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SUB-COMMITTEE ON THE PROLIFERATION OF MILITARY TECHNOLOGY

MISSILE DEFENCES AND WEAPONS IN SPACE

DRAFT INTERIM REPORT

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International Secretariat — 8 October 2004

* Until this document has been approved by the Science and Technology Committee, it represents only the views of the Rapporteur.

Assembly documents are available on its website, http://www.nato-pa.int

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"Missile defence must be debated as a technology, not a theology"
Former US Senator Sam Nunn, 3 October 2001

I. INTRODUCTION *

1. In last year's Report, this Sub-Committee analysed the emerging security debate on the future status of activities in outer space. In particular, the Report showed how the international community is slowly becoming aware of the importance of security in this delicate area and it will soon have to face important choices with regard to the military uses of outer space. It also illustrated how the United States plans to defend its space assets from such threats, if necessary by deploying weapons in outer space. On 16 December 2002, President Bush issued National Security Presidential Directive (NSPD) 23 outlining the "National Policy on Ballistic Missile Defense", of which a White House fact-sheet was released to the public in May 2003. The capabilities "planned for operational use in 2004 and 2005 will include ground-based interceptors, sea-based interceptors, additional Patriot (PAC-3) units, and sensors based on land, at sea, and in space". Furthermore, "these capabilities may be improved through additional measures", which could also include "development and testing of space-based defences". A press release from the Defence Department on 17 December 2002 specified these as being "space-based kinetic energy (hit-to-kill) interceptors and advanced target tracking satellites".

2. In last year's conclusions, your Rapporteur indicated his firm belief that the stationing of strike weapons such as kinetic kill vehicles and lasers in outer space, as well as the deployment of anti-satellite weapons, both space- and ground-based, could generate an arms race and increase, rather than counter, threats to important commercial and military assets in space.

3. The 2003 Report also highlighted that the research on space weapons by the United States coincided with the drive for missile defences, which may need some space components. In order to better understand the connection between missile defence and space weapons, this year's Report will focus on missile defence systems in allied countries. In order to put these projects in the proper context, your Rapporteur will try to assess the threat that ballistic and cruise missiles currently represent for the Alliance. Indeed, missile threats rank high on the security agendas of most NATO members. Between 38 and 40 states are known to have acquired or developed ballistic missiles. Around 30 are believed to have cruise missile and/or UAV (Unmanned Aerial Vehicle) capabilities.

4. In the broadest possible terms, two options for dealing with missile proliferation threats exist. One is multilateral diplomacy and arms/technology controls, the other is development of missile defences. Most NATO allies do not rely on one single approach, preferring instead to pursue a mix of strategies. The United States government feels that ballistic missile proliferation poses a serious threat, and is convinced of the need to deploy multi-layered systems of national and theatre missile defence (TMD). The US government's intention to proceed with fielding missile defence capabilities, according to official declarations, is based on the maturity of technology, testing success, and the assessment of long-range ballistic missile threat to the country. Despite the fact that Washington is committed to building and deploying missile defences designed to protect not only US territory, but friends and allies, many European allies have mixed views on strategic ballistic missile defence programmes. TMDs, however, enjoy strong support from most NATO nations, although there are differences in threat perception.

* The Rapporteur would like to thank Filippo Gamba, Joanna Gorska and Denis Trifonov for their assistance in preparing this Report.

5. This report will focus on allied projects such as the NATO TMD programme or the burgeoning NATO-Russia TMD co-operation. Particular attention will be devoted to the US Ballistic Missile Defense System (BMDS), whose initial capabilities are planned to be deployed by October 2004. Furthermore, updated information will be provided on US space weapons research programmes described in last year's report, including the Kinetic Energy Anti-Satellite (KE-ASAT) system and the Space-Based Kinetic Energy Experiment.

6. Finally, your Rapporteur will analyse multilateral diplomatic initiatives to control missile technology proliferation. The principal pillar of Western missile non-proliferation policy is the Missile Technology Control Regime (MTCR), an informal, voluntary association of countries aimed at controlling the proliferation of missiles, UAVs, and related technologies. Within this regime, a number of countries have developed an International Code of Conduct (ICOC), recently re-named the Hague Code of Conduct against Ballistic Missile Proliferation (HCOC).

II. THREAT ASSESSMENT

A. BALLISTIC MISSILE THREAT

7. Of approximately 40 states with ballistic missiles, 11 possess medium (1,000-1,300 km) and long-range capabilities. About 29 countries can only field low-performance short-range missiles, most of which are based on the Soviet Scud missile. Libya and Syria fall into this category. The Scud missile was developed in the 1950s on the basis of the V-2 German rocket. Quite apart from Libya's recent change of policy, it is clear that Scud-type platforms, owing to their range and accuracy limitations, pose a limited homeland security threat to most NATO members, with the notable exception of Turkey. As regards allied forces deployed in a theatre of operation, existing air defences can provide a reasonably effective protection against older versions of Scuds. However, threat from short-range ballistic missiles (SRBMs) should not be underestimated. Some states have developed or acquired enhanced SRBM systems which, if deployed against NATO expeditionary forces, would be well capable of disrupting command and logistics chains and inflicting unnecessary casualties.

8. Iran, North Korea and Pakistan present particular challenge. Iran is believed to have imported from China between 50 and 300 Scud-B missiles and at least 50 and possibly as many as 450 Scud-C missiles. China has supplied Iran and Pakistan with an unspecified number of M-11/CSS-7 advanced solid-fuel propellant SRBMs with a range of up to 400 km. Pakistan is completing a missile factory for the local production of M-11 missiles. Islamabad has also acquired Chinese M-9/CSS-6 missiles and a sophisticated mobile SRBM with solid-fuel propellant and a range of 600 km. Although Pakistan itself does not pose a military threat to NATO forces, there is a risk of Islamabad-owned weapons and technology being sold to hostile states or falling into the hands of Islamic terrorist networks operating on Pakistani territory. North Korea is believed to have improved significantly the flight characteristics and accuracy of its *Scud* missiles.

9. Iran, North Korea and Pakistan also have sophisticated medium-range ballistic missile programmes, and are seeking to develop inter-continental ballistic missile (ICBM) capabilities. US intelligence projects that America and its allies may face ICBM threats from North Korea and Iran by 2015, although one US agency questions Iran's ability to deploy ICBMs within this timeframe. China already has ICBM capabilities which it is currently seeking to upgrade. Given Beijing's past record of missile proliferation, Chinese sales of ICBM technology and even equipment to states pursuing an anti-NATO agenda cannot be ruled out.

10. There is a growing concern about the scale of North Korea's medium and long-range missile programmes, and its proliferation record. Pyongyang now fields hundreds of No Dong medium-range missiles that can deliver conventional and nuclear warheads up to 1,300 km. No Dong is a

significantly improved version of the Scud-C missile. If deployed against NATO-led forces, the system could pose a serious challenge for allied air and missile defences. The missile has a sufficient range to strike targets throughout Japan, including US bases on Okinawa.

