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B R I E F

Nuclear disarmament verification: the case for multilateralism

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Introduction

This brief follows on from a previous publication introducing the project begun by VERTIC in late 2012, on multilateral verification in nuclear disarmament¹.

The first part of this paper reflects on the current issues in the world of nuclear disarmament and the verification of activities therein. The second part provides an update on the VERTIC-led project, its findings to date and the way in which it has focused on a specific set of issues and aims. The evolution of this project has benefitted from the input of a multi-national membership.

The project’s main focus is to examine multilateral verification of nuclear disarmament. Within the context of the project this is taken to mean verification involving more than two parties, possibly including an active role for non-nuclear weapons states or inter-governmental organisations (IGOs) in the process.

More than two decades have passed since the end of the Cold War and, with that, the end of the nuclear arms race between the United States and the former Soviet Union. Since then, nuclear weapons stockpiles have been coming down as the two powers eliminate excess capabilities. Accumulated production over many years has generated very large stores of weapons-usable materials, some of which is being converted into forms and compositions suitable for civilian use.

According to the International Panel on Fissile Materials (IPFM), in 2011 there was, worldwide, approximately 1,390 metric tonnes of uranium enriched to over 90 per cent in the isotope U-235. In addition, world stockpiles of non-civilian plutonium are reportedly in the region of 230 metric tonnes. Taken together, this material is enough for tens of thousands of nuclear weapons. Global stockpiles are shrinking, however, as the US and Russia take steps to reduce surplus material.² However, while some countries are getting rid of

their stocks, or holding them in reserve other, newer, players in the nuclear weapons field are adding to theirs. The arms race between the United States and the Soviet Union may be over, but it is still on, at a smaller scale, in other parts of the world.

It is estimated that there are currently around 20,000 nuclear weapons in existence worldwide, several thousand of which are awaiting dismantlement in Russia and the United States.³ Precise figures, however, are not in the public domain.

Exactly how long it takes to dismantle one weapon is information that is not available in the public domain.⁴ In addition, how many weapons are being dismantled per year is not known. IPFM data indicates that the United States dismantled an average of 580 weapons per year between 1994 and 2009, while Russia’s current dismantlement rate is reported to be 200–300 per year. At the peak of its dismantlement activities in the 1990s, the United States managed to dismantle some 1,300 weapons per year.⁵ Therefore, going to zero will be a large-scale undertaking and implementing a decision to go to zero would, in the best of cases, likely take more than a decade, even if the order to do so was given today. Undeniably, deployed warhead numbers have fallen significantly since their Cold War peak in the mid-1980s, and look set to continue to drop, but many non-nuclear states contend that this not happening quickly enough. Criticisms are also levelled at the reversibility of arms reductions to date, or, more accurately perhaps, their *lack of irreversibility*: That is to say, that agreements do not call for the elimination of weapons system, but rather for their removal from deployment.⁶

Weapons dismantlement, where and when it occurs, is presently undertaken without international monitoring personnel present. There is no outside verification, in other words, as to how many weapons are being dismantled or where the extracted fissile material is going.

Some assume that the logical disarmament end-state is a world where all nuclear materials, be they in nuclear weapon states or elsewhere, are placed under IAEA safeguards. (It is worth noting that IAEA safeguards agreements with nuclear-weapon states are concluded on a voluntary basis. Also, they are far from comprehensive, unlike the obligation—contained within the NPT—on non-nuclear-weapon states to conclude arrangements covering all their nuclear material.)

It is clear, given the huge quantities of material in question, that such a scenario would present a challenge to the present safeguards system. Depending on how much material is stored or used, and how many facilities are processing material, the US stockpile alone would likely require tens of thousands of ‘man-days’ of inspection, should present safeguards criteria apply. Of course, drawing a ‘broader conclusion’ about the absence of undeclared nuclear material in each of the nuclear-weapon states could take many decades, and require a significant investigative effort.

