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# **A New START Model for Transparency in Nuclear Disarmament**

**Tamara Patton, Pavel Podvig, and Phillip Schell**

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UNIDIR  
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## About the cover

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## FOREWORD

Transparency and accountability are essential elements of nuclear disarmament. The action plan adopted by the 2010 Nuclear Non-Proliferation Treaty (NPT) Review Conference brought new attention to this issue by asking the nuclear-weapon states to agree on a reporting standard that would help to evaluate progress towards reductions of nuclear arsenals and to establish an important confidence-building mechanism. A number of NPT states parties as well as non-governmental expert groups have tabled proposals outlining specific measures that the nuclear-weapon states could take to fulfil the recommendation of the 2010 action plan. The nuclear-weapon states have discussed the issue in a series of P-5 meetings in recent years; some states have already made commendable progress towards releasing information about nuclear arsenals and fissile material stocks. However, the goal of a universally accepted reporting standard remains elusive, owing to the complexity of the issue, which involves a great number of legal, technical, and political choices and requires an unprecedented degree of cooperation among all of the nuclear-weapon states.

In 2012 UNIDIR launched a project that approaches the development of a transparency regime as a process that should take full advantage of the decades of experience that has been accumulated in US–Russian nuclear arms control. The transparency arrangements implemented by the Russian Federation and the United States could provide a valuable model for the reporting mechanism anticipated in the 2010 action plan. Moreover, these arrangements could be a starting point for even more ambitious transparency measures that could include disclosure of detailed information about all components of nuclear arsenals and verification procedures.

This study outlines a first step in this process by presenting a model data-exchange arrangement based on the US–Russian New START treaty. As the study demonstrates, a data exchange of this kind is well within reach and there is little that would prevent the other nuclear-weapon states from joining the Russian Federation and the United States in disclosing information about their nuclear forces. Done on a voluntary basis at first, these steps would help build confidence and encourage dialogue and cooperation, to lay a foundation for more formal and comprehensive transparency arrangements.

I hope that this study will contribute to the discussion of transparency during the NPT review process and provide a model for practical action in implementing the goals set by the 2010 Review Conference.

Theresa Hitchens  
Director  
UNIDIR

## A NEW START MODEL FOR TRANSPARENCY IN NUCLEAR DISARMAMENT

### OVERVIEW

Nuclear disarmament is one of the key elements of the nuclear non-proliferation regime established by the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). Article VI of the treaty explicitly commits all states to “pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament”. The number of nuclear weapons has indeed been dramatically reduced in the last decades—it was estimated that in 2010 all nuclear-weapon states together had about 18,000 nuclear warheads in their arsenals, down from the peak of almost 70,000 in 1986.<sup>1</sup> It is clear, however, that nuclear arsenals can be reduced even further.

The NPT review process reinforced the obligation of article VI of the NPT by calling on all nuclear-weapon states to pursue “systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goals of eliminating those weapons”.<sup>2</sup> The 2010 NPT Review Conference action plan reaffirmed this commitment and identified transparency and accountability as an important part of the nuclear disarmament process. The action plan encouraged nuclear-weapon states “to agree as soon as possible on a standard reporting form and to determine appropriate reporting intervals for the purpose of voluntarily providing standard information”.<sup>3</sup> In the NPT review process non-nuclear-weapon states made a number of proposals regarding the information that they would like to see the nuclear-weapon states to disclose. Transparency was also one of the topics of the series of meetings held by the five NPT nuclear-weapon states (the P-5) since 2009. One of the agreements reached at the P-5 conference in Paris in 2011 established a working group that was tasked with development of a glossary of nuclear terms.<sup>4</sup> However, the P-5 have not yet adopted a coordinated approach towards transparency of their nuclear arsenals.

As of 2013, the only nuclear-weapon states that have an obligation to provide information about their nuclear forces are the Russian Federation and the United States. They exchange data, some of which they make public, as part of the New START agreement, which entered into force in February 2011.<sup>5</sup> States with smaller nuclear arsenals are reluctant to accept formal obligations regarding transparency of their arsenals, arguing that the two largest nuclear powers, which still hold about 95 per cent of all nuclear weapons, would have to undertake deep reductions before transparency could be established as a universal norm. Nevertheless, France and the United Kingdom unilaterally and voluntarily released a great deal of information about their nuclear forces, declaring the upper ceilings for the total number of nuclear warheads in their arsenals and as well as the number of

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1 This number does not include about 7,000 nuclear warheads that are believed to be scheduled for dismantlement. R.S. Norris and H.M. Kristensen, “Global nuclear weapons inventories, 1945–2010”, *Bulletin of the Atomic Scientists*, vol. 66, no. 4, 2010.

2 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, document NPT/CONF.1995/32 (Part I), 1995, annex, decision 2, para. 4(c).

3 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, document NPT/CONF.2010/50 (Vol. I)\*, 2010, § I(F)i, action 21.

4 Permanent Mission of France to the United Nations in New York, “First P5 follow-up meeting to the NPT Review Conference (Paris, June 30th–July 1st, 2011)—statement by the Spokesperson of the Ministry of Foreign and European Affairs”, 1 July 2011; US Department of State, “Third P5 conference: implementing the NPT”, 29 June 2012.

5 New START refers to the Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms.

operationally available warheads. The nuclear arsenal of China is largely non-transparent, although the Chinese government has declared its support of the principle of transparency.<sup>6</sup>

A coordinated approach to transparency of nuclear arsenals would serve a number of purposes. First, it would provide a mechanism of accountability in the obligation to pursue efforts to reduce nuclear weapons that nuclear-weapon states accepted during the NPT review process. But equally importantly, it would become a valuable confidence-building measure that could help strengthen global and regional stability and create an institutional framework for bringing all the nuclear-weapon states together in the nuclear disarmament process.

Development of a comprehensive accountability standard as called for in the 2010 NPT action plan would require strong political commitment on the part of the nuclear-weapon states. It would also have to address a number of legal and technical issues related to the differences in the size, structure, and operational practices of nuclear forces as well as to policies of maintenance and modernization of nuclear arsenals. Given the complexity of these issues, finding a coordinated approach to dealing with these differences might take considerable time. However, important elements of a future transparency regime are already in place in the US–Russian nuclear disarmament process. The legal and institutional framework created by the US–Russian nuclear disarmament treaties, New START in particular, could provide a practical template for transparency of all the nuclear arsenals of the NPT nuclear-weapon states.<sup>7</sup>

This report considers the practical aspects of using New START as a model for developing the transparency and accountability measures called for in the 2010 NPT action plan. It presents an overview of efforts to introduce transparency and accountability measures and of the status of transparency of nuclear arsenals of the NPT nuclear-weapon states. The report considers the structure of the US–Russian arrangements in this area and suggests the steps that all NPT nuclear-weapon states could take to join the Russian Federation and the United States in reporting on the status of their nuclear forces.

As the first step towards transparency, all nuclear-weapon states would disclose their aggregate numbers of deployed strategic delivery vehicles, deployed warheads, and the total number of deployed and non-deployed launchers in the format specified by New START. The report presents a model New START-type data exchange that reflects the status of strategic forces of all nuclear-weapon states at the date of the most recent US–Russian data exchange. A discussion of the assumptions that went into this model data exchange is included in annex A.

A more comprehensive transparency regime would involve exchange of detailed data on deployed and non-deployed strategic systems; missile, submarine, and air bases; as well as other facilities that support operations of strategic nuclear forces. The Russian Federation and the United States already exchange such data every six months. An online supplement to this report, available at [NuclearForces.org](http://NuclearForces.org), includes model data-exchange documents for all NPT nuclear-weapon states. The supplement also contains the information that has been used to prepare these documents as well as a detailed description of the structure of the strategic forces of each state and the system and facilities that are included in the documents. A model data-exchange document for the United Kingdom is included in annex B.

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6 Permanent Mission of the People's Republic of China to the United Nations Office at Geneva and other International Organizations in Switzerland, "Transparency in armaments", 16 April 2004, [www.china-un.ch/eng/cjkk/cjblc/cjlc/t85359.htm](http://www.china-un.ch/eng/cjkk/cjblc/cjlc/t85359.htm).

7 P. Podvig, "Broadening the disarmament agenda through START", *Bulletin of the Atomic Scientists*, 4 March 2009; J.M. Acton, *Low Numbers: A Practical Path to Deep Nuclear Reductions*, Carnegie Endowment for International Peace, 2011.

The New START framework would also allow the expansion of transparency beyond data exchange. The treaty contains detailed provisions for notification and verification measures that include on-site inspections. Also, New START-type arrangements could allow non-nuclear-weapon states to take part in some verification and inspection activities.

The results presented in this report demonstrate that New START provides a practical opportunity from which all nuclear-weapon states could take advantage of the experience that the Russian Federation and the United States have accumulated in their efforts to reduce nuclear arms. This opportunity should be used to build a universal transparency and accountability mechanism to advance the goals of the 2010 NPT action plan.

## TRANSPARENCY IN THE NPT REVIEW PROCESS

By joining the NPT, nuclear-weapon states recognized their responsibility to pursue negotiations on effective measures relating to cessation of the nuclear arms race at an early date and to reductions of their arsenals. However, while the NPT requires non-nuclear-weapon states to place their nuclear activities and materials under International Atomic Energy Agency (IAEA) safeguards, the treaty does not provide a mechanism that would ensure that the nuclear-weapon states are in compliance with their obligation to make progress towards nuclear disarmament. This issue has been addressed during the NPT review process, resulting in a number of decisions that reinforced the disarmament commitment and made first steps towards establishing basic transparency and accountability requirements.

The 1995 NPT Review Conference, which extended the treaty indefinitely, adopted an agreement on the Principles and Objectives for Nuclear Non-Proliferation and Disarmament that reaffirmed the commitment by the nuclear-weapon states to undertake “systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goals of eliminating those weapons”.<sup>8</sup> The Principles and Objectives also established the first elements of accountability in this process—the states parties expressed their desire to create a mechanism that would include periodic evaluations of the progress in achieving the goals of the treaty, including progress in nuclear disarmament. However, no practical steps in that direction had been made at the time.

The final document of the 2000 NPT Review Conference included more specific language regarding periodic evaluation of progress towards nuclear disarmament. The Conference required all states parties to submit “regular reports” on the implementation of article VI and on the earlier commitment to pursue “systematic and progressive efforts to reduce nuclear weapons”. This requirement was also included in the action plan adopted by the 2010 NPT Review Conference.<sup>9</sup> The 2010 action plan also included a specific proposal regarding accountability in the nuclear disarmament process by encouraging nuclear-weapon states to agree on a standard reporting form and to determine reporting intervals for providing information. The plan also invited the United Nations to establish a publicly accessible repository of the information provided by the nuclear-weapon states.

Following the Review Conference, the United Nations Office for Disarmament Affairs created a web page that will serve this purpose. However, since no information has yet been submitted, the page displays a statement of intent: “Information will be made available on this web page once

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8 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, document NPT/CONF.1995/32 (Part I), 1995, annex, decision 2, para. 4(c).

9 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, document NPT/CONF.2010/50 (Vol. I)\*, 2010, § I(A)vi, action 2.

action is taken in accordance with Action 21 of the Final Document of the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons".<sup>10</sup>

The 2010 action plan did not set any specific requirement for the reporting format or the timeline for reaching an agreement on information exchange, leaving these decisions to the nuclear-weapon states. However, it calls on the nuclear-weapon states to make progress towards a number of disarmament goals, which include reductions of nuclear stockpiles, enhancing transparency and increasing mutual confidence. The nuclear-weapon states are expected to report these undertakings to the 2014 NPT Preparatory Committee.<sup>11</sup> Transparency appears to be one of the areas where the nuclear-weapon states are expected to make significant progress.<sup>12</sup>

## STATUS OF TRANSPARENCY OF NUCLEAR FORCES

The current level of transparency of nuclear arsenals varies substantially across nuclear-weapon states. There is no international norm that would require the nuclear-weapon states to disclose information about their nuclear forces or a mechanism for them to do so. Some steps in the direction of increased transparency of nuclear forces have been made in the context of US–Russian nuclear arms control efforts and in voluntary declarations by individual states regarding aspects of their nuclear arsenals.