11. Pyongyang is also developing a family of multiple stage ICBMs called Taepo Dong. In 1998, it attempted to place a small satellite in orbit by launching the three-stage Taepo Dong-1. Despite the failure of the missile's third stage, the test demonstrated North Korea's technical capability to launch a multiple stage ICBM. Moreover, the 1998 launch was perceived as highly provocative, as its trajectory was directed to the east, flying over Japan. According to experts from the International Institute for Strategic Studies in London, although capable of reaching (if fully developed) the continental United States, the Taepo Dong-1 would deliver only a small payload, largely insufficient for a nuclear warhead or the amount of chemical/biological agents necessary to pose a significant mass-casualty threat. For these reasons, US intelligence believes Pyongyang is focusing its efforts on developing the larger Taepo Dong-2 ICBM with a projected range of up to 10,000 km. Analysts in Washington estimated that such a missile could enable North Korea to target Alaska and the US West Coast by 2010-2015. Other assessments, some by US analysts, are much more cautious, pointing out that too little information is available to make a confident judgement about the status of the Taepo Dong-2. General (ret.) Eugene Habiger, former Commander-in-Chief of the Strategic Command, pointed out in September 2004 that the Taepo Dong-2 "has never been flight tested", and the same applied to the intercontinental version of the Taepo Dong-1. He also added that "the warhead would have to be no heavier than 300kg", and "there is a big leap of faith between developing a nuclear device [...] and to miniaturize something that is going to go into the nose cone of an ICBM". In Habiger's view, "there is no serious missile threat to the United States today".

12. A possible future threat might come from Pyongyang's efforts to develop new ballistic missile systems. According to the 2 August 2004 issue of Jane's Defence Weekly, North Korea may be trying to develop two new systems. The first would be a land-based road-mobile medium-range ballistic missile (MRBM)/ intermediate-range ballistic missile (IRBM) with an estimated range of 2,500 km; the second, a ship-mounted ballistic missile system whose range is estimated to be at least 2,500 km. The two systems in question would appear to originate from the decommissioned Soviet R-27 (or SS-N6, according to the NATO denomination) submarine-launched ballistic missile (SLBM). North Korea has 26 diesel submarines of Soviet fabrication. The information is reportedly based on reconnaissance satellite observations of September 2003, but has not yet been confirmed by any other sources. If actually deployed, such missiles would not have a range capable of striking the US mainland, but their larger diameter would allow the delivery of an early generation nuclear payload.

13. A greater threat is posed by North Korea's willingness to supply Scud-Cs and No Dongs to states like Yemen, Iran, Pakistan, and Syria. From 1987 to 1996, Pyongyang allegedly exported about 370 missiles to the Middle East. North Korean assistance has been instrumental in developing Iran's and Pakistan's medium and long-range ballistic missile capabilities. The Iranian new Shahab-3, derived from North Korea's No Dong platform, is a single-stage, liquid-fuelled, road-mobile system. The missile, which has a nominal range of 1,300 km, is primarily seen as a deterrent against Israel, but could also be deployed against US or allied forces stationed in Iraq or elsewhere in the Middle East. Five Shahab-3 missile units form part of the Islamic Revolutionary Guard force which answers directly to Iran's Yelayat hard-line religious authority. On August 11 Teheran tested an upgraded version of the Shahab-3. The test occurred only two weeks after Israel tested its Arrow anti-missile system, which actually destroyed a Scud. This was the first time that Arrow performed successfully in an exercise. The Israeli Arrow system is designed to defend against attacks from missiles such as the Shahab-3. Iranian defence officials, while claiming that the Shahab-3 field exercise was not an actual flight test but an exercise to assess the performance of new components, acknowledge that the timing of the test was no accident. According to Uzi Rubin, former director of Israel's Ballistic Missile Defense Organization, the footage of the

August 11 test shows that Iran has enhanced the range of the Shahab-3 and that a recent Shahab test appears to be of an early version of the Shahab-4 with a range of 1,450 to 2,000 km.

14. Even if Iran were committed to acquiring nuclear weapons, it would nevertheless face significant limits to its ability to arm Shahab missiles with Weapons of Mass Destruction (WMD). First generation nuclear warheads could weigh about 1,000 kg: such a heavy payload would put constraint on the range of Iranian missiles. Iran has limited ability to 'weaponise' biological agents, whose delivery on ballistic missiles is hindered by the necessity for biological munitions to resist adverse re-entry conditions. Chemical weapons would be the most likely payloads for Shahab-3 in the near future. However, Iran might be able to overcome payload limitations by increasing cooperation with North Korea in both missile and nuclear technologies.

15. North Korea could indeed decide to export its Taepo Dong technology. So far, only the No Dong system has been supplied to other countries. For instance, Pyongyang has also been behind the Pakistani project to develop a 1,300 km range missile: the Haft V (Ghauri) a solid-fuel ballistic missile is a derivative of the North Korean No Dong system. Pakistan is also expected to deploy an upgraded version of the Haft V missile with a range of 2,000 km.

16. Ballistic missile threat assessment would be incomplete without considering the broader strategic context within which missile programmes are developed. Attempts by 'states of concern' to acquire missile capabilities do not necessarily mean that they would have the will or intention to attack the NATO area or allied forces. Indeed, a senior CIA official noted in May 2000 that 'states of concern' "view these weapons more as strategic tools of defensive and coercive diplomacy, not as operational weapons of war". Testifying before the Danish Parliament in April 2003, Joseph Cirincione from the Carnegie Endowment for International Peace said that "the ballistic missile threat today is confined, limited and changing slowly. There is every reason to believe that it can be contained through diplomacy and measured military preparations".

17. This view is at odds with the conclusions drawn by the authors of the US National Intelligence Estimate (NIE) on the Ballistic Missile Threats, released in January 2002. The NIE warns that the overall trend is not in West's favour. Emerging ballistic missile states continue to increase the range, reliability and accuracy of their platforms. US intelligence analysts point out that there is only so much that existing missile and nuclear export controls can do, since states like North Korea or Pakistan have developed indigenous missile design and production capabilities, although Iran is still believed to be heavily reliant on foreign assistance.

18. Missile threat assessment is a complex process, owing to secrecy surrounding missile programmes and difficulty in tracing milestones in missile developments. Analysis is usually based on flight-testing reports, engineering estimates and data on states' economic and technological capabilities. In practical terms, this means that missile threats can be underestimated just as much as they can be overestimated.

B. CRUISE MISSILE THREAT

19. Although cruise missiles and UAVs have yet to spread widely, these systems are increasingly becoming attractive means of delivery of both conventional and non-conventional weapons. According to recent assessments, although many countries possess some type of cruise missile, about 30 states are developing land-attack cruise missiles (LACM) and/or UAVs, but only about a dozen of them present proliferation concerns. One reason these countries are interested in such weapon systems is their technological and operational advantages over ballistic missiles. Cruise missiles ensure more precise delivery due to their stable aerodynamic flight and the possibility of being guided by Global Positioning Systems (GPS). They are also cheaper and easier to procure, store and maintain. In operational terms, cruise missiles fit more closely the

asymmetric warfare requirements of less powerful states. Owing to their compact size and smaller logistics tail, they have higher rate of pre-launch survivability.

