

June 2012



Filling the Vacuum

A Framework for a NATO Space Policy



**Joint Air Power
Competence Centre**

Cover picture  NASA

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FROM:

The Executive Director of the Joint Air Power Competence Centre (JAPCC)

SUBJECT:

Filling the Vacuum – A Framework for a NATO Space Policy

DISTRIBUTION:

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“War is regarded as nothing but the continuation of state policy with other means.”

Karl von Clausewitz

Space capabilities enable NATO to achieve its political aims with greater precision, fewer resources and in less time. Gradually, these attributes have led NATO to increasingly rely on space capabilities creating both opportunities and risks worthy of further exploration.

To minimise the risks and maximise the opportunities created by this shift, the Alliance would do well to consider the existing guidance and direction provided for space. The intent of this work is to suggest realistic policy prescriptions which preserve the prerogative of the providing nations while allowing the Alliance to defend and make the best use of the asymmetric advantage provided by space capabilities.

Policy can be a double-edged sword. It can lead to constraints and restraints which make the application of military force significantly more onerous for those that actually have to conduct the task at hand. However, the lack of policy means that critical decisions must be made in the moment of crisis which may not be the right environment in which to make the best choices. The chances of each individual decision contributing to a cohesive and well thought-out comprehensive approach are also lessened.

I commend this work to you as a starting point for a serious dialogue on the usefulness and scope of a realistic framework for a NATO Space Policy. As always, the JAPCC welcomes your comments and feedback. Please contact the C4ISTAR Branch Head Colonel Uwe Heilmann at +49 (0) 2824 90 2230 or C4ISTAR branch members at c4i@japcc.de with any communication you might have on this topic.

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A rocket lifts a satellite to orbit.

CHAPTER 1

Introduction

“Command and control of military forces, precise air power, missile guidance, troop movements, environmental reconnaissance, and missile warning all have come to depend, to a large degree, on information relayed by satellites.”¹

1.1 Aim and Scope

The JAPCC originally developed and refined this proposal as a portion of its contribution to the Allied Command Transformation (ACT) Space Integrated Project Team, known colloquially as the Space IPT. While the Space IPT subsequently decided to suspend its efforts on the policy front the JAPCC considers this particular effort still worthy of continued investigation. As a Centre of Excellence, the JAPCC offers advice that decision makers can accept, or not, as they see fit. The JAPCC intends with this document not to write a broad

NATO policy, but to help readers understand the operational impact of realistic and achievable specifically targeted policy prescriptions. The following proposal is intentionally narrow in scope and concentrated on the employment, coordination and defence of space capabilities used to support NATO operations and core business. By scoping the problem down to the essential elements, the aim is to identify the critical concepts supporting military activities. Table 1 on the following page shows a partial list of various NATO uses of space and associated systems.

1.2 Why Policy?

1.2.1 Why write a policy for anything? Before the answer to why, the first question is actually ‘what?’ For the sake of simplicity, this document will use the definitions of policy from Merriam-Webster:

V1: “A definite course or method of action selected from among alternatives and in light of given conditions to guide and determine present and future decisions.”²

V2: “A high-level overall plan embracing the general goals and acceptable procedures especially of a governmental body.”³

1.2.2 Given the above, the answer to ‘why’ policy is written is to:

- Guide decisions;
- Choose a course of action;
- Adopt and communicate goals and procedures.

1.2.3 At the operational level these key factors enable deliberate planning, inform the provision and prioritisation of resources, provide a basis for improvement, provide personnel with documented guidance to aid their work, and reduce the pendulum swings which changing personalities can induce in organisations. Ultimately, policy enables appropriate and advanced preparation.

1.2.4 From a political perspective, the value of policy is to enable oversight and coherence. When decisions are made in the absence of policy, they may

not aggregate into the outcome desired; especially if the desired outcome has not been previously determined and publicised.

1.3 Does NATO Need a ‘Space’ Policy?

1.3.1 Some raise legitimate questions about the need for a NATO Space Policy. As is often pointed out, NATO does not own satellites. NATO lacks policies for Air, Land and Sea (excepting the recent Alliance Maritime Strategy) yet continues to demonstrate competence in these domains. No adversary has challenged NATO’s use of space for operations. Why invest political effort to codify how the Alliance relates to space?

1.3.2 Ultimately the question is subjective and no matter what pros, cons or evidence is offered, reasonable people presented with the same information may well reach different conclusions. The question could just as easily be stated in the negative; namely “Why doesn’t NATO need a space policy?”

Space Capability	NATO Uses (not all inclusive)	Example Systems
Position, Velocity, Time and Navigation	<ul style="list-style-type: none"> • Precision strike • Force navigation • Support to PR/CSAR • Network timing 	<ul style="list-style-type: none"> • Global Positioning System (US) • Galileo (EU)
Integrated Tactical Warning and Threat Assessment	<ul style="list-style-type: none"> • Force protection • Attribution • Missile defence 	<ul style="list-style-type: none"> • Space Based Infrared System (US) • Spirale (FRA*)
Environmental Monitoring	<ul style="list-style-type: none"> • Mission planning • Munitions selection • Weather forecasting 	<ul style="list-style-type: none"> • Defense Meteorological Satellite Program (US) • EUMETSAT (EU)
Communications	<ul style="list-style-type: none"> • Command and Control • Unmanned Aerial Vehicle ops • Deployed communications 	<ul style="list-style-type: none"> • Syracuse (FRA) • SICRAL (ITA) • SKYNET (UK)
Intelligence, Surveillance and Reconnaissance	<ul style="list-style-type: none"> • Order of battle • Battle damage assessment • Targeting 	<ul style="list-style-type: none"> • SAR Lupe (DEU) • COSMO SKYMED (ITA) • HELIOS (FRA)

*Spirale was a tech demonstrator and is no longer operational.

Table 1: NATO Use of Space.

Consequently, we invite readers to recall the point of policy as a mechanism to guide decisions, chose a course of action and adopt and communicate goals while answering for themselves the questions below:

- Is space a unique operational domain requiring unique understanding and guidance?
- Would applying the concept of collective defence to space capabilities complicate an adversary's decision to interfere with their use and thereby aid NATO's deterrence posture?
- Would coordination among NATO space capability providers increase effectiveness on behalf of NATO?
- Are today's NATO forces adequately prepared to conduct operations without the assistance of space based enabling technologies such as satellite communications, global satellite navigation, ballistic

missile early warning, satellite intelligence and meteorological support?

- Can NATO make consolidated, consistent and coordinated measures to improve the use and defence of space capabilities?
- Is sharing space-derived information useful to operations and planning across the Alliance?
- Does today's use of space capabilities for NATO purposes equate to space weaponisation?
- Can NATO realistically achieve the ambitions of the 2010 Strategic Concept without proactively addressing the space domain?

1. Maj. Gen. Mark Barrett, Dick Bedford, Elizabeth Skinner, Eva Vergies, 'Assured Access to the Global Commons', Supreme Allied Command Transformation, North Atlantic Treaty Organization, Norfolk, Virginia USA, April 2011.
2. <http://www.merriam-webster.com/dictionary/policy>
3. *ibid.*



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Space is more than satellites.



An increasingly crowded environment.

CHAPTER 11

Space Basics

"Space is an integral part of everything we do to accomplish our mission. Today, the ultimate high ground is space."

General Lester P. Lyles

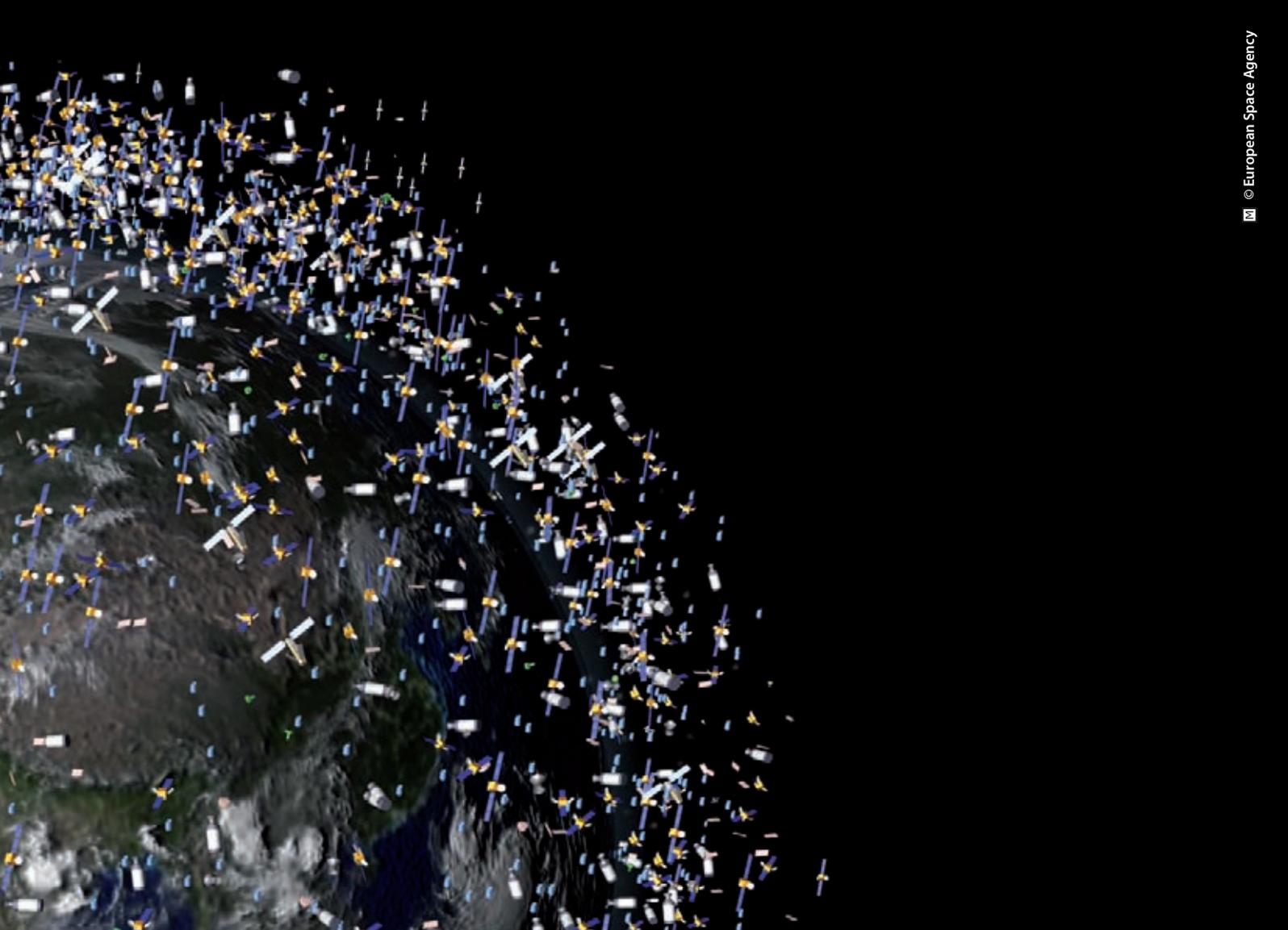
Further discussion first requires a basic, non-technical explanation of the relevant factors for military use of the space domain.

