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Executive Summary

The United States Government plans to deploy 10 interceptors in Poland and a radar installation in the Czech Republic. This has caused a stir in political and military circles in both Europe and Russia. This study examines the US proposals and their possible implications for Europe. It makes an assessment of the degree to which defences might enhance European security and sets out the parameters of a European approach towards missile defence.

The first section of the study evaluates the nature, extent and quality of threats from ballistic missiles to EU territory - especially in relation to their deployment with WMD warheads.

The second section maps the nature, extent and quality of existing missile defence capabilities. It provides an assessment of the state of US missile defence plans and programmes, examines the reasons behind the US requirement for a missile defence site in Europe, and also considers NATO's activities in missile defence.

The third section provides observations on the wider strategic implications of the US proposed deployments in Eastern Europe, including its impact on strategic stability, relations with Russia and with NATO, tackling rogue states, moving into space, industrial policy and on arms control.

The fourth section provides a brief glimpse of the national positions of some of the key European countries involved in this debate – Poland, Czech Republic, France, Germany and the UK.

This fifth section explores: the differences in perception and approach between the US Administration and the Europeans; the particular role that missile defence might play within overall European counter-proliferation strategy; and assesses some of the outstanding issues that need to be addressed as part of a balanced European approach.

The study concludes that there is no logical, military or moral reason why Europe should accept vulnerability against ballistic missile attack, if and when that vulnerability becomes apparent and where it is possible to mitigate or remove it. If cost-effective missile defences can be made to work well Europe's political leaders need to consider the option seriously.

Nevertheless, major questions remain as to whether, or at least to what extent, missile defence is warranted to meet future possible threats given the scenarios in which its presence might be relevant, the level of technical proficiency it is likely to achieve and the cost involved.

The study puts forward a number of recommendations to underpin a European approach to missile defence.

The study finishes by stating that it would not be in Europe's security interests to take decisions concerning the possible deployment of new missile defences in Europe precipitously. Any decisions should be made only after there has been an informed,

widespread and transparent debate throughout Europe. The European Parliament has a legitimate contribution to make to that debate and this study is intended to assist in that process.

Contents

Introduction

The United States Government, which has already deployed two missile defence sites in the US, would like to deploy its third site in Eastern Europe to defend against ballistic missile attack from the Middle East (most prominently from Iran). Its other two sites, located on the western fringes of US territory, are intended to act as a counter to North Korea's ballistic missiles.

The US plans, involving the deployment of 10 interceptors in Poland and a radar installation in the Czech Republic, have caused a stir in political and military circles in both Europe and Russia. Moscow claims that missile defence is really aimed at countering Russia's strategic nuclear forces and will, therefore, undermine strategic stability. Consequently, it has warned that defences will spark a renewed nuclear arms race, has said it will target these sites with Russian missiles, and threatened to stop abiding by the terms of important arms control treaties.

This study examines the US proposals and their possible implications for Europe. It makes an assessment of the degree to which defences might enhance European security and sets out the parameters of a European approach towards missile defence.

1. Threat assessment

This section evaluates the nature, extent and quality of threats from ballistic missiles to EU territory - especially in relation to their deployment with WMD warheads. Which countries have ballistic missiles that can reach EU territory – how are such capabilities likely to develop over the coming two decades – and what is the likelihood that these capabilities could pose a threat to EU territory.

The EU identifies the proliferation of weapons of mass destruction (WMD) as "potentially the greatest threat" to its security[1]. To deliver nuclear, biological or chemical weapons, there exist a wide range of primitive (cars, ships, containers) as well as high-tech transport systems such as aircraft or medium / long-range missiles. The 2003 *EU Strategy against the proliferation of Weapons of Mass Destruction* not only includes cruise missiles and UAVs but also concludes: "All such weapons could directly or indirectly threaten the European Union and its wider interests[2]."

1.1 What are ballistic missiles?

Ballistic missiles are guided weapons consisting of one or more rocket stages which provide propulsion over the first minutes of a flight path. Therefore, the ballistic trajectory can be divided into a 'boost phase', a free-flying 'midcourse phase' with its peak altitude

[1] European Security Strategy: A secure Europe in a better world, Brussels, 12 December 2003, http://www.consilium.europa.eu/uedocs/cmsUpload/78367.pdf

[2] EU Strategy against the proliferation of WMD, Council of the European Union, Brussels, 10 December 2003 http://www.sussex.ac.uk/Units/spru/hsp/2003-1213%20Strategy%20against%20WMD%20proliferation.pdf

in space and the very short 'terminal phase' where the payload enters the atmosphere with a very high closing speed (1-8 km/sec).

Payload, accuracy, range and reliability are the most important factors to describe the military performance of a ballistic missile. The payload requirement of a modern nuclear warhead is between a few hundred kilograms to at least half a ton. Depending on the missile motors and number of rocket stages, ranges vary between several hundred to several thousand kilometres. Missiles are defined primarily by their range (see Table 1): the longer the range the more stages to the missile are required; the longer the flight time, and the higher the burn-out velocity. Their accuracy can be as precise as a few tens of meters, although this is less important for a nuclear missile due to its large destructive radius. In order to launch a ballistic missile a specific infrastructure, such as a mobile transporter / erector launcher is required, along with Command and Control equipment (See Stanford 1991; Karp 1996).

Range	Stages	Flight time	Burn-out velocity [km/sec]
300 km (SRBM)	1	5 min	1.5
1,000 km (MRBM)	1	9 min	2.8
3,000 km (IRBM)	2	16 min	5.0
10,000 km (ICBM)	3	33 min	6.9

Table 1 Typical key characteristics of military ballistic missiles

As ballistic missiles are able to deliver payloads of mass destruction over considerable distances within minutes, they represent a colossal strategic threat if equipped with nuclear warheads[3]. Attacks with conventional payloads, while possibly having very serious consequences for civilian populations or armed forces, may not result in mass fatalities, or even any great damage[4].

1.2 What constitutes missile proliferation?

Different technological and political factors are responsible for missile proliferation. Due to the general diffusion of technology, the dual-use nature of aero and space industries and the export of military technology (export and licensing of SRBM technologies and equipment) many countries could, in principle, get access to ballistic missile technologies. All traditional nuclear weapon states have developed ballistic missile technologies, whether by importing scientists, knowledge or production technologies or by indigenously developing missiles and missile infrastructures (OTA 1993; Karp 1996).

Missile manufacturing is no longer a privilege of industrial countries. Nevertheless, the more sophisticated ballistic missiles are - in terms of range, accuracy and reliability - the more difficult it is to develop and produce them. Developing ballistic missiles is both technologically demanding and costly. Space launch services are increasingly attractive

[3] There are several examples of missile attacks with low accuracy equipped with explosives starting with the V-2 attacks until the "war of the cities" between Iraq and Iran terrorizing the populations in cities.
[4] Iraq fired hundreds of SCUD missiles on Israel and Saudi-Arabia and a SCUD attack which landed in an American barracks during the Second Gulf War caused 28 US fatalities.

for some countries[5]. Unfortunately, launch vehicles that are designed to lift civilian payloads into space can also be converted for use as military ballistic missiles. The key requirements for a strategic ballistic missile are long range, heavy throw weight and reliable propulsion and guidance.

Table 2: National Technological Capability for Missile Manufacture (Relative Levels)

Country	GDP & Industry	Arms Production Record	Technology	Aggregate Capability
Brazil	High	High	High	High
India	High	High	High	High
S. Korea	High	Mid	High	High
Israel	Mid	High	High	High
S. Africa	Mid	High	Mid	Mid
Argentina	High	Mid	Mid	Mid
Taiwan	High	Mid	Mid	Mid
Iran	Low	Low	Low	Low
Egypt	Low	Mid / Low	Low	Low
N. Korea	Low	Mid / Low	Low	Low
Pakistan	Low	Mid / Low	Low	Low
Iraq	Very Low	Low	Low	Very Low
Syria	Very Low	Low	Low	Very Low
Libya	Very Low	Low	Low	Very Low

Source: Mistry, Dinshaw: Containing Missile Proliferation, Strategic Technology, Security Regimes, and International Cooperation in Arms Control, University of Washington Press, Seattle and London 2003, p. 28.

1.3 The threat from ballistic missiles

A number of countries are attempting to acquire or develop medium- and long-range ballistic missiles to deliver WMD or other payloads. Aside from the five established nuclear weapon states, about 25 countries have or are trying to procure ballistic missiles[6], of which five - Israel, India, Pakistan, Iran and North-Korea - have produced and flight-tested ballistic missiles with ranges over 1,000km. Additionally, Saudi Arabia has purchased and deployed 20-25 old Chinese CSS-2 missiles (range 2,600km). North Korea's missile proliferation activities are particularly troublesome because it sold missile production technologies, as well as actual missiles, to other countries, including Pakistan and Iran. It is believed that North Korea is aiming to develop an ICBM, but its last test in July 2006 failed again.

The successful development of a nuclear, biological or chemical warhead is a significant technological challenge. It is a quantum leap from being able to build a crude nuclear bomb to being able to refine it into a ballistic missile warhead. Developing the capability

[5] In addition to the classical space-faring nations, other states have also developed capabilities to lift payloads into space, e.g. India, Japan, Ukraine, Israel and Brazil. North Korea, Iran and Pakistan take first steps to launch satellites into orbit. 28 states have the capability of "sub-orbital" launches, 45 states have used the possibility to transport payload into space by means of own or foreign carriers. See for details: Simon Collard-Wexler, Thomas Graham, Robert Lawson, Wade Huntley, Ram Jakhu, William Marshall, John Siebert, Sarah Easterbrooks: Space Security 2006, Canada 2006 [www.spacesecurity.org]

[6] It must be underlined that most of these 25 countries are now friends and allies of the United States.

to disseminate effectively chemical and biological agent from missile warheads is also a very difficult task.

Nevertheless, certain trends are worrying. A number of those who already possess ballistic missiles are seeking to extend their range and these tend to be the same states that either already own, or have ambitions to acquire, WMD. It is difficult to quantify future threats in this area, especially when states can disguise their WMD ambitions within legitimate civilian programmes. It is important not to equate capability with intent, although it is equally important to recognize that intentions can change quickly, and it is not prudent to wait until a direct threat becomes clear before determining how to defend against it.

According to US intelligence assessments, North Korea and Iran constitute an emerging strategic threat to the United States (Negroponte 2006). Both countries are suspected of having military nuclear programmes. North Korea tested a nuclear device in October 2006 and is flight-testing long-range-missiles. Iran has missiles that originated from North Korea and, according to US intelligence, might be able to develop an ICBM by 2015[7]. The Rumsfeld Report from 1998 portrayed a more serious ballistic missile threat under the assumption that emerging missile countries, such as North Korea or Iran, would have more extensive technical assistance from outside[8]. To date, however, it is far from clear whether this trend has materialized.

In principle, only a limited spectrum of measures exist that might curb or reverse missile threats: The EU WMD Strategy correctly differentiates between political and diplomatic preventative measures (such as multilateral treaties, export controls, political dialogue and diplomatic pressure) and monitoring ("first line of defence") and coercive measures under Chapter VII of the UN Charter and international law (such as sanctions - selective or global, interceptions of shipments and, as appropriate, the use of force).

The generic missile threat spectrum encompasses a wide range of types and technologies, from ground-, sea- or air-launched cruise or guided missiles with different trajectories and payloads. In the future, cruise missiles and unmanned air vehicles may be more attractive than ballistic missiles, but these delivery systems are not the subject of this study. There are a number of less conventional or asymmetrical means of delivering WMD, such as via a cargo vessel or truck. For certain states, and definitely for non-state actors, such crude devices may seem more plausible and affordable means of delivering the intended effect, than ballistic missiles.

One of the other drawbacks of using ballistic missiles is that the source of their launch can be traced by satellite technology. This means that the user, or at least his location, can be identified. For less conventional delivery methods it would probably prove that much more difficult to prove who the culprits were.
Despite these difficulties, if a state is able to perfect ballistic missile technology they will have acquired an assured means of delivering a lethal payload over long distances. Whether they are also able to perfect the development of suitable WMD warheads for

[7] Iran is the next country most capable of testing an ICBM capable of delivering a weapon to the United States during the next 15 years. See [Walpole 1999]
[8] The Rumsfeld Commission concluded that the threats to the US were "broader, more mature, and emerging rapidly" than previous intelligence estimates had suggested" and "that such threats might appear "within about five years of a decision to acquire such a capability". [Rumsfeld 1998]

deployment on these missiles represents another step-change in capability. Miniaturizing a nuclear weapon to make it suitable for fitting atop a ballistic missile is a skill that still eludes all but a small handful of states.

The ballistic missile is also attractive to states with weak or inferior air forces. Given the contemporary global balance of airpower, any state confronting US/NATO/Allied forces can expect to be subject to complete air superiority. In other words, their aircraft are unlike ever to take off, let alone be able to successfully penetrate to their targets. Ballistic missiles, on the other hand, will have no such penetration problems. Of course, they could be subjected to preventive or pre-emptive attack, but, once launched only missile defence can possibly stop them.

That is why it would be a significant achievement if it were possible to negate the effectiveness of ballistic missiles in delivering WMD by developing a capability to shoot them down. Proponents of missile defence sometimes suggest that developing such capability will in itself serve the cause of ballistic missile non-proliferation, by reducing their attractiveness as an effective weapon (although other factors will also be affecting their decisions as discussed later).

By the same token, missile defences, even if completely effective, would not remove the threat from WMD. We have to be prepared to meet a generic WMD threat however it might be delivered. Hence, defence planners need to avoid concentrating exclusively on countering ballistic missiles at the expense of addressing other means of WMD delivery.

In principle there exist a number of specific sources of possible ballistic missile threats to Europe as well to the US:

1.3.1 Accidental, unauthorized, or erroneous attack

If nuclear missiles are accidentally fired we are presently unable to prevent their passage to their target. Notwithstanding the enormity of a (possibly nuclear-armed) missiles landing on a European city, one would then be faced with the possibly extremely difficult task of trying to prevent the crisis spiraling out of control and escalating to full-blown war.

Upon the disintegration of the former Soviet Union fears of an accidental or unauthorized launch of a ballistic missile increased, with initial doubts about the state of Russia's command and control infrastructure as the economy shrank and morale in the armed forces fell. Such fears have lessened as the economic situation has improved. Nevertheless, Russia continues to rely on a 'launch on warning' policy, whereby it is prepared to launch a retaliatory strike before the attacking missiles actually reach their targets. Because such decisions to retaliate would need to be taken within a few minutes, this posture exacerbates the risk of an accidental launch.

