



Beyond the United Kingdom: Trends in the Other Nuclear Armed States

Ian Kearns

Discussion Paper 1 of the
BASIC Trident Commission

*An independent, cross-party commission
to examine UK nuclear weapons policy*

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Foreword from the Commission Co-Chairs

The last Labour Government reaffirmed its commitment to Britain's independent nuclear deterrent, based on Trident, at the end of 2006. The current coalition government, in its October 2010 Strategic Defence and Security Review (SDSR), maintained a commitment to this decision in principle but also announced some changes to UK nuclear doctrine, a reduction in the number of warheads and missiles possessed by the United Kingdom, and a delay to the timetable for the construction of the replacement submarines on which the Trident system depends.

The decision to delay the final judgment on replacing the submarines until after the next election has created a window of opportunity for further deliberation on UK nuclear weapons policy. The starting point for the BASIC Trident Commission is a belief that it is important to make the most of this opportunity.

We are living through a period of enormous change in international affairs with new powers and security threats emerging, increased nuclear proliferation risks, and growing pressure on economies and defence budgets in the West. Since the original 2006-07 decision on Trident renewal modest arms control progress has also been made by the United States and Russia and President Obama has set out a vision of a world free of nuclear weapons. The current government, more recently, has also initiated a further review of possible alternatives to Trident.

In our view, there is a strong case in this context for a fundamental, independent, review of UK nuclear weapons policy.

There is also a case, in the national interest, for lifting the issue of the United Kingdom's possession of nuclear weapons out of the day to day party political context and for thinking about it in a cross party forum. The BASIC Trident Commission is doing this by facilitating, hosting, and delivering a credible cross-party expert Commission to examine the issue in depth.

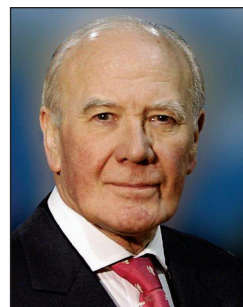
The Commission is focusing on three questions in particular, namely:

- Should the United Kingdom continue to be a nuclear weapons state?
- If so, is Trident the only or best option for delivering the deterrent?
- What more can and should the United Kingdom do to facilitate faster progress on global nuclear disarmament?

This discussion paper addresses part of the context of relevance to all three of these questions. It is the first in a series and makes an important contribution to our understanding of what is going on in the other nuclear armed states. It contains some sobering messages about the extent of the nuclear modernisation programmes going on elsewhere in the world and is a reminder of how important it is to focus on the reality of what is taking place elsewhere, and not just the rhetoric. The report is published in the name of the author, rather than in the name of the Commission as a whole, but it will feed into the Commission's deliberations and we hope it will stimulate wider discussions and further submissions of evidence for the Commission's consideration.



Malcolm Rifkind



Ming Campbell



Des Browne

BASIC Trident Commission

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Handwritten signature of Ming Campbell in black ink.

Handwritten signature of Des Browne in black ink.

Executive Summary

This paper presents both data and analysis related to current stockpiles of nuclear weapons held outside the United Kingdom. It examines stockpile numbers, force modernisation trends, declaratory policy and nuclear doctrine, and the security drivers that underpin nuclear weapons possession in each state.

Part 1 of the paper presents the stockpile data in table form, and both defines the categories used in presenting the data (strategic/non-strategic, and deployed/reserve weapons) and highlights some caveats that need to be borne in mind in relation to the publicly available data. It shows that the United States and Russia continue to dominate nuclear weapons possession and deployment. France has the third largest arsenal, though with vastly fewer weapons than either the United States or Russia. The United Kingdom and China then have a similar number of nuclear weapons to each other but at a lower number than France, while India, Pakistan and Israel are thought to have similar sized arsenals to each other but again, at lower numbers than either the United Kingdom or China. North Korea is a nascent nuclear power, known to have nuclear weapons capability but at this stage estimated to be at a very low level of warhead numbers.

Parts 2 and 3 of the paper consist of a country by country analysis of the story behind the numbers presented in Part 1. Part 2 analyses the nuclear armed states that are signatories to the Nuclear Non-Proliferation Treaty (NPT), namely the United States, Russia, China and France. Part 3 examines nuclear armed states outside the NPT, to include Pakistan, India, Israel and North Korea.

A number of notable themes emerge from the country by country analysis, and these are summarised briefly in **Part 4**.

The main conclusions are:

First, there has been a major reduction in the global nuclear weapons stockpile since the mid-1980s but since then, the number of nuclear weapon states has gone up. Nuclear weapons are present today in some of the most unstable and violence prone regions of the world, and in North East Asia, the Middle East and South Asia, there are serious conflict and proliferation concerns that suggest an increased potential for nuclear weapons use.

Second, long-term nuclear force modernisation or upgrade programmes are underway in all nuclear armed states. Hundreds of billions of dollars are earmarked for spending over the next decade, not only in the United States and Russia but in major development programmes in China, India, Pakistan and elsewhere. Almost all of the nuclear armed states covered in this paper are continuing to produce new or modernized nuclear weapons and some, such as Pakistan and India, appear to be seeking smaller, lighter, warheads to allow these either to be delivered to greater distances or to allow them to be deployed over shorter ranges and for more tactical purposes.

With regard to delivery systems, Russia and the United States have recommitted to maintaining a triad of land, sea and air forces for the long-term. China, India and Israel are seeking to build triads of their own. In the case of China and India, major ballistic missile programmes are underway, both to increase the range and sophistication of land-based systems and to build fleets of nuclear powered ballistic missile submarines. In the case of Israel, the size of its nuclear tipped cruise missile enabled submarine fleet is being increased and the country seems to be on course, on the back of its satellite launch rocket programme, for future development of an inter-continental ballistic missile (ICBM). Pakistan is not only rapidly increasing the size of its warhead stockpile but is building new plutonium production reactors, which could add to its fissile material stocks and, like North Korea, it is seeking to rapidly enhance its missile capabilities. France, having recently completed the modernisation of its ballistic missile submarine fleet, is also introducing new and more capable bombers to the air component of its nuclear force, though at reduced aircraft numbers overall, and is introducing new and better nuclear warheads to both its sea-launched ballistic missiles and to its aircraft.

There is little sign in any of these nuclear armed states that a future without nuclear weapons is seriously being contemplated.

Third, it is clear that in all of these states nuclear weapons are currently seen as essential to national security and in several of them, nuclear weapons are assigned roles in national security strategy that go well beyond deterring a nuclear attack. This is the case in Russia, Pakistan, Israel, France and almost certainly North Korea. India has left the door open to using nuclear weapons in response to chemical or biological weapons attacks. In fact, as the independent International Commission on Nuclear Non-Proliferation and Disarmament pointed out: ‘ Only China limits the stated role to deterrence against the threat or use by others of nuclear weapons; all others keep open the option, to a greater or lesser extent, of using their nuclear weapons in response to other kinds of threats.’¹

Fourth, a common justification for the modernisation and upgrade programmes underway is perceived strategic vulnerability, or potential vulnerability, in the face of nuclear and conventional force developments taking place elsewhere. The Russian nuclear programme, for example, is said to be a response to concerns over U.S. ballistic missile defence and advanced conventional capabilities like Conventional Prompt Global Strike, as well as to concerns over conventional weakness relative to China. The Chinese programme is justified by reference to these same developments in the United States and by reference to India’s programme. India’s programme, in turn, is driven partly by fear over Pakistan and China while Pakistan’s nuclear programme is justified by reference to Indian conventional force superiority. French nuclear weapons modernisation has been justified as a response to stockpiles elsewhere that ‘keep on growing’.

Fifth, in some states, non-strategic nuclear weapons are seen to have a particular value as compensators for conventional force weakness relative to perceived or potential adversaries. These weapons are seen, in this regard, to provide the conventionally weak state with conflict escalation options short of an all out nuclear attack on an adversary, which may not be seen as credible. This situation mirrors aspects of NATO nuclear doctrine during the Cold War, when

NATO worried about being over-run in Europe by superior numbers of Soviet conventional forces. Nuclear weapons are therefore

assigned war-fighting roles in military planning in countries like Russia and Pakistan. In Russia, this may take on the form of the nuclear de-escalation doctrine. In Pakistan, it is implied but left ambiguous to confuse risk-calculations in the minds of any adversary, (principally India).

Sixth, although the New Strategic Arms Reduction Treaty (START) between the United States and Russia arguably represents the most significant arms control advance in two decades, the

Treaty contains significant gaps that mean it will not necessarily lead to significant reductions in the number of nuclear weapons held by both parties. Opportunities to pursue much deeper cuts in US and Russian nuclear weapons exist, but significant political and technical challenges mean this outcome is far from certain.

Whatever the current rhetoric about global nuclear disarmament from the nuclear armed states and others, in the absence of any further major disarmament or arms control breakthroughs, the evidence points to a new era of global nuclear force modernisation and growth.

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¹ *Eliminating Nuclear Threats: A Practical Agenda for Policy-Makers, Report of the International Commission on Nuclear Non-Proliferation and Disarmament*, Canberra/Tokyo, 2009, p.29

Table 1:

Summary of Nuclear Force Modernisation Programmes Underway Outside the United Kingdom (by Country)

United States

- Projected spend on nuclear weapons and related areas over the next decade of U.S. \$700 billion.
- Of this, well over \$100 billion over the next decade is to be spent on sustaining and modernising delivery systems.
- A further \$92 billion over same period will be spent on modernising and maintaining nuclear warheads and warhead production facilities.
- Minuteman III ICBM service life is to be extended and a follow on ICBM is planned.
- Twelve new nuclear powered ballistic missile submarines (SSBNs) also planned, the first of which will come into service in 2029.
- B-52H bombers to be kept operational until 2035. Studies underway for a replacement bomber.
- Beginning 2025, US Air Force will begin replacing nuclear capable air-launched cruise missiles with longer range stand-off nuclear missile.

Russia

- Plans to spend at least \$70 billion on improvements to strategic nuclear triad (land, sea and air delivery systems) by 2020.
- Introducing new RS-24 mobile ICBMs with multiple warheads.
- An entirely new class of ICBM planned by 2018, each capable of carrying 10 warheads.
- Starting in 2013 will double its annual production of ballistic missiles.
- Existing Delta IV class SSBNs being equipped with improved Sineva missiles.
- Eight new fourth generation Borey-class nuclear powered SSBNs being built to form centrepiece of Russian naval forces to 2040, each carrying 16 new Bulava missiles with an 8,000 – 9,000km range.
- A fifth generation SSBN is said to be in development, to carry cruise missiles as well as sea launched ballistic missiles.
- Deployment of a stealth capable long range nuclear bomber expected by 2025.
- Reports of new nuclear capable short range missile being deployed to 10 army brigades over next decade.

China

- Rapid build-up both the DF-21 medium range missile, and the DF-31A road mobile ICBM, the latter thought to be targeted at the United States.
- A new road mobile ICBM with multiple warheads and multiple independent re-entry vehicles also thought to be in development.
- Up to five new SSBNs under construction, capable of launching 36-60 sea-launched ballistic missiles and capable of providing a continuous at sea deterrence capability.

France

- Has just completed deployment of four new SSBNs which are gradually being equipped with longer range (6,000 – 8,000km) M51 missiles.
- The M51s are equipped with what is described as a new, more robust, warhead type.
- Nuclear bomber fleet is in the process of being modernised with Rafale 3 aircraft replacing older Mirage 2000N's on land and Rafale MK3 replacing Super Etendard aircraft on board the Charles de Gaulle aircraft carrier. The Rafale-3s are equipped with new, improved missiles and a further new class of warhead.

Pakistan

- Extending the range of its ballistic missiles with development of the nuclear capable Shaheen II, range over 2,000km.
- Developing two nuclear capable cruise missiles, the ground launched Hatf-7 and the air-launched Ra'ad (Hatf-8), both with a range of around 320km and therefore primarily designed to be targeted at Indian forces.
- Improving its nuclear weapons designs and increasing its production of weapons grade fissile material
- Believed to be developing smaller, lighter warheads for possible longer range, or short range tactical use.

India

- Developing a whole suite of improved land based missiles (the Agni's I, II, III, IV and V) with varying ranges, the Agni IV having a range of around 5,000km, sufficient to target the whole of Pakistan and large parts of China, including Beijing. It is thought the Agni V will be near intercontinental in range.
- Plans for five nuclear powered ballistic missile submarines, each carrying Sagarika missiles with a range of around 300km. It is suspected, but not clear, whether India has developed a small nuclear warhead for deployment on these missiles.
- Has already developed a nuclear capable ship-launched cruise missile, with a 350km range.

Israel

- Extending the range of its missiles with development of the Jericho-III, range of 4,000-6,500km.
- Suspected of using its Shavit satellite launch rocket programme to underpin development of a genuine ICBM capability.
- Further expanding the size of its nuclear-tipped cruise missile enabled attack submarine fleet.
- Given existing Israeli nuclear enabled bomber options, this gives Israel a triad of nuclear delivery systems.

North Korea

- Unveiled a new Musudan missile in 2010 with a range of 2,500-4,000km, capable of reaching targets in Japan and Guam.
- Has successfully tested the Taepodong-2 with a possible range of over 10,000km, sufficient to hit half of the U.S. mainland.
- However, it is unclear whether North Korea has yet developed the capability to manufacture nuclear warheads small enough to sit on top of these missiles.

Part 1: Introduction and context

1. Introduction

Phase 1 of the BASIC Trident Commission is pursuing two streams of work in parallel. The first stream is focused on the security environment facing the United Kingdom today and on the trends likely to impact that environment in the future. As part of this stream of work, the Commission is examining:

- Trends in the other nuclear armed states;
- Emerging nuclear proliferation risks and their possible consequences;
- Underlying trends and drivers of the wider international security environment out to 2040;
- The relevance or otherwise of nuclear weapons for meeting current and emerging threats.

The second stream of work is focused on the United Kingdom itself. This includes:

- An examination of current UK nuclear weapons policy;
- An assessment of the likely impact of Trident renewal, if carried out as planned, on future UK defence budgets and on the defence equipment budget in particular;
- An examination of the place of Trident renewal in the UK defence industrial base, the UK labour market, and the wider economy.

The Commission is pursuing these two streams of work to help frame and facilitate its discussion of the fundamental question facing it, namely that of whether the United Kingdom should continue as a nuclear weapons state or opt to pursue a different, non-nuclear future. The outputs from this first phase of work will be a series of published discussion papers covering some of the areas outlined above.

This paper is the first discussion paper in the series. It analyses nuclear weapons stockpiles, deployments, and modernisation trends in the other (non-UK) existing nuclear weapons states, and also reviews declaratory policy, doctrine and the security drivers underpinning nuclear weapons possession in each of the states concerned. It provides a snap-shot of what is going on in these states and shows that, the New START Treaty between the United States and Russia notwithstanding, a great deal of nuclear force modernisation, and in some cases growth, is underway.

In terms of presentation, the paper is organised into four parts. In this first part of the paper, the basic data on global nuclear stockpiles is presented, and placed in some historical context. The data is presented country by country but is also categorised to allow for distinctions between deployed and non-deployed warheads, and between strategic and non-strategic nuclear weapons. A health warning is also included, in the form of a brief chapter which caveats the reliability of the publicly available data.

Part 2 of the paper moves on to present the story behind the numbers. It again takes a country by country approach but focuses only on the other nuclear weapon states that are signatories to the Nuclear Non-proliferation Treaty (NPT), namely the United States, Russia, China and France. More detail is presented here on nuclear force deployments, modernisation programmes, declaratory policy and doctrine, and the national security drivers that underpin nuclear policy in each case.

Part 3 goes on to do the same for the known nuclear weapon states outside the NPT regime. This covers Pakistan, India, Israel and North Korea. Part 4 then presents conclusions from the preceding analysis.

The paper is intended to stimulate discussion. It is published in the name of the author only, but the analysis presented in it will contribute to the Commission's deliberations, and to the thinking that goes into preparing its final report. Comments are invited and should be sent in the first instance to the author at iank@europeanleadershipnetwork.org, copied to Paul Ingram, Executive Director of BASIC, at pigram@basicint.org

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2. Data on Global Nuclear Stockpiles

It is estimated that more than 128,000 nuclear warheads have been built since 1945, all but two percent of them by the United States and the Soviet Union/Russia.² Numbers of nuclear weapons in state inventories peaked at almost 70,000 in 1986, since then, due to many weapons being dismantled, numbers have declined.³

Analysis published in the *Bulletin of the Atomic Scientists* in the summer of 2010 estimated that around 22,400 intact nuclear warheads remained in the possession of the world's nine nuclear weapons states.⁴ Of this total, 95 per cent were in the possession of the United States and Russia and approximately 8,000 weapons were thought operational to some extent and ready to launch at relatively short notice.⁵ Despite a general lack of tension between the nuclear powers (with the exception of the India-Pakistan relationship), as many as 2,000 weapons were also thought to be on some kind of alert (broken down by country as 960 warheads in Russia; 810 in the United States; 64 in France; and 48 in the United Kingdom).⁶

A more up to date estimate of the current size and national distribution of the global stockpile of nuclear weapons, arriving at a figure of approximately 21,240 is presented in Table 2.

