a satellite from a party resident in one country to a party resident in one country to a another country" (Part 77. Part 772 EAR). From a US perspective and understanding, there is no general freedom or right to export goods. Rather, an export license is considered to be a privilege which can be revoked in case of noncompliance with applicable regulations. Article I Sect.8 US Constitution authorizes the US congress to enact norms to ensure security and foreign trade. The United States is involved in international agreements, e.g., WA and MTCR, and implements them into national law (von der Dunk and Tronchetti 2017, p. 364).

Despite their importance for national security and for the overall economy, the US regime of export regulations has not been consolidated into a single and unified text. Instead, there are different rules applied by different departments depending on the individual item and recipient in question:

- *Dual-use goods*, i.e., goods that may be used for both nonmilitary and military applications, are regulated by the Export Administration Regulations (EAR).
- *Military goods* are governed by the International Traffic in Arms Regulations (ITAR).
- Finally, the Office of Foreign Assets Control Regulations (OFAC) relates to *particular countries*, *organizations*, and *persons* for the protection of national security interests.

With regard to OFAC, it must be pointed out that, unlike the EAR and ITAR, the main focus of these regulations is not on particular items and services but on targeted countries and end users: OFAC administers, upholds, and enforces economic trade sanctions based on US foreign policy and national security goals against targeted foreign states, organizations, and individuals. OFAC derives its authority from a variety of US federal laws regarding economic sanctions. The effect on the American space industry of these regulations is, however, only marginal given that the targeted countries are not important trading partners in the field of space technology.

Further, on 30 June 2017, US President Trump signed the Executive Order on Reviving the National Space Council. The Council's recommendations to the US President for regulatory reforms and other actions aim to "unleash the economic potential of the U.S. commercial space industry" (Office of Space Commerce 2019). The Aerospace Industries Association (AIA) announced "While the U.S. experienced the third largest trade deficit on record, our industry generated $143 billion in exports and a positive trade balance of $86 billion, effectively reducing the U.S. trade deficit by 10 percent" (Aerospace Industries Association (AIA) 2018, p. 1.).

Dual-Use Goods: The Export Administration Regulations (EAR)

The US Department of Commerce is empowered to administer and to enforce rules for the export of dual-use items under the Export Administration Act of 1979 (Export Administration Act of 1979). More specifically, its Bureau of

Industry and Security is charged with the development, implementation, and interpretation of US export control policy for dual-use items under the EAR. § 730.5 EAR refers to a broad meaning of the term "export," which applies to transactions outside of the United States or to activities other than exports. For instance, re-exports are defined by § 734.2 (b) and include in regard of space items also the transfer of registrations or monitoring/control over satellites (Part 772.1 EAR), which plays a decisive role in the monitoring of space debris. In addition, EAR applies to deemed re-exports, which are defined as releases of technology or software source code subject to EAR, within a state outside the United States, to persons who are not citizens or lawful permanent residents of that state (third-country nationals). Exceptions are imposed for the releases to nationals of certain countries (A:5 Country Group) and to certain bona fide regular and permanent employees.

Moreover, EAR encompasses in-country transfers of commodities, software, and technology that remain "subject to the EAR" once outside of the United States. Such items include:

- US-origin items, wherever located, if in their original form
- Non-US items incorporating more than de minimis amount of US-origin-controlled content
- Non-US items that are direct product of certain US-origin technology or software

The EAR establishes a number of general prohibitions (Part 736.2 EAR) relating to certain exports, re-exports, and other conduct, subject to the scope of the EAR, which necessitate a license from the Bureau of Industry and Security or the qualification for a license exception. Facts that determine the applicability of the general prohibitions are:

- The classification of the item on the Commerce Control List
- The country of ultimate destination for an export or re-export
- The ultimate end user
- The ultimate end use
- Conduct such as contracting, financing, and freight forwarding in support of a proliferation project

The relevant details are provided in accompanying lists and schedules. It is interesting to note that the otherwise existing possibility to obtain a license exception is specifically excluded for a number of items, among which feature certain "space-qualified items" (Part 740.2(a)).

Once established that an envisaged export activity does not fall under a general prohibition, the exporter needs to examine the specific license requirements, if any. This examination is accomplished by means of the CCL and the Country Chart, as well as the established reason for the control of the item (Gerhard and Creydt 2011, p. 198). The space relevant categories are Category 6, dealing with lasers and sensors and Category 9, which is listing propulsion systems, space vehicles and

related equipment. The Commerce Control List (hereinafter "CCL") includes dual-use items such as listed on the WA and MTCR list and also items under the "catch-all clause" (U.S. Department of State, A Resource on Strategic Trade Management and Export Controls 2016). Criminal sanctions, in addition to administrative and civil penalties, can be imposed where the EAR regulations have been violated (Part 764.3 EAR).