China's nuclear force posture has been predicated on being able to 'absorb' a nuclear first strike and then to retaliate i.e. a counter-value, second-strike deterrence strategy[9]. This is due primarily to China's reliance on liquid-fueled missiles, which, because they take too long to prepare, would be unable to be 'launched on warning'. As China modernizes its

[9] 'China's Nuclear Doctrine', James Martin Centre for Non-Proliferation Studies, at: http://cns.miis.edu/research/china/coxrep/doctrine.htm

forces to solid-fuel propulsion and grows increasingly nervous about US missile defence capabilities, it may become drawn towards adopting a ‘launch on warning’ posture itself.

To varying degrees, it is conceivable that a failure could occur in any of the command, control, communications, or intelligence (C3I) components that manage nuclear-armed ballistic missiles in any nuclear-armed state. For example, a renegade commander might attempt to initiate nuclear use without governmental authorization. Or perhaps a computer malfunction or false information from radars/sensors might incorrectly indicate an incoming attack, and thus prompt erroneous retaliation. The established nuclear powers have made strenuous efforts to develop robust C3I for their nuclear weapons. Nevertheless, although the risk is a remote one, it cannot be eliminated altogether. More worryingly, the spread of ballistic missiles to states that do not have sophisticated command and control procedures may well exacerbate this problem in future.

One way of addressing this problem would be to take all nuclear weapons off 'hair-trigger' alert status - in other words, to abandon doctrines of ‘launch on warning’. Unfortunately, this is something that the US and Russia still refuse to countenance fully (although the number of weapons on high alert has been reduced). For states in possession of vulnerable, relatively small nuclear arsenals the fear of 'losing them before using them' is likely to encourage them to maintain there weapons a on a hair-trigger.

The possession of missile defences, by challenging the credibility of retaliatory capabilities, will provide a further disincentive to move away from ‘launch on warning’ postures. This could produce a highly unstable situation, especially in times of crisis.

Only if missile launches are genuinely accidental could missile defence act as a stabilizing factor in as much as they offer the hope of intercepting such a missile before it inadvertently sparked a wider confrontation. It might also potentially save the lives of many thousands of people.

1.3.2 Russia

The US and Russia still have an impressive arsenal of nuclear equipped ballistic missiles with approximately 15,000 existing nuclear warheads on each side. Despite the fact that Russia continues to reduce its nuclear stockpile, at the beginning of 2007 the Strategic Nuclear Forces of Russia included 741 strategic delivery platforms (bombers and missiles) carrying up to 3,281 nuclear warheads[10]. The land-based Strategic Rocket Force is operating 489 ballistic missiles of four types (SS-18, SS-19, SS-25, SS-27, SS-27A) with approximately 1,788 nuclear warheads. Additionally, 12 strategic submarines carry 609 warheads and 79 bombers carry 884 long-range cruise missiles. A further 9,300 warheads, including non-strategic warheads, are awaiting dismantlement[11].

In contrast to the US arsenal which is modernized, Russian nuclear forces are aging rapidly and many of them have reached or are reaching the end of their life cycle. As a consequence, Russia is developing, testing and deploying new land- and sea-based forces. In 1997 Russia started to deploy the silo-based Topol-M (NATO designation SS-27) Inter-Continental Ballistic Missile (ICBM), which is equipped with one 550 kiloton warhead. In

[10] See Russian Strategic Nuclear Forces Homepage, provided by Paul Podvig: http://russianforces.org
[11] A detailed statistics can be found in the Bulletin of Atomic Scientists, March/April 2007, p.61-67.

2006 the road-mobile Topol-M1 (SS-27A) began to replace the older SS-25. On 29 May this year a new ICBM, called RS-24 (a MIRVed[12] Topol-M), was tested. This may carry six nuclear warheads, which would not be compatible with the Strategic Arms Reduction Treaty (START) Treaty.

The test record of the new submarine-launched ballistic missile (SLBM) Bulava has not been very successful and might delay the deployment of the missiles (its initial operational capability is planned for 2009). Three new strategic submarines ('Borey class'), that will carry the new SLBM, are planned for 2012. President Putin has stated that Russia's nuclear deterrent remains central to its security policy. Nevertheless, the number of Russia's strategic warheads overall might still be halved from the existing 3,000+ to about 1,726 warheads in 2020[13].

Projected strategic warheads, 2007-2020:

	2007	2012	2020
ICBMs	1843	665*	254*
SLBMs	624	600	744
Bombers	872	788	728
Total	3339	2053	1726

*Assumes no MIRV on Topol-Ms.

This assessment remains vague because it is unclear how Russia might react to the US missile defence plans in Europe. For example, Russia has threatened to withdraw from the 1987 US-Soviet Intermediate-Range Nuclear Forces (INF) Treaty, which prohibits ballistic missiles with ranges 500-5,500 km (see later for more details). It has also threatened to (re-)target its nuclear forces against any new missile defence facilities.

As things stand today it is difficult to envisage how Russia might become embroiled in a war with Europe and where the stake were sufficiently high for the use of nuclear weapons to be considered. The deployment of very limited missile defences in Eastern Europe does not really alter that equation. The more immediately deleterious consequence of such deployments is that Russia will persist with its 'launch on warning' nuclear posture, that it will be more reticent about reducing strategic warhead numbers further, and that it may well break out of the confines of other arms control treaties, thereby becoming less transparent about its capabilities.

1.3.3 Asia (including China)

The leading missile power in Asia is China, which is also embarked on force modernization. The Natural Resources Defense Council (NRDC) estimates that China has deployed approximately 130 nuclear warheads for delivery by four types of 80 land-based, nuclear-capable ballistic missiles of long range: Dong Feng (DF)-3 (range 3,100 km), DF-4 (5,500+ km), DF-5 (13,000 km) and the road-mobile DF-21(2,100 km). The only

[12] MIRV stands for a multiple, independently-targetable, re-entry vehicle. A MIRVed missile carries multiple warheads,

[13] Nuclear Notebook, prepared by the Natural Resources Defense Council (NRDC): Russian Nuclear Forces, 2007, *Bulletin of Atomic Scientists*, March/April 2007, p.61-64.

missile with intercontinental range is the DF-5[14]. It is believed that none of them are carrying MIRVs. China is also developing solid-fuelled missiles such as the DF-31 (8,000 km) and DF-31A (12,000 km). The sea-based component consists of only one nuclear-powered submarine armed with 12 single warhead missiles (Julang (JL)-1). China also has a small arsenal of nuclear bombs for delivery by aircraft. It is unclear how many DF-31 and JL-2 China might deploy in the future.

Three other countries in the region are developing and partially deploying ballistic missiles with ranges over 1,000 km. India seems to be aiming to become a full-fledged nuclear power by developing land- and sea-based ballistic missiles[15]. 36 two-stage intermediate-range AGNI I ballistic missile (range 700+ km) and 36 AGNI II (range 2,000+ km) are believed to have been deployed, whereas the AGNI III (range 3,000+ km) is in development. India also maintains the SRBM Prithvi missile family (range 100km) and air deliverable bombs for its Jaguar and Mirage aircraft. It is developing new sea-launched ballistic missiles. It is estimated that India might have produced fissile material for 40-50 nuclear warheads. This capability is justified primarily to counter China's nuclear forces, but Pakistan is the other obvious factor.

Pakistan is also enhancing its nuclear weapon capability by producing fissile material and investing in a missile testing programme[16]. It has three types of ballistic missiles for nuclear weapon delivery: the SRBM Ghaznavi or HATF-3 (400 km), the Shaheen-1 or HATF-4 (450+ km), a reverse-engineered M-9 originally supplied by China. A test-launched MRBM Shaheen-2 has a range of 2,500 km. The MRBM Ghauri is a reverse-engineered MRBM Nodong (1,300 km) which was purchased from North Korea.

The DPRK also seems to be aiming for long-range missiles. It has an existing missile programme based on Russian originated SCUD-technology and has deployed liquid-fuelled Nodong missiles which were also sold to Pakistan (named Ghauri) and Iran (Shahab-3). It is believed that North Korea made significant advances in stage separation technology. A three-staged Taepo-dong was flight-tested over Japan in August 1998, but the third stage failed. It had a No-Dong first stage, a modified SCUD-D second stage and perhaps a modified SA-2 third stage. Although the third stage failed, the two stages could be used for military missiles by the North Koreans to carry a small 450 kg warhead over a distance of 2,300 km.

From 1999 to 2006 North Korea held a missile testing moratorium, until conducting a series of missile tests in July 2006. These tests included one that was widely assumed to be the Taepo-Dong-2. The first stage failed after 42 seconds and the missile test was a complete failure. The CIA maintains that the Taepo-Dong-2 can fly 10,000 km which is very doubtful given the current state of missile technology in North Korea. A missile with such a range would need to be much larger in terms of diameter and rocket engine.

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[14] See: Nuclear Notebook, prepared by the Natural Resources Defense Council (NRDC): Chinese Nuclear Forces, 2006, *Bulletin of Atomic Scientists*, May/June 2006, p.60-63.
http://thebulletin.metapress.com/content/1w035m8u644p864u/fulltext.pdf

[15] See: Nuclear Notebook, prepared by the Natural Resources Defense Council (NRDC): India`s Nuclear Forces, 2005, *Bulletin of Atomic Scientists*, September/October 2005, p.73-75.
http://thebulletin.metapress.com/content/147052n7g76v4733/fulltext.pdf

[16] See: Nuclear Notebook, prepared by the Natural Resources Defense Council (NRDC): Pakistan´s Nuclear Forces, 2007, *Bulletin of Atomic Scientists*, May/June 2007, p.71-74.
http://thebulletin.metapress.com/content/k4q43h2104032426/fulltext.pdf

1.3.4 Middle East

In the Middle East, several countries possess short- and medium-range ballistic missiles, mostly stemming from Soviet export deliveries. Prior to 1991 Iraq had an ambitious missile programme and used its extended SCUD-B (Al-Hussein) in the first and second Gulf wars. Most of the missiles were dismantled after 1991 through the UN weapons inspection process sanctioned by UN Security Council Resolution 167. Saudi Arabia has imported 20-25 Chinese DF-3 (CSS-2) which have a range of 2,600km.

Israel has one of the most advanced ballistic missile programmes in the Middle East. It possesses a medium-range missile programme and a space launch vehicle that essentially gives it an ICBM capability. Although Israel does not deny its existence, very little is known about its ballistic missile programme. The Jericho-II is reported to have a range of between 1,500 and 3,500 km, depending on payload weight[17].

1.3.5 Iran´s ballistic missiles programme

According to US intelligence estimates, Iran already has an aggressive ballistic missile programme, including long-range ballistic missiles, and is developing a nuclear weapons programme. John Negroponte concluded in February 2006:

"Iran already has the largest inventory of ballistic missiles in the Middle East, and Tehran views its ballistic missiles as an integral part of its strategy to deter - and if necessary retaliate against—forces in the region, including US forces."[18]

The National Intelligence Estimate from 1999 says that:

"Iran is the next hostile country most capable of testing an ICBM capable of delivering a weapon to the United States during the next 15 years." [19]

The US believes that Iran might purchase the North Korean Taepo Dong-type ICBM and/or might pursue a space launch vehicle by converting it to an ICBM. In her presentation to the European Parliament, Patricia Sanders, Executive Director of the US Missile Defence Agency (MDA), said that Iran has an "accelerated missile development". On the other side, the Iranian government reports that it has only a limited missile capability with a maximum range of about 2,000 km and has terminated its ICBM development[20].

Iran is suspected of pursuing a clandestine nuclear weapons programme. The international community became suspicious when it learned that Iran was not only procuring dual-use nuclear technology from foreign firms but was also constructing an underground uranium enrichment facility at Natanz (with the help of the A.Q.Khan network) and a heavy water

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[17] Nuclear Threat Initiative website at: http://www.nti.org/e_research/profiles/Israel/Missile/index.html

18 John D. Negroponte, Director of National Intelligence, Annual Threat Assessment of the Director of National Intelligence for the Senate Select Committee on Intelligence , February 2, 2006

[19] Robert Walpole, Foreign Missile Developments and the Ballistic Missile Threat Statement for the Record to the Senate Foreign Relations Committee on Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015, by Robert D. Walpole, National Intelligence Officer for Strategic and Nuclear Programs, September 16, 1999

[20] Hildreth et al, p.2

reactor in Arak. It is claimed that with this infrastructure Tehran is acquiring the option to produce weapon-grade nuclear material in the longer run.

Worldwide pressure and sanctions have been applied to stop Tehran's military nuclear ambitions. While the International Atomic Energy Agency (IAEA) is investigating Iran´s 'nuclear history', Iran has not yet answered all of the Agency's questions. It is estimated that Iran will not be able to produce a nuclear bomb, even if it intends to do so, for a number of years - 5 to 10 years, according to the US Government[21]. It is reported that Iran also received designs for a nuclear device from the A.Q.Khan network, although Iran has denied this.

Iran´s ballistic missile programme began under the Shah (1977-1979) and continued during the first Gulf War with Iraq (1980-1988)[22]. Tehran procured several Russian originated SCUD-B missiles (R-17) from Libya and Syria. This missile later became known as Shahab-1 ('Comet') which is also a generic name for further Iranian missiles of different ranges and payloads. Iran also started to assemble SCUD components from North Korea, starting the production of liquid and solid propellants.

With the assistance of China, the latter lead to a family of unguided long-range artillery rockets (Fajir, Nazeat, Zelzal). The Zelzal-2 is capable of launching a 600 kg warhead 200 km. But Iran did not manage to shift from an unguided to a guided missile. The Iranian engineers were not very successful at 'reverse engineering' SCUD-B missiles by producing and assembling them indigenously[23]. Hence, since 1991, Iran has also acquired the Soviet 580 km-range SCUD-C (Shahab-2) from North Korea. Iran might also possess twenty SCUD-B/C launchers and about 300 Shahab-1 and Shahab-2 missiles which are armed with conventional warheads[24].

After the Iraq-Iran war, Iran started its missile collaboration with North Korea. Iran purchased No-Dong missiles (Shahab-3) which have a range of around 1,100 km[25], and is identical to the Pakistani Ghauri missile. The North Korean No Dong (Shahab-3) is an enhanced SCUD airframe powered by a new powerful rocket motor. It is estimated that the Iranian military has five or six operational launchers and about twenty missiles[26]. During mid-2001, Iran initiated a reorganization of its missile programme. Until early 2006 there were 10 Shahab-3 test launches reported which were not all successful[27].