Numbers of nuclear weapons in state inventories peaked at almost 70,000 in 1986, since then, due to many weapons being dismantled, numbers have declined.³

The data presented in the Table are divided into a number of categories, starting with a division into strategic and non-strategic weapons. The precise dividing line between these two categories is complex and has been blurred in recent years as delivery vehicle ranges and technologies have improved along with the accuracy of many of the weapons themselves. Nonetheless, in broad terms, strategic nuclear weapons are defined as those weapons that are designed to attack an enemy's strategically valuable targets, such as manufacturing systems, power and transportation systems, sources of raw material, critical material stockpiles etc. with a view to destroying an enemy's war-making capacity and will to fight. As a result, these weapons are also usually of high yield and are assigned to delivery vehicles, such as inter-continental ballistic missiles (ICBMs), sea-launched ballistic missiles (SLBMs) and heavy bombers, with the long-ranges required to hit such targets deep inside enemy territory. In contrast non-strategic nuclear weapons, often also referred to as tactical nuclear weapons, are defined as weapons to be used against an opponents military forces or supporting facilities in the context of a particular military mission of limited scope. They are assigned most often to delivery vehicles such as shorter range cruise missiles or aircraft and the weapons themselves often have smaller yields and come in a variety of forms, such as warheads for missiles, artillery shells, gravity bombs, and depth charges.⁷

2 See Robert S. Norris and Hans M. Kristensen, "Global nuclear weapons inventories," 1945-2010, *Bulletin of the Atomic Scientists*, Volume 66, No.4, July/August 2010.

3 Of around 70,000 warheads produced by the United States since 1945, about 60,000 are thought to have been disassembled. It is thought the Soviet Union/Russia has produced around 55,000 nuclear warheads since 1949, that it had around 30,000 at the end of the Cold War in 1991, and that it has dismantled around 1,000 warheads a year since then to arrive at its current estimated stockpile of 12,000. See Norris and Kristensen, *ibid.*

4 *Ibid.*, p.77

5 This figure of approximately 8,000 weapons available for short notice use corresponds loosely to the 7,750 weapons captured in Table 2 as the combined totals for deployed strategic and deployed non-strategic weapons.

6 See Robert S. Norris and Hans M. Kristensen, "Global nuclear weapons inventories, 1945-2010," *Bulletin of the Atomic Scientists*, Volume 66, No.4, July/August 2010, p.77. This number is a reduction on the earlier one used by the International Commission on Non-Proliferation and Disarmament, which stated in 2009 that: 'Altogether there are now probably about 3,000 nuclear warheads of the U.S., Russia, France and Britain at launch ready status at any given moment in peacetime, of which around 2,150 are on very high alert in line with the launch on warning concept and operational plans.' See *Eliminating Nuclear Threats, A Practical Agenda for Global Policymakers, Report of the International Commission on Nuclear Non-Proliferation and Disarmament*, 2009, p.27.

7 For a longer discussion of some of the complexities in drawing the strategic/non-strategic dividing line discussed here, see Amy F. Woolf, 'Nonstrategic Nuclear Weapons', U.S. Congressional Research Service, 2 February, 2011, pp. 5-7.

Within each of the strategic and non-strategic categories, Table 2 also employs a further sub-division between weapons that are operationally deployed in some way and others that are held in reserve. The reserve category refers to weapons that may be held in central storage or are in some other way not readily available to be mated with delivery vehicles and made operational at short notice. Deployed weapons are either fully operational, deployed with forces on active duty, or are in storage locations that would allow them to be made operational very quickly.

The final category used in the table refers to weapons that are thought to have been fully retired and are awaiting dismantlement.

The data in Table 2 shows that the United States and Russia continue to dominate possession and deployment of nuclear weapons. France has the third largest arsenal, though with vastly fewer weapons than either the United States or Russia. The United Kingdom and China then have a similar number of nuclear weapons to each other but at a lower number than France, while India, Pakistan and Israel are thought to have similarly sized arsenals to each other but again, at lower numbers than either the United Kingdom or China. North Korea is a nascent nuclear power, known to have nuclear weapons capability but at this stage estimated to be at a very low level in terms of warhead numbers.

NB: Some figures are approximate and are shown with a “~” in front of them.

Table 2:

World Nuclear Weapons Stockpiles 2011

Country	Strategic		Non-Strategic		To be Dismantled	Total by Country
	Deployed	Reserve	Deployed	Reserve		
United States	1,950 ⁸	2,850 ⁹	200	-	3,500	8,500
Russia	2,600 ¹⁰	3,700	~2000	~3,300	-	~11, 600
China	185 ¹¹	55	-	-	-	240
France	300 ¹²	-	-	-	-	300
United Kingdom	120 - 160 ¹³	65	-	-	-	225
Israel	100 - 200 ¹⁴	-	-	-	-	100 - 200
India	60 - 80 ¹⁵	-	-	-	-	60 - 80
Pakistan	100 - 110 ¹⁶	-	-	-	-	100 - 110
North Korea	0 ¹⁷	0	0	5 - 6	-	5 - 6
Total	~5,550	6,670	2,200	3,305	3,500	~21, 240

8 All the numbers used for the United States in this table are based on: Robert S. Norris and Hans M. Kristensen “U.S. nuclear forces, 2011”, *Bulletin of the Atomic Scientists*, March/April 2011.

9 Some of these reserve warheads are categorised as active in a ‘responsive force’ that could be deployed on operational delivery systems at relatively short notice, while others are in longer term storage and would take longer to make operationally ready. (Robert S. Norris and Hans M. Kristensen, “U.S. nuclear forces, 2010,” *Bulletin of the Atomic Scientists*, May/June, 2010, p. 68.) Both categories are distinct from the retired warheads that are awaiting dismantlement.

10 All data on Russian nuclear weapons numbers in this table are drawn from Robert S. Norris and Hans M. Kristensen, “Russian nuclear forces, 2010,” *Bulletin of the Atomic Scientists*, January/February, 2010, pp. 74-81.

11 For the source of numbers on China, see the Ploughshares Fund’s ‘World Nuclear Stockpile Report,’ available at: <http://www.ploughshares.org/world-nuclear-stockpile-report>

12 For the source of numbers on France see *ibid*.

say by when, so the 120-160 range is included in the table. The UK government also said it would ‘reduce its overall nuclear warhead stockpile ceiling from not more than 225 now to not more than 180 by the mid 2020s.’ The UK total of 225 nuclear weapons is used in Table 2 because again, it is not known where this process of reduction in warhead numbers has reached or whether the reductions have even started.

14 The estimated range for Israel is based on a number of different sources. See Chapter 10.

15 See the Ploughshares Fund’s ‘World Nuclear Stockpile Report,’ available at: <http://www.ploughshares.org/world-nuclear-stockpile-report>

16 This estimate is quoted in Global Security Newswire, 1 February 2011. GSN quotes US intelligence estimates that suggest a fielded Pakistani nuclear force of 90-110 warheads. See http://gsn.nti.org/gsn/nw_20110201_5282.php

17 There is no official data on the number of North Korean nuclear weapons. For a discussion of how its arsenal size is estimated and of the difficulties in assessing North Korean plutonium stocks see, Mary Beth Nikitin, ‘North Korea’s Nuclear Weapons,’ Congressional Research Service Report RL34256, 12 February 2009.

13 *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, UK Ministry of Defence, October 2010, pp. 38-39.

In this document, the UK government said it would reduce its number of operationally available warheads from ‘fewer than 160 to not more than 120’ but it did not

3. Known Unknowns: Gaps in the Data

While the data in Table 1 is a reasonably accurate reflection of the current state of affairs, however, in more general terms it is important to note that the data presented gives only an approximate picture. This is for a number of reasons.

First, there are differences in the counting rules applied to strategic nuclear weapons stockpiles in different countries.¹⁸ This makes accurate comparison difficult.

Second, and perhaps more fundamentally still, some nuclear weapons states, such as China, India, Pakistan, Israel and North Korea release no official data on their nuclear stockpiles at all. The data presented on these countries in this paper is therefore best viewed as estimation, based for the most part on available open-source information and western intelligence estimates.

Third, the situation on non-strategic nuclear weapons, at least in some countries, is opaque. In relation to this category of weapons, Russia is a particular case in point. While there is reasonable clarity on the Russian strategic arsenal the situation with regard to Russian sub-strategic nuclear weapons is shrouded in uncertainty: Most Russian non-strategic nuclear weapons (NSNW) are thought to be in storage depots inside Russia, but it is not known how many weapons there are, or where they are.¹⁹

Fourth, and in addition, there is a more general lack of transparency across all nuclear weapons states over nuclear weapons stored in reserve or awaiting dismantlement. This explains the many empty boxes in Table 1 in the 'to be dismantled' category. There have been some notable moves in the recent past to address this transparency deficit. At the opening of the 2010 NPT Review Conference in New York, for example, Hillary Clinton announced that the United States would make public the number of nuclear weapons in the U.S.

stockpile as of September 2009, as well as the number of weapons dismantled since 1991.²⁰ France and the United Kingdom, have also taken steps to increase transparency on their nuclear stockpiles in recent years.

However, it seems that some of these moves were only temporary. The Obama administration has not backed up its May 2010 announcement with additional information and one U.S. official is reported as saying that the May 2010 announcement was a

'one-time' release of information, designed perhaps, to influence the outcome of the 2010 NPT Review Conference.²¹

It remains the case today therefore, that there is insufficient transparency on nuclear stockpiles and that for this and all of the other reasons mentioned above, all data on nuclear stockpiles must be treated with caution. The data presented in Table 1 consists of best estimates based on a number of reputable and publicly available sources but it should be viewed as estimation only, not as wholly definitive. It can still be used as a sensible basis to underpin a public discussion of trends, as it is in this paper, so long as this caveat is kept in mind.

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18 ICNND, *Eliminating Nuclear Threats: A Practical Agenda for Global Policymakers*, 2009, p.19.

19 Ibid, p.21.

20 Robert S. Norris and Hans M. Kristensen, "U.S. nuclear forces 2010," *Bulletin of the Atomic Scientists*, May/June 2010, p.57

21 Hans M. Kristensen and Robert S. Norris, "U.S. nuclear forces, 2011," *Bulletin of the Atomic Scientists*, March/April 2011, p.66.

Part 2: The Story behind the numbers: The NPT nuclear weapon states

4. The United States

Nuclear Weapons and Delivery Systems

At the beginning of January 2011, the United States had an estimated 2,150 operationally deployed nuclear weapons. Of these, some 1,950 were thought to be deployed on strategic delivery vehicles, of which 500 were deployed on ICBMs, 1,152 on SLBMs, and 300 on strategic bomber aircraft. In addition, the United States had an estimated 200 non-strategic nuclear weapons assigned to dual-capable (conventional and nuclear) aircraft stationed at airbases in Europe. Beyond this, and not operationally deployed, the United States holds around 2,850 warheads in reserve and a further 3,500 retired warheads awaiting dismantlement.²² This makes for an estimated total stockpile of 8,500 nuclear weapons.

Under the terms of the New Strategic Arms Reduction Treaty (START) signed with Russia, which officially entered into force with the exchange of Instruments of Ratification between Secretary of State Clinton and Foreign Minister Lavrov in Munich on 5 February 2011, the United States is committed to reducing its stockpile of operationally deployed strategic nuclear warheads from its current 1,950 to 1,550. It is also committed to a limit of 700 deployed strategic launchers (missiles) and heavy bombers, and to a combined limit of 800 deployed and non-deployed strategic launchers and heavy bombers.²³ It has until February 2018 to meet these central treaty limits on its overall force structure.

The size of the U.S. *deployed* nuclear force, in terms of both numbers of weapons and numbers of strategic launchers, is therefore clearly reducing. However, it is important not to over-state the scale of planned reductions in the U.S. force as a result of New START.

The New START Treaty does not set sub-limits that constrain how the overall treaty limits on warhead and strategic launcher numbers are to be achieved. The Obama Administration has decided that to stay within the overall limits, it will maintain a force composition that consists of up to 420 ICBMs, each carrying a single warhead; 240 SLBMs, each carrying multiple warheads and deployed on a fleet of 12-14 nuclear powered ballistic missile submarines (SSBNs),²⁴ and around 60 heavy bombers capable of delivering either gravity bombs or cruise missiles.²⁵

However, the New START Treaty covers only *deployed* strategic nuclear warheads and *deployed and non-deployed* strategic launchers and delivery systems, and *not* sub-strategic nuclear weapons or nuclear warheads held in reserve.

The significance of this can be illustrated through reference to the Obama administration's plans for the future of the U.S. ICBM force. The decision to deploy only one warhead on each of its deployed ICBMs in future means that, in practice, ICBMs already equipped with multiple warheads will have some of those warheads removed. These warheads will not however, be destroyed. Each United States ICBM will also retain its multiple independent re-entry vehicle (MIRV) capability, meaning that in future the U.S. could rapidly upload hundreds of removed but not destroyed warheads to these missiles once again (though it would need to withdraw from the New START Treaty to do so).

Similarly, under New START's counting rules, warheads removed from SLBMs on submarines undergoing overhaul are not counted by the Treaty, even though these weapons could be re-mated with their missiles and be deployed again fairly quickly. This is not a trivial matter: At any given time, two U.S. SSBNs, each potentially carrying 96 warheads on 24 Trident II D5 SLBMs, are undergoing overhaul.

22 All data in this paragraph is drawn from Hans M. Kristensen and Robert S. Norris, "U.S. nuclear forces, 2011," *Bulletin of the Atomic Scientists*, March/April 2011, p.66 and Table 2 on p.74.

23 For more details on the Treaty's entry into force and on the implementation requirements and timelines, see background information provided by the U.S. State Department at: <http://www.state.gov/r/pa/prs/ps/2011/02/156037.htm>

24 The U.S. currently has a total of 14 Ohio-class SSBNs, of which 12 are thought to be operational. Eight of the submarines are based in the Pacific and six in the Atlantic. The 12 operational submarines each carry up to 24 Trident II D5 SLBMs, and each missile is thought to carry four warheads. This makes up a total of 288 missiles carrying the estimated total of 1,152 warheads mentioned in the text. At any given time, two submarines are undergoing overhaul.

25 Hans M. Kristensen and Robert S. Norris, "U.S. nuclear forces, 2011," *Bulletin of the Atomic Scientists*, March/April 2011, p.67.

26 *Ibid*, p.68.

It is also worth noting that New START does not count weapons deployed on strategic bombers. The Treaty counts bombers, not bombs, and assumes, artificially, that each bomber carries only one bomb. In practice, as analysts have pointed out: ‘A force of 60 bombers loaded at their maximum capacity of 1,136 bombs and cruise missiles would only count as 60 weapons under New START.’²⁶

The New START arrangements are therefore to be welcomed as the first significant U.S. – Russia arms control agreement in many years, but in light of the gaps in the Treaty it is important not to confuse the terms of the agreement with any legal obligation to reduce or destroy the number of nuclear weapons held by either party overall.

Force Modernisation

It is important too, to remember that the planned reductions in *deployed and Treaty counted*-U.S. forces are also taking place in the context of an extensive Obama administration commitment to maintain and modernise the U.S. nuclear force and its supporting infrastructure for the long-term. Senior U.S. administration officials told the U.S. Senate Foreign Relations Committee in 2010 that the U.S. intends to remain a nuclear weapons state for the foreseeable future and that:

‘Over the next decade, the United States will invest well over \$100 billion in nuclear delivery systems to sustain existing capabilities and modernize some strategic systems. U.S. nuclear weapons will also undergo extensive life extension programs in the coming years to ensure their safety, security, and effectiveness.’²⁷

In addition to the planned expenditure on delivery systems, the U.S. National Nuclear Security Administration (NNSA) will spend in excess of \$92 billion in the next decade on modernizing and maintaining nuclear *warheads and warhead production facilities*. Under the Obama administration’s nuclear force modernisation programme, three new facilities will be built to produce and maintain nuclear warheads and all current U.S. nuclear warhead types will undergo life extension and modernisation programmes. The Minuteman III ICBM will also have its service life extended to 2030 and the U.S. Department of Defense will make recommendations to the President in 2014 for a new follow-on ICBM to replace it after that point in time.²⁸

The navy is in the process of procuring 108 modified Trident II D5 missiles to help arm the current fleet of 14 Ohio-class SSBNs. Since retirements of the Ohio-class submarines will begin in 2027, plans are also in place to replace the existing Ohio-class SSBN fleet with 12 new SSBNs. Under current plans, building work on the first new submarine will commence in 2019, with work on a second boat beginning in 2022, and then work on an additional boat beginning every year between 2024 and 2033 for a total fleet of 12 new SSBNs at an estimated cost of \$80 billion.²⁹ The first new submarine is due for launch in 2026 and due to commence operational service in 2029. Each of the newer submarines will carry only 16 missiles, fewer than the 24 on each of the existing Ohio-class submarines. The reduced number of missiles on each submarine will potentially enable more submarines to operate while the United States remains within current and future arms control constraints on the number of deployed strategic launchers allowed.

With regard to strategic bombers, the United States intends to keep its B-52H bombers operational until at least 2035, but studies are also underway to identify options for a new bomber to replace it beyond that point. The air force further intends to replace its current air-launched cruise missiles (ALCMs) with a new long-range stand-off nuclear missile, beginning production around 2025.³⁰

This modernisation programme and the expenditure associated with it make up part of an estimated total U.S. spend on nuclear weapons and related issues over the next decade of \$700 billion, a figure which includes force maintenance, operational costs, modernisation programmes, investments in ballistic missile defence and a number of other areas.³¹

27 The officials were Secretary of Defense Gates and Admiral Mike Mullen. See the complete transcript of the Hearings of the U.S. Senate Foreign Relations Committee on The New START Treaty, available at: <http://foreign.senate.gov/treaties/details/?id=1668ace8-5056-a032-526a-29c8fc32e1dc>, p.87-88, in particular.

