



# **In pursuit of the best standards: what material and legal interoperability for NATO forces?**

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## In pursuit of the best standards: what material and legal interoperability for NATO forces? <sup>1</sup>

by Laetitia Cesari

### Introduction

Back in 2019, space was in everybody's mouth as the North Atlantic Treaty Organization (NATO) recognised outer space as a new operational domain, and NATO Secretary General Jens Stoltenberg reminded everyone of the important role of the Alliance as a forum to "increase interoperability."<sup>3</sup> The distinction between space used as an operational and not as a warfighting domain offers an important backdrop to NATO when addressing the integration and interoperability of space-based assets. NATO has no plans to "weaponise" space<sup>4</sup> but intends to benefit from space assets belonging to

<sup>1</sup> **DISCLAIMER:** The views expressed in this article are solely those of the author and may not necessarily represent the views of NATO, Allied Command Operations, or Allied Command Transformation or of their affiliated organizations, or Luxembourg University.

<sup>2</sup> Laetitia Cesari is a doctoral researcher in Space Law and Cyber Law at Luxembourg University.

<sup>3</sup> NATO – News, 'NATO Defence Ministers approve new space policy, discuss readiness and mission in Afghanistan' (NATO, 27 June 2019)

[https://www.nato.int/cps/en/natohq/news\\_167181.htm](https://www.nato.int/cps/en/natohq/news_167181.htm) accessed 2 January 2021.

<sup>4</sup> Martin Banks, 'NATO names space as an 'operational domain,' but without plans to weaponize it' (DefenseNews, 20 November 2019) <https://www.defensenews.com/smr/nato-2020-defined/2019/11/20/nato-names-space-as-an-operational-domain-but-without-plans-to-weaponize-it/> accessed 2 January 2021.

different NATO allies in support of its military operations.<sup>5</sup>

### **Does space matter for NATO?**

Military outlays for space-related technologies have been made since the beginning of the Space Age on the national level.<sup>6</sup> When placed in outer space, assets have a persistent outreach over the ground at any time, providing a broader perspective due to the high altitude, and a better penetration as overflight restrictions do not hinder them.

The advantages mentioned above benefit military forces on the battlefield but also during the preparation of the missions. As of April 2021, NATO is conducting large operations for which the NATO alliance needs communication and intelligence capabilities to help them plan, program, and budget the missions. Space assets provide strategic communications between the forces, uninterrupted command and control, situational awareness, and precision strike capabilities, useful for deterrence purposes.<sup>7</sup> This way, space-based technology support military forces' capabilities to anticipate, communicate about, assess, and respond to emerging threats. Space systems provided by NATO member countries also underpin the alliance's general needs for collective defence, crisis response, disaster relief, and counter-terrorism.

In practice, NATO has managed to make the most of the national space assets provided by member countries to support joint military operations. Looking beyond commercial competition, the cooperative production of advanced space systems, made essentially by the United States (US) and its closest allies (France, Italy, and the United Kingdom),<sup>8</sup> is also a significant part of the equipment acquisition and an important cooperation step for the

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<sup>5</sup> Alexandra Stickings, 'Space as an Operational Domain: What Next for NATO?' *RUSI Newsbrief*, (15 October 2020), <https://rusi.org/explore-our-research/publications/rusi-newsbrief/space-operational-domain-what-next-nato> accessed 2 January 2021.

<sup>6</sup> Kestutis Paulauskas, 'Space: NATO's latest frontier' (*NATO Review*, 13 March 2020) <https://www.nato.int/docu/review/articles/2020/03/13/space-natos-latest-frontier/index.html> accessed 2 January 2021.

<sup>7</sup> NATO Standardization Office (NSO), *Allied joint doctrine for the conduct of operations* (Allied Joint Publication 3 (AJP-03), Edn C Version 1, 2019) C-2.

<sup>8</sup> Kevin J. Scheid, 'What if NATO had no physical headquarters?' (2020) 3 NITECH - NATO Innovation and Technology, 12 [https://issuu.com/globalmediapartners/docs/nitech\\_issue\\_03\\_june\\_2020?fr=sN2JmNzE0MTM2ODY](https://issuu.com/globalmediapartners/docs/nitech_issue_03_june_2020?fr=sN2JmNzE0MTM2ODY) accessed 2 January 2021; NATO – News, 'NATO provides state-of-the-art communication solutions to Allied Navies' (*NATO*, 27 May 2020) [https://www.nato.int/cps/en/natohq/news\\_176046.htm](https://www.nato.int/cps/en/natohq/news_176046.htm) accessed 2 January 2021.



alliance. A closer look, however, reveals that the US' longstanding footprint on standardisation procedures or equipment keeps influencing the design and manufacturing of new space technologies.

### **Balancing the space systems costs**

Supporters of significant military spending on space promote the aforementioned enhanced and ubiquitous edge in joint-operations that it enables,<sup>9</sup> while opponents raise concerns over the existing US near-monopoly on the development and possession of advanced military space technologies.<sup>10</sup> Coordinating the forces' objectives require both fair burden-sharing and interoperable interfaces between states.