20. During the Cold War, two short-range cruise missile systems spread widely in the developing world. One was the Soviet-made SS-N-2 Styx anti-ship missile, used for instance by the Egyptian Navy in 1967 to sink an Israeli destroyer. The Styx is not a platform that can be easily converted into a LACM, but in the hands of terrorists or hostile states it could be deployed against NATO maritime targets. Another was the French-made AM-35 Exocet anti-ship cruise missile, which was successfully used by the Argentinean forces against British Royal Navy ships during the 1982 Falkland War. The Exocet is a more advanced platform that can be upgraded.

21. Before the war, Iraq had successfully modified 10 Chinese HY-2 Seersucker (Styx-based) anti-ship cruise missiles (ASCM) to allow them to be employed over land and attack coalition forces. US and Kuwaiti Patriot missile defence batteries failed to detect any of Iraq's low-flying cruise missiles, one of which came close to striking a US Marine encampment on the first day of combat. Following such developments, analysts are increasingly focusing on the threat of state and non-state actors converting ASCM into LACM.

22. The most ambitious cruise missile programmes are pursued by China and Iran. China is developing at least two LACM platforms. One is a 3,000 km range air-launched cruise missile derived from Styx; another is the project YJ-63 second-generation low-altitude missile that could be launched from land and sea-based platforms. Iran has co-ordinated its cruise missile programmes with China and has received a great deal of technical assistance from Beijing. Tehran is pursuing a two-stage Raad programme which involves upgrading Seersucker ASCMs, and then converting them into a land-attack platform. Around 300 Seersuckers are being fitted by Iran with new turbo-jet engines and new guidance systems.

23. The Iraq war provided important evidence of the difficulty existing systems have in detecting and tracking low-flying threats. At least two Iraqi ultralight aircraft were detected only after flying over thousands of coalition troops, prior to a US Army division's advance on Baghdad. Although some experts had been aware for years of the threat coming from UAVs, this event prompted general realisation that converting small planes into weapons-carrying UAVs would offer a particularly attractive 'poor man's' option. Some state and non-state actors could overcome the technical challenges necessary to convert one of the 425 different small aircraft available on the world market into a UAV capable of delivering over 200 kg of payload, made of either conventional or chemical/biological agents. The average cost of a kit aeroplane is little more than €20,000 ($25,000).

24. Development of anti-ballistic missile defences, intelligence analysts point out, may prompt some states to step up their cruise missile and UAV programmes. Indeed, fielding air defences that offer sound protection against cruise missile threats remains a challenge far greater than that posed by ICBMs. Effectiveness of surveillance radars is undermined by aerodynamic, terrain-hugging platforms that fly at low altitudes. Weapons-carrying UAVs pose similar problems, particularly for look-down radars that ignore slow-moving targets on or near the ground to prevent data processing jams. US missile experts project that over the course of the next 10-15 years developing states with cruise missile capabilities will seek to acquire a new generation of stealthier platforms fitted with sophisticated counter-measures. It is believed that progress in missile defences is unlikely to keep pace with cruise missile programmes. This calls for greater legal and diplomatic efforts to curb proliferation of cruise missile and UAV technology.

25. Because of the widespread availability of some of these technologies, according to Dennis Gormley of the Monterey Centre for Nonproliferation Studies, the "notion that a terrorist group might entertain using a UAV is by no means far-fetched". In a March 2004 testimony before the US House of Representatives, he indicated that there had been recently 43 recorded cases

involving terrorist groups in which remote-controlled delivery systems were either considered, developed or actually used. These included al-Qaeda plans to employ UAVs to attack G-8 leaders at their 2001 meeting in Genoa, Italy, as well as a plot to acquire a UAV to attack the UK House of Commons with anthrax.

III. *MISSILE DEFENCE SYSTEMS AND PROGRAMMES*

26. During the Cold War era, both the NATO states and Russia agreed to limit deployment of Ballistic Missile Defences (BMDs) in order to make nuclear deterrence work. At present, however, there is a growing recognition that nuclear weapons cannot provide a sufficient deterrent against missile proliferation. Conventional attack by ballistic or cruise missiles is a real threat to NATO expeditionary forces on overseas missions. There is a longer-term threat of European population centres coming within range of ballistic missiles developed by states with overtly anti-western agendas.

27. The United States government feels that ballistic missile proliferation poses a serious threat, and is convinced of the need to deploy multi-layered systems of national and theatre missile defence. Many European allies have mixed views on strategic BMD programmes. Theatre missile defence (TMD) programmes, however, enjoy strong support from most NATO nations, although there are differences in threat perception. Mediterranean states situated on NATO's southern flank, such as Italy, Greece and Turkey, are already within range of ballistic missiles from the Middle East. Both the United Kingdom and France require TMD shields for their numerous forces stationed abroad. Germany is not within range of ballistic threats, but its policy on overseas deployments is under revision, and Berlin is apprehensive of the need for a TMD system to protect German troops working as part of multi-national coalitions. Most allies agree that future joint missile defences should have anti-cruise missile and unmanned aerial vehicle (UAV) capabilities.

A. NATO TMD/MD PROGRAMMES

28. The North Atlantic Council in 1998 approved the decision to develop an alliance-wide TMD to form the integral part of NATO air defence. The case for TMD was strengthened as a result of the adoption of 1999 Strategic Concept and the Defence Capability Initiative (DCI). The Concept stated that the Alliance's top priority was to avoid own losses in a wide range of in- and out-of-area operations. The DCI called for bridging the 'capabilities gap' between the allies. All NATO member states are participating in the TMD project, as part of NATO's Extended Air Defence (EAD) concept. The NATO Air Command and Control System (ACCS) will assume responsibility for the TMD battlefield management. The system is expected to become operational in 2010.

29. In July 2001, NATO Consultation, Command and Control Agency (NC3A) awarded feasibility study contracts to two international consortia: the SAIC group led by SAIC and Boeing, and the Lockheed-Martin-led JANUS group. The studies were to explore different options of incorporating fragments of existing national TMD projects into the NATO-wide layered system. In January 2003, feasibility studies reports were submitted to the NC3A. Based upon their recommendations, NATO's Infrastructure Committee approved an extension of the TMD feasibility study for further analysis.

30. At that point, groundwork for a new, more ambitious missile defence project was being laid. In response to European concerns about the US National Missile Defence (NMD) project, the Bush administration tabled a proposal in 2002 to broaden the scope of the NATO TMD programme. At a senior-level meeting in NATO on 18 July 2002, the allies were briefed by the US delegation on various options of how to link NATO missile defence capabilities with the US BMDS. The American side pushed for recognition that ballistic missiles proliferation posed a real threat to all members of the alliance, and that joint efforts to counter this threat were required. On the whole,

the feedback from the allies was positive, although some were inclined to view the proposal as a move aimed primarily at rallying wider diplomatic support for the US NMD project.