Of all the nuclear-weapon states, the United States has disclosed the most information about its nuclear arsenal. In addition to the data on the number of strategic launchers and deployed warheads provided in accordance with New START, the United States has also released data on the number of nuclear weapons in its active nuclear arsenal. In its most recent New START data report, the United States declared that in September 2012 it had 1,722 deployed strategic warheads.<sup>13</sup> The actual number of warheads in the US arsenal is larger—according to the warhead declaration, made in 2010, the United States had 5,113 nuclear weapons in its active force and “several thousand” retired warheads awaiting dismantlement.<sup>14</sup> According to independent estimates, there are about 3,000 retired warheads in the dismantlement queue.<sup>15</sup> The 2010 declaration also contained historical data on the size of the US active nuclear arsenal, which allowed the United States to demonstrate progress in reductions of its nuclear forces. However, the US government made no commitment to publish this kind of information on a regular basis. Also, some important information about the US nuclear arsenal remains unavailable. For example, the United States has not released data on the number of its nuclear warheads deployed in Europe. Independent estimates suggest that there are about 200 nuclear weapons deployed there.<sup>16</sup>

In contrast to the United States, the Russian Federation has never officially released data about its nuclear forces or fissile material holdings beyond what was required by international agreements, including US–Russian arms control treaties. Furthermore, the Russian Federation has never publicly

10 United Nations Office for Disarmament Affairs, “Repository of information provided by nuclear-weapon states”, [www.un.org/disarmament/WMD/Nuclear/Repository](http://www.un.org/disarmament/WMD/Nuclear/Repository).

11 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Final Document*, document NPT/CONF.2010/50 (Vol. I)\*, 2010, § I(B)iv, action 5.

12 US Department of State, “Third P5 conference: implementing the NPT”, 29 June 2012.

13 US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, fact sheet, 30 November 2012.

14 US Department of Defense, “Increasing transparency in the U.S. nuclear weapons stockpile”, fact sheet, 3 May 2010.

15 H.M. Kristensen and R.S. Norris, “U.S. nuclear forces, 2012”, *Bulletin of the Atomic Scientists*, vol. 68, no. 3, 2012, p. 86.

16 *Ibid.*

released detailed exchange data—most of the information that is available comes from the releases by the United States. In particular, only the aggregate numbers of operationally deployed warheads and deployed and non-deployed strategic launchers that are submitted as part of the biannual New START data exchange are publicly available.<sup>17</sup> These data show that in September 2012 the Russian Federation declared 1,499 deployed strategic warheads. As a result of the Russian Federation’s policy not to release detailed data, there is some uncertainty regarding the exact breakdown of the Russian numbers. Also, there is no reliable information about the number of nuclear weapons assigned to non-strategic systems. Independent estimates suggest that the Russian Federation has about 4,400 nuclear warheads in its arsenal. This number includes warheads in the active arsenal as well as those in reserve and storage. Additionally, about 5,500 warheads are believed to be awaiting dismantlement.<sup>18</sup>

Over the past two decades, France has made efforts to make its nuclear arsenal more transparent in some areas and has been more reserved in others. In 1994, President Mitterrand provided details about the number of French nuclear-weapon delivery systems, the number of nuclear tests France had conducted, and the approximate number of available nuclear warheads (about 500).<sup>19</sup> Most recently, President Sarkozy stated in 2008 that “France could and should be more transparent with respect to her nuclear arsenal than anyone ever has been”, and announced a planned reduction of the nuclear arsenal to fewer than 300 warheads.<sup>20</sup> Sarkozy also declared that “France is completely transparent because she has no other weapons beside those in her operational stockpile”. This statement seems to support the absence of a reserve of warheads, as is the case of some other nuclear-weapon states.

The United Kingdom has demonstrated a fairly high level of transparency of its nuclear forces over the past few decades. The 1998 Strategic Defence Review announced the United Kingdom’s commitment to be “as open as possible about Britain’s nuclear forces”.<sup>21</sup> The review also concluded that the United Kingdom needs less than 200 “operationally available warheads” and that it will limit the total number of weapons in its arsenal.<sup>22</sup> In the Strategic Defence Review completed in 2010, the United Kingdom confirmed its position on openness, stating that “greater transparency about nuclear programmes ... adds to international trust and security”. The review disclosed that the United Kingdom would reduce its requirement for operationally available warheads from fewer than 160 to no more than 120, reduce its overall nuclear weapons stockpile to no more than 180, and further reduce the number of operational missiles on each submarine.<sup>23</sup> Also, the 2010 Review did not alter the policy stated in the 1998 Review of having only one submarine on patrol at a time.<sup>24</sup>

China generally supports the concept of transparency in armaments but also calls for the thorough examination of specific transparency measures and a different treatment of each, depending on

17 US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, fact sheet, 30 November 2012.

18 H.M. Kristensen and R.S. Norris, “Russian nuclear forces, 2012”, *Bulletin of the Atomic Scientists*, vol. 68, no. 2, 2012.

19 Institut François Mitterrand, “François Mitterrand et la dissuasion nucléaire”, 22 February 2012, [www.mitterrand.org/Francois-Mitterrand-et-la.html](http://www.mitterrand.org/Francois-Mitterrand-et-la.html).

20 “Presentation of SSBM ‘Le Terrible’—speech by M. Nicolas Sarkozy, President of the Republic”, 21 March 2008, [www.ambafrance-uk.org/President-Sarkozy-s-speech-at,10430.html](http://www.ambafrance-uk.org/President-Sarkozy-s-speech-at,10430.html).

21 UK Ministry of Defence, *Strategic Defence Review*, 1998, supporting essay 5, para. 15.

22 UK Ministry of Defence, *Strategic Defence Review*, 1998, chp. 4, para. 64.

23 United Kingdom, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, 2010, p. 38.

24 UK Ministry of Defence, *Strategic Defence Review*, 1998, chp. 4, para. 67.

their implications for China's security. The Chinese position on nuclear transparency follows these principles:

China supports appropriate and feasible transparency measures in armaments in a bid to promote mutual trust between states and regions and to enhance world peace, security and stability. It should be emphasized that transparency in armaments is [a] means rather than [an end]. Under the current international situation, no country can support or achieve absolute transparency in armaments. When and at what stage a certain country can and should undertake what transparency measures must be guided by the basic principle of assured security for all states. Countries can define specific transparency measures consistent with their national or regional situation and requirements on the basis of voluntary choice or through consultations according to their specific surroundings and political, military and security conditions.<sup>25</sup>

Despite its commitment to transparency, China has revealed the least information about its nuclear arsenal and posture compared to the other NPT nuclear-weapon states. The only official statement regarding the size of its nuclear arsenal was made in 2004. The Chinese Foreign Ministry declared in a fact sheet that, "Among the nuclear-weapon states, China ... possesses the smallest nuclear arsenal".<sup>26</sup> Independent estimates suggest that China's arsenal includes about 180 weapons that could be assigned to various delivery systems.<sup>27</sup>

Even in the cases where states have provided data about their nuclear forces, the numbers are not fully comparable, complicating the effort to build a universal transparency and accountability regime. For example, the numbers of *deployed* warheads that are disclosed by the Russian Federation and the United States do not correspond to the number of *operationally available* warheads reported by the United Kingdom or to the overall size of the nuclear stockpile reported by France. Also, it is not entirely clear which standard should be applied to China's statement on the size of its nuclear arsenal.

## PROGRESS TOWARDS A COMMON STANDARD

The action plan adopted at the 2010 NPT Review Conference brought new attention to the effort to develop a mechanism that would allow the nuclear-weapon states to release information about their arsenals and demonstrate "systematic and progressive efforts to reduce nuclear weapons". As part of this effort, non-nuclear-weapon states have put forward a number of proposals that indicate their strong interest in creating a working transparency and accountability mechanism within the NPT review process.

In 2008, Japan submitted a proposal that the nuclear-weapon states should disclose information about their progress towards nuclear disarmament.<sup>28</sup> According to this proposal, that information would include the extent of reductions in nuclear stockpiles, the number of deployed warheads and delivery systems, as well as the status of fissile material production and plans to dispose of excess military material.

25 Permanent Mission of the People's Republic of China to the United Nations Office at Geneva and other International Organizations in Switzerland, "Transparency in armaments", 16 April 2004, [www.china-un.ch/eng/cjkk/cjblc/cjlc/t85359.htm](http://www.china-un.ch/eng/cjkk/cjblc/cjlc/t85359.htm).

26 Ministry of Foreign Affairs of the People's Republic of China, "Fact sheet: China: nuclear disarmament and reduction of", 27 April 2004, [www.fmprc.gov.cn/eng/wjbj/zjg/jks/cjkk/2622/t93539.htm](http://www.fmprc.gov.cn/eng/wjbj/zjg/jks/cjkk/2622/t93539.htm).

27 H.M. Kristensen and R.S. Norris, "Chinese nuclear forces, 2011", *Bulletin of the Atomic Scientists*, vol. 67, no. 6, 2011.

28 Preparatory Committee for the 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Cluster 1: Nuclear Disarmament: Working Paper Submitted by Japan*, document NPT/CONF.2010/PC.II/WP.10, 28 April 2008.

At the 2010 NPT Review Conference, Australia and New Zealand put forward a proposal that nuclear-weapon states submit information in four key areas—nuclear doctrine, policy regarding fissile materials, warhead and delivery vehicle numbers, and strategic and tactical reductions.<sup>29</sup> The proposal suggested that nuclear-weapon states could report the current numbers, expressed as reductions, of warheads and delivery vehicles during the NPT review cycle and submit information on projected reductions.

Most recently, a transparency proposal was developed by a group of non-nuclear-weapon states, known as the Non-Proliferation and Disarmament Initiative.<sup>30</sup> This proposal further developed the approach suggested by Australia and New Zealand in 2010 and accommodated earlier ideas regarding transparency as well.<sup>31</sup> The Initiative submitted its draft of a nuclear disarmament reporting form for consideration by the nuclear-weapon states ahead of the 2011 P-5 meeting in Paris.<sup>32</sup> So far, the nuclear-weapon states have not indicated that they are ready to accept the proposal as a basis for further discussions.<sup>33</sup>

According to the terms of the 2010 action plan, it is the responsibility of the nuclear-weapon states to come up with agreed definitions of the terms that will be used in the reporting form. First steps in that direction were made at the P-5 meetings in Paris in 2011 and in Washington, DC, in 2012. The P-5 established a working group, led by China, that will develop “an agreed glossary of definitions for key nuclear terms”.<sup>34</sup> This work, however, is not considered part of the effort to increase transparency of nuclear arsenals. Rather, the glossary is to be developed to “increase efficiency of P5 nuclear consultation” and “increase P5 mutual understanding and facilitate further P5 discussions on nuclear matters”.<sup>35</sup> While agreed definitions of key terms could greatly facilitate discussions of nuclear issues, unless these definitions have strictly defined meanings they would fall short of the standard that would be required for the purposes of monitoring progress by the nuclear-weapon states towards meeting their nuclear disarmament obligations.

