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On the Necessity of Defending Belgian Interests in Outer Space

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Outer space is becoming increasingly important for modern societies. At the same time, space is being transformed from a relatively benign environment to an operational and warfighting domain. NATO has adopted an 'overarching space policy', the European Commission presented a 'European Union Space Strategy for Security and Defence', and the ESA prioritised security in the ESA Agenda 2025. As a result of this shift, Belgium needs to increase its attention to the space domain and develop the capabilities needed to defend its interests in space. The strategic document for Defence of last year, the STAR-plan, and the National Security Strategy of 2021 are already recognizing the importance of defending the space domain. However, additional actions are needed to get even with outer space's rapidly changing threat environment.

THE IMPORTANCE OF OUTER SPACE FOR MODERN SOCIETIES: A VULNERABILITY THAT NEEDS PROTECTION

Outer space has become increasingly crucial for modern societies since the launch of Sputnik in 1957, with applications ranging from dual-civilian military uses such as communication, navigation, travelling, science, environmental, and economic functions to specific military uses such as intelligence, reconnaissance, surveillance, targeting, and monitoring functions. Moreover, satellites can have dual-use (military and civilian) functions. As a result, hostile activities in space (or against space infrastructure on earth) would have profound implications for modern societies and armed forces that all rely on space-based assets.[1] During and shortly after the Cold War, space was considered a relatively benign environment. However, during the first two decennia of the 21st century, space has become a new frontier for waging war. Threats are increasing in quantity and variety and states need to defend space services that were considered secure before. The US describes space as a warfighting domain and in 2019 NATO declared space as an operational domain.[2] Furthermore, the US, China, Russia, and India have or are developing anti-satellite systems (ASAT).[3] The counter-space technologies that are used in ASAT systems can be divided into kinetic physical, non-kinetic physical, electronic, and cyber systems.[4]

Kinetic physical ASAT systems are, for instance, attacks on or sabotage of ground sites, direct ascent ASAT weapons, and co-orbital Rendez-Vous. Non-kinetic physical ASAT systems are, for example, capable of dazzling or destroying satellites via lasers such as the Russian Kalina ground-based laser. Other examples are high-powered microwaves and nuclear detonations in space that would create an electromagnetic pulse (EMP) capable of disabling satellites. Next are the electronic ASAT systems such as (uplink and downlink) jamming and spoofing. Lastly, cyber-ASAT systems can be used for data interception & corruption and command intrusion. The war between Russia and Ukraine is arguably also the first major war fought in space. Russia conducted, for instance, a successful cyberattack on the first day of the war against Viasat, "an American satellite provider whose network was used by the Ukrainian military [and other governmental users] to communicate with front-line troops".[5] Co-orbital manoeuvres related to the war in Ukraine have also been observed.

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While space is being further militarized, scholars and national delegations disagree regarding the weaponization of space because of a lack of common definitions.[6] This semantic discussion is subordinate to national security interests. The most important United Nations treaty concerning space, the 'Outer Space Treaty' (OST) from 1967, "significantly de-weaponizes the space domain". For instance, weapons of mass destruction cannot be stationed in space.[7] However, because of the changes since 1967 regarding counter-space technologies such as the development of cyber capabilities, the OST is becoming more and more obsolete.[8] Other, more recent, diplomatic endeavours, such as the 'International Code of Conduct for Outer Space Activities' proposed by the European Union (EU), are being blocked and have failed.[9] However, soft law remains for the moment the only realistic way to pursue legal evolutions and prepare binding international law.

Although Belgium established a new Cyber Command (BECYBERCOM) on 19 October 2022, political and military attention to an equally important domain, namely space, is less outspoken.[10] For example, in the latest Belgian coalition agreement from 2020, only space's economic and scientific importance is mentioned, while the security dimension is ignored.[11] However, as argued above, defending this domain is crucial for modern societies. More specifically, according to Sankaran, Russia develops ASAT weapons to counter NATO (and thus also Belgian) aerospace forces because they want "to offset the space-enabled military superiority of US and NATO forces". Consequently, Russia's offsetting strategy is directly threatening NATO (and thus Belgian) space assets.[12] The often-successful Russian attacks against Ukrainian space-based services described above signal to the West that Russia can and will use their counter-space assets when needed.

