

## **Formation for Atmospheric Science and Technology demonstration (FAST)**

# **WP 160**

## **Technical Note 1: International Law**

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**F.G. von der Dunk**

# 1. International law aspects of FAST: Introduction

The project on a Formation for Atmospheric Science and Technology demonstration mission (FAST) concerns a cooperation project between a Dutch University, the Delft University of Technology (TU Delft), and a Chinese University, Tsinghua University. For that reason, it is important to survey the most important international space law aspects pertaining to such a project, and point out where further research and analysis, alternatively certain further approaches or measures, might be required for the FAST project to go ahead as planned.

The present Technical Note, dealing with these international space law issues, concerns the first of two such Technical Notes in the context of WP 160 of the FAST project; the other Technical Note deals with Dutch national space law.

The key features of FAST from a legal perspective, as arising from the Mission Requirements Document<sup>1</sup>, would be the following:

- (1) The FAST project concerns the development, construction, launch and operation of two micro satellites, one developed, constructed and operated by a Dutch legal entity, the TU Delft (called “FAST-D”) and one developed, constructed and operated by Tsinghua University (called “FAST-T”), a Chinese legal entity.<sup>2</sup>
- (2) Both satellites will be launched by a Chinese launcher, which in view of current practice means by definition from the territory of the People’s Republic of China and conducted by Chinese entities (whether governmental, private or hybrid).<sup>3</sup>
- (3) Both satellites will operate in Low-Earth Orbits (LEO’s) of approximately 650 km altitude.<sup>4</sup>
- (4) At least two TT&C ground stations will be involved in monitoring and controlling the satellites’ operations, one located in the Netherlands and one located in the People’s Republic of China.<sup>5</sup>
- (5) The satellites will undertake a specific set of scientific investigatory activities in outer space, as well as earth observation activities of the cryosphere; the results of which will be downloaded to relevant ground stations at regular intervals.<sup>6</sup>

This survey will focus on three subsets of international space law issues, which will be dealt with in the following sections: (1) general international space law issues as they spring especially from three treaties, with a particular focus on responsibility, liability and registration issues; (2) the specific system developed on the international level dealing with radio frequencies and orbits used for satellite operations; and (3) the specific issue of security-sensitive use of satellite hardware, software and know-how and the rudimentary international and European regime dealing with trans-boundary movements of such items, which also clarifies how even national US law may interfere with an exclusively Sino-Dutch project.

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<sup>1</sup> FAST Mission Requirements Document, FAST-TUD-MRD-01, Issue 0.1, of 30 May 2008.

<sup>2</sup> See FAST MRD, pp. 1-3, esp. MIS-CONS-100.

<sup>3</sup> See FAST MRD, p. 3, MIS-CONS-120.

<sup>4</sup> See FAST MRD, p. 11, MIS-ORB-100.

<sup>5</sup> See FAST MRD, p. 10, MIS-GSO-100.

<sup>6</sup> See FAST MRD, esp. p. 2 (‘Mission Statement’, also MIS-OBJ-100).

## 2. General international space law

For dealing with the key issues of responsibility, liability and registration under international space law, three treaties are of key importance: the 1967 Outer Space Treaty<sup>7</sup>, the 1972 Liability Convention<sup>8</sup> and the 1975 Registration Convention<sup>9</sup>. Together, they provide for a general legal framework within which also the FAST satellites will have to operate.

### 2.1. International responsibility for national activities

Article VI of the Outer Space Treaty provides in relevant part:

States Parties to the Treaty shall bear international responsibility for national activities in outer space, including the Moon and other celestial bodies, whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty. The activities of non-governmental entities in outer space, including the Moon and other celestial bodies, shall require authorization and continuing supervision by the appropriate State Party to the Treaty.

This international responsibility of states thus includes private space activities, although the concepts of “national activities in outer space” and “appropriate State” have never been defined in an authoritative fashion, and pertains to ensuring that such activities are compliant with the Outer Space Treaty and by proxy essentially with all of international space law.

Closely related to the responsibility as such, a duty is pronounced for that “appropriate State” to arrange for “authorization and continuing supervision” of such activities. A national space law including prominently a licensing system for private space activities would be the most appropriate and comprehensive manner to implement this obligation, although other forms of authorization and supervision might also be envisaged – and do indeed already exist. Further to this, there is no clarity as to what the consequences are, once a relevant activity would have violated applicable provisions of international space law.

As far as the FAST project is concerned, there would be little doubt that, following from key features (1) and (4), all activities concerning FAST-D would qualify as “national activities” of the Netherlands, which state would consequently also be the “appropriate State” to exercise “authorization and continuing supervision” over these activities. Following from key feature (4) however, in addition international responsibility of the Netherlands might arise in respect of FAST-T to the extent that activities of that satellite would be controlled and/or undertaken principally through the Dutch ground station – such control or other activities would then constitute “national space activities” of the Netherlands for the purpose of Article VI.

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<sup>7</sup>. Outer Space Treaty, or Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, London/ Moscow/Washington, done 27 January 1967, entered into force 10 October 1967; 610 UNTS 205; TIAS 6347; 18 UST 2410; UKTS 1968 No. 10; Cmnd. 3198; ATS 1967 No. 24; 6 ILM 386 (1967).

