

# SMALL SATELLITES AND SMALL STATES: NEW INCENTIVES FOR NATIONAL SPACE LEGISLATION

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## I. INTRODUCTION

The development of low-cost satellite missions has made space activities increasingly accessible in past years. Such missions include the development, launch, and operation of mini satellites, micro satellites, nano satellites, pico satellites, and even femto satellites.<sup>1</sup> Standardized nano satellites in the shape of a small cube are referred to as “CubeSats.”<sup>2</sup> The United Nations has recently initiated the Basic Space Technology Initiative (BSTI) in the framework of the United Nations Programme on Space Applications in an effort to support capacity building in basic space technology and to promote the use of space technology and its applications for sustainable development.<sup>3</sup> Together with the European Space Agency and the government of

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<sup>1</sup> Although there is no internationally recognized definition of small satellites, they are typically categorized according to their mass. Mini satellites have less than 500 kilograms, micro satellites less than 100 kilograms, nano satellites less than 10 kilograms, pico satellites less than 1 kilograms, and femto satellites less than 100 grams. See, e.g., *Satellite Classification*, SMALL SATELLITE HOME PAGE, [http://www.centaur.sstl.co.uk/SSHP/sshp\\_classify.html](http://www.centaur.sstl.co.uk/SSHP/sshp_classify.html) (last visited Feb. 28, 2013). Mini satellites are sometimes categorized as satellites with a mass less than 1000 kilogram. See Rainer Sandau, *International Study on Cost-Effective Earth Observation Missions Outcomes and Visions*, 36 INT'L SOC'Y PHOTOGRAMMETRY REMOTE SENSING COMMISSION SYMP. pt. 1, available at <http://www.isprs.org/proceedings/XXXVI/part1/Papers/T04-15.pdf> (last visited Feb. 28, 2013).

<sup>2</sup> Paul Muri & Janise McNair, *A Survey of Communication Sub-systems for Inter-satellite Linked Systems and CubeSat Missions*, 7 J. OF COMM. 290, 295 (2012).

<sup>3</sup> The first symposium was held from September 8-11, 2009 and the second symposium from September 21-13, 2010. See *UN/Austria/ESA Symposium 2009-2011*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, <http://www.unoosa.org/oosa/SAP/act2011/graz/index.html> (last visited Feb. 28, 2013).

Austria, the United Nations organized several symposia dedicated to the topic of “Small Satellite Programmes for Sustainable Development.”<sup>4</sup> The European Union is supporting an international network of 50 CubeSats to be launched together from Murmansk in northern Russia under its Seventh Framework Program (FP7).<sup>5</sup>

The advantages of small satellites are manifold. More and more capable nano- and small satellites can be developed with an infrastructure and at a cost that make them feasible and affordable for organizations such as academic institutions and research centers, which have a limited budget for space activities.<sup>6</sup> Small satellites create new opportunities for developing countries and countries that had previously only been users of space applications and make the involvement of local and small industry possible. Small satellites can lead to State independence in space by increasing the State’s capability to engage in Earth observation without relying on input from major space-faring nations.<sup>7</sup>

However, due to their size and low cost, small satellites usually lack onboard propellant systems and are thus not maneuverable. Once they are deployed in an orbit they cannot change their position. This causes serious concerns relating to collisions with other space objects, even though no such inci-

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<sup>4</sup> United Nations/Austria/European Space Agency Symposium on Small Satellite Programmes for Sustainable Development, Graz, Austria, Sept. 13-16, 2011, *Implementing Small Satellite Programmes: Technical, Managerial, Regulatory and Legal Issues*, U.N. Doc. A/AC.105/1005 (Nov. 28 2011).

<sup>5</sup> QB50, <https://www.qb50.eu/index.php/project-description> (last visited Feb. 28, 2013). FP is the multi-annual research program of the European Union administered by the European Commission in the years 2007 to 2013. *See* Regulation (EC) No 1906/2006 of the European Parliament and of the Council of 18 December 2006 laying down the rules for the participation of undertakings, research centres and universities in actions under the Seventh Framework Programme and for the dissemination of research results (2007-2013), OJ L 391/1.

<sup>6</sup> *UN/Austria/ESA Symposium 2009-2011*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, <http://www.unoosa.org/oosa/SAP/act2011/graz/index.html> (last visited Feb. 28, 2013) at 2.

<sup>7</sup> Rainer Sandau, Int’l Acad. of Astronautics, Presentation at the Fourth African Leadership Conference on Space Science and Technology for Sustainable Development, *Small Satellites for Capacity Building in Space Technology Development 6* (Sept. 26 2011), [http://www.oosa.unvienna.org/pdf/bst/ALC2010/02\\_Sandau\\_ALC-Mombasa.pdf](http://www.oosa.unvienna.org/pdf/bst/ALC2010/02_Sandau_ALC-Mombasa.pdf).

dents have been reported to far.<sup>8</sup> Thus, the increased interest in small satellites also creates a number of legal issues. It is an open question how to ensure that small satellite activities do not interfere with or compromise the safety of other space systems or that they do not contribute to the creation of new space debris.<sup>9</sup> This question not only concerns the traditional space faring nations, but also other States which may find themselves confronted with space activities being planned and carried out on their territory or by their nationals. These States may be responsible or liable for those activities under international law, even without governmental support or knowledge, because of the pertinent provisions in the UN treaties on outer space or under customary international law.<sup>10</sup>

Consequently, when the development of small satellite programs materializes, States should consider if the existing national legal framework is sufficient. They should ensure that the positive effect of small satellites would not be nullified by its negative effect on the safety and the long-term sustainability of space activities at large. While supporting small satellite programs, States should also be aware of the risks connected to such activities.

This article will discuss how the elaboration of national space legislation in Austria, Belgium, and The Netherlands, three States that have enacted national space legislation recently, has been affected by the possibility of future small satellite programs and which approach these States have taken to regulate them.

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<sup>8</sup> Neta Palkovitz & Tanja Masson-Zwaan, *Orbiting under the Radar: Nanosatellites, International Obligations and National Space Laws*, in PROC. OF THE 54<sup>TH</sup> IISL COLLOQUIUM ON THE LAW OF OUTER SPACE (forthcoming, 2012) [hereinafter *Orbiting under the Radar*].

<sup>9</sup> Werner Balogh, *The Role of Binding and Non-binding Norms in the Implementation of Small Satellite Programmes*, in SOFT LAW IN OUTER SPACE 325, 329 (Irmgard Marboe ed., Böhlau 2012).

<sup>10</sup> See generally, Karl Zemanek, *The United Nations and the Law of Outer Space*, 19 Y.B. WORLD AFF. 199 (1965) (for a discussion of the binding character, under international law, of the Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space, G.A. Res. 1962 (XVIII), U.N. GAOR, 18<sup>th</sup> Sess., 1280<sup>th</sup> plen. mtg., U.N. Doc. A/RES/1962(XVIII) (Dec. 13, 1963)).

## II. THE NEED FOR NATIONAL LEGISLATION

## A. Austria

Since 1987, when Austria joined the European Space Agency (ESA), it has developed a sizable space community, consisting of a number of research institutes and commercial enterprises, which contribute to numerous ESA projects.<sup>11</sup> However, the first independent space activity started in 2006 with the initiative of the Technical University of Graz to build the first Austrian nano-satellite (20x20x20 centimeters cm in size, approximately 8 kilograms in weight). It was developed in close cooperation with the Technical University of Vienna, the University of Vienna, and the Institute for Aerospace Studies (UTIAS) at the University of Toronto.<sup>12</sup> The Austrian Ministry for Transport, Innovation and Technology financially supported the program through the Austrian Space Application Program (ASAP) of the Austrian Research Promotion Agency (Österreichische Forschungsförderungsgesellschaft (FFG)) under the supervision of its Aeronautics and Space Agency (ALR).<sup>13</sup> The scientific goal of the program is the investigation of the brightness oscillations of massive luminous stars by differential photometry.

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<sup>11</sup> See generally *Partner in der Raumfahrt in Österreich*, EUROPEAN SPACE AGENCY, [http://www.esa.int/esaCP/ESAUOVK30JC\\_Austria\\_0.html](http://www.esa.int/esaCP/ESAUOVK30JC_Austria_0.html) (last update Nov. 24, 2011). Austria's involvement in ESA activities includes participation in both mandatory and optional programs. *Austria in Space*, THE AUSTRIAN RESEARCH PROMOTION AGENCY, <http://www.ffg.at/en/space/austria-in-space> (last visited Feb. 28, 2013). The ESA mandatory program includes general activities, the space science programme and the technology programmes, the study programmes, and research grants. *Id.* As regards ESA optional programs, Austria participates in applied space research and technologies, in activities related to the European launcher Ariane but not in the International Space Station. . *Id.* In addition, in 1991, a major Austrian space activity was the bilateral cooperation project, AustroMir, which brought the first Austrian astronaut, Franz Viehböck, to the Russian space station *Mir*. See BRUNO BESSER, AUSTRIA'S HISTORY IN SPACE 39 (R. A. Harris ed., 2004), <http://www.ffg.at/sites/default/files/downloads/page/austriashistoryinspace1.pdf>.