2.1 Elementary Orbital Mechanics

2.1.1 Johannes Kepler first described the physical laws governing planetary, and by extension satellite,

orbits in the 17th century. Readers need not understand the math behind the genius, but should be aware that all satellites must cross the equatorial plane twice during every orbit and lower satellite altitudes equate to faster satellite speeds.

2.1.2 These concepts are relevant because they equate to how much time a satellite will be available for use during a given orbit, the frequency of satellite availability over an area of interest, and the physical requirement for the satellite to leave an operational area of interest on its constant path to and from the equator. Once the orbit of a satellite is known, where it will be in the future can be predicted with reasonable accuracy. That means planners can predict when the satellite will provide the required coverage but also that a savvy adversary can hide from or deceive satellites.



2.1.3 Satellites in geosynchronous orbit move about the equator at the same pace as the earth rotates. In effect, they ‘fly formation’ with the earth. Therefore, they do not move out of view and provide persistence. However, this requires an orbital altitude of approximately 36,000 Km which complicates detailed earth observation. From geosynchronous orbit a satellite theoretically can ‘see’ 1/3rd of the earth (excluding the poles due to the curvature of the earth). In reality, satellites are often somewhat restricted in regarding everything so that they are focused to achieve their design purpose.

2.2 The Three Main Parts of a Space System

2.2.1 A space-based system notionally includes three main parts: a ground segment to conduct command

and control of the satellite, a space segment consisting of the satellite itself, and the end-user (see Figure 1 on the next page). These nodes are interconnected by electromagnetic uplinks/downlinks that carry commands, communication traffic, signals, telemetry and mission data. This is relevant because all elements of a space-based system must work in concert for reliable use of the capability.

2.2.2 Satellites consist essentially of two interdependent portions: bus and payload. The bus provides the structure and other elements necessary to make the spacecraft function. The payload does the mission. Satellites may have multiple payloads if the bus can supply the physical space and other operational requirements such as power supply, heating and cooling. Operational users ordinarily focus on payload

Three Segments of Satellite Operations

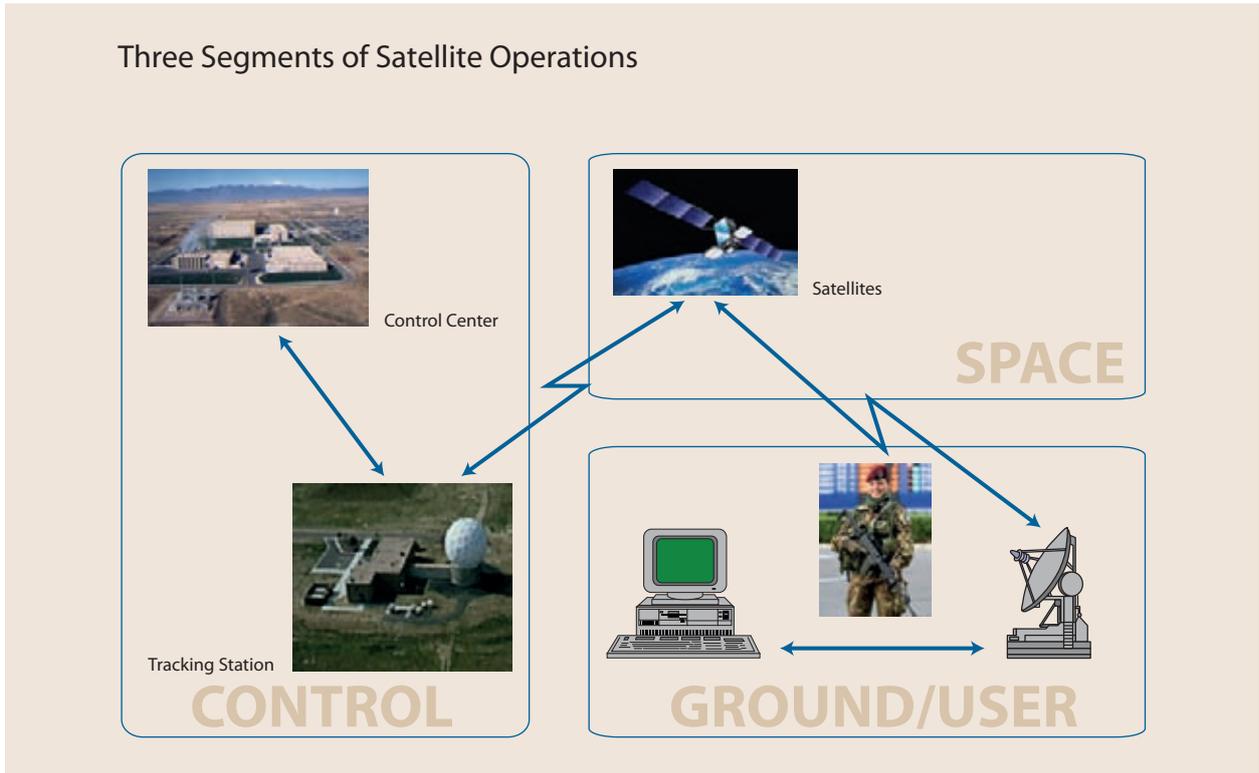


Figure 1: The Three Segments of Satellite Operations.

capabilities but need to understand that hardware limitations associated with the bus may prevent delivery of some desired capabilities.

2.2.3 Because satellites are constantly in motion, one fixed site location on the ground cannot provide continuous access (excepting the special case of the geosynchronous orbit). This can lead to the requirement for multiple global locations, deployable systems, and/or satellite memory storage for transmission once in view of a ground site.

2.2.4 The end-user is the consumer of the payload service. However, another intervening level of ground support may be required. For example, the European

Union Satellite Centre and the United States Air Force 'Eagle Vision' system use existing contractual relationships with on-orbit commercial satellite imaging companies to deliver analysed information to users. Centres such as these convert the data collected by the satellites into information end-users can use in pursuit of objectives.

2.2.5 All of these elements are connected by electromagnetic links. While some minimal interruption in the command and control system to the satellite is anticipated and planned for, an interruption of the satellite transmission to the ground can result in mission failure. Over time, an interruption of the control link to the satellite also may result in a mission failure.



NATO's stated ambition and strategic focus.

CHAPTER III

NATO Ambition

“Europe needs to have access to the best affordable capabilities for autonomous political assessment, sound decision-making, prevention policies and the effective conduct of actions. The new threats are dynamic and global; the first line of prevention of and response to crisis situations is often abroad. Space assets provide a significant contribution to confronting these threats through global monitoring, communication and positioning capabilities.”

3.1 Analysis of Space Capability Requirements: NATO Strategic Concept 2010

A review of the 2010 Strategic Concept ‘Active Engagement, Modern Defence’ reveals NATO’s ambitions. According to the Strategic Concept, NATO’s es-

sential mission is “to ensure that the Alliance remains an unparalleled community of freedom, peace, security and shared values”². The rest of the Strategic Concept defines how the Alliance intends to accomplish that mission. By realistically understanding both what the Alliance hopes to achieve and how space capabilities support those activities we can understand what, if any, shortfalls need to be addressed.

3.1.1 Including a preface and essentially a conclusion, the Strategic Concept is comprised of 10 main topic areas:

- Preface;
- Core Tasks and Principles;
- The Security Environment;
- Defence and Deterrence;
- Security Through Crisis Management;
- Arms Control, Disarmament, and Non-Proliferation;
- Open Door;
- Partnerships;
- Reform and Transformation;
- An Alliance for the 21st Century.

3.1.2 The Strategic Concept mentions space directly only once. This occurs in the Security Environment topic area stating, “A number of significant technology-related trends – including the development of laser weapons, electronic warfare and technologies that impede access to space – appear poised to have major global effects that will impact on NATO military planning and operations.”³

3.1.3 There are however a number of other declarations that indirectly refer to space or are dependent on space capabilities. In fact, many of the tasks NATO

has decided to undertake in order to achieve its strategic mission involve the use of space capabilities. This makes perfect sense; space is commonly used to meet Alliance objectives. The Strategic Concept is evidence of space capability reliance without explicit recognition of the role space plays by enabling the capabilities which NATO has come to depend upon. A sampling of these specified and implied tasks is provided at Table 2.