<sup>8</sup>. Liability Convention, or Convention on International Liability for Damage Caused by Space Objects, London/Moscow/Washington, done 29 March 1972, entered into force 1 September 1972; 961 UNTS 187; TIAS 7762; 24 UST 2389; UKTS 1974 No. 16; Cmnd. 5068; ATS 1975 No. 5; 10 ILM 965 (1971).

<sup>9</sup>. Registration Convention, or Convention on Registration of Objects Launched into Outer Space, New York, done 14 January 1975, entered into force 15 September 1976; 1023 UNTS 15; TIAS 8480; 28 UST 695; UKTS 1978 No. 70; Cmnd. 6256; ATS 1986 No. 5; 14 ILM 43 (1975).

In the Netherlands, indeed the government has taken up the issue of national implementation of these international space law provisions, and has established a national space law, effective as of January 2008. This law, which to some extent also serves as an instrument for interpreting these international provisions in the Dutch context, will be the focus of attention of Technical Note 2 in the context of WP 160.

## **2.2. International liability for damage caused by space objects**

Article VII of the Outer Space Treaty provides:

Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.

The 1972 Liability Convention then elaborated this succinct provision, for example as to the respective scope of application of fault and absolute liability, the principled lack of limitation to compensation due for damage, the states entitled to assert claims under the Convention, joint and several liability arrangements, and the scope of damage for which compensation under the Convention's system would be due. Also, the Convention reaffirmed the four cumulative ways in which particular states could become liable for the damage caused by the activities of a particular space object, by means of its definition of Article I(c):

The term "launching State" means:

- (i) A State which launches or procures the launching of a space object;
- (ii) A State from whose territory or facility a space object is launched;

In this context, only the concept of 'procuring' a launch was not entirely clear; it is often paraphrased by referring to such general concepts as 'making possible in a fundamental way', and there exists little dispute that paying for a launch as a customer and/or being the principal owner and/or operator of a satellite launched on top of the launch vehicle certainly qualify as 'procuring' such launch.

As for the FAST satellites, following from key features (1) and (2) it arises that the FAST-D satellite would cause both the People's Republic of China (as the state which launches, as well as from whose territory and from whose facility is launched) and the Netherlands (as the state which procures the launch) to qualify as launching states, and hence liable to third parties in case its operations cause any damage.

Though the relevant Article of the Liability Convention refers to a state which procures the launch and, at the international level, considerable uncertainty exists as to whether this would encompass cases where the TU Delft actually procures the launch, the Dutch national space act at least takes the position that also the procurement of launches by non-government entities, as long as Dutch, would fall within the scope of the obligations of the Netherlands under the Liability Convention.

Further, it should be noted that the above conclusion would not be principally altered, contrary perhaps to what would be expected, where two additional aspects might come into play.

Firstly, as to key feature (2) it was clarified at the FAST Conceptual Design Review meeting in Delft on 20 June 2008 that the launch of the FAST satellites would most

likely be piggy-backed, meaning another – large(r) – satellite would be on board of the launch vehicle as primary payload. Whilst this may cause yet another state, apart from the Netherlands and the People’s Republic of China, to qualify as launching state, the mere fact that FAST-D would be a micro-satellite and the launch itself would be principally dedicated to another satellite would not take away the qualification of the Netherlands as a launching state.

Secondly, further to key feature (2) the FAST MRD (in the rationale for MIS-LAUN-100) indicated that the FAST satellites, including FAST-D, might be launched for free. Such a fact, of absence of actual payment for the launch (if indeed occurring), would not change the qualification as a launching state, and hence as potentially liable for damage caused by FAST-D, of the Netherlands either: FAST-D would still be launched because TU Delft was interested for it to be launched, thus qualifying as the procuring entity.

The Dutch national space act has also taken its potential liability for non-government organised or procured launches – in the abstract – into its stride, and provided for a framework on handling this liability issue in the context of the licensing regime. Also this issue will be further addressed in Technical Note 2 to be produced under WP 160.

### **2.3. Registration of space objects launched into outer space**

Article VIII of the Outer Space Treaty already provided the nucleus on the registration issue, by providing for the following:

A State Party to the Treaty on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body.

This provision was then considerably elaborated by the 1975 Registration Convention, amongst others on such issues as national registration, provision of relevant information for the purpose of international registration. Most importantly, Article II of the Registration Convention provides for the following:

1. When a space object is launched into Earth orbit or beyond, the launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. (...)
2. Where there are two or more launching States in respect of any such space object, they shall jointly determine which one of them shall register the object in accordance with paragraph 1 of this article, bearing in mind the provisions of article VIII 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, and without prejudice to appropriate agreements concluded or to be concluded among the launching States on jurisdiction and control over the space object and over any personnel thereof.

For the purpose of international registration, the parameters to be provided to the UN Secretary General are listed by Article IV(1) as follows:

Each State of registry shall furnish to the Secretary-General of the United Nations, as soon as practicable, the following information concerning each space object carried on its registry:

- (a) Name of launching State or States;
- (b) An appropriate designator of the space object or its registration number;
- (c) Date and territory or location of launch;
- (d) Basic orbital parameters, including:

- (i) Nodal period;
- (ii) Inclination;
- (iii) Apogee;
- (iv) Perigee;

(e) General function of the space object.