<sup>12</sup> See *Partner*, THE TUGSAT-1/BRITE-AUSTRIA PROJECT, <http://www.tugsat.tugraz.at/projekt/partner> (last visited Feb. 28, 2013).

<sup>13</sup> See generally *Aeronautics and Space Agency*, THE AUSTRIAN RESEARCH PROMOTION AGENCY, <http://www.ffg.at/en/space/alr> (last visited Feb. 28, 2013).

In addition, the University of Vienna decided to purchase a more or less identical satellite “in orbit” directly from the University of Toronto.<sup>14</sup> Unlike the University of Graz project, the University of Vienna is mainly interested in the data which can be obtained by the satellite and not by the construction of the satellite as such.<sup>15</sup> The project was initiated and financed by the University of Vienna under its ordinary budget, and not by the ASAP. In fact, for a number of years the competent Austrian authorities were not even aware of the purchasing contract.

The two satellites were launched by the same launcher from a Polar Satellite Launch Vehicle (PSLV) from India and to be put into the Low-Earth Orbit (600-900 kilometers) in February 2013.<sup>16</sup> The satellites are part of an interdisciplinary and inter-university research and educational program named BRITE (Bright Target Explorer),<sup>17</sup> the long term goal of which is to develop a generic satellite platform to be used for future low-cost space missions.<sup>18</sup>

The development of the first Austrian small satellite programs raised the question if there was a need for action on the national level with regard to its obligations under international law. Austria has ratified all of the five UN treaties on outer

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<sup>14</sup> Irmgard Marboe, *The New Austrian Outer Space Act*, 61 ZEITSCHRIFT FÜR LUFT- UND WELTRAUMRECHT 26, 28 (2012). See also the “General Part” of the “Materials” to the Austrian Outer Space Act at the website of the Austrian parliament, [http://www.parlament.gv.at/PAKT/VHG/XXIV/II\\_01466/fname\\_232781.pdf](http://www.parlament.gv.at/PAKT/VHG/XXIV/II_01466/fname_232781.pdf); it was only by coincidence that the Austrian Federal Ministry for Transportation, Innovation and Technology, the ALR and the FFG became aware of the project in 2009.

<sup>15</sup> *The New Austrian Outer Space Act*, *supra* note 14, at 26, 28.

<sup>16</sup> William Graham, *Indian PSLV successfully lofts multiple satellites*, NASA SPACEFLIGHT.COM (Feb. 25, 2013), <http://www.nasaspaceflight.com/2013/02/pslv-launch-multi-sats/>. This was the result of a multi-annual decision making process during which also Russian launch vehicles, such as Dnepr, Sojus, Rockot or Cosmos, and the Ariane V have been considered. See Levtchev, *infra* note 17 at 26, 49, 54.

<sup>17</sup> The instruments aboard cover two different optical spectra which improves the quality of the expected pictures. Boris Levtchev, *Brite Austria Mission TUGSAT-1 and Uni BRITE*, in VON LISSABON ZUM RAUMFAHRTZEUG: AKTUELLE HERAUSFORDERUNGEN IM VÖLKERRECHT [LISBON TO THE SPACECRAFT: CURRENT CHALLENGES IN INTERNATIONAL LAW] 49, 52 (Sigmar Stadlmeier ed., Vienna 2011) 49, 52. See BRITE – CONSTELLATION, <http://www.brite-constellation.at> (last visited Feb. 28, 2013).

<sup>18</sup> *Mission*, THE TUGSAT-1/BRITE-AUSTRIA PROJECT, <http://www.tugsat.at/project/mission> (last visited Feb. 28, 2013).

space.<sup>19</sup> However, legislative action had not been considered necessary so far, as Austria's space activities had been carried out in international cooperation and under non-Austrian leadership, most importantly in the framework of ESA. As ESA, on its own behalf, had accepted the obligations contained in the Rescue and Return Agreement, the Liability Convention, and the Registration Convention, Austria had not seen a need for specific legislation at the national level.<sup>20</sup>

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<sup>19</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty] (Austria ratified the Outer Space Treaty on February 26, 1968, *see* Austrian Federal Law Gazette No. 103/1968); Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, *opened for signature* Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue and Return Agreement] (Austria ratified the Rescue and Return Agreement on February 19, 1970, *see* Austrian Federal Law Gazette No. No. 110/1970); the Convention on International Liability for Damage Caused by Space Objects, *opened for signature* Mar. 29 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention] (Austria ratified the Liability Convention on January 10, 1980, *see* Austrian Federal Law Gazette No. 162/1980); the Convention on Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention] (Austria ratified the Registration Convention on March 6, 1980, *see* Austrian Federal Law Gazette No 163/1980); and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, *opened for signature* Dec. 18, 1979, 1363 U.N.T.S. 21 [hereinafter Moon Agreement] (Austria ratified the Moon Agreement on June 11, 1984, *see* Austrian Federal Law Gazette No. 286/1984).

<sup>20</sup> ESA made the declarations under Article 6 of the Rescue and Return Agreement, *supra* note 19; Article VII of the Registration Convention, *supra* note 19; and Article XXII of the Liability Convention, *supra* note 19, which stipulate the possibility of international organizations to declare their acceptance of the rights and obligations provided in those treaties. In that case, references to States shall be deemed to apply to it. *See* Office for Outer Space Affairs, *Status of International Agreements Relating to Activities in Outer Space as of 1 January 2010*, U.N. Doc. ST/SPACE/11/Rev.2/Add.3 (Jan. 1 2010), available at [http://www.unoosa.org/pdf/publications/ST\\_SPACE\\_11\\_Rev2\\_Add3E.pdf](http://www.unoosa.org/pdf/publications/ST_SPACE_11_Rev2_Add3E.pdf). The position of the Austrian institutions in this respect is evidenced in the "Materials" which accompany the text of the new Austrian law. *See* "Materials" to the Austrian Outer Space Act, *supra* note 14. This position is, however, not shared by all other States. Belgium is an example of a different view. *See* Michael Gerhard, *Article VI*, in 1 COLOGNE COMMENTARY ON SPACE LAW 103, 122-123 (Stephen Hobe et al. eds., 2009). One might also ask, if the project AustroMir of 1991, *supra* note 11, had not also already required national space legislation. In regards to the European perspective of national space legislation, *see* Irmgard Marboe, *National Space Legislation: The European Perspective*, in NATIONALES WELTRAUMRECHT/ NATIONAL SPACE LAW DEVELOPMENT IN EUROPE – CHALLENGES FOR SMALL COUNTRIES 31 (Christian Brünner & Edith Walter eds., 2008).

From the beginning of the elaboration of the Outer Space Act, the issue of registration was raised. The authorities were aware of the international register of space objects kept by UNOOSA on behalf of the UN Secretary General, and of the need for a national registry. However, there was no such registry in Austria.

Subsequently, it turned out that not only the issue of registration had to be addressed but that also other issues, most importantly in connection with liability, were unsolved. It became evident that Austria could become liable for damage caused by the small satellites without having any influence or control on them. If the government had to pay compensation for such damage, it would not have a right of recourse against the operator. Therefore, the Federal Ministry for Transport, Innovation and Technology came to the conclusion that a comprehensive regulation of space activities carried out on Austrian territory or by Austrian nationals was needed.<sup>21</sup> It decided to propose to the Austrian parliament – as promptly as possible – a draft for an act on outer space.

In early 2009, the first draft was circulated<sup>22</sup> and after two and a half years of negotiations, which involved a considerable

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<sup>21</sup> The competence of the Federal Ministry for Transport, Innovation and Technology derives from the competence to regulate “the traffic system relating to the railways, aviation and shipping . . .” BUNDES-VERFASSUNGSGESETZ [B-VG][CONSTITUTION] BGBl. No. 1/1930, as last amended by Bundesverfassungsgesetz [BVG] BGBl I No. 98/2010, art. 10(¶1)(9) (Austria). See also Sigmar Stadlmeier, *Ein österreichisches Weltraumgesetz [An Austrian Space Law]*, in VON LISSABON ZUM RAUMFAHRTZEUG: AKTUELLE HERAUSFORDERUNGEN IM VÖLKERRECHT [LISBON TO THE SPACECRAFT: CURRENT CHALLENGES IN INTERNATIONAL LAW] 33 (Sigmar Stadlmeier ed., Vienna 2011); Sigmar Stadlmeier, *What's in a Register: Austria (not) Doing Her Homework?*, in NATIONALES WELTRAUMRECHT/ NATIONAL SPACE LAW DEVELOPMENT IN EUROPE – CHALLENGES FOR SMALL COUNTRIES 148, 149-150 (Christian Brünner & Edith Walter eds., Vienna 2008); Edith Walter, *The Constitutional Basis for an Austrian Space Law*, in NATIONALES WELTRAUMRECHT/ NATIONAL SPACE LAW DEVELOPMENT IN EUROPE – CHALLENGES FOR SMALL COUNTRIES 157, 162 (Christian Brünner & Edith Walter eds., Vienna 2008); Franz Koppensteiner, *Ein kleiner Schritt für die Menschheit, ein großer für Österreich?* [One small step for mankind, one giant leap for Austria?], in ÖFFENTLICHES RECHT [PUBLIC LAW] 11, 14-15 (Georg Lienbacher & Gerhart Wielinger eds., 2011).