Belgium is a major player at the European level in space and has important (economical) interests to defend. Consequently, this Policy Brief argues that Belgium should protect its interest in space by increasing its attention and capabilities in this new operational domain.

INTERNATIONAL RECOGNITION OF OUTER SPACE AS AN OPERATIONAL DOMAIN

Belgium's security and defence policy is strongly influenced by being a NATO ally and member of the EU. As stated earlier, in the London Declaration (2019) NATO for the first time mentioned space as an operational domain, "recognising its importance in keeping us safe and tackling security challenges, while upholding international law." [13] Subsequently, the Alliance adopted 'NATO's overarching Space Policy', which states that "The evolution in the uses of space and rapid advances in space technology have created new opportunities, but also new risks, vulnerabilities, and potentially threats for the Alliance's and Allies' security and defence".[14] Furthermore, NATO highlights the specific vulnerability that Russia wants to exploit, namely "Allies' space capabilities could become a high priority target given the advantages that space systems provide in conflict and given Allies' dependence on these systems to enable operations".[15] While NATO does not develop space capabilities itself, the Alliance aims to take up a support role. This role is concretely illustrated by the creation of a NATO Space Centre at Allied Air Command (Ramstein, Germany) on 22 October 2020; a NATO Centre of Excellence (Toulouse, France) is also being formed.[16] Belgian Defence will participate in both centres.

At the Brussels Summit (14 June 2021), the NATO allies signalled that "attacks to, from, or within space present a clear challenge to the security of the Alliance […] and could be as harmful to modern societies as a conventional attack. Such attacks could lead to the invocation of Article 5".[17] In addition, the 2022 Strategic Concept repeats the possibility of an Article 5 invocation and states that "Maintaining secure use of and unfettered access to space and cyberspace are key to effective deterrence and defence […] We will also boost the resilience of the space and cyber capabilities upon which we depend for our collective defence and security".[18] Therefore, it is crucial that Belgium (together with the other allies) increase its space capabilities, just as it is doing in cyberspace.

The EU also describes outer space as "increasingly contested" and states that "Our freedom of action depends on safe, secure and autonomous access to the space domain" (in its Strategic Compass that was approved by the Council of the European Union on 21 March 2022). Furthermore, the Union planned to develop an EU Space Strategy for security and defence before the end of 2023 and wants to invest in space-based capabilities by using the frameworks of Permanent Structured Cooperation (PESCO) and the European Defence Fund (EDF). The EU recognizes that there exists a need to complement its civilian Space Programme with an EU Space Strategy for security and defence that "will help us build a common understanding of space-related risks and threats, develop appropriate responses and capabilities to react better and faster to crises, strengthen our resilience and make full use of the benefits and opportunities linked to the space domain". The EU also wants to "further strengthen, deepen and expand our strategic partnership, political dialogue and cooperation with NATO" regarding outer space.[19] This goal has been reiterated in the third 'Joint Declaration on EU-NATO Cooperation', signed on 10 January 2023: "We will further strengthen our cooperation in existing areas, and expand and deepen our cooperation to address in particular the growing geostrategic competition, resilience issues, protection of critical infrastructures, emerging and disruptive technologies, space, the security implications of climate change, as well as foreign information manipulation and interference".[20] On 10 March 2023, the European Commission presented its 'European Union Space Strategy for Security and Defence', recognizing that "Additional measures are needed to defend the EU's strategic interests and to deter hostile activities in and from space".[21]