28 Robert S. Norris and Hans M. Kristensen, “U.S. nuclear forces, 2010,” *Bulletin of the Atomic Scientists*, May/June 2010, p. 62/63.

29 Ibid, p.65.

30 Hans M. Kristensen and Robert S. Norris, “U.S. nuclear forces, 2011,” *Bulletin of the Atomic Scientists*, March/April 2011, p.73.

31 For a full breakdown see Ploughshares Fund Working Paper, What We Spend on Nuclear Weapons, available at: <http://ploughshares.org/sites/default/files/resources/What%20We%20Spend%20on%20Nuclear%20Weapons%20092811.pdf>

The U.S. administration can and does legitimately make the case that many elements of its nuclear force modernisation programme are being carried out in ways that are helpful, rather than problematic, for future efforts at multilateral nuclear disarmament and non-proliferation. The planned increased capacity to produce replacement warheads and to maintain existing warheads, for example, is justified by the administration on the grounds that it will allow a reduction in the stockpile of nuclear weapons the United States maintains as an insurance against a rapidly worsening international security situation. The warhead life-extension programmes also come with a commitment not to develop any new types of nuclear warhead, and with a commitment to use only those components based on previously-tested designs. The latter commitment is explicitly designed to ensure that the United States does not recommence nuclear testing and therefore remains adherent to the Comprehensive Test Ban Treaty (CTBT).

Declaratory Policy and Doctrine

The 2010 U.S. Nuclear Posture Review (NPR) also narrowed the publicly stated role of nuclear weapons in U.S. national security strategy. Under the Bush administration the nuclear role was to deter any attack involving ‘weapons of mass destruction’ (WMD), where the latter term referred to chemical and biological weapons as well as nuclear. In the 2010 NPR, however, the Obama administration declared that: ‘The fundamental role of U.S. nuclear weapons, which will continue as long as nuclear weapons exist, is to deter nuclear attack on the United States, our allies, and partners.’³² This narrowing to focus on deterring nuclear attack was also accompanied by a strengthened negative security assurance which stated that: ‘The United States will not use or threaten to use nuclear weapons against non-nuclear weapon states that are party to the Non Proliferation Treaty (NPT) and in compliance with their nuclear non-proliferation obligations.’³³ In other words, the formal U.S. position is that nuclear weapons would not be used on any aggressor state that was a signatory to the NPT and in compliance with its NPT obligations, even if that state attacked the United States with chemical, biological, or conventional weapons.

the U.S. continues to view nuclear weapons as essential to national security and is planning, and spending, to ensure it has robust nuclear forces for many decades to come.

That said, the NPR leaves nuclear weapons in a central role with regard to U.S. national security strategy. As two of the leading international experts on global nuclear force modernisation point out:

‘The NPR specifically recommends: retaining a triad of long-range offensive nuclear forces, maintaining the current high-alert readiness level of hundreds of ballistic missiles, retaining large numbers of nuclear warheads in reserve to increase the deployed force if necessary, modernizing nuclear delivery vehicles and warheads, building new warhead production factories, and rejecting a no-first-use policy (for now).’³⁴

In practice, moreover, there is uncertainty as to what the altered U.S. declaratory policy really means for U.S. nuclear war planning. The current U.S. nuclear war plan reportedly focuses on five countries, namely Russia, China, North Korea, Iran, and Syria, and a scenario in which a terrorist-led WMD attack takes place on the United States or its allies. Out of the countries named, Russia and China are unaffected by the changed U.S. negative security assurance as they are nuclear weapons states. Iran and Syria are not in full NPT compliance, and neither North Korea nor any terrorist group are members of the NPT regime anyway.³⁵ While the Obama administration has tightened the circumstances under which it would contemplate using nuclear weapons in theory therefore, it is not clear that this means very much in terms of the current day to day practice of U.S. national security strategy.

Given all of the above, although the Obama administration deserves huge credit for kick-starting multilateral nuclear disarmament talks with Russia, it also appears true that the United States continues to view nuclear weapons as essential to national security and is planning, and spending, to ensure it has robust nuclear forces for many decades to come. This remains true even if some of the modernisation plans described in this chapter are subsequently scaled back as part of a new mini-NPR or as part of efforts to make major savings in the US defence budget.

32 See U.S. Department of Defense, Office of the Secretary of Defense, *Nuclear Posture Review Report*, April, 2010, p.vii. Available at: <http://www.defense.gov/npr/docs/2010%20Nuclear%20Posture%20Review%20Report.pdf>

33 Ibid, p.viii.

34 Hans M. Kristensen and Robert S. Norris, ‘U.S. nuclear forces, 2011,’ *Bulletin of the Atomic Scientists*, March/April 2011, p.67.

35 Robert S. Norris and Hans M. Kristensen, ‘U.S. nuclear forces, 2010,’ *Bulletin of the Atomic Scientists*, May/June 2010, p 60.

Security Drivers

Given that the United States believes it can meet most non-nuclear threats with a non-nuclear response, Obama administration nuclear policy appears driven, in security terms, primarily by the perception that the United States and its allies are facing growing nuclear threats. More specifically, there is a belief, expressed in the April 2010 U.S. Nuclear Posture Review, that: ‘The threat of global nuclear war may have become more remote, but the risk of nuclear attack has increased.’³⁶ Whereas during the Cold War the primary U.S. nuclear concern was with deterrence and strategic stability in relation to the Soviet Union, now the United States worries about a wider range of possible nuclear threats to its security.

Most pressing amongst these is the danger of nuclear terrorism and in particular, the fear that Al Qaeda or its affiliates are actively seeking a nuclear capability. The United States is concerned that much sensitive nuclear material around the world is vulnerable to theft or is available for purchase in the nuclear black market, possibly providing terrorist groups with an ability to match their nuclear intent with an acquired capability.

A second major concern, however, is that a new group of countries, hostile to the United States and its allies and in non-compliance with established global non-proliferation norms, will acquire or expand an already existing nascent nuclear weapons and ballistic missile capability. North Korea and Iran are the principle expressed worries here, and the concern is not only with a possible threat from these countries themselves, but also with the danger that they may destabilise their regions, undermine allies’ faith in U.S. security guarantees and extended deterrence, and lead to regional proliferation cascades with very uncertain consequences.

These concerns have not replaced the traditional focus on deterrence and strategic stability amongst existing nuclear powers but have added to it. With regard to the more traditional concern of strategic stability, it is clear that the U.S.-Russian relationship is far less adversarial than in the past. The New START Treaty is intended to maintain strategic stability and to provide a platform from which the world’s two major nuclear powers can negotiate much deeper reductions in the numbers of nuclear weapons they hold. However, there are still uncertainties with regard to the future of the U.S.-Russian relationship. Notwithstanding the fact that China has a much smaller nuclear arsenal than either Russia or the United

States (see Chapter 6), moreover, it is also the case that ‘the United States and China’s Asian neighbours remain concerned about China’s current military modernisation efforts, including its qualitative and quantitative modernization of its nuclear arsenal.’³⁷

The need to balance and deter other major nuclear powers remains therefore, an important driver of U.S. strategic thinking, as does the need to deter emerging nuclear powers, to re-assure allies in unstable regions, and to pursue the improved security of nuclear weapons and materials around the world. It is this mix of objectives that explains the Obama administration’s multidimensional approach, focusing on the one hand on the major nuclear force modernisation programmes outlined above, and on the other hand on arms control initiatives and on President Obama’s personal leadership of efforts to secure global stockpiles of nuclear weapons and materials.

The need to balance and deter other major nuclear powers remains therefore, an important driver of U.S. strategic thinking, as does the need to deter emerging nuclear powers, to re-assure allies in unstable regions, and to pursue the improved security of nuclear weapons and materials around the world.

36 U.S. Department of Defence, *Nuclear Posture Review Report*, April 2010, p.iv.

37 U.S. Department of Defense, *Nuclear Posture Review Report*, April 2010, p.v.

5. Russia

Nuclear Weapons and Delivery Systems

Russia has around 4,600 nuclear warheads in its deployed arsenal. Approximately 2,600 of these are defined as strategic nuclear weapons and the remaining 2000 as non-strategic weapons. Over 7,000 additional warheads (3,700 strategic; 3,300 non-strategic) are thought to be either in reserve or awaiting dismantlement, making for a current total of approximately 11,600 Russian warheads.³⁸

At the end of 2010, it was thought that just over 1,250 warheads from the operational strategic total of 2,600 were deployed on 375 ICBMs of four types. These ranged from the ageing SS-18 to the more recent, road mobile, SS-27 and the RS-24, a version of the mobile SS-27 which has multiple independent re-entry vehicle capability. A break-down of Russian weapons deployed on ICBMs is presented in Table 3.

Table 3:

Estimated Russian ICBM Deployments, end 2010

Missile Type	Numbers of ICBMs Deployed	Warheads Carried
SS-18	58	580
SS-19	70	420
SS-25	171	171
SS-27 (silo-based)	52	52
SS-27 (road-mobile)	18	18
RS-24 (mobile SS-27 with MIRV capabilities)	6	18
Total	375	1259

Source: Pavel Podvig, *Russian Strategic Nuclear Forces, April 2011*, available at <http://russianforces.org/missiles/>

38 All data on Russian nuclear weapons numbers in this paragraph are drawn from Robert S. Norris and Hans M. Kristensen, "Russian nuclear forces, 2010," *Bulletin of the Atomic Scientists*, Jan/February, 2010, pp. 74-81.

39 See Pavel Podvig's estimates in relation to the Russian strategic bomber fleet, at www.russianforces.org/aviation

40 See www.russianforces.org/navy

41 Andrei Zagorski, *Russia's Tactical Nuclear Weapons: Posture, Politics and Arms Control*, Institute for Peace Research and Security Policy, Hamburg, February, 2011, p.13. Report available at: <http://ifsh.de/pdf/publikationen/hb/hb156.pdf>

42 Robert S. Norris and Hans Kristensen, "Russian nuclear forces 2010," *Bulletin of the Atomic Scientists*, January/February, 2010, p.79.

An assessment of the Russian strategic bomber fleet at the same point in time suggested that 76 strategic bombers could carry up to 844 long range and nuclear-tipped cruise missiles.³⁹

The Russian Navy also deploys strategic nuclear weapons. These are deployed on submarines in the Northern Fleet, headquartered at Severomorsk in Murmansk, and in the Pacific Fleet, which operates out of Vladivostok. The deployment consists of 12 submarines that can deliver up to 576 nuclear warheads on 160 sea-launched ballistic missiles (SLBMs).⁴⁰

As noted in Chapter 3, big question marks remain over Russian non-strategic nuclear weapons. The Soviet Union, in 1991, and the Russian Federation in 1992, committed itself through what became known as the Presidential Nuclear Initiatives (PNIs) to eradicate all theatre nuclear weapons from ground forces (such as those deployed on non-strategic land-based missiles, artillery shells and mines). It further committed itself to store all theatre nuclear weapons assigned to the air-force in central depots and to destroy half of them; to remove all theatre nuclear weapons from surface ships and submarines to storage and to destroy one third of them; to destroy half of the theatre nuclear weapons assigned to tactical naval aviation forces; and to destroy half of all nuclear warheads allocated to anti-ballistic missile and air defence missions while removing the rest to central storage sites.⁴¹

Given these commitments of extensive withdrawal to storage, the figures of 2,000 deployed non-strategic nuclear weapons, and 3,300 non-strategic nuclear weapons held in reserve noted in Table 1, repay closer examination.

The 2,000 'deployed' weapons refer actually to weapons defined as 'active but non-deployed'. These are weapons which may be held in storage at bases throughout the country but which could quickly be returned to operational military units and be mated with their assigned delivery vehicles.

Approximately 700 of these are thought to be assigned to the navy and of these, a small number of naval missiles and torpedoes are thought to be on board submarines and ships actually on sea patrol. A further 650 sub-strategic weapons are estimated to be assigned to the air-force, and an additional 600-700 are operational in the Russian air defence system and the anti-ballistic missile defence system around Moscow.⁴²

The remaining 3,300 non-strategic nuclear weapons, are thought to be in reserve at central storage sites or awaiting dismantlement.

Given the numbers, Russia's non-strategic nuclear weapons clearly exist in much larger quantities than the 200 non-strategic nuclear weapons deployed by the United States, and Russia also maintains a greater variety of nuclear weapons and delivery systems than does the United States within this category.

Its arsenal is thought to include gravity bombs and air to surface missiles that can be carried on intermediate range TU-22M aircraft; depth bombs that can be used by naval aviation assets; sea-launched cruise missiles (SLCMs); and anti-ship, anti-submarine and air-defence nuclear weapons and torpedoes for deployment on surface ships.⁴³

Nevertheless, even having said all this, in historical context the size of Russia's deployed nuclear arsenal, both of strategic and non-strategic nuclear weapons, is currently on a downward trajectory.

The current estimates of the size of Russia's non-strategic nuclear weapons stockpile reflect a substantial reduction over the last two decades. On a number of occasions since 2004, senior Russian officials have reported that the commitments made in the 1991 and 1992 PNIs have actually been met and even surpassed. In a document circulated at the 2005 Review Conference of the NPT, for example, Russia declared that it had reduced its theatre nuclear weapons arsenal to one quarter of what it had been in 1991.⁴⁴ These claims are difficult to verify, but many serious analysts believe that, in absolute terms, Russia has reduced its deployed non-strategic nuclear weapons stockpile from about 22,000 in 1991 to the estimated figure of 2,000 deployed, or active but non-deployed, weapons today.⁴⁵

With regard to strategic delivery systems, even before the New START Treaty came into force Russia was retiring large numbers of its older ICBMs both because of their age and in order to meet limits set by the earlier Moscow Treaty. It retired around 30 SS-25s in 2009, leaving the current total of around 170 deployed. On current retirement rates, it will have retired all SS-25s by 2015.⁴⁶ It also retired around 10 SS-19s in 2009, leaving the deployed end 2010 total of 70. All but the newest 20 of the SS-19s are expected to be retired by 2012. Reductions in deployments of the SS-18, of which there were around 58 at the end of 2010, are taking place on a similar trajectory.

43 Andrei Zagorski, *Russia's Tactical Nuclear Weapons: Posture, Politics and Arms Control*, Institute for Peace Research and Security Policy, Hamburg, February 2011, p. 13/14.

44 See Miles Pomper, William Potter, and Nikolai Sokov, "Reducing and Regulating Tactical (non-strategic) Nuclear Weapons in Europe," James Martin Center for Nonproliferation Studies, December 2009, p.7

45 These numbers are drawn from Zagorski, *ibid* p.13. Norris and Kristensen, *ibid*, p.79, also note that: 'Russian defence ministry officials reportedly claimed in 2007 that ground-force tactical nuclear weapons had been completely eliminated, that air defence tactical warheads had been reduced by 60 per cent, air force tactical warheads by 50 per cent and naval tactical nuclear weapons by 30 per cent since 1992.'

Force Modernisation

While reductions are taking place, Russia is also committed to maintaining the triad of land, sea and air nuclear systems for the future and is engaged in substantial modernization of its nuclear forces. Russia's First Deputy Minister of Defence, Vladimir Popovkin, told journalists in February 2011 that around \$70 billion would be spent on Russia's strategic triad of land, sea and air nuclear forces between 2011 and 2020.⁴⁷

Newer SS-27 ICBMs, are being introduced, though due to lack of manufacturing capacity, at a slower rate than older systems are being retired. At the end of 2010, as Table 3 shows, around 50 single warhead silo-based SS-27s had been introduced, as had 18 mobile SS-27s with single warheads, and around six mobile RS-24s with multiple independent re-entry vehicles, each carrying up to three or four warheads.⁴⁸ Moving forward, after 2012, Russia will only deploy new RS-24s.⁴⁹ The new nuclear force investment programme also includes plans for an entirely new class of MIRVed ICBM by 2018,⁵⁰ with

reports suggesting that each new missile in this class will be capable of carrying up to 10 warheads.⁵¹ In April 2011 Prime Minister Vladimir Putin also said that starting in 2013 Russia would double the number of ballistic missiles it manufactures annually, investing \$500 million between now and then to boost production capacity, including at a missile facility in Votkinsk. This will ensure that while nuclear weapons deployed on ICBMs might dip below New START levels in the next few years as old systems are retired, numbers will then rise again.⁵²

Russia is committed to maintaining the triad of land, sea and air nuclear systems for the future and is engaged in substantial modernization of its nuclear forces.

46 See Norris and Kristensen, 2010, *ibid*, p.75.

47 Pavel Podvig, 'Russia to Spend \$70 billion on strategic forces by 2020,' available at: http://russianforces.org/blog/2011/02/russia_to_spend_70_billion_on.s.html

48 Pavel Podvig, *Russian Strategic Nuclear Forces, April 2011*, available at <http://russianforces.org/missiles/>. For similar numbers at the end of 2009, see (Norris and Kristensen, "Russia's nuclear forces, 2010," p.75).

49 'Russia Fields More Topol-M ICBMs', Global Security Newswire, 21 December 2010, http://gsn.nti.org/gsn/nw_20101221_5685.php

50 The International Commission on Nuclear Non-proliferation and Disarmament (ICNND) also reported in late 2009 that 'Russia has announced that it is developing a new "gliding" re-entry vehicle for its ICBMs, specifically designed to penetrate potential U.S. ballistic missile defences'. See ICNND, *ibid*, 2009, p. 21.