<sup>22</sup> The ministry had entrusted the Austrian National Point of Contact for Space Law (NPOC) of the European Centre for Space Law (ECSL) with the first draft. Prof. Christian Brünner at the University of Graz founded the Austrian NPOC in 2001. See BESSER, *supra* note 8, at 15. In late 2008, it moved to the University of Vienna.

number of ministries, the final text was accepted by the Council of Ministers on October 11, 2011. This proposal was presented to the Parliamentary Committee for Research, Technology and Innovation where it was endorsed unanimously on December 1, 2011. The Act was adopted unanimously on December 6, 2011 by the National Council and on December 15, 2011 by the Federal Council.<sup>23</sup>

After the vote at the National Council, the Minister for Transport, Innovation and Technology reiterated that the main reason for the new act was the launch of the two small satellites developed by universities in Graz and Vienna. Despite the fact that the launch would take place from India, Austria would become a “launching State” and, as such, it had to implement the space treaties it had ratified. The new act would now provide for the risk of damage and pertinent liability.<sup>24</sup>

A few members of parliament also raised their voices in favor of the new act. Some emphasized the importance of the law for the Austrian research community.<sup>25</sup> Others pointed out that Austria had accepted international obligations by ratifying the Outer Space Treaty in 1967 and that the new act ensured that these obligations could be complied with.<sup>26</sup> Some emphasized the importance of the space register and the peaceful uses of outer space,<sup>27</sup> while others noted the need for authorization procedures, liability provisions, and provisions on the mitigation of space debris.<sup>28</sup> One Member of Parliament opined that the draft

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<sup>23</sup> BUNDESGESETZ ÜBER DIE GENEHMIGUNG VON WELTRAUMAKTIVITÄTEN UND DIE EINRICHTUNG EINES WELTRAUMREGISTERS (WELTRAUMGESETZ) BUNDESGESETZBLATT [BGBl I] No. 132/2011 (Austria), translated in *Austrian Federal Law on the Authorisation of Space Activities and the Establishment of a National Space Registry*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, <http://www.oosa.unvienna.org/pdf/spacelaw/national/austria/austrian-outer-space-actE.pdf> (last visited Feb.28, 2013) [hereinafter *Austrian Outer Space Act*]. See also *Weltraumgesetz*, REPUBLIK ÖSTERREICH PARLAMENT, [http://www.parlament.gv.at/PAKT/VHG/XXIV/II/II\\_01466/index.shtml](http://www.parlament.gv.at/PAKT/VHG/XXIV/II/II_01466/index.shtml) (last visited Feb. 28, 2013).

<sup>24</sup> Press Release, Minister Doris Bures, Bahnnetze – Einheitlichere Vorschriften für Bessere Verbindungen. Österreich hat nun auch ein Weltraumgesetz [Rail networks - More uniform rules for better connections. Austria now also has an Outer Space Act] (Dec. 6 2011), [http://www.parlament.gv.at/PAKT/PR/JAHR\\_2011/PK1198/](http://www.parlament.gv.at/PAKT/PR/JAHR_2011/PK1198/).

<sup>25</sup> *Id.* at MP Kurt Gartlehner’s statement.

<sup>26</sup> *Id.* at MP Johannes Schmuckenschlager’s statement.

<sup>27</sup> *Id.* at MP Gerhard Deimek’s statement.

<sup>28</sup> *Id.* at MP Albert Steinhauser’s statement.

was not spectacular but necessary in view of the envisaged launch of the two Austrian research satellites.<sup>29</sup> All of the members of parliament that took the floor voiced their support of the new act and emphasized that space research and technology was a growing industry. However, it was also stated that Austria still had development potential in this area and that the two small satellites did not signify that Austria was on its way to becoming a space power.<sup>30</sup>

### B. Belgium

Belgium has been engaged in international space cooperation since almost the beginning of the space age. It was actively involved in the European Space Research Organization (ESRO) that later became ESA.<sup>31</sup> Belgium hosts one of the stations in Redu, in the Ardennes region of Southern Belgium. With about ninety percent of the federal space budget used to fund programmes run by ESA, Belgium is the fifth largest contributor to the organization. Thanks to its diversified industry, Belgium is able to participate in all fields of space research and applications.<sup>32</sup> The main efforts of Belgian space activities are situated in the fields of Technology (TEC), Launchers (LAU), Telecom

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<sup>29</sup> *Id.* at MP Rainer Widmann's statement.

<sup>30</sup> *Id.* at MP Rainer Widmann & MP Bernd Schönegger's statements.

<sup>31</sup> One of the first activities in which Belgium was directly involved was the establishment of a station for the European Space Tracking (ESTRACK) network, operated by the European Space Operations Centre (ESOC) for ESA. See DAWINKA LAUREYS, BELGIUM'S PARTICIPATION IN THE EUROPEAN SPACE ADVENTURE 3 (R.A. Harris ed., 2003).

<sup>32</sup> Jean-François Mayence, *The Belgian Law on the Activities of Launching, Operating and Monitoring of Space Objects*, VIII<sup>TH</sup> EUROPEAN INTERPARLIAMENTARY SPACE CONFERENCE 3 (2006), available at <http://www.belspo.be/belspo/eisc/pdf/doculaw/Mayence.pdf> (last visited Feb. 28, 2013) [hereinafter *The Belgian Space Law*]. Currently, the Belgian space sector involves some seventy teams in federal or regional scientific establishments or research centres of excellence, as well as around forty companies and almost 1,600 direct jobs for highly qualified people. See *Space Cooperation, KINGDOM OF BELGIUM*, [http://diplomatie.belgium.be/en/policy/policy\\_areas/striving\\_for\\_global\\_solidarity/space\\_cooperation/](http://diplomatie.belgium.be/en/policy/policy_areas/striving_for_global_solidarity/space_cooperation/) (last visited Feb. 28, 2013). More than forty manufacturers are regularly active in the space sector. See *The Belgian Space Industry*, BELGIAN SCI. POL'Y OFFICE, [http://www.belspo.be/belspo/space/beIndu\\_en.stm](http://www.belspo.be/belspo/space/beIndu_en.stm) (last visited Feb. 28, 2013).

and Integrated Applications (TIA), and Human Space Flight (HSF).<sup>33</sup>

Like the majority of States, Belgium witnessed the growth of commercial activity during the past years. The Vitrociset Company, based in Redu, operated orbital manoeuvres on foreign satellites.<sup>34</sup> Although the company's premises are situated on the ESA Redu Ground Station, its activities not covered by the ESA Convention, still fell under Belgian jurisdiction.<sup>35</sup> Two specific characteristics of Belgium encourage an intense concentration of space industry and operators: first, the fact that Belgium hosts the majority of EU institutions and, second, the particularities of the Belgium fiscal system.<sup>36</sup>

As with many other countries, the operation of small satellites by commercial organizations and academic institutions will increase in the next decades due to their affordability. A number of Belgian companies have the capability to develop and are developing small satellites. For instance, Spacebel is a software engineering company operating in the Space and Earth monitoring application sectors and serving space agencies, major aerospace prime companies, EU institutions, as well as the commercial market.<sup>37</sup> Another Belgian company, Verhaert Design and Development NV has been developing advanced small space systems like small satellites for the past 30 years.<sup>38</sup>

Belgium has ratified all five United Nations space law treaties as well as the conventions of EUMETSAT, ECMWF, ESO, EUTELSAT. It has further concluded several bilateral coopera-

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<sup>33</sup> Maarten Adriaensen & Philippe Erhard, *Space Activities and Governance and the Role of Regional Authorities: Belgium Case Study*, 57 EURO. SPACE POL'Y INST. PERSPECTIVES 1, 2 (2012).

<sup>34</sup> Jean-François Mayence, *Introduction to Belgian Law on the Activities of Launching, Flight Operations or Guidance of Space Objects*, in 5 SPACE LAW: BASIC LEGAL DOCUMENTS E.X (Karl-Heinz Böckstiegel et al. eds., 15<sup>th</sup> ed. 2011) [hereinafter *Introduction to Belgian Law*].

<sup>35</sup> *Id.*

<sup>36</sup> Matxalen Sánchez Aranzamendi, *Economic and Policy Aspects of Space Regulation in Europe, Part I: The Case of National Space Legislation – Finding the Way between Common and Coordinated Action*, 21 EUROPEAN SPACE POLICY INSTITUTE 18 (Sept. 2009).

<sup>37</sup> See SPACEBEL, <http://www.spacebel.be/> (last visited Feb. 28, 2013).

