

ENGLISH VERSION

DEFENCE SPACE STRATEGY

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Ministerial Foreword

Space offers unprecedented opportunities for development and progress that enhance our daily lives. However, our societies increasingly depend on space assets to run smoothly, which also increases our vulnerabilities.

Defence is no exception, and space, along with cyber defence, has become a real national security issue. The Space Treaty of 1960 and the various initiatives taken at the level of the United Nations (UN) since then have thus far prevented an arms race in space by preserving on the use of outer space for peaceful purposes. Today, space has become an increasingly contested, competitive and congested environment. With moreover more activities and actors in space, comes an increased risk of conflict. Thus, ensuring respect of international law and peaceful use of space remains a relevant challenge.

It is in this complex and evolving security environment that the first Luxembourg defence space strategy has been developed.

This strategy is part of a global context. On a national level, space has played an important role in the diversification of the

economy, which has strengthened the space economic sector. Luxembourg has been an incubator for various companies, thus becoming a catalyst for cooperation, technological innovation and commercial development in space. These efforts have contributed to building Luxembourg's international reputation as a centre of excellence in the space sector.

At an international level, and as part of its commitment to multilateralism, Luxembourg defends the values promoted by the international organisations of which it is a member, such as the European Union (EU), the North Atlantic Treaty Organisation (NATO) and the United Nations. Given its multilateral and unified security architecture, it is Luxembourg's responsibility to meet its obligations as a reliable partner within these international organisations and to bear its burden of responsibility for the efforts inherent in collective and common defence.

In this context, Luxembourg is contributing to the joint effort in defence and collective security by developing high value-added space capabilities, which will be made available to our partners and



allied countries. It should be stressed that Luxembourg's contributions are part of the global '3D' approach, promoting a coherent approach between Diplomacy, Development and Defence. As an example, I would like to mention our contribution to the UN Mission in Mali (MINUSMA) and to the EU military training mission in Mozambique, for which we have deployed secure satellite communications.

The development of dual-use capabilities, both civilian and military, and the use of these capabilities in accordance with international law are of particular importance.

In addition to the protection and peaceful use of atmospheric space, the space policy also aims to contribute to the elimination of satellite debris in space and to the reduction of the carbon footprint of space activities, in particular by accounting for the carbon footprint of space activities, by using energy-efficient solutions and technologies as far as possible and by reusing, at least partially, launch systems.

It may seem surprising that a country of Luxembourg's size develops its own defence space strategy. Luxembourg has

its own national satellite and high-ranking foreign representatives have characterized Luxembourg's efforts in the space field as "*Luxembourg is punching well above its weight*". This analogy with sport shows that in the field of space, Luxembourg can have an impact, and make its fair contribution to the global security and defence efforts.

In the field of space, the challenge today is not only to find partners to further develop our ambitions, but also to implement them quickly in order to stay ahead of potential adversaries.

With this in mind, I present the first Luxembourg "Defence Space Strategy", which will guide these efforts in the years to come. I will work closely with my colleagues in the Government and the wider public sector to ensure that this vision becomes a reality.

François BAUSCH

Deputy Prime Minister
and Minister of Defence



Launch of GovSat-1 communications satellite by a Falcon 9 space launch vehicle on January 31, 2018 from Cap canaveral

1 Introduction

Under the authority of the Minister responsible for Defence, the Directorate of Defence and the Luxembourg Armed Forces coordinate and implement Luxembourg's defence policy at both national and international levels. Just as the space sector has become more important in Luxembourg, particularly due to its economic development opportunities it provides, space has become a crucial area for Defence.

While the day-to-day applications of space technologies bring significant benefits to humankind, such as for the economy, climate change studies, agriculture or medicine, it is also true that space is of key importance in which various States, civil and military actors, as well as private and public entities are increasingly active. The ever increasing risks and threats, lie mainly in the destruction or disruption of observation or communication satellites by debris or hostile attacks, with serious impacts on the functioning of our society and on our defence capabilities. Faced with this situation, it is essential to continue to strengthen and protect current capabilities, both military and civilian, and to develop new space-based resources.

Since 2019, NATO has adopted its own space strategy and recognised space as an operational domain. It inaugurated the NATO Space Centre within the Allied Air Command in Ramstein (DE) and supported the creation of the Space Centre of Excellence in Toulouse (FR).

Space is also a major strategic priority at EU level. For example, in January 2022, the EU Ministers of Defence agreed on the need to develop a European space strategy for security and defence during their informal meeting in Brest.

Defence welcomes the fact that increased importance is attached to the field of space at NATO and EU level for the years to come given

technological developments, and from the need to strengthen defence strategy and resilience in crisis response.