3.1.4 Space capabilities tend to be integrated at the developmental level making them largely transparent

Strategic Concept Declaration	Specified and Implied Space-Related Tasks
Safeguard the freedom and security of all members by political and military means	Provide strategic intelligence, missile warning, satellite navigation, satellite communication
Deter and defend against threats, including emerging security challenges, where they threaten fundamental security of individual Allies or the Alliance as a whole	Develop credible deterrence mechanisms for space systems and defensive measures to preserve space capabilities in support of operations should deterrence fail
Enhance international security through partnerships, contributing to arms control, non-proliferation and disarmament	Conduct non-invasive treaty monitoring to aid international efforts to control arms and non-proliferation
Countries are increasingly reliant on communication, transport and transit routes for international trade, energy and prosperity	Provide for secure, defensible, and redundant satellite communications as a mechanism through which international trade is regularly conducted
Environmental and resource constraints including water scarcity and increasing energy needs have potential to significantly affect NATO planning and operations	Provide persistent, non-invasive, global monitoring to warn of emerging crises
Maintain the ability to sustain concurrent major joint operations and several smaller operations for collective defence and crisis response, including at strategic distance	Provide the virtual infrastructure required for modern military operations including satellite communications, remotely piloted vehicles and all-weather precision strike
Develop a ballistic missile defence capability for populations and territory	Conduct space operations to enable all phases of Integrated Air and Missile Defence defined as: <ul style="list-style-type: none"> • Surveillance • Battle Management, Command, Control, Communications, and Intelligence • Active Air Operations • Passive Air Operations
Be prepared to contribute to stabilisation and reconstruction	Aid host-nations by providing satellite communications, navigation and imagery to plan and monitor reconstruction efforts

Table 2: Strategic Concept Specified and Implied Tasks for Space Capabilities.

to operators and planners. Also, a limited number of personnel are charged with guidance and oversight of space capabilities. Further reducing the visible footprint, NATO no longer owns or operates any satellites. NATO currently uses on-orbit capabilities as provided by Nations or purchased from commercial entities. However, because space systems are not simply comprised of orbital spacecraft, this does not mean that NATO owns no space capabilities. These capabilities will be briefly discussed later in this document at paragraph 5.3.4.

3.1.5 In light of the specified and implied tasks above the Alliance should decide if the use of the space domain for operations constitutes a requirement for active management, guidance and oversight given perceived shortfalls in:

- Personnel and procedures to coordinate space activities for Alliance operations;

- Personnel and procedures to ensure NATO space requirements are understood and met;
- Personnel with the training, education and responsibility to develop and implement deterrence and defence mechanisms for space capabilities;
- Rapid response options to mitigate degradation in space support;
- Incorporation of space-related tasks into relevant training and education forums;
- Awareness of the space domain as it impacts NATO operations.

1. European Commission's Space for Security Web Page.

2. 'Strategic Concept For the Defence and Security of The Members of the North Atlantic Treaty Organisation', Preface.

3. IBID, Number 14.

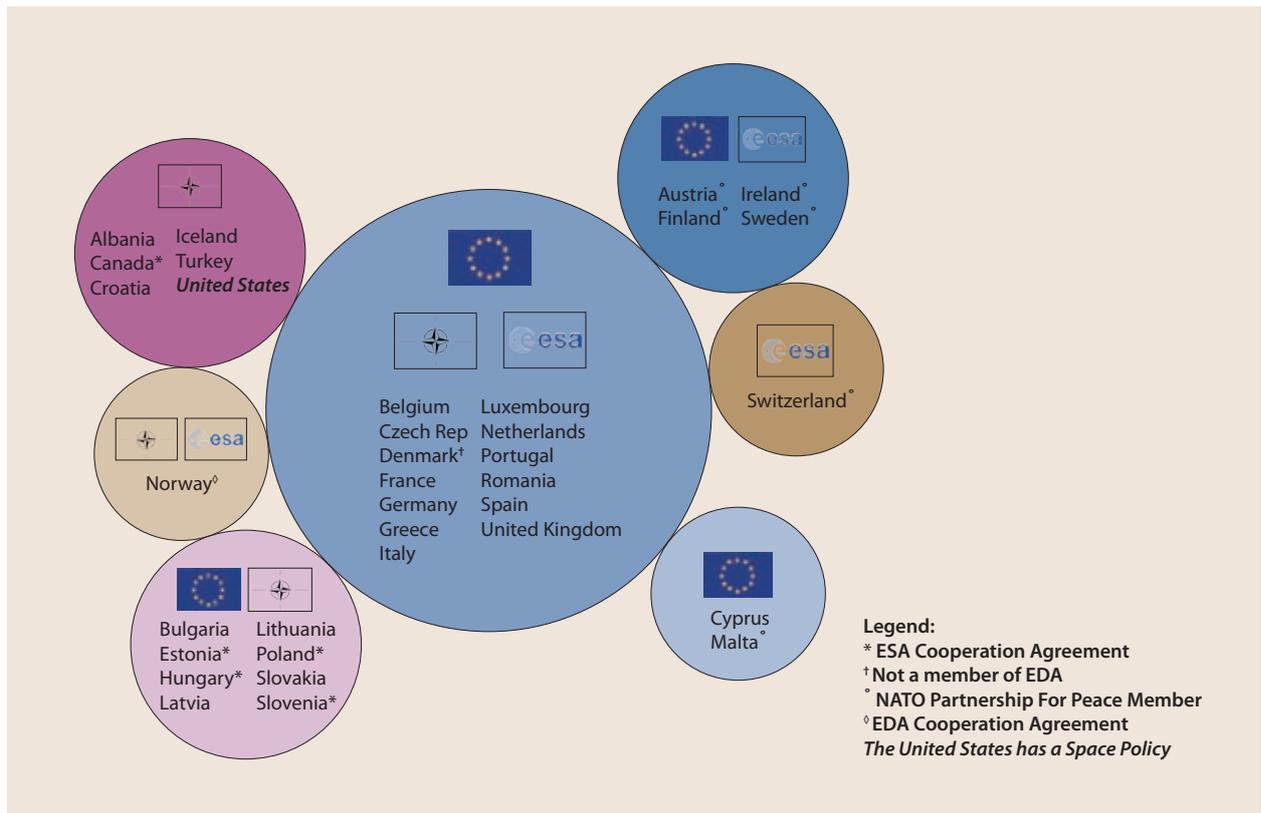


Figure 2: Transatlantic Space Cooperation: 35 Nations.

CHAPTER IV

Commonalities and Complexities

“In common with the other major space powers, it therefore appears that in Europe space is acknowledged at a high political level by all of the actors involved as an important factor in helping to meet the needs of citizens.”

4.1 Current Space Policy for NATO Nations

4.1.1 Often the issue of space is complicated within NATO because of the perceived political difficulties associated with the domain. This most likely results from the Cold War roots of the Alliance when space activities were largely the preserve of the United States and the Soviet Union and the spectre of nuclear con-

flict loomed large. However, even before the end of the Cold War, and certainly in the decades since, access to space capabilities has expanded dramatically with more than 60 nations and organisations currently in space.² Figure 2 shows the transatlantic space cooperation between 35 nations belonging to NATO, European Union (EU) and/or European Space Agency (ESA).

4.1.2 Within Europe, this has led to the development of both capabilities and political guidance, including guidance on the use of space capabilities for security and defence. In 2007, the EU agreed to create a European Space Policy in article 172a of the Lisbon Treaty.³

4.1.3 In 2010 the US invested roughly triple that of the next 11 Nations worldwide combined in the space domain.⁴ This disparity in spending is not a recent occurrence but indicative of a long-term trend. As one might expect given this level of investment, the US has a robust and mature space policy. In fact, the first US Space Policy was published under the Eisenhower

administration and each subsequent administration has felt compelled to release a revised policy sometime during its tenure. The Obama administration released the most current iteration in 2010.⁵

4.1.4 Of the 28 Nations in NATO, 21 are directly covered by the now existing EU Space Policy by virtue of their membership in that body.⁶ That leaves six Nations in NATO not explicitly covered under either the EU or US Space Policy. Norway, while not a member of the EU, is a member of the ESA and a cooperating state with the European Defence Agency. The remaining Nations are: Albania, Canada, Croatia, Iceland and Turkey. None of these Nations has a published national space policy. However, Canada has 32 payloads on orbit and Turkey has six.

4.1.5 Significant publicly stated philosophical differences on the use of space for military purposes for 23 of 28 NATO Nations are not apparent. The remaining Nations have not, at least publicly, stated opposition to the space policy positions of the EU or US. A compilation of the basic principles guiding the policies of both the European Union and the United States is included in Annex B. Taken in total, both policies express:

- Space applications benefit society and private citizens;
- Space applications may be used for security and defence;
- Strong and competitive space industries are vital to progress and growth;
- Space exploration and science contribute to knowledge based societies and benefit humanity;
- Sovereignty and independence are essential.

4.1.6 Despite these similarities, US Space Policy is far more robust in its assertion of national rights to freedom from purposeful interference in space. This indicates that the US perceives a greater risk of conflict in space than is apparent in the EU Space Policy. In line with this, US Space Policy clearly states the

intent to contribute to the defence of Allied space systems. Yet without reaching agreements with the Allies in advance of the need to take defensive measures, it is unclear how the US could make good on this intent.

4.2 International Norms

4.2.1 In 2008, the EU drafted a Code of Conduct for space activities which was generally well received by the international community and with negotiation and modification is likely to be eventually adopted by major space-faring nations. In the first draft, subscribing states to the code voluntarily police themselves in accordance with four principles:

- The freedom of access to, exploration and use of outer space and exploitation of space objects for peaceful purposes without interference, fully respecting the security, safety and integrity of space objects in orbit;
- The inherent right of individual or collective self-defence in accordance with the United Nations Charter;
- The responsibility of States to take all the appropriate measures and cooperate in good faith to prevent harmful interference in outer space activities;
- The responsibility of States, in the conduct of scientific, commercial and military activities, to promote the peaceful exploration and use of outer space and take all the adequate measures to prevent outer space from becoming an area of conflict.⁷

4.2.2 The code is in keeping with the 1967 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies'. Widely accepted as one of the primary sources of international space law, the Outer Space treaty primarily addresses two concerns with regard to the weaponisation of space: orbital nuclear weapons or other weapons of mass destruction and the use of celestial bodies for the conduct of military operations.⁸ The treaty, as commonly interpreted, does not forbid the use of space capabilities such as

satellite navigation, satellite communication, weather monitoring, intelligence gathering or missile warning for military purposes.