Although the Iranian government claims that the Shahab-3, deployed since 2003, is an indigenous capability, it is not apparent that Iran has such manufacturing capability. There are also indications that the development is yet to be completed. Iran seems to be dependent on Russian and North Korean networks, and has only a small number of Shahab-3 missiles, which are not very reliable and cannot reach Central Europe.

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21 William J. Broad, Nazila Fathi and Joel Brinkley, 'Analysts say a nuclear Iran is years away', *International Herald Tribune*, 13 April 2006.
22 http://www.nti.org/e_research/profiles/Iran/Missile/index.html
23 Geoffrey Forden, 'How the World's Most Underdeveloped Nations get the World's Most Dangerous Weapons', *Technology and Culture*, vol. 48, no. 1, (January 2007), pp. 92-103
24 Shapir 2006, p. 1
25 With a 700 kg payload and an estimated range of 1,300 km it can reach targets in Israel.
26 Shapir 2006, p.2
27 The first flight test was conducted in September 1998. See Shapir 2003

There is speculation about more advanced versions of the Shahab-3, dubbed Shahab-4 and 5, but a complete new missile has not yet been identified. A number of countries' intelligence services believe that Iran is also developing new longer-range ballistic missiles. In principle, there are two ways to do that. First, Iran could purchase Taepo-Dong 1 and 2, which have ranges of 2,300 and 5,500 km respectively. The second path is to enhance and improve the Shahab-3 missile. The latter method is quite unreliable and would not expand the range to more than 1,500 to 2,000 km. At present, Iran has no Shahab series production and the capacity to develop new engines or guidance components are beyond Iran´s capabilities. Specialists are concluding that the status of Iran is comparable with the situation of Iraq in the 1980s or 1990s[28].

Another way to acquire MRBM capability is to acquire tested North Korean Taepo-Dong technology. The North Korean regime sold ballistic missiles technology to countries such as Pakistan and Iran and flight tested the Taepo-Dong-1 in August 1998 as a three stage space-launch vehicle. The Taepo-Dong-1 has a No-Dong first stage, a modified SCUD-D second stage and perhaps a modified SA-2 third stage. This booster failed during the only test in August 1998 and could not place a small satellite in orbit. Nevertheless, the two stages could be used for military missiles by the North Koreans to carry a small 450 kg warhead over a distance of 2,300 km.

In July 2006, North Korea also tested a missile widely assumed to be the Taepo-Dong-2. The first stage failed after 42 seconds and the missile test was a complete failure. The CIA maintains that the Taepo-Dong-2 can fly 10,000 km which is very doubtful given the current state of missile technology in North Korea. A missile with such a range must be much larger in terms of missile diameter and rocket engine. According to German and Israeli sources, North Korea transferred a new type of missile (dubbed BM-25) to Iran. This land-based version of a submarine-launched missile from the Soviet era would have a range of 3,500km. The status of this old system is unknown, but there are doubts as to whether Iran can handle this technology sufficiently to construct a reliable missile that can reach Europe[29].

1.3.6 Non-state actor

The risk of the use of ballistic missiles by terrorists as a means of delivering WMD is low, as they are very unlikely to be in a position to operate ballistic missiles without extensive state-sponsored or state-condoned assistance. Nevertheless, it should not blind us to the possibility of certain states losing centralized control of part of their missile arsenal. Conceivably, like-minded fanatics in terrorist groups and the military could conspire to seize such a capability in the context of civil war or serious internal disturbance. While not wishing to overplay this risk, we cannot afford to ignore the potential dangers where the interaction of state, non-state and state-sponsored activity is blurred.

[28] Robert H. Schmucker: Iran and its Regional Environment, The Nuclearization of the Broader Middle East as a Challenge for Transatlantic Policy Coordination, Second Transatlantic Conference, Berlin, March 27, 2006 [http://www.hsfk.de/downloads/Panel%201%20-%20Schmucker.pdf]

[29] See: 'Iran bought long-range missiles, says Israel', *Guardian Unlimited*, 26 April 2006 [http://www.guardian.co.uk/iran/story/0,,1763000,00.html]

2. Defence capabilities – Present and Future

This chapter maps the nature, extent and quality of existing missile defence capabilities. It provides an assessment of the state of US missile defence plans and programmes against the threat from longer-range ballistic missiles, including analysis of technical questions concerning command and control of missile defence systems and their technical configurations. It examines the reasons behind the US requirement for a missile defence site in Europe, and also considers NATO's activities in missile defence.

2.1 Explaining missile defences

2.1.1 Key characteristics

In relation to BMD systems, the threat can be considered and ranked according to a few crucial technical characteristics (a) the range, (b) the flight time and the speed and (c) the payload of an attacking missile.

According to their range, the ballistic missiles will have different performances in terms of speed and altitude of flight. Consequently their trajectory will differ, as well as their penetration capability. In principle, the longer the range, the more difficult it is to intercept the missile in the terminal phase.

According to the mode of propulsion (liquid or solid), the missile's performances will differ in term of mobility, readiness and 'burn' time. Initially, when building long range missiles, liquid propulsion is used, with performance enhancements usually made possible by the addition of upper stages. This technology can be mastered by countries with a reasonable level of technical resources. It still remains delicate to handle and it necessitates some preparatory time prior to a launch.

Solid propulsion is more effective militarily as missiles can be stored in fixed installations (silos) or can be deployed as mobile systems: both of which can be made available without delay. It is also more efficient and powerful for a given burning time (longer range, higher velocity). This technology remains complex for long-range missiles and fewer countries have mastered it than liquid propulsion technologies for an equivalent range.

According to the nature of the warhead and to its destructive capacity, the requirements will differ, vis-à-vis the level of performance required for a BMD system. Basically, two cases can be considered:

> (i) The missile is equipped with a conventional warhead (i.e. conventional explosives). It can then be considered as a normal military target capable of causing only limited impact – although the more accurate the missile, the more militarily effective it will be.
>
> (ii) Alternatively, the missile may be equipped with a WMD warhead. Several types of payloads can then be used with varying destructive and contamination effects. These payloads can be chemical or biological - most efficiently dispersed via numerous bomblets, rendering the task of intercepting them all successfully

virtually impossible[30]. Or the payload could be nuclear. It must also be noted that such WMD missiles usually deploy a range of deception devices (chaff and decoys) during their mid-course ballistic trajectory in order to complicate the task of the BMD. This drastically increases the complexity and the level of performance required of a missile defence system.

These are the various characteristics that Extended Air Defence (EAD)/BMD systems will have to address. They are used as terms of reference to deduce the basic principles underlying the defensive systems requirements and to build a typology that differentiates between the different defensive systems and missions.

2.1.2 The extent of the desired protection

Another dimensioning variable of a BMDsystem concerns the type and the extent of the protection that is desired. If combined, these two aspects of the protection can be summarized in the following cases:

(i) *The protection of projected armed forces during a conflict*: this case deals with a limited perimeter (at the theatre level), and with military or combat threat implying the use of Extended Air Defence (against aeroplanes or cruise missiles) up to theatre missile protection (against tactical ballistic missiles). It will have to deal with sophisticated air threats or cruise missiles up to short-range ballistic missiles (e.g. SCUD types with a range under 600 km). Such a system will mainly be composed of terrestrial deployable means, both for the detection/tracking and for the intercept.

(ii) *A regional protection against immediate neighboring threat*: this case involves the protection of a larger perimeter (e.g. Europe) with a capability to deal with medium-intermediate-range missiles (from 600-1,000 to 3,500 km with a velocity inferior to 5 km per second). Such a system would require dedicated fixed (and possibly mobile) assets (long-range early warning capability gained through focused sensors – space-based, terrestrial radars etc. dedicated BMD interceptors).

(iii) *A global protection involving theatre and continental defence worldwide*. This case implies a planetary coverage for detecting all type of missile launches (from short-range missiles to ICBMs with a range superior to 5,000 km and a velocity of more than 5 km per second), using permanent and worldwide distributed sensors – including space-based sensors, dedicated terrestrial detection and battle management radars, as well as the use of exo-atmospheric interceptors allowing the engagement of the target in space, during the mid-course phase of the missile flight (assuming the missile has not been destroyed early during the propulsion phase). Dedicated endo-atmospheric interceptors can also be envisioned as an ultimate defence during the atmospheric re-entry of the missile.

These three cases represent typical but not exhaustive dimensioning scenarios. Still, these virtual missions give a notion of minimal and maximal requirements for a defence system. In particular, the latter case represents the most demanding scenario for the performances of a BMD system.

[30] Garwin, Richard L., *Ballistic Missile Defense Deployment to Poland and the Czech Republic*, Talk at the Erice International Seminar, 38th Session, August 21, 2007.

2.2 US rationale

US strategic documents are clearly shifting the focus away from nuclear deterrence by strengthening "active defences".

"Because deterrence may not succeed, and because of the potentially devastating consequences of WMD use against our forces and civilian population, US military forces and appropriate civilian agencies must have the capability to defend against WMD-armed adversaries, including in appropriate cases through pre-emptive measures… Active defenses disrupt, disable, or destroy WMD en route to their targets. Active defenses include vigorous air defense and effective missile defenses against today's threats. Passive defenses must be tailored to the unique characteristics of the various forms of WMD." [31]

The possession of ballistic missiles by potential adversaries may be perceived as a means of deterring intervention by the international community: a point that the US well understands. The US wants to ensure that its strategic military options are not curtailed through fear of an adversary's possible use of ballistic missiles against US forces and territory. It also believes that a potential aggressor would be more likely to be deterred if he knew that he could not threaten US (or European) territory with ballistic missiles.

2.3 US plans

The Presidential National Security Directive (PNSD-23) which was signed by President Bush in December 2002 reaffirmed his Administration's policy "to develop and deploy, at the earliest possible date, ballistic missile defences drawing on the best technologies available". PNSD-23 also states that the US would begin to deploy MD in 2004 "as a starting point for fielding improved and expanded missile defences later"[32]. This Directive was preceded in January 2002 by a memo to the MDA from the then-Defence Secretary Donald Rumsfeld, which underlines that the MDA should develop defence systems by using "all technology available". From this it should be clear that US missile defence systems will expand in the coming years.

Hence, as part of its ongoing deployment programme, the Bush Administration has requested funding to start the design, construction and deployment of a third interceptor site of its global Ballistic Missile Defence (BMD) system. The stated purpose of the 'ground-based mid-course defence system' is to help to defend US forces stationed in Europe, US friends and allies as well as US territory against long-range missile threats. The proposed BMD system is to consist of a site for ground-based interceptors (GBI) in Poland, a fixed mid-course radar site in the Czech Republic, and a mobile radar facility which will be deployed closer to the Middle East. According to Lt. Gen. Henry Obering, Director MDA, the reasons for these geographical locations is to maximize the coverage of Europe for ballistic missile launches from the Middle East and redundant coverage for the US against ICBMs[33]. The deployment should be completed by 2013 at a cost of $4.04

[31] US National Security Strategy, p.3
[32] Lewis, Postol, p.13.
[33] Obering Presentation March 2007, p. 17.

billion. (For a full official exposition of US BMD plans for Europe visit the Missile Defense Agency (MDA) website[34].)

In a speech on 23 October 2007 at the National Defense University President Bush outlined past US missile defence efforts. The key points are laid down in a Fact Sheet: *Defending America and its Allies Against Ballistic Missile Attacks*, Office of the Press Secretary, October 23, 2007, and details of the US plans in Europe can be found in the MDA brochure: *Proposed U.S. Missile Defense Assets In Euro*pe, which includes details about the threat, the protection of Europe and also addresses some European concerns about Russia and debris falling on European soil.

The GBI site in Poland will form the third part of the integrated BMD system that already includes around 20 silo-based interceptors in Fort Greely/Alaska and three more in Vandenberg/California. The first interceptors were deployed in 2002 and the US Administration insists that current deployments represent an 'operational capability' that provides 'a rudimentary protection' of the continental US. These interceptors work through achieving a direct collision with the attacking missile i.e. they are 'kinetic hit-to-kill' vehicles. Over the coming years it is planned to deploy up to 44 GBIs in the US, complemented by 10 in Eastern Europe[35]. Once the production capability of the GBI is established, and if more locations become available for deployment, this infrastructure can be expanded.

Deployment of the Ground-Based Interceptors of the US Ground-based Mid-course Defence System[36].

Ground Based Interceptors	August 2007	End CY-2007	Planned 2013
Alaska	19	21	40
California	3	3	4
Europe	0	0	10
Total	22	24	54

The approximate size of the interceptor site in Poland is 275 hectares and for the radar site in the Czech Republic 30 hectares. The 10 interceptors are silo-based, based on solid propellant, and are a two-stage variant of the originally three-staged interceptors already deployed in the US. The silos have a smaller dimension than those used for offensive US Minuteman ICBMs but the GBIs are of similar size. The State Department says that no test of thee missiles will be conducted in Europe and that the GBIs would only be launched in response to an attack. The US estimates that 200 people (military, civilians, contractors) are needed to operate the site[37]. (For discussion of the possible impact of these GBIs on Russian ICBMs, see Section 3)

The European Mid-course Radar (EMR), proposed to be deployed in the Czech Republic, is a high-resolution tracking radar which has the task to identify and to distinguish the

[34] http://www.mda.mil/mdalink/html/thirdsite.html
[35] Ibid.
[36] Phil Coyle, October 2007
[37] U.S. Department of State, April 4, 2007

missile warhead from the other missile parts and to guide the GBIs to the target[38]. At present, the radar is located at the Kwajalein Atoll in the Marshall Islands where it has been used to participate in missile defence tests. The US State Department says that the facility will require approximately 150 personnel to operate the EMR.

The radar capability is limited by the number of the so-called transmit/receive modules (T/R) which are distributed over its 100-120-square-metre antenna[39]. At the current stage of planning the EMR only can track several objects in flight. The maximum capacity of 300,000 T/R modules would result in an increase of the tracking of hundreds of objects. If the US decided to expand the capability of the EMR, this could become a serious problem for the Russian deterrent.

The third element of the European Missile Defence component is a transportable forward-deployed radar (FBX). According to the MDA, this high-resolution X-Band radar is an enhancement to the planned European BMD sites because, with other layered sensors, it provides "a continuous tracking and discrimination capability with more opportunities to engage the target, resulting in a greater probability with more opportunities for a successful intercept"[40]. The air transportable FBX can be deployed closer to Iran and, in principle, it provides capability for earlier acquisition and more tracking data. Placed between Iran and Europe multiple FBX radars can enhance the capability of the BMD system.