At the national level, Defence has been active in the space sector for more than ten years. Through its participation in the American Wideband Global SatCom (WGS) programme, its involvement in the private-public partnership LUXGOVSAT or the implementation of its own Earth observation space system LUXEOSys, Defence has acquired significant experience and built an international reputation as well as developed in-depth competencies.

However, in view of future challenges, cooperation between countries sharing the same principles and values will be a key factor. Thus, the creation of cooperation and synergies between different initiatives will be at the heart of this defence space strategy.

In addition to the collaborative aspect, increasing the resilience of space capabilities is also one of the guiding principles of this strategy. Indeed, the risks arising from our dependence on space increase in cases where we have only one capability without any redundancy. Increasing resilience through access to multiple systems or enhanced capacity protection will allow us to ensure the continuity of services and the smooth functioning of our society in the event of an attack, disruption or other problem with the functioning of our space assets.

This space strategy aims to define concrete objectives for Defence in order to consolidate Luxembourg's role as a reliable reference partner in the field of space at both national and international level, by strengthening existing capabilities and developing new ones.



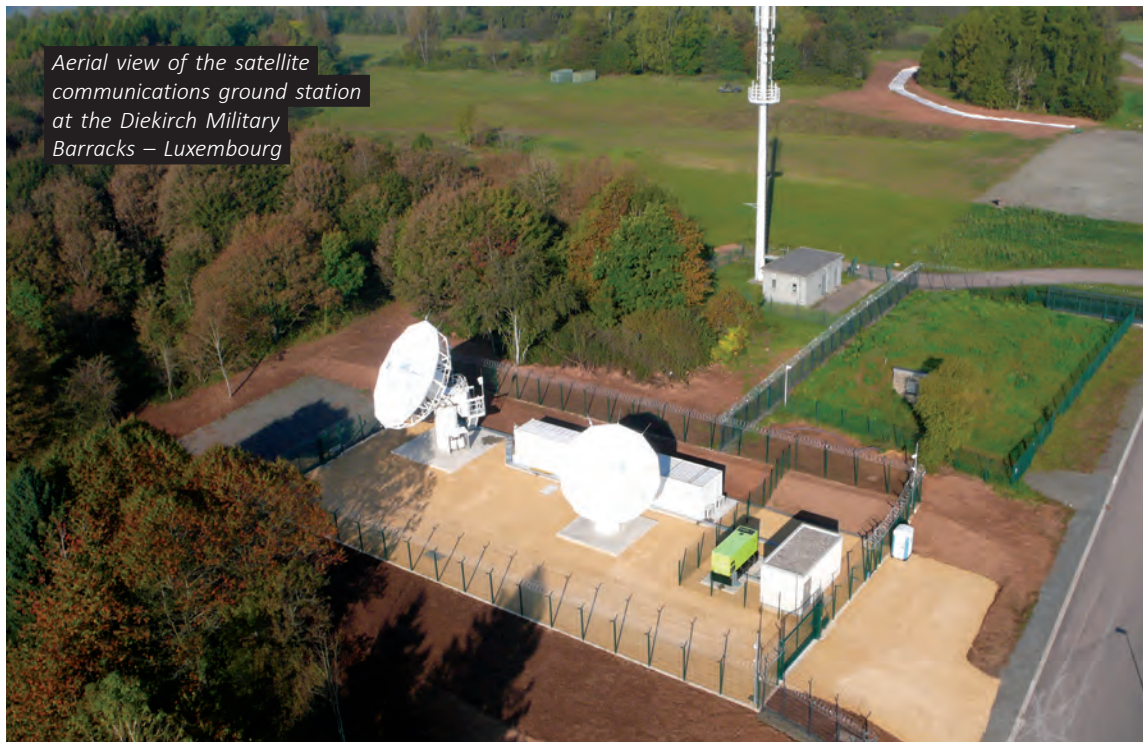
2 Luxembourg's long-term objective for space strategy

Willing to act in solidarity, Luxembourg Defence will consolidate its role as a reliable reference partner in the field of space by 2030.

Through development of space capabilities at national level or in cooperation with NATO/EU partners, and by strengthening the resilience of these capabilities, Defence will not only meet its national needs but also contribute these capabilities to international organisations and allied countries.

By doing so, Defence will help to guarantee access and to preserve a peaceful and sustainable use of space, in full compliance with international law, while relying on the expertise of the Luxembourg space sector.

In order to achieve this long-term objective for space, Defence intends to rely on FOUR strategic objectives, which will be detailed in the following chapter.



Aerial view of the satellite communications ground station at the Diekirch Military Barracks – Luxembourg



National Earth observation satellite LUXEOSys, scheduled for launch in 2023



Antennas of the satellite communications ground station of the Diekirch Military Barracks - Luxembourg

3 Strategic objectives

The long-term goal requires useful, sustainable, efficient space capabilities governed by Defence and, to the extent possible, implemented by the Luxembourg Armed Forces.

