Verification Is Possible: Lessons From The Trilateral Initiative For Today

Noah Mayhew, Research Associate, Vienna Center for Disarmament and Non-Proliferation, Vienna, Austria

Abstract

Non-proliferation and arms control face new challenges in the 21st century, characterised by changing geopolitics and new technologies, including advances in cyber capabilities. As arms control treaties are abrogated and the prospect for future reductions in fissile material stockpiles look bleak, the question of verification features more prominently. While innovative approaches are needed to ensure the veracity of tomorrow's agreements, the past offers important lessons. The Trilateral Initiative, a collaboration between the United States, the Russian Federation and the International Atomic Energy Agency (IAEA), is one such programme. The Trilateral Initiative was born as a feasibility study in 1996 to determine how excess, weapons-usable nuclear material could be removed from US and Russian defence programmes and placed under permanent monitoring by the IAEA without revealing proliferation-sensitive information. It is a case study of what is possible. During the Trilateral Initiative, the Joint Working Group developed a workable model for the verification of plutonium removed from defence programmes that protected sensitive aspects of the material, as well as a draft model verification agreement to underpin the legal aspects. It also discussed financing options for implementing the Trilateral Initiative. The effort was ceased due to changing political tides in the United States and Russia. However, the scientific community continued to develop the technical methodology and produced a prototype "Attribute Verification System with Information Barrier for Plutonium with Classified Characteristics utilizing Neutron Multiplicity Counting and High-Resolution Gamma-ray Spectrometry" or "AVNG." In 2009, the prototype was demonstrated. Now, more than 10 years later, it is time to recall the lessons of the Trilateral Initiative and apply them to today's threat environment. This paper will detail the important lessons from the Trilateral Initiative, including the significance of ongoing work at the technical level so that agreements can be executed when political will is present, the importance of proper programme management and an analysis of how models like the Trilateral Initiative can be adapted to today's issues, including cybersecurity.

I. Introduction

Nuclear verification has always been subject to the ebb and flow of technical capability and political will. Its applications span from nuclear safeguards implemented by the International Atomic Energy Agency (IAEA) to fissile material reductions by nuclear-weapon States – chiefly the United States and the Russian Federation – and ultimately for nuclear disarmament. Each of these applications entail different technical requirements and the political will to implement solutions can be fleeting. This trend often leads to a real or perceived Catch-22 – there is no political will to conclude an agreement, so the technical work to develop effective and reliable verification techniques does not take place. As a result, when political will to conclude a verifiable agreement exists, there is no technical framework to support it. This can lead to a situation in which the political will runs out before a mutually-acceptable technical framework for verification can be completed.

This is the story of the Trilateral Initiative. During the Trilateral Initiative, which ran from 1996 to 2002, the United States, the Russian Federation and the IAEA sought to identify ways in which the IAEA could monitor the irreversible removal of classified forms of weapons-origin fissile material from defence programmes without risking access by IAEA inspectors to proliferation-sensitive or classified information.[1] The participants of the Trilateral Initiative developed a model verification agreement, as well as a technical framework for verifying the nature, isotopic composition and mass of material submitted for verification.[2] Different sources of funding for these activities were considered. However, the Trilateral Initiative was never implemented – by the time the technical framework was complete, political will had dissipated.

This paper examines the Trilateral Initiative, in particular how its participants were able to overcome challenges related to nuclear verification, how those challenges have changed since the end of the Trilateral Initiative, and the lessons to be drawn today.

II. History and Summary of the Trilateral Initiative

The Trilateral Initiative, initially proposed by the Russian Federation, began in 1996 as a feasibility study announced at the 1996 IAEA General Conference, one year after the indefinite extension of the Treaty on the Non-Proliferation of Nuclear Weapons.[3] The goal of the feasibility study was to identify legal, technical and financial means through which the IAEA could verify that "weapon-origin fissile material declared by the states as excess to their respective defense requirements—including classified forms of fissile material—remained removed from their respective nuclear weapons programs."[4] Under the Trilateral Initiative, a task force called the Joint Working Group (JWG) was established with American, Russian and IAEA representatives, which normally met five times per year in conjunction with meetings of the IAEA Board of Governors to review progress made at the expert level on the development of legal, technical and financial arrangements.[5]

Unlike other programmes that were developed and implemented in the 1990s and early 2000s, such as the US-Russian HEU Purchase Agreement and the Plutonium Management and Disposition Agreement (PMDA), the Trilateral Initiative did not have concrete goals for how much material would be subject to it.[6] Rather, it was meant to offer a technical and legal framework through which any country that was motivated to reduce fissile material stockpiles could do so under IAEA verification.