As a result of the 2013/2014 Export Control Reform, numerous items, such as transitioned military items (600 series) and transitioned spacecraft items (ECCNs 9A515), were moved from ITAR to the EAR. As of end 2014, the majority of commercial spacecraft items were moved from ITAR to EAR, where they are classified under:

- ECCN 9A515: Commercial communication satellites and spacecraft including lower-performing remote sensing satellites, planetary rovers and (inter-)planetary probes, related systems for these and parts/components of satellite bus, and payloads not listed on the USML
- ECCN 9A004: International Space Station (hereinafter "ISS"), James Webb Space Telescope, and parts or components thereof.

The revised United States Munitions List (hereinafter "USML") Category XV covers now satellites and spacecraft providing unique military and intelligence functions, human-rated habitats, and certain ground control equipment and parts/components. The latter includes 18 specific technologies critical to military functions, any payload performing the military functions described above, and US DoD funded payloads.

Restrictions on certain "military end uses" in the People's Republic of China and Russia or "military end users" in Russia are imposed. Exceptions are defined in EAR 744.21 for export, re-exports, transfers, and launch within Russia for the ISS. Stricter requirements for military end users in the People's Republic of China are expected in May 2019.

License exceptions can result from the *de minimis* rule, which is based on:

- The percentage, by value, of US-origin-controlled content in a foreign-made item
- The intended destination of the re-export or deemed re-export
- *De minimis* percentage: 0% threshold for 9x515 (The 9x515 Export Control Classification Number (hereinafter "ECCN") describes "spacecraft," related items, and some radiation-hardened microelectronic circuits that were previously subject to the International Traffic in Arms Regulations (hereinafter "ITAR")) to China, 10% threshold for Iran, North Korea, Syria, and Sudan, as well as 25% threshold applicable to all other countries.

Secondly, it can result from a Strategic Trade Authorization (hereinafter "STA"), requiring a prior consignee statement for transfers and re-exports in the A:5 country group (37 US partners and allies including all ESA member states). Lastly, license exemptions apply for US government programs (hereinafter "GOV").

Military Goods: The International Traffic in Arms Regulations

"[. . .] For everyone active in the space sector, knowledge about how to deal with International Traffic in Arms Regulations (hereinafter "ITAR") is absolutely necessary" (Gerhard and Creydt 2011, p. 203; current version http://pmddtc.state.gov/regulations_laws/itar_official.html). ITAR governs the export, re-export, re-transfer, and temporary import of defense items and services. Under the Arms Export Control Act of 1976, the State Department has the delegated power to control, enforce, and administrate the regulations. These defense articles and services are listed in the United States Munitions List (hereinafter "USML") (Part 121 ITAR). USML categories of particular interest in the context of space activities are:

- Category XV: Satellites and Spacecraft, providing unique military and intelligence functions
- Category IV: Launch Vehicle, including any interface between any spacecraft and a launch vehicle
- Category XII: Fore Control. Laser, Imaging and Guidance Equipment, such as Global Navigation Satellite System (hereinafter "GNSS") receiving equipment exceeding the "CoCom rule"
- Category XIII: Materials and Miscellaneous Articles

Following the passing of the Strom Thurmond National Defense Authorization Act for fiscal year 1999 (Public Law 105–261 1998), the export control competence concerning commercial satellites was shifted from the Department of Commerce to the Department of State following concerns about the proliferation of sensitive satellite technology (for the background and details, van Fenema 1999, p. 332). Exports under the ITAR are broadly defined (Annex 5 reflects a detailed scope of application), also covering:

- Exports of defense articles outside the United States.
- Transfer of registration, control, or ownership to a foreign person of any aircraft, vessel, or satellite covered by the USML, whether in the United States or abroad.
- Disclosing/transferring in the United States of any defense article to foreign government and disclosing technical data to a foreign person
- Performing a defense service for foreign person

ITAR consists of 11 parts (§§120–130) and aims to enforce the Arms Export Control Act (hereinafter "AECA"). Administrating body of the AECA is primarily the Department of State under the Directorate of Defense Trade Controls (hereinafter "DDTC").