4.2.3 In keeping with these international norms on the use of space for security and defence, the EU does not prohibit the use of space capabilities for military purposes. According to the website of the European Commission, "Space infrastructures can be put at the service of the European Union's security needs. Global Monitoring for Environment and Security (GMES) and the Galileo global navigation satellite programme, whilst being civil systems under civil control, may have military users."⁹

4.3 Militarisation and Weaponisation of Space

It is important to clarify here the difference between military use of space and weaponisation of space. Space-enabled capabilities, such as Beyond Line of Sight command and control of Remotely Piloted Vehicles, are intrinsic to the modern battlefield. The use of satellite navigation to aid weapons delivery is another accepted legitimate use of space capabilities. In fact, not using satellites for this application could result in using a larger number and/or more powerful, weapons to create the same effects, putting populations and property at greater risk. The accuracy and dependability of this particular combination has even

led to the development of purely kinetic weapons without high explosive to further limit unintended consequences. The advantages afforded by these capabilities indicate that their abandonment at this stage is unlikely. The principal differentiation between these applications and weaponisation of space is the use of a terrestrial intermediary. For example, were satellites to drop munitions directly from orbit, many would consider those to be space weapons even though the effect might be similar to that achieved by Joint Direct Attack Munitions dropped from Remotely Piloted Vehicles using satellite communications and guided to their targets via the Global Positioning System. Though not expressly forbidden, there are no known such systems in existence today.

1. Towards a Space Strategy for the European Union that Benefits its Citizens, April 2011.
2. Lynn, William J., Remarks on Space Policy, published in *High Frontier: The Journal for Space and Cyberspace Professionals*, Volume 7, Number 2.
3. Treaty of Lisbon amending the Treaty on European Union and the Treaty establishing the European Community, signed at Lisbon, 13 December 2007, Article 172a.
4. Spyros Pagkratis, *Space Policies, Issues and Trends in 2010/2011* European Space Policy Institute, June 2011 (Source: ESPI Report 35, all rights reserved). Figure, pg 13. In 2010 the US spent \$48 Billion while Russia, Japan, France, China, Germany, India, Italy, the UK, Canada, Spain and South Korea combined spent \$16 Billion.
5. National Space Policy of the United States of America, 28 June 2010.
6. European Space Policy, 26 April 2007.
7. Council Conclusions on the draft Code of Conduct for outer space activities, 8–9 December 2008.
8. "States Parties to the Treaty undertake not to place in orbit around the Earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction, install such weapons on celestial bodies, or station such weapons in outer space in any other manner. The Moon and other celestial bodies shall be used by all States Parties to the Treaty exclusively for peaceful purposes. The establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military maneuvers on celestial bodies shall be forbidden. The use of military personnel for scientific research or for any other peaceful purposes shall not be prohibited. The use of any equipment or facility necessary for peaceful exploration of the Moon and other celestial bodies shall also not be prohibited."
9. http://ec.europa.eu/enterprise/policies/space/esp/security/index_en.htm

CHAPTER V

Proposed Policy Framework

“There are at least five major areas of concern for NATO in space: evaluating, determining, and articulating NATO’s needs in space; planning and training for access denial and operations in a degraded environment; improved space situational awareness and protocols for sharing information; developing agreed policy for NATO’s use of national assets in space; and the accrual of a dedicated cadre of space experts, along with the creation of a NATO space office.”¹

5.1 Proposed Policy: Guiding Principles

5.1.1 The five proposed NATO principles at Table 3 (on the next page) reflect a more narrow focus, also captured in the title, than those of the EU and the US. The intent is to concentrate on the employment,

coordination and defence of space capabilities on behalf of NATO operations and core business. This automatically limits the scope of the proposal to the most pressing areas of operational concern. By scoping the problem down to the essential elements, the aim is to identify the critical concepts with broad acceptance and military utility. It is assumed that any NATO policy must have coherence with existing policies such as those of the EU and the US, but not substantially reiterate them.

5.1.2 The proposed principles for the Alliance line-up with the policies of the EU and the US by:

- Respecting sovereignty and National control while acknowledging the benefits of coordination;
- Providing the basis for expanding the concept of collective defence to space capabilities in proportion to their recognised economic and societal importance to NATO Nations;

The first launch of the Space Shuttle.



Proposed Guiding Principles

Alliance collective defence and security is applicable to space capabilities supporting NATO operations

International standards and norms contribute to the preservation of space capabilities for all

The coordination of Nationally owned and controlled space capabilities will result in improved operational effectiveness and efficiency for the Alliance and Nations

Space capabilities, along with technology in general, are rapidly improving resulting in the levelling of previously stark disparities

Coordination and collective defence of space capabilities employed on behalf of NATO is an active and continuously evolving process

Table 3: Five Proposed Guiding Principles for a NATO Space Policy.

- Recognising the principle of 'space for peaceful purposes' (to include security and defence applications);
- Recognising the technological and economic impetus for space activities in concert with the lowering barriers of entry into the domain;
- Recognising the need to translate stated policy into on-going action.

5.2 Implications of the Proposed Guiding Principles

Taken in total, the guiding principles were drafted as they were to:

- Provide deterrence by openly communicating Alliance understanding of space capability importance in their role as critical enablers of NATO operations and their importance to national economies;
- Communicate Alliance conviction in the use of space for peaceful purposes as defined by both European and US policy documents;
- Create an environment for cooperation and coordination, but not command or control, of sovereign space capabilities operated in pursuit of NATO objectives in recognition of the potential for increased effectiveness and efficiency;

- Provide a basis for increased cooperation with the realisation that all technology is rapidly improving and qualitative, if not quantitative, parity could be a basis for agreements;
- Create an environment where space capabilities are viewed and addressed holistically with the intent of adding coherence and direction on a continuous basis.

5.3 Proposed Policy: Definition

5.3.1 Operations in space are not really analogous to operations in other domains, though they do share some similarities. For example, you could compare the natural motion of the tides with the natural progression of an orbit. A satellite does not have a sortie time. It is either in position for use or it is not. When General MacArthur planned the amphibious landing at Inchon in 1950 he timed the operation to the natural cycle of the tides. To do otherwise would have meant certain failure. This is a simple example of how military operations take natural phenomenon into account when conducting operations. Orbits are natural phenomenon like the tides. Just as General MacArthur relied on subject matter expert knowledge and timing of the tides to conduct the landing at Inchon, so too must the natural environment of space be understood if space capabilities are to be optimally employed.

5.3.2 Recalling the intentional limit to the scope of the proposal and recognising the fact that there is no internationally accepted definition of where 'space' begins; the intent is to put the emphasis on the functions of space capabilities supporting NATO operations. Therefore, the proposed definition of space capabilities is:

NATO space capabilities are orbital and non-orbital capabilities whose primary function is to deliver products and applications supporting NATO operations in the doctrinal mission areas of: space force enhancement; space control; space support; and space force application.

5.3.3 The doctrinal mission areas of space force enhancement, space control, space support and space force application are codified in Allied Joint Publication 3.3 (A) published in November, 2009.²

5.3.4 Written in this way, the definition would specifically include:

- Craft or vehicles designed to operate at altitude in the absence of any aerodynamic control for any portion of their operations profile and their related launch facilities;
- Terrestrial facilities designed and/or operated to monitor, command, control and communicate with craft or vehicles as referenced above and/or other similar terrestrial facilities;
- The electromagnetic links used to monitor, command, control and communicate with craft or vehicles as referenced above;
- The personnel trained to operate, employ, acquire, maintain and defend craft, vehicles or facilities as referenced above;
- User equipment such as tactical data processors and receivers specifically designed and/or operated to receive information from other space capabilities.

5.3.5 The intent behind this definition is to move away from space as a location and begin the process

of identifying operational requirements. Under this definition, NATO **does** own space capabilities today, just not orbiting spacecraft as described in the first bullet above. Specifically, the Alliance owns and operates two large satellite communications ground stations along with several high capacity Transportable Satellite Ground Terminals and a host of smaller tactical terminals.³ The Alliance owns an untold number of GPS receivers and there are certainly personnel within the Alliance that meet the definition.

5.3.6 The fact that NATO presently conducts space related activities is a key point. The current approach is related more so to functional areas such as communications and intelligence. This approach has clearly borne fruit; the Alliance is capable of using space capabilities today. However, it stands to reason that more tightly associating these capabilities and resources under a common policy would improve overall guidance and oversight while allowing NATO to develop something akin to Air Power in the space domain.