It may be noted, that effectively there are a few loopholes in the obligations resting upon states under the Registration Convention, but it is anyhow to be expected that the Netherlands would like to comply with the provisions of the Convention as comprehensively as possible.

Consequently, the direct consequences for FAST arising from this framework and with a view to key feature (2) are that the Netherlands and the People's Republic of China, qualifying as the two launching states of FAST-D, would have to determine jointly which of the two will actually fulfil the requirements of the Registration Convention, and consequently may (continue to) exercise primary jurisdiction with regard to the spacecraft as such.

### 3. The ITU regime for radio frequency and orbit assignments

The FAST satellites will require – as does every satellite or other space operation – the use of certain radio frequencies and the attendant orbits without interference, in order to operate properly.

This is where the International Telecommunication Union (ITU)<sup>10</sup> comes in. The ITU is an intergovernmental organisation within the UN system which has, amongst others, as its task to try and coordinate the use of radio frequencies, including those used in the context of satellite operations taking into account the operational orbits, at the international level in order to prevent harmful interference.<sup>11</sup> Thus, key feature (3) makes this regime applicable to the FAST project as well.

Despite some efforts to provide non-state entities (both intergovernmental organisations and private operators) a larger say in the development of the ITU legal regime, the ITU is still a classic intergovernmental organisation dominated legally speaking by states.<sup>12</sup> This is certainly also true when it comes to the complicated process in the ITU context of trying to coordinate and regulate the use of radio frequencies as well as, in the case of satellite operations, geostationary orbital slots or non-geostationary orbits.<sup>13</sup>

In short, this process could be characterised as a two-step, alternatively three-step one.

Firstly, actual decisions regarding the use of frequency spectrum are taken at World Radio Conferences, organised every two or three years, with reference to types of services – the ‘allocation’ of frequency bands.<sup>14</sup>

‘Allocation’ is defined here as destining a frequency band “for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio

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<sup>10</sup>. Established in its current version by the ITU Constitution, or Constitution of the International Telecommunication Union, Geneva, done 22 December 1992, entered into force 1 July 1994; 1825 UNTS 1; UKTS 1996 No. 24; Cm. 2539; ATS 1994 No. 28; Final Acts of the Additional Plenipotentiary Conference, Geneva, 1992 (1993), at 1; and the ITU Convention, or Convention of the International Telecommunication Union, Geneva, done 22 December 1992, entered into force 1 July 1994; 1825 UNTS 1; UKTS 1996 No. 24; Cm. 2539; ATS 1994 No. 28; Final Acts of the Additional Plenipotentiary Conference, Geneva, 1992 (1993), at 71. Both the ITU Constitution and the ITU Convention have been amended repeatedly since 1992.

<sup>11</sup>. See in particular Art. 1, ITU Constitution.

<sup>12</sup>. Relevant efforts resulted at the Kyoto Conference of 1994 in an amendment to Art. 19, ITU Convention, allowing for the participation of non-governmental entities as ‘small-m’ members, providing them with the right of access to all relevant information as well as consultation; and at the Minneapolis Plenipotentiary Conference of 1998 in allowing them to achieve a status of ‘Sector members’, i.e. of full-blown participation at the ITU sector level. Yet, states are still the only full members of the organisation represented on the Council; see e.g. Artt. 2, 4; also Artt. 3, 8, 10, ITU Constitution.

<sup>13</sup>. It should be noted that formally, for a long time, the ITU had competence only to coordinate the use of radio frequencies. Since it however soon became apparent that the risk of actual interference depended also on the geographical location of the satellites at issue, ITU effectively started taking those positions into consideration as well, first only for the geostationary orbit (as the main orbit of interest for a long time), then for other orbits as they became populated as well. This was ultimately reflected in Art. 44, ITU Constitution, listing radio frequencies, the geostationary and other orbits equally as limited natural resources and calling for a use which should be rational, equitable, efficient and economic – with the ITU regime being tasked to realise such aims.

<sup>14</sup>. See Art. 13, ITU Constitution; Art. 7, also Art. 9, ITU Convention.

astronomy service under specified conditions”.<sup>15</sup> Such allocations take place after extended negotiations between, in principle, all ITU member states, with other entities interested (international organisations, private companies and others) involved only indirectly through their member state delegations.

Secondly, states (and states only) may then apply with the ITU for being provided with the right to use certain frequencies and attendant slots or orbits. After a procedure of ‘advanced publication’, that is the filing of a proposal for a satellite system and extended coordination with affected operators, ‘allotment’ takes place of the frequencies and attendant orbits – if the coordination has resulted in the conclusion that no other existing or previously-filed satellite system would be interfered with by the intended use of those frequencies and orbits.