An authorization is the prerequisite for conducting an export, re-export, or transfer of an ITAR-controlled item, regardless of its destination. Different license requirements exist for the permanent or the temporary export of any defense article or technical data (§§ 123 and 125 ITAR). The performance of defense services also requires the prior approval by the Directorate of Defense Trade Controls of the State

Department, which requires the conclusion of specific agreements between the performer of such services and the respective international partner (§§ 124.1 ITAR). Conclusively, authorization can be obtained in form of a license (DSP-5. DSP-83, DSP-73) or an agreement (Technical Assistance Agreement (hereinafter "TAA") (§ 120.22 defines the Technical Assistance Agreement as an agreement for the performance of a defense service and/or the disclosure of technical data (including the assembly of defense articles, providing that production rights or manufacturing know-how are not conveyed, which are to be covered by a MLA), Manufacturing License Agreement (hereinafter "MLA") (§ 120.21 defines a Manufacturing license agreement as an agreement granted by a US national to a foreign person to manufacture defense articles abroad, which involve either the export of technical data (§120.10 ITAR), defense articles, the performance of a defense service, or the use by the foreign person of technical data or defense articles previously exported by the US national (§124 ITAR))).

The "see-through" rule applies to commodities, software, and technical data. According to this rule, any non-US-made item incorporating US-origin ITAR content will require DDTC approval to re-transfer the ITAR content, regardless of the type of content or destination. Compared to the EAR, ITAR "sees through" the item and continues to control the original ITAR content. Further, there is no *de minimis* threshold in the ITAR. However, some ITAR-controlled items are exempted from the "see-through" rule when incorporated into an EAR controlled system, e.g., USML spacecraft (Category XV) items.

There are only a few exemptions from ITAR authorization requirements, such as the Defense Trade Cooperation Treaties with Australia and the United Kingdom for certain governmental end users (Long 2013, p. 58 ff.). In addition, ITAR contains exemptions for transfers to regular employees (including loan-employment contractors) from NATO and EU member states, Switzerland, Australia, Japan, and New Zealand. It follows that this exemption applies to all ESA member states. A transfer of items or services to dual/third-country nationals outside these countries can be made in the framework of:

- Foreign vetting
- DDTC vetting

The ITAR regulations have been criticized as too cumbersome, complex, and time-consuming (e.g., Abbey and Lane 2009), which in turn is said to have led to a competitive disadvantage for the US space industry and a decline of exports, as competitors around the globe started to invest in the non-dependence in certain fields of technology (see also Landry 2010). However, with Space Policy Directive – 2 "Streamlining Regulations on Commercial Use of Space," which was signed by President Donald J. Trump in May 2018, the White House is eager to ensure the promotion of economic growth and the minimization of uncertainties for taxpayers, investors, and private industry while protecting national security, public safety, and foreign policy interests.

The overall objective is the encouragement of American leadership in space commerce (the White House. President Donald J. Trump is Reforming and Modernizing American Commercial Space Policy 2018).

Space Policy Directive 2 addresses five areas:

1. Commercial launch and licensing
2. Commercial remote sensing
3. Creation of an Office of Space Commerce within the Department of Commerce
4. Radio frequency spectrum management
5. Export licensing

The latter requests the National Space Council to review of export licensing affecting commercial space flight as well as commercial remote sensing activities with strict consideration of US commercial space policy objectives. As a result, the NASA Advisory Council Regulatory and Policy Committee issued recommendations to relieve the Lunar Gateway from such licensing restrictions as are applicable to the ISS (NASA Advisory Council Regulatory and Policy Committee Observations, Findings, and Recommendations of 12 October 2018).

In October 2018, the US State Department issued minor ITAR revisions, including two space relevant changes. As result of a previous revision conducted by the Department of Commerce's Bureau of Industry and Security (BIS), the State Department added a note clarifying that the rocket engine controls in Category IV(d) of the USML do not apply to satellite and spacecraft thrusters. Such thrusters fall under USML Category XV(e)(12) or ECCN 9A515 of the CCL. Further, the ITAR update also amended the definition of spacecraft-related defense services in USML Category XV(f), but without changing the actual scope of the controls (Office of Space Commerce. ITAR Clarification on Satellite Thrusters 2018). After the recent update of the USML, Category XV now includes letter (f) "the furnishing of assistance (including training) to a foreign person in the launch failure analysis of a satellite or spacecraft, regardless of the jurisdiction, ownership, or origin of the satellite of spacecraft, or whether technical data is used."