The case for multilateralism

First and foremost, signatories to the 1968 Nuclear Non-Proliferation Treaty have signed up to Article VI, which stipulates that, *‘each of the Parties to the Treaty undertakes 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, and on a Treaty on general and complete disarmament under strict and effective international control.’*⁷ It is generally accepted that this basic premise applies to all parties of the treaty—that is, the overwhelming majority of the international community—and that it binds all of them, not just the five nuclear-weapon state members of the treaty, to a specific objective: nuclear disarmament in all its aspects.

Secondly, it seems obvious that one of the advantages of a verification effort

involving representatives of several verifying states will be the inherent checks and balances in such an arrangement. All will be observing each other in the expectation that each will be following agreed procedures and expected behaviours. This means that higher confidence can be invested in the belief that the verifiers (inspectors) will have little or no opportunity or inclination for malpractice or falsification of results.

Thirdly, and related to the above, the international community is likely to invest more trust in a verified disarmament activity if they can see that it was not carried out in a pre-existing atmosphere of trust between two allies, behind closed doors.

Fourth, the argument should be made that if the nuclear weapons-owning states are well-placed to disarm with some ad hoc set of bilateral verification arrangements in place, why have they not done so in the forty-plus years since the NPT was signed? The involvement of non-nuclear-weapon states alongside nuclear-weapon states could inject new energy into the process.

Anecdotal evidence points toward an assumption among nuclear-armed states that, whether parties to the NPT or not, since they are the owners of nuclear weapons it is their business—and their business alone—to carry out and to verify reductions in their nuclear arsenals.⁸ It is sometimes also said that it is somehow easier to exchange information between the recognised nuclear-weapon states, as this would not give rise to proliferation concerns. This statement cannot, however, be taken at face value.

Any verification exercise involves, by its nature, an exchange of information. However, a major challenge involved in the verification of declared activities in a military context is that information the verifier (the inspector) might wish to have access to will often be denied by the host (the disarmer). It is important, when discussing multilateral involvement in disarmament verification to make a distinction

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between denial of access to some information based on international obligations for non-proliferation and denial of access to information based on national security considerations:

- i. A denial of access to information on proliferation concerns would occur when there are grounds to believe that furnishing information would ‘assist’ a non-nuclear weapon state in the manufacture of a nuclear weapon or other nuclear explosive device. This denial is based on the nuclear-weapon state’s legal obligation under the NPT as well as its own national security calculus.⁹
- ii. A denial of access to information on national security grounds would occur when there are grounds to believe that furnishing information would be prejudicial to national interests or, to take the words used in the United Kingdom as an example, cause serious or exceptionally grave damage to the nation.¹⁰

The reason for making this distinction is that there may, in the future, be room for re-consideration of the scope and level of classification—perhaps as a result of negotiations at the state level that could allow for more transparency and verification procedures to take place while also taking security considerations into account—on the second kind of denial.

Whether it is easier to conduct an inspection that involves only nuclear-weapon state personnel is a matter that remains open for discussion. In that scenario one could envisage the job being made easier by the nuclear-weapon states involved in the verification enterprise entering into disclosure agreements, along the lines of the 1958 UK–US Mutual Defence Agreement.¹¹ While this divulgence has been deemed acceptable between close allies, it remains to be seen whether one could achieve similar levels of disclosure between former adversaries, say the US and Russia. Whether

bilateral or multilateral, within the context of nuclear disarmament, verification entails an array of challenges, hurdles and potential pitfalls relating to national security, health and safety, and risks of proliferation. In terms of verification scenarios, two basic configurations would be:

- A process where verification involves only nuclear-weapon states (either bilaterally or multilaterally and
- A process where both nuclear and non-nuclear weapon states participate in verification (either bilaterally, or multilaterally or through an IGO such as the IAEA).¹²

There are numerous possible sub-arrangements within these two basic configurations. (There are, for instance, more than 20 different bilateral configurations in which the P5 nuclear weapon states could collaborate—one state acting as verifier and the other dismantling—and more than 60 different configurations if the IAEA or another intergovernmental organisation were to be involved in any trilateral way).