The Model Verification Agreement

For the Trilateral Initiative to be actionable, the IAEA would have to conclude an agreement with the States that were submitting material for IAEA monitoring. While the NPT nuclear-weapon

[1] Thomas E. Shea and Laura Rockwood, "IAEA Verification of Fissile Material in Support of Nuclear Disarmament," Belfer Center, May 2015. Available at: https://www.belfercenter.org/sites/default/files/files/publication/iaeaverification.pdf.
[2] *Ibid.*
[3] International Atomic Energy Agency (hereafter "IAEA"), General Conference Record of the Third Plenary Meeting (GC(40)/OR.3), November 1996. Available at: https://www.iaea.org/sites/default/files/gc/gc40or-3_en.pdf.
[4] Thomas E. Shea and Laura Rockwood, "IAEA Verification of Fissile Material in Support of Nuclear Disarmament."
[5] Thomas E. Shea, "Report on the Trilateral Initiative," IAEA Bulletin 43/4/2001, December 2001. Available at: https://www.iaea.org/sites/default/files/publications/magazines/bulletin/bull43-4/43403054953.pdf.
[6] In-person interview with Laura Rockwood, 13 August 2018.

States (NWS) currently have voluntary offer safeguards agreements in place with the IAEA, these agreements allow the NWS in question to submit a list of facilities to the IAEA that are eligible for verification activities. Other facilities are not eligible for verification. The Trilateral Initiative's Model Verification Agreement, like voluntary offer agreements, was derived from INFCIRC/153, which details the structure and content of comprehensive safeguards agreements mandated for non-nuclear-weapon States under the NPT.[7]

Unlike voluntary offer agreements, the Model Verification Agreement would not allow the material submitted for verification to be withdrawn, except in the following circumstances.[8] Once submitted under the Trilateral Initiative, the material would remain under monitoring indefinitely, or until it satisfied conditions detailed in the agreement such as consumption or dilution of the material in such a way that is no longer usable for any nuclear activity. This condition is present in INFCIRC/153, as well.[9]

In order to submit material for monitoring under the Trilateral Initiative, participating States and the IAEA would have to have a way to verify that said material was, in fact, weapons-usable material, e.g. uranium or plutonium of a certain mass and isotopic composition. However, this task had to be accomplished in such a way as not to risk the exposure of proliferation-sensitive information. This was not just the prerogative of the United States and the Russian Federation, which would be interested in the protection of sensitive information related to their own weapons programmes, but also an obligation under NPT's Article I which prohibits NWS from proliferating nuclear weapons "directly or indirectly" and obligates them "not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons."[10]

To this end, a technical framework referred to as attribute verification with information barriers was developed.

Attribute Verification with Information Barriers

The chief technical goal of the Trilateral Initiative was to determine that material submitted for verification was weapons-grade fissile material, and to do so without gaining access to classified, proliferation-sensitive information.[11] The JWG quickly concluded that existing methods for nuclear verification could reveal proliferation-sensitive information if inspectors were allowed access to raw measurement data. As such, the technical experts began developing a system that would indicate a simple "yes" or "no" for certain questions, based on unclassified reference points.[12] Under this approach, the JWG came up with three questions which could be answered to determine the authenticity of the material. Unfortunately, the Trilateral Initiative was only able to

[7] *Ibid.*
[8] *Ibid.*
[9] IAEA, The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (INFCIRC/153), paragraphs 11 and 12. Available at: https://www.iaea.org/sites/default/files/publications/documents/infcircs/1972/infcirc153.pdf.
[10] The Treaty on the Non-Proliferation of Nuclear Weapons, Article I. Available at: https://www.un.org/disarmament/wmd/nuclear/npt/text/.
[11] Thomas E. Shea, "The Trilateral Initiative: A Model For The Future?," Arms Control Today, Volume 38, May 2008. Available at: https://www.armscontrol.org/act/2008-06/features/trilateral-initiative-model-future.
[12] Thomas E. Shea and Laura Rockwood, "IAEA Verification of Fissile Material in Support of Nuclear Disarmament."

develop this methodology for plutonium before 2002 when the programme was ended.[13] The questions were:

(1) Is plutonium present in the container?
(2) Is it weapons-grade plutonium?
(3) Is the mass of the weapons-grade plutonium greater than a threshold of mass specified for each facility where verification will take place?