51 'Russia Details Planned Nuke Updates', Global Security Newswire, 24 February 2011, http://gsn.nti.org/gsn/nw_20110224_1258.php

52 'Russia to Boost Ballistic Missile Manufacturing, Putin Says', Global Security Newswire, 21 April 2011, http://gsn.nti.org/gsn/nw_20110421_5548.php

Russia also continues to improve and add to the size of its SSBN fleet. The investment programme to 2020 includes a plan for eight new fourth generation Project 955, or Borey class, submarines. The first submarine in this class left dry dock in April 2007 and began sea trials in 2008. Construction of further vessels in the series has been underway since 2004.⁵³ These new Borey class submarines will carry 16 new Bulava missiles with an 8,000 – 9,000km range and each missile will be capable of carrying up to 6 warheads. There have been technical problems with the development of the Bulava missile but irrespective of this, it is still thought the Borey-class submarines will form the centre-piece of Russian naval nuclear forces until the 2040s.⁵⁴ The older Delta IV class submarines which make up a portion of Russia's existing fleet are also being equipped with improved Sineva SLBMs and will continue to play a role.⁵⁵ In March 2011 a fifth generation SSBN, which would carry cruise missiles as well as SLBMs, was also reported to be in development.⁵⁶

Although the Russian tactical nuclear arsenal has been substantially reduced, and some of the remaining weapons in this category are old and will need to be retired in the near future, some reports indicate that Russia's sub-strategic forces are being modernised with the deployment of Iskander-M short range tactical land based missiles to 10 army brigades over the next decade, providing them with new capability to fire either precision conventional munitions or nuclear weapons.⁵⁷

Russia's current fleet of nuclear-capable, long-range Tu-95 MC and Tu-160 warplanes is also being updated, and a new long range nuclear capable bomber with stealth capabilities is being designed, though this is not expected to be deployed until around 2025.⁵⁸

Deterrence remains an important concept in Russian strategic thinking, and the role of nuclear weapons as a military instrument for providing deterrence has increased since the early 1990s

Declaratory Policy and Doctrine

These attempts to modernise Russia's nuclear forces are not surprising. Deterrence remains an important concept in Russian strategic thinking, and the role of nuclear weapons as a military instrument for providing deterrence has increased since the early 1990s as a function of the dramatic weakening of Russia's conventional forces.

This weakening of conventional forces, and the increased importance of nuclear weapons to Russian national security, has been reflected in changes to Russian declaratory policy over the last two decades.

In the 1993 military doctrine, the Russian position was that nuclear weapons would only be used in an extremely unlikely large scale global war. Their role was therefore to serve as a just in case insurance asset against unknown future threats.⁵⁹ Between the early 1980s and early 1990s, the Soviet Union, and then the Russian Federation, committed itself to a 'no-first-use' policy.

In 1993, in the midst of post-Communist transition turmoil and conventional military weakness, the 'no-first-use' policy was revoked. In the 2000 military doctrine moreover, it was made clear that nuclear use would be contemplated in the context of possible regional conflicts, and not only in the context of a global war.

By the time of the February 2010 military doctrine, the position had been revised further still, to state that:

*'Russia reserves the right to use nuclear weapons in response to the use of nuclear weapons and other types of weapons of mass destruction against it and (or) its allies, as well as in response to large-scale aggression utilizing conventional weapons in situations critical to the national security of the Russian Federation.'*⁶⁰

53 Pavel Podvig, 'Russia's Strategic Nuclear Forces: Strategic Fleet,' December 2010, available at: <http://russianforces.org/navy/>

54 Norris and Kristensen, 'Russia's nuclear forces, 2010' p.77.

55 The Sineva was reportedly test fired successfully in April 2011. See: 'Russian Sub Launches Nuke-Capable Missile in Test', Global Security Newswire, 27 April 2011, http://gsn.nti.org/gsn/nw_20110427_8184.php

56 For a news report on this, see: http://gsn.nti.org/gsn/nw_20110321_2234.php

57 'Russia Details Planned Nuke Updates', Global Security Newswire, 24 February 2011, http://gsn.nti.org/gsn/nw_20110224_1258.php

58 'New Russian Nuclear Bomber Not Coming Before 2025', Global Security Newswire, 3 March 2011, http://gsn.nti.org/gsn/nw_20110303_1720.php

59 For a longer discussion of changes in Russian declaratory policy and doctrine, see Steve Andreasen and Michael Gerson, 'Deterrence Seen Through the Eyes of Other Nations,' in George P. Shultz, Sidney D. Drell, and James E. Goodby (eds), *Deterrence: Its Past and Future*, Hoover Institution Press, Stanford, 2011, pp. 111-115.

60 The full text of the new Russian military doctrine, translated into English, is available at: http://www.carnegieendowment.org/files/2010russia_military_doctrine.pdf

Russian policy and planning is also now thought to be based on the notion of nuclear use as a method of de-escalating a potential conflict.⁶¹ This doctrine of nuclear de-escalation is designed to ensure that the Russian nuclear deterrent remains credible by providing a range of nuclear options short of the use of strategic nuclear forces in a conflict setting. It is a direct response to Russia's conventional military weakness. The selective use of a range of non-strategic nuclear weapons would, it is suggested, provide Russia with the capacity to inflict a precise level of damage on an adversary, while demonstrating Russian resolve to go nuclear, all with the intention of persuading an aggressor that may be winning a conventional conflict to cease operations.⁶²

The Russian position on nuclear use now therefore to some extent mirrors that of a conventionally weaker NATO during the Cold War, and is also ambiguous, since 'situations critical to the national security of the Russian Federation' are not defined in the 2010 military doctrine. Decisions to utilize nuclear weapons would in practice be made by the Russian Federation president.

Security Drivers

The Russian stance on nuclear policy overall is linked to a number of specific underlying security concerns.

First, Russia has deep concerns over U.S. ballistic missile defence. These concerns existed during the years of the Bush administration and related then to U.S. plans to install missile interceptors in Poland and a radar site in the Czech Republic. The concerns have persisted despite the reset in the U.S.-Russian relationship initiated by the Obama administration. There are concerns in particular, that Phase IV of the Obama administration's Phased Adaptive Approach to ballistic missile defence, due for deployment around 2020, would provide the United States with the ability to intercept Russian ICBMs and therefore undermine a key leg of the Russian nuclear deterrent.

61 Though analysts like Alexei Arbatov have recently questioned this in their interpretations of the 2010 Russian Military Doctrine. See Alexei Arbatov, *Gambit or Endgame: The New State of Arms Control*, Carnegie Papers on Nuclear Policy, March 2011.

62 For a further discussion of the nuclear de-escalation doctrine and its origins see Andrei Zagorski, *Russian Tactical Nuclear Weapons: Posture, Politics and Arms Control*, Institute for Peace Research and Security Policy, Hamburg, February 2011, pp. 22-29.

Second, U.S. plans to develop and deploy Conventional Prompt Global Strike (CPGS) weapons are seen in Russia as a potentially dangerous and destabilising development. The fear is that these weapons would give the U.S., in the midst of a serious crisis, a conventional first strike capability against Russian nuclear forces, and that the U.S. ballistic missile defence system would be able to deter or defend effectively against any Russian response. There is also a concern that Russia might not be able to distinguish between a conventional or nuclear ballistic missile launch against it, and might consequently mistake a conventional attack for a nuclear one and react accordingly, perhaps launching nuclear armed missiles of its own in response to a warning of an incoming missile attack.

Third, these concerns form one part of a wider set of Russian concerns in relation to NATO. Russia bitterly opposed, and continues to oppose, the expansion of NATO to the former Soviet Republics and views this expansion as encroachment into a zone of privileged Russian security interests. It is particularly concerned about any possible future NATO expansion to Georgia and Ukraine.

The 2010 Russian military doctrine caused a stir in this regard by declaring that the main external military dangers to Russia include:

*'The desire to endow the force potential of the North Atlantic Treaty Organization (NATO) with global functions carried out in violation of the norms of international law and to move the military infrastructure of NATO member countries closer to the borders of the Russian Federation, including by expanding the bloc.'*⁶³

Fourth, beyond these concerns about relations with NATO and strategic stability in the relationship with the United States, Russia has long-term concerns about China. Relations have improved markedly since the days of the Sino-Soviet split, but Russia remains worried about the implications of China's rise for the geo-political situation in East Asia, and concerned about the possibility of a sudden Chinese drive to achieve some sort of nuclear parity with the United States. Some also believe that Russia's continued possession of large numbers of tactical or non-strategic nuclear weapons is designed to offset worries about conventional force weakness in relation to China.

63 See the text of the 2010 Russian military doctrine, available at: http://www.carnegieendowment.org/files/2010russia_military_doctrine.pdf

The 2010 Russian military doctrine... declared that the main external military dangers to Russia include: 'the desire to endow the force potential of NATO with global functions... and to move the military infrastructure... closer to the borders of the Russian Federation...'

6. China

Nuclear Weapons and Delivery Systems

China is believed to have approximately 240 nuclear weapons. Of these, approximately 185 are thought to be deployed, with the rest held in reserve.⁶⁴ The bulk of the Chinese arsenal is deployed on approximately 130-140 land-based ballistic missiles of six types.⁶⁵ These are set out in Table 4.

Table 4:

China's Medium and Long Range Ballistic Missile Deployments⁶⁶

Type	Minimal Range (km)	Number
DF-3A	3,000	17
DF-4	5,500	17
DF-5A	13,000	20
DF-21	2,100	55
DF-31	7,200	10-15
DF-31A	11,200	10-15
Total		130-140

The oldest of the missiles are the DF-3A and the DF-4. As Table 4 indicates, these are deployed in small numbers (less than 20 of each), and they also do not have the range to reach the continental United States. Both are being phased out and replaced with newer systems (see below). The longer range DF-5A, of which there are also approximately 20 deployed, is an ICBM that can deliver a multi-megaton warhead over long distances (13,000km). It is believed that since the early 1980s the DF-5A has been targeted at the United States and Russia.⁶⁷ All three of these older missile types are liquid-fuelled, which means they take a long time to prepare for launch.

64 See NTI China Nuclear Profile, available at: http://www.nti.org/e_research/profiles/China/Nuclear/index.html

65 The descriptions of China's ballistic missile capability in this section are based primarily on Robert S. Norris and Hans M. Kristensen, 'Chinese nuclear forces, 2010,' *Bulletin of the Atomic Scientists*, November 2010, p.135. Also see, Jonathan Holslag, *Trapped Giant: China's Military Rise*, IISS, London, 2010. China also has three other types of ballistic missile, the DF 11, DF11A and DF 15 but all three have much shorter ranges, at less than 500km.

66 This table is an adapted version of one containing China's short, medium and long-range ballistic missiles in Jonathan Holslag, *ibid*, p.46.

The newer, solid-fuelled, and therefore more quickly launch-ready DF-21 missile, with a range of approximately 2,150km, is China's main regional nuclear missile. Approximately 55-60 nuclear capable versions of the DF-21 are thought to have been deployed so far.

Two further solid-fuelled missile types, the DF-31 and the DF-31A are also now being introduced and make up the full compliment of China's medium and long-range land-based ballistic missile capability. The DF-31 is another long range (7,200km) ICBM, though its range does not reach the continental United States. Its targeting is thought to be primarily regional (including India), though the numbers currently deployed are tiny, at fewer than 10-15 missiles. The DF-31A has a range of around 11,200km, sufficient to reach most of the continental United States. Between 10 and 15 DF-31A's are thought to have been deployed so far.

The U.S. intelligence community reportedly believes that all six of China's medium to long-range land-based ballistic missile types carry single rather than multiple warheads and all, except the silo-based DF-5A, are thought to be road-mobile.⁶⁸

In addition to its land-based ballistic missile capabilities, China has a small inventory of approximately 20 air-delivered nuclear bombs for delivery on H-6 bombers.⁶⁹

Force Modernisation

China is reported to have increased its nuclear-capable weapons systems by around 25 per cent over the past five years and the U.S. Department of Defense recently told the U.S. Congress that 'China has the most active land-based ballistic and cruise missile programme in the world'.⁷⁰

Pentagon estimates suggest that deployments of China's DF-21 medium range missile are increasing rapidly, from around 20 missiles in 2005, to 85-95 missiles in 2010, of which, as noted in Table 4, approximately 55-60 are thought to be nuclear-capable. These missiles are gradually replacing the older DF-3A and the DF-4.

67 Robert S. Norris and Hans M. Kristensen, 'Chinese nuclear forces, 2010,' *Bulletin of the Atomic Scientists*, November 2010, p.135.

68 *Ibid*

69 Robert S. Norris and Hans M. Kristensen, 'Global Nuclear Inventories, 1945-2010,' *Bulletin of the Atomic Scientists*, July/August 2010,p.80; Also, Robert S. Norris and Hans M. Kristensen, 'Chinese nuclear forces, 2010,' *Bulletin of the Atomic Scientists*, November 2010, p.138.

70 Office of the Secretary of Defense, 'Annual Report to Congress, Military and Security Developments Involving the People's Republic of China - 2010,' p.1. Available at: http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf

The U.S. intelligence community has also previously suggested that it expects around 75-100 DF-31A road-mobile ICBMs to be deployed and targeted on the United States by 2015, a marked increase on the 10-15 missiles of this type deployed at the moment.⁷¹ It is also thought that China may be developing a new road-mobile ICBM with MIRV-capability⁷² as well as anti-satellite weapons, decoys, and jamming and thermal shielding technologies to allow China's ballistic missiles to more easily penetrate the United States' and other countries' developing ballistic missile defences.⁷³

At sea, China is building a serious ballistic missile submarine capability. It currently has a single Xia-class SSBN but this has never sailed a deterrent patrol and is no longer thought to be fully operational. Three to five Jin-class SSBNs, each with 12 launch tubes for SLBMs, however, are now under construction, with some reports suggesting that the first of these has already entered service.⁷⁴ Technical difficulties with the development of the associated JL-2 missiles have slowed progress and it is not clear when these will become fully operational.⁷⁵ If the assessments on the numbers of submarines being built are broadly correct, however, then once they are operational, China will have the platforms from which to launch a minimum of 36-60 ballistic missiles from submarines (each either with a single warhead or with MIRV capabilities). The numbers of submarines being built would also be sufficient to give China a continuous at sea SSBN presence in future.

There are also increasing question marks over the possible nuclear role of China's DH-10 land-attack cruise missile. While this appears to be mainly conventionally armed at the moment, numbers are growing, increasing from around 150-350 missiles in 2009, to something in the 200-500 range now. Should these cruise missiles become nuclear-armed, this would give China's nuclear forces greater survivability, flexibility and arguably as a result, military-political effectiveness in a conflict.⁷⁶

Declaratory Policy and Doctrine

China's official approach to nuclear deterrence centres on maintaining a nuclear force structure capable of surviving an enemy attack while being able to respond with enough strength to inflict unacceptable damage on the aggressor.⁷⁷ Its efforts to modernise its nuclear forces and to develop penetration aids for its own ballistic missiles must therefore be assessed against what it sees as the shifting requirements of meeting this goal.

Consistent with this approach to nuclear deterrence, China has a no-first use policy which comes in two parts. It states both that it will never use nuclear weapons first against any nuclear-weapon state and that it will never use or threaten to use nuclear weapons against any non-nuclear weapon state or nuclear weapon free zone.⁷⁸

In terms of operational posture, it is thought that China's nuclear weapons are not deployed at a high alert or readiness level. Though public information is scarce, on a day-to-day basis, many warheads are believed to be kept in storage mainly at a central storage facility with a smaller number deployed at five major military installations around the country. Warheads are not therefore routinely mated with their delivery systems.⁷⁹

Security Drivers

Overall, although the Chinese nuclear arsenal is dwarfed by those of the United States and Russia, the enhancements to Chinese nuclear forces described above are significant and they are driven by a number of strategic concerns. Principle among these is the perceived need to improve regional deterrence in relation to both India and Russia, and worries over U.S. plans to deploy improved ballistic missile defences which may render China's current offensive nuclear capability insufficient.

There are also concerns over improved U.S. and Russian intelligence, surveillance and reconnaissance capabilities and over developments in conventional precision global strike which might make it easier to target China's existing nuclear weapons. China, in other words, is worried about a number of possible strategic vulnerabilities and is investing in the size and sophistication of its nuclear forces to compensate for them.

71 Robert S. Norris and Hans M. Kristenen, 'Chinese nuclear forces, 2010,' *Bulletin of the Atomic Scientists*, 66(6), 2010, p.136.

72 Office of the Secretary of Defense, 'Annual Report to Congress, Military and Security Developments Involving the People's Republic of China-2010,' p.2. Available at: http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf

73 Ibid, p. 34

74 Ibid, p. 3.

75 Ibid, p. 34

76 National Air and Space Intelligence Center, Ballistic and cruise missile threat, NASIC-1031-0985-09, 23 June 2009, p.29.

77 Office of the Secretary of Defense, 'Annual Report to Congress, Military and Security Developments Involving the People's Republic of China-2010,' p.34. Available at: http://www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf

78 See the account of this position provided in *ibid*, p. 34/35

79 Robert S. Norris and Hans M. Kristensen, 'Chinese nuclear forces, 2010,' *Bulletin of the Atomic Scientists*, November 2010, p.135.