<sup>38</sup> *Hellma in Space*, HELLMA, <http://www.hellma.be/text/677/en/news-hellma-benelux.html> (last visited Feb. 28, 2013).

tion agreements with other States. Due to the increasing commercial space activities and the resulting probability of becoming responsible under international law, the Council of State provided the Minister for Science Policy with its recommendations concerning the draft Belgian Space Act at the end of 2004.<sup>39</sup> The aim was the implementation of international outer space law in the national legal framework<sup>40</sup> and the creation of a legal framework for existing or emerging activities in Belgium, as well as possible activities to be performed by Belgian citizens. The Law entered into force on 1st January 2006 as the Law of 17 September 2005.<sup>41</sup>

The Belgian Space Law responds to the specific needs of a small State actively involved in international cooperation and activities and considers the regulation of the relevant issues in a pragmatic way. The main reason for the elaboration of a national space act was the country's fear of being held liable for activities beyond its supervision and control according to Article VII<sup>42</sup> of the Outer Space Treaty.<sup>43</sup> Article VII with its notion of "launching State," including any legal or natural person of the nationality of the State was also of concern for Belgium. The Belgian Space Law is the first law in Europe that makes explicit reference to both Article VII of the Outer Space Treaty and to the Liability Convention.<sup>44</sup> The Law is based on the following three pillars: (1) authorization and supervision of space activities, (2) registration of space objects, and (3) liability actions.<sup>45</sup>

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<sup>39</sup> Jean-Francois Mayence, *Implementing the United Nations Outer Space Treaties - The Belgian Space Act in the Making*, PROC. 47TH COLLOQUIUM L. OUTER SPACE 134 (2004).

<sup>40</sup> *Id.*

<sup>41</sup> Law on the Activities of Launching, Flight Operation or Guidance of Space Objects of Nov. 16, 2005, Moniteur Belge [M.B.] [Official Gazette of Belgium], *adopted* Mar. 19, 2008., *entered into force* Apr. 11, 2008 [hereinafter Belgian Space Law].

<sup>42</sup> Outer Space Treaty, *supra* note 19.

<sup>43</sup> *Introduction to Belgian Law, supra*, note 34.

<sup>44</sup> Armel Kerrest de Rozavel & Frans.G. von der Dunk, *Liability and Insurance in the Context of National Authorisation*, in FRANS.G. VON DER DUNK, ED., NATIONAL SPACE LEGISLATION IN EUROPE 125, 133 (Martinus Nijhoff Publishers, Leiden-Boston, 2011).

<sup>45</sup> Jean-Francois Mayence, *Granting Access to Outer Space: Rights and Responsibilities for States and their Citizens An Alternative Approach to Article VI of the Outer Space Treaty, Notably Through the Belgian Space Legislation*, in FRANS.G. VON DER DUNK, ED., NATIONAL SPACE LEGISLATION IN EUROPE 73, 118 (Martinus Nijhoff Publishers, Leiden-Boston, 2011) [hereinafter *Granting Access to Outer Space*].

All are crucial for small satellites and are relevant for the compliance with a State's responsibility under Article VI.

So far, the Belgian Space Law has not been applied to any particular space activity and no space object has been registered.<sup>46</sup> However, this may change in the near future. As a first step, a mission involving a small satellite called *OUFTI* has been developed and constructed in the framework of a national project led by the University of Liège.<sup>47</sup> It was designed in Belgium and funded by the Belgian government. As in Austria, this small university satellite mission was the first Belgian space activity outside the frame of ESA programs.

Nevertheless, other than originally planned, *OUFTI* will not be launched on a Vega demonstration flight but will rather be integrated in the large QB50 project in the FP7 of the EU. Yet, this will not change the role of Belgium in this context. On the contrary, the Belgian Von Karman Institute for Fluid Dynamics is the lead institute in the QB50 project.<sup>48</sup> It will eventually sign the contract with the Russian launch provider. It is planned that the 50 CubeSats will be launched together in 2014 by a single Shtil-2.1 from Murmansk in northern Russia into a circular orbit at 320 km altitude.

### C. Netherlands

The Netherlands also has a long tradition in space research with considerable knowledge in the scientific and technical space sector and has been involved in space activities since the late 1950s.<sup>49</sup> The country is engaged in international cooperation within ESA and contributes strongly to the European Space Agency. Approximately seventy percent of the Dutch space

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<sup>46</sup> *Id.* at 120.

<sup>47</sup> *Id.*

<sup>48</sup> See Press Release, Von Karman Institute for Fluid Dynamics, QB50, a network of 50 small satellites in space, approved by the European Commission, [https://www.vki.ac.be/index.php?option=com\\_content&view=article&id=249&Itemid=400%20target=](https://www.vki.ac.be/index.php?option=com_content&view=article&id=249&Itemid=400%20target=) (last visited Feb. 28, 2013).

<sup>49</sup> See Daan de Hoop, *Space Activities in The Netherlands – A Short History*, in BRUCE BATTRICK, LORRAINE CONROY, EDs., PROC. OF THE CONCLUDING WORKSHOP THE EXTENDED ESA HIST. PROJECT 75 (2005).

budget is used to fund ESA programs. Established in 1968 in Noordwijk, the European Space Research and Technology Centre (ESTEC) is the largest site of ESA.

The Netherlands is among the States that have ratified all five UN treaties on outer space and is a member in the major international organizations like INTELSAT, INMARSAT, EUTELSAT, and EUMETSAT.<sup>50</sup> The enactment of a Dutch Space Activities Act originated from the necessity to implement the obligations arising out of the five UN space treaties. This necessity followed the emergence of non-governmental outer space activities with certain connections to the Netherlands. These connections included the presence of private companies, which were active in the increasingly commercialized telecommunications sector.<sup>51</sup> The planned participation of the Dutch company MirCorp in a Russian space tourism project also raised awareness of the possibility of Dutch legal involvement under international space law.<sup>52</sup>

Although the emphasis of space activities lays on international cooperation, the Netherlands can register autonomous Dutch space activities as well. Two Dutch-built satellites have been launched so far: the ANS (Astronomical Netherlands Satellite) in 1974 and the IRAS (Infra-Red Astronomical Satellite) in 1983.<sup>53</sup> The elaboration of a national space law was also triggered by the continuous market growth after 2002. New Skies NV, which had emerged from INTELSAT as a separate company and had incorporated in The Netherlands in 1998, and to which six satellites in orbit were transferred to,<sup>54</sup> was in need of

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<sup>50</sup> *Id.* at, 226 et seq.

<sup>51</sup> Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., *Information on National Legislation Relevant to the Peaceful Exploration and Use of Outer Space: Reply of the Netherlands*, Mar. 22-Apr. 1, 2010, U.N. Doc. A/AC.105/C.2/2010/CRP.11, at 1 (Mar. 23 2010), available at <http://web1.olemiss.edu/ncrsas/atlas/archive/files/2f91e6a213433ae5d64a4df5a5f3f40d.pdf> (hereinafter *Reply of the Netherlands*).

<sup>52</sup> Frans von der Dunk, *Regulation of Space Activities in The Netherlands*, in RAM S. JAKHU, ED., NATIONAL REGULATION OF SPACE ACTIVITIES 231 et seq. (Springer – Dordrecht. 2010).

<sup>53</sup> *Id.* at 225.

<sup>54</sup> However, the Netherlands notified to OOSA that it did not consider itself as “launching State” or “State of registry”, but would bear international responsibility for the satellites’ operation. See FRANCIS LYALL AND PAUL LARSEN, *SPACE LAW: A TREATISE* 337 (Ashgate, Surrey 2009).

additional capacity and launched a number of satellites on its own.<sup>55</sup> The legal consequences of this activity prompted the Netherlands to draft a national space law. The Dutch Parliament enacted the Dutch Space Activities Act<sup>56</sup> on January 24, 2007 and it entered into force on January 1, 2008.<sup>57</sup> The law entered into force only with effect to the European part of the Netherlands and does not apply to the six islands in the Caribbean, Aruba, and the five Netherlands Antilles.<sup>58</sup>

Since then, one small Dutch satellite has been put into orbit, namely the CubeSat *Delfi-C3* of the Delft University of Technology. It was launched by an Indian launcher in 2008.<sup>59</sup> A follow-up is already in preparation, namely the *Delfi-n3Xt* (*move in space*) to be launched in 2013.<sup>60</sup>

Furthermore, the Dutch Company ISIS (Innovative Solutions In Space BV), established in 2006 as a spin-off of the *Delfi-C3* nanosatellite project from Delft University of Technology, is of notable mention. The company offers a broad range of turn-key nanosatellite solutions, ranging from standard CubeSat solutions in the 1-4 kilogram range to 20 kilogram compact microsatellites.<sup>61</sup> In particular, ISIS is also actively involved in the QB50 project under the EU FP7 for which it provides a variety

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<sup>55</sup> *Regulation of Space Activities in The Netherlands*, *supra* note 52, at 234.