Other mobile US tactical missile defence systems such as Patriot, Aegis/SM-3 and Terminal High Altitude Area Defence (THAAD) systems could also be deployed on European territory to add to overall interception capability, although the US administration only sees them as a means to augment coverage and interception of S/MRBMs. Given the fact that Iran may well *only* possess MRBMs in the years to come it could be an appropriate alternative to deploy sea-based Aegis Cruisers in the Mediterranian and the Baltic Sea instead of the more strategic, fixed GBI system in Poland and the Czech Republic[41].

Other alternative include the use of Russian Early Warning Radars or Early warning data in Azerbaischan (Gabala) or in Armavir (Russia). Such a constellation could be enhanced by deploying FBX-radars in Turkey or in the Caspian Sea. It is reported that the Russian President would accept such an approach. A study of the American Physical Society of 2004 concluded that a boost-phase system in the Caspian Sea or Turkmenistan could intercept attacking missile from the Middle East.

The idea of an integrated and layered BMD system is to engage ballistic missiles in all phases of their flight. Besides the interceptors already referred to, therefore, there are six further missile defence systems that are currently in the planning testing phase (see Table 3).

A debated issue is the current performance and future capability of the exo-atmospheric "hit-to-kill technology" during the mid-course phase of an attacking missile where

[38] U.S. Department of State, April 4, 2007
[39] Currently roughly 20,000 T/R modules are planned. See: Lewis, Postol, p.14.
[40] Missile Defense Agency: Fact Sheet: European Capability Initiative, p. 2
[41] R. Garwin, Erice August 21, 2007

basically a kill vehicle collides with a selected target or target set. There have been relatively few tests of the deployed GBI system. In September 2007 the MDA achieved the seventh intercept out of thirteen attempts for the GMD programme. The testing conditions until now have been very artificial. The targets are 'cooperative' and, therefore, not comparable with a real attack situation. It is striking that in later tests new malfunctions occurred, which had previously been observed.

Certainly such a complex technology will improve over time, but it is clear that the current system cannot match countermeasures (techniques designed to confuse or deceive a defence system). Light-weight devices such as decoys, warhead replica balloons made of aluminized mylar or aerosol clouds can be included in the BM´s payload and set-free with the original warhead after the burn-out of the BM in space. Due to the absence of 'drag' forces, in space these parts appear very similar to actual warheads. The BMD system would have the complicated task to select the 'right' target. A key problem is that the effectiveness of the current BMD-technology cannot be improved because more of the physical observables that could be used to distinguish decoys from warheads can be measured with IR and Radar Sensors. The system cannot look into inflated and metal-skinned balloons and therefore does not know which target is the real warhead. That means that such as system cannot work against long-range missile with penetration aids.

The most recent test did not include countermeasures and the future test planning only will consist of a very limited set of countermeasures. An analysis of the Union of Concerned Scientists concluded in 2004:

"Later this year, the United States plans to declare "operational" a ballistic missile defense system that will have no demonstrated capability and would be ineffective against a real attack by long-range missiles. The administration's claims that the system will be reliable and highly effective are irresponsible exaggerations. There is no technical justification for deploying the system[42]*."*

The BMD system clearly has not proven it can work under 'real world' circumstances. Furthermore, it is missing major components such as the Space Tracking and Surveillance System (STSS). Other components are tenuous or not yet operating such as the command and control system, and the Sea-based X-band radar.

Another assumption is the question whether the US Congress will fund a third BMD site in Europe. Congress has cut funding for the European component in 2008. The House reduced the MDA's budget request for the BMD system by $160 million and the Senate by $85 million. The Bush administration had requested $310.4 million[43].

Table 3 - State of the Missile Defence programmes in the main countries

Type	Country	Name	Status	Details
Ground based interceptors against	USA	Patriot PAC2/PAC3	Deployed	

[42] Union of Concerned Scientists: Mission not accomplished, [http://www.ucsusa.org/global_security/missile_defense/mission-not-accomplished-2004-missile-defense-deployment.html]
[43] Victoria Samson, 12 June 2007, p. 3

aerial platforms and SRBM				
	Germany, Italy, USA	MEADS	Design and Development phase (until 2015)	Delivery unknown
	France, Italy	SAMP(T)	To be fielded (2008-2010)	24 units ordered (OCCAr, France)
Sea Based interceptors against aerial platforms and short range maneuvering missiles	France, Italy, UK	PAAMS	To be fielded (2008-2009)	Sea-based interceptor
Ground based interceptors against aerial platforms and MRBM	USA	THAAD	To be fielded (2010)	Against S/MRBM
Sea Based interceptors against MRBM	USA	Aegis/SM-3	Deployed, under test	Against S/MRBM
Ground based interceptors against MRBM/ICBM	USA	GBI	Deployment started late 2004	20 silo-based GBI deployed in Alaska and in California + 10 more planned for Poland Exo-atmospheric interception
Airborne interception	USA	Airborne Laser	First flight tests 2005/06	Boost-phase interception
Spaceborne interception	USA	Spaceborne laser	R&D level	Boost-Phase and Global mid-course interception
Space-Based Early Warning System (SBIRS)	USA	SBIRS	Deployment started in 2006	The first satellite (SBIRS HEO-1 has been put in orbit in 2006 The First Geo Satellite should be put in orbit in 2009 Two LEO satellite demonstrators for missile tracking and warhead discrimination are in preparation

2.4 BMD projects and NATO involvement

The US and some European countries are pursuing various BMD-related programmes (set out in Table 3) according to: assessment of the threat (short term and long term); level of resources available for a BMD system both in absolute and in relative terms for countries interested in participating; and level of technological development/ availability.

Basically, the first category of threat (short-range missiles directed at projected armed forces) is being addressed by a range of capabilities developed by the most advanced

countries. The most well-known system is the US Patriot PAC-3 system, with a preliminary version appearing during the first Gulf War to address the Iraqi SCUD missile threat[44].

In Europe, indigenous systems (such as the Sol-Air Moyenne Portée Terrestre (SAMP/T) built in cooperation between France and Italy) and multinational systems such as the MEADS (Medium Extended Air Defence System) built partly by Germany, Italy and the US (the latter partner representing about 50 per cent of the budget) exist in this domain. These systems are now being integrated in the NATO effort called Active Layered Theater Ballistic Missile Defense (ALTBMD).

The ALTBM programme within NATO is based upon a shared threat assessment of a need to protect NATO forces against attack from short-range ballistic missiles (already possessed by a number of states). This is a 'bottom up' approach whereby existing technologies and weapons are enhanced and integrated into a coherent anti-ballistic missile capability.

Only two systems have been envisioned specifically to address the second category of threat i.e. medium-range ballistic missiles: the US naval system Aegis-Standard and the US ground interceptor system THAAD (Theater High Altitude Area Defense) are both dedicated to area and regional protection, against sophisticated aerial threats up to intermediate-range missiles.

Only one system is being developed for addressing the most challenging scenario implying the interception of ICBMs i.e. GBIs plus supporting infrastructure - space-based early warning, dedicated terrestrial detection and battle management radars, and possibly boost–phase intercept techniques.

The US appears to be prepared to contribute this third missile site to NATO's defence. This could be achieved by directly integrating the new site into NATO's ALTBMD programme. According to one source, this would cost about €1Bn, and would also enhance the overall capability of NATO's ALTBMD[45].

2.5 Remaining technological challenges

For a complete BMD system, several technologies or applications appear to remain very challenging even for the most technologically advanced countries. As already stated, the most acute challenges relate to the interception of long-range ballistic missiles. Basically, the following capabilities are required:

Detection, tracking: In the US, two new satellites have been fielded to renew and enhance detection and tracking capabilities. Four more satellites in geo-stationary orbit will complete this 'first layer' space-based system in the coming years. While improving the

[44] The Patriot´s intercept rate was quite low. There is little evidence to prove that the Patriot hit more than a few Scud missiles launched by Iraq during the Gulf War. See the technical debate on Patriots performance during the 1991 Gulf War: [http://www.fas.org/spp/starwars/docops/operate.htm]

[45] Robert Bell, Senior Vice President for European Business, SAIC. Remarks available at: http://www.securitydefenceagenda.org/Portals/7/Reports/2007/SOD_Missile%20Defence%20March%202007.pdf 202007.pdf

current US space-based early warning system in term of sensitivity and reactivity, uncertainties remain about the deployment of such systems for operational use in relation to short- to medium-range missile given the possible difficulties of detecting and tracking such missiles.

Discrimination: To discriminate and achieve final tracking of incoming warheads, a supplementary layer of space-based systems is envisioned in low-earth orbit. One of the main functions of such a system would be to help discriminate between real warheads and possible decoys, allowing complementary terrestrial systems (radars and interceptors) to address the real target. According to the UK Ministry of Defence, the development of decoys is a "costly and technically complex" long-term project and that as a result "most countries will retain their emphasis on the development of basic missile systems"[46]. Others disagree claiming that if a country succeeds to build a long-range missile it should not be so complicated to add countermeasures[47].

This poses hard technological challenges, notably in the field of infra-red sensitivity given the technical constraints that are applied on such a system during its operational life. It must also take into account the evolution of the threat for a relatively long period (corresponding to the life cycle of the space-based system itself), implying a good knowledge of the countermeasures. In parallel, similar problems apply regarding those mentioned above concerning the short- to medium-range missiles. It must be noted that a first satellite (SBIRS HEO-1) composing the US system SBIRS was put into orbit in 2006.

Hit-to-Kill Technology: In some instances, notably when ICBMs equipped with nuclear warheads are targeted, the interception itself will have to be lethal i.e. 100 per cent efficient, in order to destroy the warhead completely. In this case, there is a direct relationship between the type of threat and the demand on the global performance of the system.

It must be noted that this could have direct consequences for Europe vis-à-vis the level of its involvement in a global protection system that would also be designed for the Continental US. In particular, placing 10 ground-based interceptors in Poland as well as an X-band radar in the Czech Republic as part as of a global anti-missile system (rather than as a part of a regional system only) indicates the building of a system destined to address the most sophisticated threat, including nuclear-warhead-equipped ICBMs. Total efficiency is then required in order to prevent the regional consequences of intercepted missiles that are not completely destroyed.

3. Strategic, political, industrial and arms control implications

The chapter now provides some observations on the wider strategic implications of the US proposed deployments in Eastern Europe.

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[46] *Missile Defence: a public discussion paper*, Ministry of Defence, December 2002.

[47] See Garwin 2007 and the study: "Countermeasures," A Technical Evaluation of the Operational Effectiveness of the Planned U.S. National Missile Defense System, UCS, MIT Study, A.M.Sessler (Chair of the Study Group), J.M. Cornwall, R. Dietz, S.A. Fetter, S. Frankel, R.L. Garwin, K. Gottfried, L. Gronlund, G.N. Lewis, T.A. Postol, and D.C. Wright, April 2000. [http://www.ucsusa.org/assets/documents/global_security/CM_all.pdf]

3.1 Impact on strategic stability

From the conceptual point of view, the establishment of a missile defence system is *per se* a departure from a strategic posture based on deterrence; it is significant that the US administration is making the case for the system on the grounds of missiles in the hands of 'fanatical' regimes not prone to the rational logic of deterrence, and potential unintentional launches.

The relationship between missile defence and deterrence is ambiguous; missile defence potentially jeopardises classical deterrence based on mutually assured destruction (MAD) and can create an incentive to arms race and the development of counter-measures. On the other hand, it remains true that not all threats can be deterred and some potential adversaries may not take decisions based on a shared vision of rationality.

During the Cold War, each superpower understood that defence against the enormous nuclear ballistic missile arsenals of the other was futile and, therefore, against the norm of military planning, they accepted the reality of their mutual vulnerability. It is important to understand that this was an anomaly. For in today's debate over missile defence – at least in relation to long-range missiles - it tends to be those who seek to challenge the wisdom of remaining vulnerable to ballistic missile attack that are branded the heretics, whilst the orthodox view is that vulnerability is a good thing and should be preserved.

Conceptually, the onus of proof should fall on those who argue *against* states defending themselves from missile attack. The fact that missile defence was once deemed undesirable and ineffective in the particular context of the enormous nuclear arsenals of two competing superpowers, does not *of itself* mean that a limited missile defence is undesirable, or that it need be ineffective in a different strategic environment.

Nevertheless, if we are to shift the strategic paradigm away from mutual vulnerability we should only do so having considered the possible implications with great care and on the basis of the widest achievable international agreement. The logic behind this criticism of missile defence is that those with long-range missile capabilities will expand and intensify their efforts in order to try and overcome any defences. This applies to those who already possess these capabilities, including the established nuclear powers Russia and China, and also to new proliferant states. Moreover, the possession of nuclear weapons may be perceived as serving to deter the overwhelming conventional military superiority of the US: what befell non-nuclear-armed Iraq has not befallen nuclear-armed North Korea, for example.
Then there is the question of how credible such missile defence systems might be, given their unproven reliability. The degree of effectiveness of missile defences has an obvious consequence for their impact on strategic stability. If such defences were infallible they would have an obviously profound impact on strategic stability as defined through MAD. On the other hand, if they are only partially effective, they would have far less impact.

The problem of reliability can be expressed by a relatively simple question: what is the level of success that can be reached and is that sufficient to allow the possessor to take certain actions and political decisions, knowing that technically the system will underpin those decisions? Finding an answer to this question is not easy, partially because of the premature level of the technology, partially because of the classified nature of the

programme. Significant issues in relation to information technology and how well the extremely complex battle management system will work remain to be resolved.

Putting aside for the moment the *likelihood* of being able to devise and deploy a working missile defence system, we can speculate what could be the strategic impact of being able to do so. A proven system that could overcome ballistic missile attacks and distinguish relatively sophisticated decoys, even in non-cooperative environments, would provide a significant strategic advantage to the US, rendering its territory safe from ballistic missile attack. In principle, if you can hit a bullet with another bullet once, you can hit many times: therefore, in the long run we should take into account the possible wider implications of a highly effective missile defence system towards nuclear powers such as Russia and China.

The credibility of the Russian nuclear arsenal would be significantly reduced by a credible and extensive US missile defence system. Russia would be obliged to invest more in countermeasures, increase the number of deployed nuclear warheads, and potentially develop a missile defence system of its own. It remains to be seen whether these are realistic options for the Russian defence budget, but the consequences would be negative in terms of reduction of trust and significantly less prospects of cooperation with the US.