7. France

Nuclear Weapons and Delivery Systems⁸⁰

France has around 300 nuclear weapons. President Sarkozy announced a reduction to this number in a speech at the ballistic missile submarine shipyard in Cherbourg in March 2008.⁸¹ The thinking underpinning the speech, and what amounted to a re-definition of 'strict sufficiency' in the number of French nuclear weapons, can be found in more detail in the *French White Paper on Defence and National Security* published later the same year.⁸²

France's nuclear force consists of both sea and air based components. The majority of the 300 warheads, around 240 in total, are designed for deployment on France's four nuclear powered Le Triumphant-class SSBNs. At least one of these submarines is deployed on patrol at any given time, but three submarines are always in the operational cycle and France has the capacity to maintain two submarines at sea for protracted periods if it is deemed necessary to do so.

Three of the submarines currently carry the M-45 sea-launched ballistic missile, with a range of around 4,000km, with each submarine carrying up to 16 missiles and each missile being armed with up to six TN-75 nuclear warheads. The fourth submarine carries up to 16 newer M-51 missiles, with a standard range of approximately 6,000km, and a high-end range of perhaps 8,000-9,000km with reduced payloads, and each of these missiles can also carry up to six TN-75 nuclear warheads.⁸³ Only 48 missiles are available in total however, and it is not known what the distribution of those missiles across the four submarines actually is.

The air based component of the French nuclear force consists of two squadrons of the French Air Force. Each of the squadrons is equipped with Mirage 2000N aircraft that carry the Air-Sol-Moyenne Portee (ASMP) medium range (300km) air-launched missile or the newer ASMP-A. Each missile carries either a single TN-81 warhead or the newer Tete Nucleaire Aero-Portee (TNA) warhead. In addition to around 60 missiles deployed, it is thought that further missiles may be kept in storage.⁸⁴ The French Navy operates a further squadron of 10 Super Etendard aircraft from the Charles de Gaulle aircraft carrier, also armed with the ASMP with the TN-81 warhead.

Force Modernisation

The deployment of all four of the Le Triumphant-class SSBNs was only complete in 2010. Although France has reduced its fleet from five to four boats in the process of deploying this second generation of submarines, the deployment nevertheless represents a recent and very significant modernisation of the French nuclear force, one that is designed to ensure French nuclear deterrent capabilities into the 2030s. The new submarines are superior to the class of submarines they replaced and are reported to be 1,000 times quieter.⁸⁵ The M45 missile on board France's SSBN fleet is also gradually being replaced with the newer and longer range M-51 missile described above. Starting in 2015, the M51s will themselves also be modified to take what is described as a more robust new warhead, the Tete Nucleaire Oceanique (TNO).

France is also modernising its nuclear bomber fleet. Since 2009, the Rafale 3 has been replacing the older Mirage 2000N in performing the nuclear mission from land. The Rafale 3s have new missiles, the ASMP-A noted above, with improved accuracy and manoeuvrability, plus a longer range than the ASMP at around 500km.⁸⁶ Each new missile will again also come with the newer class of warhead, the Tete Nucleaire Aero-portee (TNA). A carrier based version of the Rafale 3, the Rafale MK3, is also replacing the Super Etendard strike aircraft on board the *Charles de Gaulle* aircraft carrier.⁸⁷

80 The author would like to thank Bruno Tertrais of the Fondation pour la Recherche Stratégique for his comments on this chapter. Any remaining errors are the authors alone.

81 For a translation of the speech in full, see:
<http://www.acronym.org.uk/docs/0803/doc09.htm>

82 For a translation of the entire White paper, see:
http://merln.ndu.edu/whitepapers/France_English2008.pdf

83 International Institute for Strategic Studies, *The Military Balance 2011*, p.105; Claire Taylor, *The French Nuclear Deterrent*, House of Commons Standard Note, SN/IA/4079, 30 June 2010; Bruno Tertrais, 'France', in Barry Blechman (ed), *Unlocking the Road to Zero: France and the United Kingdom*, The Stimson Center, March 2009.

84 Claire Taylor, *The French Nuclear Deterrent*, House of Commons Standard Note, *ibid*.

85 Robert S. Norris and Hans Kristensen, 'French nuclear forces 2008', in *Bulletin of the Atomic Scientists*, Sept/October 2008, p.53.

86 The ASMP had a range of about 300km.

87 *Ibid*, p.54

Declaratory Policy and Doctrine

France possesses a nuclear deterrent in order to protect what it describes as its 'vital interests.' These vital interests were set out in a 1994 White Paper as: 'The integrity of the national territory, including the mainland as well as the overseas departments and territories, the free exercise of our sovereignty, and the protection of the population.'⁸⁸ In his March 2008 Cherbourg speech, and in the subsequent 2008 White Paper, President Sarkozy largely re-iterated this long-standing position, describing French vital interests as those elements that constitute 'our identity and our existence as a nation-state, as well as our capacity to freely exercise our sovereignty'.

For President Sarkozy it is also vital that France must be able to count on nuclear weapons at all times in order to respond to any surprise, though he has stressed, in particular, the possible threat of aggression from other states rather than terrorist groups.

Sarkozy's comments in 2008 were interpreted by some as a narrowing of the role of nuclear weapons in French national security strategy because they appeared to downplay an emphasis on the possible role of nuclear weapons in responding to terrorist attacks which had been emphasised by Sarkozy's predecessor as president, Jacques Chirac. However, while stressing that French nuclear weapons were not targeted at anyone specifically, and while not explicitly re-iterating Chirac's position that France might use nuclear weapons in response to state-sponsored terrorism, Sarkozy did say that 'France's deterrent protects the country from any aggression against our vital interests emanating from a state - *wherever it may come from and whatever form it may take.*'⁸⁹ This may not therefore have been the narrowing of the nuclear role that some claimed.

"France's deterrent protects the country from any aggression against our vital interests emanating from a state - wherever it may come from and whatever form it may take." - Sarkozy

French declaratory policy is more expansive than that of the United States, and has been at least since the latter was constrained in the April 2010 U.S. Nuclear Posture Review (see Chapter 4). It is also more expansive than current UK declaratory policy which was modified to fall in line with the U.S. position in late 2010. To put this another way, France believes that nuclear weapons may have a potentially larger role to play in deterring aggression, in a wider range of circumstances and scenarios, than do the current administrations in either London or Washington.

President Sarkozy also declared at Cherbourg that British and French vital interests are so close that 'there can be no situation in which the vital interests of either of our nations could be threatened without the vital interests of the other also being threatened,' and re-stated French commitment to

Article V of the North Atlantic Treaty which states that an attack on one member of NATO is an attack on all.⁹⁰ France's nuclear weapons should, he went on, be seen in this context as a key element available for the defence of European and not only French security.

The influence of France's declaratory policy and wider approach is clearly evident in its nuclear doctrine. According to leading French nuclear analyst Bruno Tertrais, French doctrine is to deter an attack on its vital interests by threatening unacceptable damage 'to an aggressor's political, economic and military centres of power. It also includes the option to threaten an adversary who may have misjudged French resolve or miscalculated the limits of French vital interests with a limited strike (nuclear warning) aimed at restoring deterrence.'⁹¹ France has therefore also consistently been against the idea of a 'no-first-use' pledge when it comes to nuclear weapons and attaches less weight to Negative Security Assurances (NSAs) than some of its allies. It qualifies the NSAs it has previously given to non-nuclear State Parties to the NPT by arguing that nuclear retaliation is consistent with the legal right to self-defence as recognised in Article 51 of the U.N. Charter and that this right to self defence would, in the face of aggression by others, take precedence over any 'no-first-use' commitments given in peace time. France also argues that any state not delivering on its own non-proliferation commitments, including in relation to chemical and biological weapons could not expect any negative security assurance to apply to them.

88 See Bruno Tertrais, 'France', in Barry Blechman (ed), *Unlocking the Road to Zero: France and the United Kingdom*, The Stimson Center, March 2009, pp. 7-9.

89 See a discussion of this in Bruno Tertrais, 'France', in Barry Blechman (ed), *Unlocking the Road to Zero: France and the United Kingdom*, The Stimson Center, March 2009, pp.7-8.

90 See Sarkozy's Cherbourg speech. Translation available at: <http://www.acronym.org.uk/docs/0803/doc09.htm>

91 See Bruno Tertrais, 'France', in Barry Blechman (ed), *Unlocking the Road to Zero: France and the United Kingdom*, The Stimson Center, March 2009, p.8.

Security Drivers

The original French decision to pursue a military nuclear programme can be attributed to a number of factors, namely: The traumatic experience of humiliating defeat and occupation in 1940; the growing Soviet threat in the 1950s; a lack of faith in the U.S. nuclear guarantee to Europe; and the belief that nuclear weapons were essential if France was to remain a major world power.

Today, France believes its nuclear weapons are necessary for a different set of reasons.

First, the maintenance and modernisation of French nuclear forces as described in this chapter is said to be justified by 'certain other nuclear stockpiles that keep on growing' (a reference, it is thought, to the changes in Chinese, Indian and Pakistani nuclear forces described elsewhere in this paper).⁹²

While France does not perceive a direct nuclear threat to its own vital interests today, it does not rule out such a threat re-emerging in future, including from Asia, and believes that it should keep its nuclear weapons as an insurance policy for at least as long as the cost is bearable. Possible threats not dismissed in French leadership circles include a resumed threat to Europe from Russia and a threat from China, though the latter is less a concern that France would be threatened in isolation and more a concern that it could be blackmailed to stay out of a future crisis in Asia if it no longer possessed nuclear weapons. The idea that nuclear weapons continue to bestow independence and strategic autonomy of action remains a powerful one in France.

France looks set to view its possession of nuclear weapons as an essential long-term feature of its national security planning

Second, France is also worried about proliferation risks in the European neighbourhood. A nuclear-capable Iran with a ballistic missile capability to hit Europe, and wider WMD proliferation to other countries in the Middle East and possibly North Africa, is a major concern.

Third, it has been argued that: 'Paris would like Europe to benefit from the same strategic autonomy that it has enjoyed since acquiring nuclear weapons in the 1960s.'⁹³ There is no implication in this that France is in favour of a shared European nuclear deterrent with fully shared decision-making on nuclear use. The interest appears to stem from the belief that, long-term, Europe cannot emerge as a genuinely autonomous strategic actor in the world without the nuclear dimension being considered.

None of this means that France has been inactive or uninterested on issues related to arms control and disarmament in the recent past. French leaders have argued that they maintain their nuclear forces at the lowest level necessary to meet strategic requirements and that France has unilaterally reduced its nuclear stockpile by more than 50 per cent since the height of the Cold War. France also is dismantling its fissile material production facilities and has provided assistance to nuclear threat reduction programmes in Russia in the recent past. The country also sees its wider activities to support chemical, biological and conventional weapons disarmament as a part of its disarmament commitment under Article VI of the NPT.

Nevertheless, without very radical changes to the international environment to reduce the level of security threat, and without major reductions in the nuclear arsenals of larger nuclear powers and a wider effort to disarm, including not only the United States and Russia but also serious engagement from China, France looks set to view its possession of nuclear weapons as an essential long-term feature of its national security planning.

⁹² Robert S. Norris and Hans M. Kristensen, 'French nuclear forces, 2008,' *Bulletin of the Atomic Scientists*, September/October 2008, p. 52

⁹³ Bruno Tertrais, 'France', in Barry Blechman (ed), *Unlocking the Road to Zero: France and the United Kingdom*, The Stimson Center, March 2009, p.6

Part 3: The Story behind the numbers: Nuclear weapon states outside the NPT

8. Pakistan

Nuclear Weapons and Delivery Systems

In early 2011, a number of U.S.-based media outlets and expert commentators described Pakistan's nuclear arsenal as having doubled in size in recent years, making it the fastest growing nuclear arsenal anywhere in the world. Many also noted that on reasonable projections, Pakistan is on course to be the world's fourth largest nuclear power, ahead of the United Kingdom and France, but probably still behind an expanded Chinese force, in the very near future.⁹⁴

These reports, though alarmist in some cases, do signify a real change. While it remains very difficult to accurately gauge the exact number, type, and deployment of Pakistan's nuclear weapons, public and open source estimates appear to confirm a steady build up in the arsenal, from around 60-80 nuclear weapons when President Obama took office in 2009 to around 100-110 now.⁹⁵

Pakistan currently relies on a combination of aircraft and ballistic missiles for the nuclear mission.⁹⁶ Its U.S.-manufactured F-16s are believed to play a nuclear role, each carrying a single bomb and with a refuelled range of around 1,600km, sufficient to hold most of India at risk. French manufactured Mirage Vs may also be tasked with additional nuclear strike missions, and each has a range of around 2,100km.⁹⁷

Pakistan also currently deploys around 50 Hatf-3 ballistic missiles with a range of some 400km, and up to 10 Hatf-4s with a slightly longer range of 450km. It also has up to a further 25 Ghauri (Hatf-5) nuclear-capable ballistic missiles which have a range of 1,200km.⁹⁸

94 Karen DeYoung, 'New estimates put Pakistan's nuclear arsenal at more than 100', *Washington Post*, 31 January 2011; David E. Sanger and Eric Schmitt, 'Pakistani Nuclear Arms Pose Challenge to U.S. Policy', *The New York Times*, 31 January 31 2011; and Bruce Riedel, 'Pakistan and the Bomb', *YaleGlobal Online*, 21 February, 2011, available at www.yaleglobal.yale.edu/print/6856.

95 For a more balanced view of the implications of the increase, see Alexander H. Rothman and Lawrence J. Korb, 'Pakistan doubles its nuclear arsenal: Is it time to start worrying?' *Bulletin of the Atomic Scientists*, 11 February, 2011.

Force Modernisation

Pakistan is developing a second longer range nuclear capable ballistic missile, the Shaheen II, with a range of just over 2000km. This missile is road mobile and thought to be very close to becoming operational.

Two nuclear capable cruise missiles are also under development.⁹⁹ The ground-launched Babur (Hatf-7) has been test-launched a number of times and is thought to have a range of around 320km. The air-launched Ra'ad (Hatf-8) is thought to have a similar range.¹⁰⁰

Beyond this, several commentators have pointed to worrying developments in Pakistan's nuclear infrastructure. Pakistan is thought to be improving its weapon designs and to be moving beyond its first generation weapons, developed using Highly Enriched Uranium (HEU), to pursue plutonium based designs. To facilitate this, it has brought a second plutonium production reactor on stream at its Khushab site in the Punjab and a third is now in development at the same site. In addition, it has built a second reprocessing plant at its New Labs facility near Rawalpindi. According to the independent International Panel on Fissile Materials (IPFM), the changes will at least double Pakistan's annual production of weapon plutonium.¹⁰¹ These infrastructural developments are also significant because they suggest that Pakistan is trying to replace its heavy uranium based bombs with smaller, lighter, plutonium based devices that can be delivered over longer distances via ballistic and cruise missiles.

96 For a discussion on the size, motivations for, and operational posture of Pakistan's nuclear arsenal see Brig. General (Ret) Feroz Hassan Khan, 'Pakistan's Perspective on the Global Elimination of Nuclear Weapons', in Barry Blechman (ed), *Unblocking the Road to Zero: Perspectives on Advanced Nuclear Nations* (Pakistan/Israel), Stimson Nuclear Security Series, Volume III, April 2009.

97 See Robert S. Norris and Hans Kristensen, 'Pakistani nuclear forces, 2009', *Bulletin of the Atomic Scientists*, September/October 2009, p.84.

98 The figures used in this paragraph for numbers of delivery vehicles held by Pakistan are drawn from, *The Military Balance 2011*, International Institute for Strategic Studies, London, p.263.

99 Robert S. Norris and Hans Kristensen, 'Pakistani nuclear forces, 2009', *Bulletin of the Atomic Scientists*, September/October 2009, p.84

100 Figures on the range of all missiles mentioned, and for the range of aircraft mentioned in previous paragraphs, are drawn from Robert S. Norris and Hans Kristensen, 'Pakistani nuclear forces, 2009', *Bulletin of the Atomic Scientists*, September/October 2009, p.84.

101 International Panel on Fissile Materials, *Global Fissile Material Report 2010*, pp. 126-133. Available at http://www.fissilematerials.org/ipfm/site_down/gfmr10.pdf

Declaratory Policy and Doctrine

The purpose of Pakistan's nuclear weapons is to serve as weapons of last resort, the existence of which is aimed at deterring any large scale attack, conventional or nuclear, on the state or its territory. Ongoing improvements in warhead design and in the range and diversity of the means of delivering Pakistan's nuclear weapons to target, as outlined above, are designed to provide Pakistan with options once a conflict has broken out, and to ensure that even in the context of a pre-emptive attack by an aggressor, Pakistan could reliably put the aggressor's cities and military-industrial sites at risk.

The country has no formally issued or published nuclear doctrine. However, senior military officials have in the past publicly indicated the circumstances under which Pakistan might consider using nuclear weapons. These include large-scale conventional attacks against Pakistan that result in economic strangulation, the political destabilisation of the Pakistani state, significant loss of territory, or the destruction of a large part of the Pakistani military.¹⁰² Because Pakistan's nuclear weapons are seen as weapons of last resort and possible responses to conventional attack, the country has not adopted a No-First-Use policy.

Since the region in which Pakistan sits is characterised by active conflicts and a strong potential for future limited wars moreover, Pakistan is thought to configure its nuclear forces for plausible war-fighting roles and to have integrated war plans that assume combined conventional and nuclear weapons use. This approach, it is believed, bolsters the credibility and therefore the deterrent value of Pakistan's nuclear weapons. However, Pakistan also maintains deliberate ambiguity over its targeting policy and over the nature of the warheads used on its delivery vehicles. This makes it difficult for adversaries to distinguish between delivery vehicles that are nuclear tipped and those that are not. Although it has no affirmative policy of nuclear first use, Pakistan retains the nuclear use option and this ambiguous force posture deliberately to increase uncertainty and complicate risk assessments in the mind of any potential aggressor.