Export Regulations of the European Union

The European Union (EU) has for many years played a leading role in arms export control, both regionally and internationally. Nowadays, export control regulations on dual-use goods and defense equipment have been harmonized within the EU under a common regime. Similar to the US approach, products are categorized into either dual-use goods or military products. However, unlike to the situation in the United States, none of the regulations or national laws has extraterritorial effect on third countries outside the EU.

However, the categorization of items in dual-use and defense equipment caused conflicts of competences. EU competences are laid down in the EU treaties. Article 3 (1.e) of the Treaty on the Functioning of the European Union (hereinafter "TFEU")

provides for the exclusive competence of the EU over Common Commercial Policy (hereinafter "CCP"). Article 207 defines the scope of CCP, which can be summarized as unified basis for trade affairs, e.g., liberalization and export control. At the same time, Art. 4(1) of the Treaty of the European Union (hereinafter "TEU") sets out the exclusive member state authority over national security matters since member states prefer to exercise their sovereignty in this area. Moreover, Art. 346 of the Lisbon Treaty provides for member state's sovereignty on "public security."

Prior to 2009, national rules regulating the transfer of defense equipment did not necessarily distinguish between exports to third countries and transfers between EU member states.

Space activities are business activities. However, they cover the transfer of dual-use items, which has to be assigned to the objectives of national security and foreign policy as it refers to nonproliferation. Accordingly, the EU set up a Council Regulation (Council Regulation (EC) No. 3381/94, OJ L 367/1) based on CCP and a Council Decision (Council Decision 94/942/CFSP, OJ L 367/8) based on the Common Foreign and Security Policy (hereinafter "CFSP") to create a common export control regime for dual-use items. The underlying competence of CCP was defined by the European Court of Justice (hereinafter "ECJ"), resulting in the exclusive competence over EU external trade relations (Opinion of the Court of 11 November 1975 given pursuant to Article 228 of the EEC Treaty – Avis 1/75). Thus, according to Art. 2(1) TFEU only the EU might legislate and adopt legally binding acts in CCP.

The currently applicable Council Regulation (EC) No. 428/2009 (hereinafter referred to as EU Dual-Use Regulation) was established after the ECJ decided to assign dual-use exports to the scope of the CCP and, by doing so, to the exclusive EU competence (Fritz Werner Industrie-Ausrüstungen GmbH v Federal Republic of Germany; Criminal proceedings against Leifer and others). Council Regulation 428/2009 of May 2009 (Council Regulation No. 428/2009 of 5 May 2009 setting up a community regime for the control of exports, transfer, brokering, and transit of dual-use items, OJ L 134) governs the export of dual-use goods from a country within the EU to a third country. In addition, the export of military goods and defense-related products is regulated by Directive 2009/43 (http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri¼OJ:L:2009:146:FULL:EN:PDF.), the European Union Code of Conduct on Arms and Exports, and the Common Military List of the European Union. Under the regime established by Directive 2009/43, member states can issue general licenses for those exports throughout the EU where the risk of re-exportation to foreign countries is under control. At the same time, the nation states retain their discretion to determine the eligibility of products for the different types of license and to fix their terms and conditions. In 2008, the European Council also agreed on the Common Position 2008/944/CFSP defining common rules governing control of export of military technology and equipment to *third* countries. It should be noted, however, that the impact of these rules on the European space industry is not particularly important, since most space-related items are considered dual-use and not military items. There are also council regulations restricting the export against specific countries, e.g.,

Myanmar (Council Decision 2010/232/CFSP). Moreover, Council Regulation (EU) No 833/2014 of 31 July 2014 introduces certain restrictive measures as applicable for exports of items and services under Council Regulation (EC) No 428/2009 and on certain service related to the supply of arms and military equipment, if an embargo on such goods is applied by the member states. However, the prohibition should not affect the exports of dual-use goods and technology, including for aeronautics and for the space industry, for nonmilitary use, or for a nonmilitary end user (Council Regulation (EU) No 833/2014, pp. 1–11). The aim of this harmonization is to promote European and international security as well as to allow for comparable conditions for all economic entities within the EU's common market. Despite this development, some differences do, however, remain among EU member states with regard to export control licensing (Gerhard and Creydt 2011, p. 210).