While these initiatives represent significant progress in creating a mechanism for accountability in nuclear disarmament, implementation of these proposals is likely to encounter a number of difficulties. Most importantly, in the absence of detailed definitions of key terms to be used in the reporting forms—such as warhead or delivery vehicle—reported numbers might not provide

29 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Working Paper Submitted by Australia and New Zealand*, document NPT/CONF.2010/WP.40, 22 April 2010.

30 The group is also known as the Friends of Non-Proliferation Treaty or the Berlin Ten. It includes Australia, Canada, Chile, Germany, Japan, Mexico, the Netherlands, Poland, Turkey, and the United Arab Emirates.

31 Preparatory Committee for the 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Transparency of Nuclear Weapons: The Non-Proliferation and Disarmament Initiative*, document NPT/CONF.2015/PC.I/WP.12\*, 20 April 2012.

32 Statement of the Third Ministerial Meeting of the Non-Proliferation and Disarmament Initiative, New York, 21 September 2011.

33 Permanent Mission of France to the United Nations in New York, “First P5 follow-up meeting to the NPT Review Conference (Paris, June 30th–July 1st, 2011)—statement by the Spokesperson of the Ministry of Foreign and European Affairs”, 1 July 2011, [www.franceonu.org/france-at-the-united-nations/un-express-922/article/first-p5-follow-up-meeting-to-the](http://www.franceonu.org/france-at-the-united-nations/un-express-922/article/first-p5-follow-up-meeting-to-the).

34 Ibid.; US Department of State, “Third P5 conference: implementing the NPT”, 29 June 2012, [www.state.gov/r/pa/prs/ps/2012/06/194292.htm](http://www.state.gov/r/pa/prs/ps/2012/06/194292.htm).

35 Ibid.; Permanent Mission of France to the United Nations in New York, “First P5 follow-up meeting to the NPT Review Conference (Paris, June 30th–July 1st, 2011)—statement by the Spokesperson of the Ministry of Foreign and European Affairs”, 1 July 2011, [www.franceonu.org/france-at-the-united-nations/un-express-922/article/first-p5-follow-up-meeting-to-the](http://www.franceonu.org/france-at-the-united-nations/un-express-922/article/first-p5-follow-up-meeting-to-the).



a meaningful picture of progress. Unless there is a clear, mutual understanding of what is involved in nuclear reductions, data in reporting forms might actually tell a distorted story of disarmament efforts and even become a source of misunderstanding and distrust.

The lack of commonly accepted definitions of the terms that describe nuclear arsenals reflects the complexity of developing a framework that would accurately take into account various aspects of operations of nuclear weapons complexes. There are substantial differences in the structure of nuclear forces, capabilities of delivery systems, operational procedures, nuclear warhead handling and maintenance systems, and the fissile material production complexes, which make it extremely difficult to come up with a uniform set of definitions that would be applicable in all nuclear-weapon states.

For example, nuclear warheads could be installed on operationally deployed delivery vehicles, such as land-based or submarine-launched ballistic missiles. Warheads could be stored in close proximity to their delivery systems or moved to a centralized storage facility. Warheads in storage could be considered part of the active arsenal, ready to be deployed, or they could be designated for dismantlement.

The situation is even more complicated with regard to delivery vehicles. A number of delivery systems, such as bombers, cruise missiles, or ballistic missiles, can be used to deliver conventional as well as nuclear weapons. In this situation, without an agreed understanding of what kinds of nuclear warheads and delivery vehicles should be accounted for, a disclosure of aggregate numbers would reveal very little about the actual status of nuclear arsenals or progress towards nuclear disarmament.

## **TRANSPARENCY IN US–RUSSIAN NUCLEAR ARMS CONTROL**

Most of the issues associated with accurate reporting on nuclear disarmament have been successfully resolved in the US–Russian nuclear arms control process. In the long history of bilateral arms control, the United States and the Russian Federation have created increasingly elaborate legal and institutional mechanisms to support their efforts to limit and reduce nuclear arsenals.

The first transparency measures were implemented in the SALT I agreements, signed in 1972,<sup>36</sup> in which the parties agreed not to interfere with national technical means, such as satellite observation, that were used to verify compliance. The next arms control agreement negotiated by the United States and the Soviet Union, SALT II, included a limited exchange of data about the composition of strategic nuclear forces, but did not provide for other transparency measures or include inspection procedures. Nevertheless, the SALT agreements confirmed the essential role of transparency in nuclear arms control.

In the 1980s, the United States and the Soviet Union achieved a significant breakthrough in the area of transparency. The Intermediate-Range Nuclear Forces (INF) Treaty, signed in 1987, included provisions for exchange of detailed data on intermediate-range missiles, as well as for on-site inspections to verify information submitted in the data exchange and elimination of missiles, and for monitoring of production facilities. The INF Treaty also established an important precedent by directly involving non-nuclear-weapon states in nuclear disarmament activities. First, the United States and the Soviet Union concluded separate agreements with the states that had missile bases and other facilities on their territories in order to allow inspection activities there.<sup>37</sup> Second, after

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36 SALT refers to the Strategic Arms Limitation Talks.

37 The United States signed agreements with West Germany, the United Kingdom, Belgium, Netherlands, and Italy. The Soviet Union had agreements with East Germany, Poland, Czechoslovakia, and Hungary.

the breakup of the Soviet Union in 1991, the Russian Federation and most other former Soviet republics were recognized as successor states. Four of the states that had inspectable facilities on their territory—the Russian Federation, Belarus, Kazakhstan, and Ukraine—actively participated in the treaty activities, which included data exchange, consultations, notifications, and inspections. Since inspection activities of the INF Treaty ended in 2001, these states continue to exchange information as required by the treaty.<sup>38</sup> Since the treaty is of unlimited duration, the data exchanges will continue as long as the treaty remains in force.

The data exchange, notification, and inspection provisions were also included in the US–Soviet START I Treaty that reduced strategic nuclear arsenals.<sup>39</sup> The treaty, signed in 1991, required the parties to submit biannual declarations that contained data on strategic nuclear forces, and included provisions for notification on a range of activities related to deployment and operations of nuclear forces as well as conversion and elimination of delivery vehicles and their launchers. After the dissolution of the Soviet Union, four former Soviet states became parties to the treaty—the Russian Federation, Belarus, Kazakhstan, and Ukraine. Between 1994 and 2009, while the treaty remained in force, all five parties to the treaty exchanged information on their strategic forces and participated in inspection activities.<sup>40</sup>

The next US–Russian arms control agreement, the Strategic Offensive Reductions Treaty (SORT), signed in 2002 in Moscow, demonstrated that progress towards greater transparency cannot be taken for granted. The treaty committed the Russian Federation and the United States to reducing their respective nuclear arsenals to between 1,700 and 2,200 “strategic nuclear warheads”, but never specified the meaning of this term.<sup>41</sup> Even after the treaty entered into force, the parties did not develop a common approach to accounting for the warheads limited by the agreement. Instead, each state used its own definition, which called into question verifiability and irreversibility of the reductions and undermined the confidence-building value of the treaty. Also, the treaty included no verification measures that would help resolve the uncertainty surrounding the terms of the agreement.

New START, which was signed by the United States and the Russian Federation in April 2010 and entered into force in February 2011, superseded SORT and returned to the practice of accountability that was established by earlier US–Russian arms control agreements. Moreover, the treaty set a new standard for transparency in US–Russian nuclear arms control. New START preserved the key elements of the bilateral transparency regime—detailed definitions, provisions for regular data exchange, notifications, and inspections, as well as institutional mechanisms to support implementation of the treaty. The treaty also introduced provisions that require disclosure of the actual number of warheads deployed on strategic delivery systems, so that the data released by the parties more accurately reflect the operational status of the nuclear forces and progress towards the reduction of nuclear arsenals.

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38 Statement of Jamie F. Mannina, Spokesman in the US Department of State’s Bureau of Arms Control, Verification and Compliance, 17 December 2012, available at [http://russianforces.org/blog/2012/12/start\\_and\\_inf\\_treaty\\_inspectio.shtml](http://russianforces.org/blog/2012/12/start_and_inf_treaty_inspectio.shtml).

39 START I refers to the Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms.

40 Statement of Jamie F. Mannina, Spokesman in the US Department of State’s Bureau of Arms Control, Verification and Compliance, 17 December 2012, available at [http://russianforces.org/blog/2012/12/start\\_and\\_inf\\_treaty\\_inspectio.shtml](http://russianforces.org/blog/2012/12/start_and_inf_treaty_inspectio.shtml).

41 Treaty Between the United States of America and the Russian Federation on Strategic Offensive Reductions, article I.

## NEW START TRANSPARENCY PROVISIONS

New START established three central limits on the strategic nuclear forces of the Russian Federation and the United States. It requires the parties to reduce the number of deployed strategic delivery vehicles to no more than 700 and the number of deployed warheads to no more than 1,550. Also, the total number of launchers, deployed and non-deployed, should be reduced to no more than 800. The reductions will have to be completed by the end of the seven-year period since entry into force—by February 2018. After that, the treaty provisions will remain in force until 2021. The parties will also have the option of extending the treaty for five years.

In terms of the numbers, the reductions called for in New START are relatively modest. In fact, the first data exchange showed that, at the time the treaty entered into force in February 2011, the Russian Federation was already below the treaty limits on deployed systems—it had 1,537 deployed warheads on 521 deployed strategic delivery vehicles. The numbers declared by the United States were higher—1,800 deployed warheads and 882 deployed strategic delivery vehicles—but still close to the treaty limits.<sup>42</sup> Neither state will have difficulty reducing its forces below the limits in the seven years allowed for treaty implementation.

Even though New START does not require significant reductions of nuclear arsenals, it makes an extremely valuable contribution to nuclear disarmament. The treaty preserves and strengthens the legal and institutional framework of strategic arms control that allows reductions of nuclear forces to proceed in a transparent and verifiable manner. New START also includes provisions that make most of the reductions of nuclear forces irreversible.

The treaty limits three categories of strategic delivery systems—land-based intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs), and heavy bombers. It defines an ICBM as a ballistic missile with a demonstrated range of more than 5,500km. For an SLBM to be covered by New START, it has to have a demonstrated range of more than 600km. A heavy bomber is defined as either a bomber with a range of more than 8,000km or a bomber that can carry long-range nuclear air-launched cruise missiles (long range defined as more than 600km).<sup>43</sup>

New START also specifies that in order to be counted against the limit of 700 deployed delivery systems, a ballistic missile must be installed in a launcher—a silo, a road-mobile launcher, or a launch tube on a submarine. All heavy bombers that fit the definition and located at declared air bases are also counted as deployed unless they are converted to non-nuclear missions according to a procedure described in the treaty. The treaty further specifies that all re-entry vehicles installed on deployed ballistic missiles should be counted against the limit of 1,550 operationally deployed warheads. One warhead should be counted for each deployed bomber. Finally, the treaty accounts for all launchers, deployed or non-deployed, as a way to limit the maximum number of ballistic missiles that each party could deploy and therefore provide a degree of irreversibility to the reductions.

To support implementation of the treaty, New START requires the parties to exchange biannual reports that provide detailed information on the systems limited by the treaty. These reports contain data on the number of deployed delivery vehicles, their locations, and the number of deployed warheads at each operational base. The reports also provide information about non-deployed

42 The Russian Federation and the United States declared 865 and 1,124 deployed and non-deployed strategic launchers accordingly. US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, fact sheet, 1 June 2012.