The achievement of the long-term objective relies on FOUR strategic objectives (SOs), which will be further subdivided into several underlying sub-objectives:

SO 1: Consolidate current space capabilities, increase their resilience and develop new systems

Sub-objective 1.1: Specific space capabilities in SATCOM, EO, PNT and SSA

Sub-objective 1.2: Operationalisation of assets

Sub-objective 1.3: Continuous mapping of future challenges and opportunities, developments and technologies

SO 2: Support freedom of action in and from space

Sub-objective 2.1: Cybersecurity in space and electromagnetic protection of assets

Sub-objective 2.2: Clean space

Sub-objective 2.3: Ensuring access to space

Sub-objective 2.4: Supporting a credible deterrent through international alliances and partnerships

Sub-objective 2.5: Supporting the creation of norms and standards for responsible and sustainable behaviour

SO 3: Foster national and international cooperation

Sub-objective 3.1: Strengthening cooperation and developing new partnerships

Sub-objective 3.2: Coordination in the EU and NATO frameworks

Sub-objective 3.3: Promotion of dual-use synergies to strengthen the Luxembourg space sector

Sub-objective 3.4: Supporting research and exchange programmes

SO 4: Attract and secure a skilled and motivated workforce

Sub-objective 4.1: Strengthening the attractiveness of Defence as an employer

Sub-objective 4.2: Introduction of the 'space' career path within Defence

3.1 SO 1: Consolidate current space capacities, increase their resilience and develop new systems

Luxembourg has its own space capabilities and the provision of these high added-value resources reinforces the reputation of Defence as a respected partner within multinational alliances and organisations, willing to act in solidarity with partners. Luxembourg can thereby make an effective contribution to the common effort.

It is thus essential that Defence maintains and increases this reputation by continually participating in the military commitments of the international organisations of which Luxembourg is a member, and by pursuing a targeted development of its capabilities.

The services provided by space assets for security and defence applications are generally divided into 4 main categories: Satellite Communication (SATCOM), Earth Observation (EO), Space Situational Awareness (SSA) and Positioning, Navigation and Timing (PNT).

Bearing in mind the needs of Luxembourg Armed Forces, those of international organisations and of our partners and allied countries, Defence will structure its capacity building according to the following principles: consolidation of existing capabilities, improvement of their resilience and creation of new value-added systems, using, if possible, technologies with a limited carbon footprint.

3.1.1 Sub-objective 1.1: Specific space capabilities in SATCOM, EO, PNT and SSA

3.1.1.1 Satellite communication (SATCOM)

In the field of satellite communications, where Defence has been active for about ten years, the focus will be on the resilience of communication systems aimed at multi-orbit access in order to ensure the continuity of communications.

In addition to participation in the multinational WGS programme and the national GovSat-1 satellite, Defence will deepen its SATCOM capacity in the commercial (Ku and Ka band) and military (X and mil-Ka band) frequency bands through participation in various programmes, giving preference dual-use (civil and military) of these bands, where possible. In order to achieve this and to ensure resilience, Defence will invest in strategic systems in all three satellite orbits (GEO, MEO, LEO).

Next to the **strategic** SATCOM systems mentioned above, Defence will also analyse the needs and opportunities in the area of **tactical** satellite communications (UHF TacSat or equivalent system) and if necessary develop its own assets.

Finally, Defence will develop a project to extend the current SATCOM hub station, allowing the anchoring of several links from different satellite constellations. This extension should improve the resilience of infrastructures on the ground.

The development of new capabilities will be achieved as far as possible through participating in international programmes aimed at cooperation and system sharing.

Considering the increasing strategic importance of SATCOM coverage at the level of the Poles, special attention will be paid to this.

3.1.1.2 Earth Observation (EO)

Defence will continue to develop its Earth Observation capacity, focusing initially on the implementation of the national observation satellite LUXEOSys, which will be equipped with a camera to take images of the Earth. Particular emphasis will be placed on maintaining the authenticity and reliability of the images produced by the LUXEOSys system. This new

system also meets a need for governmental imagery among international organisations. In addition, a dual use of the images is envisaged, particularly in the field of disarmament and climate change monitoring. Indeed, LUXEOSys can be used to observe and monitor the effects of major environmental changes, including climate change, deforestation, desertification and surface water pollution.

Defence will support initiatives of international organisations aiming to continuously monitor the Earth through the integration of data from multiple sources, not only governmental but also commercial, and to access them as soon as the need for imagery arises.

Luxembourg will also support initiatives aimed at developing analytical capabilities, in particular through artificial intelligence, allowing the automated processing of the mass of geospatial data produced.

The development of a Centre for the analysis of images from the LUXEOSys observation satellite and imagery from Defence's airborne systems (UAVs, on-board cameras, etc.) will be further studied once LUXEOSys is operational.