<sup>56</sup> Law Incorporating Rules Concerning Space Activities and the Establishment of a Registry of Space Objects, 80 *Staatsblad* (2007) 1 [hereinafter Dutch Space Activities Act].

<sup>57</sup> The Dutch Space Activities Act is implemented by the Space Objects Registry Decree of 13 November 2007 that entered into force together with the Act and the Order Concerning Licence Applications for the Performance of Space Activities and the Registration of Space Objects of 7 February 2008, which entered into force on 22 February 2008. Heleen De Brabander-Ypes, *Introduction to the Law Incorporating Rules Concerning Space Activities and the Establishment of a Registry for Space Objects*, in 5 *SPACE LAW: BASIC LEGAL DOCUMENTS E.XIV* (Karl-Heinz Böckstiegel et al. eds., 15<sup>th</sup> ed. 2011); *Reply of the Netherlands*, *supra* note 51.

<sup>58</sup> See *Regulation of Space Activities in The Netherlands*, *supra* note 52, at 237 (2010).

<sup>59</sup> Tanja Masson-Zwaan, *The (non-)Applicability of the Netherland's Space Activities Act to certain "Dutch" Space Activities*, in 6<sup>TH</sup> EILEEN GALLOWAY SYMPOSIUM (Dec. 1, 2011), at slide 12, [http://www.iislweb.org/docs/2011\\_galloway/Masson-Zwaan.pdf](http://www.iislweb.org/docs/2011_galloway/Masson-Zwaan.pdf) (last visited Feb. 28, 2013).

<sup>60</sup> See *Delfi Space*, <http://www.delfispace.nl/index.php/delfi-n3xt> (last visited Feb 28, 2013).

<sup>61</sup> See *Innovative Solutions in Space*, <http://www.isispace.nl/cms/index.php/2011-07-20-09-31-21/isis-in-brief> (last visited Feb 28, 2013).

of products. In its “one-stop-shop” for CubeSats and nanosats systems, it offers a series of standardized, off-the-shelf components and subsystems for a variety of manufacturers.<sup>62</sup>

It follows that small satellites will play an important role in the Netherlands in the near future by using and driving the market for miniaturised space systems. However, as will be shown, the Dutch national space legislation does not necessarily apply to all of these space activities undertaken in the Netherlands.

### III. SELECTED ISSUES RELATING TO THE APPLICABILITY OF THE AUSTRIAN, BELGIAN, AND DUTCH SPACE LEGISLATION REGARDING SMALL SATELLITES

The Austrian, Belgian and Dutch national space laws have been elaborated in view of increasing private space activities. These also include projects of small satellites which are often developed by institutions independent from the State. All three national space laws are meant to be comprehensive and to deal with all the legal aspects connected to space activities, such as authorization, supervision, registration, liability, insurance, transfer of the space object, as well as enforcement and sanctions. The national space laws have been characterized as space laws of the so-called second generation that aim at creating a comprehensive legal framework for nascent commercial space activities.<sup>63</sup> However, they are different from each other in terms of their scope of application, their liability and insurance regimes, as well as their regulations concerning space debris mitigation. In particular, the three States have taken different approaches as regards to the applicability of their legislation to small satellites.

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<sup>62</sup> See CubeSatShop, <http://www.cubesatshop.com/> (last visited Feb. 28, 2013).

<sup>63</sup> Aranzamendi, *supra* note 36, at 4.

*A. Scope of Application**i. Austria*

Section 1(1)(3), makes it clear that the Austrian Outer Space Act is not only applicable to space activities carried out in Austrian territory and on board of vessels or airplanes registered in Austria, but also by a natural person with Austrian citizenship or legal persons seated in Austria.<sup>64</sup> This broad scope of personal jurisdiction, which is not shared by all countries,<sup>65</sup> covers activities undertaken by Austrian universities as well as private law subjects. Thus, it also targets small satellite programs such as those by the Technical University of Graz and the University of Vienna. The definition of “national” activity is thus not limited to activities carried out by State entities but also by non-State entities with Austrian citizenship. The only limitation is that space activities by Austrian citizens are only covered if they are involved as “operators,” that is, the Act will not apply if they only collaborate in space activities and do not act on their own account.<sup>66</sup>

This is in line with the requirement of Article VI of the Outer Space Treaty which demands authorization and continuing supervision of space activities carried out by non-governmental entities. However, the obligations of the entities targeted by the Act are not limited to the authorization obligation but also encompass the obligation to register.<sup>67</sup> Even if the obligation to register is not automatic, because Section 9 of the

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<sup>64</sup> Austrian Outer Space Act, *supra* note 23, § 1(1)(3). The definition follows the general principle of public international law that a State may only be made responsible for such activities over which it can exercise territorial and personal jurisdiction. See Michael Gerhard, *Article VI*, *supra* note 20, at 113-12.

<sup>65</sup> Some States limit the personal scope of application of the space acts to areas that are not subject to the sovereignty of any State (Norway), or make it subject to international agreements (Belgium), or to respective secondary legislation (the Netherlands). See Michael Gerhard, *Article VI*, *supra* note 20, at 114. Also many other States, such as Sweden, South Africa, Australia, France, England, and the USA have included a broader personal scope of application of their respective space laws. See *id.* at 114-15.

<sup>66</sup> See Austrian Outer Space Act, *supra* note 23, § 2, which contains a number of definitions, including the term “space operator”. See also the explanations in the “Materials” to the Austrian Outer Space Act, *supra* note 14, at 2-4.

<sup>67</sup> See Austrian Outer Space Act, *supra* note 23, §§ 9-10.

Act qualifies that only objects “for which Austria is considered to be the launching State” the burden of proof to show which State is the launching State is incumbent on the space operator according to the Liability Convention. If the operator does not register such object, it will be considered as a violation of the Act.

Furthermore, the scope of application does not differentiate whether the space activity is sponsored in whole or in part by Austrian public funds. Thus, Austria’s responsibility also includes privately funded programs. This avoids the risk of control deficits, in particular with regard to small satellite programs.

## ii. Belgium

According to Article 2, section 1, the 2005 Belgian Space Law covers:

activities of launching, flight operations and guidance of space objects carried out by natural or legal persons in the zones placed under the jurisdiction or control of the Belgian State or using installations, personal or real property, owned by the Belgian State or which are under its jurisdiction or its control.<sup>68</sup>

Activities carried out by natural or legal persons of Belgian nationality, irrespective where they are carried out, fall under the Law when it is provided for in an international agreement.<sup>69</sup> Thus, the Law primarily applies the territorial criterion, whereas the personal criterion is used only in a subsidiary manner when an international agreement prescribes it.

The Belgian Space Law defines a “flight operation” and “guidance” as an “operation relating to the flight conditions, navigation or evolution in outer space of the space object, such as the control and correction of its orbit or its trajectory.”<sup>70</sup> The problem in relation to small satellites is that, after positioning in orbit, no further manoeuvring of the satellite is possible. It is

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<sup>68</sup> Belgian Space Law, *supra* note 41, at art. 2, § 2

<sup>69</sup> Belgian Space Law, *supra* note 41, at art. 2, § 2.

<sup>70</sup> *Id.* at art. 3, No. 5.

not clear if the mere sending and receiving of signals, even if performed on Belgian territory can be regarded as a “flight operation” or “guidance.” It has been pointed out that once placement in orbit is achieved, the flight is autonomous, without any propulsion or guidance capacity which would then exclude the applicability of the Belgian Space Law to such satellites.<sup>71</sup>

The same may result if one rests on the “operator” who is defined in Article 3, Number 2, as a “person that carries out or undertakes to carry out the activities . . . by ensuring, alone or jointly, the effective control of the space object.”<sup>72</sup> “Effective control” means control of the “means of control or remote control and the related means of supervision, necessary for the implementation of the activities of launching, the flight operations and guidance of one or more space objects.”<sup>73</sup> As small satellites usually are not controllable in the sense of orbit correction and thus are beyond human control, no effective control is possible. The lack of manoeuvrability may be regarded as a lack of activity of small satellites and excludes them from the definition of space activity provided for in the law, and thus, from the scope of its application.<sup>74</sup> As a consequence, small satellites would fall outside the scope of application of the Belgian Space Law and would not be “authorized” and “supervised” by the Belgian authorities.<sup>75</sup>

As regards the question if Belgium would consider itself as a “launching State” of small satellites, the situation is not very clear. The definition of “launching State” referred to in Article 3, Number 11 in the Belgian Space Law refers to the definition stated in the 1972 Liability Convention and the 1975 Registration Convention. These definitions include the State which “procures” the launch. While small satellites of public universities may fall under this definition, as in the case of the *OUFTI* of the

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<sup>71</sup> *Granting Access to Outer Space*, *supra* note 45, at 73, 120.

<sup>72</sup> Belgian Space Law, *supra* note 41, at art. 3, § 2.

<sup>73</sup> *Id.* at art. 3, No. 3.