Although Article 2 of the ESA Convention states that "The purpose of the Agency shall be to provide for and to promote, for exclusively peaceful purposes […]",[22] the recent ESA Agenda 2025 did state "Develop space for safety and security" as one of the priorities for 2025 because of the following realisation: "Today, many programmes such as weather satellites, the Galileo Public Regulated Service, satellite-based communications or European launchers already serve national dual use needs on an operational basis. Most risks to our society and economy require space to be properly involved. The same space industry is working on ESA programmes as well as national defence programmes, with technological overlaps and complementarity. Several Member States have integrated civil and military space policies or teams." Therefore, the "ESA should become the natural technical partner for developing space infrastructure with safety and security purposes at European level".[23] A concrete example of the ESA taking up security roles is the Cyber Centre of Excellence of the ESA, located in Belgium. These explicit statements constitute a clear departure from the earlier focus on peaceful purposes because space (unfortunately) is becoming an increasingly contested domain. Something that the more 'neutral' member states of ESA increasingly recognize.

Subsequently, the US established a Space Force (USSF) in 2019.[24] The USSF has as its goal the "organizing, training, and equipping troops (space guardians) during peace time in order to present them to the combatant commands (i.e., US Space Command) during a time of space conflict or war". The US Space Command is "responsible for conducting operations in, from, and to space in order to deter conflict and, if necessary, defeat aggression, and defend US vital interests".[25] The UK created a UK Space Command in April 2021. This is a Joint Command and thus "staffed from the Royal Navy, British Army and Royal Air Force, the Civil Service and key members of the commercial sector". The three responsibilities of this command are (1) space capability, (2) space operations, and (3) space workforce training and growth.[26] France has changed its Air Force to the Air and Space Force (Armée de l'Air et de l'Espace, AAE) in 2019.[27] Consequently, NATO, EU, ESA and allies are underscoring the importance of defending their interest in outer space by adopting strategies, restructuring their armed forces and developing additional capabilities. The following part will discuss Belgium's policy regarding space security and defence.

BELGIAN DEFENCE POLICY AND CAPABILITIES IN OUTER SPACE

Like the EU, Belgium has a space policy that predominantly focuses on the civilian aspects of space. This is characterised by the fact that the Belgian Science Policy Office (BELSPO) is responsible for developing and implementing general space policy. However, the Belgian Space Strategy states that "the component 'security-defence' for Europe's space sector is in full evolution", furthermore, "Belgium should position itself to become part of it and let its players take up key positions, among others in the area of cybersecurity".[28] As stated above, the importance of space from a security and defence perspective was not mentioned in the Belgian coalition agreement from 2020. Nevertheless, the more detailed Policy Statement of the Minister of Defence of 4 November 2020 said that the competition between major powers strongly increases, and that Belgium also needs to play its role in space.[29]

On 1 December 2021, the federal government adopted the first-ever Belgian National Security Strategy. This strategic document states that a race has started to control untapped areas such as outer space, which can become new zones of conflict. Furthermore, the National Security Strategy speaks of an increase in societal dependence on space technologies, which can lead to opportunities but also vulnerabilities when access to space-based services is denied. Consequently, the strategy calls for increasing the resilience and protection of critical space-based services. Regarding concrete capabilities, the document mentions the 'Public Regulated Service' (encrypted service for governmental purposes) that is planned to use the European Galileo global navigation satellite system (GNSS).[30]

In addition, one of the important tasks of the current government regarding defence policy was to update the Strategic Vision for Defence from 2016. The Minister of Defence tasked a "strategic committee" of academics with preparing two advisory documents in preparation of the update, the STAR-plan (Security & Service, Technology, Ambition and Resilience), which was adopted on 17 June 2022. The first advisory document describes the expected trends in the security environment from 2021 to 2030. Regarding outer space, the concept of 'New Space' (the greater importance of private, commercial space initiatives next to governmental initiatives) and the related economic importance are emphasized. Subsequently, the document also mentioned the increase in dependency of the Belgian and allied economies and armed forces on space and the development of counter-space systems, leading to the militarization of space. Lastly, it stresses the importance of cooperation on a bilateral or European level.[31]