43 Protocol to New START, part I, paras. 37, 77, 23, 41 respectively.

launchers—these include silos without missiles, mobile launchers at production and storage facilities, and training and test launchers and bombers. Even though the treaty does not limit the number of non-deployed delivery vehicles, the data exchange includes detailed information about them. For the first time in the history of nuclear arms control, each missile or aircraft, as well as each missile launcher, whether deployed or not, is assigned a unique identification number that can be used to trace its movements. Also, although the biannual reports do not contain data on the number of warheads (that is, re-entry vehicles) installed on individual missiles, this information could be disclosed for the purposes of inspections activities.

To verify the correctness of the information provided in the data exchanges, New START includes a number of provisions that facilitate verification. It prohibits interference with national technical means of verification, such as satellite observation, and includes provisions for on-site inspections. Each party is allowed to conduct up to 18 inspections a year to confirm the accuracy of the data exchange reports. Ten of these inspections can be conducted at the operational bases to verify the information about the number of delivery vehicles located there and the number of warheads deployed on missiles or the number of nuclear armaments that are carried by bombers. Eight inspections can be used to access other facilities declared in the treaty—storage sites, training facilities, test ranges, as well as conversion and elimination sites.

In addition to the biannual data exchange, the treaty requires the parties to give prompt notification of any change in the data provided in the report. Also, the parties should notify each other of all significant events concerning strategic weapons, such as movements of missiles and bombers, major exercises, and production or elimination of delivery systems. Notifications are handled by national Nuclear Risk Reduction Centers, established in 1988 to facilitate time-sensitive communication between the United States and the Soviet Union and since then expanded to serve a range of bilateral and multilateral treaties and agreements.<sup>44</sup>

The treaty established the Bilateral Consultative Commission that is responsible for resolving questions about compliance with the treaty and ensuring its viability and effectiveness. The Commission holds biannual meetings in Geneva to discuss issues of treaty implementation. If necessary, the Commission could also discuss other issues related to the treaty, such as new kinds of strategic arms.<sup>45</sup>

Even though the New START transparency and accountability provisions were developed in the context of bilateral US–Russian nuclear arms control, they could be applied to the nuclear arsenals of other nuclear-weapon states. The key advantage of New START is that it provides a legal and organizational framework for nuclear reductions that has been thoroughly tested in practice. Extending this framework to all nuclear-weapon states would be a natural and direct way of building a comprehensive system that could ensure transparency and accountability in nuclear disarmament.

It is very important that the treaty provides a clear set of definitions to describe components of the nuclear forces and their operational status, so that the information submitted by the parties is comparable and can be interpreted in an unambiguous way, especially in those cases where definitions used by individual states are different from those specified in New START.<sup>46</sup> By requiring the parties to account for operationally deployed delivery systems and warheads specified in the treaty, New START makes it possible to closely track progress towards nuclear force reductions. Also,

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44 US Department of State, Bureau of Arms Control, Verification and Compliance, “United States Nuclear Risk Reduction Center (NRRC)”, 24 October 24 2012.

45 Protocol to New START, part 6, § I.

46 China, for example, defines an ICBM as having a range greater than 8,000km, whereas New START specifies a range greater than 5,500km. See for example J.W. Lewis and Hua Di, “China’s ballistic missile programs, technologies, strategies, goals”, *International Security*, vol. 17, no. 2, 1992, p. 6.

by limiting the number of launchers, the treaty sets an upper bound for the number of strategic nuclear warheads, which is a general indicator of progress towards eliminating nuclear arms.

Another extremely important element of the treaty is the organizational structure to support its implementation that the Russian Federation and the United States have been building over more than 20 years. The key components of the New START implementation system include the Bilateral Consultative Commission, the Nuclear Risk Reduction Centers, and the national organizations that conduct the on-site inspections required by the treaty. The work of these institutions is one of the most valuable aspects of the US–Russian arms control process and the experience gained during implementation of previous nuclear disarmament agreements is hard to overestimate. For example, implementation of the INF Treaty reductions involved more than 850 on-site inspections.<sup>47</sup> During the 15-year implementation period of the START Treaty, between 1994 and 2009, the United States and the Russian Federation conducted more than 1,100 inspections.<sup>48</sup> From the entry into force of New START until the end of 2012, they also had conducted more than 40 on-site inspections and exchanged almost 3,000 notifications.<sup>49</sup> The involvement of all nuclear-weapon states in such activities would serve as an extremely important tool in fostering cooperation and confidence-building among them.

## **PRACTICAL STEPS TOWARDS TRANSPARENCY AND ACCOUNTABILITY**

Participation by all nuclear-weapon states in a New START-type transparency regime could be accomplished through a series of voluntary initiatives by individual states, done either in coordination or unilaterally. Each state would decide on what kind of information it would like to release, the amount of information that would be openly available, and the activities that it would be willing to participate in. Unlike the Russian Federation and the United States, other nuclear-weapon states do not have to assume legal obligations regarding specific limits on nuclear arsenals. What is important is that the states use the legal and institutional framework of the treaty to demonstrate progress in their “systematic and progressive efforts to reduce nuclear weapons” to which they made a commitment during the NPT review process.

### **AGGREGATE DATA ON THE STATUS OF STRATEGIC FORCES**

As the first step towards transparency of their nuclear arsenals, the other nuclear-weapon states could join the Russian Federation and the United States in disclosing information on their strategic nuclear forces in the form defined by New START—the aggregate numbers of deployed delivery systems, deployed warheads, and deployed and non-deployed launchers. Such reporting would use the legal framework developed in the treaty to ensure that the same set of definitions is consistently applied to all nuclear arsenals.

Most of the information that would be released at this stage is already available to the public. In addition to the Russian Federation and the United States, which report these data as part of the New START implementation process, France and the United Kingdom have already made publicly available most of the information that would be required to prepare New START-type reports. There is less information available about China’s strategic forces, but open-source data provide a good basis for an estimate.

47 US Department of Defense, Defense Treaty Inspection Readiness Program, “Intermediate-Range Nuclear Forces (INF) Treaty”, <http://dtirp.dtra.mil/TIC/synopses/inf.aspx>.

48 US Department of Defense, Defense Treaty Inspection Readiness Program, “New Strategic Arms Reduction Treaty (New START) (NST) and predecessors”, <http://dtirp.dtra.mil/TIC/synopses/start.aspx>.

49 Ibid.

**Table 1.** Example New START-type aggregate data report (as of 1 September 2012)<sup>50</sup>

Category of data	China	France	Russian Federation	United Kingdom	United States
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	60	48	491	24	806
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	0	288	1,499	88	1,722
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	109	64	884	64	1,034

Table 1 shows what a New START-type aggregate data report would look like for all nuclear-weapon states. The numbers presented in the table reflect only those delivery systems that are covered by New START provisions—ICBMs, SLBMs, and heavy bombers. China would report as deployed its estimated 60 land-based ICBMs; it would also include as non-deployed the 36 launchers on its three ballistic missile submarines that have not yet reached operational status, as well as some launchers that are used for tests and training. As China is widely believed to keep nuclear warheads separately from its deployed ICBMs, no deployed warheads would be accounted for in a New START-type report. France and the United Kingdom would include deployed SLBMs and their launchers. Each of these two states has four ballistic missile submarines, of which some could be in overhaul, so their launchers would be counted as non-deployed. At the date of the model data exchange, 1 September 2012, France had one submarine in overhaul and the United Kingdom had two submarines without missiles on board.

A summary of the analysis that was used to obtain these estimates and a breakdown of the numbers by categories of strategic systems are presented in annex A. Since the numbers for China, France, and the United Kingdom are not based on official data, the actual numbers of deployed delivery systems and their warheads might be different from those in the table.

A commitment to publish the aggregate numbers would also help strengthen the process of consultation among the nuclear-weapon states. In order to ensure accuracy and consistency of the data, states would need to establish a mechanism that would coordinate interpretation of the treaty provisions as they apply to different nuclear forces. This could be done within the framework of the current P-5 meeting process or in bilateral discussions with the Russian Federation or the United States. Regardless of the format, these discussions would be an invaluable tool for building confidence and trust among all the nuclear-weapon states.

50 Data for the United States and the Russian Federation come from the biannual exchange required by New START, which contained data declared current as of 1 September 2012; see US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, fact sheet, 30 November 2012. Data for China, France, and the United Kingdom are estimates based on open-source information.

## DETAILED DATA EXCHANGE REPORTS

Disclosure of aggregate numbers that reflect the status of strategic forces would provide a basic level of transparency in nuclear arsenals. The next step towards greater openness of nuclear forces would involve publication of detailed reports similar to those that the Russian Federation and the United States exchange every six months. In addition to aggregate numbers, the biannual reports include information about deployed and non-deployed delivery systems, their launchers and supporting facilities, as well as technical characteristics of missiles and aircraft. These data would provide a fuller account of the developments related to strategic nuclear forces and allow accurate evaluation of progress in reductions of nuclear arsenals.

Disclosure of this information would be a significant advance in transparency of nuclear forces for all states involved in the process, since today no state publicly releases information about strategic nuclear arsenals with the amount of detail specified in New START. The treaty, of course, requires the Russian Federation and the United States to submit this information to each other, but it allows them to withhold the data from the public. The Russian Federation has chosen not to release any of its New START data. The United States makes public an unclassified version of the document, withholding some of the data.

Most states would consider the information contained in the exchange reports required by New START rather sensitive and would be reluctant to release it to the public or share it with other states. However, the experience of the Russian Federation and the United States, which have been regularly exchanging this kind of information for more than 20 years, strongly suggests that a New START-type data exchange would have no significant effect on the security of nuclear forces. Publication by the United States of the unclassified version of its New START report also indicates that the data in the reports could be safely released to the public.

In fact, most of the information that would be included in a detailed New START-type data exchange could be obtained from open sources, ranging from official government statements and documents to intelligence estimates and satellite imagery. To illustrate this point, a supplement to this report, available online at [NuclearForces.org](http://NuclearForces.org), presents model New START-type exchange documents for all five NPT nuclear-weapon states that are based on the analysis of publicly accessible data. As an example of the information presented in the supplement, annex B contains a model New START-type report for the United Kingdom.

These documents demonstrate that, for the most part, locations of missile, submarine, and air bases, as well as locations of other facilities and main technical characteristics of the strategic delivery systems, are known with fairly high accuracy. At the same time, the information about non-deployed missiles, the number of warheads deployed at individual bases, and unique identification numbers of delivery vehicles and launchers is normally not available in the public domain. It should be noted, though, that with the exception of the information about non-deployed missiles, these data are not critical from the point of view of establishing transparency of nuclear arsenals.

Indeed, the unclassified version of the New START report that was published by the United States provides a model that all other states could follow. The public version of the report withholds coordinates of the facilities listed, such as missile silos, submarine and air bases, the number of deployed warheads at each base, and unique identifiers of delivery vehicles and launchers. This format provides enough information to assess the status of strategic nuclear forces without disclosing potentially sensitive information.

## FURTHER STEPS TOWARDS TRANSPARENCY

New START also provides a mechanism that could extend transparency of nuclear arsenals beyond regular disclosure of information about the status of strategic forces. The data exchange process could provide an opportunity to strengthen the mechanisms of communication between states that allow them to share military and other information. The Russian Federation and the United States use their Nuclear Risk Reduction Centers to handle the New START data exchange, notifications, and information about inspections. The centres are also used to facilitate implementation of other agreements and treaties, bilateral as well as multilateral.<sup>51</sup> China, France, and the United Kingdom also participate in various data exchange arrangements that handle information related to their treaty obligations.