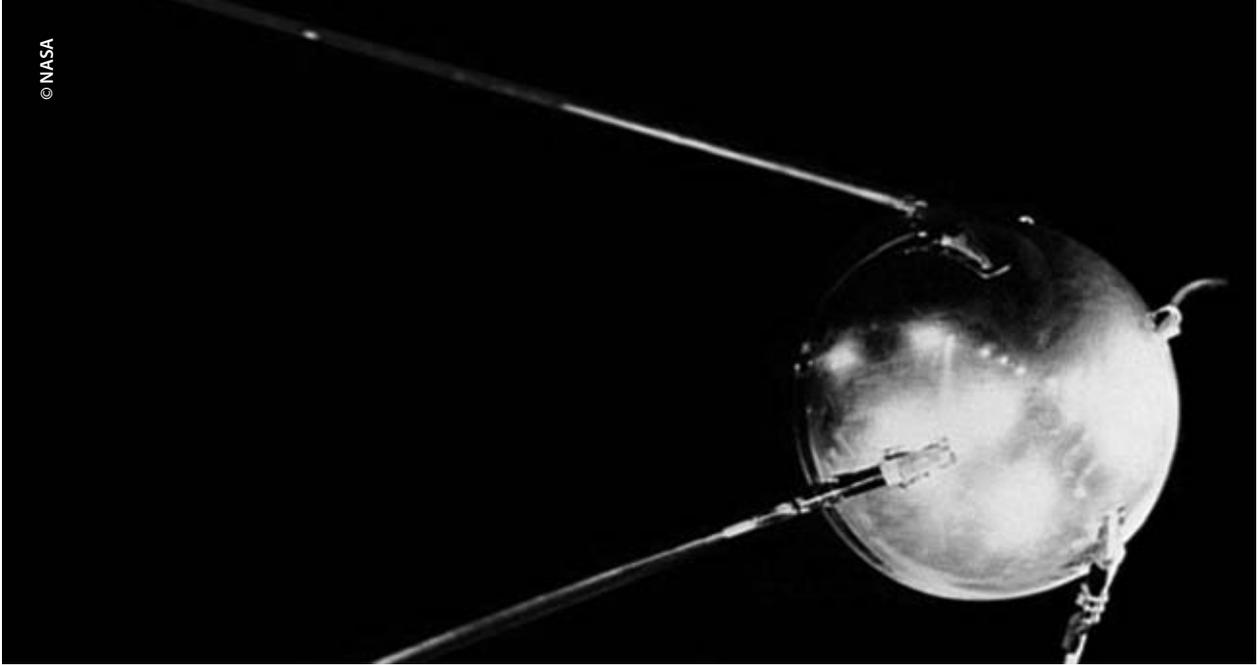
5.4 Proposed Policy: 7 Tenets

Following from the guiding principles and definition, 7 tenets are recommended to further define NATO's approach to space. Each of these tenets is further amplified in order to provide the rationale behind the concept. A full compilation of the proposed policy framework is included at Annex A.

5.4.1 Tenet 1

Space capabilities help underpin international stability, well-being, security and peace as well as the individual and collective capacity of Nations to provide deterrence, resist armed attack and manage crises. Therefore, NATO seeks to preserve and protect access to space-based capabilities in keeping with international norms and existing treaties.

5.4.1.1 Amplification: The fundamental and enduring purpose of NATO is to safeguard the freedom and security of all members by political and military means.



Sputnik announced the space age to the public.

Because modern economies operate globally, national freedom and security are no longer strictly limited to a nation's territorial boundaries.

5.4.1.2 The intent of the first tenet is to communicate the importance of space capabilities and set the stage for the development of protective activities within the scope of existing norms and laws. Given the importance of space capabilities for the functioning of National economies, it is conceivable that purposeful interference with spacecraft could impact a Nation's security. As stated in the Assured Access to the Global Commons Report, "In the civil sector of the most developed nations, loss of space and its cyber-enabled backbone would bring certain areas of commerce, finance and government to a halt for the days or weeks it would take to devise work-around systems."⁴ The trend towards greater reliance on space capabilities implies that the Alliance's dependence on space will not simply grow and contract linearly with the stated level of ambition but in fact will only increase as space capabilities enable greater portions of Alliance national economies.

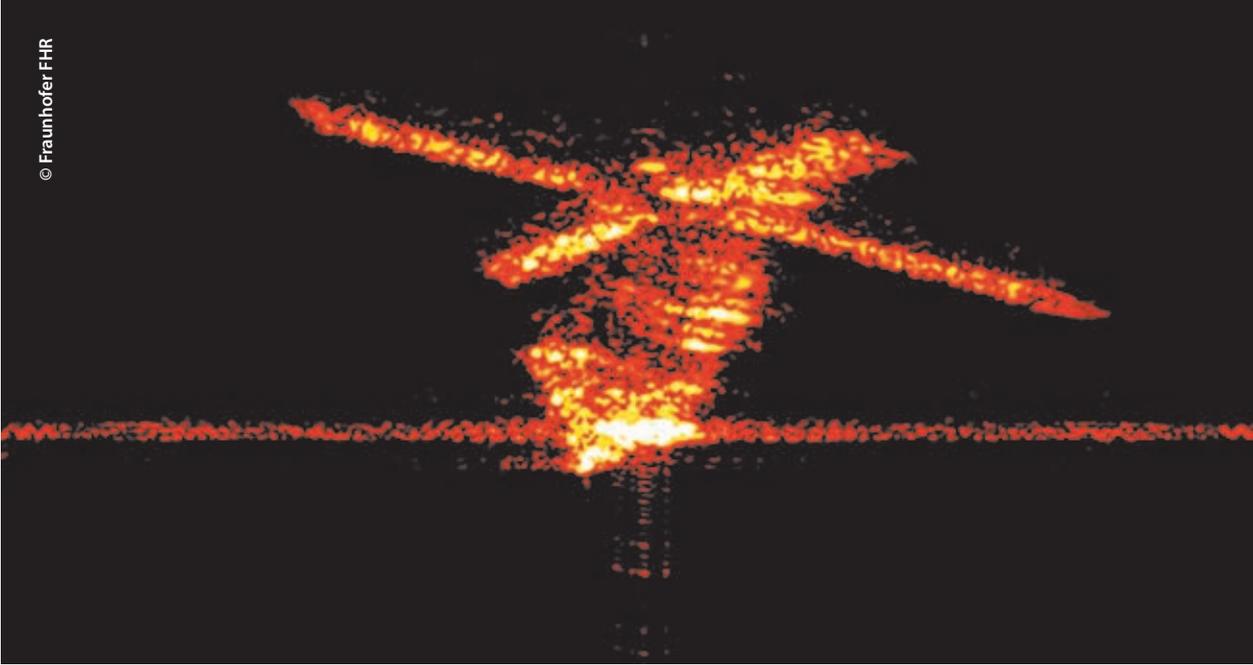
5.4.1.3 The Alliance's use of space capabilities for operations has gained significant attention over the last two years, particularly after release of JAPCC's NATO Space Operations Assessment Report revised in January 2009⁵. Space capabilities can meet unique mission requirements that other capabilities simply cannot. Space capabilities contribute significantly to minimising logistical footprints and civilian casualties.

They help protect forces by gathering and disseminating information. They contribute to the unparalleled ability to deploy and sustain forces as well as NATO contributions to stabilisation and reconstruction identified in the Strategic Concept.⁶ In short, space capabilities contribute significantly and legitimately to NATO operations. Therefore, the Alliance should carefully consider the reliance of operations on space-based enablers, determine whether reliance warrants contingency plans, and whether contingency plans can be developed without established guidance.

5.4.1.4 This tenet also assumes NATO can gain deterrent value and a measure of space protection by explicitly stating Alliance intent to defend contributing nation space capabilities. Because there is no internationally accepted definition of where space begins, it is conceivable that an actor in the future could exploit this ambiguity in their favour. If NATO publicly stated its intentions with regard to space capability defence, the Alliance may deny that ambiguity and potentially gain deterrent value.

5.4.2 Tenet 2

NATO is committed to the concept that space is open to all Nations for peaceful purposes. The Alliance will engage with the international community to prevent misunderstanding and build partnerships while improving its ability to coordinate and preserve space capabilities for NATO operations. To



Ground-based radar image of ESA's Automated Transfer Vehicle.

that end, NATO supports the development of space capability Transparency and Confidence Building Measures (TCBM) and the development and sharing of Space Situational Awareness (SSA), to include the ability to attribute space capability activities to terrestrial actors, as a prerequisite for safe and responsible space operations.

5.4.2.1 Amplification: There is, perhaps legitimate, fear that space will become a battleground and that an arms race in space is unavoidable. It is in NATO's best interest to contribute to stability and avoid suspicions that lead other Nations to decide they have no choice but to pursue counterspace capabilities. It is already the explicitly stated position of most NATO nations to conduct space activities in accordance with international norms and laws and this tenet serves to further communicate openly with the public and non-NATO nations to that end. Of course, the term 'peaceful purposes' is assumed here to encompass the standard understanding that the use of space capabilities for military operations remains legitimate.

5.4.2.2 Readers may recall from earlier that 'Partnerships' is one of ten main headings of the Strategic Concept. The Strategic Concept asserts that Euro-Atlantic security is best assured through dialogue and cooperation with a global network of countries and organisations based on reciprocity, mutual benefit and mutual respect.⁷ Partnerships in the space domain may contribute as a practical thread of this strategic initiative.

5.4.2.3 Transparency and Confidence Building Measures (TCBMs) are designed to prevent suspicion, build international credibility and prevent miscalculations based on imperfect knowledge. The concept of TCBMs related to space, though not necessarily specific TCBMs, is gaining acceptance in NATO nations. NATO need not specifically develop or propose TCBMs, but NATO support for TCBMs will align Alliance activities with the current international trend. The act of publishing a policy would in itself contribute to transparency.

5.4.2.4 With regard to TCBMs, one of the primary limitations highlighted by Ms. Jana Robinson of the European Space Policy Institute (ESPI) is "they tend not to enforce monitoring and verification provisions and require participants that are willing to cooperate fully"⁸. Robinson also points out that, "Engaging in TCBMs can be a politically treacherous path, especially in those instances where each step has to be continuously calibrated. The abuse of TCBMs can also leave politicians politically exposed"⁹.