‘Allotment’ is defined here as the “entry of a designated frequency channel in an agreed plan, (...) for use by one or more Administrations for a terrestrial or space communication service in one or more (...) countries or (...) areas”.<sup>16</sup> “Administrations” in this context unambiguously refers to states, in other words: any non-state entity (intergovernmental organisation, private company or other) has to find a ‘sponsoring state’ willing to apply for allotment on his or her behalf.<sup>17</sup>

Allotment of frequencies to a specific Administration for a specific proposed satellite system then leads to inclusion in the Master Register, at least in theory guaranteeing to the intended user interference-free usage of those frequencies in the context of the agreed orbits. The absence of a binding dispute settlement process within the ITU system however should be noted, so that any perceived violation of the prohibition to interfere with ITU-allotted frequencies would essentially have to be counteracted at the political level.

Furthermore, the system is enormously complicated by the differentiation between exclusive, primary and secondary allocations and allotments, as well as the many exceptions or special arrangements on a regional or national basis or on the basis of the types of services, which are included in a voluminous set of frequently changing ‘footnotes’.

If it is the state itself that will operate the satellite system thus coordinated, the process stops here, after two steps. If, however, the process concerns a satellite system to be operated by a non-state operator, whether this concerns an intergovernmental organization, a private operator or another kind of non-state entity, a third step is necessary: that of ‘assignment’. Since none of such non-state actors have autonomous standing in requesting the use and coordination of frequencies and slots or orbits, the state acting as sponsoring state of the intergovernmental organisation respectively authorising the private operator has to be allotted those.

In turn, such a state then has to ‘assign’ those to the intergovernmental organisation or private operator concerned. ‘Assignment’ of a radio frequency or radio frequency channel is defined here as the “authorization given by an Administration for a radio

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<sup>15</sup>. Section 1.16, Radio Regulations.

<sup>16</sup>. Section 1.17, Radio Regulations.

<sup>17</sup>. See Annex to the ITU Constitution, first bullet: “Administration: Any governmental department or service responsible for discharging the obligations undertaken in the Constitution of the International Telecommunication Union, in the Convention of the International Telecommunication Union and in the Administrative Regulations”.

station to use a radio frequency or by an Administration for a radio station to use a radio frequency or radio frequency channel under specified conditions".<sup>18</sup>

With a view also to key feature (3), for the FAST project the consequences of this system are essentially threefold.

Firstly, any frequencies to be used, both for communication between the ground and FAST-D, and for communication between FAST-D and FAST-T if applicable, need to fit within the appropriate ITU allocations for the type of satellite services in which the FAST activities belong. Thus, further research as well as contacts with the relevant ITU department should determine in which category of satellite services FAST activities fit, and what frequency bands have been allocated for that category.

Secondly, as far as FAST-D is concerned, following from key feature (1) the Dutch government should be made to apply for the frequencies called for (fitting, of course, within the allocations as referred to above), taking into account the envisaged orbital parameters, and to take its responsibility in the context of the coordination process. In view of the amount of time that process may often take, it would be wise to start it as early as possible, informing the relevant branch of the Dutch government at an early stage about relevant intentions and details.

Thirdly, once the allotment for the frequencies and orbits concerned has been granted to the Netherlands, the assignment of the same to the TU Delft, as the operator for the purposes of ITU arrangements, should be arranged. Even as this may be a relatively straightforward procedure, it would be prudent to pre-arrange as much as possible that, once allotment occurs, assignment indeed follows suit.

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<sup>18</sup>. Section 1.18, Radio Regulations.

## 4. International, European and national US law on security-sensitive exports as it may interfere with international satellite operations

Satellite activities are almost by definition both of a high-key technology and, at least potentially, of a dual-use character, which raises issues related to international and national security of the state or states involved. These issues are currently being addressed through a rudimentary legal framework focusing on the monitoring and control of exports of highly sensitive technology – hardware, software and know-how.

That legal framework consists as relevant for the FAST project on the international, European and even national levels of the states concerned, as represented by, respectively, the Wassenaar Arrangement<sup>19</sup>, EC Regulation 1334/2000<sup>20</sup> and follow-up legislation, and – primarily – the US International Trade in Arms Regulations (ITAR's).

### 4.1. The Wassenaar Arrangement

The Wassenaar Arrangement is a, formally non-binding, arrangement on export controls for conventional weapons and sensitive dual-use goods and technologies. It was designed to promote transparency and greater responsibility in transfers of conventional arms, dual-use goods and dual-use technologies. Participating states commit themselves to ensure through national policies and national regulations that cross-border transfers of these items do not contribute to the development or enhancement of military capabilities in states not participating in the Wassenaar Arrangement.<sup>21</sup>

The decision to actually allow or deny transfer of any item, however, remains the sole responsibility of each individual participating state.<sup>22</sup> Thus, also, export controls differ from state to state in terms of documentation required, license fees, length of time to get a license, and duration of validity of the license.