3.1.1.3 Positioning, navigation and timing (PNT)

The use of and access to satellite-based positioning, navigation and timing systems has become essential for most military activities.

Therefore, Defence will coordinate with the competent Luxembourg authorities to ensure access to the American global positioning system (GPS) for the Luxembourg Armed Forces. Furthermore, Defence will closely follow the development of the European global satellite navigation system GALILEO in order to increase the resilience and availability of positioning data.

3.1.1.4 Spatial situational awareness (SSA)

The increasing number of satellites and orbital debris, combined with the development,

testing and demonstration of anti-satellite capabilities and complex orbital manoeuvres have highlighted the need for a robust space situational awareness. This will involve detecting, characterising and determining the trajectory of objects to avoid possible collisions and to prevent potential future threats. The objective is to contribute to the preservation of freedom of action in the space environment and the preservation of the peaceful use of space in accordance with international law.

Space situational awareness, based on appropriate and verified information, is essential for informed decision-making. Being able to identify a threat early will allow decision makers to anticipate and respond to potential consequences, particularly in cases which may affect strategic space capabilities.

In this new area of activity, Defence will put in place space situational awareness capabilities using ground and space-based assets to detect a wide range of threats, whether natural (e.g. asteroids) or man-made (debris, hostile actions). The challenge will be to ensure the detection of all objects down to 10 cm in size, or even smaller if feasible, in all orbits. Emphasis will be placed on characterising space objects and determining their trajectories to detect possible anomalies.

This capacity will not only serve to protect Luxembourg's military, governmental and civilian systems, but will also contribute to the common effort to protect the systems of our allies and partners and to limit the spread of orbital debris.

The development of such SSA capacity will be realised with the objective of creating synergies with national as well as international actors and complement the efforts undertaken at the civilian level.

3.1.2 Sub-objective1.2: Operationalisation of assets

While the development of capabilities allows expansion portfolio of Luxembourg's assets, the operationalisation of space capabilities implies that Defence does not have these assets exclusively at its disposal, but that the Luxembourg Armed Forces are able to operate them in a more or less autonomous manner. It has to be noted that the Luxembourg Armed Forces will not be able to operate all the systems developed, due to the lack of work force.

Therefore, this long-term sub-objective will be limited in this strategy to the operationalisation of the SATCOM and LUXEOSys systems. Consequently, other capabilities will be co-managed through partnerships with international agencies, allied countries and industrial actors.

3.1.2.1 Satellite communication (SATCOM)

Currently the Luxembourg Armed Forces, through their mobile SATCOM teams, implement Defence's space communication resources, in particular in the framework of Luxembourg's contributions to the UN, the EU and NATO. Defence will continue to do so and will ensure, within the limits of its available resources, an operation by the Luxembourg Armed Forces of the deployed SATCOM systems.

In addition, Luxembourg Armed Forces will consider taking over the management and operation of the extension of the SATCOM tracking station. This will permit the Luxembourg

Armed Forces to continue fostering the development of their own SATCOM expertise, strengthen Defence's strategic autonomy and contribute to the creation of a competence cluster within the Luxembourg Armed Forces.

3.1.2.2 Earth Observation (EO)

To operate the LUXEOSys Earth observation satellite, an operational centre will be established to pilot the satellite and to manage image requests and production. The management of this centre will be in part outsourced. Luxembourg Armed Forces will continue their efforts to strengthen this operational centre.

3.1.3 Sub-objective1.3: Continuous mapping of future challenges and opportunities, developments and technologies

Defence will undertake a regular horizon scanning in order to identify the opportunities that will potentially influence Luxembourg's position in the field of space, including in the field of Green Space. The results of this iterative exercise will allow the identification of emerging technologies and programmes most relevant to Defence. This mapping will be conducted in cooperation with national government partners, industry and higher education.

Defence will also map out future challenges in order to identify threats and make the most of technological developments to improve its contribution in the field of space at national and international level.



National Earth observation satellite LUXEOSys, scheduled for launch in 2023

3.2 SO 2: Supporting freedom of action in and from space

The concept of freedom of action can be extended to countries with their own space systems or dependent on these assets. Access to space and the peaceful use of space must be guaranteed in accordance with international law. As a corollary of peaceful use, the protection of our satellites in space will support the physical security of our troops and, more generally, the good functioning of our society.

The range of threats to satellites continues to grow, from neutralisation to complete destruction. The new challenges are manifold and include many types of civilian and military technologies, both space and ground-based, as well as space debris and the increasing congestion of outer space. Lack of transparency can also lead to misunderstandings and, potentially, accidents and conflicts.