31. As a follow-up to the US-European consultations, a decision was taken at the NATO Summit in Prague in November 2002 to launch a new Missile Defence Feasibility Study to build on the progress made by the original TMD studies. As part of the process, the NATO Military Committee approved on 27 May 2003 a classified Military Operational Requirement (MOR) spelling out the range of issues that a new MD feasibility study would be expected to address. The Military Committee recommended that allies adopt a 'phased evolutionary approach' to the development of joint MD system, one that would take into account gradual changes in technology and threat assessment.

32. On 26 September 2003, the NC3A awarded a new €15 million feasibility study contract to the SAIC-led consortium. The study will look into designing a missile defence system with a wider coverage than a TMD. The NATO MD shield would be tied in with the US BMDS system, and would cover NATO's entire territory, including bases and populations centres, as well as expeditionary forces deployed overseas. The acquisition decision is expected to be made by NATO countries in 2006.

B. ANTICIPATED NATO TMD/MD ARCHITECTURE

33. Any future NATO MD system is likely to include low-tier and upper-tier defences. The former would provide protection from aircraft, cruise missiles and ballistic missiles with range below 1,000 km. The upper-tier would protect NATO forces from longer-range theatre ballistic missiles. It is hoped that the two-tier system may be able to ensure a leakage rate (i.e. percentage of warheads penetrating the defences) of under 1 percent. Given the fact that most of the elements of the system are untested or in the trials phase, many doubt that the system could ensure such a high kill rate. The overall challenge is to build a TMD system capable of accomplishing the following four missions: detection of missiles, tracking missiles in flight, discrimination between warheads and decoys, and destruction of attacking missiles.

34. At present, a number of national and cross-national TMD projects are under way. The United States, Germany, France, Italy, the Netherlands, Spain and Turkey are developing missile defence systems that are expected to serve as components of a future NATO layered TMD. In the low-tier range, there are:

- Patriot PAC-2 and PAC-3 projects (United States/Germany/the Netherlands/Turkey);
- Mobile MEADS (Medium Extended Air Defence System) project (Germany/Italy/United States);
- Aster (or SAMP/T) TMD project (France/Italy).

The upper-tier range is represented by:

- THAAD (Theatre High-Altitude Area Defence) project (US Army);
- Navy Theatre-Wide Ballistic Missile Defence project incorporating AEGIS and SM-3 Block II programmes (US Navy).

35. The process of designing a joint MD system involves search for the right balance between re-assigning national TMD assets on the one hand, and procuring common assets owned and operated by NATO on the other. The member states have reached a consensus on the need for the MD system to have a NATO-operated Battle Management/C3/Intelligence (BMC3I) backbone. Whether the alliance can afford to acquire its own interceptor and sensor assets remains an open question. As noted by Robert G. Bell, former NATO Assistant Secretary General for Defence Investment, in the short run, the allies are likely to opt for some sort of intermediate solution. NATO may procure three PAC-3 batteries owned and operated as a core NATO Response Force

(NRF) asset. In the longer run, the NRF missile defence capabilities could be enhanced with MEADS and Aster systems, as well as upper-tier MD assets.

36. The various elements of the NATO TMD/MD architecture are at different stages of development:

- **PAC-3:** the Patriot Advanced Capability-3 system is expected to form the backbone of NATO's future TMD system. The project is at an advanced stage, and currently provides the only TMD operational capability that can be assessed. The system is designed to intercept tactical ballistic missiles, cruise missiles, tactical air-launched missiles and aircraft. The PAC-3 system uses two kinds of missiles, a hit-to-kill system for ballistic missile targets and a blast-fragmentation missile to attack airbreathing targets. Question marks about the PAC-3's effectiveness and its suitability for the NATO TMD remain. US defence officials are upbeat about the PAC-3 performance during operations in Iraq in 2003, where it was deployed for the first time. However, out of nine Iraqi missiles successfully engaged by Patriots, only two were actually hit by PAC-3s, the other 7 were shot down by PAC-2s. More importantly, the Iraq war uncovered faults in the system's capability to identify 'friend or foe'. A PAC-3 missile shot down a US Navy F/A-18 fighter aircraft killing a pilot. The system has also been involved in a friendly fire incident when a PAC-3 missile hit a British Tornado jet killing two crew members. In his latest annual report, the Director of the Pentagon's Office of Operational Test and Evaluation acknowledged the problem and recognised the need for "significant improvements" in this area. The US Missile Defense Agency, however, has downplayed the significance of the 'friend or foe' problem to the TMD project, pointing out that the PAC-3 now has a proven ability to intercept ballistic missiles coming in a vertical path.

- **MEADS**: this system has yet to enter the design and development phase, and currently has no operational capability. This international programme may in the future replace the PAC-3 project. MEADS will be a mobile air and missile defence system protecting expeditionary forces on the move. Its range of missions will be similar to that of the PAC-3. The complete system is expected to be fielded in 2012-2014. Since MEADS will have a 360° coverage and enhanced capability to intercept cruise missiles and UAVs, the project is currently enjoying strong support from the US Army.

- **Aster**: the Aster project is making a good progress but its operationally capability is still difficult to assess. In November 2003, the European procurement agency OCCAR awarded a €3 billion contract to start series-production of Aster ground- and naval-based air defence systems for the French, German and British armed forces. The contract also released funding for development of the Aster Block 1 anti-tactical ballistic missile system designed for the NATO TMD. The Eurosam consortium will supply 18 Aster Block 1 missile batteries to the French Army and Air Force, and to the Italian Army. The consortium will also manufacture Aster 15 vertical-launch surface-to-air anti-missile systems for the French, Italian, and UK navies. Aster 15 SAAM systems are capable of intercepting short-range ballistic missiles.

C. NATO MILITARY-TO-MILITARY TMD CO-OPERATION

37. At the military level, air forces of several NATO states are conducting Air Defence/Theatre Air and Missile Defence exercises within the framework of the 'Joint Project Optic Windmill' (JPOW). The JPOW is co-ordinated by the Royal Netherlands Air Force with the support and participation from the US Missile Defence Agency (MDA), US Joint Theatre Air and Missile Defence Organisation, US European Command, and national air forces of Germany and Greece. Items tested during the exercises include cruise missile defence, defence against longer-range

ballistic missiles modelled on Iran's Shahab-2 and -3 generation, and co-ordination between ground- and naval-based TMD units.

38. In response to the 2001 US National Intelligence Estimate on ballistic missile threats, Turkey has launched a TMD feasibility study. Ankara is particularly concerned about threats posed by the new Iranian Shahab-3 medium-range missile, capable of hitting targets almost anywhere in Turkey. The Turkish Air Force favours construction of a two-tier TMD shield. The capability will be acquired through a number of bi-lateral and NATO-wide co-operative efforts. Turkey seeks participation in a joint US-Israel Arrow 2 anti-tactical ballistic missile project, and is also taking part in the NATO TMD programme.

D. NATO-RUSSIA TMD CO-OPERATION

39. Consultations on possible TMD co-operation between NATO and the Russian Federation first began in 1998 under the auspices of the Permanent Joint Council. More recently, the new NATO Russia Council (NRC) has set-up an Ad-Hoc Working Group on TMD. In 2000, President Vladimir Putin put forward a proposal for a joint NATO-Russia TMD system. The plan has received mixed feedback from NATO allies. There is recognition that from the compatibility point of view, constructing a joint system at this stage would be difficult if not impossible.