For NATO suppliers to collaborate in cooperative production programs, interoperability becomes a necessary development component.<sup>11</sup> Defined as "the ability to operate together using harmonised standards, doctrines, procedures and equipment,"<sup>12</sup> interoperability allows technical, procedural, and human coordination,<sup>13</sup> as well as the development of more affordable systems by reducing production and ownership costs.<sup>14</sup>

### **The limits of interoperability**

In this Article, interoperability considerations are twofold: first involves standardisation around physical components, software and communications protocols and policy, the *material interoperability*, and second is the policy and legal challenge to define a common and consistent mind-set on rules-of-engagement, the *legal interoperability*.

On the one hand, material interoperability is an enterprise-level activity of the alliance. When developing or acquiring space technologies, NATO member countries must ensure they are interoperable, meaning the systems must be compatible with the other ones used by the other NATO allies and that

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<sup>9</sup> NATO Science & Technology Organization, *Science & Technology Trends 2020-2040, Exploring the S&T Edge* (2020) 17.

<sup>10</sup> Le groupe de réflexions Mars, 'OTAN, inutile et indispensable' *La Tribune* (Paris, 20 April 2021).

<sup>11</sup> Thomas L. Koepnick, 'International Armaments Cooperation: a key to coalition interoperability' (2005) 28(1) *DISAM Journal of International Security Assistance Management* 21.

<sup>12</sup> NATO Standardization Office (NSO), *Allied joint doctrine (Allied Joint Publication 1 (AJP-01))*, (edn E version 1, 2017) LEX-5.

<sup>13</sup> *Ibid* 1-2.

<sup>14</sup> Koepnick, *supra* note 10.

logistics is interchangeable for joint operations.<sup>15</sup> Training makes the space systems even more interoperable for the mid- or long-term force planning. In peacetime, when national armed forces carry out exercises with standard materials and systems, they learn how to use them and, on a side note, are more likely to purchase similar assets later.<sup>16</sup> They also develop common risk mitigations measures for those space systems. Standardisation highly depends on national participation as NATO member countries have to ratify international standardisation agreements. Military forces are also entitled to subscribe to international standardisation to make sure they can develop and maintain defence equipment.

On the other hand, when carrying out an operation during an armed conflict, any coalition of states have to agree on collective priorities, common doctrines and thresholds.<sup>17</sup> The broad range of NATO activities requires coordination in the unfolding military operations, from the planning to the assessment. There is no common agreement on law application or enforcement, but a standard exists on rules of engagement training: NATO standardization agreement (STANAG) 2449.<sup>18</sup> This guideline provides for mutual approaches for NATO member countries when training their forces on the Law of Armed Conflict.<sup>19</sup> Nevertheless, the shortfall in convergent legal frameworks can cause inconsistent actions on the battlefield as a divergence in the decisions made during a joint mission is likely to raise tensions between allies.<sup>20</sup>

This article critically engages with the idea that interoperability poses legal problems and an unfair burden on the less developed members of the NATO alliance. This article presents a two-fold analysis of interoperability challenges in utilising space-based assets, particularly joint responsibility during hostilities. Considering the situation described above, ways to approach interoperability merit fresh reflection. To that end, this paper analyses how

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<sup>15</sup> Christopher Ptachik, Edward Durell, and Robert Bamberg, 'Air Force Management of Materiel ISAs' (2014) *Defense Standardization Program Journal* 11-18.

<https://fddocuments.in/reader/full/natointernational-standardization-defense-standardization-impact-of-nato> accessed 2 January 2021.

<sup>16</sup> Rainer L. Glatz and Martin Zapfe, 'NATO's Framework Nations Concept', 218 *CSS Analyses in Security Policy* (2017) 3.

<sup>17</sup> Kirby Abbott, 'A brief overview of legal interoperability challenges for NATO arising from the interrelationship between IHL and IHRL in light of the European Convention on Human Rights' (2014) *International Review of the Red Cross* 96 (893) 108.

<sup>18</sup> NATO STANAG 2449: Annual training on the law of armed conflict, June 26, 2019.

<sup>19</sup> Jody M. Prescott, 'Training in the Law of Armed Conflict – A NATO Perspective', (2008) 7(1) *Journal of Military Ethics* 68.

<sup>20</sup> Kirby Abbott, *supra* note 16, at 111-112.

material interoperability developed and what it means for the NATO allies. Legal interoperability is also an ambiguous point that leaves room to think about NATO member countries' responsibility. This article examines several alternative approaches and proposes suggestions for how NATO member countries can build stronger and fairer relationships.