Needless to say, the level of complexity would increase further if one were to involve *non*-nuclear-weapon states on a multilateral basis, rather than through an IGO such as the IAEA. Each non-nuclear-weapon state wishing to get involved would need to contract with one or more of the nuclear-weapon states. The likelihood of achieving a uniform verification regime across the board in this last case would be very low.¹³ If an IGO such as the IAEA were to be the *only* contractual counterpart, at least only one set of negotiations would need to occur.

A multilateral (i.e. intergovernmental) organisation could thus serve as an ‘anchor’ on which subsequent disarmament agreements could be attached. By necessity, any procedure agreed with an intergovernmental organisation, or procedure proposed by it, would need to have a ‘minimum denomi-

nator' (or perhaps a 'greatest common factor') character. The proposed procedure would need to be acceptable to the inter-governmental organisation itself, naturally, but also to each and every prospective party to it.¹⁴

Where non-nuclear-weapon states are involved in the future, either as participants in verification or as recipients of the resulting information, steps will need to be taken to ensure that absolutely no proliferative nuclear weapon design and manufacturing information is revealed to them. In this context, to date there has been little work done on investigating or developing the involvement of non-nuclear-weapon states in nuclear disarmament verification—with the notable exception of the UK–Norway Initiative.¹⁵ Any verification project involving a multilateral organisation, in which non-nuclear-weapon state nationals serve would, perforce, need to address the questions discussed here.

The case for the IAEA

So why should one investigate the potential of having the International Atomic Energy Agency involved in disarmament verification? There are three primary reasons for this:

- First, all the nuclear-armed states of the world, with the exception of the DPRK, are members of the organisation. It therefore constitutes an already existing, natural, meeting place for the states with the highest stake in the enterprise.
- Second, the Agency has been doing nuclear verification, in one form or other, since almost the day it was founded, notably in South Africa, and it has accumulated, as a result, a vast amount of technical knowledge and experience.
- Third, since the Agency is already conducting verification activities in most of the nuclear-armed states (for safeguards

purposes) it has experience in dealing with the states in question.

Despite these advantages, opinion nevertheless appears to be split when it comes to asking the Agency to take a significant future role in nuclear disarmament verification. Opposition to the idea is based along three main lines:

- First, that an intergovernmental organisation such as the IAEA is not the obvious or the appropriate body to administer future nuclear arms control verification. Past disarmament-related activities have been supported by bilateral verification processes (for instance the US-Russian co-operative fissile material reduction activities);
- Second, that the purpose of the IAEA safeguards system mainly concerns the fissile material accountancy obligations of the non-nuclear-weapon states party to the NPT. The resources and the budget of the IAEA are already stretched on this mission, without adding to their responsibilities with a new branch of business;
- Third, that IAEA inspectors would at times, be placed in a situation where they would learn military secrets, which would be proliferative if they were from a NNWS or if the information they learned were passed on to the IAEA.

All of these points can be addressed.

- On the first point; it is the position of some states that disarmament processes will need to become multilateral before they themselves are prepared to begin reducing numbers of nuclear weapons.¹⁶ It is also the case that future disarmament verification which involves states beyond the nuclear-weapon states would likely be more universally trusted and provide a much-desired direct involvement for non-nuclear-weapon states in

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activities that move the world toward a lower nuclear threat situation;

- On the second point; While it is largely correct to state that the present structure of the IAEA is geared towards verifying the obligations of non-nuclear weapon states under the NPT, it is an exaggeration to claim that this is the *only* function that the Agency was designed to fulfil. The Agency’s broader mandate is relatively clear on the matter. Moreover, the Agency has been involved in aspects of nuclear disarmament verification before: in verifying the completed dismantlement of South African nuclear weapons in the early 1990s; as part of the ‘Trilateral Initiative’ from 1996–2002; and, today, as the organisation that is developing a technical verification scheme for the US-Russian Plutonium Management and Disposition Agreement. The question is not if, but how, the Agency could be re-structured or enhanced to handle a wider-ranging future verification challenge—especially if that challenge involved direct verification of the process of warhead dismantlement, rather than, or in addition to, the verification of excess fissile materials.
- On the third point, any inspector, from any type of inspection regime, could be placed in a situation where they could potentially learn military secrets. This is not something that exclusively applies to the IAEA. Moreover, the Agency already has long experience in dealing with industrially-sensitive or commercially-secret information. Despite some public debate on the matter, safeguards-confidential information enters the public domain on exceptionally rare occasions. Granted, the Agency would need to apply very stringent levels of security on the most sensitive information, and agreed procedures to restrict this (for example, to nuclear-weapon state IAEA personnel only). This would of course require some preparatory work by the organisation.