The participating states only agree to *notify* transfers and denials, as well as to *control* (transfers of) all items in the List of Dual-Use Goods and Technologies and the List of Munitions, annexed to the Arrangement.<sup>23</sup> Controls do not apply to technology or software in the public domain, to basic scientific research or to the minimum

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<sup>19</sup>. Wassenaar Arrangement on Export Controls for Conventional Arms and Dual-Use Goods and Technologies, Wassenaar, done 19 December 1995, effective 12 July 1996. Currently, the following states are participating states in the Wassenaar Arrangement, with the states being members of the Union and/or ESA so indicated: Argentina, Australia, Austria (EU & ESA), Belgium (EU & ESA), Bulgaria (EU), Canada, Croatia, Czech Republic (EU), Denmark (EU & ESA), Estonia (EU), Finland (EU & ESA), France (EU & ESA), Germany (EU & ESA), Greece (EU & ESA), Hungary (EU), Ireland (EU & ESA), Italy (EU & ESA), Japan, Latvia (EU), Lithuania (EU), Luxembourg (EU & ESA), Malta (EU), the Netherlands (EU & ESA), New Zealand, Norway (ESA), Poland (EU), Portugal (EU & ESA), Republic of Korea, Romania (EU), the Russian Federation, Slovakia (EU), Slovenia (EU), South Africa, Spain (EU & ESA), Sweden (EU & ESA), Switzerland (ESA), Turkey, Ukraine, the United Kingdom (EU & ESA), and the United States.

<sup>20</sup>. Council Regulation setting up a Community regime for the control of exports of dual-use items and technology, No. 1334/2000/EC, of 22 June 2000; OJ L 159/1 (2000).

<sup>21</sup>. See Art. I(1), Wassenaar Arrangement.

<sup>22</sup>. See Art. II(3), Wassenaar Arrangement.

<sup>23</sup>. See Artt. II(4), III(1), Wassenaar Arrangement; also Appendix 5.

necessary information for patent applications. The Lists have two annexes, of sensitive items and of very sensitive items respectively, to which different levels of control should be applied, and are reviewed regularly to reflect technological developments.

Finally, the participating states agree to exchange general information on risks associated with transfers of conventional arms and dual-use goods and technologies in order to consider, where necessary, the scope for coordinating national control policies to combat these risks.<sup>24</sup>

For the FAST project, in particular key feature (2), the fact that the launch of FAST-D is going to take place on top of a Chinese launcher from Chinese territory, qualifies the transfer of FAST-D to the People's Republic of China as an export of all the hardware, software and know-how involved to a state not participating in the Wassenaar Arrangement, hence triggering the application of the Arrangement.

This means that it should be investigated primarily with the Dutch national authorities – and, if the satellite is not going to be built and assembled in the Netherlands, with the national authorities of the state(s) where it is going to be built and/or assembled – to what extent the relevant national export controls, following the guidelines developed under the Wassenaar Arrangement and taking into particular account the various lists of items under the Annex, would be applicable in the case of FAST-D – and if so, to what extent FAST-D may come under exceptions or exemptions, for example as relating to basic scientific research.

#### **4.2. EC Regulation 1334/2000 and follow-up Regulations**

The involvement of the European Union from a legislative perspective in matters of security-related hardware, software and know-how took shape prominently as of 2000, with the enunciation of a Regulation setting up a Community regime for the control of exports of dual-use items and technology. This Regulation, 1334/2000, has been amended to some extent by later EC law, but still remains the key document in the present context.

In many ways, the Regulation presents the transformation of the international but essentially voluntary regime established principally by the Wassenaar Arrangement into binding law for the EU member states. Regulation 1334/2000 in this respect itself states in Annex I – List of Dual-Use Items and Technology: “This list implements internationally agreed dual-use controls including the Wassenaar Arrangement, the Missile Technology Control Regime (MTCR), the Nuclear Suppliers’ Group (NSG), the Australia Group and the Chemical Weapons Convention (CWC).”<sup>25</sup>

Such later Regulations included the following, addressing the issues indicated hereunder:

- Regulation 2889/2000, providing for minor changes to Annexes I and IV<sup>26</sup>;
- Regulation 458/2001, providing for minor changes to Annex I<sup>27</sup>;

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<sup>24</sup>. See Art. IV(1), Wassenaar Arrangement.

<sup>25</sup>. Annex I – List of Dual-Use Items and Technology, Regulation 1334/2000, 9. The Australia Group concerns chemical and biological weapons, so that does not need to be considered here – as is the case with the MTCR, the NSG and the CWC.

<sup>26</sup>. Council Regulation amending Regulation (EC) No. 1334/2000 with regard to intra-Community transfers and exports of dual-use items and technology, No. 2889/2000/EC, of 22 December 2000; OJ L 336/14 (2000).

- Regulation 2432/2001, providing for updates to, and replacement of, the Annexes in order to take account of, *inter alia*, changes adopted by the Wassenaar Arrangement plenary session in December 2000<sup>28</sup>;
- Regulation 880/2002, providing for minor changes to Annex IV<sup>29</sup>;
- Regulation 149/2003, providing for updates to, and replacement of, the Annexes in order to take account of, *inter alia*, changes adopted in the context of the Wassenaar Arrangement's regime in the course of 2001 and 2002<sup>30</sup>;
- Regulation 885/2004, ensuring application of a number of EC Regulations and Decisions including Regulation 1334/2000 to the ten then-new EU member states<sup>31</sup>;
- Regulation 1504/2004, providing for updates to, and replacement of, the Annexes in order to take account of, *inter alia*, changes adopted in the context of the Wassenaar Arrangement's regime between December 2002 and December 2003<sup>32</sup>;
- Regulation 394/2006, providing for updates to, and replacement of, the Annexes in order to take account of, *inter alia*, changes adopted in the context of the Wassenaar Arrangement's regime<sup>33</sup>; and
- the aforementioned Regulation 1183/2007, providing for updates to, and replacement of, the Annexes in order to take account of, *inter alia*, changes adopted in the context of the Wassenaar Arrangement's regime<sup>34</sup>.