3.2 Moving into space

As mentioned, the principal part of the current missile defence project is focusing on mid-course interceptors, operating in the upper atmosphere and low outer space. This has significant implications in terms of spill-over effect in space. Space is already being used to support the missile defence programme, in particular in the early warning phase; space satellites play a fundamental role in identifying missile launches and guaranteeing the flow of information within the battle management structure. But the use of space for building up a credible missile defence could go much further than that, as foreseen in the 1980s in President Reagan's 'Star Wars' plan.

Moreover, missile defence, both kinetic and laser-based, has an intrinsic Anti-Satellite (ASAT) value; the principle is relatively simple: if you can hit a bullet in space, you can (probably more easily) hit a satellite. The reliance on space assets to discover and target incoming missiles is also vulnerable and can determine a stronger bias in favour of space denial techniques.

The next step by the MDA could be to move from the current approach based on ground kinetic interceptors to - when the technology is more mature - intensive use of lasers, both in the air and in space. This would mark a significant leap in the military use of space: in a way, it would be similar to going back to the 'Brilliant Pebbles' concept, a prospect foreseen 20 years ago. Some already argue that a space-based missile defence system would overcome European scepticism because such interceptors would be located in space[48]. However, a study issued by the American Physical Society in 2003 revealed that a global space-based system for boost-phase defence would require the launch of 1,600

[48] Taylor Dinerman: European missile defense: why bother ? in: The Space Review, March 26,2007 [http://www.thespacereview.com/article/836/1]

interceptors into space, at a cost of about $44Bn[49]. Such a step would also lead to the weaponisation of low-earth orbit, thereby breaking a taboo that could lead to an arms race in space[50].

3.3 Tackling rogue states

As referred to earlier, the US believes that a potential aggressor would be more likely to be deterred from acts of regional aggression if he knew that he could not threaten US (or European) territory with ballistic missiles. But what happens if a 'rogue' state is not deterred; does carry out an act of regional aggression and then defies the international community to intervene? How willing would European governments be to confront such a state militarily in the knowledge that European cities were at risk?

A supplementary question would then be whether the protection offered by a missile defence system (of unproven reliability) would alter their calculations? If there is no realistic prospect of deploying a perfect defence the adversary – when confronted with missile defence - would only know that he was *less likely* to be able to threaten the adversary's territory. To assume that missile defences might be infallible then leads to another mistaken piece of analysis, only this time by the critics of the concept.

These critics say that missile defence will embolden the US to be more ready to start wars. But unless it is possible to develop an infallible defence against the threat of ballistic missiles armed with WMD, then surely it remains a threat that one would remain extremely wary of provoking. Is it credible to believe that a US President would take the risk of acting in a way that promoted a WMD attack upon American citizens on the basis that missile defence would *guarantee* their protection? Because unless missile defence removes the risk entirely, surely it will make little or no difference to a President's calculations in pursuing a conflict against a state armed with WMD.

Since the consequence of even a single warhead landing on a city is so catastrophic, one's ability to mitigate an attack is of far less relevance than the overwhelming imperative of preventing the attack in the first place. This leads us back to a reliance on more established mechanisms of deterrence.

Moreover, if deterrence appears to be failing, there is always the option of resorting to preventive or pre-emptive attack. It will always be preferable to prevent the launch of a WMD-armed ballistic missile than to try and shoot it down after the event. This was something a UK parliamentary committee concluded:

"…if a future US President came to believe the US was at imminent risk of a WMD ballistic missile attack from a "rogue state", we believe it is reasonable to assume that that

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[49] Cf: American Physical Society: Report of the APS Study Group on Boost-Phase Intercept Systems for National Missile Defense. July 15, 2003, Washington. P.xxii In: [http://www.aps.org/public_affairs/popa/reports/nmdfull-report.pdf (July 2003)]

[50] See for the technical, legal and political consequences: Götz Neuneck / André Rothkirch: The Possible Weaponization of Space and Options for Preventive Arms Control, in: ZLW German Journal of Air and Space Law, Vol. 55 (4) Winter 2006 Number 4, pp. 501-516. [http://www.heymanns.com/servlet/PB/menu/1127773_l2/index.html]

President would authorise the pre-emptive destruction of the rogue state's missile site or sites regardless of whether NMD [National Missile Defence] *had by then been deployed in the USA or not."* [51]

The option to launch a pre-emptive strike against an adversary's missile launchers, prior to any conflict having begun, is obviously highly controversial. If it failed to achieve its aim, it would probably provoke a retaliatory salvo. Even if not used initially, once the adversary feared defeat in the subsequent conflict, he would be sorely tempted to fire his missiles before they were destroyed on the ground. This is the so-called 'use them or lose them' dilemma.

In some cases – essentially when less sophisticated, liquid-fuelled missiles are involved - it might be possible to detect a missile launch being prepared. In which case there could be an opportunity to launch a pre-emptive strike. The political problem is that of trying to convince world opinion that your initiation of military force was essential in order to prevent an imminent threat from materializing, and thereby justifiable under international law, and doing so probably after much of the evidence has been obliterated. There is also the worry that the pre-emptive attack might fail: the military experience, for example when trying to hit mobile Iraqi missile launchers shortly before they were launched during the First Gulf War, was not very impressive. Or, worse still, the attack might be conducted on the basis of false intelligence and consequently be demonstrated - after the event - to have been completely unjustified.

3.4 Impact on relations with Russia

While the missile defence system acts in the upper atmosphere and in outer space, it nonetheless can have a relevant impact on the strategic balance on the ground. Geography remains an important factor, as the system infrastructure needs to be placed in positions that are compatible with the potential missile path of hostile launchers; proximity to the target is therefore essential for boost-phase interceptors, and it remains as well a relevant factor for mid-stage kinetic hit-to-kill systems.

To complete the coverage of the territory of the US, the missile interceptors and radars of the GBI segment have to be placed outside the US, thus determining an 'area of influence' that can be perceived negatively by potential rivals. The US request to build up two installations in Eastern Europe is already causing major troubles in the relationship with Russia.

Placing relevant components of the GBI in two former Warsaw Pact countries very close to the Russian border is considered, in the current nationalistic Kremlin vision, as a provocation and a humiliation – by demonstrating that Russia's area of influence is now severely limited. Frustration about several rounds of NATO expansion and the deployment of US troops in Bulgaria and Romania are adding to this view. Hence, Russia has reacted very badly to the US plans. When the US withdrew from the Anti-Ballistic Missile (ABM) Treaty Russia appeared to accept the decision, without agreeing with it. Yet these

[51] Eighth Report of Foreign Affairs Committee, *Weapons of Mass Destruction*, Session 1999-2000, August 2000, HC 407, para.40.

deployments in Eastern Europe seem to have been too provocative for the Kremlin to swallow.

President Putin has compared this situation to the one between the US and the then Soviet Union that led to the Cuban missile crisis[52]. He claims that these defences are aimed at their nuclear missiles; thereby undermining Russia's deterrent posture. The US says that 10 interceptors could not possible challenge the credibility of Russia's many thousand intercontinental nuclear warheads, but Russia fears that this is only an initial deployment that could be expanded later.

Russia points to its theoretical vulnerability to a disabling first strike. This is the scenario in which the US has - or is perceived to have - the capability sufficient to completely destroy Russia's nuclear forces through the use of a combination of highly accurate offensive missiles and missile defences that 'mop up' the limited residual forces launched in retaliation. Although this scenario appears fanciful, it is one that has concentrated the minds of US and Russian strategic nuclear planners for decades and if either side were to *believe* that it might have become credible would have dangerous ramifications for strategic stability.

A radar in the Czech Republic is much closer to missile silos in Western Russia than to Iran. If launched, Russian missiles would rise into the radar field of view very early in their trajectory. They could be observed from three minutes after launch for about 10 minutes. This includes the time when the 'warhead bus' manoeuvres to put the various re-entry vehicles on their respective trajectories. In particular, the radar could also observe the release and deployment of decoys, which could provide valuable information to enhance the ability to discriminate between warhead(s) and decoys. Although it is improbable that reliable recognition and identification will be possible where many objects are involved, Russian planners will have to take a conservative approach, assuming a significant discrimination capability. The way for them to overcome this would be to use more sophisticated decoys and/or to increase the numbers of missiles and warheads. As the European radar is to be integrated into the global BMD system, the information gained (concerning discrimination, trajectories, and so on) could also be used in relation to the launch and control of US-based interceptors[53].

Given that the Czech-based radar can observe Russian ICBMs, the next question is whether interceptors based in Poland could hit them. It remains technically uncertain if the European component of the BMD system would be able to shoot down incoming Russian missiles. According to the MDA this is not possible, but other studies insist that if a certain level of performance of the interceptors is reached, some engagement of Russian ICBMs heading to the US is not out of reach.

Obering has stated explicitly that the "US System cannot counter Russian Offensive Missiles" and that the "European interceptor site has no capability to defend U.S. from

[52] Putin compares US shield to Cuba, BBC News Friday, 26 October 2007 [http://news.bbc.co.uk/1/hi/world/europe/7064428.stm]

[53] See: Jürgen Altmann, Götz Neuneck US Missile Defense Plans in Europe - Implications for Russia. Paper for 57th Pugwash Annual Conference Prospects for Disarmament, Dialogue and Cooperation: Stability in the Mediterranean Region Bari, Italy, 21-26 October 2007.

Russian launches"[54]. On the other hand, simulations by Prof. Ted Postol (MIT), a long-time independent technical expert on BMD issues, demonstrate that this view is highly dependent on the speeds of the defensive interceptors and offensive ICBMs. It can be shown that an intercept from Poland even for the northernmost European ICBM site is kinematically possible[55]. While it is true that 10 interceptors based in Poland are no danger for the Russian force of about 500 ICBMs, the US plans to continue to expand its defences and the Russian arsenal is set to shrink in number over the next decade. Russia may be justified in viewing the current deployments as only the beginning of a much larger and more capable BMD deployment. Just as importantly, missile defence is *perceived* by Russia as a system that modifies the strategic balance.

Another aspect rarely considered, is the possibility that the launch of these defensive interceptors could be misconstrued as an attack from offensive missiles. In the hypothetical situation in which ICBMs were launched by Iran towards the mid- and western US, they would need to fly over Belarus and Russia, respectively. To intercept them in space, the interceptors would have to fly in an easterly direction i.e. towards Russia. In shape and size, the interceptor missiles are not that much different from medium or small ICBMs[56]. There are obvious dangers here during ties of crisis.

The Russian proposal for the common use of early-warning radar much closer to Iran makes technical sense. Russia has also suggested that interceptors should be deployed much closer to Iran, and then only after the Iranians have actually flight tested a long-range missile. The early availability of early warning and tracking data from radars close to Iran would also augment the effectiveness of BMD against short- and medium range missiles from the Mediterranean region. The common use of a radar would, of course, require a very high degree of co-operation.

Given that both the US and Russia have mutual concerns about the potential threat posed by the proliferation of ballistic missiles, this disagreement could be settled through greater diplomatic effort and cooperation. Russia has proposed such collaboration in the past (*en passant*, it also continues to deploy its own – nuclear-tipped – missile defences around Moscow). There should be means by which the US can reassure Russia of its intentions that will not provoke an arms race and unwinding of arms control agreements. The alternative is that the gap continues to widen, and eventually a cold war spirit returns: one that risks dividing and ultimately perhaps even decoupling Europe from the US.

3.5 Impact on relations with NATO

The current US missile defence proposal for the third site in Europe has been pursued bilaterally with the two potential host countries (Poland and the Czech Republic),

[54] Henry A. T. Obering, Missile Defense For US Allies And Friends, Presentation, March 2007, viewgraph 22; P. Sanders, Missile Defense Program Overview For The European Union, Committee On Foreign Affairs, Subcommittee On Security And Defence, Presentation, 28 June 2007 (viewgraph 26)

[55] See: Theodore Postol, Massachusetts Institute of Technology Proposed US Missile Defense in Europe: Technological Issues Relevant to Policy, Presentation Capitol Hill, Washington, DC, August 28, 2007, Center for Science, Technology and Security Policy/AAAS [http://cstsp.aaas.org/files/BriefOnEastEuropeMissileDefense.PDF]

[56] For example, the US Minuteman III with three nuclear warheads is 18m long and 2m wide, whereas the GBI interceptors are around 15m in length and 1.3m in diameter.

therefore bypassing NATO. This marginalisation of the Atlantic Alliance (offering *ex-post facto* coverage to a unilateral US decision) cannot be considered as a good sign for European security.

The 2002 the NATO Prague summit decided to examine options for addressing the increasing BMD threat to Alliance territory "consistent with the indivisibility of Allied security". The same summit approved a secret 10,000 page 'NATO Missile Defense Feasibility Study', which evaluates options to protect NATO member states' territory and population centres against the full range of missile threats. This study was conducted by Scientific Applications International Corporation (SAIC) and endorsed by the Conference of National Armaments Directors (CNAD). It forms an analytical basis for decisions and includes assessments of potential performance, costs and development risk.

This study recommends a NATO BMD architecture that combines NATO's Active Layered Theatre Ballistic Missile Defence Programme (ALTBMD) capabilities with a "national" class, mid-course capability, deployed at a number of sites in NATO Europe[57]. However, NATO's 26 member states could not agree to implement one of the options contained in the study[58]. The study itself raises more questions than it answers due to the fact that details of many key assumptions are not clear e.g. the exact location of interceptors and sensors, the problem of countermeasure problem, or the likelihood of an emerging threat. The NATO summit in Riga in November 2006 concluded that: "missile defence is technically feasible within the limitations and assumptions of the study[59]". Unfortunately neither the limitations nor the assumptions of the study are made clear.

In September 2006, NATO launched the ALTBMD programme with has the aim of having a system with an initial operational capability to protect troops in the field by 2010, and to be fully operational by 2016. The protection of NATO territory, including population centres, against the full "attack spectrum" will require further studies.

At a briefing in March 2007 in Berlin, Lt. Gen. Obering, Director of the US Missile Defence Agency (MDA), said that US missile defence components could become a national contribution towards an Alliance-wide defence system against long-range missile threats, if and when NATO decides to establish such a system. Obering was, however, sceptical about whether NATO members would be willing to pick up the costs of such a system.

In June this year, when they met in Brussels, NATO Defence Ministers concluded a three-track approach by: (i) continuing the ongoing NATO project to develop a 'theatre missile defence' for protecting troops by 2010; (ii) to assess the full implications of the US system for the Alliance; and (iii) to continue cooperation with Russia on TMD as well as engage in consultations more widely.