The second advisory document states that Belgium "should need to play its role in all domains", including outer space. One of the reasons behind this advice is the need to protect lines of communication. More concretely, Belgium "must gain and ensure access to resilient and secure space-based systems (satellite communication, space-based ISR [Intelligence, Surveillance, and Reconnaissance], PNT [Positioning, Navigation, and Timing]), supported by trained personnel and R&D programmes. [Belgium's] Defence will contribute to the security and resilience of national and allied space assets because of its national and international task regarding the development of Space Domain Awareness and Space Traffic Management".[32]

The STAR-plan itself repeats the trends described in the first advisory document regarding the security environment. The plan also mentions NATO's declaration of space as the fifth operational domain. Furthermore, it also takes on board the recommendations of the second document and adds that the contribution to security will be reflected in the development of cyber services for space in collaboration with the Belgian-based Security Cyber Centre of Excellence (SCCOE) of the European Space Agency (ESA) and "microsatellite monitoring services". Regarding international cooperation in the space domain, Belgian Defence works closely with France for space-based IMINT (Image Intelligence). The French Helios programme has recently been replaced by the new CSO system (Composante Spatiale Optique). Belgium takes part in this new programme and already invested in this capability via BELSPO. The goal of this space-based IMINT capability is to give situational awareness on a

"strategic and operational level to military and civilian decision-makers" and the Belgian military intelligence service (ADIV/SGRS) is responsible for this capability. Furthermore, the STAR-plan states that Belgium must now consider the next steps regarding CSO.[33]

Besides the space-based IMINT capability, the STAR-plan also identifies other key space support capabilities. Because space-based assets are important to support operations, the development of Space Situation Awareness is required. In addition, the document states that a more "holistic approach" towards this new domain is needed, "multiple indicators show that a paradigm shift is underway and that there is a renewed general interest in the security aspects of space. It would be a pity if Belgium missed this pivotal moment for all our capabilities at a time when our allies, even the smallest countries, are investing in this domain". Moreover, a protection capacity against the jamming of GPS needs to be developed. Furthermore, all these initiatives must be situated in the development of a 'Space Defence Strategy' (currently being drafted) that takes all national and international policies and actions, namely "NATO Space Domain Action Plan, EU CARD Defence in Space Focus Area, National space strategy, security aspects in the space programme of the EU, ESA Cyber in Space, initiatives of the allies…". Lastly, this space support section ends with summing up all the investments: "renewal of the GNSS navigation systems, the construction of the C2 PRS Galileo of the defensive and deployable support systems of the NAVWAR [Navigation Warfare] assets as well as the […] [creation of] a Space Security Centre". The budget and foreseen dates of these investment projects are (€2022) 2,83 million for the personal navigation system (GNSS) in 2031, 11,35 million for the NAVWAR assets during the period 2025-2026, and 45,40 million for the creation of a Space Security Centre during the period 2025-2029 (this budget also includes the build-up of the required SSA sensors). Finally, regarding R&T (Research and Technology) the Royal Higher Institute for Defence (RHID) is responsible for the establishment of an "ecosystem of excellence for aerospace applications in the security and defence domain".[34] The associated Military Programming Law of June 2022, approved by the government and parliament, is the official budgetary underpinning of the STAR-plan. Next to the 59,58 million for 'space support', a part of the 144,44 million for 'digitalisation & communication support' goes to satellite communications.[35]

Subsequently, the RHID developed a 'Defence, Industry and Research Strategy' (DIRS) that was approved by the Belgian Council of Ministers on 16 September 2022 and one of the priority domains in this strategy is "Cross-cutting cyber defence for land, maritime, air and space, with a view to building the desired national autonomy in military cyber capabilities and progressive development of a robust civilian-military cyber ecosystem of excellence". In addition, 'technical advisory committees' are being set up and one of these committees is organised around space-related applications.[36] Moreover, €100 million from the DIRS will be invested in ESA projects. This co-funding by the Belgian Defence (together with BELSPO) of ESA projects ensured the selection of the Belgian astronaut. Additionally, this could lead to synergies regarding the development of dual-use research and applications by Belgian actors. Belgium has already a Solar-Terrestrial Centre of Excellence (STECE) which combines the expertise of three Federal Scientific Institutes, namely the Royal Observatory of Belgium, the Royal Meteorological Institute, and the Royal Belgian Institute for Space Aeronomy. The space weather services provided by this centre of excellence are also of interest to the Belgian armed forces.