It would be counter-intuitive not to make best use of the verification knowledge and expertise that exists in the IAEA. The Agency knows how to protect commercially-, politically- and militarily-sensitive information. The Agency could have teams with weapons inspectors, supplemented by a cadre of administrative and logistical support. The IAEA has a head-start in terms of skills and experience. These authors believe that achieving relevant capacity-building and consolidation of the skills and experience required by a future inspectorate for nuclear arms control verification, via limited re-organisation within the IAEA, is a more realistic prospect than starting a bespoke organisation from scratch elsewhere.

There is also a legal case to involve the IAEA in future multilateral disarmament verification efforts. The IAEA Statute provides for the Agency’s right to apply safeguards, at the request of parties, to ‘any bilateral or multilateral arrangement, or at the request of a state, to any of that state’s activities in the field of atomic energy.’ Disarmament verification is therefore implicitly included in the Agency’s mandate.

Getting knowledge to where it counts: sound investments in capacity-building

It is not enough simply to identify and promote the IAEA as the body that should be called upon to verify nuclear arms reductions. The Agency must be capable to be able to deliver on the assigned task as well.

While the IAEA has done some amount of disarmament verification in the past, it is clear that its present capacity to deal with this type of work within the organisation is limited. Moreover, new arrangements would need to be made each time, if the Agency was called upon to carry out verification of the sort discussed in this paper.

In the end, it is up to the member states of the IAEA to shape the role of the organisation, and equip it to handle whatever role the membership finds suitable. Further capacity-building to deal with future verification challenges—with a focus on disarmament-related verification—is a realistic prospect. Capacity-building could be organised along two lines:

1. Building institutional knowledge within the IAEA, and organising a system to retain specialist knowledge through proper documentation of manuals, equipment specifications, operational procedures, and work instructions; and
2. Investing in member states' own capacity to furnish the IAEA with substantive and financial support aimed at maintaining readiness for a role in disarmament verification, and ensuring that such a verification mission could be deployed in a timely and cost-effective fashion.

Capacity-building within appropriate individual member states of the IAEA will be an essential adjunct to building capacity within the IAEA itself. After all, the Agency does not exist in isolation. It draws funding and guidance from its member states and its manpower is drawn from those countries. If the community of members (which, as was noted above, includes all nuclear-armed states save one) can become incrementally more subject-area aware and more sophisticated in their views in relationship to the whole subject of verification, the community would progressively find itself in a better position to leverage its resources onto future verification challenges.

We are advocating a programme of capacity-building, gap analysis and technology development and training—through engagement with the Agency and outreach to interested member states. The promotion of this idea and the completion of studies to support it are two goals within VERTIC's current work on multilateral disarmament verification.

VERTIC's capacity-building effort

Shortly after the NPT review conference in 2010, VERTIC began to consult with a number of governments on the prospects of engaging in a concerted effort to build multilateral capacity to handle nuclear disarmament verification. This involved engagement with national delegations on the side-lines of international meetings, mostly in Vienna, and conferences elsewhere.

In 2011, the effort started in earnest, with ISS Africa co-hosting the first meeting and helping to assemble a project group. This group was drawn from a number of research organisations and government agencies from four different countries, as well as the IAEA. The purpose of the group was to investigate the potential future role of international organisations in multilateral nuclear disarmament verification. The investigations have primarily centred on the role of the International Atomic Energy Agency, and they have aimed to further investigate a number of strands emerging from the 2010 IAEA Safeguards Symposium.¹⁷ The project aims to fully support the IAEA Department of Safeguards Long-Term Strategic Plan (2012–2023), and to deliver its results within the duration of that plan.¹⁸

The first objective of the project group was to investigate ways in which support for a future role for the IAEA could be generated among member states of the Agency and, closely linked to this, what kind of capacity-building or institutional reorganisation would be required should the Agency become the, or an, accredited agency for independent verification of nuclear weapons disarmament activities worldwide.