<sup>74</sup> *Granting Access to Outer Space*, *supra* note 45, at 73, 120; *see also* Diane Howard, *The Sixth Eilene M. Galloway Symposium on Critical Issues in Space Law. A Comparative Look at National Space Laws and Their International Implications 2* (Dec. 1, 2011) available at [http://www.iislweb.org/docs/2011\\_galloway/Galloway\\_report.pdf](http://www.iislweb.org/docs/2011_galloway/Galloway_report.pdf).

<sup>75</sup> *Orbiting under the Radar*, *supra* note 8.

University of Liège,<sup>76</sup> the situation is more uncertain as regards satellites launched by other institutions or companies, such as the Von Karman Institute in the QB50 project of the EU FP7. It seems that Belgium considers adopting a pragmatic solution for the satellites participating in the QB50 project. The Belgian government intends to issue a statement in which it associates itself with the launch, and therefore “co-procures” the launch of the space object.<sup>77</sup> This governmental endorsement will clarify the situation and will help to clearly identify Belgium as one of the launching States which, for liability and registration purposes, is of utmost importance. However, this solution creates, on the other hand, uncertainties as regards to other small satellite projects for which such a governmental endorsement will perhaps not be possible to achieve.

The uncertainty as regards to the applicability of the 2005 Belgian Space Law to small satellites was one of the reasons for an initiative to reform it. The proposal for an amendment of the Law includes a new wording of the definitions of the terms “operator,” “effective control,” “flight operation,” and “guidance.” Thereby, the coverage of small satellite projects would be explicitly addressed. The signature of the draft by the King is expected soon so that it can be passed by the Belgium Parliament in 2013. The new version of the Belgian Space Law would then clearly be applicable to small satellite missions initiated and controlled by actors on Belgian territory which is a desirable result.

### iii. Netherlands

According to Section 2, para. 1, of the Rules Concerning Space Activities and the Establishment of a Registry of Space Objects (2007 Dutch Space Activities Act),<sup>78</sup> space activities that are performed in or from within the Netherlands, or else on or from a Dutch ship or Dutch aircraft, fall under the Act’s scope of

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<sup>76</sup> *Granting Access to Outer Space*, *supra* note 45, at 73, 120.

<sup>77</sup> *Orbiting under the Radar*, *supra* note 8.

<sup>78</sup> Dutch Space Activities Act, *supra* note 56.

application.<sup>79</sup> Furthermore, the Act can be declared wholly or partly applicable by Order in Council for designated space activities that are performed by a Dutch natural or juridical person on or from a ship or aircraft that falls under the jurisdiction of a State that is not party to the Outer Space Treaty, as well as for the organization of outer-space activities by a natural or juridical person from within the Netherlands.<sup>80</sup>

The Act primarily applies the territorial criterion in a broad sense, covering also activities on Dutch ships and airplanes.<sup>81</sup> The nationality criterion, however, is applied only with the aim to fill gaps in international responsibility in cases when space activities are conducted by Dutch nationals in the territory of a State that is not a party to the Outer Space Treaty.

The Act defines “space activities” as “the launch, the flight operation or the guidance of space objects in outer space.”<sup>82</sup> According to the Act’s explanatory memorandum, the term “guidance of space objects” includes “all command and control activities in relation to a space object (usually a satellite) – e.g. the execution of major and minor manoeuvres designed to keep a satellite in its position in outer space or to adjust its position/orbit ( . . . ).”<sup>83</sup> It follows that, similar to the 2005 Belgium Space Law, the Dutch Act stresses the manoeuvrability of the space object, which usually is not existent in the case of small satellites. It is therefore unclear if small satellites fall under the scope of application of the Act.

Although the Dutch Space Activities Act was already in force, the Act was not applied in 2008 upon the launch of the *Delfi-C3* nanosatellite project from Delft University of Technology. This has caused criticism and concern by commentators who point out that this practice results in the lack of obligation to obtain a license for conducting small satellites activities which nevertheless pose risks and dangers to the space envi-

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<sup>79</sup> *Id.* at sec. 2(1).

<sup>80</sup> *Id.* at sec. 2(1)(b).

<sup>81</sup> See *Regulation of Space Activities in The Netherlands*, *supra* note 52, at 237.

<sup>82</sup> Dutch Space Activities Act, *supra* note 56, at sec. 1(b).

<sup>83</sup> Dutch Space Activities Act’s Explanatory Memorandum, *cited in*, *Orbiting under the Radar*, *supra* note 8.

ronment.<sup>84</sup> Furthermore, such exclusion of small satellites from the concept of “national space activities” may conflict with the State’s international responsibility for such activities, as Article VI, does not distinguish between manoeuvrable and non-manoevrable space objects. The “space activity” for which the State is responsible encompasses in any case the positioning in an orbit of a space object, even if after that no change in the position is possible.

The Dutch practice of not considering itself a “launching State” in cases where not the State itself but rather a private entity under Dutch jurisdiction “procures” the launch has also been criticized.<sup>85</sup> This, however, does not only concern small satellites but also larger satellites.

In order to accommodate the concerns raised against the non-licensing of small satellites, the Dutch administration has started to reconsider its policy. In August 2012, the Dutch Minister for Economic Affairs, Agriculture and Infrastructure agreed to broaden the scope of the 2007 Space Activities Act, so that guidance and operation of non-manoevrable small satellites from the Netherlands become a national space activity and fall under the licensing regime.<sup>86</sup>

Considering small satellite projects as “national space activities” under Art. VI would be a first step to fully include them under the scope of the national legislation. This should eventually also lead to the recognition of the Netherlands as a “launching State” for liability and registration purposes. In particular, the lack of registration of small – or larger – satellites procured by Dutch nationals might lead to an important disadvantage for them. More and more launch providers demand in the launching contract that the space object should be registered by the home country of the procurer. If that home country does not allow for registration of such space objects, the operator might not get a contract to launch the space object.<sup>87</sup> Such a result should be avoided for the benefit of the nascent small satellites com-

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<sup>84</sup> *Orbiting under the Radar*, *supra* note 8.

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> *Id.*

munity. It is another argument to make national space legislation fully applicable to small satellites.

### *B. Liability, Recourse and Insurance*

#### i. Austria

Section 3 of the Austrian Space Law Act contains a general obligation of authorization of space activities with the conditions regulated in Section 4. In this context, the issue of liability has been of utmost concern to the Austrian ministries involved in the drafting process, in particular the Ministry of Finance. It should be made sure that damage caused by private space objects should ultimately not remain an issue of liability for the Austrian State. Because of this issue, insurance is one of the conditions for authorization of the space activity. Section 4, paragraph 4 provides that “[i]n order to cover liability for damages caused to persons and property, the operator is under the obligation to take out an insurance covering a minimum amount of €60 000 000 per insurance claim.”<sup>88</sup>

However, the Ministry for Transport, Innovation and Technology wanted to avoid an obligation of insurance that would be prohibitive for developers of small satellites, such as the Technical University of Graz and the University of Vienna. Therefore, it commissioned a study to assess the risk of the two small satellites causing damage. The study eventually showed that the risk of small satellites of causing damage on Earth would be very

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<sup>88</sup> This amount is taken from the French example and has to be adjusted from time to time. Due to Article 18 of the Austrian Federal Constitution Law, it would not have been possible to provide for an unspecified amount, such as “the maximum probable loss” as it is contained in other national space laws, for example in other countries, such as Australia and in the United States. Article 18 of the Federal Constitutional Law (B-VG) stipulates in paragraph 1, “[t]he entire public administration shall be based on law.” BUNDES-VERFASSUNGSGESETZ [B-VG] [CONSTITUTION], *supra* note 21, at art. 18, para. 1. This provision is generally interpreted as providing for the legality of the actions of the administration and the prevention of arbitrariness. The Constitutional Court interprets this provision rather strictly paying due regard to the intentions and the legal theory of the drafter of the Austrian Constitution, Hans Kelsen. *See* Aranzamendi, *supra* note 36, at 11-15 (ESPI report on national space legislation which includes a table on the different insurance obligations).

low or even zero.<sup>89</sup> It explained that the satellites constructed by the two universities would almost inevitably burn up upon re-entry into the Earth atmosphere.

Therefore, it was concluded that small satellites for science and research and education should be exempted from the obligation of insurance. After several drafts and negotiations between various ministries, the following solution was decided:

[i]f the space activity is in the public interest, the Minister for Transport, Innovation and Technology may determine a lower sum or release the operator from the insurance requirement by administrative decision, taking into account the risks connected to the activity and the operator's financial capacity. Space activities are in the public interest if they serve science, research or education. For other satellites, in particular large commercial satellites, the obligation to obtain insurance is clearly kept.<sup>90</sup>

As Austria is liable for damage caused by a space object of which it is considered the "launching State" under international law,<sup>91</sup> the Austrian Outer Space Act provides for a right of recourse of the government against the operator.<sup>92</sup> Section 11, paragraph 2 specifies that "[f]or damage caused on the surface of the Earth or to aircraft in flight, the right of recourse comprises an amount up to the sum of the insured risk, but no less than the minimum amount of insurance set out [under Section 4]." This limitation does not apply if the damage is due to

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<sup>89</sup> Hans-Peter Rösler & Bernhard Schmidt-Tedd, *Studie zu Start, Betrieb und Risiken von Kleinsatelliten (Study to Start, Operate and the Risks of Small Satellites)*, insbesondere BRITE-AUSTRIA (Sept. 2009) (on file with author).