Secretary General J. de Hoop Scheffer said that NATO members not only agreed on the roadmap on BMD but also on the "indivisibility of security". A study (expected to be

[57] Some meagre details have been published: Bernd Kreienbaum: Missile Defence Feasibility Study, in: Military Technology 9/2006, p.54
[58] Ibid., pp.50-55.
[59] Riga Summit Declaration Issued by the Heads of State and Government participating in the meeting of the North Atlantic Council in Riga on 29 November 2006[http://www.nato.int/docu/pr/2006/p06-150e.htm]

published in February 2008) will assess the possibilities of "bolting" NATO´s TMD project on to the US system "to ensure that all of Alliance territory would be covered from missile threats"[60].

3.6 Industrial impact

In economic, industrial and technological terms, missile defence is one of the most relevant US defence programmes ever. Funding for research into a variety of different missile defence initiatives, dating back to the mid-eighties, have been constantly kept alive by Democrats and Republicans alike. A cumulative $27.4Bn (current dollars) have been spent in the period FY93 to FY00.

However, renewed impetus came with the Bush Administration. Over the past seven years, from Fiscal Year (FY) 2001 on, the US spent a global amount of $53.9Bn. Missile defence appropriation jumped from $4.8Bn in FY 2001 to $7.8Bn in FY 2002, up to $9.4Bn in FY 2007. Clearly, this has become a high priority programme for the Administration and the Republican Party, and this trend could continue even in the advent of a Democratic President in 2008, as s/he might be wary of being regarded as 'soft' on defence. In any case, the current Democratic-controlled Congress is not negatively disposed towards missile defences.

Moreover, some technological demonstrators are now reaching a level of maturity that some consider is sufficient to continue the current deployment of certain parts of the complex multi-layered system. Other, more innovative elements of the programme are still at the study or demonstrator phase. Actual deployment of the GBI, early warning radars (acquisition, tracking, discrimination, fire control mechanisms and so on) and battle management structures in Europe will require additional funds, in the order of billions of dollars, even to acquire a limited capability to protect the US from a small number of relatively unsophisticated missiles.

The overall amount spent in 23 years of missile defence funding totals around $106.8Bn under four different Presidents and six Administrations. Moreover, this public figure probably underestimates the true overall spending in the field, as some basic technological research is not administered directly by the MDA, and there is a credible suspicion of 'black' programmes being funded under different generic labels and hidden in the balance sheet.

Clearly, the US defence industries involved in studying and developing missile defences together with the Pentagon have been the beneficiaries of this massive spending. The sectors involved are many: from new radar technology to missile warheads (kinetic in particular); from high speed communications; from cutting-edge IT capability to manage the enormous flow of data coming from innovative sensors; and from high power lasers and their integration in large flying platforms. The system integration effort alone is probably the more challenging issue, as decisions about when to activate BMD would need to be taken in a few minutes and the execution cannot be delayed even by seconds.

[60] NATO agrees on missile defence way forward, 14 June 2007 [http://www.nato.int/docu/update/2007/06-june/e0614a.html]

Shooting down a small target flying at a very high speed with another 'bullet' is very challenging indeed, as the failure of some tests of the GBI system has proved. The particularly risky research activity involved would probably never have been undertaken even by the largest defence company, without the backing and constant inflow of Pentagon money. What is very attractive for companies in particular is the potential for the development of breakthrough technologies that the overall programme provides.

While the research *per se* can be subject to a very high rate of failure and inapplicability, the investigation goes deep into issues that rarely would be considered of commercial interest by defence companies. Therefore, the technological boost provided for the missile defence programmes to the aerospace and defence sector could have a wide-ranging impact, similar to that experienced during the 'space race' years. That at least is the hope of the industrial participants, but one has to keep in mind that scientific-technical developments are mostly triggered by market competition and open R&D, not by military research.

And in any case, as the different MDA programmes move towards more mature phases, they move from the very profitable but less labour-intensive area of research to manufacturing, which provides for possibly reduced margins but long-term substantial production orders.

Therefore, it is more than understandable that many defence companies in Europe want to be in the missile defence business, in order to keep linked to the potential technological leap and to receive substantial contracts, or at least a fraction of a market that could value up to $10Bn per year in the following 10-15 years (taking into account the historical development of funding described above).

The industrial interest in missile defences is not necessarily connected with a national or multinational strategic approach, but has a sound business and technological basis. The supply side 'base' of missile defence is nowadays fundamentally restricted to US companies, although some cooperation with non-US entities (European, but also from Israel) has been achieved and there are consortia studying transatlantic solutions within NATO. But the core of the US architecture and the system currently under deployment has not been shared even with its closest allies.

Despite that, some European companies are developing systems and technologies that could be of interest for a missile defence system, such as high-altitude high-speed missiles (from MBDA, the European missile leader), advanced radar modules (from French, Italian, German and UK companies). However, the European focus so far has been on theatre defences and mobile protection of troops deployed, more than on large ground-based systems for strategic defence of the territory of the kind that the US is proposing to deploy in Poland and the Czech Republic.

Certain expertise of the European Space Agency, such as that relating to precise satellite-to-satellite docking systems, could be developed in relation to BMD systems. But the limited European defence budgets would not allow significant technological advancements and large procurement contracts of a similar size to that benefiting US companies; procurement efforts in Europe mostly involve transportable (ground or naval) missile

systems useful in the terminal phase and as close-in weapons systems, with limited capabilities against very fast, longer-range ballistic missiles warheads.

The funding issue, however, is not even the main one making transatlantic industrial cooperation very complicated: technology transfer is the single most important factor. Missile defence is a strategic priority for the US and one of its most technologically advanced endeavours. Therefore, the Pentagon is not very keen on sharing results with anybody and US defence industry is happy to preserve a slice of budget away from international competition and cooperation. Transatlantic technology transfer issues are difficult to overcome and require strong political commitment, which has not been the case so far. Restrictions are applied even when ultimately they produce difficulties in integrating the different layers of missile defences, thus damaging the overall effort.

The most relevant example of difficulties encountered so far involves MEADS, a US-dominated programme for deployable defences for troops - representing the ultimate evolution of the Patriot-PAC approach. Despite significant military and industrial interest and financial commitment from Germany and Italy, the programme (currently managed by a specific NATO agency) has suffered uncertainties and delays. The request for technology sharing and technology transfer to MEADS from another US missile system, THAADS, has been rejected. This has lead to the application of European capabilities instead, in particular in the radar segment.

However, the possibility of some limited cooperation in the field could be improved by a stronger strategic agreement about missile defences overall. In addition, European partners should make sure that the question of technological and industrial cooperation and the access from non-US companies is included in any future transatlantic agreements or programmes.

3.7 Impact on arms control

BMD relates to arms control in a variety of ways, some of which are directly related to ballistic missiles, some relate to recent Russian pronouncements as to the consequences of US BMD plans, and others relate to where US BMD plans might lead next. This section starts by looking at the controls applied to countering the proliferation of ballistic missiles, it goes on to look at relevant bilateral and multilateral treaties (some of which Russia is threatening possibly to withdraw from as a consequence of US BMD plans) and concludes by looking at how the future possible direction of BMD might impinge upon arms control.

3.7.1 Missile Technology Control Regime (MTCR)

As ballistic missiles are the most effective means of delivering a nuclear weapon, the international community has placed great store by trying to restrict their spread around the world: Hence, the establishment of the Missile Technology Control Regime (MTCR) in 1987 by a group of Western nations. The MTCR is an informal and voluntary agreement between states that seeks to coordinate national export licensing efforts aimed at preventing ballistic missile proliferation. It applies to ballistic missiles, space launch vehicles, un-manned air vehicle systems (including cruise missiles) with capabilities exceeding a range of 300km and a payload of 500kg. Its membership is now 34[61]. All

[61] Missile Technology Control Regime website at: http://www.mtcr.info/english/index.html

MTCR decisions are taken by consensus, and MTCR partners regularly exchange information about relevant national export licensing issues.

To its credit, the MTCR has been able to slow the spread of ballistic missiles by making it more difficult for proliferators to get their hands on such weaponry and its components. Yet, a number of key producers remain outside the regime – for example, India, Iran, North Korea and Pakistan – who continue to advance their missile programmes; not only for domestic purposes but also for export (of which North Korea is the worst culprit)[62].

3.7.2 The Hague Code of Conduct against Ballistic Missile Proliferation (HCOC)

The HCOC, formerly known as the International Code of Conduct (ICOC), was adopted in November 2002 in The Hague, and is meant to supplement the MTCR (although its membership is not restricted)[63]. The aim is to create a norm against missiles capable of delivering WMD. It calls on all countries to show greater restraint in their own development of such missiles and to reduce their existing arsenals if possible. Participants are expected to exchange information on their ballistic missile and space launch vehicle programmes, as well as to provide advance notice of any launches these capabilities. More than a hundred countries have signed the HCOC.

3.7.3 CFE Treaty

The 1990 Treaty on Conventional Armed Forces in Europe (or CFE Treaty) is an arms control agreement between NATO countries and those of the Warsaw Treaty Organization (WTO) that established parity in major conventional forces/armaments between East and West from the Atlantic to the Urals[64]. It sought to severely curtail the prospect of either 'side' being able to conduct surprise attacks or to initiate large-scale offensive operations. By 1995, when the limits took effect, over 52,000 battle tanks, armoured combat vehicles, artillery pieces, combat aircraft and attack helicopters had either been destroyed or converted. In addition, more than 4,000 intrusive on-site inspections of military units and installations had been conducted.

Once the WTO was dissolved and after NATO's expansion, the Treaty was amended to take into account the evolving geo-strategic environment. However, its ratification by NATO Allies is awaiting Russia's compliance with adapted CFE flank provisions and continued fulfillment of its commitments regarding withdrawals of Russian forces from Georgia and Moldova. This has angered Russia, which insists that while it continues to make serious efforts to resolve the issue – it had already agreed on the removal of military bases from Georgia, the withdrawal of these forces is not legally bound to the CFE treaty.
In the spring of 2007 President Putin made a direct link between US missile defence plans and the CFE Treaty. He accused the West of interfering in Russia's internal affairs and of building up its armed forces around Russia's borders. As a consequence, Russia might consider leaving the CFE treaty if talks with NATO countries show no visible progress in the implementation of the treaty in the future, he concluded[65].

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[62] Daryl Kimball, 'The Missile Technology Control Regime at a Glance', *Arms Control Association Factsheet*, September 2004.
[63] Hague Code of Conduct on Monterey Institute website at: http://cns.miis.edu/pubs/inven/pdfs/icoc.pdf.
[64] Conventional Armed Forces in Europe (CFE) Treaty, Fact Sheet, Bureau of Arms Control Washington, DC, June 18, 2002.
[65] 'Putin proposes moratorium on CFE Treaty', Novosti News Agency, 26 April 2007, at: http://en.rian.ru/russia/20070426/64462473.html

3.7.4 INF Treaty

US missile defence plans have also been cited as the main reason why Moscow is now also threatening unilaterally to abandon the 1987 Intermediate Nuclear Forces (INF) Treaty: an agreement between Russia and the US that eliminates all nuclear and conventional ground-launched ballistic and cruise missiles with ranges of 500 to 5,500 kilometers[66]. Russia's Chief of the General Staff, Yury Baluyevsky said that there was evidence that would justify Russia's withdrawal from the Treaty, and its Defence Minister, Sergei Ivanov, described the Treaty as a relic of the Cold War. While other countries were developing such weapons, he added, Washington and Moscow's hands were tied. Foreign Minister, Lavrov, qualified these statements by stating that no final decision had been made in this regard[67].

It appears that the concerns of the Russian military are twofold. Firstly, it is anxious about its inability to match developments in missile systems by others (because of its Treaty obligations). However, the notion that one has to be able to replicate *all* types of nuclear forces deployed by any potential adversary reflects a worrying mindset within the Russian military. Russia has more than enough longer-range nuclear forces to be able to deter and/or destroy any potential enemy armed only with shorter-range missiles.

Russia' second concern relates to the restrictions the INF Treaty places on its means of countering / overwhelming US missile defences deployed in Europe. Russia may feel that it needs to be able to deploy a quantity of shorter-range, mobile (and cheaper) systems – in addition to its longer-range, strategic systems – in order to guarantee its ability to survive a US 'first strike' and still be able to retaliate successfully through any missile defences.

3.7.5 ABM Treaty

During the 1960s the US and Soviet Union built up huge arsenals of offensive land-based and sea-based nuclear-armed intercontinental ballistic missiles (as well as fleets of nuclear-armed strategic bombers). As they did so they also began developing defensive missiles intended to intercept the offensive ones. The potential for an accelerating arms race between offensive and defensive systems was apparent to both sides. Fortunately, two factors prevented this race from proceeding very far. First, the technology required to 'shoot down' incoming warheads and missiles proved too difficult to master, and second, the development of multiple-warhead missiles meant that the task of the defenders was becoming infinitely more problematic.

Rather than attempt to gain a strategic advantage by embarking on an expensive arms race in both defensive and offensive systems - that appeared bound to end in failure, both superpowers accepted the reality of mutual assured destruction. In other words, each side accepted their vulnerability to destruction by the other and that strategic stability would be preserved so long as neither tried to upset this 'balance of terror'. Any meaningful defence against such massive capability was not only irrelevant, its pursuit was potentially destabilising. Hence, in 1972, the US and Soviet Union signed the Anti-Ballistic Missile (ABM) Treaty that imposed severe restrictions on missile defence deployments:

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[66] For an analysis of the INF Treaty see, for example, Daryl Kimball, 'The Intermediate-Range Nuclear Forces Treaty at a Glance', Arms Control Association Factsheet, Feb 2003.

[67] 'Russia may unilaterally quit INF Treaty', Novosti News Agency, 16 February 2007. See, for example: http://www.globalsecurity.org/wmd/library/news/russia/2007/russia-070216-rianovosti01.htm

restrictions that were tightened still further by a subsequent Protocol to the Treaty in 1974. In the current debate it is as well to remember, therefore, that missile defences against strategic systems, though numerically and geographically constrained, were actually permitted by the ABM Treaty.

The US decided to abandon *all* of those missile defences it had deployed and not to exercise its right to deploy any more while it was a party to the ABM Treaty. The Soviets and subsequently the Russians, on the other hand, continued to deploy their permitted quota of 100 interceptors around Moscow. This missile defence system, which has been upgraded on numerous occasions (including since the Cold War ended) continues to be deployed to this day. Unlike the new US system, the Russian missile defence interceptors carry nuclear warheads.