### **I. From national standards to STANAG: a first-come first-served approach for material interoperability**

At the 2014 Wales Summit, the NATO allies committed to dedicating 2% or more of their gross domestic product (GDP) to defence spending.<sup>21</sup> To meet the challenges the NATO allies could potentially face in the future and comply with the collective defence principle set out in Article 5 of the Washington Treaty, the participants to the meeting of the North Atlantic Council in Wales engaged to provide more resources, capabilities, and political will as required by the NATO Readiness Action Plan.<sup>22</sup> In 2020, twelve NATO member countries achieved this GNP spending goal – 3 more than in 2019.<sup>23</sup>

#### **The global hegemonic position of the US**

Even though the NATO allies' military spending is globally rising, the US still supports a significant share of the NATO burden and is the leading equipment supplier globally.<sup>24</sup> NATO allies, especially in Europe, highly depend on the US industry and US capabilities for their defence. For the NATO alliance to cooperate efficiently, they have to overcome "technological and doctrinal discrepancies", as NATO Deputy Secretary General Mircea Geoană stressed during a webinar on interoperability held on 16 July 2020.<sup>25</sup> NATO established STANAGs to facilitate interoperability between the US and its European NATO allies.<sup>26</sup> This way, the different technologies are conceived with the same standards, so the information transmitted is read and translated into formats that a system understands. Even though interoperability and common

<sup>21</sup> Wales Summit Declaration 2014.

<sup>22</sup> NATO, 'Readiness Action Plan' (NATO, 23 March 2020)

[https://www.nato.int/cps/en/natohq/topics\\_119353.htm](https://www.nato.int/cps/en/natohq/topics_119353.htm) accessed 2 January 2021.

<sup>23</sup> Stockholm International Peace Research Institute (SIPRI), 'World military spending rises to almost \$2 trillion in 2020' (SIPRI 26 April 2021) <https://sipri.org/media/press-release/2021/world-military-spending-rises-almost-2-trillion-2020> accessed 2 May 2021.

<sup>24</sup> SIPRI, 'Global arms industry: Sales by the top 25 companies up 8.5 per cent; Big players active in Global South' (SIPRI 7 December 2020) <https://www.sipri.org/media/press-release/2020/global-arms-industry-sales-top-25-companies-85-cent-big-players-active-global-south> accessed 2 January 2021.

<sup>25</sup> NATO – News, 'Emerging and disruptive technology webinar on interoperability' (NATO, 16 July 2020) [https://www.nato.int/cps/en/natohq/news\\_177301.htm](https://www.nato.int/cps/en/natohq/news_177301.htm) accessed 2 January 2021.

<sup>26</sup> AJP-01, *supra* note 11, 1-2.

standards allow for better detection and assessment of the operational risks, they also pose design and manufacturing constraints for small suppliers that must be compliant, even when developing new technologies, with the hegemon's rules – in this case, the US.

Most equipment purchases are made by NATO through direct commercial sales to private companies or groups of companies and often include an agreement in the form of cooperative Memorandum of Understandings (MOU). Even if NATO has the choice between competitive products provided by its pool of suppliers, the NATO Support and Procurement Agency will tend to favour the most interoperable ones, according to the standards in place.<sup>27</sup> In this regard, with the historically strong position of the US as a global supplier, the risk would be that US-based industry influence technical standards to further their commercial interests when developing technologies and the NATO allies must comply with longstanding US standards nonetheless.

### **Balancing national commercial interests and the interests of the Alliance**

This leading position gives the US-based industry a competitive advantage as national and private companies keep providing the technologies and are subsequently more likely to bottom-up the best practices that the NATO Standardisation Office will adopt. In 2019, for instance, the US company Lockheed Martin announced the completion of work to enhance the NATO interoperability of uncrewed air vehicles that would be improving the potential for new sales internationally. According to the US company, this improvement was primarily due to "the sharing of knowledge and information and integration" of Lockheed Martin's software.<sup>28</sup>

On the competition side, this state of affairs can create disparities for those states that would like to innovate and develop new technologies. It would cost them much money not to toe the line when developing new systems. In 2013 an opposite situation illustrated how the NATO European allies sometimes could not coordinate internationally or follow NATO standards when researching and developing new technologies. In 2013, Germany had decided to withdraw its purchase interest in the Euro Hawk reconnaissance

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<sup>27</sup> NATO STANAG 2449, *supra* note 17.

<sup>28</sup> Sky-Watch, 'Lockheed Martin and Sky-Watch to enhance NATO-interoperability' (11 October 2019) <https://sky-watch.com/news/lockheed-martin-and-sky-watch-to-enhance-nato-interoperability/> accessed 2 January 2021.



drones as the country realised that meeting the NATO standards would have required an additional cost of 500 million to 600 million euros.<sup>29</sup> A French Member of the National Assembly Commented during a Commission on National Defence and Armed Forces that the US being the most powerful NATO nation, any new system they conceive would almost necessarily become the NATO standard.<sup>30</sup> This development would imply factory standards adjustments for the NATO allies, so they don't depend too much on the US for the conception of new systems. Given that by developing their own systems, a NATO ally would run the risk of no longer being interoperable with the other NATO allies, which could cause them to be "one war behind from a technological point of view".<sup>31</sup> By doing so, the smaller players have to opt to concede their intellectual property rights, so their technology is interoperable with existing systems. Back in 1996, in a communication on *The Challenges Facing the European Defence-Related Industry, A Contribution for Action at European Level*, while recognising the strategic importance of standards for the efficiency of the internal market, the European Commission noted that care should be taken in the future to ensure that "the competitiveness of the EU defence industries" is not hampered.<sup>32</sup>