102 Steve Andreasen and Michael Gerson, 'Deterrence Seen Through the Eyes of Other Nations,' paper prepared for the Hoover Institution/Nuclear Threat Initiative conference on *Deterrence: Its Past and Future*, Stanford University, November 2010, pp.38-40.

103 See Robert S. Norris and Hans Kristensen, 'Pakistani nuclear forces, 2009,' *Bulletin of the Atomic Scientists*, September/October 2009, p.85. Also International Commission on Nuclear Non-proliferation and Disarmament, (ICNND), *Eliminating Nuclear Threats: A Practical agenda for Global Policymakers*, 2009.

On a day to day basis Pakistan's nuclear weapons are thought to be dispersed and not stored at a central location. They are also thought to be kept off alert in an unassembled state in peacetime with nuclear cores kept separate from the rest of the weapon, and weapon storage areas being some distance from the location of designated delivery vehicles.¹⁰³ Little is known about the 'use controls' on Pakistan's nuclear weapons. However, a senior military official reportedly said in 2006 that 'Pakistani nuclear controls include some functional equivalent to the two-man rule and permissive action links' used by other nuclear weapons states.¹⁰⁴

Security Drivers

Some have argued that the entire Pakistani nuclear weapons programme is motivated by a desire on the part of the country's leadership to achieve elevated status as the Islamic world's only nuclear power.¹⁰⁵ There have been rumours, as an adjunct to this, that Pakistan has agreed a secret deal to transfer nuclear weapons to Saudi Arabia in the event that Saudi Arabia feels threatened by Iran.¹⁰⁶

A more persuasive rationale for Pakistan's growing nuclear infrastructure and arsenal and for the enhancements to its ballistic and cruise missile capability however, is the country's deep rooted sense of insecurity. There are a number of factors that serve as drivers for this.

First, Pakistan believes it has learned from bitter experience that its national security cannot be left to others. In particular, the military defeat by India in 1971, and the subsequent secession of east Pakistan as the independent state of Bangladesh, are seen as examples of an earlier misplaced tendency to rely on allies for support at times of crisis. Defence planners since that time have assumed the need for national self-reliance.

104 Robin Walker, 'Pakistan's Evolution as a Nuclear Weapons State: Lt. Gen. Khalid Kidwai's CCC Address,' a news brief published by the Center for Contemporary Conflict, U.S. Naval Postgraduate School, 1 November 2006, available at www.ccc.nps.navy.mil/news/kidwaiNov06.asp

105 For a brief account of the origins of this, see Brig. General (Ret) Feroz Hassan Khan, 'Pakistan's Perspective on the Global Elimination of Nuclear Weapons,' in Barry Blechman (ed), *Unblocking the Road to Zero: Perspectives on Advanced Nuclear Nations* (Pakistan/Israel), Stimson Nuclear Security Series, Volume III, April 2009, pp. 11-14.

106 See Bruce Riedel, 'Pakistan and the Bomb,' *Yale Global Online*, 21 February 2011, available at www.yaleglobal.yale.edu/print/6856

Pakistan is thought to configure its nuclear forces for plausible war-fighting roles and to have integrated war plans that assume combined conventional and nuclear weapons use.

Second, Pakistan feels its existence has never been accepted by its neighbours. The state became independent as a result of communal violence following Indian independence from the British. Its northern neighbour, Afghanistan, has never fully accepted the contours of the Afghanistan-Pakistan border. To the south, Pakistan has been locked in a tense relationship and intermittent conflict with India for decades over Jammu and Kashmir, and the Pakistani leadership worries that growing Indian diplomatic and economic ties with Afghanistan are motivated by a desire to isolate and encircle it.

Third, Pakistan believes itself to be at a fundamental conventional military disadvantage in relation to India and believes Indian military doctrine is based on planning for very rapid conventional thrusts into Pakistani territory in the event of a renewed crisis or conflict between the two states. Since 9/11, moreover, Pakistan's security situation has been further complicated by the fact that al-Qaeda and Taliban forces have penetrated Pakistani territory. In cooperation with domestic insurgents, these groups have forced Pakistan's military to partly re-orient itself away from the perceived Indian threat in the south, to focus on counter-terrorism and counter-insurgency operations inside and along Pakistan's border with Afghanistan in the north and west.¹⁰⁷ As Pakistan's conventional military forces are weaker than India's and now also have to divide their attention across a wider range of threats, the nuclear deterrent has grown ever more important in the minds of policy-makers as the most reliable method for deterring any possible attack from India.

107 For a longer and more detailed examination of Pakistan's security context, see Brig. General (Ret) Feroz Hassan Khan, 'Pakistan's Perspective on the Global Elimination of Nuclear Weapons,' in Barry Blechman (ed), *Unblocking the Road to Zero: Perspectives on Advanced Nuclear Nations* (Pakistan/Israel), Stimson Nuclear Security Series, Volume III, April 2009.

108 See Robert S. Norris and Hans M. Kristensen, 'Indian nuclear forces 2010,' *Bulletin of the Atomic Scientists*, 66(5) 76-81. The estimate of the size of India's assembled nuclear arsenal is based on assessments of the stockpile of weapons grade plutonium produced by India.

9. India

Nuclear Weapons and Delivery Systems

India is thought to have something in the range of 60-80 assembled nuclear weapons, of which around 50 are fully operational.¹⁰⁸ At the moment, fighter bombers (Mirage, Jaguar and possibly MiG-27s) and short range ballistic missiles (the Prithvi I with a range of only 150km) are the only fully operational elements of India's nuclear force. However, because all Indian nuclear delivery systems are dual-capable (they can deliver either nuclear or conventional weapons to target), it is difficult to say more about the composition and readiness of the Indian nuclear force.

Force Modernisation

What is clear is that the country continues to develop a triad of land, sea and air-based delivery systems at a rapid rate.

On land, the Agni I missile has undergone successful test launches and may now be operational. It has a range of around 700km, a significant advance over the Prithvi I. A successful testing of an Agni II missile, with a range of around 2,000km, was also reported in May 2010. This is an improved version of the Agni I and is designed to be either road, or rail-mobile. A rail-mobile Agni III, with a range of over 3,000km has been test flown on a number of occasions, and has been described by an Indian Army spokesperson as a missile that 'can even strike Shanghai.'¹⁰⁹

The Indian Defence Research and Development Organisation (DRDO) also announced plans in 2008 to build an Agni IV, with a range of 5,000km, sufficient to target the whole of Pakistan, and even Beijing. It is thought this might also be a technology demonstrator for the near intercontinental Agni V, which is also in development.

U.S. defence officials believe that between 2015 and 2020, the Indian nuclear force will be made up primarily of Agni III and Agni IV missiles with enhanced warheads, some possibly even with multiple warheads, though it is not clear that India will have the wherewithal to add MIRV capabilities to its missiles anytime in the near future.¹¹⁰

109 *Times of India*, May 8, 2008, Agni III not targeted at any particular country: Army.

110 See Robert S. Norris and Hans M. Kristensen, 'Indian nuclear forces 2010,' *Bulletin of the Atomic Scientists*, 66(5), p. 79.

On 26 July 2009, India also launched its first SSBN, the *Arihant*. Four other submarines are reportedly planned. The *Arihant* appears to be serving as a technology development and integration platform and it is unclear whether it will become fully operational. It is thought to be equipped with 12 launch tubes for the K-15 version of the Sagarika missile which would have a range of around 300km and be capable of carrying a payload of around 500kg. This is a smaller payload than the 1,000kg plus planned for the land based missiles and might therefore indicate that India has developed a smaller warhead for deployment on its emerging SSBN fleet.

India is further thought to have developed and successfully tested a nuclear capable ship-launched ballistic missile, the *Dhanush*, though this has a range of only around 350km, a fact which means that to reach land targets the ships carrying it would have to position themselves dangerously close to enemy shorelines before launching.¹¹¹

India is developing an intermediate range (1,000km) land-attack cruise missile for deployment on land, sea and air platforms but it is not known at present whether it will be nuclear capable. To be so, India would need to develop a further small, light-weight warhead.

Declaratory Policy and Doctrine

The fundamental purpose of Indian nuclear weapons was stated in the late 1990s to be 'to deter the use and threat of use of nuclear weapons by any state or entity against India and its forces.'¹¹² In a statement on the operationalisation of its nuclear doctrine in 2003, it added that: 'nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere', and that 'nuclear retaliation to a first strike will be massive and designed to inflict unacceptable damage.'¹¹³ India has therefore declared a no-first use policy. However, it has reserved the right to modify this, declaring in the same 2003 statement that, 'in the event of a major attack against India, or Indian forces anywhere, by biological or chemical weapons, India will retain the option of retaliating with nuclear weapons.'¹¹⁴

'nuclear weapons will only be used in retaliation against a nuclear attack on Indian territory or on Indian forces anywhere'

Indian nuclear policy is also officially based on the desire to maintain a 'credible minimum' nuclear deterrent, though it has never specified what it considers the size requirement of its 'minimum credible' deterrent to be.

Although India has the capacity to deploy nuclear weapons on aircraft and short and medium-range ballistic missiles at relatively short notice, it does not maintain, on a daily basis, its nuclear forces on a high state of alert. According to the Indian Ministry of Defence, this position is held in contrast to some other states that follow 'doctrines or postures of launch on warning.'¹¹⁵

Security Drivers

India's nuclear forces are primarily a response to two features of its security environment.

First, they are designed to provide a deterrent in relation to two nuclear-armed neighbours that are also in alliance with one another, namely Pakistan and China.

India is involved in a long-running and well known rivalry with Pakistan which has resulted in three wars between the two countries and at least one other short military engagement of note. From the Indian perspective, Pakistan supports insurgent activity in the disputed and heavily Muslim populated region of Kashmir and is also heavily implicated in terrorist attacks on Indian soil.

Conflict is never very far below the surface.

The Indian relationship with China has improved in recent years but long-term, China is seen as India's main strategic threat. The initial Indian nuclear programme in the 1960s was a response to defeat in the 1962 war with China and to China's own nuclear test in 1964. India is therefore seriously concerned about the developments in the Chinese nuclear programme described earlier in this paper. It is also well aware that China and Pakistan cooperate closely on nuclear matters.

Second, the Indian nuclear programme reflects a perceived need for India to be self-reliant in terms of its security. India is not a member of any alliance or other grouping of states to which it could turn for deterrence or defence support in the face of a crisis.

111 Ibid, p. 80.

112 See National Security Advisory Board of India, Draft report of National Security Advisory Board on Indian Nuclear Doctrine, released on 17 August 1999. Available at: <http://www.pugwash.org/reports/nw/nw7a.htm>

113 See Steve Andreasen and Michael Gerson, 'Deterrence Seen Through the Eyes of other Nations,' Hoover Institution Press, Stanford, 2011, p.166.

114 See Indian Government Statement on 'Operationalisation' of Nuclear Doctrine, New Delhi, 4 January 2003, available at: <http://www.acronym.org.uk/docs/0301/doc06.htm>

115 Indian MOD, *Annual Report 2004-2005*, p.14. Available at: <http://www.mod.nic.in/reports/welcome.html>

10. Israel

Nuclear Weapons and Delivery Systems

Israel has never explicitly acknowledged its nuclear status and as a result, there are no official sources to draw on when providing an account of the nuclear weapons at its disposal. However, it is widely assumed that Israel is indeed a nuclear weapons state and a number of unofficial sources, Israeli and non-Israeli, make this claim publicly.¹¹⁶

A number of estimates of the size of the Israeli nuclear arsenal have been attempted. All of these are problematic because in the absence of any official information, they are forced to rely on questionable assumptions about several important aspects of the Israeli nuclear programme, such as the amount of weapons-grade plutonium that Israel may or may not have been able to produce over the years at its main reactor near Dimona,¹¹⁷ the weapons designs used by Israel, and the efficiency of the weapons production process itself. To add a further layer of uncertainty, the assumptions made by many analysts in turn tend to be partly based on the testimony of a former Israeli nuclear technician, Mordechai Vanunu, to the *Sunday Times* in 1986. This testimony, while adding to what was known by the outside world, is thought to contain knowledge gaps and some inconsistencies.

This all helps to explain why estimates of the size of Israel's nuclear weapons inventory vary widely. Some estimates suggest that Israel may have as many as 400 weapons, though most estimates, such as those produced by the Stockholm International Peace Research Institute (SIPRI), the U.S. Defence Intelligence Agency, or Hans Kristensen and Robert S. Norris in the Nuclear Notebook series published in the *Bulletin of the Atomic Scientists*, estimate an arsenal in the 100-200 weapon range.¹¹⁸ These estimates relate to the entire arsenal, covering free-fall bombs, warheads for missiles (including possible thermonuclear weapons) and perhaps, though there is no agreement on this, tactical nuclear weapons in the form of artillery shells or mines.¹¹⁹

In terms of delivery systems, Israel has options across land, sea and air. Since the early 1970s, it has had a nuclear capable short-range (500km) missile in the form of the Jericho-I, work on which initially began with French assistance in the 1960s, around the same time as work began on the Dimona reactor.¹²⁰ An intermediate-range Jericho-II missile was developed in the mid-late 1980s and deployed in 1990. It again is nuclear capable, and has a longer range of around 1,800km.¹²¹ Both missiles are road and rail mobile and Israel is thought to deploy around 100 missiles, across the two types, in total.¹²²

Israel has also developed a sea-launch capability for its nuclear weapons. Three Dolphin-class submarines were bought from Germany, with the first arriving in Haifa in July 1999, and all three received and deployed by the year 2000.¹²³

116 For a discussion, and a review of some of these sources, see International Institute for Strategic Studies, *Nuclear Programmes in the Middle East: In the Shadow of Iran*, London, 2008, pp.119-140.

117 Israel operates two known nuclear facilities, one around 15km from Dimona in the Negev Desert and the other, the Soreq Nuclear Research Centre, about 40km south of Tel Aviv. The Soreq facility is under International Atomic Energy Agency (IAEA) safeguards and is used for research and training in nuclear engineering. Much greater secrecy surrounds the more important Dimona facility, which is thought to conduct the full range of weapons related activities. There has never been any clarity over the power of the reactor at Dimona, leading to uncertainty over the size of Israel's plutonium stockpile and therefore also to uncertainty over the number of nuclear weapons it might have been able to produce. For a fuller account of these facilities and Israel's fissile material stocks, see IISS, *Nuclear Programmes in the Middle East: In the Shadow of Iran*, pp.130-132.

118 For the estimate of 400 weapons, see Kenneth S. Brower, 'A propensity for Conflict: Potential Scenarios and Outcomes of war in the Middle East', *Jane's Intelligence Review*, Special Report Number 14, February 1997, pp.14-15. For the SIPRI estimate, see *SIPRI Yearbook 2007: Armaments, Disarmament and International Security*, p.548. The U.S. Defence Intelligence Agency figures can be found in *Nuclear Programmes in the Middle East: In the Shadows of Iran*, International Institute for Strategic Studies (IISS), pp. 132-133. For the figures published in the *Bulletin of the Atomic Scientists* see, 'Israeli nuclear forces 2002', Vol.58, No. 5, pp.73-75.

119 Robert S. Norris, William M. Arkin, Hans M. Kristensen and Joshua Handler, 'Israeli nuclear forces, 2002', *Bulletin of the Atomic Scientists*, September/October 2002, p.75. The IISS also reports that: 'It is also rumoured that Israel debated the question of tactical nuclear weapons at length, but ultimately decided not to move in that direction.' See, IISS, *Nuclear Programmes in the Middle East*, Op. cit., p.124.

120 In early 1966, *The New York Times* reported that Israel had bought a first instalment of 30 missiles from France. However, after the 1967 Arab-Israeli war, France imposed an embargo on new military equipment and Israel was forced to produce the Jericho-I independently thereafter. For a brief history of these developments, see Robert S. Norris, William M. Arkin, Hans M. Kristensen and Joshua Handler, 'Israeli nuclear forces, 2002', *Bulletin of the Atomic Scientists*, September/October 2002. See also Nuclear Threat Initiative's 'Israel Nuclear Profile', available at: http://www.nti.org/e_research/profiles/Israel/Nuclear/index.html

121 See NTI, 'Israel Nuclear Profile', ibid.

122 See International Institute for Strategic Studies, *Nuclear Programmes in the Middle East: In the Shadow of Iran*, Op. cit. p.133

123 See Robert S. Norris, William M. Arkin, Hans M. Kristensen and Joshua Handler, 'Israeli nuclear forces, 2002', *Bulletin of the Atomic Scientists*, September/October 2002, p.75.

These are thought to be armed with dual capable cruise missiles which were developed in Israel, with each missile having an estimated range of 1,500km.¹²⁴ It is also believed that the submarines are armed with modified U.S. Harpoon anti-ship missiles, some of which could have been modified to carry nuclear weapons to land targets.¹²⁵

In the air, Israel has two main aircraft types that could perform the nuclear role. It has well over 200 F.16s, bought from the United States mainly in the period 1980-1995, though it is assumed that only a fraction of this number will have the modifications, trained crews, and practiced procedures necessary to make them suitable for the nuclear mission. In addition, and more recently, Israel has bought from the United States a further 87 F-15 Eagle fighter and ground attack aircraft. Some of these could have subsequently been made suitable for the delivery of nuclear weapons, since in the United States the F-15E Strike Eagle has the nuclear role.¹²⁶

Force Modernisation

Israel is also trying to develop its delivery system capabilities further. Since 1988, it has been launching satellites into orbit atop a three stage Shavit rocket believed to be modelled on the Jericho-II. There has been speculation for some time that the Shavit could provide a platform from which Israel could develop an ICBM capability, should it wish to do so, and it now seems to be taking a further step in that direction. A Jericho-III missile, based on the Shavit, is thought to be in development and to have a range of around 4,000 – 6,500km.¹²⁷

Given the air power options and submarine launched cruise missile capabilities already available to Israel, it seems clear that the country is continuing to enhance its own triad of land, sea, and air launched nuclear systems.