It is a priority to ensure the security and protection of Luxembourg's space assets and those of our allies against all types of disturbances, whether natural or man-made, threats of kinetic or non-kinetic or even cyber actions, to guarantee our freedom of action in and from space. Therefore, it is important to encourage joint efforts towards the clarification and further development of a normative framework applicable to space.

3.2.1 Sub-objective 2.1: Cybersecurity in space and electromagnetic protection of assets

The protection of systems in space includes the protection of data sent to and from satellites in orbit and the cyber protection of ground terminals, docking stations and related computer networks.

Defence will extend its cyber defence strategy to military and dual-use space assets and

participate in programmes to protect space assets from electromagnetic interference and meddling.

Defence will support programmes to secure satellite communications. In this respect, an integrated "multi-layered" security approach will be required to meet operational requirements. To this end, the focus will be on systems for waveform protection, ground equipment security and anti-jamming technologies.

Particular attention will be paid to the cybersecurity of the networks covered by the SATCOM services made available by Defence and on the external secure links allowing access to the LUXEOSys observation satellite.

3.2.2 Sub-objective 2.2: Clean space

Space debris is the greatest environmental hazard to space assets. With the amount of debris increasing with each launch or retirement of a spacecraft, and with the increase in activities conducted in space, it is clear that the risk of collision or damage will increase significantly in the future. For example, in 2019, the ESA counted 34,000 objects larger than 10 cm and 900,000 objects larger than 1 centimetre, representing more than 6,000 tons of debris orbiting the Earth.

In addition, each nation is responsible for damage caused directly or indirectly by its space assets.

Defence will participate in "Clean space" programmes aiming to reduce debris and invest in space clean-up initiatives. Furthermore, it will also follow the evolution of emerging technologies and Active Debris Removal (ADR) systems, as well as the development of future systems to repair satellites in orbit.

3.2.3 Sub-objective 2.3: Ensuring access to space

Access to space is essential for the functioning of our society, including military activities. Therefore, such access must be ensured through resilient satellite launch capabilities as well as the implementation of procedures for space traffic management.

Defence will participate in programmes to implement new, more flexible and agile satellite launch procedures and techniques from Europe. Launch access times will be taken into account in order to facilitate a rapid and flexible response to different threats.

In order to minimise the risk of collision between satellite, Defence will contribute to the evaluation of available and necessary technologies and capabilities through initiatives in the development of Space Traffic Management (STM).

3.2.4 Sub-objective 2.4: Supporting a credible deterrent through international alliances and partnerships

Effective protection of space assets requires a credible deterrent posture towards potential adversaries. Only partnerships and alliances will enable Luxembourg to build up a real deterrent capacity. Furthermore, the extension of the collective defence principles of Article 5 of the Washington Treaty (NATO) to the field of space is an important development in this respect.

To this end, Defence will seek to strengthen existing alliances and partnerships in the space domain.

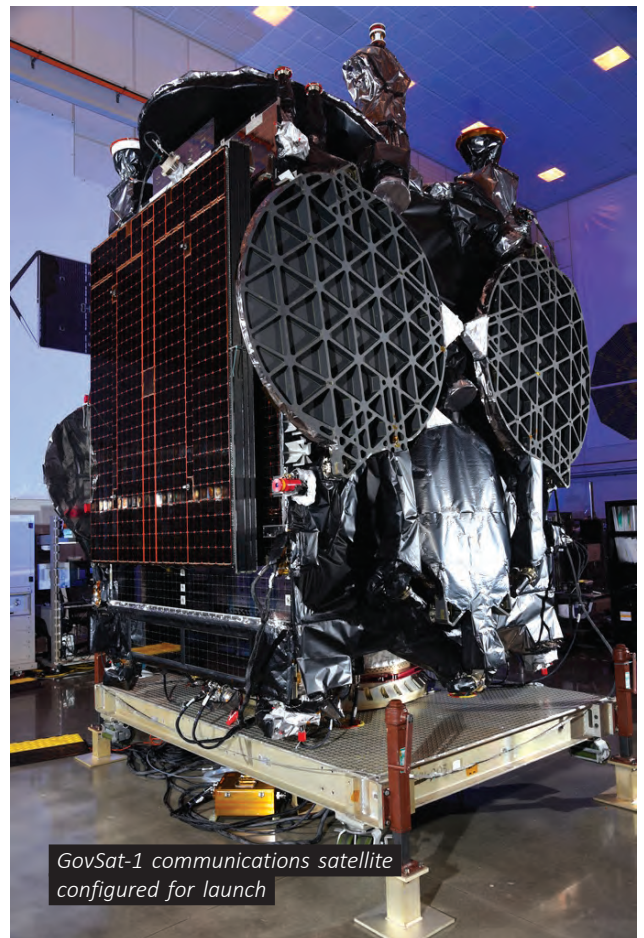
3.2.5 Sub-objective 2.5: Supporting the creation of norms and standards for responsible and sustainable behaviour

The current *Corpus Juris Spatialis*, including the Outer Space Treaty ratified by Luxembourg, can

be improved, particularly regarding the use of space. Indeed, given the divergent interpretations of certain concepts and definitions, the risk of uncertainty and misunderstanding caused by increasing use and interest in space is increasing.