To answer these questions, high-resolution gamma spectrometry would confirm that the gamma rays emitted by the item were indicative of plutonium and that the isotopic composition corresponds with that of weapons-grade plutonium.[14] Neutron multiplicity counting would determine the mass.[15] This combination of measures would allow inspectors to verify that the nuclear material proffered by the State was, in fact, weapons-grade plutonium. However, these measures would not by themselves resolve concerns related to the risk of proliferating classified information. To this end, the JWG developed a special black-box environment, where material could be placed for measurement but never physically seen by inspectors.[16]

Eventually a prototype system was developed, called the "Attribute Verification System with Information Barrier for Plutonium with Classified Characteristics utilizing Neutron Multiplicity Counting and High-Resolution Gamma-ray Spectrometry," or "AVNG."[17] As intended, the AVNG was constructed as a large box in which material could be placed for verification. When measuring attributes of classified material, the AVNG would flash a green light for "yes" if the material satisfied the respective requirement and a red light for "no," if it did not. It also contained security protocols, such as a "secure" mode which would disable the system if it was opened in any way.[18]

The End of the Trilateral Initiative

Unfortunately, efforts under the Trilateral Initiative to develop the Model Verification Agreement and the AVNG ended in 2002, when US and Russian leadership declared that the mandate of the feasibility study had been fulfilled. While US and Russian leadership announced their intention to instruct their respective technical experts to "begin without delay discussions on future possible cooperation within the trilateral format," no such meetings in a trilateral format have ever been conducted.[19]

---

[13] In-person interview with Laura Rockwood, 13 August 2018.
[14] Thomas E. Shea and Laura Rockwood, "Nuclear Disarmament: The Legacy of the Trilateral Initiative," Deep Cuts Working Paper No.4, March 2015. Available at: https://deepcuts.org/images/PDF/DeepCuts_WP4_Shea_Rockwood_UK.pdf.
[15] *Ibid.*
[16] Diana G. Langner et al, "Attribute Verification Systems with Information Barriers for Classified Forms of Plutonium in the Trilateral Initiative," Symposium on International Safeguards: Verification and Nuclear Material Security, 29 October – 1 November 2001. Available at: https://www-pub.iaea.org/MTCD/publications/PDF/ss-2001/PDF%20files/Session%2017/Paper%2017-02.pdf.
[17] Duncan MacArthur, "The Effects of Information Barrier Requirements on the Trilateral Initiative Attribute Measurement System (AVNG)," Institute of Nuclear Materials Management 42nd Annual Meeting, 15-19 July 2001. Available at: https://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-01-3333.
[18] *Ibid.*
[19] IAEA, "IAEA Verification of Weapon-Origin Fissile Material in the Russian Federation and the United States," 16 September 2002. Available at: https://www.iaea.org/newscenter/pressreleases/iaea-verification-weapon-origin-fissile-material-russian-federation-and-united-states.

However, US and Russian scientific experts did continue to collaborate on the AVNG outside the auspices of the Trilateral Initiative and conducted prototype tests as recently as 2010.[20] Should the countries ever wish to utilise that prototype, they would need to work with the IAEA for its own authentication procedures but continued bilateral laboratory-to-laboratory cooperation demonstrated that the technical work does not have to take place simultaneously to the political work. It also provided proof of concept for the AVNG system.

However, as the former head of the Trilateral Initiative office at the IAEA Dr. Thomas Shea has observed, the "threat environment" has changed since the JWG worked on the Trilateral Initiative.[21] If it, or a version of it, is to be revived, countries will need to consider the challenges faced during the Trilateral Initiative.

III. Challenges to the Trilateral Initiative

At the time it was active from 1996 to 2002, the Trilateral Initiative enjoyed the broad support of the US and Russian governments. The IAEA, as a statutory matter, can apply safeguards to any bilateral or multilateral arrangement at the request of the parties, as was the case with the Trilateral Initiative.[22] However, the negotiations were not without other challenges.

The biggest challenge was that political will to implement the Trilateral Initiative ran dry before the technical and legal arrangements were complete. Others included trouble with equipment authentication, programme costs, and questions about what constituted "irreversibility" in terms of the material placed under safeguards. It is likely that these three challenges could have been resolved between the parties given more time, but when the US and Russian governments declared the Trilateral Initiative complete there was no official modality for the IAEA to be involved or for the Trilateral Initiative to be implemented.