### **A slender protection for intellectual property rights**

Setting the foundational standards that will define next-generation technologies allows the hegemon to be the one determining how to make systems interoperable. This strong position on the market can limit interoperability to a restricted set of systems and equipment, which can subsequently cause the reduction of choices for the NATO forces. It is mainly the case for space systems that need longer-term requirements because of their long lifespan. Once established, the rules behind the design and manufacturing of the assets are difficult to uproot. To ensure the alliance purchases their products and services, NATO suppliers have to collaborate and disclose their patent and intellectual property rights to make their interfaces interoperable. The smaller players have to comply with NATO standards even with the risk they would provide information to enable competitors to develop

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<sup>29</sup> Reuters, 'Germany will not buy Euro Hawk drones - govt source' (14 May 2013) <https://www.reuters.com/article/germany-arms-eurohawk-idUSL6N0DV31220130514>

<sup>30</sup> NATO STANAG 2449, *supra* note 17.

<sup>31</sup> French National Assembly, Commission de la Défense Nationale et des forces armées, Travaux de la Commission, Tome VII Défense équipement des forces – dissuasion I (Dossier législatif n°3465, 2020).

<sup>32</sup> The Challenges Facing the European Defence-Related Indus (Communication from the Commission, 1996) COM (96) 10.

competing technologies. Pursuant to Article 7 of the Trade-Related Aspects of Intellectual Property (TRIPS), “the protection and enforcement of intellectual property rights should contribute to the promotion of technological innovation and to the transfer and dissemination of technology, to the mutual advantage of producers and users of technological knowledge and in a manner conducive to social and economic welfare, and to a balance of rights and obligations.”<sup>33</sup> Article 7 of the TRIPS illustrates the need to balance proprietary rights and the larger interests of social welfare. Without this balance, the development of a technology or an innovative product is at stake as entities investing in inventions expect a return on investment.

However, in the space sector, the US' dominant position creates a quasi-monopolistic situation favouring the US-based industry, which benefits from the hegemon's standing.

### **Material interoperability of space systems: “historical standards” through the ages**

In the 2000's, under the NATO SATCOM Post-2000 (NSP2K) program, satellite communications (SATCOM) capabilities have been used for expeditionary missions by NATO forces. France, Italy and the United Kingdom formed a consortium for 15 years (2005-2019) to provide NATO with access to SYRACUSE 3, SICRAL 1 and 1 bis and Skynet 4 and 5 geostationary satellites.<sup>34</sup> The three countries signed a MOU with the NATO alliance in 2004.

On this basis, France, Italy and the United Kingdom controlled the satellites through the Joint Program Management Office and the NATO Mission Access Centre.<sup>35</sup> The Joint Program Management Office was in charge of the overall management, including dialogue about NATO requirements. The NATO Mission Access Centre carried out daily operations and execution of the capacity on behalf of the countries, while the NATO Communications and Information Agency (NCI) managed the MOU and provided service allocation and network monitoring on behalf of NATO.<sup>36</sup> Under this cooperation,

<sup>33</sup> Annex 1C to the Marrakesh Agreement (General Agreement on Trade-Related Aspects of Intellectual Property, TRIPS) (15 April 1994) 1869 U.N.T.S. 299.

<sup>34</sup> NATO, 'SATCOM Post-2000 (Archived)' (NATO 23 April 2021)

<sup>35</sup> *Ibid.*

[https://www.nato.int/cps/en/natolive/topics\\_50092.htm](https://www.nato.int/cps/en/natolive/topics_50092.htm) accessed on 2 May 2021; Space Daily, 'France And NATO Sign Satellite Communications Agreement' (3 December 2004)

<https://www.spacedaily.com/news/milspace-comms-04zzx.html> accessed on 2 January 2021.

<sup>36</sup> *Ibid*; NATO, 'Satellite communications' (23 April 2021)

European countries have proved their capacity to work together efficiently, providing MILSATCOM capabilities that offered NATO access to the military Ultra High Frequency band and Super High Frequency (SHF) band. With this access, NATO forces could transmit significant amounts of data for tactical communications and transmissions with military hardening features based on common standards.<sup>37</sup> Hence, the NP2K program was designed to accommodate the 5 KiloHertz (KHz) and 25 KHz channels of legacy UHF systems, first employed in US Navy satellites and US Air Force satellites.<sup>38</sup> Remotely piloted aircraft such as the Northrop Grumman Block 40 Global Hawk,<sup>39</sup> the Boeing P-8A Poseidon,<sup>40</sup> and the Boeing E-3 Sentry<sup>41</sup> all rely on SATCOM for data transfer and, to a lesser extent, control.<sup>42</sup> Operated by the NATO's Alliance Ground Surveillance (AGS) system, based at Sigonella, Italy, Global Hawk is capable of collecting imagery over large areas and using the SATCOM architecture designed by the NCI. Since April 2016, the Luxembourgish government started providing NATO SHF band and commercial Ku band.<sup>43</sup> SATCOM supports the deployment of surveillance and mobility operations through the Alliance Ground Surveillance system as part of the Luxembourgish contribution in kind to NATO.

Under the contract concluded between the Luxembourg Authorities and NATO, Luxembourg acquires and the NCI Agency manages the services

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[https://www.nato.int/cps/en/natohq/topics\\_183281.htm](https://www.nato.int/cps/en/natohq/topics_183281.htm) accessed on 2 May 2021.