Dual-Use Items

§12 of the preamble of Council Regulation 428/2009 provides that "[. . .] Member States retain the right to carry out controls on transfers of certain dual-use items within the Community in order to safeguard public policy or public security." As a consequence, member states implement the Regulation by issuing licenses and enforcing export control in accordance with Art. 9 of this Regulation (Art. 9, (EC) No.428/2009.; Wetter 2009, p. 49). It was adopted as a single document abandoning the "cross-pillar" approach (Aubin and Idiart 2011, p. 109). Free trade of dual-use items within the EU is one of the general principles (§ 4 Preamble, European Union Regulation (EC) 428/2009). The Council Regulation 428/2009 establishes a common community export licensing system, a common control list, and a common export authorization. Dual-use items which require a license to be exported from the EU are listed in Annex I. Most space assets are regarded as dual-use items under Annex I: Category 9, aerospace and propulsion, lists the different systems, equipment, components, materials, software, and technology subject to the regulation. Authorizations, which are valid throughout the community, are granted by the competent authorities of the member state where the exporter is established. Pursuant to Article 22.1 of Regulation 428/2009, dual-use goods items in Annex IV of the regulation are considered to be particularly sensitive and require a license even to be traded *within* the European market. This procedure, which concerns also quite a number of space-related items, constitutes an exception to the principle of free movements of goods (Wetter 2009, p. 54). It is interesting to note that Annex IV establishes some explicit exemptions (OJL 134, p. 264) and as such does not control the following items of the MTCR technology:

1. That are transferred on the basis of orders pursuant to a contractual relationship placed by ESA or that are transferred by ESA to accomplish its official tasks
2. That are transferred on the basis of orders pursuant to a contractual relationship placed by a member state's national space organization or that are transferred by it to accomplish its official tasks

3. That are transferred on the basis of orders pursuant to a contractual relationship placed in connection with a community space launch development and production program signed by two or more European governments
4. That are transferred to a state-controlled space launching site in the territory of a member state, unless that member state controls such transfers within the terms of this regulation

On 10 October 2018, Commission Delegated Regulation (EU) 2018/1922 amended Council Regulation 428/2009. This delegated regulation revises the EU dual-use list in Annex I in accordance with the decisions taken within the framework of the international nonproliferation regimes and export control arrangements in 2017. The majority of changes results from amendments of the 2017 Plenary of the Wassenaar Agreement. Space relevant among them is the increase of controls for ground-based spacecraft control equipment (9A004). In addition, Section 4E001 now covers new decontrol for technology for "vulnerability disclosure" and "cyber incident response."

The Missile Technology Control Regime agreed in 2017 to amend the control on satellite navigation systems (7A105) to include regional and global systems.

Another renewal in European Union Export Controls is the EU foreign investment screening regulation, which entered into force on 10 April 2019. It is based on a proposal scheduled by the European Commission in September 2017 and intends to ensure Europe's security and policy order in relation to foreign direct investment within the EU.

The EU is the main destination for foreign direct investment in the world with an amount of € 6.295 billion at the end of 2017. The new framework aims to create a cooperation mechanism between member states and EU Commission to enable exchange on the matter and "[. . .]allow the Commission to issue opinions when an investment poses a threat to the security or public order of more than one Member State, or when an investment could undermine a project or programme of interest to the whole EU, such as Horizon 2020 or Galileo[. . .]" (European Commission. EU foreign investment screening regulation enters into force 2019). Moreover, it intends to foster international cooperation on investment screening and to establish requirements for national screening mechanisms.

The Export Control Regulations of the European Space Agency

The European Space Agency (ESA) is an international organization created by the Convention for the establishment of a European Space Agency, which was opened for signature in Paris on 30 May 1975 and entered into force on 30 October 1980. According to Article II ESA Convention, its member states entrusted ESA "[. . .] to provide for and to promote, for exclusively peaceful purposes, cooperation among European States in space research and technology and their space applications, with a view to their being used for scientific purposes and for operational space applications systems [. . .]".

While Article VI of Annex I to the ESA Convention provides that "Goods imported or exported by the Agency or on its behalf, and strictly necessary for the exercise of its official activities, shall be exempt from all import and export duties and taxes and from all import or export prohibitions and restrictions," in drawing up the Convention, ESA member states also paid heed to the potentially highly sensitive nature of the technology developed and introduced with Article XI.5(j) of the ESA Convention, a starting point for ESA's own rules and procedures with regard to export control issues.

It provides that:

> The ESA Council shall adopt, by a two-thirds majority of all Member States, rules under which authorisation will be given, bearing in mind the peaceful purposes of ESA, for the transfer outside the territories of the Member States of technology and products developed under the activities of ESA or with its assistance.

These rules supplement the regular national export control procedures. Exports remain in their essence governed by national laws and regulations, given their foreign policy and security implications, even in the case of an export of technologies or products developed under the activities or with the help of ESA.