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<sup>27</sup>. Council Regulation amending Regulation (EC) No. 1334/2000 with regard to the list of controlled dual-use items and technology when exported, No. 458/2001/EC, of 6 March 2001; OJ L 65/19 (2001).

<sup>28</sup>. Council Regulation amending and updating Regulation (EC) No. 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 2432/2001/EC, of 20 November 2001; OJ L 338/1 (2001).

<sup>29</sup>. Council Regulation amending Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 880/2002/EC, of 27 May 2002; OJ L 139/7 (2002).

<sup>30</sup>. Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 149/2003/EC, of 27 January 2003; OJ L 30/1 (2003).

<sup>31</sup>. Council Regulation adapting Regulation (EC) No 2003/2003 of the European Parliament and of the Council, Council Regulations (EC) No 1334/2000, (EC) No 2157/2001, (EC) No 152/2002, (EC) No 1499/2002, (EC) No 1500/2003 and (EC) No 1798/2003, Decisions No 1719/1999/EC, No 1720/1999/EC, No 253/2000/EC, No 508/2000/EC, No 1031/2000/EC, No 163/2001/EC, No 2235/2002/EC and No 291/2003/EC of the European Parliament and of the Council, and Council Decisions 1999/382/EC, 2000/821/EC, 2003/17/EC and 2003/893/EC in the fields of free movement of goods, company law, agriculture, taxation, education and training, culture and audiovisual policy and external relations, by reason of the accession of the Czech Republic, Estonia, Cyprus, Latvia, Lithuania, Hungary, Malta, Poland, Slovenia and Slovakia, No. 885/2004/EC, of 26 April 2004, OJ L 168/1 (2004).

<sup>32</sup>. Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 1504/2004/EC, of 19 July 2004; OJ L 281/1 (2003).

<sup>33</sup>. Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 394/2006/EC, of 27 February 2006; OJ L 74/1 (2006).

<sup>34</sup>. Council Regulation amending and updating Regulation (EC) No 1334/2000 setting up a Community regime for the control of exports of dual-use items and technology, No. 1183/2007/EC, of 18 September 2007; OJ L 278/1 (2007).

Under the regime of Regulation 1334/2000, ‘dual-use items’ are broadly defined as all “items, including software and technology, which can be used for both civil and military purposes”<sup>35</sup>, whereas ‘export’ means essentially “transmission of software or technology by electronic media, fax or telephone to a destination outside the Community”<sup>36</sup> – and ‘exporter’ is equally broadly defined<sup>37</sup>.

‘Technology’ itself then is also defined in such broad terms, albeit not in the main body of the Regulation itself but by Annex I: “specific information necessary for the ‘development’, ‘production’ or ‘use’ of goods”, further elaborated in that “this information takes the form of ‘technical data’ or ‘technical assistance’”, whereby the latter “may take forms such as instructions, skills, training, working knowledge and consulting services and may involve the transfer of ‘technical data’, and these may in turn “take forms such as blueprints, plans, diagrams, models, formulae, tables, engineering designs and specifications, manuals and instructions written or recorded on other media or devices such as disk, tape, read-only memories”, as defined by the most recent relevant instrument of EC law, Regulation 1183/2007.<sup>38</sup>

An authorisation is then required for export of the dual-use items listed in Annex I, essentially similar to the Wassenaar Arrangement’s List of Dual-Use Goods and Technologies.<sup>39</sup> If the prospective exporter is aware that an item, even if it is not listed in Annex I, might be used in a way proscribed by the Regulation, it is still bound to apply the applicable provisions.<sup>40</sup> This burdens the exporter with its own responsibility to determine in good faith whether it should adhere to those provisions, independently of any good or technology being listed on the existing version of the Annex.

Annex I itself treats, in considerable detail, ten categories of technology falling within the scope of the Regulation’s regime: Categories 0 (Nuclear materials, facilities, and equipment), 1 (Materials, chemicals, “microorganisms” and “toxins”), 2 (Materials processing), 3 (Electronics), 4 (Computers), 5 (Telecommunications and “information society”), 6 (Sensors and lasers), 7 (Navigation and avionics), 8 (Marine) and 9 (Aerospace and propulsion).

Generally speaking, the final responsibility for deciding on applications for export authorisations still lies with the national authorities of the EU member states.<sup>41</sup> Member states may also, in their sovereign discretion, decide to “prohibit or impose an authorisation requirement” regarding items not listed in Annex I “for reasons of public security or human rights considerations”, as long as they “notify any measures adopted pursuant” to this clause to the Commission.<sup>42</sup>

In addition, by means of Annex II the Regulation establishes a Community General Export Authorisation (CGEA), which applies to a few exceptional export scenarios. The CGEA constitutes an exception to the aforementioned sovereign discretion of member states, and it is thus formally confirmed that for all other items, any

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<sup>35</sup>. Art. 2(a), Regulation 1334/2000.