As members of the Organization for Security and Co-operation in Europe (OSCE), France and the United Kingdom take part in the OSCE Communications Network that is used to provide a way to securely share information within the organization.<sup>52</sup> The Nuclear Risk Reduction Centers operate as nodes of the OSCE network, so it could be used to transmit the New START-type data between different states and handle the related notifications. The Russian Federation's centre also maintains direct contact with its counterpart in China, which allows the two states to exchange information on implementation of agreements that regulate deployment of military forces in the border regions and mutual notifications of ballistic missile launches.<sup>53</sup> These communication links could be used to help establish information exchange channels between China and other states.

New START also includes detailed verification procedures that are designed to ensure accuracy of the information on strategic forces supplied by the parties. These procedures include a ban on interference with national technical means of verification, exhibits of delivery systems, exchange of telemetry information, and detailed provisions for on-site inspections. Extending these verification activities to all nuclear-weapon states would be an important trust- and confidence-building measure through creating institutional arrangements to support the nuclear disarmament process.

The NPT nuclear-weapon states already participate in a range of verification and inspection activities related to arms control and disarmament treaties, such as the Chemical Weapons Convention, the Treaty on Conventional Forces in Europe, the Open Skies Treaty, and bilateral agreements. Even though only the Russian Federation and the United States currently conduct inspections of strategic nuclear force facilities, all the nuclear-weapon states have the organizational structure that could support verification and inspection activities of a New START type.

The inspections could be conducted on a voluntary basis at the initiative of individual states. In most cases, actual on-site inspection activities would require a formal agreement between the governments that would regulate access of foreign inspectors to the facilities, non-disclosure of information obtained during inspections, and other legal issues. However, there is no reason to believe that these issues could not be resolved on a bilateral or multilateral basis based on the

51 US Department of State, Bureau of Arms Control, Verification and Compliance, "United States Nuclear Risk Reduction Center (NRRC)", 24 October 2012, <http://www.state.gov/t/avc/rls/199564.htm>; Russian Ministry of Defence, "Natsional'nyy tsentr po umen'sheniyu yadernoy opasnosti [National Nuclear Risk Reduction Center]", [http://structure.mil.ru/structure/ministry\\_of\\_defence/details.htm?id=11148@egOrganization](http://structure.mil.ru/structure/ministry_of_defence/details.htm?id=11148@egOrganization).

52 Organization for Security and Co-operation in Europe, "The OSCE Conflict Prevention Centre", fact sheet, [www.osce.org/cpc/13717](http://www.osce.org/cpc/13717).

53 Russian Ministry of Defense, "Natsional'nyy tsentr po umen'sheniyu yadernoy opasnosti [National Nuclear Risk Reduction Center]", [http://structure.mil.ru/structure/ministry\\_of\\_defence/details.htm?id=11148@egOrganization](http://structure.mil.ru/structure/ministry_of_defence/details.htm?id=11148@egOrganization); "Russia and China to exchange launch notifications", [RussianForces.org](http://RussianForces.org), 21 October 2010, [http://russianforces.org/blog/2010/10/russia\\_and\\_china\\_to\\_exchange\\_.shtml](http://russianforces.org/blog/2010/10/russia_and_china_to_exchange_.shtml).



experience of other arms control agreements. To facilitate this process, the Russian Federation and the United States could invite other states to conduct demonstration inspections at their facilities in order to share their experience.

Non-nuclear-weapon states could also be involved in New START-type transparency arrangements. The precedent for this was set by Belarus, Kazakhstan, and Ukraine, which became parties to the INF and START treaties alongside the Russian Federation and the United States after the dissolution of the Soviet Union. During 1994–2009, when the START treaty was in force, these states regularly submitted the data required by the treaty and participated in inspections in the United States (even though most of the inspections were conducted by the Russian Federation). The United States also inspected facilities located in these countries. Belarus, Kazakhstan, and Ukraine participated in the inspection activities of the INF Treaty and continue to exchange declarations and notifications required by that agreement.<sup>54</sup>

## BEYOND NEW START

The New START framework provides a precise but extremely flexible tool for building a structure of transparency and accountability in nuclear disarmament. First of all, it gives nuclear-weapon states a template for reporting on the status of nuclear forces in accordance with a common well-defined standard. Just as importantly, it would help strengthen the current mechanism for consultation among nuclear-weapon states by bringing into the discussion the issues of force structures, deployment practices, and readiness status of forces. These discussions could become a valuable confidence-building tool that would allow for expanding the transparency measures to more detailed information exchange and then to verification activities, including on-site inspections.

Considered in the context of the transparency proposals that were made during the NPT review process, the data provided by New START reporting would be incomplete at first, as it would not include information about nuclear doctrine, policy regarding fissile materials, numbers of nuclear warheads in reserve, alert status of deployed weapons, and numbers of non-strategic weapons. However, as the states build mutual confidence and gain experience in dealing with New START-type procedures, they could expand transparency beyond the original framework.

While the New START provisions do not cover non-strategic weapons and delivery systems, its approach could be applied to such weapons as well. In most cases, warheads associated with non-strategic systems would not be considered deployed as defined in New START, which would be reflected in the reports. The treaty also provides a procedure for distinguishing nuclear and non-nuclear delivery systems, which could be adapted to cover non-strategic armaments. An arrangement that would cover non-strategic systems could use the experience of the INF Treaty as well as that of New START.

The treaty provisions do not directly address the alert status of the deployed weapons. At the same time, the information provided in the data exchange would give a good understanding of the degree of readiness of various delivery systems. In most cases, measures that reduce the alert level of individual weapon systems would be reflected as a change of their deployment status. Furthermore,

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54 US Department of State, Bureau of Arms Control, Verification and Compliance, “Treaty between the United States of America and the Union of Soviet Socialist Republics on the Elimination of their Intermediate-Range and Shorter-Range Missiles (INF Treaty)”, [www.state.gov/t/avc/trty/102360.htm](http://www.state.gov/t/avc/trty/102360.htm); Statement of Jamie F. Mannina, Spokesman in the US Department of State’s Bureau of Arms Control, Verification and Compliance, 17 December 2012, available at [http://russianforces.org/blog/2012/12/start\\_and\\_inf\\_treaty\\_inspectio.shtml](http://russianforces.org/blog/2012/12/start_and_inf_treaty_inspectio.shtml).

in most cases the procedures of New START could be applied to verification of de-alerting measures should the nuclear-weapon states agree to implement them.

Information about nuclear warheads in reserve would not be immediately available under New START-type reporting arrangements. However, New START-type reports would provide information about non-deployed weapons and launchers that could be used to estimate the size of strategic nuclear reserves. If transparency arrangements are extended to non-strategic delivery systems, they would provide a degree of accountability regarding the total size of nuclear weapon stocks. After the first elements of a transparency regime are in place, states would find it easier to move towards greater openness of information about all categories of nuclear weapons.

Transparency in nuclear disarmament is a process as much as it is a goal. Specific arrangements would most certainly evolve as the nuclear-weapon states begin to share information about their nuclear arsenals and become increasingly involved in cooperative efforts to reduce them. Adopting the New START rules and procedures would be a first practical step in that direction that would help create a confidence-building mechanism to facilitate additional transparency and further nuclear reductions. Such a process would mark significant progress towards fulfilling the transparency commitments of the 2010 NPT action plan and the disarmament and non-proliferation goals of the NPT itself.

## ANNEX A. NEW START-TYPE DATA FOR NUCLEAR WEAPON STATES

### CHINA

China's nuclear arsenal is estimated to consist of approximately 180 weapons that could be assigned to various operational delivery systems. Currently, only China's land-based ballistic missiles and nuclear-equipped aircraft are considered operational. The sea-based leg of China's nuclear deterrent has not yet reached operational status. Additional warheads may be in reserve, comprising a total stockpile of about 240 warheads.<sup>1</sup> China's nuclear-capable land-based ballistic missile arsenal consists of approximately 130 missiles of six types: the DF-5A, DF-31, and DF-31A intercontinental-range missiles, and the DF-3A, DF-4, and DF-21 ballistic missiles of shorter range. China's sea-based nuclear force consists of the JL-1 and JL-2 SLBMs. All of China's ballistic missiles are believed to carry a single warhead although China is believed to be working on MIRV technology.<sup>2</sup> China's nuclear arsenal also includes a small number of weapons that could be delivered by air.

For the purposes of reporting under the New START standard, only about 60 of China's nuclear-capable land-based ballistic missiles would qualify as ICBMs. These include 20 DF-5A missiles and about 40 missiles of the DF-31 and DF-31A types, all of which have a range of over 5,500km. It is important to note that China has its own system for categorizing missiles ranges, in which only missiles with a range of more than 8,000km are considered intercontinental. Also, in Chinese terminology, only missiles with a range of more than 1,000km are considered strategic.<sup>3</sup> This illustrates the importance of the established common standard provided by New START.

This report assumes that the total number of ICBMs, as defined in New START, is about 60. Although the operational status of China's ICBMs is not officially confirmed, it is reasonable to assume that all ICBMs are contained in their respective launchers. Therefore, all of China's about 60 ICBMs are considered as deployed from the point of view of the New START definition.

Even though China's ICBMs would be considered deployed, it is widely believed that during peacetime these missiles do not have warheads installed. China appears to store nuclear warheads in storage facilities separate from their delivery vehicles except in very rare cases in which individual warheads are uploaded for technical assessments.<sup>4</sup> If this is the case, China would report zero deployed ICBM warheads in a New START-type data exchange.

A New START-type report would require an account of the total number of deployed and non-deployed ICBM launchers. It would include the 60 launchers that contain deployed ICBMs. As for non-deployed ICBM launchers, China does not seem to have a significant number of silos or road-mobile launchers that could be used to launch an ICBM—according to the estimates of the US Department of Defense, each deployed ICBM is associated with one launcher.<sup>5</sup> This suggests that the

1 H.M. Kristensen and R.S. Norris, "Chinese nuclear forces, 2011", *Bulletin of the Atomic Scientists*, vol. 67, no. 6, 2011.

2 R. Acheson (ed.), *Assuring Destruction Forever: Nuclear Weapon Modernization Around the World*, Reaching Critical Will, 2012, p. 17.

3 See for example J.W. Lewis and Hua Di, "China's ballistic missile programs, technologies, strategies, goals", *International Security*, vol. 17, no. 2, 1992.

4 Ibid.; Li Bin, "Tracking Chinese strategic mobile missiles", *Science and Global Security*, vol. 15, no. 1, 2007, p. 11; Nuclear Threat Initiative, "China shows nuclear transparency in new report", [www.nti.org/gsn/article/china-shows-nuclear-transparency-in-new-report](http://www.nti.org/gsn/article/china-shows-nuclear-transparency-in-new-report).

5 US Department of Defense, *Annual Report to Congress: Military and Security Developments Involving*

only non-deployed launchers are those that are used for training purposes or for missile tests. The exact number of these launchers is unknown, but it could be estimated that China has approximately 10 of them, corresponding to the number of missile bases. So, by New START methodology, the total number of China's deployed and non-deployed ICBM launchers is about 70.

Although New START does not limit non-deployed delivery systems and does not require reporting of the number of non-deployed missiles in the aggregate report, information about non-deployed missiles would be included in the detailed data exchange report. This would help address the claims that China may have a significant number of missiles that are located in clandestine facilities and could be deployed on short notice.<sup>6</sup> New START reports maintain an account of all non-deployed delivery systems by including information about their locations and assigning them unique identification numbers that allow their movements to be tracked.

China's SLBMs, the JL-1 and JL-2, could be deployed on the Xia-class and Jin-class submarines, respectively. However, none of the SLBMs would be considered deployed according to New START-type reporting. The single Xia-class submarine, which could carry 12 JL-1 SLBMs, has never achieved operational status, so it is believed that its launchers do not contain missiles. Therefore, neither the JL-1 SLBMs nor the launchers on the submarine would be considered deployed. However, the 12 launch tubes on the submarine would be counted towards the total number of SLBM launchers.