<sup>37</sup> Gordon Adams, Guy Ben-Ari, John Logsdon and Ray Williamson, 'Bridging the Gap – European C4ISR Capabilities and Transatlantic Interoperability' (The George Washington University, 2004) 20.

<sup>38</sup> Madhavendra Richharia and Leslie David Westbrook, 'Satellite Systems for Personal Applications Concepts and Technology' (2010) Wiley, 332.

<sup>39</sup> NATO, 'Alliance Ground Surveillance (AGS)' (NATO 23 February 2021)

[https://www.nato.int/cps/en/natohq/topics\\_48892.htm](https://www.nato.int/cps/en/natohq/topics_48892.htm) accessed on 2 May 2021.

<sup>40</sup> John Keller, 'Boeing looks into installing MUOS SATCOM system to improve communications aboard P-8A reconnaissance plane' (Military & Aerospace Electronics, 28 May 2020)

<https://www.militaryaerospace.com/communications/article/14176773/p8a-satcom-communications> accessed on 2 January 2021.

<sup>41</sup> John Keller, 'Boeing to equip E-3 AWACS avionics with high-speed internet SATCOM capability in \$50 million contract' (Military & Aerospace Electronics, 12 August 2020)

<https://www.militaryaerospace.com/communications/article/14181448/internet-satcom-awacs> accessed on 2 January 2021; Boeing, 'E-3 Airborne Warning And Control System', Historical Snapshot <https://www.boeing.com/history/products/e-3-airborne-warning-and-control-system.page> accessed on 2 January 2021.

<sup>42</sup> Jim Winchester, 'The Phoenix has risen, interview with Laryssa Pattern and Ramon Segura' (2020) 3 NITECH - NATO Innovation and Technology, 78.

[https://issuu.com/globalmediapartners/docs/nitech\\_issue\\_03\\_june\\_2020?fr=sN2JmNzE0MTM2ODY](https://issuu.com/globalmediapartners/docs/nitech_issue_03_june_2020?fr=sN2JmNzE0MTM2ODY) accessed on 2 January 2021.

<sup>43</sup> GovSat, NATO AGS Contract awarded to GovSat (Press Release, 8 November 2016)

provided by GovSat, a public-private partnership between the Luxembourg Government and the private satellite operator SES, to create a link between the NATO Global Hawk unmanned aerial vehicles (UAV) and ground segment over the AGS operational area.<sup>44</sup> More recently, a new SATCOM program has replaced the NSP2K program from 1 January 2020. France, Italy, the United Kingdom and the US concluded a MOU to provide SATCOM services that would enable intelligence gathering and navigation, tracking forces worldwide and detecting missile launches.<sup>45</sup> For this NATO SATCOM Services 6th Generation program, the NCI Agency operates the satellite communications capability delivering services to NATO as a part of the deterrence and defence capacities of the Alliance until 2036.<sup>46</sup>

The International Telecommunication Union (ITU), leading United Nations agency for information and communication technologies, adopted instruments used for frequency allocations on a global scale, including specific provisions for the military use of frequency spectrum. However, in exceptional cases, extended to NATO forces, Article 48 of the ITU Constitution and paragraph 4.4 of the Radio Regulation provide exceptions to achieve flexibility of the radiofrequency spectrum.<sup>47</sup>

Nevertheless, with a fleet exclusively composed of US aircraft, there is a high probability SATCOM architecture complies with the US-industry originated standards that the other NATO allies will have to fit with in the long run, and that will serve as a reference for ITU purposes. As stated in an article published by the French company Thales about an anti-jam modem protecting satellite communications, "to meet the specific requirements of each customer, each country and each branch of the military, [the system] has had to adapt."<sup>48</sup> In other words, when inventing a new waveform protocol, Thales' engineers had

<sup>44</sup> *Ibid.*

<https://govsat.lu/news/press-release-nato-ags-contract-awarded-to-govsat/> accessed 2 January 2021.

<sup>45</sup> NATO, 'NATO begins using enhanced satellite services' (12 February 2020)

[https://www.nato.int/cps/en/natohq/news\\_173310.htm](https://www.nato.int/cps/en/natohq/news_173310.htm) accessed on 2 January 2021; NATO, 'Satellite communications' (23 April 2021)

[https://www.nato.int/cps/en/natohq/topics\\_183281.htm](https://www.nato.int/cps/en/natohq/topics_183281.htm) accessed on 2 May 2021.

<sup>46</sup> *Ibid.*

<sup>47</sup> NATO Joint Civil/Military Frequency Agreement (2002)

[https://halberdbastion.com/sites/default/files/2018-04/NATO-Joint-CivilMilitary-Frequency-Agreement\\_%282002-Dec%29.pdf](https://halberdbastion.com/sites/default/files/2018-04/NATO-Joint-CivilMilitary-Frequency-Agreement_%282002-Dec%29.pdf) accessed on 2 January 2021.