Regarding the development of a Belgian 'Space Defence Strategy' that is currently being drafted, the Netherlands and Luxembourg have recently published similar documents titled respectively 'Defensie Ruimteagenda' (Defence Space Agenda)[37] & 'Defence Space Strategy'.[38] Subsequently, these documents can inform the drafting process in Belgium and synergies between the Benelux states in the space domain can be identified and deepened. The 'Defence Space Agenda' of the Dutch Ministry of Defence describes, for instance, Belgium as a strategic bilateral partner and states that the Netherlands is "expanding the currently ongoing cooperation with Belgium on space weather and see opportunities to

develop military SATCOM capabilities together with Belgium and Luxembourg".[39] On the other hand, Belgium also cooperates closely with France, the traditional partner concerning space-based IMINT. The choice of partners in outer space is, therefore, linked to the broader geostrategic debate in Belgium. By cooperating in with the Netherlands, Luxembourg, and France on space security and defence, Belgium would strengthen the European pillar within NATO.

CONCLUSION: TIME TO PRIORITISE OUTER SPACE

At a time when NATO adopted its 'overarching space policy', the European Commission presented its 'Space Strategy for Security and Defence', the ESA is prioritising security, and allies are integrating space more prominently into their armed forces, Belgium cannot get behind during this pivotal moment, as stated in the STAR-plan. Modern societies like Belgium are increasingly dependent on space-based services. In addition, the Belgian and allied armed forces use space-based assets as strategic enablers for military operations. This brings opportunities, but also vulnerabilities because potential adversaries are developing counter-space weapons to counter these assets. Belgium must, therefore, prioritise space in the coming years. Subsequently, Belgium must increase its attention and strengthen its capabilities in this essential operational domain. Creating a Space Security Centre and the aim to build up national space situational awareness capabilities, next to the formulation of a Belgian Space Defence Strategy and other developments, are important first steps that are urgently needed if Belgium wants to catch up with outer space's rapidly changing threat environment. Moreover, the Belgian Chef of Defence, Admiral Michel Hofman, indicated in January 2023 that the Air Component should evolve into an Air and Space Component.[40]

Nevertheless, a state that has so many interests in space should be more ambitious. The next strategic document for the Belgian Defence should, therefore, build upon the current plans and strengthen the Space Office or establish a Belgian Space Command that brings together personnel from across the Belgian military providing space support. This new command should control all the national military space assets and services such as the planned Space Security Centre, space situational awareness capabilities, potential future military STACOM capabilities (jointly developed by Belgium, the Netherlands, and Luxembourg – an opportunity identified in the 'Defence Space Agenda' of the Netherlands) and the current space-based IMINT capabilities. In addition, more military personnel that focus on this crucial domain is needed and related, the space defence and security IQ in Belgium needs to be strengthened. Furthermore, developing shared early warning capabilities could also be a complementary space support service when the new Anti-Submarine Warfare Frigates (ASWF) arrive from 2027 onwards. The STAR-plan mentioned the possibility of integrating a Ballistic-Missile Defence (BMD) system on the ASWFs. As a result, the new frigates could contribute to NATO Integrated Air and Missile Defence (NATO IAMD).[41] Shared early warning is also one of the areas identified in NATO's overarching Space Policy as required space systems.[42] Consequently, when taking note of the societal and military interests, it is clear that the Belgian Defence needs to become a credible and reliable partner in protecting these interests in outer space.

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