Equipment Authentication

For any verification framework to be effective, the parties to the related agreement must be confident that the equipment used for verification gives accurate readings, that it is not susceptible to sabotage and that it will not endanger information they see as critical to their national security, such as proliferation-sensitive information about weapons-usable nuclear material. The debate on how to achieve these conditions was ongoing when the Trilateral Initiative ended.

For example, if the IAEA were to provide the equipment, the US and Russia would have to authenticate the equipment using undisclosed methods. If they found the equipment to be acceptable, the IAEA would need to assure itself that it had not been tampered with in any way.[23] If the US or Russia were to find the equipment unacceptable, it might not tell the IAEA the reason or return the equipment at all.[24]

---

[20] Sergey Kondratov et al, "Testing the AVNG," Institute of Nuclear Materials Management, 51st Annual Meeting, 11 July, 2010. Available at: https://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-UR-10-02626.

[21] In-person interview with Dr. Thomas E. Shea, 22 May 2018.

[22] The Statute of the IAEA, Article III.5. Available at: https://www.iaea.org/about/statute.

[23] Thomas E. Shea, "The Trilateral Initiative: IAEA Verification of Weapon-Origin Plutonium in the Russian Federation and the United States," Symposium on International Safeguards: Linking Strategy, Implementation and People, 20-24 October 2014.

[24] *Ibid.*

Bearing in mind these constraints, the JWG agreed that the equipment used for the Trilateral Initiative would need to be designed, manufactured, tested and authenticated on an ongoing basis in a trilateral format.[25] This could have been an acceptable solution had the Trilateral Initiative's work not ended in 2002.

US and Russian scientists did continue to work on equipment authentication after the Trilateral Initiative formally concluded. US and Russian scientists further developed the AVNG prototype through 2010, when scientists from the Institute of Nuclear and Radiation Research of the All-Russian Scientific Research Institute of Experimental Physics, the Los Alamos National Laboratory and the Lawrence Livermore National Laboratory conducted demonstrations to the satisfaction of Russian security officials.[26] However, if such a system were to be used in future fissile material reductions, the IAEA would have to authenticate the equipment, as well.

Concerns About Programme Costs

In the 1990s, the prospect of funding arms control and fissile material reduction verification activities became salient in the IAEA context, not just with regard to the Trilateral Initiative, but also with reference to the PMDA. A report by the Director General outlined five options for funding such activities: (1) the establishment of a fund through voluntary contributions; (2) funding in accordance with the regular budget scale of assessment; (3) funding from the regular budget in accordance with the existing formula for assessed contributions to safeguards costs; (4) funding from the regular budget in accordance with a different formula; and (5) creating a special fund or funds outside of the regular budget on the basis of one of the formulas referred to in the previous three options.[27] Regardless of the modality, the Director General emphasised that the funding for these activities would need to be both reliable and predictable.

According to the Director General's report, upon implementation of the Trilateral Initiative cost estimates would be based on the model verification agreement and the ultimate cost of the technical arrangements, i.e. of the operational AVNG.[28] While one unofficial estimate of the total cost of the steps required to apply verification arrangements, cover equipment costs and the number of inspectors (including inspection days, travel and support) was at $10 million per year, an official cost assessment was never agreed.[29] As with the issue of equipment authentication, the issue of programme cost might have been resolved if the Trilateral Initiative had been implemented.

Irreversibility and Cessation of Safeguards on Submitted Material

The parties were unable to agree on the conditions for irreversibility before 2002. In other words, what would the conditions have been for the IAEA to assure itself that the material placed under safeguards through the Trilateral Initiative could never again be used in the manufacture of nuclear weapons? There were some conditions under which the IAEA could stop implementing safeguards on material subject to verification under the Trilateral Initiative, which are common to

[25] *Ibid.*
[26] Sergey Kondratov et al, "Testing the AVNG," Institute of Nuclear Materials Management, 51st Annual Meeting, 11 July, 2010.
[27] IAEA Archives, "Financing Agency Verification of Nuclear Arms Control and Reduction Measures," GOV/INF/1999/9, 21 May 1999.
[28] *Ibid.*
[29] In-person interview with Dr. Thomas E. Shea, 22 May 2018.

comprehensive safeguards agreements, namely export to another State when the material would be subject to safeguards in the importing State, or otherwise transfer to another IAEA verification regime.[30] Under these conditions, the IAEA would continue to implement safeguards on the material.