In December 2001, because it wanted to deploy strategic missile defences once again, the Bush Administration decided to exercise its right to withdraw the US from the ABM Treaty. This took effect in June 2002. As a consequence the US is now free to develop, test and deploy missile defences and configure radar systems to perform functions related to intercepting missiles. Hence, it was able to upgrade its early warning radar at Fylingdales in the UK and Thule in Greenland, and is no longer prohibited from deploying missile defence interceptors in Poland and related radar in the Czech Republic.

3.7.6 The Moscow Treaty

At the time, Russia's response to the US withdrawal from the ABM Treaty was measured and restrained. Indeed, although he did not agree with its decision, President Putin agreed with the US to a new round of cuts in strategic nuclear forces. Subsequently, in May 2002, the Treaty of Moscow was signed. This committed the US and Russia to reduce their strategic arsenals to 1,700-2,200 warheads each (from a level of about 6,000) by 2012. Both sides are free to define the composition and structure of their offensive forces within the imposed ceilings[68].

Hence, fears that the demise of the ABM Treaty would result in the strategic nuclear arms control process going into reverse did not happen. Russia appeared to have accepted that the missile defence programme envisaged by the US Administration would not impinge upon the credibility of the Russian nuclear deterrent. Yet this mood now appears to be changing. The Russians are now beginning to link US missile defence plans with their own strategic nuclear force modernization[69].

It is difficult to gauge to what extent this resurrected linkage of US missile defences to Russian offensive systems is genuine and to what extent it is driven by other factors, one of which is the need to excuse its own force modernization. What appears to have triggered more recent Russian hostility to missile defence plans is the fact that US bases are being established on the territory of former Warsaw Pact countries and their proximity to Russian territory, rather than to any resurrected fears about the system's threat to Russian missile *per se*.

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[68] Victor Mizin, 'The Moscow Treaty', *NTI Issue Brief*, Center for Nonproliferation Studies (CNS), Monterey Institute of International Studies, July 2002.

[69] For example, see: http://cns.miis.edu/pubs/week/070601.htm

Nevertheless, it is perhaps unfair to dismiss entirely the Russian reaction as just another example of paranoia. Russia may be growing increasingly anxious about the US gradually encircling its territory with military capabilities that could, one day, be turned against Russia once again. In the Kremlin there will be generals pointing to their own dwindling and vulnerable nuclear forces and matching these against a combination of highly accurate US offensive systems and developing defensive systems. Expressions of fear that Russia might become the victim of a disabling first strike will rumble more loudly, with a clamouring for more warheads on existing systems, new and mobile systems, and perhaps also anti-satellite weaponry.

3.7.7 Arms Control in Space

Although both the US and Russia deployed numerous military satellites into orbit during the Cold War, they resiled from deploying actual weapons in space: in other words, although space is heavily militarized, it is not yet weaponized. Rather they chose to negotiate the Outer Space Treaty (1967), which prohibited the stationing of WMD in space. However, this Treaty does not cover the transit of nuclear weapons (on ballistic missiles) through space or nuclear weapons launched from earth into space for the purposes of destroying incoming missiles[70]. Nor does it mention anti-satellite weapons or the placement of conventional weapons in space.

For years, international efforts to begin negotiations on 'the prevention of an arms race in outer space' (PAROS) have got nowhere, despite vociferous calls from Russia and China in particular (partly sparked by the Bush Administration's recent renewed interest in BMD). The US refuses to accede to such talks, and some commentators now doubt whether China would want to forego the option of being able to attack US space-based military assets:

"China understands that its best chance of successfully countering US military power lies in being able to attack America's relatively vulnerable eyes, ears and voice[71]*."*

China's successful test of a ballistic missile intercept against a satellite in January this year demonstrates that Beijing may well be thinking along these lines. The deployment of US missile defences will necessitate a commensurate deployment of supporting elements, such as tracking satellites and their ground stations. These will be particularly vulnerable to attack. Yet, any defence strategy based on launching attacks upon the eyes, ears and voice of one's opponent is likely to prove highly destabilizing in times of crisis. A nuclear-armed power that is being attacked in such a manner by another nuclear-armed power may well be panicked into using its nuclear weapons early[72].

Under the Bush Administration, the US Air Force and MDA have begun to pursue the development of space weapons technologies. It is not surprising, therefore, that the US position against a space weapons ban has hardened. This is due both to a renewed interest

[70] Rebecca Johnson, 'Safeguarding Space Security: missile defence and the challenge for Europe', presentation to e-Parliament Conference on Space Security, Rayburn House Office Building, Washington, DC, September 14, 2005.
[71] Ashley J. Tellis, 'Punching the US Military's "Soft Ribs": China's Antisatellite Weapon Test in Strategic Perspective', *Carnegie Policy Brief*, No.51, June 2007.
[72] Rebecca Johnson, *op. cit*., pp.31-32.

in acquiring space weaponry for both offensive and defensive purposes, and to the current administration's deeply-held distrust of international treaties.

4. National positions of key EU Member States

This section provides a brief glimpse of the national positions of some of the key European countries involved in this debate.

4.1 Poland

Poland's former Deputy Foreign Minister, Witold Waszczykowski, said that the US may start building a missile base in Poland as early as February 2008[73]. It is too early to say precisely what the position of the newly-elected government in Poland might be, but it appears to be broadly in favour of missile defence as well, with many Poles seeing a good case for stronger ties with the US[74]. However, Civic Platform leader Donald Tusk has pledged to hold a stronger position in negotiations with the US[75]. A senior US defence official says the US wants to finish its negotiations with both Poland and the Czech Republic in time for their parliaments to consider the treaties early next year, and for construction to begin later in the year. But he says the talks with Poland are not as far along as the negotiations with the Czech Republic.

4.2 Czech Republic

Czech President Vaclav Klaus has called for relations between the Czech Republic and the US to be strengthened and indicated that the BMD radar that the US wants to site in the country could be one means of doing so[76]. His indirect backing for the radar follows a furore in the Czech Republic after US Secretary of State Robert Gates suggested that a Russian presence could be accepted at the radar to ease hostility from Moscow. Prime Minister Mirek Topolanek was forced to make clear that observers - but no Russian soldiers - might be allowed.

According to Tomas Klvana, the Czech government's spokesman on this issue, whatever agreement might arise from discussions between the US and Czech governments will have to be ratified by both chambers of the Czech parliament and also signed by the president. Only then can preparatory work begin. The Czech government maintains that its bilateral negotiations with the US are compatible with Article 3 of the Washington Treaty, which enables the development of any defence system between any two NATO countries that then can be used for the entire alliance. The radar has been constructed so that it will be fully compatible with NATO[77].

[73] 'Poland, U.S. to discuss missile defense in Washington', *Novosti*, 16 July 2007.
[74] 'Sky High', *The Economist*, 20 October 2007, p.38.
[75] **'**Gates hopes Polish military cooperation will continue', AFP, 22 October 2007.
[76] 'Czech President cites radar as means of cementing US relation', AFP, 28 October 2007.
[77] Czech Republic: based capability not threats, Radio Free Europe, interview with Tomas Klvana, 19 July 2007.

4.3 France

As seen from France, the current debate should be viewed in the context of traditional French strategic deterrence doctrine based on the existence of nationally owned nuclear deterrent forces. As such, a future European BMD system would obviously constitute a rupture in the deterrence doctrine. This doctrine was revalidated by former President Chirac in a speech made in Brest (France) on 19 January 2006 indicating that France would not rule out the use of its nuclear assets against terrorist sources.

France has been actively engaged in: the development of extended air-defence systems able to protect projected forces in theatre, against either sophisticated aerial threats or even against cruise or short-range ballistic missiles; active participation in NATO's ALTBMD studies exploring the technical feasibility of a European wide protection system; the national development of first technological demonstrators in the field of space-based early warning capabilities (these exploratory programmes called '*Spirale'* should lead to the launch of two satellites end of 2008).

France's approach is marked by a large dose of pragmatism. Indeed, this pragmatism can be understood as being the *sine qua non* condition for any political acceptance in France of any anti-missile effort in Europe. It reflects a need for better and more adapted intelligence capabilities in the field of missile proliferation.

Characteristically, the national research and development effort for space-based early warning satellites is to be conceived firstly as a mean to enlarge intelligence capabilities - very similar to the way the first French electro-optical *Helios* satellite was conceived. Such means are considered necessary to signal to possible adversaries that their actions can be detected and attributed. They are also perceived as reinforcing some level of national decision-making autonomy, allowing a better knowledge about short- and near-term threats to national and European interests.

France is also aware that a number of military counterforce- type actions could be envisaged before any adversary is in a position directly to threaten European territory. This implies a reliance on sensitive and reliable information that could be provided by sufficient proprietary capabilities.

In relation to the possible deployment of BMD in Europe, France is likely to require that it relates to a good understanding of the threat (both in technical and geopolitical terms), has commonly agreed rules of engagement, and is based upon a shared view of the best approach to discourage or prevent the use of WMD against Europe. It would also want there to be a good understanding of the technical performance and operational consequences of such a BMD system.

Clearly, the French position has demonstrated evolved in recent years, especially in relation to the need for France and Europe to modernize their intelligence and military tools to address the threat from ballistic missiles. Further evolutions – perhaps more favourable than is currently the case towards the US plans - to defend Europe would be conditioned by important preliminary political advances on ESDP.

4.4 Germany

The renewed debate on the third BMD site in Europe has also caused controversy in Germany. The fear that the system is antagonizing Russia and may lead to a new arms race in Europe, is widespread. The government seems to be split over the issue: whereas the Conservatives (CDU/CSU) seem to favour missile defence, the Social Democratic Party (SPD) is more than sceptical. Chancellor Merkel has said: "Germany prefers a solution within NATO and an open dialogue with Russia". NATO missile defence should be "seen as a task for the Alliance collectively"[78]. Foreign Minister Steinmeier wrote:

"We cannot allow a missile defence system to be either a reason or a pretext for a new arms race (…) there is no 'old' and 'new' Europe, and no one should try to sow such seeds of discord for short-term gains. Europe´s security is indivisible[79]*."*

He has demanded that the issue will be discussed within both NATO and the EU. He went on to say:

"No military defence system, however sophisticated it may be, can guarantee 100 per cent protection. Our top priority therefore remains disarmament, not rearmament. We don't want a new arms race in Europe! And I don't believe anyone wants to call into question the carefully balanced network of disarmament and arms control agreements. Our goal must be to preserve and strengthen this system[80]*."*

The opposition parties in parliament are criticizing the US's unilateral stance and many believe that the BMD system is also directed against Russia. The Green Party, the Left Party (Die Linke) and the Free Democrats all oppose the US plan. Resistance is also spreading within the SPD. Party Chairman Beck warned against the resurgence of the Cold War and former Chancellor Schröder fears a detrimental impact on Russian-German relations[81]. An SPD Executive Committee resolution from March 2007 states:

"While the United States of Americas points to the defensive character of the new anti-ballistic missile defence system, which is not directed at Russia, the Russian government has described its potential deployment as a threat and announced countermeasures. These differing positions need to be clarified and reconciled in the interests of Europe's security policy. This requires an open and trusting exchange between NATO and Russia. Over and above the requirements of security policy and the technical feasibility of the envisaged defence system, attention must be paid to the consequences in terms of disarmament policy[82]*."*

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[78] Interview with ZDF 12 March 2007.

[79] Frankfurter Allgemeine Sonntagszeitung 18 March 2007 [See: http://www.auswaertiges-amt.de/diplo/en/Infoservice/Presse/Interview/2007/070318-Abruestung-FASZ.html]

[80] Ibid.

[81] See for analytical details: Thomas Bauer, Florian Baumann: Missiles for Europe? U.S. plans expose Europe´s strategic weakness, Center for Applied Policy Research, no.3 July 2007 [http://www.cap-lmu.de/publikationen/2007/cap-policy-analysis-2007-03.php]

[82] SPD Executive Committee resolution: Increase disarmament – Prevent rearmament, Berlin 26 March 2007, http://www.spd.de/show/1710526/040407_abruestungsbeschluss_pv_en.pdf

Although the CDU/CSU are expressing clearer support for missile defence, they also underline the need for more intense consultations with Russia. A spokesman for the CDU/CSU parliamentary group rejected the bilateral approach between the US and Poland/ Czech Republic and asserted that the EU is an unsuitable forum in which to discuss this issue, due to the exclusion of the US and Norway - only NATO offers the proper framework for negotiations with Russia[83].

4.5 UK

The UK Government set out its approach to missile defence in greatest detail when it published a public discussion paper at the end of 2002[84]. It did so at that time primarily because it was about to grant permission to the US Government to upgrade the Ballistic Missile Early Warning Radar at RAF Fylingdales, to enable it to perform a role within the US missile defence architecture (permission was subsequently granted in early 2003).

The precise extent of the threat to the territory and forces of NATO member states from ballistic missiles carrying weapons of mass destruction is certainly difficult to quantify in time and scale. However, potential threats are growing and cannot be ignored. If we are to meet these prospective threats as far as we can, we need to plan ahead and prepare properly. There are complex issues to be considered before the UK and others can determine… the role that missile defence could play as an element of this strategy…" [85]

More recently, the UK has announced that Britain has agreed to another RAF base - at Menwith Hill – to be used as part of the US missile defence system[86]. This will involve the installation and operation of equipment by the US government:

"…to allow receipt of satellite warnings of potentially hostile missile launches, and will pass this warning data to both UK and US authorities. The data will also be fed into the US ballistic missile defence system for use in their response to any missile attack on the US." [87]

Traditionally, the UK Ministry of Defence has been rather sceptical about missile defence, primarily on grounds of technical proficiency and cost-effectiveness, but it is unlikely to spurn any commercial opportunities that might arise from participation in the programme.

The present UK government says that it has no plans to site missile interceptors in the UK, but that it would keep this option "under review as the threat evolves". Clearly, the Blair Government was supportive of the Bush Administration's missile defence plans. It is too early to say whether his successor is any less enthusiastic, although Prime Minister Brown has already established a little more distance between US and UK foreign policy.

[83] See: Thomas Bauer, Florian Baumann: July 2007p. 10.
[84] *Missile Defence: a public discussion paper*, Ministry of Defence, December 2002.
[85] Ibid., p.30.
[86] Rt. Hon. Des Browne, MP, Secretary of State for Defence, *Official Report*, House of Commons, 25 July 2007, Column 71WS.
[87] Ibid.