<sup>36</sup>. Art. 2(b) sub (iii), Regulation 1334/2000.

<sup>37</sup>. See Art. 2(c), Regulation 1334/2000.

<sup>38</sup>. Regulation 1183/2007, Annex I, OJ L 278, 18.

<sup>39</sup>. See Art. 3(1), Regulation 1334/2000; Annex I – List of Dual-Use Items and Technology.

<sup>40</sup>. See Artt. 3(2), 4, Regulation 1334/2000.

<sup>41</sup>. See Artt. 5, 6(2), Regulation 1334/2000.

<sup>42</sup>. Art. 5(1), resp. (2), Regulation 1334/2000.

authorisation shall be granted – or refused – by the member state where the exporter is located.<sup>43</sup>

Such an authorisation may be an individual, global or general authorisation, valid throughout the Community.<sup>44</sup> Member states must maintain or introduce in national legislation the possibility of granting a global authorisation to a specific exporter for dual-use items valid for export to one or more specified countries.<sup>45</sup> The competent authorities may refuse to grant an export authorisation and may annul, suspend, modify or revoke an export authorisation that they have already granted.<sup>46</sup>

As for the FAST project, of course it is not feasible in the context of the present Technical Note to survey, analyse and evaluate in particular all the details of the categories listed in Annex I. However, as it seems that a number of categories would indeed be involved in the FAST-D transfer to the People's Republic of China following from the combination of key features (1) and (2) in particular, it would be prudent to conduct in due time such a deeper survey, analysis and evaluation in order to make sure where that transfer might possibly come into conflict with the Regulation's regime, the precise extent to which the Netherlands have interpreted and implemented that on a national level, and then what could possibly be done about it where necessary.

#### **4.2. US national law and its international impact**

The Wassenaar Arrangement has established a broad, though strictly speaking non-legally binding regime for export control to states viewed with suspicion from an international security perspective, whereas Regulation 1334/2000 and follow-up Regulations have transferred that into a binding legal regime at least for the EU member states – but not without leaving them considerable individual discretion on the national level in implementation and still allowing them in most cases to make the ultimate decision on allowing the export to take place or not.

In either case, the United States – certainly in recent years – have shown themselves far from completely satisfied with the extent to which this rudimentary regime has served their national security interests as perceived by them. While that may well hold, in individual cases, for other national governments also, the case of the United States is particularly relevant here in view of the general need for US components in most satellite ventures.

Though formally speaking not part of international (space) law, the *de facto* position of the United States and US companies in the world of space activities results in a potentially rather obstructive effect of certain parts of US national law on international space and satellite activities. Notably this concerns the various US export control regulations operative in the same field as the Wassenaar Arrangement and Regulation 1334/2000. The background to these regulations is the worry of US authorities that highly sensitive technology might fall into the hands of powers antagonistic to US interests, and thus represent a danger to US national security.

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<sup>43</sup>. See Art. 6(2), Regulation 1334/2000.

<sup>44</sup>. See Art. 6(2), Regulation 1334/2000, para. (3) further providing that Annex II, Part 2, items may not be included in general authorisations but require the more targeted approach of an individual or global authorisation.

<sup>45</sup>. See Art. 6(5), Regulation 1334/2000.

<sup>46</sup>. Cf. Artt. 8 9(2), Regulation 1334/2000.

The current complex US export control regime reflects a constant tug-of-war between ‘pro-business’, hence ‘pro-export’, and ‘pro-national security’, hence ‘anti-export’ concerns. This is reflected in an institutional tug-of-war between the Department of Commerce, primarily defending US commercial interests, and the Department of State, primarily defending US security interests.

Together, these two Departments are responsible for any licensing of export of strategic goods, including space technologies. The Department of State deals with those technologies that are inherently military in character, while the Department of Commerce is concerned with dual-use items.

The Export Administration Act<sup>47</sup> and the Arms Export Control Act<sup>48</sup> are the main laws comprising the US export control regime.

Through the latter, the Department of State licenses the commercial export of exclusively military items and related technical data. The infamous International Traffic in Arms Regulations (ITAR’s) essentially constitute the implementing regulations for the Arms Export Control Act.

Items such as weapons, ammunition, and civilian articles designed, adapted, or modified for military or intelligence uses are monitored and controlled if they are included on the US Munitions List (USML). As of 15 March 1999, commercial satellites were placed on the USML and therefore require Department of State approval for export. The 1999 law also requires the Department of Defense to approve any satellite export.

The former, the Export Administration Act, is the national law through which the Department of Commerce licenses exports of non-military, dual-use technology. The technologies covered include many difficult-to-classify, dual-use items, listed on a lengthy, very technical Commerce Control List (CCL) that covers such items as high-speed computers, navigation devices, and other items which have potential military and/or civilian applications without much modification being necessary.