In November 2005, Israel also signed a contract worth \$1.17 billion with Germany for the construction of two more attack submarines, the first of which is planned to be completed by 2012.¹²⁸ Given the air power options and submarine launched cruise missile capabilities already available to Israel, it seems clear that the country is continuing to enhance its own triad of land, sea, and air launched nuclear systems.

Declaratory Policy and Doctrine

Israel maintains a strict policy of nuclear opacity: It neither confirms nor denies that it has nuclear weapons and therefore has no formally declared position on what its nuclear weapons are for nor any formal explanation of the circumstances under which they might be used.¹²⁹

Despite its widely accepted status as a de facto nuclear weapons state moreover, it has exploited the official ambiguity in its position to declare that Israel will not be the first country to introduce nuclear weapons to the Middle East.

This formula is partly a product of history and partly a product of the nuclear debate that has gone on inside Israel over many years. With regard to history, former Israeli Prime Minister Levi Eshkol, in the 1960s, was the first to declare that Israel would not be the state to introduce nuclear weapons to the Middle East. He did this in the context of an American reluctance at the time to see Israel go nuclear and while the United States itself was also actively trying to negotiate and help lead the introduction of the NPT. Israel did not want, in these circumstances, to give up its covert nuclear programme but also did not want to openly undermine U.S. efforts on nuclear non-proliferation in general.¹³⁰

124 'In June 2002, former Pentagon and State Department officials told the *Washington Post* that Israel was arming three diesel-powered submarines with cruise missiles capable of carrying nuclear warheads,' quoted in *ibid.* p.75.

125 These reports have been denied but: 'In 2003, in an interview with the *Los Angeles Times*, Israeli and American officials announced that Israel had deployed U.S. supplied Harpoon ASCMs on its Dolphin submarines and modified the missiles to carry nuclear warheads.' (See NTI 'Israel Nuclear Profile,' *Op. cit.*).

126 For the numbers of aircraft quoted here, see the International Institute for Strategic Studies, *The Military Balance*, 2011, p.314.

127 According to the IISS: 'In January 2008, Israel successfully tested a dual stage ballistic missile, the details of which were subject to strict military censorship. Media reports, including those broadcast on Israeli radio, identifying the missile as a Jericho-III are so far unconfirmed.' See IISS, *Nuclear Programmes in the Middle East*, *Op.cit.* p. 133.

128 See http://www.nti.org/e_research/profiles/Israel/Nuclear/index.html

129 At the same time, Israel has refrained from any overt nuclear weapons testing and has not, explicitly at least, ever threatened another state with a nuclear weapons attack. See NTI, *Israel Profile*, Nuclear overview, at http://www.nti.org/e_research/profiles/Israel/Nuclear/index.html. However: 'Some believe that Israel has conducted secret nuclear tests. An explosion high in the atmosphere on September 22 1979, off the eastern coast of South Africa is widely believed to have been a clandestine Israeli test.' See Robert S. Norris, William M. Arkin, Hans M. Kristensen and Joshua Handler, 'Israeli nuclear forces, 2002,' *Bulletin of the Atomic Scientists*, September/October 2002, p.73.

130 For the history of the Israeli nuclear weapons programme see Avner Cohen, *Israel and the Bomb* (New York: Columbia University Press, 1998).

At the same time, and ever since then, there has been a long-standing debate on nuclear policy inside Israel between those analysts in favour of the security benefits of a clear Israeli nuclear deterrent on the one hand, and those who believe that an explicitly declared Israeli nuclear weapon would be bound to provoke an Arab response and put Israel at greater security risk on the other.¹³¹

According to the reasoning of the second group a public declaration of the existence of an Israeli bomb would be self-defeating and Israel's security would be better served by a Middle East completely free of nuclear weapons. A recent strategic dossier on Nuclear Programmes in the Middle East from the International Institute for Strategic Studies noted that 'although the second argument has never overcome the first, Israel's 'nuclear policy has always been shaped by a determination not to give hostile states an incentive to develop their own nuclear arsenals.'¹³²

The Israeli policy of nuclear opacity, coupled to what became a U.S. policy of 'don't ask don't tell', has been pursued as the path through these dilemmas. For most of the last fifty years, Israel has been able to pursue the technological elements of a nuclear deterrent while not declaring its capability publicly and not therefore openly provoking others in the region into developing a nuclear capability of their own.

However, to maintain the credibility of its deterrence posture, and to sow confusion in the minds of potential enemies, it is also suspected that Israel itself allows periodic leaks and rumours about its nuclear capabilities to gain traction overseas.¹³³

While nuclear opacity has been the settled position of the Israeli state for decades now, it has also nonetheless come under pressure, especially at times of crisis as Israel has struggled to make its undeclared and untested deterrent effective. 'During the build-up of the first Gulf war', for example, 'Prime Minister Yitzhak Shamir responded to Iraqi threats of missile attacks by declaring that any state attacking Israel should know it would be struck in the most severe way', adding that Israel had 'a very strong deterrent capability'. His defence minister, Moshe Arens, went further, warning Saddam Hussein about Israeli weapons, 'which the world does not yet know about.'¹³⁴

No official information is available on the doctrine that would shape the use of Israeli nuclear weapons in a conflict scenario. Over the years, however, it has been widely assumed that the primary purpose of Israel's nuclear weapons was to provide an insurance policy against the country being over-run by the larger conventional forces of neighbouring Arab states. Nuclear use scenarios apparently developed in the 1960s tended to support this point of view, since they focused primarily on a successful Arab military penetration of Israel's pre-1967 borders and the exposure of Israeli cities to 'massive and devastating air attacks.'¹³⁵

Israel's stated reasons for not joining the NPT are also informative with regard to the likely purpose of the nuclear weapons in its arsenal. Although it may be assumed that Israel's private reason for not joining the NPT is to avoid the kinds of inspections that would put an end to its nuclear deterrent, its publicly stated reasoning focuses on the unacceptably weak safeguards and inspection regimes involved, given what it describes as the special requirements of the Middle East.

These special requirements relate partly to the fact that several other states in the region are known to possess both chemical and biological weapons, and the means to deliver them. It may be assumed from this therefore, that Israel sees its undeclared nuclear weapons as relevant not only to any conventional military threats, but also to any emergent nuclear threats in the region and to any state that might seek to attack or threaten Israel with chemical or biological weapons.¹³⁶

Security Drivers

Israel's nuclear weapons programme was not, it seems, originally driven by any fear that others in the region were developing a nuclear weapons capability of their own. Consistent with the idea that Israel subsequently planned for possible nuclear weapons use in response to being on the verge of a conventional military defeat, the original motivation for the nuclear weapons programme in the mid-1950s appears to have been, as noted above, that of compensating Israel for its demographic, geographic, and conventional military weakness relative to Arab neighbours that were talking openly of the need to destroy it.

there has been a longstanding debate... between those analysts in favour of... a nuclear deterrent on the one hand, and those who believe that an explicitly declared Israeli nuclear weapon would be bound to provoke an Arab response...

131 See IISS, *Nuclear Programmes in the Middle East*, Op. cit.

132 Ibid p.125.

133 Ibid, p.128.

134 See NTI's 'Israel Nuclear Profile', available at: http://www.nti.org/e_research/profiles/Israel/Nuclear/index.html

135 See IISS, *Nuclear Programmes in the Middle East*, Op. cit. p.128.

136 The threat of chemical or biological attacks also featured in the scenarios developed in the 1960s which were referred to earlier in this paragraph.

Prime Minister David Ben Gurion apparently felt at that time that Israel's conventional weakness was a barrier to resolving the Arab-Israeli conflict because it encouraged Arab states to believe in the viability of a military solution. Peace, in his view, would only come if the Arab states understood that military victory was impossible. He therefore initiated the covert nuclear programme as a measure to equalise the regional power balance.¹³⁷ As Shimon Peres, Ben-Gurion's aide at the time, subsequently noted in his memoirs: 'Ben Gurion believed that science could compensate us for what nature has denied us.'¹³⁸

Over the years, the spectre of conventional military conflict appears to have acted as a spur to specific developments in Israel's nuclear weapons capability. According to the Israeli analyst Avner Cohen, Israel improvised two explosive devices on the eve of the Six-Day War in 1967.¹³⁹ The experience of near conventional defeat in the Yom Kippur War in 1973 however, and the realisation that the nuclear weapons in Israel's possession were not the most militarily useful in the circumstances, reportedly led to Israel developing far more advanced weapons of varying size thereafter, including thermo-nuclear weapons at the upper end of the scale to provide the basis for some minimum deterrent vis a vis the Soviet Union, but also smaller tactical warheads that might have been useful had Syrian forces managed to cross the Jordan river in 1973.¹⁴⁰

The shift away from an improvised deterrent to a more sophisticated strategic and possibly tactical one was also apparently pursued as a policy to extract maximum conventional military support from the United States, since it was felt that the more credible the Israeli use of nuclear weapons became, the more incentive the United States would have to ensure Israel's conventional forces were so strong that the nuclear option would never be needed by Tel Aviv.¹⁴¹

137 The Israeli's set up their Atomic Energy Commission secretly in 1952. A secret nuclear deal between Israel and France followed, reportedly signed on 3 October 1957, and it is believed that work on the reprocessing plant at Dimona began in early 1958.

138 Shimon Peres, *Battling for Peace: Memoirs*, (London: Weidenfeld and Nicolson, 1995), p. 132.

139 See Avner Cohen, *Israel and the Bomb*, Op. cit.

140 This is based on the testimony that Vanunu gave to the *Sunday Times* in 1986. See NTI's 'Nuclear Profile of Israel,' available at: http://www.nti.org/e_research/profiles/Israel/Nuclear/index.html The Israeli government was apparently divided in 1973 between those who wanted to make Israel's nuclear weapons ready for use and those who did not believe that that moment had been reached. However, there seems to be some consensus that even had Syrian forces crossed the Jordan River and the moment of last resort been reached, the weapons in Israel's possession were not tactical weapons appropriate to the situation.

Since the 1980s, and having achieved some success with this goal, Israel's primary security concerns appear to have changed. Qualitative improvements in Israel's conventional military capabilities and changes to the regional diplomatic scene, including signed peace agreements between Israel and both Egypt and Jordan, have reduced concerns over a conventional incursion into Israeli territory. These concerns were replaced first by worries over Iraqi WMD, and more recently by concerns related to the Iranian nuclear programme. The concerns over the nuclear programmes of others led both to the birth of the Begin doctrine, under which Israel has taken pre-emptive military action against secret nuclear facilities first at Osirak in Iraq in 1981, and at Al Kibar in Syria in 2007, and to Israel's strategic decision to develop its own sea-based strategic nuclear forces to make them more invulnerable.¹⁴²

Today, Iran is the primary concern. From an Israeli perspective, the combination of Iran's apparent desire to develop a nuclear weapon with frequent and hostile Iranian leadership statements questioning Israel's right to exist makes Iran an existential threat. This is not just a concern that Israel could be subject to a nuclear attack from Iran, since such an attack would be suicidal for Iran as well as catastrophic for Israel, but a concern that weapons will be used through miscalculation or misunderstanding between two states that do not talk to each other directly, in a region that is highly volatile, and where conflicts could break out on a number of fronts almost at any time. There are also concerns that if Iran were to develop nuclear weapons, some elements in the regime in Tehran might facilitate the falling of those weapons into terrorist hands.¹⁴³

In these circumstances, Israel continues to view its own nuclear weapons as an insurance policy and there is a widespread view in Israel that had the country not possessed nuclear weapons in the first Gulf War in 1991, Saddam Hussein would have armed the many Scud missiles fired at Israel from Iraq with chemical or biological weapons. There is a belief, in other words, that Israel's veiled nuclear threat to other powers in the region works as an effective deterrent and cannot therefore be given up, short of an agreement on a WMD-Free Zone across the entire Middle East.

141 According to the IISS, concerns about Israeli nuclear weapons-use led President Nixon to initiate, within days of the Yom Kippur War commencing, an air lift that replenished Israel's conventional military supplies. See IISS, *Nuclear Programmes in the Middle East*, Op. cit. p.128.

142 For an account of the Israeli attack on the Syrian nuclear reactor at Al Kibar, see *Spiegel Online International*, 'How Israel destroyed Syria' Al Kibar Nuclear Reactor,' available at: <http://www.spiegel.de/international/world/0,1518,658663,00.html>

143 See IISS, *Nuclear Programmes in the Middle East*, Op. cit. p.135.

11. North Korea (DPRK)

Nuclear Weapons and Delivery Systems

North Korea (officially the Democratic People's Republic of Korea) fully withdrew from the NPT on 10 January 2003 and formally announced in February 2005 that it had manufactured nuclear weapons. It conducted its first underground nuclear weapon test in October 2006, and a second test in May 2009.¹⁴⁴ There were question marks over the success of its first test in 2006 which, according to seismic data, produced a sub-kiloton yield when North Korea had told China in advance that it expected a yield of four kilotons. The second test appears to have been more successful, achieving a yield of around two kilotons.¹⁴⁵

U.S. intelligence officials believe therefore that North Korea has the capability to manufacture nuclear devices, though it does not know if it has in fact done so, beyond the two devices that were tested. No official data therefore exists on the number of nuclear weapons in the DPRK arsenal. DPRK Vice Foreign Minister Kim Gye Gwan said in 2005 that the DPRK had 'enough nuclear bombs to defend against a U.S. attack. As for specifically how many we have, that is a secret.'¹⁴⁶ There is no way, of course, of verifying or confirming his statement.

Analyst estimates of an arsenal of around six weapons, as noted in Table 2 in Chapter 2, are based on the amount of separated plutonium that North Korea may have been able to produce. These estimates suggest overall production of around 50kg of separated plutonium, enough for at least six nuclear weapons but possibly more.¹⁴⁷ However, these estimates also need to be treated with great caution. The amount of fissile material used in each nuclear weapon depends on the sophistication of the design and there is no reliable open source information on North Korean nuclear weapons design. There are also uncertainties over how much plutonium North Korea has been able to produce and concerns over a previously undisclosed uranium enrichment programme shown to US academic visitors to North Korea in November 2010.¹⁴⁸

144 For a recent detailed analysis of North Korea's nuclear programme, see Jonathan D. Pollack, *No Exit: North Korea, Nuclear Weapons and International Security*, IISS, London, 2011.

145 See US Director of National Intelligence Director James R. Clapper's Statement to the House Permanent Select Committee on Intelligence, 10 February 2011, pp. 6-7, available at: http://www.dni.gov/testimonies/20110210_testimony_clapper.pdf

146 See ABC News, 8 June, 2005, at <http://abcnews.go.com/WNT/story?id=831078&page=1>

147 For the source of several of these estimates and for a discussion of the difficulties in assessing North Korean plutonium stocks see, Mary Beth Nikitin, *North Korea's Nuclear Weapons*, Congressional Research Service Report RL34256, 12 February 2009.

The latter consisted of a modern uranium enrichment facility at Yongbyon, consisting of at least 2,000 second generation centrifuges, providing North Korea with a second route to the fissile material required for making nuclear weapons, and possibly therefore with a capacity for weapons production on a much larger scale. The existence of this previously unknown facility also raised questions about whether other uranium enrichment activities were secretly underway elsewhere in the country.

With regard to delivery systems, U.S. sources estimate that North Korea has deployed over 600 Scud missiles of various kinds and ranges, and about 200 Nodong medium-range ballistic missiles.¹⁴⁹ The Scud variants have the shortest ranges, up to around 1,000km, and are thought to be primarily conventionally armed though with the potential to carry chemical warheads. There is uncertainty over precisely when the first Scuds were imported from the Soviet Union and over how and when they were subsequently reverse engineered and developed indigenously, but common estimates are that imports occurred in the late 1970s to early 1980s, with testing and production getting underway in the mid 1980s. The Nodong missiles were developed in the late 1980s and flight-tested in the early 1990s. They are more advanced than the other Scud derivatives, have a longer range at 1,300 to 1,500km, and are capable of being armed with a single conventional, chemical, or nuclear warhead.

Force Modernisation

The development of North Korea's ballistic missile capability continues. In October 2010 a new missile, designated the BM/25 or Musudan missile was unveiled at the DPRK military parade.¹⁵⁰ It is thought to be both land mobile and sea-based and to have a longer range than North Korea's other missiles, at 2,500 to 4,000km. The emergence of this missile confirmed earlier rumours of the missile's development, with some reports indicating that it was first picked up on U.S. satellite images in 2003, and that it was actually first publicly displayed at a military parade in April 2007.

148 See Steve Andreasen and Michael Gerson, *Deterrence Seen Through the Eyes of Other Nations*, in George P. Shultz, Sidney D. Drell, and James E. Goodby (eds), *Deterrence: Its Past and Future*, Hoover Institution Press, Stanford, 2011, p. 186/187.

