



**Wilton
Park**



Report: Irreversibility in nuclear disarmament

Monday 4 – Wednesday 6 March 2024

In association with

UK Foreign, Commonwealth and Development Office and the Royal Norwegian Ministry of Foreign Affairs.

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Foreign, Commonwealth
& Development Office



UTENRIKSDEPARTEMENTET

Norwegian Ministry of Foreign Affairs

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Context and key policy issues

The action plan of the 2010 NPT Review Conference established three key principles of disarmament: transparency, verification and irreversibility. As the latter has remained underdeveloped, Wilton Park, in partnership with FCDO and the Norwegian MFA, has convened two successful dialogues on Irreversible Nuclear Disarmament in March 2022 and March 2023.

The outcomes of the first conference formed the basis for a UK-Norway side event at the tenth NPT Review Conference the following August. This attracted considerable interest, and the draft Final Document acknowledged that further work on IND was required and called for States Parties to build an understanding of the application of irreversibility measures in nuclear disarmament.

International collaboration on IND can now be considered a key element of the next NPT review cycle and a vital component of any future disarmament process. The joint statement made by Austria, Mexico, Norway and the UK at the August 2023 Preparatory Committee meeting emphasised the support to an enhanced dialogue among States parties to build a common understanding of the application of irreversibility. Further, the main focus of such a dialogue would be on irreversibility in the actions and activities of nuclear-weapon States to implement their agreed obligations and commitments on nuclear disarmament.

The third dialogue on Irreversible Nuclear Disarmament will assess how to take IND forward. It will offer the opportunity to further develop detailed thinking on the technical, legal, normative, and political parameters and criteria of irreversibility and foster international dialogue aimed at critically engaging with IND.

Goal and objectives

This conference seeks to assess different aspects of IND and consider how to build on the work initiated at the 2022 and 2023 dialogues. To foster new thinking and inform the debate, the conference will be supplemented by newly commissioned original research by non-government subject matter experts.

The conference will:

- Further develop a shared understanding of what IND will require.
- Based on commissioned papers, discuss the technical, legal, normative, and political parameters and criteria for irreversibility, both during a process of disarmament, and after disarmament has been achieved.
- Review the work conducted in diplomatic and academic fields since the 2023 Wilton Park conference, assess its implications, and explore avenues for taking IND work forward.
- Develop a programme of work that will include next steps and fora for collaboration, with a framing vision of a submission to the 2026 NPT Review Conference.

Executive Summary

Wilton Park, in partnership with the Norwegian Ministry of Foreign Affairs and the UK Foreign, Commonwealth & Development Office (FCDO), hosted a dialogue on “Irreversibility in Nuclear Disarmament”. The dialogue centred around how to frame irreversibility in nuclear disarmament (IND) for inclusion in 2026 Review Conference of the Nuclear Non-Proliferation Treaty (NPT RevCon) discussions and documents.

There was an appetite among the participants for more dialogue, wider engagement and the translation of high-level discussions into actionable steps that States and civil society can take now to further the IND agenda. By shifting the IND dialogue to become more forward-looking to the 2026 NPT

RevCon and beyond, the specific areas which garnered the most discussion included:

- Defining IND and its relation to other concepts, such as verification, transparency and latency.
- Separating how IND is considered in both the process to achieve disarmament and the resulting end state.
- Developing a substantial list of areas from which to extract lessons for the IND community.
- Introducing future steps for the IND community, including areas of further research.

This report is organised by those discussion areas and lists the specific ways in which participants, and the greater IND community, can ensure progress is made in the coming years towards irreversible nuclear disarmament.

Introduction

Wilton Park held its third dialogue in a series on “Irreversibility in Nuclear Disarmament”, which sought to build on previous academic and diplomatic work made since the March 2022¹ and March 2023² dialogues and August 2023 NPT Preparatory Committee (PrepCom) joint statement.³

This dialogue shifted the conversation to the future: how to move IND forward to the 2026 NPT RevCon and beyond. Wilton Park sought to further develop detailed thinking on the parameters and criteria of irreversibility and foster

¹ Zuzanna Gwadera, “Irreversibility in Nuclear Disarmament,” Wilton Park, August 2022, in <https://www.wiltonpark.org.uk/app/uploads/2021/12/WP2019-Report.pdf>

² J. Luis Rodriguez, “Moving forward on Irreversibility in Nuclear Disarmament”, Wilton Park, September 2023, in <https://www.wiltonpark.org.uk/app/uploads/2023/01/WP3125-Report.pdf>

³ “First Preparatory Committee for the 2026 Non-Proliferation Treaty Review Conference: irreversibility statement”, UK Foreign, Commonwealth & Development Office and Delegation of Norway, 11 August 2023, in <https://www.gov.uk/government/speeches/first-preparatory-committee-for-the-2026-non-proliferation-treaty-review-conference-irreversibility-statement>

international dialogue between NPT States Parties and non-governmental organizations (NGOs) to critically engage with IND.