As a result of continued disagreement over export controls, the Export Administration Act lapsed in August 2001, but the export control system is being kept alive by Presidential invocation of emergency powers. A proposed 2001 new version of the act would have included stiffer penalties for violations of the Act, while at the same time including a mass-market exemption for technologies publicly and/or generally available – a rather sensible thing, but apparently not politically feasible (yet).

For the FAST project, consequences of this complicated regime – which cannot be dealt with by this Technical Note in further detail – would arise in case US-originating components are somehow going to be used for the FAST project; in other words, if under key feature (1) the TU Delft will intend to use such components. If it does, with a view to key feature (2) the export of such components to wherever the FAST satellites are being built and assembled – for FAST-D presumably the Netherlands – require specific export authorisations in order to take place.

Such export authorisations either may be refused altogether, or require an extended process of documentation, argumentation and investigation that can easily take many months if not years to be completed. In other words: it would be worthwhile to analyse at an early stage to what extent FAST-D in particular intends to use any

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<sup>47</sup>. Export Administration Act of 1979, 50 U.S.C. § 2410 (1979).

<sup>48</sup>. Arms Export Control Act, 22 U.S.C. § 2778.

technology, components, hardware, software or know-how with a US origin, and to the extent it would, determine whether so-called 'ITAR-free' – read non-US – alternatives are available and feasible from a technical and cost perspective, and if not, start the process of obtaining the necessary clearances as soon as possible.

## 5. Concluding remarks: the way forward

While, following the general point of departure of the legal regime for all space activities which is the freedom of exploration and use of outer space as expounded by Article I of the Outer Space Treaty, there are no principled show-stoppers to the FAST project as it is currently envisaged, nor to the role of the TU Delft in that framework, analysis has shown there are a number of key parameters evolving from the legal framework which require specific actions in order to make the FAST project compliant with them.

In some cases moreover, it has uncovered a number of areas where, ideally, further investigation on precise legal parameters, requirements and conditions would be undertaken and/or further measures trying to solve the issues and problems potentially arising from them would be considered. This results in the following list of considerations.

*Firstly*, at the FAST CDR meeting of 20 June 2008 reference was made to space debris issues and relevant guidelines and more formal requirements to de-orbit satellites at or towards the end of life. Whilst these could not have been taken care of by the present analysis, this is an issue which indeed would merit further investigation in the future, since it has become clear at the FAST CDR meeting that the FAST satellites would be intended to follow these guidelines.

*Secondly*, with reference to key feature (5) the present Technical Note has not addressed the earth observation aspects of the activities to be undertaken by the FAST satellites. Whilst the baseline here is, again, freedom of space activities, there are some international legal consequences regarding data access evolving in particular from UN Resolution 41/65 of 1986 that may warrant further research and analysis. Also, the intellectual property rights aspects, especially those concerning copyrights and similar regimes, and how they may or may not be applicable to space-generated data, has not been dealt with by the work undertaken under WP 160 – maybe it is subsumed in the work (to be) performed under WP 170.

*Thirdly*, though to a large extent the precise ramifications of international responsibility (section 2.1), international liability (section 2.2) and registration (section 2.3) will have to be dealt with at a national level through the Dutch national space act – and hence will be re-addressed by the Technical Note on Dutch national space law – it would be helpful to evaluate whether and at what point the key features of the FAST project might run the risk of coming into conflict with specific detailed regulation evolving from those general ramifications.

*Fourthly*, on the issue of frequency and orbital allocations, allotments and assignments (as discussed in section 3), it should be investigated – preferably at an early stage – in which category of satellite services FAST activities fit and what frequency bands have been allocated for that category; as far as FAST-D is concerned action should be undertaken to inform the Dutch government about relevant intentions and details, and make it apply for the frequencies called for and take its responsibility in the context of the coordination process; and make sure the assignment of frequencies and orbits to the TU Delft, as the operator for the purposes of ITU arrangements, will be arranged without hick-ups.

*Fifthly*, with regard to the international regime established by and on the basis of the Wassenaar Arrangement (as dealt with in section 4.1), it should be investigated

primarily with the Dutch national authorities (and, if the satellite is not going to be built and assembled in the Netherlands, with the national authorities of the state(s) where it is going to be built and/or assembled) to what extent the relevant national export controls, following the guidelines developed under the Wassenaar Arrangement and taking into particular account the various lists of items under the Annex, would be applicable in the case of FAST-D – and if so, to what extent FAST-D may come under exceptions or exemptions, for example as relating to basic scientific research.

**Sixthly**, with regard to the binding European regime established on the basis of Regulation 1334/2000 (as discussed in section 4.2), it would be prudent to conduct in due time a deeper survey, analysis and evaluation of all the details of the categories listed in Annex I, in order to make sure where transfers might possibly come into conflict with the Regulation's regime, the precise extent to which the Netherlands have interpreted and implemented that on a national level, and then what could possibly be done about it – if necessary.

**Seventhly**, as to the special case of US national law (addressed in section 4.3), it would be worthwhile to analyse at an early stage to what extent FAST-D in particular intends to use any technology, components, hardware, software or know-how with a US origin, and to the extent it would, determine whether so-called 'ITAR-free' (read non-US) alternatives are available and feasible from a technical and cost perspective, and if not, start the process of obtaining the necessary clearances as soon as possible.