<sup>90</sup> Austrian Outer Space Act, *supra* note 23, subsec. 4(1)(4)

<sup>91</sup> See Outer Space Treaty, *supra* note 19, at art. VII; Liability Convention, *supra* note 19, at arts. II & III.

<sup>92</sup> The right of recourse of the State against the operator needs to be laid down by law. See MICHAEL GERHARD, NATIONALE WELTRAUMGESETZGEBUNG: VÖLKERRECHTLICHE VORAUSSETZUNGEN UND HANDLUNGSERFORDERNISSE [NATIONAL SPACE LAW: INTERNATIONAL REQUIREMENTS AND ACTION REQUIREMENTS] 147 (2002); Irmgard Marboe, Österreich als "Startstaat" – rechtliche Konsequenzen [Austria as a "Launching State" - Legal Consequences], in [LISBON TO THE SPACECRAFT: CURRENT CHALLENGES IN INTERNATIONAL LAW] 11, 26 (Sigmar Stadlmeier ed., Vienna 2011)

fault by the operator or his agents or if the operator has carried out the space activity without authorization.<sup>93</sup>

Furthermore, it must be pointed out that in regards to the liability of the operator, the provisions of the General Civil Code (Allgemeines Bürgerliches Gesetzbuch (ABGB)) and pertinent rules under other federal laws are applicable.<sup>94</sup> Also, with regard to the hazardous nature of space activities, the principles on liability for hazardous activities developed by jurisprudence must be taken into account.

## ii. Belgium

The Belgian law was characterized as a law with an open basis for authorization and a rather precise liability regime.<sup>95</sup> According to Article 4, section 1, any person who wants to carry out activities covered by Article 2, must obtain an authorization that will be granted on a personal basis. Article 4, section 3 imposes the general condition that the activities must comply with international law principles. Also, the King may determine special conditions for granting authorizations “with a view to ensuring the safety of people and property, protecting the environment, ensuring the optimal use of air space and outer space, protecting the strategic, economic and financial interests of the Belgian State . . . .”<sup>96</sup> Finally, the Minister may attach further specific conditions that the Minister may deem useful on a case-by-case basis.<sup>97</sup> In particular, the Minister may create an obligation for insurance to be taken out in favour of third parties to cover the damage that may result from the space activity. As the formulation of the law provides for the prescription of an obligation for insurance on a case-by-case basis, it is possible that it will not be prescribed for small satellites.

Furthermore, the Minister may limit the authorization granted for a specific period of time.<sup>98</sup> The access to premises,

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<sup>93</sup> Austrian Outer Space Act, *supra* note 23, at art. 11(2).

<sup>94</sup> See the “Materials” to the Austrian Outer Space Act, *supra* note 14, at 12.

<sup>95</sup> Aranzamendi, *supra* note 36, at 18.

<sup>96</sup> Belgian Space Law, *supra* note 41, at art. 5, § 1.

<sup>97</sup> *Id.* at art 5 §. 2.

<sup>98</sup> Granting access to outer space, *supra* note 45, at 119.

facilities, and documentation relevant for the assessment of the activities is imposed by the law.<sup>99</sup>

Article 15 of the Law<sup>100</sup> provides for a right of recourse against the operator in the case that the Belgian State is liable for damages pursuant to Article VII of the Outer Space Treaty<sup>101</sup> or the provisions of the Liability Convention.<sup>102</sup> The amount of compensation under such an action is determined in accordance with Article 15, section 2. The amount of compensation may be limited by the King, especially on a percentage of the operator's average revenue. The ceiling amount is calculated on the basis of the estimated damage's value by the King.<sup>103</sup> In this case, Belgium bears the remaining part of the indemnification costs.<sup>104</sup> The aim of the compensation's limitation is to avoid an unlimited liability of the operator and to enable him to insure the risk under reasonable conditions.<sup>105</sup> The Belgian State also has a right of recourse against the operator's insurer, which is not subject to any prior action.<sup>106</sup> As the potential risk evolving from small satellites is comparably small, operators of small satellites will probably benefit from the compensation's limitation. Thus, in order to support small industry, the Law balances the mitigation of possible liability with the aim that commercial activities are not charged with the condition of an expensive insurance and compensation.

### iii. Netherlands

In regards to the prerequisites for obtaining a license under the Dutch Law, it has been noted that the Act remains a framework law with the necessary flexibility for the Dutch au-

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<sup>99</sup> *Id.*

<sup>100</sup> Belgian Space Law, *supra* note 41, at art. 15.

<sup>101</sup> Outer Space Treaty, *supra* note 19.

<sup>102</sup> Liability Convention, *supra* note 19.

<sup>103</sup> *Implementing the United Nations Outer Space Treaties - The Belgian Space Act in the Making*, *supra* note 39, at 138.

<sup>104</sup> *Id.*

<sup>105</sup> *The Belgian Law on the Activities of Launching*, *supra* note 32, at 17-18.

<sup>106</sup> See Belgian Space Law, *supra* note 41, at art. 15, § 7

thorities to add further requirements as the expertise grows<sup>107</sup> and to impose additional requirements when needed (Section 4).<sup>108</sup>

According to Section 3(4), the licensee shall get insurance against any liability “arising from the space activities for which a license is required,” as far as judged reasonable by the Minister of Economic Affairs.<sup>109</sup> Account is taken of what can “reasonably be covered by insurance.”<sup>110</sup> In order to implement this provision, further rules can be imposed by Ministerial Order according to Section 3(7). After the changes of the law, insurance will become an obligation for space activities including small satellites. As there is no market for insurance of these kinds of activities at the moment, the gap will have to be filled.<sup>111</sup>

Although the maximum level of coverage is required for the financial risks, account is taken of the customary level of insurance coverage in a particular sector of space activities.<sup>112</sup> The extent of the insurance coverage will be determined on the basis of advice from experts in the fields of risk assessment and space-travel insurance.<sup>113</sup> This risk-assessment could help private companies and academic institutions to operate small satellites, as the costs for obtaining a licence could remain at a lower level in view of the lower risks in the context of small satellites. Thus, space activities will probably be affordable for

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<sup>107</sup> See Frans G. von der Dunk, *Implementing the United Nations Outer Space Treaties – The Case of the Netherlands*, in *NATIONALES WELTRAUMRECHT/ NATIONAL SPACE LAW DEVELOPMENT IN EUROPE – CHALLENGES FOR SMALL COUNTRIES* 92, 100 (Christian Brünner & Edith Walter eds., Vienna 2008).

<sup>108</sup> *Regulation of Space Activities in The Netherlands*, *supra* note 52, at 239.

<sup>109</sup> *Implementing the United Nations Outer Space Treaties – The Case of the Netherlands*, *supra* note 107.

<sup>110</sup> Dutch Space Activities Act, *supra* note 56, at subsec. 3(4).

<sup>111</sup> *Orbiting under the Radar*, *supra* note 8, at 6.

<sup>112</sup> Explanatory Memorandum to the Space Activities Act, Commentary to Section 3, subsections 4 & 7 (June 13, 2006); for the Dutch version of the memorandum see *Tweede Kamer der Staten Generaal, Vergaderjaar 2005-2006*, 30 609, nr.3 (unofficial English translation on file with the authors). See also Cécile Gaubert, *Insurance in the Context of National Authorisation*, in *FRANS.G. VON DER DUNK, ED., NATIONAL SPACE LEGISLATION IN EUROPE* 166, 168 (Martinus Nijhoff Publishers, Leiden-Boston, 2011).

<sup>113</sup> Explanatory Memorandum to the Space Activities Act, *supra* note 112, at Commentary to Section 3, subsections 4 & 7.

small and medium companies as well as for academic institutions.

In the case that the Netherlands is obliged to pay compensation under Article VII of the Outer Space Treaty or the Liability Convention, the State is entitled “to recover this sum, in full or in part, from the party whose space activity has caused the damage.”<sup>114</sup> However, this approach of unlimited compensation is qualified and can be mitigated as a result of the clauses limiting the licensee’s liability, as well as the actual reimbursement of the Dutch government “to the value of the sum insured, as specified in Section 3, subsection 4” (e.g. referring to the clause calling upon the Dutch government to determine the “maximum probable cover”).<sup>115</sup> The explanatory memorandum applies a version of the Maximum Probable Loss concept in the same way as is seen in comparable clauses in the U.S. and Australian national licensing regimes.<sup>116</sup> The possibility to limit compensation allows the State to take into account the concrete circumstances of every case. Alternatively, the Netherlands may exercise this right against the insurer to compensate the licensee.<sup>117</sup>

### C. Mitigation of Space Debris

The increasing use of small satellites can jeopardize the initiatives on the mitigation of space debris because they often lack manoeuvring capability. Once in orbit, they usually remain there and cannot be removed. Depending on the orbit, this can mean hundreds of years. During this time, they represent a dangerous threat to expensive functional space craft. Put bluntly, it may be said that, from the perspective of owners and operators of sophisticated satellite missions, small satellites are nothing more than future space debris.