The exact status of the Jin-class submarines is unknown. It is estimated that two submarines are in operational service.<sup>7</sup> A third submarine appears to be under construction. Each submarine could carry 12 JL-2 SLBMs, but by all indications the missile is not yet ready for deployment. Therefore, by New START methodology, China has 24 non-deployed launchers of JL-2 SLBMs and no deployed launchers or missiles.

The number of non-deployed SLBM launchers would also include three launchers on China's Golf-class submarine that were used for test launches of JL-1 and JL-2 missiles.

None of China's nuclear-capable aircraft would fall under the New START definition of a heavy bomber. China's arsenal reportedly includes gravity bombs that can be delivered by the H-6 fighter-bomber. The gravity bombs could also be deployed on a more modern combat aircraft that is under development.<sup>8</sup> However, neither of these aircraft would be considered a heavy bomber, since they have a range of less than 8,000km and are not equipped to carry long-range nuclear air-launched cruise missiles. China is developing an air-launched cruise missile with a range of more than 1,500km, but development has not been completed and it is not clear if that missile could be equipped with a nuclear warhead. Accordingly, in a New START-type report China would not have to declare any heavy bombers or warheads associated with them.

Table A1 summarizes the information on China's nuclear delivery systems and warheads that would be reported in a New START-type information exchange.

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*the People's Republic of China 2012*, 2012, p. 78.

- 6 B. Stephens, "How many nukes does China have?", *Wall Street Journal*, 24 October 2012; V. Yesin, "Tretiy posle SShA i Rossii [The third after the Unites States and Russia], *Voyenno-pormyshlennyy kurier*, 2 May 2012, <http://vpk-news.ru/articles/8838>.
- 7 US Department of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2012*, 2012, p. 24; H.M. Kristensen, "Chinese Jin-SSBNs getting ready?", *FAS Strategic Security Blog*, 2 June 2011, [www.fas.org/blog/ssp/2011/06/jin2011.php](http://www.fas.org/blog/ssp/2011/06/jin2011.php).
- 8 US National Security Council, "Report to Congress on status of China, India and Pakistan nuclear and ballistic missile programs", 28 July 1993, obtained under the US Freedom of Information Act by the Federation of American Scientists, <http://fas.org/irp/threat/930728-wmd.htm>.

**Table A1.** Estimated breakdown of New START aggregate numbers for China as of 1 September 2012

	ICBMs	SLBMs	Heavy bombers	Total
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	60	0	---	60
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	0	0	---	0
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	70	39	---	109

## FRANCE

France maintains two components in its nuclear force—ballistic missiles deployed on four Triomphant-class submarines, and land-based and carrier-based nuclear-capable aircraft.<sup>9</sup> Of these, only the SLBMs would qualify as strategic delivery systems under the New START definition.

There are two types of SLBMs that are currently in service—the older M-45 and the more recently deployed M-51. Since the M-45 has a range of about 6,000km and the M-51 of more than 8,000km, both missiles would qualify as SLBMs for the purposes of New START-type reporting.

As of early 2013, two of the four Triomphant-class ballistic missile submarines, *Le Terrible* and *Le Vigilant*, were equipped to carry the M-51 SLBM, with 16 launch tubes on each submarine. However, as of 1 September 2012—the date of the most recent New START data exchange—*Le Vigilant* was in overhaul, undergoing conversion of its launchers from M-45 to M-51.<sup>10</sup> Accordingly, in a New START-type report providing data as of September 2012, it would still be counted as a submarine with M-45 SLBM launchers. *Le Vigilant* emerged from dry dock in October 2012; another submarine, *Le Triomphant*, is expected to begin the overhaul process in 2013.

With the exception of *Le Vigilant*, which was in a dock at the time of the September 2012 data exchange, all submarines most likely had missiles installed in their launchers. Unlike the United Kingdom, the French government has not given official statements indicating that it operates its nuclear submarines at a reduced missile load. Since each Triomphant-class submarine has 16 launch tubes, France would report 48 deployed SLBMs.

Both the M-45 and M-51 SLBMs are capable of carrying up to six warheads. The exact number of warheads deployed on these SLBMs is not known. President Jacques Chirac announced in January 2006 that “the number of nuclear warheads has been reduced on some of the missiles in our submarines”.<sup>11</sup> Since the French government has not provided more specific information on this reduced loading, France would report up to a maximum of 288 operationally deployed warheads.

9 S. Kile et al., “World nuclear forces”, in *SIPRI Yearbook 2011*, Stockholm International Peace Research Institute, p. 339.

10 “Le SNLE Le Vigilant retrouve l’île Longue”, *Mer et Marine*, 22 October 2012, [www.meretmarine.com/fr/content/le-snle-le-vigilant-retrouve-lile-longue](http://www.meretmarine.com/fr/content/le-snle-le-vigilant-retrouve-lile-longue).

11 “Speech by M. Jacques Chirac, President of the Republic, during his visit to the Strategic Forces”, 19

In reporting the total number of launchers, France would include the 16 non-deployed SLBM launchers on *Le Vigilant* as well as the 48 deployed launchers on the submarines that were in service. It appears that France does not have other launchers that would be considered non-deployed for the purposes of New START-type reporting. Therefore, the total number of SLBM launchers, deployed and non-deployed, is 64.

The air-based component of the French nuclear forces includes three types of nuclear-capable aircraft—the Mirage 2000N, Rafale F3, and Rafale MK3. These aircraft are equipped to carry a medium-range air-to-surface missile, the ASMP-A.<sup>12</sup> Since none of the aircraft have a range of more than 8,000km and the range of the missiles they carry is less than 300km, the aircraft would not be considered heavy bombers under the New START definition and therefore France would not have to include them in a data exchange report.

This means that if France had submitted a New START-type report in September 2012, it would list 48 deployed SLBMs, up to 288 deployed warheads, and a total of 64 launchers of SLBMs. The breakdown of this data is given in table A2.

**Table A2.** Estimated breakdown of New START aggregate numbers for France as of 1 September 2012

	ICBMs	SLBMs	Heavy bombers	Total
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	---	48	---	48
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	---	288	---	288
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	---	64	---	64

## RUSSIAN FEDERATION

The Russian Federation's nuclear arsenal consists of a wide range of delivery systems that vary in their missions, capabilities, and operational status. Among these systems are ICBMs, SLBMs, cruise missiles, torpedoes, and gravity bombs.<sup>13</sup> Most of these delivery systems are considered non-strategic for the purposes of New START, which limits only land-based ICBMs, SLBMs, and heavy bombers. However, in terms of warheads, strategic systems account for more than half of Russia's active nuclear arsenal—2,400 warheads out of the 4,400 nuclear weapons that the Russian Federation is believed to have. The Russian Federation is also estimated to have more than 5,000

January 2006, [www.ambafrance-uk.org/Speech-by-M-Jacques-Chirac,6771.html](http://www.ambafrance-uk.org/Speech-by-M-Jacques-Chirac,6771.html).

12 S. Kile et al., "World nuclear forces", in *SIPRI Yearbook 2011*, Stockholm International Peace Research Institute, p. 339.

13 H.M. Kristensen and R.S. Norris, "Russian nuclear forces, 2012", *Bulletin of the Atomic Scientists*, vol. 68, no. 2, 2012; H.M. Kristensen, *Non-Strategic Nuclear Weapons*, Special Report no. 3, Federation of American Scientists, 2012.

nuclear warheads in reserve or awaiting dismantlement.<sup>14</sup> The large number of Russian weapons that fall outside the scope of the New START limits and reporting requirements presents a significant challenge for the nuclear disarmament process. At the same time, two factors should be taken into account. First, no non-strategic nuclear weapons are deployed with operational units, as all these weapons have been consolidated in centralized storage sites.<sup>15</sup> Second, as far as the warheads in reserve are concerned, the Russian Federation has very limited capability to deploy these weapons on existing strategic delivery systems. Overall, the number of deployed strategic warheads reported by the Russian Federation under New START accurately reflects the size of its deployed nuclear force.

Although the Russian Federation submits to the United States biannual reports on the status of its strategic forces and provides notifications as required by New START, the Russian Federation has chosen not to make this information publicly available. The only official data on Russian strategic forces that are available outside of the US–Russian bilateral exchange are the aggregate numbers that the treaty allows the United States to disclose.<sup>16</sup> In the most recent data exchange, the Russian Federation reported that as of 1 September 2012 it had 491 deployed ICBMs, SLBMs, and heavy bombers and 1,499 warheads associated with them. It also reported a total of 884 deployed and non-deployed launchers.

The lack of availability of the detailed New START report data complicates the analysis of the composition of Russian strategic forces. However, the reported aggregate numbers in combination with the information that was disclosed during earlier START exchanges, official statements, and data from a range of open sources allow a reasonable estimate.

New START reporting explicitly lists five types of Russian land-based ballistic missiles that are considered operational under the treaty—RS-12M (also known as SS-25 or Topol), RS-12M2 (SS-27 or Topol-M), RS-18 (SS-19 or UR-100NUTTH), RS-20 (SS-18 or R-36M2), and RS-24 (Yars). These missiles are deployed at 12 ICBM bases that are operated by the Strategic Rocket Forces. An analysis of open-source information suggests that Russia has 312 deployed ICBMs.

There is some uncertainty about the number of operationally deployed ICBM warheads. Some missiles are known to carry a single warhead (SS-25 Topol and SS-27 Topol-M) while the SS-19 carries six, and the SS-18 carries 10. The RS-24 Yars is believed to be deployed with six warheads each. However, 20 SS-19 at one of the missile bases probably had their warheads removed at the time the Russian Federation submitted its latest report, as these ICBMs are being withdrawn from service to be replaced by new missiles.<sup>17</sup> If this was the case, the Russian Federation would have had 1,032 deployed ICBM warheads.

In addition to the deployed ICBMs, the Russian Federation has a substantial number of non-deployed ICBM launchers. These include more than 120 silos for the SS-18 and SS-19 that are preserved for potential future deployment of new ICBMs, about 90 road-mobile ICBMs at conversion and elimination facilities, and approximately 45 silos and mobile launchers that are used for training or

14 H.M. Kristensen and R.S. Norris, “Russian nuclear forces, 2012”, *Bulletin of the Atomic Scientists*, vol. 68, no. 2, 2012.

15 Interview with S. A. Ryabkov, *Moskovskiy novosti*, 29 October 2012, [www.mid.ru/brp\\_4.nsf/newline/A19C5DA665D26FCD44257AA6002C21A8](http://www.mid.ru/brp_4.nsf/newline/A19C5DA665D26FCD44257AA6002C21A8).

16 US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, 3 October 2012, [www.state.gov/t/avc/rls/198582.htm](http://www.state.gov/t/avc/rls/198582.htm).

17 “RS-24 missiles to replace UR-100NUTTH in Kozelsk”, *RussianForces.org*, 24 July 2012, [http://russianforces.org/blog/2012/07/rs-24\\_missiles\\_to\\_replace\\_ur-1.shtml](http://russianforces.org/blog/2012/07/rs-24_missiles_to_replace_ur-1.shtml).

are located at test ranges. When these numbers are taken into account, it could be estimated that the Russian Federation has a total of about 570 ICBM launchers, deployed and non-deployed.

The Russian ballistic missile submarine fleet includes submarines of four types that could be equipped with four different types of SLBMs. The SLBMs declared operational under New START are the RSM-50 (R-29R, SS-N-18), RSM-52 (R-39, SS-N-20), RSM-54 (R-29RM, SS-N-23), and RSM-56 (Bulava). Not all of these missiles are currently deployed—the SS-N-20 has been withdrawn from service, while Bulava is a new missile that has not yet entered service.