The second objective of our work was to review the state of current technology and procedural development in the practical challenge of verifying nuclear disarmament and, in so doing, to identify outstanding unresolved issues. Specifically, the project sought to examine:

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- What prevents any organisation given tasks such as verifying nuclear warhead dismantlement—as well as the fissile components and material that are taken out of them as part of the dismantlement process—from doing so right now?
- What are the special constraints and problems when we consider multilateral verification of these processes, whether by a team sourced from an intergovernmental organisation such as the IAEA or indeed by any team that includes inspectors from non-nuclear-weapons states?

The third aim of the project was to identify the kinds of equipment—or at least the requirements and specifications of such equipment—that inspectors from non-nuclear-weapon states or the IAEA would need to have available in order to complete a successful verification mission in all the situations they are likely to be faced with. Intertwined with this are the operating procedures and protocols, including data management and distribution procedures, that would be required for these kinds of activities.

Using the project group meetings as focal points for discussion, a number of specialised papers have been produced and used as the basis for dialogue and ideas-exchange. One of the outputs of the first project meeting was to establish which specific areas of work would be the focus of the project and what issues subsequent project papers would address. The first selection of studies between November 2011 and March 2012 covered the following subjects:

1. Definitions in nuclear arms control verification;
2. The relationship between trust and confidence in verification;
3. Availability and future development of suitable Non-Destructive Assay technologies;
4. Capacity building requirements for the period 2012–2023; and

5. Long term policy aspects of multilateral nuclear disarmament verification.

The papers prepared for discussion from March 2012 were as follows:

1. Development of a requirements approach for disarmament verification equipment;
2. Main aims and design features of multilateral project exercises;
3. Best practice consideration for verified warhead dismantlement;
4. Policy and technical lessons drawn from South Africa’s nuclear programme; and
5. Policy considerations when working with the IAEA Board of Governors or the General Conference.

In late 2012, the project group reached consensus on work-streams that would be particularly appropriate to furthering the aims of the project. The project group also concluded that there were more ideas, and more items for consideration, than it would be practicable to study in-depth. Therefore a refinement of these suggestions was required, which remains in process as we go to press. It was further decided that as far as possible these work streams would be shared among the participating states, and other interested parties, in the project.

Interim findings

Political support for an Agency role in disarmament verification

We have already established that the principle of IAEA involvement in disarmament verification has some support from a number of IAEA member states, and that it is tied-in with the Strategic Plan of the IAEA’s Department of Safeguards.¹⁹ During the course of the project to date, it has become clear that putting such ambitions into practice means overcoming two main challenges.

The first of these is an internal challenge, and concerns how to build a more general

level of in-house support for a programme of this kind. The second challenge concerns how to establish IAEA member state support for the initiative. Without explicit member state support, practical work by the IAEA Secretariat will be unable to begin in any meaningful way. Work needs to be funded, and funds come from member states, as do mandates to engage on certain issues. The Strategic Plan of the Department of Safeguards has been prepared as an internal document (there is a summary on the IAEA website). This will in due course need to be implemented with extra-budgetary funds from, for example, the member state support programme.

At present, it also remains unclear what proportion of IAEA member states endorse the idea of the Secretariat preparing for future verification challenges, even on a purely technical level. As noted above, some at least seem to be of the view that the Secretariat of the organisation ought to focus on implementing the present safeguards system. These are hesitant to approve of projects that may divert the Agency's attention from its perceived core mission.

One of the challenges identified for the current project is to engage with and to initiate capacity-building within appropriate member states and, beyond this, to canvass opinions on the issue more broadly.