Other conditions that were discussed included the substitution of material subject to the agreement with other material not otherwise subject to verification if it was equivalent in amount and isotopic content. This might include low enriched uranium that had been downblended from high enriched uranium, as well as irradiated plutonium. The IAEA might also determine that the material had been consumed or otherwise diluted in a way that it is no longer usable for nuclear activities or "practically irrecoverable," and would thus no longer be subject to verification.[31]

It was this last point that prompted a great deal of discussion among the parties in the context of the Trilateral Initiative, as well as in the PMDA negotiations. For example, one method of plutonium disposition discussed during this time period was vitrification with highly radioactive waste which Russian experts argued could be too easily undone.[32] The American experts, on the other hand, felt that the radiation barrier presented by this method would be a sufficient deterrent to further use, especially because, as a practical matter, the United States had other plutonium in storage which would not require chemical separation from highly radioactive waste in order to use.[33]

This debate took place in the context of PMDA negotiations, but the principle of irreversibility was a sticking point for Trilateral Initiative as well. This issue was outstanding in 2002 when the Trilateral Initiative ended, but could have been resolved had official negotiations been allowed to continue.

IV. Challenges to Nuclear Verification Today

The challenges faced by the parties from 1996 to 2002 would certainly resurface if States endeavoured to create a modern-day version of the Trilateral Initiative. Advances in technology could make verification more effective, but it also presents new problems in equipment authentication. Programme costs are certain to remain an issue for fissile material reductions, especially considering the monumental financial impact of the COVID-19 pandemic. As noted above, agreement on the principle of irreversibility was also problematic for the PMDA, the negotiations of which officially lasted until 2016 when it was suspended, having found no agreeable solution on practical recoverability.

However, a modern-day Trilateral Initiative would also face other challenges, including the greatly increased importance of cybersecurity and the reduction in official fora for cooperation on these issues due to a lack of political will and the crisis in US-Russian relations.

[30] Thomas E. Shea and Laura Rockwood, "IAEA Verification of Fissile Material in Support of Nuclear Disarmament," Belfer Center, May 2015.
[31] *Ibid.*
[32] Multiple anonymous interviews with experts involved in the PMDA negotiations, held via Zoom.
[33] *Ibid.*

The Cyber Threat

The Trilateral Initiative took place well before the advent of cybersecurity as a high-profile threat to national security. While the AVNG was relatively simple in terms of computing power, there are both concrete and perceptual challenges to cybersecurity in such a system today.

For example, it is likely that if something like the Trilateral Initiative were established today that there could no connection whatsoever between the AVNG (or its modern equivalent) and the internet. Should a cyberattack on the device be detected, determining the origin of the attack would be extremely difficult and likely very politicised to the extent that it may put into question the authenticity of all material placed under safeguards that was verified with the device. There would also need to be stringent physical security measures, such that all parties could assure themselves that there had been no physical tampering or the use of a Stuxnet-style computer virus meant to falsify readings.

More broadly, unless the equipment agreed upon for such a project today were completely analogue, there would have to be progress between the United States and Russia in establishing agreed-upon guidelines for responsible behaviour in cyberspace. This is partially because the two governments view issues in cyberspace fundamentally differently.

The United States defines cybersecurity in the US National Cyber Strategy as "effectively identifying, protecting, and ensuring resilience of their networks, systems, functions, and data as well as detecting, responding to, and recovering from incidents."[34] The Russian Federation sees the issue more broadly as information security, defined in the Doctrine of Information Security of the Russian Federation as "the state of protection of the individual, society and the State against internal and external information threats, allowing to ensure the constitutional human and civil rights and freedoms, the decent quality and standard of living for citizens, the sovereignty, the territorial integrity and sustainable socio-economic development of the Russian Federation, as well as defence and security of the State."[35]

As a result of these fundamental differences, it has been extremely difficult to find agreement on cyber governance and would likely present significant challenges to this sort of verification.

Reduction of Fora for Cooperation

Since the Trilateral Initiative ended in 2002, the United States and Russia have dramatically reduced their participation in fora which would be conducive to dialogue on nuclear issues. Russia refused to participate in the fourth Nuclear Security Summit in 2016 and suspended its participation in the PMDA in the same year, citing "unfriendly actions" by the United States.[36] A number of US-Russian arms control agreements have fallen away in the past years, including the Intermediate-

[34] National Cyber Strategy of the United States of America, September 2018. Available at: https://trumpwhitehouse.archives.gov/wp-content/uploads/2018/09/National-Cyber-Strategy.pdf.
[35] Doctrine of Information Security of the Russian Federation, 5 December 2018. Available at: https://www.mid.ru/en/foreign_policy/official_documents/-/asset_publisher/CptICkB6BZ29/content/id/2563163.
[36] Ukaz Prezidenta Rossiiskoi Federatsii Nomber 511. Available at: http://static.kremlin.ru/media/acts/files/0001201610030004.pdf.