40. As a consequence, the co-operation has instead focused on bridging the gap between Russian and NATO technical standards and operational doctrines. The idea is to pave the way for possible joint deployments in the future. The parties have already developed an experimental TMD concept and a concept of operations. The NRC has launched a study on the interoperability of air and missile defence forces. Joint command-post TMD exercises in the United States were planned for early 2004. At a threat assessment level, NATO and Russia are undertaking a joint study of global patterns of nuclear, biological and chemical (NBC) weapons proliferation.

41. Moscow's support for joint TMD projects partly stems from its continuing opposition to the US plan for a national BMDS. Russian diplomats claim that such a system would undermine strategic stability based on deterrence, and may give impetus to a new nuclear arms race. At the same time, Russia recognises the need for an advanced TMD system to protect peacekeeping and other forces deployed abroad. It also recognises that due to budgetary and technological constraints, building an independent missile defence may not be the most feasible option. In 2003, Russian and US sources indicated that Moscow and Washington could sign a bilateral agreement designed to promote specific TMD-related projects between the defence industries of the two countries. It is, however, clear that a joint co-operative project on a MEADS scale is likely to remain a distant possibility.

42. At the national level, Russia is continuing the development of the S-400 medium-range air and missile defence system capable of intercepting aircraft and cruise and ballistic missiles. The project is still in the design and development phase, but has recently received a big boost in funding. The range of missions and capabilities of the S-400 will be broadly similar to those of the MEADS system. The S-400 is to replace a highly successful S-300 TMD system. The Russian military is also enhancing its capabilities to track ballistic missiles. In 2002, it launched two new missile attack warning facilities: the Volga radar station at Baranovichi (Belarus) and the Okno optical tracking station in Nurek (Tajikistan).

IV. THE US BALLISTIC MISSILE DEFENSE SYSTEM

43. As your Rapporteur illustrated in detail last year, from the outset of its mandate, the Bush administration has pursued a robust ballistic missile defence programme, which would include parallel architectures with air-, land-, sea- and space-based components. One of the first steps

taken to make possible the development and testing of the full range of missile defence capabilities has been the US withdrawal from the ABM Treaty, announced in December 2001 and made effective as of July 2002. On 17 December 2002, US President George W. Bush directed the Secretary of Defense to proceed with fielding "a set of initial missile defense capabilities beginning in 2004". The capabilities "planned for operational use in 2004 and 2005 will include ground-based interceptors, sea-based interceptors, additional Patriot (PAC-3) units, and sensors based on land, at sea, and in space". According to the US Missile Defense Agency (MDA), this year the United States "will have a capability to defeat a ballistic missile attack threatening the United States".

44. The Initial Defensive Capabilities (IDC), according to the most recent indications by the Pentagon, will include a number of interceptor missiles for the Ground-based Midcourse Defense (GMD) to be fielded at Fort Greely, Alaska, by October 2004. The US MDA emplaced its fifth interceptor missile into its underground silo at Fort Greely on 25 September 2004. One additional interceptor is planned for emplacement at the facility by mid-October. Two interceptors will be deployed later this year at Vandenberg Air Force Base (AFB), California. The IDC will include sensors, such as launch-warning satellites, an L-band phased-array radar on the Aleutian Island of Shemya, Alaska, and an Upgraded Early Warning Radar at Beale AFB, California. The system will have two fire-control nodes: one at Fort Greely and the other at Colorado Springs. According to MDA, "once these components are placed into service with the associated concept of operations, training and support, they will constitute the Initial Defensive Operations" (IDO).

45. The Defense Department plans to field "up to 20" GMD interceptors by the end of 2005: 16 at Ft. Greely and four at Vandenberg. By the end of 2005, up to 10 sea-based interceptors are to be fielded as part of the Aegis Ballistic Missile Defense programme and the Sea-Based X-band Radar (SBX) is expected to be installed on a huge oil-drilling platform. The early warning radars in Fylingdales, United Kingdom, and Thule, Greenland, are to be upgraded to improve detection capabilities off the US east coast. Over the years, the United States will add other elements to its initial capabilities, such as the Theater High Altitude Area Defence (THAAD), using kinetic energy 'hit-to-kill' technology to intercept missiles in their terminal trajectory, or the Airborne Laser (ABL), a modified Boeing 747 that would carry a chemical laser capable of destroying missiles in their boost phase. President Bush, according to MDA, "made clear that there is no final, fixed missile defense architecture, but rather a set of capabilities to be fielded and improved over time".

46. Additional elements of the BMDS will be "fielded and improved over time" using a two-year block approach, or "spiral development". "Block 2006", for instance, refers to capabilities to be fielded or activities to be performed during calendar years 2006 and 2007. This would group all missile defence technologies into blocks depending on which point in a ballistic missile trajectory the weapons were attempting to make the intercept (i.e., during the initial or boost phase, midcourse, or terminal). Although this was done to ensure co-operation across service lines, according to many analysts it made monitoring spending on missile defence programmes more difficult since funding requests are now hidden under vague names like "Boost" or "BMD sensors".

47. Many in the United States are questioning whether the administration's accelerated deployment of BMDS elements would actually undermine the effectiveness of the system. In September 2003, a report by the General Accounting Office (GAO), the audit, evaluation, and investigative arm of the US Congress, warned that the cost of US missile defence programmes is likely to escalate, and the system's effectiveness could be impaired, because the Pentagon has decided to field a ballistic missile defence system by summer 2004. The report identified ten critical Ground-based Midcourse Defense (GMD) technologies and assessed the readiness level of each. According to the report, the MDA developed and tested only two of these ten technologies. In conclusion, the GAO indicated that "making a decision to begin system integration of a capability before the maturity of all critical technologies have been demonstrated increases the program's cost, schedule and performance risks". Because of the stepped-up schedule proposed by the administration, "there is a greater likelihood that critical technologies will not work as intended in

planned flight tests". In a another report released in February 2004 the GAO stated: "No component of the system to be fielded by September 2004 has been flight-tested in its deployed configuration. Significant uncertainties surround the capability to be fielded by September". The GMD system has destroyed a target in five out of eight tests. The last one, which took place in September 2002, was a failure.

48. The director of the Pentagon's Office of Operational Test and Evaluation, Thomas P. Christie, wrote in his annual report to Congress, "Due to the immature nature of the system, models and simulations of the ballistic missile defense system cannot be adequately validated at this time". He noted that the MDA has left itself only "very limited time for demonstration" of the system which is to be fielded this year since there have been developmental problems with the new booster rockets. Mr Christie also declared while testifying before the Senate Armed Services on 11 March 2004, that he was not sure if the system being deployed this year would defend the United States against a North Korean missile attack. One of Christie's predecessors, Philip Coyle, recently declared that he believed the initial system "will have no demonstrated capability to defend against a real attack", as the system components are not mature enough to warrant alert status. Moreover, according to Coyle, the system will not include key radar (such as X-band radar) and space sensors needed to track missiles and identify warheads. Also Former StratCom Commander General Habiger recently criticised the deployment of the Initial Defensive Capabilities: "The MDA states on its website that, 'the initial fielding is not the perfect system, but it will provide a necessary capability where none exists today'. I can guarantee you that when 'initial defensive capability' is brought up, no one is going to say that we have gone from zero to 5% capability. And with the kind of capital investment we have made, I think that is wrong".