The SLBMs that are currently in service are deployed on submarines of two types—three Project 667BDR (Delta III) submarines that can carry 16 R-29R each, and six Project 667BDRM (Delta IV) submarines that can be equipped with 16 R-29RM. In September 2012, two Delta IV submarines were in overhaul, so their launchers did not contain deployed missiles. This means that at the time of the most recent data exchange the Russian Federation had 112 deployed SLBMs.

The R-29R and R-29RM can carry three and four nuclear warheads, respectively, so 400 deployed SLBM warheads would be counted against the respective New START limit.

The non-deployed SLBM launchers that would be accounted for under New START include the 32 launchers on the two Delta IV submarines in overhaul, as well as the 60 launchers on older Project 941 (Typhoon) submarines, which have been withdrawn from service (two submarines are awaiting elimination and one has been converted for SLBM tests). The Russian Federation also has two new submarines of the Project 955 (Borey) class, each of which will carry 16 Bulava missiles. Since this missile has not been accepted for service yet, the launchers on the two Borey submarines most likely do not contain missiles and therefore should be counted as non-deployed. Taking into account the two test SLBM launchers that the Russian Federation declared in the data exchanges, there are 126 non-deployed SLBM launchers; so, the Russian Federation has a total of 238 SLBM launchers, deployed and non-deployed.

The Russian Federation declared two types of heavy bombers that are subject to the New START limitations—the Tu-95MS and Tu-160. These bombers can carry long-range nuclear air-launched cruise missiles as well as gravity bombs. In 2009, the Russian Federation declared 13 operational Tu-160 and 63 Tu-95MS. Since then, some aircraft have been withdrawn from service and others were transferred out of the operational force for repair or modernization. As a result, it is estimated that in September 2012 Russia had 67 heavy bombers that were counted as deployed—11 Tu-160 and 56 Tu-95MS.

The New START rules for counting deployed nuclear warheads associated with heavy bombers assign one deployed warhead to each deployed aircraft. This means that the Russian Federation would declare 67 warheads deployed on its heavy bombers. The actual number of nuclear arms assigned to the bomber force is not known, but it could be as high as about 800.<sup>18</sup> This number, however, is not reported under New START.

In addition to the operationally deployed heavy bombers, about 15 aircraft are counted as non-deployed. This number includes the aircraft used for tests and training and those undergoing repair. The total number of heavy bombers, deployed and non-deployed, is taken to be 82.

Table A3 provides an estimated breakdown of the Russian Federation's aggregate numbers reported in the most recent data exchange. Because of some uncertainty in the number of non-deployed

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18 H.M. Kristensen and R.S. Norris, "Russian nuclear forces, 2012", *Bulletin of the Atomic Scientists*, vol. 68, no. 2, 2012.



launchers, the total number of launchers in the estimate is 880, which is different from the official data.

**Table A3.** Estimated breakdown of the Russian Federation’s New START aggregate numbers. The totals are the officially released data that reflect the status as of 1 September 2012. Other numbers are estimates.

	ICBMs	SLBMs	Heavy bombers	Total
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	312	112	67	491
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	1,032	400	67	1,499
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	560	238	82	884

## UNITED KINGDOM

The United Kingdom maintains a solely sea-based nuclear force, which includes Trident II ballistic missiles deployed on four Vanguard-class submarines. The missiles deployed on the submarines are leased from the United States under a sharing arrangement that gives the United Kingdom access to a common pool of missiles.<sup>19</sup> The range of Trident II qualifies it as an SLBM under the New START definition (the United States explicitly reported Trident II as an SLBM that is covered by the New START limits).

Each of the four Vanguard-class submarines—*Vanguard*, *Victorious*, *Vigilant*, and *Vengeance*—can carry 16 SLBMs, giving the United Kingdom the capability of deploying 64 SLBMs. However, one of the submarines is normally undergoing overhaul at any given time, so the actual number of deployed missiles would be no more than 48. Under the missile-sharing agreement with the United States, the United Kingdom has access to 58 missiles from the pool; as of the end of 2012, 10 of these missiles had been used in flight tests.<sup>20</sup>

The United Kingdom apparently operates its submarines at a reduced load. In 2010, the UK government announced that it would implement measures to reduce the number of operational

19 Nuclear warheads are installed on SLBMs at bases in the United Kingdom. N. Ritchie, *A Nuclear Weapons-Free World?: Britain, Trident and the Challenges Ahead*, 2012, p. 95.

20 UK House of Commons, Defence Committee, “The future of the UK’s strategic nuclear deterrent: the strategic context. Eighth report of session 2005–06”, 20 June 2006, [www.publications.parliament.uk/pa/cm200506/cmselect/cmdfence/986/986.pdf](http://www.publications.parliament.uk/pa/cm200506/cmselect/cmdfence/986/986.pdf). The most recent test launch took place on 23 October 2012; see Lockheed Martin, “Lockheed Martin-built Trident II D5 missile achieves 143 successful test flights”, October 2012, [www.lockheedmartin.com/us/news/press-releases/2012/october/1031-ss-trident.html](http://www.lockheedmartin.com/us/news/press-releases/2012/october/1031-ss-trident.html).

missiles on each submarine from 12 to eight, indicating that the currently deployed submarines carry no more than 12 missiles on board.<sup>21</sup>

To determine the number of deployed SLBMs that would be reported under a New START-type data exchange, it is necessary to take into account that, as of 1 September 2012, one of the submarines (*Vengeance*) was in overhaul, so it did not have any deployed SLBMs on board. Another submarine, *Vigilant*, which completed its overhaul earlier in 2012, was undergoing preparation for deployment that ended with a live test fire on 23 October 2012.<sup>22</sup> Given this timing, *Vigilant* most likely did not have missiles on-board on 1 September 2012. The other two UK submarines most likely had missiles loaded in their launch tubes, so it could be assumed that the United Kingdom would report 24 deployed SLBMs.<sup>23</sup>

There is also some uncertainty about the number of deployed warheads. In 2010, the UK government declared that each submarine is equipped with no more than 48 warheads and made a commitment to reduce this number in the future.<sup>24</sup> In 2011, the Minister of Defence announced that “at least one of the Vanguard class ballistic missile submarines (SSBN) now carries a maximum of 40 nuclear warheads”.<sup>25</sup> This would have to be in reference either to *Vanguard* or to *Victorious*, both of which had completed their scheduled overhauls by that time. Therefore, with one of these submarines carrying a maximum of 48 warheads and one carrying a maximum of 40, this would amount to 88 deployed warheads on 1 September 2012.

The total number of SLBM launchers that the United Kingdom would report under a New START-type data exchange would include all 64 launch tubes on its four submarines, regardless of whether or not they contain a missile.

To summarize, if the United Kingdom would report the aggregate data as required under New START, it would list 24 deployed SLBMs, 88 deployed warheads, and 64 deployed and non-deployed SLBM launchers. Table A4 provides a breakdown of the aggregate data. It should be noted that the numbers for deployed SLBMs and warheads are upper-bound estimates. The actual number could be lower.

21 United Kingdom, *Securing Britain in an Age of Uncertainty: The Strategic Defence and Security Review*, 2010, p. 5. The UK parliamentary record suggests that submarines normally carry fewer than 16 missiles; see UK House of Commons, under “nuclear submarines”, 19 December 2006, [www.publications.parliament.uk/pa/cm200607/cmhansrd/cm061219/text/61219w0038.htm](http://www.publications.parliament.uk/pa/cm200607/cmhansrd/cm061219/text/61219w0038.htm); UK House of Commons, under “HMS Vigilant”, 19 December 2006, [www.publications.parliament.uk/pa/cm199798/cmhansrd/vo971201/text/71201w08.htm](http://www.publications.parliament.uk/pa/cm199798/cmhansrd/vo971201/text/71201w08.htm); and UK House of Commons, under “HMS Vigilant”, 1 December 1997, [www.publications.parliament.uk/pa/cm199798/cmhansrd/vo971201/text/71201w08.htm](http://www.publications.parliament.uk/pa/cm199798/cmhansrd/vo971201/text/71201w08.htm). The authors are grateful to Nick Ritchie for providing references to the UK parliamentary record.

22 UK House of Commons, “Written answers to questions”, 19 November 2012, [www.publications.parliament.uk/pa/cm201213/cmhansrd/cm121119/text/121119w0001.htm](http://www.publications.parliament.uk/pa/cm201213/cmhansrd/cm121119/text/121119w0001.htm). The preparation process is known as a Demonstration and Shakedown Operation (DASO).

23 It is also possible that the number of missiles on one of the active submarines was reduced to 10. However, in the absence of official data that would confirm that, this report assumes that both active submarines carry 12 missiles.

24 Cabinet Office of the United Kingdom, “Trident value for money review”, fact sheet 10, <https://update.cabinetoffice.gov.uk/sites/default/files/resources/Factsheet10-Trident-Value-for-Money-Review.pdf>.

25 UK House of Commons, “Written ministerial statements”, 29 June 2011, [www.publications.parliament.uk/pa/cm201011/cmhansrd/cm110629/wmstext/110629m0001.htm](http://www.publications.parliament.uk/pa/cm201011/cmhansrd/cm110629/wmstext/110629m0001.htm).

**Table A4.** Estimated breakdown of New START aggregate numbers for the United Kingdom as of 1 September 2012.

	ICBMs	SLBMs	Heavy bombers	Total
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	---	24	---	24
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	---	88	---	88
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	---	64	---	64

## UNITED STATES

The United States has released the most detailed account of the status of its strategic nuclear forces. In addition to publishing the US and Russian aggregate numbers of deployed delivery systems and warheads and the total number of launchers, the United States has made public unclassified versions of its biannual reports.<sup>26</sup> These documents contain a detailed account of the status of the US strategic nuclear forces.

The New START data exchange reports serve as important transparency tool as they provide information about the largest part of the US operational nuclear force. Overall, about 2,000 nuclear warheads are assigned to strategic delivery systems, while the only non-strategic weapons that would be considered deployed are the approximately 200 bombs in Europe.<sup>27</sup> As long as the United States maintains its strategic arsenal at New START levels, non-strategic weapons would not significantly distort the picture of US nuclear posture. The case of reserve warheads is more complicated. The United States maintains the capability to add to its operationally deployed arsenal about 2,800 warheads currently kept in active reserve. Although New START does not explicitly limit this capability, reporting under the treaty provides the information that makes it possible to accurately estimate it and take it into account.

In the most recent New START data exchange, the United States declared 806 deployed ICBMs, SLBMs, and heavy bombers and 1,722 accountable deployed warheads. The report also listed the total of 1,034 deployed and non-deployed launchers.

For the ICBM component of its strategic nuclear force, the United States reports the status of two types of missiles—Minuteman III and Peacekeeper (MX). However, only the Minuteman III is

26 Information removed from the documents during the declassification process includes the coordinates of listed facilities, unique identification numbers of delivery systems and launchers, and the number of deployed warheads (other than the aggregate number). US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty aggregate numbers of strategic offensive arms”, 20 November 2012, [www.state.gov/t/avc/newstart/c39906.htm](http://www.state.gov/t/avc/newstart/c39906.htm). The complete unclassified data for the United States is available upon request from the Bureau of Arms Control, Verification and Compliance.

27 H.M. Kristensen and R.S. Norris, “U.S. nuclear forces, 2012”, *Bulletin of the Atomic Scientists*, vol. 68, no. 3, 2012, p. 86.

currently deployed. The nominal US ICBM force consists of 450 missiles of this type deployed in silos at three missile bases. At the date of the most recent data exchange (1 September 2012), one ICBM was removed from its silo, probably for maintenance, so the number of deployed ICBMs was reported as 449.