This basic provision of Article XI.5(j) of the ESA Convention is implemented by Chap. IV of the ESA Rules on Information, Data, and Intellectual Property, adopted by the ESA Council on 19 December 2001 (rules), ESA/CCLV/Res. 4 (final). These rules are intended to ensure close liaison between the agency and the national export control authorities of the member states. In line with general ESA policy considerations, the rules contribute to promoting the maximum exploitation of ownership rights by drawing a clear distinction between technology and products that are owned by ESA, on the one hand, and those which are owned by contractors of the agency, on the other hand: the transfer of technology or products owned by ESA necessitates the *authorization* by the Agency Technology and Product Transfer Board (hereinafter "ATB"), whereas the transfer of technology or products owned by contractors only needs to be subject of a *recommendation* by the ATB.

The ATB's authorization or recommendation, which is – again – not a substitute for the national-level authorization process but rather an additional procedure, is not necessary when the transfer of technology or products is made pursuant to a cooperative agreement between ESA and a government agency of the country of destination. In such case, it is assumed that the ESA Council, when approving the cooperative agreement, has given an overall authorization for the transfer of data and goods in accordance with the relevant provisions of the agreement.

In a first instance, the ATB functions according to a written procedure: when the technology or products are owned by ESA, the transfer proposal is *rejected* when one-third or more of all member states have communicated their opposition. When the technology or products are owned by a contractor, a transfer is *not recommended* where one-third or more of all ATB delegations have communicated their opposition. If, however, within a given time frame, one or more ATB delegations request a meeting to discuss the matter, the ATB Chair convenes such a meeting. The decision shall then be taken at that meeting, with a two-thirds majority of all ATB delegations

present (resolution amending the terms of reference for the Agency Technology and Product Transfer Board (ATB), adopted on 11 October 2006, ESA/C/CLXXXIX/Res. 2 (Final), which amends the terms of reference adopted by the resolution on the creation of an Agency Technology and Product Transfer Board, ESA/C/CLXVII/Res. 1 (Final), adopted on 8 October 2003).

In considering its authorizations and recommendations, the ATB takes into account several factors, such as:

- That the purpose of the Agency is to provide for and to promote, for exclusively peaceful purposes, cooperation among European states in space research and technology and their space applications
- The competitive position of the member states industrial entities as a whole and the competitive edge and technical lead for technology and products
- The relevant provisions of the member states export control laws and regulations
- The requirement for timely implementation of the Agency's programs and activities
- The requirement for restrictions on re-export and/or the existence of any relevant technology transfer agreements

ESA's rules do not prejudice the fact that export control is a national competence, governed by the national laws and regulations of the member states and, in numerous instances, subject to those international agreements by which the member states are bound. This implies also that a certain technology or product that has been developed under an ESA program may still need to be submitted to the regular national export control procedure in case it is planned to be used in another ESA program by another member state than the member state of the originator. In line with that, Article XXIII of Annex I to the Convention provides, "Each Member State shall retain the right to take all precautionary measures in the interests of its security."

In the particular case of an ESA project incorporating US-origin content, software, or information or in when ESA is partnering with NASA and US companies, complying with US export controls is of utmost importance. As a result, ESA may be restricted in its ability to:

- Re-transfer or re-export that US-origin content to other entities within European countries or from one country to another
- Share the US-origin information or software with certain employees, contractors, or other individuals within ESA
- Re-transfer or re-export ESA prototypes or finished products to other countries, including for launch

Conclusions

"Space has a security dimension and security has a space dimension" (European Commission White Paper 2003, p. 17). Space export controls are conducted in an extremely complex set of rules and regulations governing the trade in space items,

items that are not only used in an ultra-hazardous environment but are also dual-use by nature. As the evolution of space activities is closely linked to scientific and technological innovations, new developments in these sectors need to be taken into account. The presented revisions to the existing export control regimes reflect the growing awareness of technological developments and areas of vulnerability.

In addition, with the ever-increasing interest in space activities and related growing participation, diverse policy objectives and varying policy considerations play a central role in this global environment that is evolving at an ever-increasing pace. The diverging interests of governments, international organizations, space agencies, and private actors need to be investigated and balanced while taking into consideration that the international trade in technology is influenced by the interplay between commercial interests, foreign policy objectives, and national security considerations in respect to the proliferation of sensitive technologies. The different approaches and national concepts to regulate the trading in space items provide therefore a characteristic exemplification of how individual nations balance these different and conflicting interests – what degree of importance they attach in their system of political values to one in relation to the others.

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