5.4.2.5 This is one of the reasons NATO should seek to develop its awareness of the space domain. The doctrinal term for this concept is Space Situational Awareness (SSA), defined as, "the result of sufficient knowledge about space-related conditions, constraints, capabilities and activities (both current and planned) in, from, toward or through space"¹⁰. Nations within NATO, particularly the United States, United Kingdom, France and Germany, have

developed or are developing SSA capabilities. The European Union is also endeavouring to develop an SSA capability. Sharing the information from multiple producers in a NATO context would improve the combined knowledge of all and thereby enhance SSA. Adopting a shared SSA approach within NATO may aid the ability to attribute space capability activities to terrestrial actors; a known shortfall in the current system. This will help protect against abuses of TCBMs by adding an additional layer of independent verification as well as contribute to deterrence by providing evidence that can be used to counter denials and justify proportional responses.

5.4.3 Tenet 3

National and commercially provided space capabilities currently enable and enhance NATO operations by providing intelligence, surveillance and reconnaissance, communications, command and control, meteorological data, position, navigation and timing, and ballistic missile launch early warning.

NATO's first priority for these space capabilities is thus to assure their continued delivery in support of NATO operations.

5.4.3.1 Amplification: The intent of this tenet is to clearly define capability preservation as the top priority. All NATO Nations provide physical force protection for their troops. However, those same troops, to a greater or lesser extent, use space capabilities to accomplish their tasks. These capabilities also require protection so that the mission can be accomplished.

5.4.3.2 The Strategic Concept acknowledges the emergence of technologies that could limit access to space capabilities and therefore impact NATO planning and operations. During World War II, the Allies attacked German petroleum, oil and lubrication industries because the manoeuvre warfare of the day required fuel. Modern warfare still requires fuel, but just as important is a thirst for massive volumes of information. Ultimately, it is the information that space capabilities gather and disseminate that



Italy's SICRAL 1B; part of NATO's leased SATCOM program.

makes them so important to NATO operations. While the previous tenet makes clear to the international community that NATO will act responsibly in the space domain, this tenet conveys legitimate preparedness to defend capabilities that have become key enablers.

5.4.3.3 Explicitly stating this concept in a tenet would provide a solid linkage between Strategic Concept tasks to conduct training, exercises, contingency planning and information exchange against emerging security challenges to the space domain. It would also add more specificity to the requirement to assess the security impact of emerging technologies and ensure military planning accounts for those potential threats.

5.4.4 Tenet 4

Space capabilities are integral to Alliance activities and require general space education as well as the development, certification and management of

personnel from across the Nations. NATO seeks the capability to plan for the optimal employment and defence of space capabilities as a fundamental part of Alliance planning and operations. NATO will identify positions throughout the command structure to accomplish these functions and request personnel to fill them.

5.4.4.1 Amplification: The point has been made that space is ingrained in the architecture of NATO. It is part of how the Alliance fights and essential to the ability of NATO to effectively execute the Strategic Concept. The intent of this tenet is to convey the importance of developing personnel to ensure the Alliance can meet its strategic intent.

5.4.4.2 Those that have recognised the importance of space have tended to lump space together with air. This tends to frustrate those more closely associated with the air domain because they have false expectations about what space capabilities can provide, who can task them, their flexibility



French space professionals at Schriever Wargame 2012 International.



Partnering – a proven and cost effective model.

and persistence. In the worst cases this frustration leads to the many positives of space capabilities being simply ignored because personnel have not been properly equipped to weave them together with terrestrial capabilities into the scheme of manoeuvre.

5.4.4.3 Defence budgets are shrinking and austerity is the order of the day. However, the force structure has to reflect current operational realities as well as fiscal realities. This might not mean a net addition of uniformed personnel as much as changing the demographics of certain positions. In other words, instead of having a requirement for four pilots or ground based air defenders perhaps it would be better to modify the requirement so that one of the four is a

certified space operator. This results in no total increase in personnel but broadens the experience and skill set of the entire group potentially resulting in innovative solutions that save money in the long-run.

5.4.4.4 The key is that it must be an active process. Returning again to the specified and implied tasks associated with the Strategic Concept, it is fair to ask; What NATO entity is currently organised, trained or equipped to take the required actions?

5.4.5 Tenet 5

The effective use of information, including that derived from space capabilities, is paramount to NATO operations. The responsibility to employ Nationally

provided and controlled space capabilities and to plan for their preservation falls across multiple disciplines and organisations within Nations and the Alliance. NATO will coordinate space capability activities supporting NATO operations in order to aid the Alliance and Nations to remain effective, efficient and flexible.

5.4.5.1 Amplification: One of the key concerns regarding any space policy NATO might hope to adopt is the issue of sovereignty and control. Space capabilities have historically required large expenditures to field and are deployed to support national activities first and foremost. Nations are understandably reluctant to cede any control over their sovereign assets or accept any constraints on their use. This tenet recognises this fact and makes clear that NATO should not seek command and control over space capabilities owned by the Nations. However, when capabilities are supporting NATO operations the Alliance has an interest in ensuring a coordinated effort to cover all tasks effectively. With coordination, all Nations can use their limited resources more efficiently. This not only aids Alliance operations, but will also enable Nations to assess how best to allocate their resources between National tasks and NATO support.

5.4.5.2 One way to conduct this activity is by using the Joint Force Commander's (JFC) existing Space Coordinating Authority (SCA) as documented in AJP 3.3 (A). The function of SCA is "to coordinate joint space operations and integrate space capabilities"¹¹. However, the existing doctrine does not describe an enduring mechanism to match specific NATO-nation mission requirements with available national capabilities due to the recognition that coordination at the strategic political level is likely required to fully access national space assets.¹² This policy tenet would enable the practical development of an agreed-to and documented process to match NATO-nation capabilities to NATO operational requirements at the proper level. This will require information about the details of who is being supported with a given service and for what reason. Space capabilities may not exist in sufficient quantities to support all users simultaneously in certain circum-



The Joint Force Command conducts SCA.

stances. This could result from active intervention by an adversary or a simple shortage based on multiple competing requirements. NATO will need to know what capabilities are available or could be made available and then prioritise limited resources in order to preserve maximum mission effectiveness.

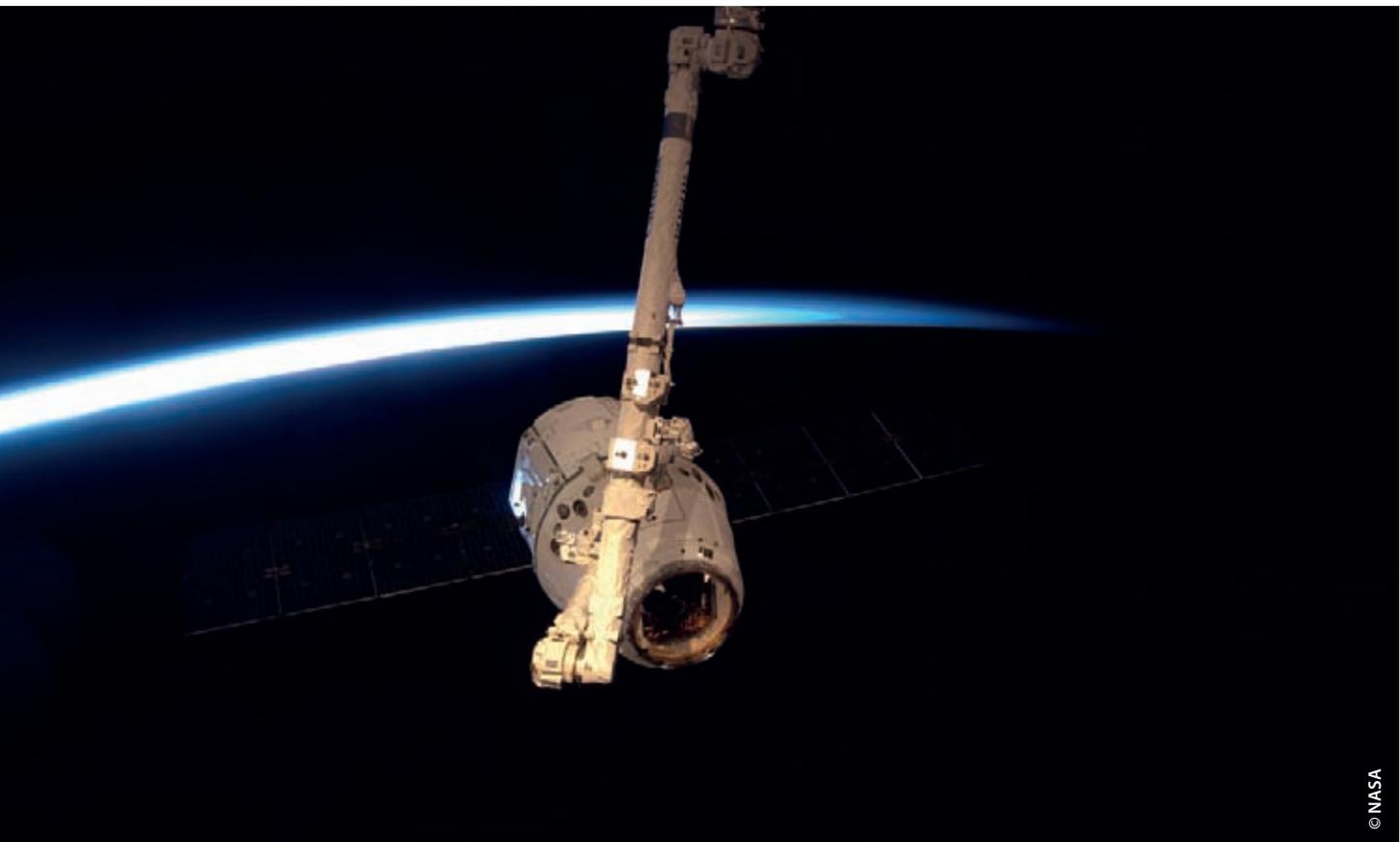
5.4.5.3 Sharing information and coordinating activities offers wide ranging benefits supporting NATO and national objectives that should be weighed against the risks of divulging information critical to an individual nation's security. On the ground, users gain the benefits of better coordination and efficiency. For space assets, a measure of protection is achieved through increased awareness of the space domain. For example, if the satellites of two nations are simultaneously experiencing similar problems, that could be an important data point for satellite operators in each nation. NATO does fuse some of this information together. This tenet codifies what already happens and could serve as a spur to increased sharing.