On the other hand, small satellites have a lot of potential. Not only are they an important means for developing knowhow

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<sup>114</sup> Dutch Space Activities Act, *supra* note 56, at subsec. 12(1).

<sup>115</sup> *Implementing the United Nations Outer Space Treaties – The Case of the Netherlands*, *supra* note 107, at 92, 100; , *Liability and Insurance in the Context of National Authorisation*, *supra* note 44, at 125, 133.

<sup>116</sup> *Regulation of Space Activities in The Netherlands*, *supra* note 52, at 242.

<sup>117</sup> Dutch Space Activities Act, *supra* note 56, at subsec. 12(4).

in emerging space faring nations, but for technological development in general. The development of microtechnology may bring important achievements for larger space projects.<sup>118</sup> Furthermore, the issue of debris removal has been addressed by a number of researchers with original ideas.<sup>119</sup> Therefore, small satellites can be a threat or a chance in the area of space debris mitigation. In national space legislations, States may have to find a proper balance between the preservation of the space environment and the fostering of new technological developments. Measures to avoid space debris are crucial but should not be implemented in a prohibitive manner.

For the Ministry for Transport, Innovation and Technology in Austria, the avoidance of space debris has been an important concern. The obligation to mitigate space debris is expressly contained in two articles of the Act. First, it appears as a condition for authorization.<sup>120</sup> Second, it is specifically outlined in Section 5 that “[t]he operator has to make provision for the mitigation of space debris in accordance with the state of the art and in due consideration of the internationally recognized guidelines for the mitigation of space debris. Especially measures limiting debris released during normal operations have to be taken.”<sup>121</sup>

The condition of Section 1, paragraph 1, letter 4 has to be read and applied in combination with Section 5.<sup>122</sup> The “internationally recognized guidelines for the mitigation of space debris” mentioned in Section 5 are first and foremost the 2002 Space Debris Mitigation Guidelines of the Inter-Agency Space Debris Coordination Committee (IADC),<sup>123</sup> which constitutes the most important international forum for the global coordination of ac-

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<sup>118</sup> See Balogh, *supra* note 9, at 325, 327.

<sup>119</sup> See, e.g., Alex Da Silva Curiel, University of Surrey, Presentation at the UN/ESA/Austria Symposium on Small Satellite Programmes for Sustainable Development, *Space Debris – Issues and Mitigation Measures* (Sept. 15, 2011), <http://www.unoosa.org/oosa/SAP/act2011/graz/index.html>.

<sup>120</sup> Austrian Outer Space Act, *supra* note 23, § 4(1)(4).

<sup>121</sup> *Id.* § 5.

<sup>122</sup> See the explanations in the “Materials” to the Austrian Outer Space Act, *supra* note 14, at 8.

<sup>123</sup> See IADC Space Debris Mitigation Guidelines (Oct. 15, 2002), [http://stage.tksc.jaxa.jp/spacelaw/kokusai\\_utyu/space\\_debris2/IADC.pdf](http://stage.tksc.jaxa.jp/spacelaw/kokusai_utyu/space_debris2/IADC.pdf) (last visited Feb. 28, 2013).

tivities in connection with artificial and natural space debris.<sup>124</sup> In addition, the UNCOPUOS Space Debris Mitigation Guidelines of 2007<sup>125</sup> should also be used as a point of reference.<sup>126</sup> Thus, the obligation to mitigate space debris as contained in the Act encompasses, in particular, to limit debris released during normal operations, to minimize the potential for on-orbit break-ups, to provide for post mission disposal and to prevent on-orbit collisions.

As regards small satellites, the IADC Guidelines provide that they should be left in an orbit in which atmospheric drag will limit the orbital lifetime after completion of operations to a maximum of 25 years.<sup>127</sup> This is, however, a condition which is not easy to comply with. In the UNCOPUOS Guidelines, this criterion has not been included. The problem is that small satellites are generally only secondary payloads. They depend on the necessities of the primary payload and have usually little influence on the selection of the orbit. The 25-year-limit is therefore a difficult condition. For the two Austrian nano satellites, a transitional provision was inserted which exempts them from this requirement.<sup>128</sup> Their envisaged orbit would not comply with the 25-year-limit, but the satellites were commissioned before the Act entered into force. Regardless, future missions must, in principle, comply with this criterion.

In contrast, neither the Belgium nor the Dutch Act requires the licensee to provide for space debris mitigation measures expressly. However, the impact of the space activity on spatial environment, including its consequences of space debris, could be required under Article 8, section 2 of the Belgian law. This clause establishes that a study shall be carried out before an authorization is granted that assesses the potential impact on the environment in outer space of the launch or operation of the space object. The same is true for the Dutch law according to

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<sup>124</sup> See the "Materials" to the Austrian Outer Space Act, *supra* note 14, at 8.

<sup>125</sup> See Comm. on the Peaceful Uses of Outer Space, Legal Subcomm., *Space Debris Mitigation Guidelines*, available at [http://www.oosa.unvienna.org/pdf/publications/st\\_space\\_49E.pdf](http://www.oosa.unvienna.org/pdf/publications/st_space_49E.pdf) (last visited Feb. 28, 2013).

<sup>126</sup> See the "Materials" to the Austrian Outer Space Act, *supra* note 14, at 8.

<sup>127</sup> See IADC Space Debris Mitigation Guidelines, *supra* note 123, at Guideline 5.3.2.

<sup>128</sup> Austrian Outer Space Act, *supra* note 23, § 15.

which regulations and purposes can be attached to the license for the purpose of "protection of the environment in outer space."<sup>129</sup> Thus, although not expressly mentioned in these two Acts, the avoidance of space debris probably is also an issue of concern and respective measures of the operators might be required under the general provisions concerning the environment.

#### IV. CONCLUSION

Austria, Belgium, and the Netherlands are rather small countries where the necessity of national space legislation became obvious after the emergence of space activities exercised by private operators. It can be envisaged that small satellites will play an important role in the space activities of these countries in the future. The national legislation of these States thus had to find a balance between a legal regime that would implement the States' obligations under international law and a certain flexibility that would allow supporting small operators and scientific institutions. Although Belgium and the Netherlands originally did not include non-maneuverable small satellites in their scope of application, respective criticism has led to a change of approach in both countries, as a consequence of which a revision of relevant provisions are now in progress. After the changes, the laws will cover all kind of small satellites, falling under the general application of the laws, which are, *per se*, favorable of nascent space activities.

The three laws all allow for the waiver of certain conditions in the authorization process, depending on the specific case. In the Austrian and Dutch laws, taking out insurance is an obligatory requirement for the authorization of space activity. However, the possible exemption for satellites "in the public interest" provided for in the Austrian Act is one of the most tangible signals of support of small satellite programs. Under the Dutch law, the result is a lower insurance since the Minister considers the maximum possible cover for the liability arising from the space activities. The Belgian Law has opted for a case-by-case

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<sup>129</sup> Dutch Space Activities Act, *supra* note 56, at subsec. 3(3)(c).

assessment complemented by a strong control system where the Minister decides in each case whether an insurance obligation will be prescribed.

Furthermore, all three laws provide for the limitation on the operator's liability and a liability ceiling, thus removing the high cost burden on smaller companies and universities to launch small satellites.

The questions of space debris and environmental issues are important in all three laws. Even though only the Austrian Space Act explicitly obliges the operator to take appropriate measures for the mitigation of space debris, the other two Laws prescribe strict environmental obligations. These cover not only the environment on Earth, but may also be used to include space debris in Outer Space. As small satellites have hardly any maneuvering capability, international space debris mitigation guidelines require a low enough orbit for such missions so that orbital lifetime after completion of operations is limited, e.g. to a maximum of twenty-five years. The near future will show if States will demand compliance with such guidelines under their national authorization scheme. If there is a broad consensus on the implementation of the guidelines, this could stimulate launch service providers to begin developing commercially attractive launch services for small satellites to bring them into sufficiently low Earth orbits.

These three national space acts attempt to reconcile drafting provisions for the safe and responsible use of outer space without inhibiting the countries' nascent space ambitions. In all three acts, a number of issues concerning authorization are left to the discretion of the authorities in order to assess the different space projects on a case-by-case basis. The laws provide for a possible preferential treatment of small satellite missions in relation to larger commercial projects. Even if the scope of application of the laws is rather broad, the administrative and financial burdens for small projects can be kept to a necessary minimum. However, and most importantly, the laws ensure that the authorities are informed about ongoing space activities and provide the basis for communication between them and the prospective space actors. This may contribute considerably to