Range Nuclear Forces (INF) Treaty in 2019 and the US and Russian withdrawal from the Open Skies Treaty in 2020 and 2021 respectively.

The 2010 Strategic Arms Reduction Treaty's (New START) Bilateral Consultative Commission is the only official forum in which the US and Russia continue to discuss arms control, and by extension verification thereof. There is hope that the strategic stability talks recently initiated by Presidents Biden and Putin could be an opportunity to reinvigorate working-level fora for dialogue on nuclear verification, which could in turn work towards finding solutions to verification challenges in arms control and, indeed, in fissile material reduction activities. There is precedent for this, as American and Russian scientists cooperated extensively in the 1980s to the early 2000s on nuclear issues, through laboratory-to-laboratory cooperation that has all but dissipated.

V. Lessons to Draw from the Trilateral Initiative

Recalling that the Trilateral Initiative was established as a feasibility study rather than as a formal commitment to dispose of a certain amount of fissile material, the Trilateral Initiative did what it nominally set out to do. When the American and Russian governments declared the Trilateral Initiative complete in 2002, they had a technical framework that was theoretically workable and later proven so, a legal framework that was largely acceptable to all parties involved, and financing options. The biggest weakness of the Trilateral Initiative was bad luck on timing – the political will ran out.

In this regard, there are lessons to be learned from the Trilateral Initiative, with applications both to a future similar endeavour and for verifying future arms control and fissile material reduction agreements.

Sustained Cooperation

The political will to enter into negotiations for an arms control agreement or for fissile material reductions should not be a necessity for working-level cooperation, especially laboratory-to-laboratory cooperation. This type of cooperation should be ongoing regardless of the political climate. This ensures that, when there is an agreement that can be verified, the parties have the technical ability to do so. Laboratory-to-laboratory cooperation also builds trust at the working level, which is both critical to success in this field as well as conducive to technological advancements that better all of humankind. It pays dividends whether or not there is a deal on the table and may even lead negotiators to put the *right* deal on the table.

Similarly, simply because work towards achieving an agreement at the political level has ended should not suggest that work at the technical level should stop. It was exactly this kind of sustained work that allowed American and Russian scientists to finish the prototype AVNG that serves as an example of what is possible even today.

Programme Costs

Any endeavour aimed at fissile material reduction or arms control will have costs associated with it. What is important if the IAEA is to verify adherence to this endeavour is for the parties to discuss financing simultaneously with technical and legal arrangements such that verification does not seem impossibly expensive from the very beginning. It is also important to think creatively, as

Director General Mohammed ElBaradei did in 1999 with regard to funding for the IAEA's activities in the Trilateral Initiative and the PMDA, and as Director General Rafael Mariano Grossi is doing now with his foray into non-traditional partnerships for IAEA funding.

Agreement Longevity

Parties for future fissile material reduction (and similar) agreements must try as much as possible to "future-proof" the agreements for which they are responsible. While not directly related to verification as such, enshrining agreements into national law can help to reinforce verification activities under the agreement, providing incentives for funding to be diverted to national laboratories for such purposes. While classifying the Trilateral Initiative as a feasibility study may have made it easier to dedicate national resources to it, ultimately this designation made the Trilateral Agreement too easy to abandon when interest in its implementation waned.

Application to Other Domains

As new arms control agreements are sure to face similar challenges in the years to come, it will be important to remember the accomplishments of the Trilateral Initiative and assess whether the lessons learned can be applied to the next arms control agreements. This is particularly salient in terms of mitigating cyberthreats and equipment authentication, considering the ever-increasing pace of technology advancement.

VI. Conclusion

The strategic stability talks mandated by the joint decree by Presidents Biden and Putin offer an opportunity once again to take advantage of political will to make progress in fissile material reduction and arms control. Outcomes from the talks will depend on the personalities in the room, but they will also depend on the technical verification capabilities available when and if an agreement results from the talks. While there are many lessons to learn from the Trilateral Initiative, perhaps the most important one is that the Trilateral Initiative should not be forgotten. It is a shining example of what is possible on a technical, legal and political level when two countries have a vested interest in achieving a deal.