5.4.6 Tenet 6

NATO will ordinarily meet space capability requirements through National contributions augmented by commercially available services. NATO views space capabilities as mechanisms that possess unique operational benefits which make them ideally suited

to meet NATO mission requirements in certain situations. Therefore, space related capabilities, products and applications are expressly desired as part of a Nation's contribution to NATO. NATO encourages Nations to partner together to develop space related capabilities, products or applications that may be beyond the resources of a single Nation. To aid the continuous process of reform, modernisation and transformation NATO will specify space capability needs in terms of availability, persistence, assurance, tasking authority and information releasability.

5.4.6.2 This tenet is also intended to convey a concept which all NATO nations could use to field space-capabilities: partnership and partial ownership. It is demonstrably feasible to partner with other nations to buy a single satellite and in return receive access to a complete multi-satellite constellation. One example of this is the Disaster Monitoring Constellation in which Algeria, China, Nigeria, Spain, Turkey and the UK either have previously, or are currently participating.¹³ These kinds of capabilities use 'good enough' technology. They reduce cost, enable shar-



The Space X Dragon capsule challenges prevailing attitudes and precludes new opportunities.

5.4.6.1 Amplification: This tenet is intended for NATO to make clear that space capabilities are expressly desired. These requirements should be tied to perspective, persistence, access and availability. The Alliance is working to clearly define space requirements so that Nations know what to provide. However, codifying the intent in a policy document would help solidify the process and expectation.

ing, and can be upgraded and expanded to address emerging concerns. This approach is conceptually similar to other partnerships undertaken by NATO nations such as the E-3A, C-17 and A-400M but likely lends itself to even greater flexibility and innovation because Nations could acquire complementary capabilities creating a constellation capable of achieving greater results.

5.4.6.3 Since the definition of space capabilities proposed earlier includes ground capabilities, the Alliance should also evaluate ground based capabilities such as the European Union Satellite Centre and the US Air Force Eagle Vision. These organisations make use of on-orbit capabilities to provide rapid intelligence, surveillance and reconnaissance support. Owning the capability is the best way to get truly responsive effects.

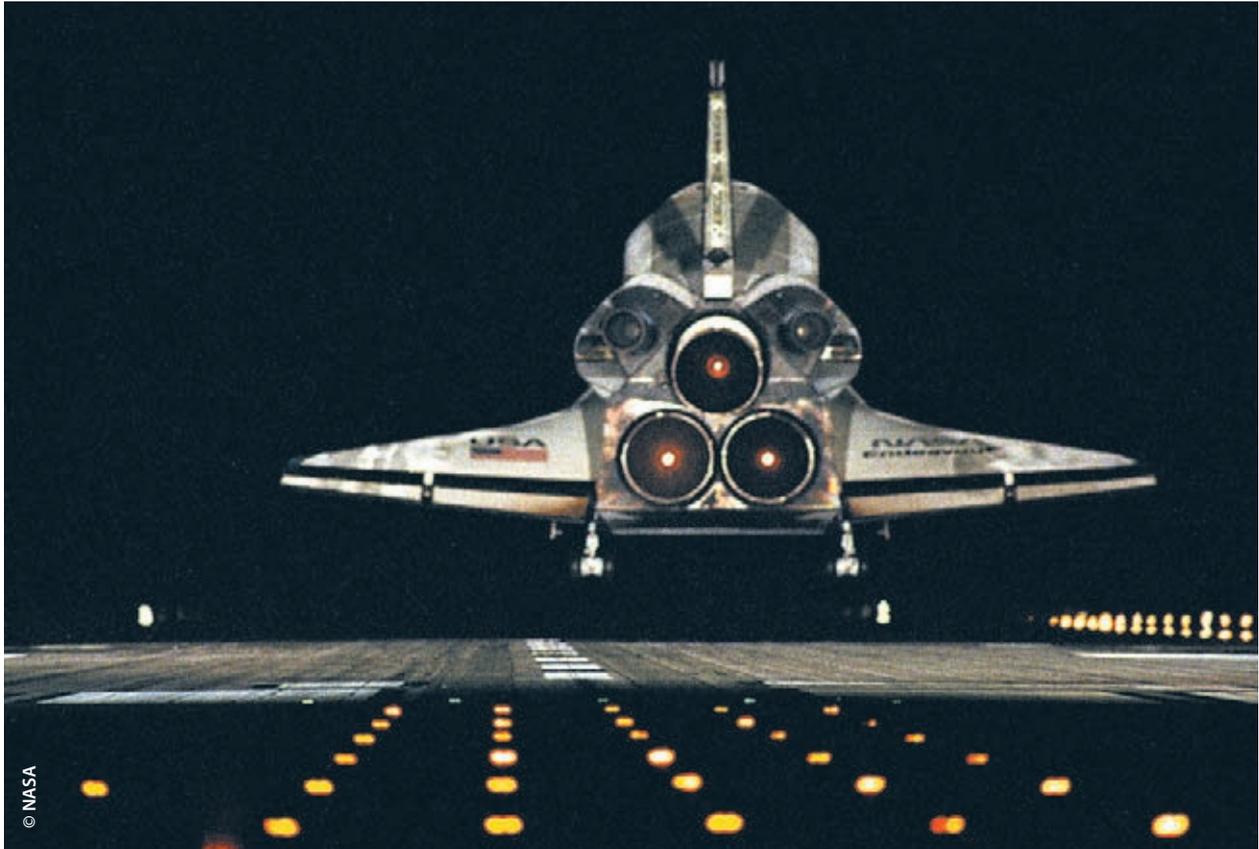
5.4.7 Tenet 7

NATO supports and encourages the development of innovative space capability technologies and initiatives that reduce cost, increase availability, improve capability, add resilience and contribute to the strengthening of the Alliance. NATO will remain abreast of the latest developments and research opportunities in order to incorporate as rapidly as possible new space capabilities in support of missions.

5.4.7.1 Amplification: This tenet is intended to provide a basis for continued NATO research on the use of space capabilities in support of the Alliance. The space domain is rapidly evolving, with commercial interests driving significant changes. For example,

the technology behind the development of space tourism could have clear military benefits such as the ability to rapidly deliver cargo and personnel across the globe. In the near term, small satellite technology may fundamentally change the nature of space operations. It is likely that there will still be large, high technology satellites, but these will probably become part of a larger network that includes an array of small satellites and even nanosatellites. Satellites of this kind could provide unknown tactical advantages for NATO operations. Without research into the possibilities key opportunities may slip by and NATO's ability to keep pace with potential adversaries could diminish.

1. Maj. Gen. Mark Barrett, Dick Bedford, Elizabeth Skinner, Eva Vergles, 'Assured Access to the Global Commons', Supreme Allied Command Transformation, North Atlantic Treaty Organization, Norfolk, Virginia USA, April 2011, Page 27.
2. Paragraphs 0609-0613.
3. Traffic Engineering for NATO Satellite Communications Services, Ramon Segura.
4. Maj. Gen. Mark Barrett, Dick Bedford, Elizabeth Skinner, Eva Vergles, 'Assured Access to the Global Commons', Supreme Allied Command Transformation, North Atlantic Treaty Organization, Norfolk, Virginia USA, April 2011.
5. Single, Thomas, JAPCC Space Ops Assessment, Revised Jan 2009.
6. "Strategic Concept For the Defence and Security of The Members of the North Atlantic Treaty Organisation", Numbers 20, 23.
7. IBID, number 29.
8. Robinson, Jana, The Role of Transparency and Confidence Building Measures in Advancing Space Security, September, 2010. Page 51.
9. IBID, page 12.
10. Allied Joint Doctrine for Air and Space Operations, AJP-3.3(A), Nov 2009. Paragraph 0610a.
11. AJP 3-3
12. Allied Joint Doctrine for Air and Space Operations, AJP-3.3(A), Nov 2009. Paragraph 0605.
13. http://www.dmcii.com/about_us_constellation.htm



Mission complete.

CHAPTER VI

Conclusion

“Smart defence is about building security for less money by working together and being more flexible. This requires identifying those areas in which NATO allies need to keep investing. The operation in Libya has underlined the unpredictability of threats and the need to maintain a wide spectrum of military capabilities, both frontline and enabling ones.”

NATO Secretary General Anders Fogh Rasmussen

6.1 Potential Outcome of Implementing the Proposed Framework

As part of the ACT study ‘Assured Access to the Global Commons’, the authors noted, “Lack of a comprehen-

sive space policy that addresses these and other issues is a growing vulnerability for the Alliance. Without a well-conceived and articulated policy, planning, preparation, and training suffer from uncertainty”¹.

6.1.1 The proposals above are meant to convey a possible path to address the vulnerability mentioned by the ‘Assured Access to the Global Commons’ study. Given NATO trends towards ballistic missile defence, deployability, precision, reachback communication and maximum flexibility, the use of space is not likely to diminish in the short term (see Table 4 for summary of key points).

6.1.2 In a perfect world, the implications of enacting the proposed policy as written would result in an Alliance with credible deterrence in the space domain, operating in an environment with limited intentional threats, capable of effectively meeting current and emerging requirements. Many factors will influence

Key Points
Space is, and will be, part of how the Alliance conducts operations.
The operational imperative for space capabilities will grow.
Adversaries may see NATO space capabilities as enablers and seek to deny their use.
Adversaries may also use space capabilities to meet their objectives.

Table 4: Summary of Key Points.

the actual achievement of such a lofty ambition. However, the chances of arriving at this state are greater when policy principles are agreed upon.