The short-term goal was set to support work leading to the submission of a working paper to the 2026 NPT RevCon through building a shared understanding of IND, continued academic exploration of IND, workplan development and mutual support between States and NGOs. This work's long-term goals are driving towards strengthening Article 6 of the NPT and preparing all necessary elements for when disarmament becomes a reality.

Defining IND and its relation to other concepts

A clear, common definition of IND is lacking, although participants disagreed if there is even a need for a definition. There is support for moving towards a common understanding, but having one, narrow definition could be limiting. Discussions on defining IND can be constraining and prove to be distracting from progress on IND-related issues; however, in spite of these reservations, there was progress on building a common understanding of IND and how it links to other concepts.

Irreversibility is a spectrum. It can be enhanced, but nothing is every truly irreversible. For example, nuclear capacity cannot go to zero, but weapons can be irreversibly eliminated in a verifiable manner. Thus, judgements of irreversibility are subjective and are closely linked to trust and confidence.

Despite the progress made at this dialogue, there is still work to be done on building a common understanding in a number of areas, including in IND's relationship to delivery vehicles and the concept of "complete" disarmament. Further conversations were had regarding IND's relationship to the concepts of verification, transparency and latency.

Verification

Verification of IND does need a narrow definition as it differs from current, traditional discussions around verification. While IND and verification do overlap, they differ in scope and outcomes, and, therefore, should not be conflated as IND covers a broader set of items often not covered by treaties.

The community needs to be explicit about what is being verified: does this mean changes of physical material, facilities or something else? Further, there is a difference between verifying that something is irreversible and verifying that an action that has happened is not being undone.

Transparency

Transparency was linked a number of times to IND, especially as it can help lead to greater trust, confidence and cooperation. It can help foster a virtuous action cycle where States continue to take cooperative measures towards IND via transparent actions.

Linkages between irreversibility, verification and transparency are important to explore and develop a common understanding of as they are the three key principles established in the 2010 NPT RevCon.⁴

Latency

Latency is in some ways the reverse image of irreversibility, and is thus also a spectrum. Determining what contributes to a State's latency (or latent capability in the case of formerly-armed States) can help inform the IND regime of which specific areas should be considered for verification and monitoring in a disarming or disarmed world.

⁴ "Final Document – Volume I (NPT/CONF 2010/50 (Vol. I))", 2010 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, 2010, p.20, in <https://www.un.org/en/conf/npt/2010/>

Some States think of latency as a deterrent in and of itself, which allows for some security during the process of disarmament; however, this goes against the disarmament norm, which calls for the reduced importance of nuclear weapons.

Discussions on hedging can be conflated with discussions on latency, but they should be separated as hedging requires active decisions. Further, some participants were hesitant to include latency as part of irreversibility conversations as the topic can distract and prove contentious, thus hampering collaborative progress on IND.

IND and the process of achieving disarmament

The participants noted several areas that need to be clarified in order to have a clear understanding of how IND factors into the process of achieving disarmament.

Institutional involvement

While discussions centre around the NPT and Article 6, one of the major issues with this framework is the fact that several nuclear-armed States are outside of the NPT. While disarmament can begin in the NPT, eventually another mechanism would need to be included in order to account for these States.

The role of the IAEA must be clarified. If the IAEA is involved in the process of disarmament, and ensuring IND along the way, its scope and purview would need to be clearly defined. Additional considerations on handling sensitive weapons information would need to be raised, and the IAEA would need to be better resourced to handle the increase in workload.

Regardless of the specific institutions, a layered approach is needed. A global regime will ensure uniformity, while complementary regional and bilateral approaches would build confidence. The institutional layer would be the primary

cornerstone, which would then be composed of individual, specific mechanisms at different areas of the nuclear fuel cycle and weapons complexes.

Further thought must be put into the cost of the disarmament process. Cost sharing across States Parties could be viable, but this must be done fairly and equitably with careful planning.