Defence will continue to adopt a responsible and sustainable behaviour in the development, deployment and use of its satellite assets, in accordance with its international commitments.

Defence will also support Luxembourg state actors working towards the development of norms and standards that promote responsible and sustainable behaviour and the non-stationing of weapon systems in space.



3.3 SO 3: Fostering national and international cooperation

By adopting its own space policy in 2019, NATO has recognised space as an operational domain on a par with land, air, sea and cyber.

On the EU side, ministers of Defence agreed in January 2022 on the need to develop a European space strategy for security and defence.

Strengthening of existing cooperation and the development of new partnerships are crucial in the field of space. Coordination and convergence of individual approaches of member states or countries of the Alliance across the major space activity areas (SATCOM, EO, PNT and SSA), with a view to preparing the future space environment, will be major challenges. At the national level, Defence supports dual-use synergies and research programmes and will thus contribute to the strengthening of an already thriving space sector in Luxembourg.

3.3.1 Sub-objective 3.1: Strengthening cooperation and developing new partnerships

Luxembourg will not be able to act alone in this area and close coordination between partners will therefore be essential.

For over 10 years, Defence has been providing capabilities, mainly in the form of secure satellite communications, as national contributions to NATO agencies, the EU and the UN. Future images of the Earth, taken by the LUXEOSys observation satellite, will also be made available to our partners and international organisations as in-kind contributions.

Defence will continue to offer, within its means, national in-kind contributions and identify opportunities for cooperation that arise at the international level.

In addition to participating in various NATO and EU committees and working groups, Defence will participate in space programmes initiated within the framework of the EU's Permanent Structured Cooperation (PESCO), which are in line with this defence space strategy.

3.3.2 Sub-Objective 3.2: Coordination in the EU and NATO frameworks

The Defence Space Strategy has been written in accordance with the reference documents at EU and NATO level.

More concretely, capability development of Defence in space should not rely solely on national opportunities but should also partake into account the rapidly changing international context. In particular, Defence will have to respond to the challenges and needs included in the NATO and EU planning processes.

Defence will ensure the interoperability of assets to avoid unnecessary duplication and to maximise cost effectiveness.

Defence will support relevant European Defence Fund (EDF) calls in order to support the national economy, in particular small and medium-sized enterprises, and to develop initiatives that contribute to meeting current and future needs of Defence and those of its partners.

**3.3.3 Sub-objective 3.3:
Promotion of dual-use synergies
to strengthen the Luxembourg
space sector**

The development of defence space capabilities in collaboration with industry will contribute to strengthening Luxembourg's attractiveness as a location for companies and support further innovative in this field. Developments supported by Defence will thus contribute to reinforcing Luxembourg's reputation as a leader and role model, consolidating its reputation, visibility and position as a centre of excellence in this field.

Furthermore, Defence will cooperate closely with government space agencies to identify synergies in the development of dual-use capabilities, particularly in the area of space situational awareness (SSA).

**3.3.4 Sub-objective 3.4:
Supporting research and exchange
programmes**

Space is a fast-moving field where the pace of innovation will accelerate and where partnerships are crucial.

Defence will participate in programmes to exchange information with our partners' space workstreams so that potential joint programmes can be identified.

Defence will support research programmes, including in the field of green space technologies, to meet new requirements for military operations or security purposes. These research programmes will be undertaken with national and international partners, in particular through multinational cooperation arrangements.



3.4 SO 4: Attract and secure a skilled and motivated workforce

Defence attaches particular importance to the quality and relevance of the training of military personnel. It is committed to offering attractive career paths at all levels, developing high added-value expertise. The establishment of a pool of experts and the creation of an attractive career path in the space sector within Defence is a challenge.

Indeed, a military capacity building is more demanding than creating an asset or service in the private sector. It requires goal-oriented organisation and operational principles. Experienced personnel led by competent and knowledgeable leadership will be essential. The real and sustainable benefit of military space capabilities will lie in the recruitment and development of the necessary technical-scientific skills and knowledge. Space domain will provide an additional opportunity for professional development within Defence, even if a "space" career path within Defence cannot be established in the short term.

The objective should be to attract a qualified and motivated space workforce to both Defence and the Luxembourg Armed Forces. An increase to both, the Directorate of Defence and the Luxembourg Armed Forces, the visibility of Defence in the space domain will attract new talent.