Review of the state of current technologies and procedures

Within discussions on the state of current technologies and their procedures for use, the so-called 'initialisation problem' arose on a number of occasions as a central obstacle to progress—as the 'brick wall' through which there is at present no known door. The initialisation problem, essentially, concerns how (or whether) inspectors are able to tell if an object presented at the outset, prior to dismantlement, is a genuine nuclear warhead.²⁰ The initialisation problem is well-recognised as a major challenge in the field of nuclear disarmament verifi-

cation by those looking into the technical aspects of this issue. As yet, though, short of establishing with certainty that an item is a warhead as it is physically removed from deployment and tracking that item with airtight chain-of-custody through its entire dismantlement chain, no breakthrough solution has been proposed or developed.²¹

Another major problem is the issue of equipment authentication: that is, mutual confidence between inspectors and hosts that equipment does what it is stated as being able to do, and that it does so accurately, with due regard for proliferation-sensitive information if required—and that it does no more. Added to which is the need for hosts to certify that equipment is safe for use in their dismantlement facilities.

Where proliferation concerns would need to be taken into account, the complexity of authentication, certification and the initialization problem is heightened still further. At present the main proposed approach to addressing this additional challenge is to employ devices known as 'information barriers', which take readings from nuclear components in the same way as normal measurement equipment, before filtering-out proliferative information and presenting inspectors with a simple yes/no result.

Of course, such devices require a substantial amount of pre-use negotiation and joint development, as inspectors will need to be confident that results are based on pre-agreed, mutually-acceptable attributes, and hosts will want to ensure that the device itself cannot provide inspectors with more information than they are prepared to allow. Information barriers, it was agreed, may represent a promising way forward, but their level of technological development currently leaves much to be desired and, in any case, they considerably add to the burden of requiring all equipment to be authenticated and certified for use.

Technological uncertainty puts emphasis on the need to develop procedures which, while not able to provide near certain assurance, will be able to provide enough

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detection probability to offer a significant deterrence against cheating. This includes thinking about procedures that emphasise redundancy, so that even if one particular component of the verification regime fails the system will keep working. A system of designed in this way is often more stable than a system attempting to incorporate components intended not to fail in the first place.²² Practically, this will involve using several procedures designed to authenticate a warhead, in which technology such as the information barrier plays a role in providing a sufficient condition for successful verification.

Equipment review

The project has also sought to ask: what is needed for future inspection teams engaged in nuclear warhead dismantlement verification? In many ways, this question follows closely from the review of current technology and procedures referred to above.

Essentially, all equipment for use in a verification mission of this kind, as with any disarmament verification mission, would need to pass the authentication test—by both sides—and would also need to be certified for use by the hosting side within the relevant facility or site. On the certification front, a whole set of issues that are critically important when considering equipment development plans revolve around the very basic constraints that would apply to the deployment and use of equipment in a real verification mission.

The development of measurement equipment in a laboratory environment, isolated from the end-use requirements and realities, could result in items that would be impractical for a real inspection. Considerations for design must include the whole gamut of personnel safety considerations (electrical, radiological, fire, explosion, toxicity, laser hazards, hot/cold surfaces, asphyxiation hazards etc.), physical constraints on use (allowable size, footprint, weight, robustness; allowable data collection times) and

others. Other factors that need to be taken into account include the costs of verification equipment components—such as high-purity germanium crystals, for one.

In addressing performance requirements for future inspection equipment, it is clear that performance must be considered simultaneously—and adjusted accordingly—with the likely restrictions on use that would apply, as well as the authentication issue. In this regard, practical exercises, building on the lessons learned from past activities such as the UK–Norway exercises of 2008/2009, may be able to play a key role. Setting up and running practical exercises presents an array of challenges all by itself, but these activities offer prime opportunities for ‘road-testing’ equipment and procedures (assuming, of course, that a suitable level of realism can be generated). Practical exercises, either conducted live or virtually, may yet play an important role in the onward development of this project, as may computer-based 3-dimensional modelling of verification scenarios.

Future plans

Over the next two years VERTIC intends to convene several further multilateral meetings to continue to discuss these and other associated issues, and to review the products of the work streams as they progress. In support of these meetings and this work, VERTIC will itself be conducting research into areas identified as priorities in order to inform and focus discussions, as well as overseeing the specific study projects in support of the project. It is our intention that the research and analytical work conducted as part of this project will translate into practical exercises and serious long-term engagement from IAEA member states.