49. On 21 April 2004, Lt. Gen. Ronald Kadish, then-MDA director, told a US Senate Appropriations subcommittee that the deployment of the Initial Defensive Capabilities was on schedule. He acknowledged nonetheless that the system will not guarantee a total defence against enemy missiles. "If 100 percent sure is the standard, we're not going to meet it", he said. When asked by a senator whether he could guarantee 50 percent success rate, Kadish declined to answer publicly. In June 2004, Lieutenant General "Trey" Obering was appointed MDA director. On 18 August, US Secretary of Defense Donald Rumsfeld responding to analysts criticising the logic of 'something is better than nothing' declared: "I think there are any number of things that you benefit [from] greatly by getting [the Initial Defensive Capability] out there, playing with it, working with it, testing it, evolving it, learning about it. (...) And that is not a rush to deployment, that's a rush to learning, by my standard".

50. The Bush administration has presented a defence budget request for the fiscal year 2005 (beginning 1 October 2004) of $402 billion, which includes $10.2 billion for missile defence. This represents nearly a $1.2 billion increase over 2004. In particular, the MDA FY2005 budget request includes substantial increases over last year. Overall the 2004-2009 total is $3.231 billion greater than last year ($53.122 billion vs $49.891 billion), while Block 2004 activities have gone up $1.1 billion and Block 2006 have increased of $4.7 billion. The legislative process is due to be completed in October 2004, but at this stage the Administration's request appears likely to be approved by Congress.

V. US MISSILE DEFENCE AND SPACE WEAPONS RESEARCH

51. As indicated in the 2003 Sub-Committee report, the US BMDS does not exclude the deployment of weapons systems in outer space. However, the funding requested by the US government for FY2005 is limited, and most of the activities in this area are so far restricted to R&D. Moreover, the National Defence Authorization Act for Fiscal Year 2005 requires the Secretary of Defence to conduct a comprehensive review of the US space posture. The Secretary of Defence shall submit the report no later than 15 March 2005. The review shall include:

1. "The role of space in United States military and national security strategy, planning, and programming.
2. The policy, requirements, and objectives for space situational awareness.
3. The policy, requirements, and objectives for space control.
4. The policy, requirements, and objectives for space superiority, including defensive and offensive counterspace.
5. The policy, requirements, and objectives for space exploitation, including force enhancement and force application.
6. The policy, requirements, and objectives for intelligence surveillance and reconnaissance from space.
7. Current and planned space programs, including how each such program will address the policy, requirements, and objectives described in paragraphs (1) through (6).
8. The relationship among United States military space policy and national security space policy, space objectives, and arms control policy.
9. The type of systems, including space systems, that are necessary to implement United States military and national security space policies.
10. The effect of United States national security space policy on weapons proliferation."

Your Rapporteur would also like to note that some important elements of the current BMDS architecture have potential anti-satellite (ASAT) capabilities. Furthermore, the United States continues research on an active ground-based anti-satellite system programme, the KE-ASAT. All these systems, if and when deployed, could actually undermine, rather than enhance, security in space as well as globally. The most dangerous possible consequence, as indicated in last year's report, is the starting of a military space race. Other consequences include technical damage to space assets by orbital debris, and possible negative consequences for commercial space programmes or industries, such as telecommunications. Your Rapporteur will provide below an update of these R&D programmes, which were already described in last year's report.

A. SPACE-BASED MISSILE DEFENCE RESEARCH

52. **Space-Based Kinetic Energy Experiment** – The programme has its origins in the Brilliant Pebbles of the Reagan era. Kill vehicles would be placed in orbit. A kill vehicle near the missile launch site would then use its on-board propulsion and sensors to accelerate out of its orbit and home on the missile, attempting to destroy it by hit-to-kill technology. The orbital speed of the kill vehicle would be roughly 8 km/s with the propulsion system capable of accelerating it by an additional 6 km/s. This speed would allow it to travel from low earth orbit to geosynchronous orbit in just over an hour, and still have a speed of nearly 10 km/s at that altitude.

53. In July 2003, the American Physical Society published a report on the feasibility of boost-phase intercept systems for NMD. According to the study, space-based interceptors would have an advantage over land- and sea-based interceptors because they are not constrained by geography to being located close to the target missile, and the practical limits on their accelerations and velocities are not hampered by the atmosphere. But to get enough coverage would mean putting over a thousand interceptors into orbit, which would cost around $40 billion to launch, and involve a widely unrealistic five- to ten-fold increase America's launch capacity. Furthermore, the work of such interceptors could be made more difficult by deliberate last-minute variations in speed and trajectory by the target missile, radar jamming, or multiple missile launches – none of which would be challenging for potential adversaries.

54. Space weapons, however, have also strong supporters in the United States. Gregory Canavan, Senior Fellow at the Los Alamos National Laboratory, in a report released by the Heritage Foundation in January 2004, argues that space-based kinetic kill vehicles using largely

1980s era Brilliant Pebbles technology could provide the cheapest and most effective defence against enemy missiles in their boost and mid-course phases. "Space-based systems have good coverage for large areas. They are intrinsically global [which] counts to their advantage when the goal is to protect America, its allies and friends from missiles launched anywhere". Similarly, Henry F. Cooper, the director of the SDI (Strategic Defense Initiative) during the first Bush Administration, has argued that the technology for space-based interceptors, Brilliant Pebbles, will be the most affordable and effective means of defending both the United States and its allies.

55. In July 2003, the MDA officially opted for postponing its space test bed because there was neither adequate technology nor political will to carry out the program's goal in the near term. As Terry Little, MDA's programme manager for the space test bed said, "You need a lot of satellites and they need to be affordable to buy and launch". However, the MDA's FY2005 budget request mentions development of a space-based interceptor test bed and development and testing of lightweight space-based interceptor components as part of Block 2012 activities beginning in 2005. The MDA obtained an initial $14 million for research on a space-based interceptor test bed last year, and $119 million in 2005 for granting design contracts.

56. **Space-Based Laser (SBL)** - This system's main element would be a satellite armed with a hydrogen-fluoride chemical laser capable of destroying missiles during their boost phase. Funding for research on SBL has waned over the years because of the operational challenges of deploying such a system. In FY2002, SBL was transferred from the Air Force to the MDA. Congress eliminated $120 million from the President's proposed $170 million appropriation for the SBL in the Budget for FY2002. The SBL program was officially cancelled in 2002 due to technical and cost challenges. Funding for technology work continued in FY2002 and FY2003 ($49 million and $25 million respectively). In the FY2004 and FY2005 budgets, SBL work has been folded into the MDA's technology budget and is not identified separately.