3.4.1 Sub-objective 4.1: Strengthening the attractiveness of Defence as an employer

With an increase in space activities in the public and private sectors, competition for space talent and profiles is growing. In this context, Defence, like other employers, must remain attractive.

An intensification of the scope and reach of activities in the space field will strengthen the attractiveness of Defence as an employer.

Defence will raise awareness through social media, cooperation with the Luxembourg education sector, and actively participate in national events to promote the recruitment of young talent.

Closer cooperation with the University of Luxembourg in the field of space will be considered.

Defence will also consider sending employees to participate in national and international space exercises and training.

3.4.2 Sub-objective 4.2: Introduction of the space career path within Defence

Given the scope of the Defence's activities and the specific requirements for those working in the military domain, it is essential to identify concrete personnel requirements, to phase in their introduction and to determine the corresponding profiles. The introduction of a "space" profession as a career path within Defence would strengthen space expertise over time.

In this context, Defence will undertake a feasibility study of the development of such a 'space' career path.

However, it is not only a question of recruiting the necessary personnel directly from the labour market, but also of developing a coherent career plan enabling personnel to acquire the necessary skills. Thus, the space sector should also reap the rewards of a mixed workforce of military and civilian personnel.

In the long term, Defence must be able to guarantee the sustainability of the projects and capabilities developed, and be able to provide qualified personnel to support the work of the future NATO Centre of Excellence in Toulouse and the NATO Space Centre in Ramstein.



Launch of GovSat-1 communications satellite by a Falcon 9 space launch vehicle on January 31, 2018 from Cap Canaveral

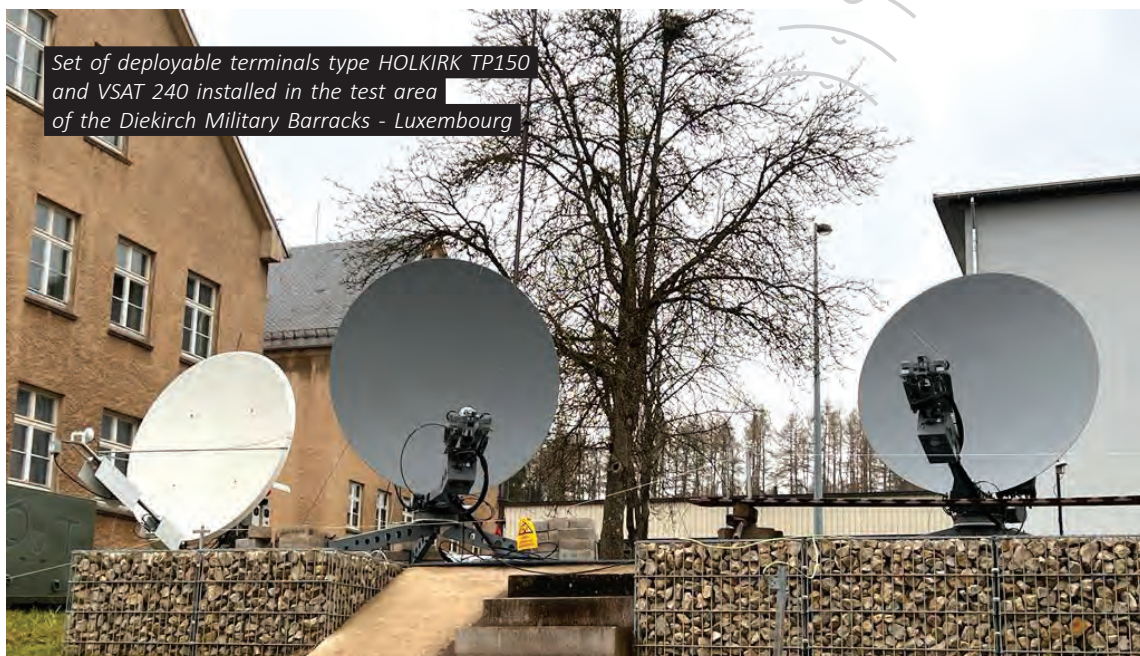
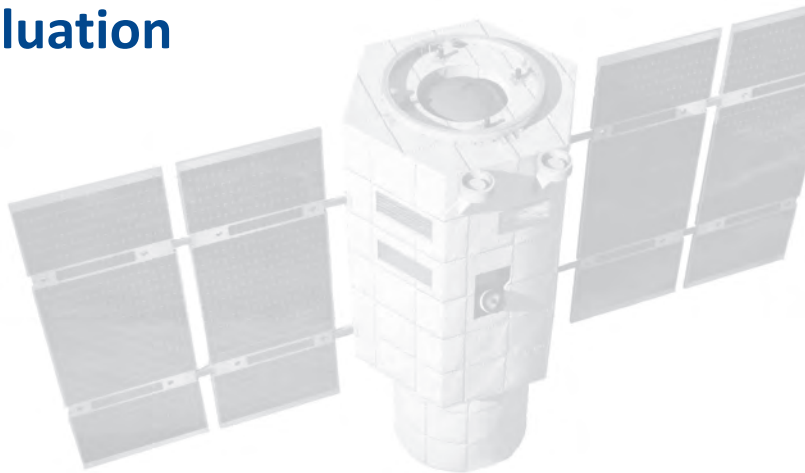
4 Monitoring and evaluation