<sup>48</sup> Thales, 'Modem 21: A Dynamic of Innovation for Milsatcom Security' (News, 4 December 2018) <https://www.thalesgroup.com/en/worldwide/defence/news/modem-21-dynamic-innovation-milsatcom-security> accessed on 2 January 2021.



to comply with NATO standards so it could be integrated on board UAVs and fast jets to link them to satellites.<sup>49</sup>

When building the network architecture, NATO forces are likely to base the standards on the US remote aircraft that were used for decades by the AGS system.<sup>50</sup>

The current state-of-the-art described above has an interesting story to tell about innovation. Standards generally change much more slowly than new technologies conception. NATO forces will have to adjust equipment and systems with more diverse technologies if they want a military power that is able to adapt to all types of hostile operations and interference. This comes in handy for satellite operators and space beneficiaries, which will gladly benefit from increased competition that continues to drive down the cost of the materials. However, buying technologies developed outside of the NATO allies industry is not without risk. Any corrupted equipment or software can facilitate access to a system and subsequently wide swaths of sensitive data and control functions through the equipment architecture. These are strong factors that lead states to consider other commercial partnerships for the financial set-up of their national industry while being cautious when purchasing technologies from foreign countries.

## **II. Shaping minds for the legal course of action: building interoperability at the strategic, operational and tactical levels**

For the past ten years, some NATO allies have taken on an increasing share of joint activities supported by space assets. Their level of investment in the space industry keeps growing without, for the moment, appearing to level off. Despite this increase, the US continues to assume the brunt of NATO operations.

### **The variety of mind-sets within NATO**

During joint operations, the views of the NATO allies can differ on various points. No matter how much intelligence is provided or how good communications are between the NATO allies, NATO member countries' mind-sets are very diverse. Whether complete equality in burden-sharing or the involvement of national troops can or should be achieved in these realms is an open question. It is a question, however, that masks a much more serious issue

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<sup>49</sup> *Ibid*

<sup>50</sup> Winchester, *supra* note 41, 80; Gordon Adams et al., *supra* note 36, 61.

for the NATO allies, particularly for those less developed countries and their capabilities and operational concepts becoming outdated or are incompatible with those of the US.<sup>51</sup>

At the operational level, the NATO commander is in charge of leading tactical activities to achieve the NATO alliance's strategic objectives. The Supreme Headquarters Allied Powers Europe (SHAPE) is in charge of preparing, planning, conducting and executing joint military operations, missions and tasks.<sup>52</sup> In this process, the expectation that all the NATO allies apply the same standards at the strategic, operational, and tactical levels is widely held by NATO which plans, budgets, and operates with its own objectives.

### **The importance of training and coordinating forces**

NATO allies benefit from the training of their capabilities. Testing to which extent they are interoperable, knowing their skills and equipment and understanding their responsibilities improves their overall performance in more complex situations. Yet, even if NATO forces are trained with the same standards, it is only over time, when individuals and small groups interact, that they accommodate the workarounds and follow the same rules of engagement.<sup>53</sup>

Nevertheless, one of the rationales for the latter is not what the applicable law is or what the standards are but that getting forces into joint exercises helps to disrupt deeply rooted patterns and mind-sets of how to perform a mission.<sup>54</sup>

NATO plans a considerable number of exercises each year, including national and multinational exercises organised by the NATO allies. In 2020, the NATO allies had the opportunity to participate in 88 NATO military exercises and held 176 national and multinational exercises altogether.<sup>55</sup> For the year 2021, NATO plans to carry out 95 exercises, and the NATO allies intend to conduct

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<sup>51</sup> Myron Hura, Gary McLeod, Eric V. Larson, James Schneider, Daniel Gonzales, Daniel M. Norton, Jody Jacobs, Kevin M. O'Connell, William Little, Richard Mesic, et al., *Interoperability A Continuing Challenge in Coalition Air Operations* (RAND Corporation 2000) 30.

<sup>52</sup> NATO, 'The NATO Command Structure' (Factsheet, 2018) 1  
[https://www.nato.int/nato\\_static\\_fl2014/assets/pdf/pdf\\_2018\\_02/1802-Factsheet-NATO-Command-Structure\\_en.pdf](https://www.nato.int/nato_static_fl2014/assets/pdf/pdf_2018_02/1802-Factsheet-NATO-Command-Structure_en.pdf) accessed on 2 January 2021.

<sup>53</sup> Myron Hura et al, *supra* note 50, 10 and 46.

<sup>54</sup> *Ibid.*

<sup>55</sup> NATO, 'Key NATO and Allied exercises in 2021' (Factsheet, 2021) 1  
[https://www.nato.int/nato\\_static\\_fl2014/assets/pdf/2021/3/pdf/2103-factsheet\\_exercises.pdf](https://www.nato.int/nato_static_fl2014/assets/pdf/2021/3/pdf/2103-factsheet_exercises.pdf) accessed on 2 May 2021.