VERTIC intends to report periodically on progress under this project in the form of briefing papers such as this one as well as in articles and presentations at appropriate events.

Endnotes

- 1 VERTIC Brief No. 17, *Multilateral verification: Exploring new ideas*, David Cliff and David Keir, January 2012.
- 2 International Panel on Fissile Materials, *Global Fissile Material Report 2011*, Creative Commons (2011), p. 8 and 16.
- 3 International Panel on Fissile Materials, *Global Fissile Material Report 2011*, Creative Commons (2011), p. 4.
- 4 See, for instance, in respect to the US designed B83, Frank Munger, *How long does it take to dismantle bomb parts?*, Knox News, 31 August 2012, <<http://blogs.knoxnews.com/munger/2012/08/how-long-does-it-take-to-disma-1.html>> (accessed 14 March 2013). Complete dismantlement, according to the US NNSA, is “a lengthy process” involving several sites, see NNSA, *Dismantlement Fact Sheet*, available at <<http://nnsa.energy.gov/mediaroom/factsheets/dismantlement-o>> (accessed 14 March 2013).
- 5 International Panel on Fissile Materials, *Global Fissile Material Report 2011*, p. 5.
- 6 VERTIC’s 2011 study *Irreversibility in Nuclear Disarmament: Practical steps against nuclear rearmament* examines and develops the concept of irreversibility as it relates to nuclear disarmament. It makes a distinction between *unarmed states*, where re-armament could be achieved in little time and at relatively low cost, and *disarmed states*, where rearmament can only occur with considerable investment of money and resources. A non-deployed weapon can always be re-deployed, and treaties of that kind is hence highly reversible. See pages 51 and 61 in particular for an analysis of US-Russian arms reductions agreements.
- 7 This text has been unanimously interpreted, by the International Court of Justice, as ‘an obligation to pursue in good faith and bring to a conclusion negotiations leading to nuclear disarmament in all its aspects under strict and effective international control’. The court argues in support of its interpretation that, ‘the legal import of that obligation goes beyond that of a mere obligation of conduct; the obligation involved here is *an obligation to achieve a precise result*—nuclear disarmament in all its aspects—*by adopting a particular course of conduct*, namely, the pursuit of negotiations on the matter in good faith.’ (Emphasis added.)
- 8 It ought to be noted that of all nine nuclear-armed states, only Russia and the United States are carrying out significant reductions of their arsenals. The Chinese, French and UK arsenals are at relatively stable levels, whereas the status of arsenals in the DPRK, India, Israel and Pakistan is largely unknown.
- 9 There is, however, no apparent consensus on what is meant by “assisting” another state or what the meaning of the term “manufacture” is. In other words, the boundaries between lawful and unlawful sharing of information are not clear. To further complicate things, according to Article IX.3. of the NPT, only states that have detonated a nuclear explosive device before 1 January 1967 are considered to be ‘nuclear weapon states’. Hence, sharing of nuclear weapons information by one of the weapons-state recognized by the treaty with the DPRK, India, Israel or Pakistan, would be considered to be as proliferative and as unlawful as sharing information with, say, Germany or Norway.
- 10 See Los Alamos National Laboratory, Badge Office and Visit Control, UK - USA Classification Equivalency Table, <http://badge.lanl.gov/uk-usa_classification.shtml> (accessed 14 March 2013).
- 11 In particular, the agreement stipulates that the UK and the US, “will exchange with the other Party other classified information concerning atomic weapons, sensitive nuclear technology, and controlled nuclear information, including special nuclear materials properties and production or processing technology, when, after consultation with the other Party, the communicating Party determines that the communication of such information is necessary to improve the recipient’s atomic weapon design, development and fabrication capability.” See US–UK Mutual Defence Agreement, Disarmament Diplomacy, Issue No. 77, May/June 2004, <<http://www.acronym.org.uk/dd/dd77/77mda.htm>> (accessed 18 March 2013).
- 12 Simply involving the IAEA does not necessarily imply the participation of inspectors of non-nuclear weapon state nationality, or inspectors that have necessarily lost their respective national security clearances.