6.2 Closing Remarks

6.2.1 In modern operations, time is a critical resource. This implies that the decision making process is a key centre of gravity. The value of policy is to address concerns while time allows, and not in a crisis, so that better decisions can be made in a more timely manner.

6.2.2 When the Alliance prepares for action it develops multiple Courses of Action (COA) and then evaluates them against each other and possible adversary COAs. A good COA can take many forms, including

‘do-nothing’. However, in the absence of evidence to the contrary, NATO should assume that access to space capabilities will be contested in future engagements and that it will want more capability than it currently has available. If access is denied, it will happen rapidly and the Alliance assumes risk if it does not prepare in advance. As noted in the Strategic Concept, it is in the best interest of the Alliance to plan for the optimal employment and defence of space capabilities as an integral part of operations. One way to provide the coherent guidance and oversight to facilitate that process is to develop a NATO Space Policy.

1. Maj. Gen. Mark Barrett, Dick Bedford, Elizabeth Skinner, Eva Vergles, ‘Assured Access to the Global Commons’, Supreme Allied Command Transformation, North Atlantic Treaty Organization, Norfolk, Virginia USA, April 2011, Page 34.

ANNEX A

Proposed NATO Policy on the Employment and Coordination of Space Capabilities

Purpose

The purpose of this document is to recommend a framework for a NATO Space Policy.

Introduction

Space is a unique operational domain like air, land and sea in which and from which National capabilities important for Alliance defence and security are derived. Space capabilities enable and enhance all NATO missions including the unparalleled ability to deploy and sustain robust military forces in the field and the ability to contribute to stabilisation and reconstruction. The current use of space capabilities, the rapidly evolving strategic security environment, and the complexity of the space domain, highlight the requirement for NATO Space Policy.

Recommended Guiding Principles

Alliance collective defence and security is applicable to space capabilities supporting NATO operations

International standards and norms contribute to the preservation of space capabilities for all

The coordination of Nationally owned and controlled space capabilities will result in improved operational effectiveness and efficiency for the Alliance and Nations

Space capabilities, along with technology in general, are rapidly improving resulting in the levelling of previously stark disparities

Coordination and collective defence of space capabilities employed on behalf of NATO is an active and continuously evolving process

Recommended Definition for 'NATO Space Capabilities'

NATO space capabilities are orbital and non-orbital capabilities whose primary function is to deliver products and applications supporting NATO operations in the doctrinal mission areas of: space force enhancement; space control; space support; and space force application. It specifically includes:

- Craft or vehicles designed to operate at altitude in the absence of any aerodynamic control for any portion of their operations profile and their related launch facilities.
- Terrestrial facilities designed and/or operated to monitor, command, control and communicate with craft or vehicles as referenced above and/or other similar terrestrial facilities.
- The electromagnetic links used to monitor, command, control and communicate with craft or vehicles as referenced above.
- The personnel trained to operate, employ, acquire, maintain and defend craft, vehicles or facilities as referenced above.
- User equipment such as tactical data processors and receivers specifically designed and/or operated to receive information from other space capabilities.

Recommended 7 Tenets

Tenet 1: Space capabilities help underpin international stability, well-being, security and peace as well as the individual and collective capacity of Nations to provide deterrence, resist armed attack and manage crises. Therefore, NATO seeks to preserve and protect access to space-based capabilities in keeping with international norms and existing treaties.

Tenet 2: NATO is committed to the concept that space is open to all Nations for peaceful purposes. The Alliance will engage with the international community to prevent misunderstanding and build partnerships while

improving its ability to coordinate and preserve space capabilities for NATO operations. To that end, NATO supports the development of space capability Transparency and Confidence Building Measures (TCBM) and the development and sharing of Space Situational Awareness (SSA), to include the ability to attribute space capability activities to terrestrial actors, as a prerequisite for safe and responsible space operations.

Tenet 3: National and commercially provided space capabilities currently enable and enhance NATO operations by providing intelligence surveillance and reconnaissance, communications command and control, meteorological data, position, navigation and timing, and ballistic missile launch early warning. NATO's first priority for these space capabilities is thus to assure their continued delivery in support of NATO operations.

Tenet 4: Space capabilities are integral to Alliance activities and require general space education as well as the development, certification and management of personnel from across the Nations. NATO seeks the capability to plan for the optimal employment and defence of space capabilities as a fundamental part of Alliance planning and operations. NATO will identify positions throughout the command structure to accomplish these functions and request personnel to fill them.

Tenet 5: The effective use of information, including that derived from space capabilities, is paramount to NATO operations. The responsibility to employ Nationally provided and controlled space capabilities and to plan for their preservation falls across multiple disciplines and organisations within Nations and the Alliance. NATO will coordinate space capability activities supporting NATO operations in order to aid the Alliance and Nations to remain effective, efficient and flexible.

Tenet 6: NATO will ordinarily meet space capability requirements through National contributions augmented by commercially available services. NATO views space capabilities as mechanisms that possess unique operational benefits which make them ideally suited to meet NATO mission requirements in certain situations. Therefore, space related capabilities, products and applications are expressly desired as a portion of a Nation's contribution to NATO. NATO encourages Nations to partner together to develop space related capabilities, products or applications that may be beyond the resources of a single Nation. To aid the continuous process of reform, modernisation and transformation NATO will specify space capability needs in terms of availability, persistence, assurance, tasking authority and information releasability.

Tenet 7: NATO supports and encourages the development of innovative space capability technologies and initiatives that reduce cost, increase availability, improve capability, add resilience and contribute to the strengthening of the Alliance. NATO will remain abreast of the latest developments and research opportunities in order to incorporate as rapidly as possible new space capabilities in support of missions.

Summary

Though this proposed framework for a NATO Space Policy is intentionally narrow in scope and concentrated on the employment, coordination and defence of space capabilities used to support NATO operations and core business, it can be used as a starting point for serious dialogue on a much needed NATO Space Policy.

ANNEX B

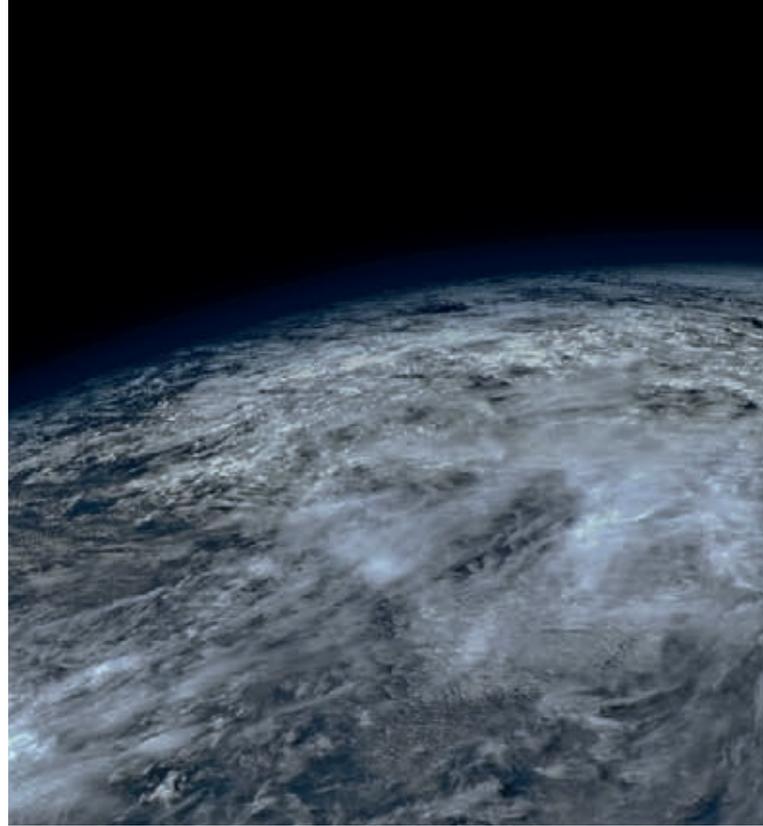
A Compilation of EU and US Space Policy Guiding Principles

European Union Strategic Mission ¹	United States Guiding Principles ²
Develop and exploit space applications serving Europe's public policy objectives and the needs of European enterprises and citizens, including in the field of environment, development and global climate change.	It is the shared interest of all nations to act responsibly in space to help prevent mishaps, misperceptions, and mistrust. The United States considers the sustainability, stability, and free access to, and use of, space vital to its national interests. Space operations should be conducted in ways that emphasise openness and transparency to improve public awareness of the activities of government, and enable others to share in the benefits provided by the use of space.
Meet Europe's security and defence needs as regards space.	A robust and competitive commercial space sector is vital to continued progress in space. The United States is committed to encouraging and facilitating the growth of a U.S. commercial space sector that supports U.S. needs, is globally competitive, and advances U.S. leadership in the generation of new markets and innovation-driven entrepreneurship.
Ensure a strong and competitive space industry which fosters innovation, growth and the development and delivery of sustainable, high quality, cost-effective services.	All nations have the right to explore and use space for peaceful purposes, and for the benefit of all humanity, in accordance with international law. Consistent with this principle, "peaceful purposes" allows for space to be used for national and homeland security activities.
Contribute to the knowledge-based society by investing strongly in space-based science and playing a significant role in the international exploration endeavour.	As established in international law, there shall be no national claims of sovereignty over outer space or any celestial bodies. The United States considers the space systems of all nations to have the rights of passage through, and conduct of operations in, space without interference. Purposeful interference with space systems, including supporting infrastructure, will be considered an infringement of a nation's rights.
Secure unrestricted access to new and critical technologies, systems and capabilities in order to ensure independent European space applications.	The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defence, deter others from interference and attack, defend our space systems and contribute to the defence of allied space systems, and, if deterrence fails, defeat efforts to attack them.

Listed as they chronologically appear in their source documents.

1. European Space Policy, 26 April 2007.

2. National Space Policy of the United States of America, 28 June 2010.



Joint Air Power Competence Centre

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