B. ANTI-SATELLITE CAPABILITIES

57. As indicated above, some elements of the US BMDS may have anti-satellite capabilities. These include the Ground-based Midcourse Defense (GMD). The MDA plans to have 20 operational interceptors by the end of 2005. Given that the interceptors' planned burnout speed is reported to be 7 to 8 km/s, and that they could lift the kill vehicle to a height of roughly 6,000 km, they could therefore reach satellites in low earth orbit (at altitudes less than 1,200 km). It is unclear what ground sensors will be part of the early deployment system at Fort Greely but extensive space tracking assets that the US possesses would provide a good approximation of a satellite's location. Similarly, sensors to detect the light and heat from a warhead in the midcourse phase of its flight should also be able to detect satellites. The X-band radars that are to be part of the GMD system should be able to track satellites in low earth orbits.

58. **The Air Borne Laser** (ABL) can also have ASAT capabilities. According to publicly available analyses, the ABL would be able to destroy missiles at a range of a few hundred kilometres with a dwell of 10 to 20 seconds. If the ABL, flying at an altitude of about 13 km, is to be able to attack long-range missiles, the beam director must be able to point the beam upwards, which would allow it to target satellites in low earth orbit as well. The mission to destroy a satellite would require less power than destroying a missile.

59. The ABL programme has undergone an initial flight test series of the modified Boeing 747 and tracked a ballistic missile launch from Vandenberg, as a part of a GMD intercept test. The MDA awarded a $242 million contract modification in July 2003 to Boeing to cover cost growth on ABL. The additional money did not reflect an increase in the $2.1 billion value of the Boeing's ABL contracts. The money was to cover unanticipated additional work on building the laser and beam control components and integrating them into the aircraft. The Pentagon has also awarded Boeing a contract for design work on a second 747-400F that would be converted into a laser carrier.

However, the ABL's position could be undermined by a contract signed late last year by Northrop Grumman to develop a boost-phase intercept missile that could accomplish the same task as the laser system.

60. The ABL was budgeted at $345 million in FY2004. The MDA has been planning to conduct its first lethality demonstration in 2004-2005, but the development effort has been plagued by cost and weight issues. The MDA said last September that the first shoot down attempt was likely to take place in 2005, rather than late in 2004 as earlier analyses predicted. The programme was heavily criticized by the General Accounting Office in a July 2002 report. Because of "programme and schedule uncertainties," the ABL will not be included in the 2004 initial deployment as originally planned. Instead, it may be added during the Block 2006 timeframe.

61. **Aegis-LEAP** – This ship-based missile defence system is intended to intercept missiles with ranges from 1,000 to 2,000 km. The system reportedly has a burnout speed of 3 km/s. Fired vertically for use as an ASAT, the kill vehicle would be able to reach altitudes of 400 to 500 km and attack satellites at those altitudes. However, these low altitudes contain a relatively small number of satellites, most of which currently are owned by the United States. The eventual goal is to develop a system intended to intercept long-range missiles, using interceptors similar to those of the ground-based system. The Pentagon has also asked for a modular design of MKVs to be applied to the Navy's Aegis system.

62. The United States is also conducting advanced research on other ASAT programmes. **The Kinetic Energy ASAT** would involve ground-based interceptors that could be launched atop existing ICBMs designed to destroy or temporarily disable hostile satellites, using hit-to-kill technology. Congress revived the KE-ASAT programme in FY1996. In its report on the FY2004 Defense Department authorization bill, the Senate Armed Service Committee recommended adding $4 million to the funding requested for space control in order to assess and evaluate KE-ASAT technologies, and to develop space control technologies that leverage KE-ASAT capabilities. In the FY2004 Defense Department appropriations act, Congress added $7.5 million for KE-ASAT under the ballistic missile defence technology.

63. The Pentagon has been conducting research on developing a miniature kill vehicle (MKV) for its ballistic missile interceptors. The availability of large numbers of these kinetic energy kill vehicles should allow a single interceptor to engage multiple warheads or eliminate sophisticated decoys while still leaving sufficient numbers of MKVs to intercept real targets. The first application would be for the GMD, with several dozen kill vehicles to replace the single device now carried on the booster. The MDA picked Lockheed Martin in January 2004 to develop and build the MKV. MKV development during the next eight years could cost $768 million. First flight tests are not planned until around 2007-2008.

64. **Micro-satellites** - the Defense Advanced Research Projects Agency is reportedly working on 'micro-satellites' that could be used in an ASAT role. Baseline technology has evolved from kill vehicles designed for missile defence. Advantages of the small satellites are that they are hard to detect and track and they can be launched in the shrouds of bigger space vehicles. There is also an air-launch concept under consideration, with the first stage involving a Boeing 747-400 aircraft.

VI. MISSILE TECHNOLOGY NON-PROLIFERATION REGIME

65. For many years, the international community has relied on a single non-proliferation regime to control the proliferation of missiles, the 1987 Missile Technology Control Regime (MTCR), an informal, non-treaty association of states sharing common interests. The MTCR, which includes now 33 states, is intended to control the proliferation of ballistic and cruise missiles, UAVs, and related technologies in order to limit the risks of nuclear, biological and chemical (NBC) weapons

proliferation. The regime seeks to coordinate national export licensing efforts through a number of guidelines. These include: national control laws and procedures; information-sharing between states on any import requests they refuse, to ensure that commercial advantage is not subsequently gained by export to another state; the denial of any requests for transfers in terms of nuclear weapon delivery systems development; and the prohibiting of re-transfers to other states without authorisation.

66. The MTCR includes a two-category common control list: the first category items are subject to a strong presumption of denial and include complete rocket and UAV delivery systems and sub-systems; the second category items are less restricted but still require some end-use certification or verification and include propulsion and propellant components and launch and ground support equipment. The two categories of items have been regularly updated by MTCR participating states. In 2002, for instance, controls were extended to UAVs and aerosol-spray devices to be mounted on them. At a meeting in September 2003, acknowledging that terrorists may acquire missiles or UAV technologies, MTCR members agreed to implement a "catch-all" provision to the regime. This would give a legal basis for regime members to place export controls on items and equipment that are not specifically listed in the MTCR or national control lists when these items are to be used for missile programs. This addition is meant to restrict the movement of dual-use equipment. One official noted that proliferators have shifted their focus away from selling complete missile systems and production technologies to acquiring bits and pieces designed for other purposes but that can be used to produce missile-related items. At the same meeting, MTCR members agreed to restrict "intangible" technology transfers – sending blueprints for missile systems via e-mail or fax. MTCR members also initiated regular meetings of officials responsible for export control enforcement.

67. MTCR states also manage contacts of different kinds with countries that do not participate in the regime. A number of countries have also signaled their intention to become members or pledged to abide by the MTCR guidelines. In particular, China, which introduced a number of important changes in its export controls regulations in 2002, has recently indicated its intention to join the regime.