220 national and multinational exercises.<sup>56</sup> The exercises are organised either in multi-domain, on the land domain, in the air domain, or are conducted as maritime operations. The troops can train specific skills such as "cyber defence, crisis response decision-making, Chemical, Biological, Radiological Nuclear defence, logistics, communications and medical activities".<sup>57</sup> As mentioned above, STANAG 2449 allows NATO member countries to adopt a common understanding of the Law of Armed Conflict when training their forces.<sup>58</sup>

### **Law of Armed Conflicts as a paradigm for legal interoperability**

Change does not happen quickly, but without interactions and exchange of best practices, which are part of peacetime operations, a common doctrine is unlikely to be shaped, as even the strongest rules and standards are subject to interpretation. As a military alliance, NATO member countries have to spend more means coordinating their operations and policy decisions since a tremendous public interest exists in these issues. STANAG 2449 is a voluntary standard established by NATO to help ensure compliance with the Geneva Conventions and the Additional Protocols.<sup>59</sup> It provides common ground for training and implementation methodology of the Law of Armed Conflicts (LOAC) through the NATO forces. The military training dispensed to the troops at the national level provides an understanding of the minimum standards within subjects such as methods of warfare, protection of cultural property, the use of force in peacekeeping operations, or the commander's responsibilities.

According to STANAG 2449, the LOAC is applicable to a variety of situations. It is the case of armed conflict between states, when a state occupies another's state territory, during disputes related to the right of self-determination, and of internal armed conflicts in which dissident armed forces "under responsible command, exercise such control over a part of its territory as to enable them to carry out sustained and concerted military operations and to implement."<sup>60</sup> Conversely, it also applies to peace support operations not constituting armed conflict. A good understanding of LOAC allows the NATO allies to understand not only the individual phases but rather the overall effects of their missions, and to assess the impact made by their operations.

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<sup>56</sup> *Ibid.*

<sup>57</sup> *Ibid.*

<sup>58</sup> Jody M. Prescott, *supra* note 18, 68.

<sup>59</sup> *Ibid.*

<sup>60</sup> NATO STANAG 2449, *supra* note 17.

### **What's in a Law? Or how to make space activities interoperable**

Greater involvement of NATO forces in operations requiring the use of force, lethal or not, against opposing troops has led to a greater need for minimum standards regarding rules of engagement.<sup>61</sup> This need stems from two complementary questions: does LOAC bind NATO if all of its member countries have ratified the 1949 Geneva Conventions, and all but two have ratified Additional Protocols I and II to the Geneva Conventions? If so, do NATO member countries have to enforce the rules when carrying out joint operations? Today on the battlefield, a wide diversity of forces from different cultures and backgrounds composes NATO forces. During joint missions, some individuals or groups can fall short of the rules, especially if they haven't been trained to follow the standards applicable to armed forces and develop another mind-set off the beaten tracks.

Coalition operations supported by space-based assets may seem more complicated than it is in practice. As addressed in the introduction, space has been recognised as an operational domain, meaning that there is a greater reliance on the space domain and therefore, a growing need for safety measures 'precluding inherent malfunction and mitigating the risks of accidental damage that would be caused by or undergone by a space object, including its component parts.'<sup>62</sup> It is not to be confused with warfighting domain, even though the normalisation of space operations increase vulnerabilities of space-based assets and subsequent need for space security, understood as 'the protection of a space object, including its component parts, against the risk of intentional actions undertaken by external or unauthorized actors.'<sup>63</sup> The need for safety measures for all types of space assets will benefit all countries, but not all of them will have the willingness and money to invest in this matter. The political will is important, so, as for material interoperability, the US influence is significant, especially in space.<sup>64</sup> For instance, the Space Policy Directive 7 on Space-Based Positioning, Navigation, and Timing Policy adopted in January 2021 states the need to "maintain lead responsibility for negotiating with foreign defence organizations for any

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<sup>61</sup> David Cloud, 'NATO Plans to Command 12,000 G.I.'s in Afghanistan' (The New York Times 29 September 2006).

<sup>62</sup> Laetitia Zarkan Cesari, 'What's in a word? Notions of "security" and "safety" in the space context' (United Nations Institute for Disarmament Research – UNIDIR, 2020) <https://www.unidir.org/commentary/whats-word-notions-security-and-safety-space-context> accessed on 2 January 2021.

<sup>63</sup> Ibid.

<sup>64</sup> Myron Hura et al, *supra* note 50, 52.



cooperation regarding access to or information about GPS military services."<sup>65</sup>

Whether they are space actors or space beneficiaries, many among the NATO allies will follow the same US practices and procedures they have followed for years, even though the non-US powerful NATO allies can provide good leverage on a case-by-case basis.<sup>66</sup> If the aim is to build a solid and coherent framework for the emerging space activities, nobody has succeeded yet. But if the aim is to support lagging NATO member countries in applying LOAC when using space-based assets for joint operations, there is a greater chance that legal interoperability works.

To get comprehensive space cooperation off the ground, awareness of the sector, transparency of the activities and rules of behaviour must spread. Intent to follow common standards must be followed up by action. Finally, even though US-European space collaboration is not without precedent, NATO commanders must find ways to consider all the various NATO member mind-sets when making decisions. This view on international cooperation can be seen in part in last year's US National Space Policy. The document emphasises the importance of strengthening "United States leadership in space".<sup>67</sup> This influence is twofold.