- 13 In material accountancy, this complexity has already manifested itself as each of the nuclear-weapon states has a fundamentally different ‘Voluntary Offer Agreement’ in force with the IAEA. So far, it is clear that one size definitely does not fit all.
- 14 In other words, if the IAEA proposes that ‘procedure A’ should apply in any given disarmament situation, that procedure would need to be acceptable not only to states such as the United States and Russia, but to IAEA member states such as India, Israel and Pakistan as well.
- 15 The UK–Norway Initiative has been extensively covered elsewhere. See for instance the chapter on the initiative in David Cliff, Hassan Elbahtimy and Andreas Persbo, *Verifying Warhead Dismantlement: Past, present, future*, Verification Matters No. 9, September 2010.
- 16 See, for instance, the speech by former UK Secretary of Defence Des Browne to the Conference on Disarmament, *Laying the Foundations for Multilateral Disarmament*, 5 February 2008, <http://www.labour.org.uk/des_browne_conference_on_nuclear_disarmament> (accessed 18 March 2013).
- 17 See Symposium on International Safeguards: Preparing for Future Verification Challenges, Vienna, Austria, 1–5 November 2010, <<http://www-pub.iaea.org/iaea meetings/38095/Symposium-on-International-Safeguards-Preparing-for-Future-Verification-Challenges>> (accessed 20 March 2013).
- 18 IAEA Department of Safeguards, Long-Term Strategic Plan (2012–2023), <[http://www.iaea.org/OurWork/SV/Safeguards/documents/LongTerm_Strategic_Plan_\(20122023\)-Summary.pdf](http://www.iaea.org/OurWork/SV/Safeguards/documents/LongTerm_Strategic_Plan_(20122023)-Summary.pdf)> (accessed 21 March 2013).
- 19 IAEA Department of Safeguards, Long-Term Strategic Plan (2012–2023), <[http://www.iaea.org/OurWork/SV/Safeguards/documents/LongTerm_Strategic_Plan_\(2012-2023\)-Summary.pdf](http://www.iaea.org/OurWork/SV/Safeguards/documents/LongTerm_Strategic_Plan_(2012-2023)-Summary.pdf)> (accessed 21 March 2013). The plan stipulates that the department should “contribute to nuclear arms control and disarmament, by responding to requests for verification and other technical assistance associated with related agreements and arrangements” and that and that it should “Maintain readiness to provide technical expertise and/or to verify nuclear arms control and disarmament related arrangements and agreements”.
- 20 For an overview of the issue, see The United Kingdom–Norway Initiative: Research into the Verification of Nuclear Warhead Dismantlement, Working Paper submitted by the Kingdom of Norway and the United Kingdom of Great Britain and Northern Ireland. NPT/CONF.2010/WP.41, para. 72 and 73. <<http://www.vertic.org/media/assets/Publications/WP41.pdf>> (accessed 21 March 2013).
- 21 However, for an update on UK–Norway Initiative work on the issue, see The United Kingdom–Norway Initiative on the Verification of Nuclear Warhead Dismantlement, UKNI Presentation, NPT PrepCom, Vienna, May 2012, <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/28425/20120503_npt_prepcom_presentation.pdf> (accessed 21 March 2013).
- 22 Most components in a system will fail at one point or another. Creating truly fail-safe systems is challenging and is best served by using specialist knowledge to build in diversity of design, so as to minimise common-mode failures.

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About this paper

In this brief, the case for multilateral involvement in nuclear disarmament verification is discussed, with reference to VERTIC's ongoing capacity-building effort with non-nuclear-weapon states and intergovernmental organisations. This project has been running since 2011, with the objective of consolidating a role for the IAEA in disarmament verification, as well as reviewing the requirements of verification technology.

Building trust through verification

VERTIC is an independent, not-for-profit non-governmental organization. Our mission is to support the development, implementation and effectiveness of international agreements and related regional and national initiatives, with particular attention to issues of monitoring, review, legislation and verification. We conduct research, analysis and provide expert advice and information to governments and other stakeholders. We also provide support through capacity building, training, legislative assistance and cooperation

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