The unclassified version of the New START data exchange released by the United States does not contain information about the number of warheads on individual ICBMs. It is known that most US ICBMs carry a single warhead and the total number of deployed ICBM warheads is estimated to be 500.<sup>28</sup>

In addition to the 449 launchers that contained deployed ICBMs, the United States declared 108 non-deployed launchers. These include the silo from which a missile was temporarily removed, 100 intact silos that were used to deploy Minuteman III and MX missiles in the past, and seven test launchers. The total number of ICBM launchers is therefore 557. The data exchange also reported that the United States has 321 non-deployed ICBMs (263 Minuteman III and 58 MX) that are located at ICBM bases as well as at storage, repair and production facilities.

The US submarine fleet includes 14 ballistic missile submarines of the Ohio class that are deployed at two bases. Six submarines are based in the Atlantic and eight in the Pacific. Each submarine is equipped to carry 24 Trident II ballistic missiles, which is the only type of SLBM declared under New START as operational.

According to standard procedure of the US Navy, at any given time some submarines are in either long-term overhaul or undergoing repair after patrol, so their missiles are removed from launch tubes. These missiles and launchers are not considered deployed for the purposes of the treaty.

The unclassified version of the New START report does not provide information about the number of warheads on SLBMs. It is believed that deployed Trident II SLBMs carry four to five warheads on average, so on the date of the report the United States had approximately 1,100 deployed SLBM warheads.

According to the New START report, the United States does not have any SLBM launchers for tests or training, so the 336 launchers on 14 submarines give the total number of SLBM launchers. The data exchange also reported that the United States has 180 non-deployed SLBMs. This number includes SLBMs that were removed from the submarines undergoing overhaul as well as reserve SLBMs that are stored at submarine bases and production facilities. It is worth noting that the United Kingdom has access to the pool of non-deployed Trident II SLBMs, so the total number of these missiles in US custody changes from one report to another.

At the time of the signature of the treaty, the United States declared four types of heavy bombers—B-52G, B-52H, B-1B, and B-2A. However, only the B-52H and B-2A can carry nuclear weapons. The B-1B has been converted to non-nuclear missions, so they no longer appear in the New START balance. The conversion was performed according to a procedure specified in the treaty soon after New START entered into force.<sup>29</sup> The B-52G bombers are no longer operational; the aircraft are located at a storage facility, where they are being eliminated. Until this process is completed, the B-52G bombers will be accounted for under New START, even though they are no longer operational.

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28 Ibid.

29 US Department of State, Bureau of Arms Control, Verification and Compliance, “New START Treaty implementation update”, 17 May 2012, [www.state.gov/t/avc/rls/183335.htm](http://www.state.gov/t/avc/rls/183335.htm).

**Table A5.** The breakdown of New START aggregate numbers as reported by the United States as of 1 September 2012. The number of warheads on deployed ICBMs and SLBMs are estimates.

	ICBMs	SLBMs	Heavy bombers	Total
Deployed ICBMs, deployed SLBMs, and deployed heavy bombers	449	239	118	806
Warheads on deployed ICBMs, on deployed SLBMs, and nuclear warheads counted for deployed heavy bombers	500	1,100	118	1,722
Deployed and non-deployed launchers of ICBMs, deployed and non-deployed launchers of SLBMs, and deployed and non-deployed heavy bombers	557	336	141	1,034

In its New START data submission the United States declared that as of 1 September 2012 it had 118 deployed heavy bombers (30 B-52G, 78 B-52H, and 10 B-2A). According to the treaty rules, these bombers are counted as carrying a single weapon each. The actual number of nuclear weapons that are assigned to them is somewhat higher, with estimates suggesting that the US bomber force could carry about 300 weapons.<sup>30</sup> In addition to the 118 deployed bombers, the United States declared 23 non-deployed aircraft, which are located at production and repair facilities or are used for tests.

Table A5 provides a summary of the information provided in the US New START report and gives an estimate of the number of warheads deployed on ICBMs and SLBMs.

30 H.M. Kristensen and R.S. Norris, "U.S. nuclear forces, 2012", *Bulletin of the Atomic Scientists*, vol. 68, no. 3, 2012, p. 86.

## ANNEX B. MODEL DATA EXCHANGE REPORT FOR THE UNITED KINGDOM

Data as of: 01 September 2012

### CATEGORIES OF DATA PERTAINING TO STRATEGIC OFFENSIVE ARMS

#### Section II. Aggregate Numbers

	United Kingdom
Deployed ICBMs, Deployed SLBMs, and Deployed Heavy Bombers	24
Warheads on Deployed ICBMs, on Deployed SLBMs, and Nuclear Warheads Counted for Deployed Heavy Bombers	88
Deployed and Non-deployed Launchers of ICBMs, Deployed and Non-deployed Launchers of SLBMs, and Deployed and Non-deployed Heavy Bombers	64

#### Section III. ICBMs, ICBM Launchers, and Warheads on Deployed ICBMs

United Kingdom

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## Section IV. SLBMs, SLBM Launchers, and Warheads on Deployed SLBMs

### United Kingdom

	SLBM Type or Variant of a Type	Total
	TRIDENT II	
Deployed SLBMs	24	24
Warheads on Deployed SLBMs	88	88
Non-deployed SLBMs	0	0
Deployed and Non-deployed Launchers of SLBMs	64	64
Deployed Launchers of SLBMs	24	24
Non-deployed Launchers of SLBMs	40	40
Test Launchers	0	0

### Submarine Base

Name/Location: HM Naval Base Clyde, Scotland  
 Coordinates: 56° 04' N, 04° 49' W

	SLBM Type or Variant of a Type
	TRIDENT II
Deployed SLBMs	24
Warheads on Deployed SLBMs	88
Non-deployed SLBMs	0
Deployed Launchers of SLBMs	24
Non-deployed Launchers of SLBMs	40

Ballistic Missile Submarines Based at this Submarine Base  
Number of Submarines/Aggregate  
Number of Launchers by SLBM Type

TRIDENT II

Submarine Type  
Vanguard 4/64

Submarine name:  
HMS Vanguard  
HMS Victorious  
HMS Vigilant  
HMS Vengeance

SLBM Loading Facilities

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Production Facilities for SLBMs

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Production Facilities for Ballistic Missile Submarines

Name/Location: BAE Systems Maritime/Barrow-in-Furness, Cumbria, England  
Coordinates: 54° 06' N, 3° 14' W

SLBM Type or Variant  
of a Type

TRIDENT II

Non-deployed  
Launchers of SLBMs 0

Storage Facilities for SLBMs

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Repair Facilities for SLBMs

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Test Ranges

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## Conversion and Elimination Facilities for SLBMs

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## Conversion or Elimination Facilities for SLBM Launchers

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## Section V. Heavy Bombers and Nuclear Warheads Counted for Deployed Heavy Bombers

United Kingdom

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## Section VI. Space Launch Facilities

United Kingdom

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## Section VII. ICBM and SLBM Technical Data

Classification A: Assembled ICBMs or SLBMs in Launch Canisters  
 Classification B: Assembled ICBMs or SLBMs Without Launch Canisters  
 Classification C: ICBMs or SLBMs Maintained, Stored, and Transported in Stages

United Kingdom

### (a) Intercontinental Ballistic Missiles

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### (b) Submarine-Launched Ballistic Missiles

Missile	SLBM Type or Variant of a Type
	TRIDENT II
Classification	C
Number of Stages	3
Length of Assembled Missile Without Front Section (m)	13.4

Maximum Diameter of Missile Airframe (Without Stabilizers, Raceways, Lug Guides, or Other Protruding Elements) (m)	2.1
Total Length of a Missile as a Unit With Launch Canister	
With Front Section (m)	---
Without Front Section (m)	---
Length of Launch Canister Body (m)	---
Diameter of Launch Canister Body (Without Protruding Elements) (m)	---
Missile Stages	
First Stage	
Length (m)	7.0
Length of First Stage Without Nozzle Attached (m)	6.8
Diameter (m)	2.1
Type of Propellant (Liq/Sol)	Sol
Second Stage	
Diameter (m)	2.1
Type of Propellant (Liq/Sol)	Sol
Third Stage	
Diameter (m)	0.81

Type of Propellant (Liq/Sol)	Sol
Size Criteria for Conducting Inspections	
97% of the Length of Launch Canister Body (m)	---
97% of the Diameter of Launch Canister Body (Without Protruding Elements) (m)	---
97% of the Length of First Stage (m)	6.8
97% of the Diameter of First Stage (m)	2.0

External and Functional Differences Between Training Models of Missiles and SLBMs of Corresponding Types

For Training Models of Trident II Types of Missiles:

One hole, no less than 25 millimeters in diameter, drilled through the casing of the first stage rocket motor and into the inert propellant

### Section IX. Other Data Required by the Treaty

1. Notwithstanding subparagraph 3(b) of Article IV of the Treaty, the first stage of an ICBM or SLBM may be located at the locations provided for in this paragraph where static testing or static firing is conducted. Such first stages of ICBMs or SLBMs shall continue to be declared for the facility at which such first stages of ICBMs and SLBMs were located prior to their movement to the locations provided for in this paragraph.

(c) United Kingdom

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2. To each Party, ICBMs, SLBMs, submarines, heavy bombers, inspection airplanes, and, where applicable, variants referred to in the Treaty, are known as follows:

In the United  
Kingdom

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SLBMs: TRIDENT II

Submarines: VANGUARD

3. For each Party, the inspection activity sites associated with points of entry are as follows:

(c) United Kingdom

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4. For each Party, the facilities not subject to inspection are as follows:

(c) United Kingdom

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5. For each Party, the airports for the points of entry are as follows:

(c) United Kingdom

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6. For each Party, the routes for flights of inspection airplanes to points of entry are as follows:

(c) United Kingdom

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7. For each Party, formerly declared facilities that, in accordance with Section VII of Part Three of this Protocol, are considered eliminated for the purposes of the Treaty and notification of elimination of which has been provided in accordance with Section II of Part Four of this Protocol, are as follows:

(c) United Kingdom

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8. For each Party, currently or formerly declared facilities, portions of which have been excluded, in accordance with the Annex on Inspection Activities to this Protocol, for the purposes of the Treaty from within the boundaries specified on the inspection site diagrams of such facilities, and notification of changes in the boundaries of which has been provided in accordance with Section VI of Part Four of this Protocol, are as follows:

(c) United Kingdom

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## ABBREVIATIONS

IAEA	International Atomic Energy Agency
ICBM	intercontinental ballistic missile
INF	intermediate-range nuclear forces
New START	Treaty between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
P-5	The permanent members of the United Nations Security Council, and the NPT nuclear-weapon states (China, France, Russian Federation, United Kingdom, and United States)
SALT	Strategic Arms Limitation Talks
SLBM	submarine-launched ballistic missile
SORT	Treaty between the United States of America and the Russian Federation on Strategic Offensive Reductions
START I	Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms



Transparency and accountability are important elements of nuclear disarmament. The action plan adopted at the 2010 Non-Proliferation Treaty Review Conference encouraged the nuclear weapon states to agree on a reporting standard that would help demonstrate progress in their commitment to pursue reductions of nuclear arsenals. This study presents a model for such reporting, based on the approach developed by the Russian Federation and the United States in the New START treaty. As the study demonstrates, the framework of the US–Russian nuclear disarmament process could serve as the foundation for a multilateral transparency and accountability regime, and provide a basis for closer cooperation and confidence-building measures among all NPT member states to help advance the goal of nuclear disarmament.