68. At the end of the 1990s, it became clear that the MTCR, which focuses on supply-side controls, was not sufficient to stem missile proliferation. In 1999, MTCR members decided to consider further steps in this area of non-proliferation that would involve a larger number of countries. In 2000, at a meeting in Helsinki, MTCR partners issued a draft International Code of Conduct (ICOC) under which subscribing countries would commit themselves to exercising maximum restraint in the development, testing and deployment of ballistic missiles. In the following two years, the members of the European Union took the initiative in a diplomatic process to acquire multilateral support for the draft ICOC. An intergovernmental conference was held in Paris in February 2002 during which more than 80 states agreed on a revised draft ICOC. After being further revised at a meeting in June in Madrid, the final code of conduct was adopted by 90 states in November 2002 in The Hague and re-named the Hague Code of Conduct against Ballistic Missile Proliferation (HCOC).

69. The HCOC does not represent an effective and verifiable regime against ballistic missiles, but a politically binding document that encourages countries to report annually on their missile and space programmes and to alert all other members when conducting ballistic missile tests. The focus being on broad principles rather than detailed action plans, the HCOC will not have an inspection system to assure compliance with it or sanctions for violating it. However, it is remarkable that, as of January 2004, 111 states have signed the HCOC, including 60 non-MTCR states. Nevertheless, critics point out that countries actively seeking the capacity to build long-range ballistic missiles such as India, Iran, Israel, North Korea, and Pakistan, have not signed the HCOC.

70. According to most analysts, the MTCR appears to be working quite well in restricting access to missile technology. It is a fact, as Mark Smith, an expert from the UK Mountbatten Centre for International Studies, highlighted, that "virtually all missiles outside the MTCR are *scuds* or *scud* derivatives. That is to say, Second World War V-2 technology remains the base element for missiles in the developing world". On the other hand, countries like North Korea and Iran have been remarkably successful in improving *scud* technology and exporting their products. One of the major problems of the MTCR is that it places prohibitions only on exports and not on possession of missile technology. It would have been difficult, however, to impose a regime against the possession of missiles. They are delivery systems rather than weapons in their own right, and prohibiting them as has been done with NBC weapons might not be feasible or even desirable.

71. Something could be done, however, to strengthen the MTCR norm against cruise missiles and UAVs. Acquisition of certain technologies is in fact made easier by existing loopholes in the regime. In a presentation to this Committee during the Annual Session in Orlando, Dennis Gormley of the Monterey Centre for Nonproliferation Studies, said that there exist several legal paths to enhancing cruise missile capabilities. These include indigenous production; 'off-the-shelf' purchases from industrial suppliers of short-range (under 300 km) missiles with a view to upgrading them; conversion of short-range anti-ship cruise missiles that have spread widely in the developing world; and conversion of UAVs and small manned aircraft into autonomous missiles. In particular, Gormley underlined the importance of revising the MTCR control list by adding to it flight control systems specially designed to transform manned aircraft or radio-controlled UAVs into completely autonomous systems.

72. Among other weaknesses of the MCTR identified by Gormley are the lack of broad political consensus on cruise missile threats; the commercial availability of dual-use aerospace technologies; and weakening support for the MCTR from states keen on developing BMD projects. This is particularly unfortunate, as missile non-proliferation efforts and theatre missile defences could be mutually reinforcing.

73. Finally, your Rapporteur would like to underline that the existence of failed states and chronic regional instability are still the primary drivers of missile proliferation. States seek missile capability (as well as NBC weapons) in order to acquire a form of status. Many states of concern, as noted earlier, view these weapons as strategic tools of defensive and coercive diplomacy, rather than operational weapons of war. It is therefore extremely important to continue to address the problems and conflicts in many unstable regions, notably in the Middle East, Central Asia and the Korean Peninsula, through political, diplomatic and economic means.

VII. CONCLUSION

74. The above analysis indicates that the threat coming from the proliferation of ballistic missiles is serious but not daunting. NATO countries have rightly recognised the need for deploying robust and effective theatre missile defences. These will enable the Alliance to defend itself from the challenge of ballistic missiles developed by some states of concern, notably in the Middle East. More importantly, TMD systems appear indispensable at a moment when NATO and its member states are increasingly involved in military operations in dangerous regional contexts, where the threat of ballistic missile attacks is considerable, if not certain.

75. But as we develop anti-ballistic missile defences, states of concern (and indeed terrorists) might step up their efforts to acquire cruise missiles and UAVs, which are, as we have seen, much more difficult to detect and counter using current missile defences. The technologies to effectively defend ourselves from such threats are still a few years away. Moreover, states of concern will seek to acquire more sophisticated cruise missiles and UAVs capable of circumventing our most advanced missile defences.

76. Strengthening the MTCR - particularly provisions dealing with cruise missiles and UAV technologies and dual-use items - and expanding the HCOC to more countries, especially in unstable regional contexts, might prove to be the most effective strategy to stem cruise missile and UAV proliferation. Other political, diplomatic and confidence-building measures should be envisaged to address the problems and conflicts in many troubled regions of the world.

77. In general, your Rapporteur believes that a successful strategy against missile proliferation would consist of a combination of diplomacy, confidence-building measures, multilateral non-proliferation treaties, a strict missile technology export control regime and effective theatre missile defences.

78. Your Rapporteur does not believe that the threat of ballistic missiles, at present as well as in the foreseeable future, is such to justify the deployment of multi-layered, Alliance-wide ballistic missile defences of the type that the United States government is planning to deploy. Especially because in many instances the technologies do not appear to be mature, and in others the costs involved in the deployment of truly effective systems are extremely high, sometimes difficult to bear even for the richest country in the world.

79. The US Department of State recognised, in its comments to the earlier version of this report, that "*cost and technological maturity are valid concerns*", but that the United States "*is taking the best technology available and developing it further by testing it on a sophisticated test-bed in the Pacific*". This appears questionable, as the Missile Defense Agency was testing the system from Kwajalein Island and Vandenberg AFB well before the construction began at Fort Greely, and it could have continued to do so. Besides, Fort Greely is not planned to be used as test facility. This indicates that the priority went into construction and deployment rather than testing. Furthermore, all the intercept tests so far have been conducted under artificial conditions different from those that actual attacks are likely to present (target and launch time, point of impact and shape of the target were all known in advance). The MDA declared that it would rely on modeling and simulation. But unfortunately today's modeling and simulations do not capture all the complexities inherent in ballistic missile and missile defense systems. This is why the National Defense Authorization Act for FY 2005, as of today, allows the funds requested for missile defence but explicitly asks the Secretary of Defense "to prescribe criteria for operationally realistic testing of fieldable prototypes developed under the BMD".

80. The Bush administration contends that the Initial Defensive Capabilities work and will offer at least some kind of defence from ballistic missiles. Your Rapporteur is not alone in considering this questionable. In May 2004, a report sponsored by the Union of Concerned Scientists, a US-based independent non-profit organisation, indicated that the system being deployed by the United States government has no demonstrated capability to defend against a real attack, and there is no basis for knowing the system being deployed will have such capability.

81. Finally, your Rapporteur would like to reiterate concerns about the danger of deploying space weapons. Even if so far the United States is only conducting research in this area, we are concerned that plans to station strike weapons in outer space, as well as the possible deployment of anti-satellite weapons, both space- and ground-based, could generate an arms race and increase threats to important commercial and military assets in space. It is therefore important that the NATO Parliamentary Assembly draw once more the attention of member parliaments to this important matter in the context of the Alliance's debate on missile defences.