5. Developing a European approach to missile defence

This section explores: the differences in perception and approach between the US Administration and the Europeans; the particular role that missile defence might play within overall European counter-proliferation strategy; and assesses some of the outstanding issues that need to be addressed as part of a balanced European approach. Of course, it is impossible to generalise about there being a single 'European' perception of, or approach to, missile defence. But this study is attempting to identify the components of a common framework within which Europe can develop a more coherent position, whether this is manifested in organizational terms through the EU, NATO or both.

5.1 US and Europe: Differences in perception and approach

The current US Administration and probably its successors (although perhaps to different extents) seem to be convinced of the need for strategic missile defence, and are prepared to continue investing large sums to try and make it work. Europeans have to take this reality into account when dealing with their transatlantic ally and leading NATO partner. While European governments have a right to subject Washington's missile defence plans to critical scrutiny, where these have implications for European and international security, they should not object to the US aspiration to be able to protect US citizens from ballistic missile attack.

Nevertheless, from the analysis above we can detect a difference in perception about the nature and immediacy of the ballistic missile threat, and in how best to meet it, between the US Administration and most of Europe (to varying degrees). This is manifest in a number of key respects:

Threat perception
There appears to be some disagreement about threat perception. This involves differences over how quickly certain states – particularly Iran - might develop long-range missiles capable of targeting European and US populations, and also the likelihood of such capability becoming a real threat. This is rooted primarily in different perceptions vis-à-vis the ability of other instruments to meet such threats in the absence of missile defence (diplomacy, deterrence, and so on). It is also partly the manifestation of a historical/cultural phenomenon. Europeans are more familiar with having to live with geographically proximate threats than is the US.

Cost effective?
There are clear doubts on the European side, as indeed there are amongst many in the US as well (outside the Bush Administration), that the technology can ever be made to work to a level that would make the huge investments necessary a cost-effective proposition. Hence, European governments are more wary of investing scarce resources in this expensive technology.

Pre-emption
There is greater reticence among Europeans to discuss openly the option of taking pre-emptive military action against the ballistic missile launch sites of potential adversaries. Some proponents of missile defence mischievously suggest that this option would become much more likely if missile defences are *not* deployed. Yet if

ever there was a looming conflict against a state with limited ballistic missile capability based in a known location, the incentive – for Europeans as well as the US - to strike pre-emptively might prove irresistible.

Impact on arms control and relations with Russia
The Europeans appear more concerned than is the US administration about the possible danger of missile defence deployments in Europe seriously damaging relations with Russia. Europeans tend to see Russia as an important player – located on the east of their continent – with whom Europe at least has to develop a *modus vivendi*, if not a strategic partnership. Europeans would be disturbed by Russia pulling out of key arms control treaties and a return to frostier security relations.

Weaponising space
The Bush Administration is quite prepared to consider missile defence options that involve the weaponisation of space as part of the aspiration of achieving 'full spectrum dominance' i.e. being able to neutralize any offensive action by any adversary anywhere on the planet. Europeans tend to be much more fearful that the weaponisation of space would be counter-productive and, given the vulnerability of space assets (including European ones), that any arms race in space would prove potentially harmful, in both security and commercial terms.

5.2 Does Missile Defence have a role to play?

So, can missile defence make a positive contribution to European security? Does it provide a necessary/useful addition to the other mechanisms available that can be deployed to counter the threat posed by ballistic missiles? At present, Europe can deploy a variety of policy instruments to meet this threat. The approximate chronological sequence in which they would be applied is as follows:

Arms control
Acting through export control mechanisms, Europe can work towards physically preventing other states from acquiring WMD and ballistic missiles. We know that export controls have slowed the proliferation of ballistic missiles, without having been able to prevent it. Moreover, a number of states are now able to produce ballistic missiles of shorter range indigenously. **Physically preventing (rather than slowing) *all* proliferation of ballistic missiles through export controls is not realistic.**

Diplomacy
European governments can use diplomatic and other means to persuade states that their security would not be enhanced by the acquisition/development of ballistic missiles. The motivations for acquisition can be influenced by diplomacy, but are often driven by stronger geo-political forces – either emanating from the region or for strategic reasons. **It is reasonable to expect, and to plan for, the likelihood that the proliferation of ballistic missiles of longer range will continue.**

Deterrence
Even if they are already in possession of ballistic missiles, Europe can dissuade states from contemplating their use (primarily through deterrence i.e. threat of retaliatory action). But will deterrence always work against every potential adversary? Most of the time it probably will: but every dictator, in every circumstance, cannot be assured. One should also account for the possibility of an accidental or inadvertent launch, which, by definition, cannot be deterred. **Deterrence cannot be guaranteed in every circumstance and the small possibility of accidental/inadvertent launch cannot be discounted and may increase** in line with proliferation to states with less robust command and control procedures.

Pre-emption
There is a possibility that preventive or pre-emptive military action could eradicate the missiles before they are launched. In particular circumstances, when it is possible to detect and locate an imminent attack from a ballistic missile, and where one has the necessary capability at hand to respond before that missile is actually launched, a pre-emptive strike might be an option. Nevertheless, **the political risks attached to pre-emptive action are high, there will be many occasions when militarily the circumstances would not be conducive to launching such a strike, and there is no guarantee that the strike would be successful.**

Defence
Europe can deploy the means to mitigate their impact if, nevertheless, ballistic missile are fired in anger. **This is where missile defences could be relevant**, assuming that the measures and mechanisms above have failed to prevent an attack (whether deliberate or accidental) from ballistic missiles.

Protection
Europe can provide certain measures of civil defence, such as providing underground shelters, and hardening key targets against the impact of attack. **It is not realistic to attempt, or possible to provide, complete protection for all European citizens from ballistic missile attack**. Nevertheless, prudent civil defence measures are necessary to ensure the survival of key elements of state power and, where possible, to mitigate the impact upon civilian casualties.

5.3 Achieving the right balance

Although, on the basis of the above, a case can be made that Europe might benefit from missile defence – on grounds that the other elements of its non-proliferation and counter-proliferation policies cannot be guaranteed to succeed in all circumstances – a number of further questions have to be addressed. These mainly centre on achieving the right *balance* between addressing different security concerns.

Targeting resources
For instance, what is the appropriate trade-off between the risk of ballistic missile attack on the one hand, and investment in countermeasures on the other? To reach

an informed opinion Europe needs to make a detailed appraisal of the existing and likely future threats posed by ballistic missiles and their proliferation. Incorrect judgments about the nature of the threat can distort security postures in the context of limited defence budgets. In attempting to meet one element of the threat posed by WMD i.e. the still latent one of delivery by long-range ballistic missile, Europe should not divert its attention from other extant and more immediate threats. Hence, any investments in missile defence need to be weighed extremely carefully against the opportunity costs such investment incurs.

Political relations

Do the political and other security consequences of pursuing this capability outweigh the benefit that missile defences might provide? If the consequence of deploying a handful of interceptors - of perhaps questionable technical proficiency - against a putative future threat is to alienate Russia, lead to a dismantlement of arms control agreements and thwart a moving away from 'launch on warning' strategies, the overall impact on European security would probably be detrimental. On the other hand, if Europe is faced with a genuine threat from ballistic missile attack from the Middle East it has a responsibility to try to meet that threat and to mitigate its impact upon European citizens. To fail to take defensive measures simply in order to 'appease' the Russians would not be wise.

Configuring the system

Is it possible to deploy missile defences in ways that accommodate these and other concerns? Can missile defences be deployed in ways that are configured so as to meet the potential threats from the Middle East but that will not damage Europe's important security relationship with Russia? For example, would the deployment of sea-based assets be just as effective, and more reassuring to Russia than land-based deployments on the territories of their former allies?

Compromising neutrality

Critics of missile defence have also posited a scenario in which the US is engaged in conflict with another state armed with ballistic missiles, without the support of most/all of its European partners. The adversary then fires a missile at the US, which is then intercepted over European territory. Consequently, the debris from this missile – possibly WMD related – then falls upon European territory. This makes US BMD based in Europe dangerous for Europeans, so the argument goes. The contrary view is that such a scenario is implausible as it pre-supposes that Europe could stay neutral in a conflict in which the US was being attacked with ballistic missiles launched from the Middle East. It also implies that Europe would rather the missile delivered its payload intact upon the US than take the risk of fragments from intercepted missiles falling on European soil.

6. Findings and Recommendations

There is no logical, military or moral reason why Europe should accept vulnerability against ballistic missile attack from states of concern, if and when that vulnerability becomes apparent and where it is possible to mitigate or remove it. If cost-effective missile defences offer the chance of shooting down ballistic missiles (whether launched deliberately or accidentally), thereby potentially saving many lives, Europe's political leaders need to consider the option seriously.

Through their participation in NATO's ALTBM programme, European governments have already accepted the principle of missile defences being an important part of Europe's military capabilities to protect its troops in theatre. Are European political leaders willing to inform their populations that they are not prepared to deploy systems that could potentially offer some protection from ballistic missile attack, when they are deploying similar systems to protect the armed forces?

It is important to recognise that the distance the missile has traveled before exploding its ordnance upon the target does not diminish its impact, have any relevance to those on the receiving end, or have any intrinsic difference in strategic terms. In addition, once a ballistic missile has been launched there is no means of calling it back or activating a self-destruct mechanism. The only way to try to avert catastrophe would be to attempt to intercept the missile and destroy it. If the technology can be made to work why should we not give ourselves that final chance to save many thousands of lives?

Nevertheless, major questions remain as to whether, or at least to what extent, missile defence is warranted to meet future possible threats given the scenarios in which its presence might be relevant, the level of technical proficiency it is likely to achieve and the cost involved. There is no realistic prospect of an infallible missile defence system being deployed for the foreseeable future, and the recommendations in this study are based on that assumption.

The EU has a duty to develop a strategic concept under the roof of NATO and in close collaboration with the US so that a future BMD system does not pose a threat to third countries[88]. This study now seeks to identify the components of a common framework within which Europe can develop a more coherent European position. The common objective for Europe, as well as for the US and Russia, should be to ensure stability is preserved in the context of a new, transparent strategic framework. This study puts forward the following recommendations to underpin a European approach to missile defence.

European threat assessment

In order to reach an informed opinion, Europe first needs to be clear about its own assessment of existing and likely future threats posed by ballistic missiles, their proliferation and their deployment/use as weapons of mass destruction. As part of that process it should reappraise whether it is applying all of its various policy instruments to greatest effect to prevent the threat from ballistic missiles. Robert

[88] Karl von Wogau, MEP, Chair of the Security and Defence Sub-Committee of the European Parliament. Source: http://www.wogau.de/07/action=speeches/2_speeches_34_EN.htm

Gates' recent proposal to build and prepare its planned BMD sites in Europe, but not to activate them unless and until the Iranian threat is confirmed[89], could serve to reconcile transatlantic threat assessments.

Prevention

A European approach should reiterate the principle that the overriding priority should remain the prevention of the use of ballistic missiles. If missiles are launched in anger against Europe this would represent a significant failure of policy. The deployment on missile defences should not alter this fundamental principle. In other words, the prosecution of foreign policy should not be influenced in the direction of greater risk taking on the basis that missile defence will cope with the consequences of miscalculation.

A 'hedge' against uncertainty

A European approach should proceed on the basis that modest deployments of missile defences – of proven technical proficiency (though not perfect) - configured to meet threats from a limited number of ballistic missiles can serve as a useful hedge against the unpredictability of 'rogue' dictators, and as insurance against accidental or inadvertent launches.

Develop an integrated European approach

If Europe does decide that it wants an upper-layer missile defence, a political decision is needed as to whether it should be developed by expanding ALTBMD to include the proposed US capabilities[90]. In principle, it is preferable for Europe to proceed on the basis of expanding existing NATO activities in ALTBMD to embrace territorial defence, rather than for the US to proceed on the basis of striking bilateral deals with two Member States.

Multilateral solutions

Wherever possible, Europe should seek multilateral solutions to tackling the threat posed by the proliferation of ballistic missiles. Any multilateral framework should include Russia. As the planned US defences are not aimed at Russia, given that Russia has its own concerns about the threat from ballistic missile proliferation, and that Russia is an important player in the European security discourse, it makes sense to consult and involve Russia in this process. Europe should welcome the news that US Defence Secretary Gates and Secretary of State Rice have reportedly presented proposals to the Russians whereby Russia would join the US and NATO in designing and operating an anti-missile system intended to protect all of Europe[91].

[89] Brian Knowlton, 'Bush and Gates address Missile Defence', *International Herald Tribune (Europe),* 23 October 2007.

[90] 'What are NATO's next steps on Missile Defence?', Conference of the Security and Defence Agenda, held in Brussels, 18 March 2007. report available at: http://www.securitydefenceagenda.org/Portals/7/Reports/2007/SOD_Missile%20Defence%20March%202007.pdf

[91] Ibid.

Preserving strategic stability
Missile defences should be deployed in ways that are compatible with the preservation of strategic stability, especially in relation to the strategic nuclear balance between the US and Russia. This means that they should not be deployed either in location, configuration or scale that challenge the credibility of Russia's overall nuclear deterrent posture.

Universal coverage
Any European missile defence policy should be based on the principle that the protection is offered to all of Europe. To leave certain countries or regions within Europe exposed to possible attack from ballistic missiles would be potentially divisive and undermine the aim of achieving common security for all.

Weaponisation of space
As certain future planned US BMD projects would involve the placement of weapons in space, Europe needs to reach an agreed view on whether or not it is in favour of extending missile defence technologies into this domain. In doing so, Europeans will need to weigh carefully the potentially harmful impact on strategic stability of placing weapons in space (especially vis-à-vis Russia and China) against the additional BMD capability afforded.

Industrial participation
In light of political decisions, consideration will need to be given to how European industry might participate in, and benefit from, this massive technological undertaking. It is understandable that many defence companies in Europe want to link up to the potential technological leap afforded by BMD, and be part of market that could be worth up to $10Bn per year over the next 10-15 years.

It would not be in Europe's security interests to take decisions concerning the possible deployment of new missile defences in Europe precipitously. Any decisions should be made only after there has been an informed, widespread and transparent debate throughout Europe. As the Chair of the Parliament's Security and Defence Sub-Committee has said:

"The European Union has the competence and the necessary resources to take part in this system. But the concept pursued by the USA at present would lead to safety gaps at the edges of Europe. For the necessary improvements and consultations, however, we still need sufficient time. Therefore the current missile defence system may not be pushed through by force." [92]

The European Parliament has a legitimate contribution to make to this debate and this study is intended to assist in that process.

[92] Source: http://www.wogau.de/07/action=speeches/2_speeches_34_EN.htm

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