149 See 'North Korea Profile: Missiles, Nuclear Threat Initiative', available at: http://www.nti.org/e_research/profiles/NK/Missile/index.html

150 Steve Andreasen and Michael Gerson, 'Deterrence Seen Through the Eyes of Other Nations', in George P. Shultz, Sidney D. Drell, and James E. Goodby (eds), *Deterrence: Its Past and Future*, Hoover Institution Press, Stanford, 2011, p. 188.

Other sources have claimed that the Musudan was deployed in 2007 following surrogate flight tests conducted for North Korea by Iran.¹⁵¹ These reports are unconfirmed but if the Musudan has been tested and deployed, it would be able to reach targets in both Japan and Guam. The missile is thought to be capable of carrying either a single conventional or nuclear warhead.

Over recent years, North Korea has also developed the Taepodong-1, a three stage ballistic missile with an estimated range of up to 2,500km. The Taepodong-1's significance is that it is North Korea's first multi-stage missile. As such, when it was first tested in 1998 it demonstrated that North Korea had mastered some of the technologies required to develop and deploy an intercontinental ballistic missile (ICBM), such as multiple-stage separation and effective guidance of multiple-stage rockets.¹⁵² It is currently thought either to be deployed in very small numbers or not at all. This is because it adds little military advantage over the capability provided by the already deployed Nodong missiles mentioned earlier. A Net Assessment of North Korea's weapons programmes by the International Institute for Strategic Studies in 2004 noted that: 'there would be limited military value in deploying the Taepodong-1 because it contributes little to the strategic role already played by the deployed No-dong force, which effectively covers all critical targets in Japan with a warhead capable of delivering a nuclear weapon. In two-stage configuration, the TD-1 can deliver a payload comparable to that carried by the Nodong to a greater range, but the extra distance does not encompass any key targets of significant value to North Korea.'¹⁵³ The U.S. Defense Intelligence Agency (DIA) similarly concluded in 2003 that the Taepodong-1 was primarily a test bed for multi-stage missile technologies.

In that regard, it has clearly also contributed to the ongoing attempts to develop a Taepodong-2, (also known as the Unha space launch vehicle). This is a significant advance over the Taepodong-1. It uses more advanced technology and although there are disagreements over its potential range, from 6,000km to 15,000km, it is clear that its range far outstrips that of the Taepodong-1. It has been unsuccessfully tested twice, once in 2006 and then again in 2009, but the 2009 test provided enough information for some observers to estimate that in its two-stage version it is intended to have a range of 7,000-7,500km and in its three-stage version a range of 10,000-10,500km.¹⁵⁴ This would provide the two-stage version with a capability to hit Alaska and Hawaii and the three-stage version, if developed successfully, with sufficient range to hit half of the U.S. mainland.¹⁵⁵

Although it seems clear that North Korea is seeking a missile capable of threatening the United States however, one other crucial area of remaining uncertainty surrounds whether North Korea has in fact developed the capacity to miniaturise warheads and place them on missiles. Former U.S. Defense Intelligence Agency Director Lowell Jacoby claimed to the Senate Armed Service Committee in April 2005 that North Korea did indeed have the capacity to arm a missile with a nuclear warhead but other officials have since back-tracked on that statement. In January 2011, then U.S. Defense Secretary Robert Gates, while on a trip to Beijing, stated publicly that in his view North Korea was becoming a direct threat to the United States and would have an ICBM-capability within five years. He did not, however, comment on North Korea's capability in relation to arming missiles with nuclear warheads.¹⁵⁶

Declaratory Policy and Doctrine

The North Korean government set out the public rationale for its nuclear weapons programme on 21 April 2010 in a Foreign Ministry *Memorandum on the Korean Peninsula and Nuclear Weapons*. This Memorandum was reported by The Central News Agency of the DPRK, and stated that North Korea possessed nuclear weapons in order 'to be able to react to nukes with nukes.'¹⁵⁷ This statement largely chimes with U.S. assessments of North Korean nuclear doctrine and intent which have stressed North Korean nuclear capabilities as being for deterrence and coercive diplomacy rather than for war-fighting purposes.

151 See NTI background material on the Musudan, available at http://www.nti.org/e_research/profiles/NK/Missile/capabilities.html#musudan

152 See NTI background material on the Taepodong-1, available at: http://www.nti.org/e_research/profiles/NK/Missile/capabilities.html#taepodong1

153 International Institute for Strategic Studies, 'North Korea's Weapons Programmes: A Net Assessment.' International Institute for Strategic Studies, 2004.

154 David Wright and Theodore Postol. 'Post-launch Examination of the Unha-2.' *Bulletin of the Atomic Scientists*, 29 June 2009, www.thebulletin.org.

155 See Federation of American Scientists, 'North Korea's Taepodong and Unha Missiles.' Available at: <http://www.fas.org/programs/ssp/nukes/nuclearweapons/Taepodong.html>

156 See *The Guardian*, 11 January 2011: <http://www.guardian.co.uk/world/2011/jan/11/north-korea-america-robert-gates>

157 For a summary of the Memorandum, see the Past News section, 21 April 2010, of the website of the Korean Central News Agency of the DPRK, available at: www.kcna.co.jp

In a 2008 assessment, the U.S. Director of National Intelligence told the Senate Select Committee on Intelligence that North Korea would ‘not attempt to use nuclear weapons against U.S. forces or territory unless it perceived the regime to be on the verge of military defeat and risked an irretrievable loss of control.’¹⁵⁸ North Korea has a visible habit of using its nuclear weapons capabilities to seek leverage in diplomatic negotiations and often increases the rhetoric associated with those weapons at times of difficulty or crisis in its engagement with the international community.¹⁵⁹

Security Drivers

The North Korean leadership, in the context of the suspended but politically unresolved 1950s conflict with South Korea and the United States, believes U.S. and South Korean military forces are a direct threat to North Korea’s survival.¹⁶⁰ Japan’s role as a major staging area for the U.S. military also categorises it as a potential enemy in the eyes of the DPRK regime.

According to the public statements of the North Korean government, the United States represents a particularly serious threat. Indeed, in the words of the regime itself, ‘the extreme nuclear threat from the United States has compelled the DPRK to have access to nuclear weapons.’¹⁶¹ Its Foreign Ministry Memorandum on the nuclear issue in April 2010 argued that: Koreans had been the second biggest victims of the U.S. atomic bomb attacks on Hiroshima and Nagasaki in 1945; the United States had threatened to use nuclear weapons on North Korea during the 1950-53 Korean War and had triggered a mass exodus of refugees from North to South Korea in the process; the United States had been the first to introduce nuclear weapons to the Korean Peninsula by transferring them from Japan to South Korea in the late 1950s; and that the United States has conducted military exercises for using its nuclear weapons against the DPRK since the late 1960s. In the circumstances, it went on; the DPRK has had no option but to develop nuclear weapons of its own.¹⁶²

North Korea has a visible habit of using its nuclear weapons capabilities to seek leverage in diplomatic negotiations

However, two other security drivers appear to be important in explaining North Korea’s nuclear programme. The first of these concerns the weakness of the country’s conventional military forces. Recent U.S. intelligence assessments have claimed the DPRK leadership perceives South Korean conventional military forces to be overwhelmingly superior, with the forces of the North thought to be plagued by aging weapons, increased diversion of the military to support domestic infrastructure projects, under investment in training, and only limited domestic production of combat systems.¹⁶³

Second, there is evidence that the regime in the North uses its nuclear and missile programmes to generate important export revenues. Although North Korea is forbidden from importing or exporting missiles, for example, under UN Security Council Resolutions 1718 and 1874, it has done so in the past and is widely believed still to do so. North Korea has sold Nodong missiles to several countries in the Middle East, South Asia, and North Africa, including Egypt, Iraq, Iran and Pakistan. Pakistan’s Hatf-5 missile, discussed earlier in this paper, is in fact closely related to the Nodong as a result, as is the Shehab-3 missile possessed by Iran.¹⁶⁴ The Al Kibar nuclear reactor secretly constructed by Syria, and attacked and destroyed by Israel in 2007, was also reportedly built with North Korean assistance.¹⁶⁵

The North Korean nuclear programme therefore appears to be driven both by a desire to compensate for conventional weakness in relation to perceived external threats, and by the need to find additional resources to sustain regime legitimacy at home. It is therefore difficult, when thinking about the drivers of the nuclear programme, to separate external concerns from concerns over the regime’s own survival.

161 See coverage of the Foreign Ministry Memorandum on the Korean Peninsula and Nuclear Weapons in the Past News section, 21 April 2010, of the website of the Korean Central News Agency (KCNA) of the DPRK, available at: www.kcna.co.jp

162 See KCNA coverage, *ibid.*

163 See Dennis Blair, ‘Annual Threat Assessment of the US Intelligence Community’, 2 February, 2010, to the Senate Select Committee on Intelligence, pp.14-15, available at: http://www.dni.gov/testimonies/20100202_testimony.pdf

164 See NTT’s ‘Overview of North Korean missile capabilities’, available at: http://www.nti.org/e_research/profiles/NK/Missile/capabilities.html#m_usudan

165 See Fiona Simpson, ‘The IAEA’s Dilemma with Syria’s Al Kibar Nuclear Site’, *Bulletin of the Atomic Scientists*, 6 May 2008, available at: <http://www.thebulletin.org/web-edition/features/the-iaea-s-dilemma-with-syria-s-al-kibar-nuclear-site>. Also see the link from this article to a US intelligence background briefing on the North Korean role at the Syrian site, available independently at: http://dni.gov/interviews/20080424_interview.pdf

158 See Mary Beth Nikitin, ‘North Korea’s Nuclear Weapons,’ Congressional Research Service Report RL34256, 12 February 2009, p.10.

159 Such as, for example, North Korea’s threats to increase its ‘war deterrent capabilities’ in 2008, to express displeasure at not being removed from the U.S. terrorism list. See Mary Beth Nikitin, ‘North Korea’s Nuclear Weapons,’ Congressional Research Service Report RL34256, 12 February 2009, p.10/11.

160 Steve Andreasen and Michael Gerson, ‘Deterrence Seen Through the Eyes of Other Nations,’ in George P. Shultz, Sidney D. Drell, and James E. Goodby (eds), *Deterrence: Its Past and Future*, Hoover Institution Press, Stanford, 2011, p. 182

Part 4: Conclusion

12. Conclusion

A number of notable themes emerge from the country by country analysis presented in this paper.

First, there has been a major reduction in the global nuclear weapons stockpile since the mid-1980s but since then, the number of nuclear weapon states has gone up. Nuclear weapons are present today in some of the most unstable and violence prone regions of the world, and in North East Asia, the Middle East and South Asia, there are serious conflict and proliferation concerns that suggest an increased potential for nuclear weapons use.

Second, long-term nuclear force modernisation or upgrade programmes are underway in all the currently nuclear armed states. Hundreds of billions of dollars are earmarked for spending over the next decade, not only in the United States and Russia but in major development programmes in China, India, Pakistan and elsewhere. Almost all of the nuclear armed states covered in this paper are continuing to produce new or modernized nuclear weapons and some, such as Pakistan and India, appear to be seeking smaller, lighter, warheads than they possess currently, to allow these either to be delivered to greater distances or to allow them to be deployed over shorter ranges and for more tactical purposes.

There is little sign in any of these nuclear armed states that a future without nuclear weapons is seriously being contemplated.

With regard to delivery systems, Russia and the United States have recommitted to maintaining a triad of land, sea and air forces for the long-term. China, India and Israel are seeking to build triads of their own. In the case of China and India, major ballistic missile programmes are underway, both to increase the range and sophistication of land-based systems and to build fleets of nuclear powered ballistic missile submarines. In the case of Israel, the size of its nuclear tipped cruise missile enabled submarine fleet is being increased and the country seems to be on course, on the back of its satellite launch rocket programme, for future development of an inter-continental ballistic missile. Pakistan is not only rapidly increasing the size of its warhead stockpile but is building new plutonium production reactors, which could add to its fissile material stocks and, like North Korea, it is seeking to rapidly enhance its missile capabilities. France, having recently completed the modernisation of its ballistic missile submarine fleet, is also introducing new and more capable bombers to the air component of its nuclear force, though at reduced aircraft numbers overall, and is introducing new and better nuclear warheads to both its sea-launched ballistic missiles and to its aircraft.

There is little sign in any of these nuclear armed states that a future without nuclear weapons is seriously being contemplated.

Third, it is clear that in all of these states nuclear weapons are currently seen as essential to national security and in several of them, nuclear weapons are assigned roles in national security strategy that go well beyond deterring a nuclear attack. This is the case in Russia, Pakistan, Israel, France and almost certainly in North Korea. India has left the door open to using nuclear weapons in response to chemical or biological weapons attacks. In fact, as the independent International Commission on Nuclear Non-Proliferation and Disarmament pointed out: ‘Only China limits the stated role to deterrence against the threat or use by others of nuclear weapons; all others keep open the option, to a greater or lesser extent, of using their nuclear weapons in response to other kinds of threats.’¹⁶⁶

Fourth, a common justification for the modernisation and upgrade programmes is strategic vulnerability, or potential vulnerability, in the face of nuclear and conventional force developments taking place elsewhere. The Russian nuclear programme, for example, is said to be a response to concerns over U.S. ballistic missile defence and advanced conventional capabilities like Conventional Prompt Global Strike, as well as to concerns over conventional weakness relative to China. The Chinese programme is justified by reference to these same developments in the United States and by reference to India’s programme. India’s programme, in turn, is driven partly by fear over Pakistan and China while Pakistan’s nuclear programme is justified by reference to Indian conventional force superiority. French nuclear weapons modernisation has been justified as a response to stockpiles elsewhere that ‘keep on growing’.

nuclear weapons are currently seen as essential to national security and in several of them, nuclear weapons are assigned roles in national security strategy that go well beyond deterring a nuclear attack.

Fifth, in some states, non-strategic nuclear weapons are seen to have a particular value as compensators for conventional force weakness relative to perceived or potential adversaries. These weapons are seen, in this regard, to provide the conventionally weak state with conflict escalation options short of an all out nuclear attack on an adversary, which may not be seen as

credible. This situation mirrors aspects of NATO nuclear doctrine during the Cold War. Nuclear weapons are therefore assigned war-fighting roles in military planning in countries like Russia and Pakistan. In Russia, this takes on the form of the nuclear de-escalation doctrine. In Pakistan, it is implied, but left ambiguous to confuse risk-calculations in the minds of any adversary, but principally India.

Sixth, although the New START Treaty between the United States and Russia arguably represents the most significant arms control advance in two decades, the Treaty contains significant gaps that mean it will not necessarily lead to significant reductions in the number of nuclear weapons held by both parties.

Whatever the current global rhetoric about nuclear disarmament from the nuclear armed states, in the absence of any further major disarmament or arms control breakthroughs, the evidence points to a new era of nuclear weapons modernisation and growth.

¹⁶⁶ See *Eliminating Nuclear Threats: A Practical Agenda for Policy-Makers, Report of the International Commission on Nuclear Non-Proliferation and Disarmament*, Canberra/Tokyo, 2009, p.29.

Beyond the United Kingdom: Trends in the Other Nuclear Armed States

Dr. Ian Kearns

Discussion Paper 1 of the **BASIC Trident Commission**

*An independent, cross-party commission to
examine UK nuclear weapons policy*

The BASIC Trident Commission

BASIC has set up an independent, cross-party commission to examine the United Kingdom's nuclear weapons policy and the issue of Trident renewal. The Commission is operating under the chairmanship of:

Lord Browne of Ladyton (Des Browne), former Labour Secretary of State for Defence;

Sir Malcolm Rifkind, former Conservative Defence and Foreign Secretary; and

Sir Menzies Campbell, former leader of the Liberal Democrats and Shadow Foreign Secretary.

Other members of the Trident Commission are:

Professor Alyson Bailes, Former Head of the Security Policy Department at the Foreign and Commonwealth Office

Sir Jeremy Greenstock, former UK Ambassador to the UN

Lord Guthrie of Craigiebank, former Chief of the Defence Staff

Professor Lord Hennessy of Nympsfield, Queen Mary, University College London

Lord Rees of Ludlow, Astronomer Royal and recent President of the Royal Society

Dr Ian Kearns, Chief Executive of the European Leadership Network.

It was launched on 9 February 2011 in Parliament. The Commission is:

- Examining the international context within which the decision on Trident renewal now sits;
- Assessing current UK nuclear weapons policy and the policy of the United Kingdom in efforts to promote multilateral nuclear disarmament and non-proliferation;
- Examining the costs associated with Trident renewal and any potential consequences for non-nuclear portions of the defence budget;
- Considering all possible future policy options with the potential to maintain UK national security while further strengthening efforts at multilateral nuclear disarmament and non-proliferation.

The Commission will report in late 2012.

Why the Commission is sitting

The last Labour Government committed to renewing Britain's nuclear deterrent in 2006-07. The current coalition government recommitted to this decision in principle in its October 2010 Strategic Defence and Security Review (SDSR), but also decided to delay the timetable for the construction of the replacement submarines until after the next election (which must take place by May 2015). This has created a window of opportunity for further deliberation. The Commission was convened to make the most of this opportunity.



We are living through a period of dramatic change in international affairs with new powers emerging, increasing nuclear proliferation risks within both the community of states and terrorist groups, and growing financial pressure on western defence budgets. There is a strong case, in the national context as well the international, for conducting a fundamental review of UK nuclear weapons policy. BASIC Trident Commission is filling the gap left by Government, by facilitating, hosting and delivering a credible cross-party expert Commission to examine this issue in depth.