Technical considerations

Disarmament needs to work towards eroding capabilities and capacities to the point where rearming is too costly (in both time and money) to be political viable as true irreversibility is nearly impossible. This can be accomplished in a variety of ways, and is case-specific depending on the disarmer.

Knowledge management is critical during the process of disarmament. To prevent proliferation, sensitive weapons information needs to be closely held, or potentially destroyed. The key to this issue is the future of scientists and other employees of the nuclear weapons complex in the disarming State. New jobs must be found (including potentially as inspectors to verify IND in other States) so experts do not defect or attempt to proliferate knowledge to the highest bidder. Additionally, as national laboratories often have dual missions – providing important scientific discoveries for civilian use – this knowledge and expertise must be preserved while removing the nuclear weapons mission.

Developing a complete nuclear history of a large, complex nuclear-armed State will take time and might prove impossible depending on the age of the programme. Considerations should be made as to “how much is enough” when it comes to historical information and nuclear archaeology.

As facets of nuclear technology are inherently dual-use in nature, how one controls the use of advanced nuclear technology (e.g. inertial confinement fusion) while also

verifying IND is an important issue for clarification. Additionally, for States that actively cooperate with others on their nuclear weapons programme, is it enough to say they have disarmed if their partner States have not?

Further details on a myriad of technical considerations are provided in research papers developed following the March 2023 dialogue.⁵

Normative and political considerations

Norms should be developed to encourage disarmament and maintain the path towards a world without nuclear weapons. There is a need to erode the idea that nuclear weapons are important. For disarmament to continue, nuclear weapons should no longer make sense in society.

A culture of transparency throughout the process must be developed. This can fight against the uncertainties inherent in IND, especially for larger nuclear programmes. This will also lead to trust and confidence, which helps States keep on the path to disarmament.

Once a State is committed to the pathway of disarmament through norms, trust and confidence, the State builds a sense of identity and reputation based on these ideas, which can provide a self-reinforcing mechanism to preserve disarmament. It also becomes too costly to reverse course while the benefits of committing to disarmament simultaneously increase as the process continues.

⁵ For a sampling, see the “Irreversibility in Global Nuclear Politics Part I” issue of the *Journal for Peace and Nuclear Disarmament* 6:2 (2023) in <https://www.tandfonline.com/toc/rpnd20/6/2>

IND in a post-disarmament world

In envisioning an end state for IND, the focus shifts from merely achieving disarmament to ensuring continuous monitoring and active engagement. Disarmament regimes must be crafted with a long-term perspective, recognizing that numerous processes must persist well beyond the completion of disarmament.

Political agency is a crucial element, with increased importance placed on engaging with political drivers to sustain disarmament efforts. The transition to a post-disarmament era involves not only technical considerations but also the cultivation of political will to translate ideas into concrete actions. Much of this depends on if the State is a willing or unwilling disarmer.

Critical questions regarding the level of risk tolerance and the mechanisms required to detect and respond to significant developments will be important to address; although, this is highly dependent on the mechanism through which the end state is achieved.

Robust verification measures to uphold compliance with end-state agreements will need to be developed, including consequences for cheating. The involvement of organizations like the IAEA (if it is indeed the verifying organisation in the end state) would require enhanced resources and information management systems. Discussions also revolved around the maintenance of expertise in nuclear weapons verification in a world without nuclear weapons.

Legal considerations should also be addressed. There were discussions and some disagreement over the process governing the transition from a Nuclear Weapons State (NWS) to a Non-Nuclear Weapons State (NNWS), thus this issue requires further exploration and clarification.

Lessons to be learned

Out of the discussions and academic work, several areas were highlighted as sources of lessons for the IND community. Although, researchers should be cautious about an over-reliance on case study analysis as it can be highly individual to the State and temporal context.

Nuclear Weapon Free Zones (NWFZs), exemplified by the Tlatelolco Treaty, serve as models for regional and international security, fostering cooperation and preventing proliferation through continuous communication and modifications to maintain relevancy. Efforts in the Middle East regarding the proposed Weapons of Mass Destruction Free Zone (WMDFZ) could also inform discussions, and be an avenue through which to discuss IND. Lessons should be extracted from NWFZs to find keys to their success from an IND perspective.

Individual States, primarily South Africa and Iraq, offer valuable examples of the process of disarmament and subsequent verification.

Concrete actions towards disarmament and verification measures are exemplified by: the Chemical Weapons Convention, NWS arsenal reductions (especially in regard to fissile material accounting and safeguards), NNWSs that have Comprehensive Safeguards Agreements and Additional Protocols in force, and the Treaty on the Prohibition of Nuclear Weapons (TPNW).