4.1 Activities and programmes

The activities and programmes underlying the strategic objectives and sub-objectives will be subject to an annual review to be presented to the Minister of Defence. This review could potentially lead to an adjustment of activities and programmes.

4.2 Strategic objectives and sub-objectives

In the light of the review and adjustment of activities and programmes, the strategic objectives and sub-objectives will also be reassessed periodically.



Set of deployable terminals type HOLKIRK TP150 and VSAT 240 installed in the test area of the Diekirch Military Barracks - Luxembourg

5 Glossary and definitions

ADR	Active Debris Removal
Defence	Luxembourg Armed Forces and the Directorate of Defence of the Ministry of Foreign and European Affairs
EDF	European Defence Fund <i>The EDF is a fund originally proposed by the European Commission to provide financial support to defence projects developed jointly at the European Union level. More specifically, it is an industrial European funding programme designed to finance innovative research and development (R&D) projects of interest to the European defence sector. It differs from PESCO in that it aims to support the industrial base by generating the broadest and most consensual multinational projects possible, on identified technological capability areas.</i>
EO	Earth Observation
EU	European Union
EUTM Mozambique	European Union Military Training Mission in Mozambique
GALILEO	<i>Galileo is a highly accurate satellite positioning system. The programme was initiated by the European Union.</i>
GEO	Geostationary Orbit <i>The Geostationary Orbit is located at an altitude of 35,786 km (commonly rounded to 36,000 km) and has the particularity of remaining permanently above the same point on the equator. The satellite is then stationary with respect to the Earth.</i>
GPS	Global Positioning System American Satellite Navigation and Tracking System
LEO	Low Earth Orbit <i>A LEO orbit is a circular orbit located between 400 and 2,000 km in altitude. This LEO orbit is mainly used to place observation and telecommunication satellites into orbit, but also for the International Space Station and other scientific missions.</i>
LUXEOSys	Luxembourg Earth Observation System
MEO	Medium Earth Orbit <i>The average Earth orbits are between 2,000 km and 35,786 km and are mainly used to place radio navigation (GPS, Galileo) and communication satellites.</i>
MINUSMA	United Nations Multidimensional Integrated Stabilisation Mission in Mali <i>MINUSMA is a United Nations peacekeeping operation in Mali. It operates due to the war in Mali and is the main component of the military intervention in Mali.</i>

NATO	North Atlantic Treaty Organisation
Orbit	<i>An orbit is the closed curve representing the path that a celestial object (satellite) draws in space under the effect of gravitation and inertial forces.</i>
PESCO	Permanent Structured Cooperation <i>PESCO is both an institutional process and a structuring framework enabling the EU to develop the necessary defence capabilities and to make them available for EU operations and missions, including the most demanding ones. The activation of PESCO is part of the implementation of the EU Comprehensive Strategy and is part of a wider process aimed at strengthening the EU's Common Security and Defence Policy (CSDP).</i>
PNT	Positioning, navigation and synchronisation system
Resilience	Resilience in the context of space capabilities is the ability to continue to function despite deficiencies or disruptions. A system will be resilient when the service provided by the system in orbit can be guaranteed despite the failure of one of its components.
R&D	Research and development
SATCOM	Satellite Communication system
SO	Strategic objective
SSA	Space Situational Awareness
STM	Space Traffic Management
Outer Space Treaty	<i>Treaty on the principles governing the activities of States in the exploration and use of outer space, including the moon and other celestial bodies.</i> <i>It is an international treaty from 1967 (ratified by Luxembourg) on the exploration and use of outer space. This treaty is a cornerstone of the Corpus Juris Spatialis and, among other things, laid the legal foundations for the exploration of space at a time when both the United States and the USSR were engaged in the exploration of space and the race to the Moon.</i>
UHF TACSAT	Ultra High Frequency for tactical satellite communication <i>The ultra high frequency (UHF) band is the band of the radio spectrum between 300 MHz and 3 000 MHz. Carried on board a satellite, this frequency band has the particularity of being able to allow communications using light tactical (radio) terminals.</i>
WGS	Wideband Global SatCom <i>The WGS system is a constellation of geostationary satellites operated by the United States Defense Department. Through a cooperative agreement, the programme's partner countries have access to the secure military satellite communications of the system.</i>

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