First, the US National Space Policy highlights the need for a framework that would include "the pursuit and effective implementation of best practices, standards, and norms of behaviour."<sup>68</sup> The NATO allies would set up this common framework by adopting "United States space regulatory approaches and commercial space sector practices".<sup>69</sup> In a very transparent way, the US National Space Policy draws out the US' strategy of carrying out diplomatic and public diplomacy efforts with its NATO allies, "to strengthen the understanding of, and support for, United States national space policies and programs and to promote the international use of United States space capabilities, systems, and services."<sup>70</sup>

Second, the National Space Policy clearly states the US intention to

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<sup>65</sup> Memorandum on Space Policy Directive 7: The United States Space-Based Positioning, Navigation, and Timing Policy, 15 January 2021.

<sup>66</sup> Myron Hura et al, *supra* note 50, 41-42.

<sup>67</sup> National Space Policy of the United States of America, 9 December 2020, 3 <https://trumpwhitehouse.archives.gov/wp-content/uploads/2020/12/National-Space-Policy.pdf> accessed on 2 January 2021

<sup>68</sup> US National Space Policy, 12.

<sup>69</sup> *Ibid.*

<sup>70</sup> *Ibid.*, 13.

"facilitate new market opportunities for United States commercial space capabilities and services".<sup>71</sup>

In short: the NATO allies have to comply with their international obligations, they have to follow US standards even more, out of necessity. The classified policy adopted by NATO in 2019 is not a space strategy as it is the case for the US National Space Policy mentioned above. NATO Secretary General Jens Stoltenberg presented it as an overarching space policy approved by the NATO ministers. The fact that NATO allies manage to agree on a common space policy is encouraging not only for the protection of space systems<sup>72</sup> but also for international cooperation in this field, as internationally accepted behavioural norms on existing and potential threats and security risks to space systems still have to be developed.<sup>73</sup> The NCI Agency is increasingly using satellite communications delivered by commercial and national capabilities in support of military operations. To ensure coordination among the NATO allies, NATO needs to set up a comprehensive policy on providing and using space data, information and effects<sup>74</sup> and in this context, not focusing on the US and its closest NATO allies only but on all of the space beneficiaries.

One way to do it would be to carry out an open consultation within the NATO alliance, as is done in the General Assembly of the United Nations (UNGA). The UNGA recently adopted resolution 75/36, encouraging UN Member States "to study existing and potential threats and security risks to space systems."<sup>75</sup> This resolution calls for states to share their considerations about what "could be considered responsible, irresponsible or threatening and their potential impact on international security, [...] to share their ideas on the further development and implementation of norms, rules and principles of responsible behaviours and on the reduction of the risks of misunderstanding

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<sup>71</sup> Ibid.

<sup>72</sup> NATO, 'NATO Defence Ministers approve new space policy, discuss readiness and mission in Afghanistan' (27 June 2019) [https://www.nato.int/cps/en/natohq/news\\_167181.htm](https://www.nato.int/cps/en/natohq/news_167181.htm) accessed on 2 January 2021.

<sup>73</sup> Benjamin Silverstein, 'NATO's return to space', Commentary (War on the rocks, 3 August 2020) <https://warontherocks.com/2020/08/natos-return-to-space/> accessed on 2 January 2021; Alexandra Stickings, *supra* note 4.

<sup>74</sup> Laryssa Patten, 'NCI Agency provides critical support to development of new NATO space policy' (NCI Agency Newsroom, 23 July 2019) <https://www.ncia.nato.int/about-us/newsroom/nci-agency-provides-critical-support-to-development-of-new-nato-space-policy.html> accessed on 2 January 2021.

<sup>75</sup> UNGA Resolution 75/36 on 'Reducing space threats through norms, rules and principles of responsible behaviours' (23 October 2020).

and miscalculations with respect to outer space.”<sup>76</sup>

Space-based assets enable and support military operations – and other areas of civilian life. For this reason, space assets can become targets for attack or disruption. Thus, the dynamics between States on Earth and in space differs, and a multilateral dialogue could be a way to reduce the vulnerabilities, misunderstandings and tensions that drive the greater involvement of space assets in military operations.

### **Conclusion: going off the beaten track**

Interoperability was thought to minimise the misunderstandings between the NATO allies and to reduce military costs. All the NATO member countries are addressing these issues to some degree, but great disparity remains. Indeed, despite the emergence of new space actors all over the world, the influence balance is in favour of the US and its closest NATO allies.

There is a growing trend among NATO members countries in which the troops will tend to follow their national standards or, conversely, the one standards put in place by the US over the years even without realising it.<sup>77</sup> But nobody knows how to apply or enforce the law to outer space. There is no global understanding of these questions, even in case of incidents caused by counter-space capabilities, dual-use systems, or harmful interference.

The quest for greater consideration of collective priorities requires multiple strategies that not only involve the US, but also its NATO allies, individually.<sup>78</sup> All NATO country members are becoming more dependent on space services. For this reason, the challenges that the NATO allies face, both as space powers or are space beneficiaries, should be considered collectively without excluding any stakeholder.

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<sup>76</sup> *Ibid.*

<sup>77</sup> Kirby Abbott, *supra* note 16, 110-111.

<sup>78</sup> Alexandra Stickings, *supra* note 4.