Further, the actual process of disarmament can take lessons from: the climate change community and their studies on how to dismantle the coal industry, the passive erosion of the US

and post-Soviet nuclear complexes in the 1990s,⁶ and a case study on the UK nuclear weapons complex.⁷

Verification lessons can be learned from: the US and USSR actions in the Cold War, IAEA verification of enrichment and reprocessing facilities, the EURATOM safeguards systems (as it has a uniform system for NWS and NNWS), and case studies on contemporary nuclear weapons complexes.⁸

When exploring the concept of latency, attention should be paid to the IAEA's Acquisition Path Analysis methodology, the JCPOA (with special care not to confuse the concept of latency and breakout time), Japan, and Germany.

To garner lessons on virtuous versus disruptive action cycles, one can analyse the Argentina/Brazil dynamic via the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), or an example from a different context, the Paris Climate Accords.

Further areas of research – for NGOs and academia

One of the goals of this dialogue was to propose further areas of research for NGOs and academia, focusing on various interdisciplinary approaches and methodologies.

There was a proposal for biannual, Track 1.5 scenario-based tabletop exercises, aiming to move beyond problem analysis towards recommending policy changes through the

⁶ Dr Nick Ritchie, "Irreversibility and Nuclear Disarmament: Unmaking Nuclear Weapon Complexes", *Journal for Peace and Nuclear Disarmament* 6:2 (2023), 218-243, in <https://www.tandfonline.com/doi/full/10.1080/25751654.2023.2282737>

⁷ Dr Nick Ritchie, "Provisional systems map of the UK nuclear weapons complex", University of York, available at: <https://embed.kumu.io/72049ffc0af7e5f2e55234fea31f166f>

⁸ Using the model developed in: Alberto Muti, Grant Christopher and Noel Stott, "The Role of Verification in Supporting Irreversible Nuclear Disarmament", *Journal for Peace and Nuclear Disarmament* 6:2 (2023), 292-302, in <https://www.tandfonline.com/doi/full/10.1080/25751654.2023.2291892>

exploration of disarmament drivers across normative, legal, security, technological and domestic domains.

Scenario mapping for a world without nuclear weapons, inspired by previous studies,⁹ emerged as a research avenue, aiming to explore security landscapes, technical issues, rearmament factors, cost considerations, regional dynamics and the roles of institutions (e.g. the IAEA).

A market survey of IND was proposed to assess stakeholders' interests and perspectives, shedding light on the agenda's reception across different regions and among non-NPT nuclear-armed States, NWSs and NNWSs.

A number of additional areas ripe for research were proposed by both civil society and governments, including:

- A paper series on practical steps and “things that cannot be reversed” versus “what is not reversed”.
- A workshop and research paper on “quick wins” – which early steps could yield dividends on irreversibility later in the process.
- Increased research on latency and its impact on IND, which would attempt to remove the controversy around this topic.
- Historical analyses on how IND was discussed or considered in trilateral discussions.
- Funding mechanisms for disarmament.

⁹ David Cliff, Hassan Elbahtimy and Andreas Persbo, “Irreversibility in Nuclear Disarmament: Practical steps against nuclear rearmament”, Verification Research, Training and Information Centre, September 2011, in <https://www.nonproliferation.eu/wp-content/uploads/2018/09/davidcli64256hassanelbahtimyandandreaspersbo4ece48257c33b.pdf>

- Using the UK nuclear weapons complex map¹⁰ as a guide for other cases, including to: (1) map out the dismantlement and disarmament process in South Africa and (2) develop a picture of latency in NNWSs.
- How critiquing nuclear deterrence works together with disarmament to establish norms devaluing nuclear weapons.

Future steps – for governments

Momentum and commitment must be maintained. Without money and political support behind IND, civil society will be forced to pivot into other areas and the concept will get pushed aside at international fora. Civil society identified a number of items that are needed from governments to continue IND work, including clarity on roles, purpose, desired outcomes and stakeholders.

Unified standards, clear processes and transparency are essential for achieving concrete results, with an emphasis on translating theoretical discussions into practical procedures without over-complicating the approach. To work towards the path of IND, NWSs can already start small, short-term, concrete actions. Some steps were already identified, such as removing nuclear material from defence programmes to place under safeguards and including more facilities in IAEA Voluntary Offer Agreements.

Preparations for the 2024 and 2025 NPT PrepComs and 2026 NPT RevCon should entail a multi-pronged approach aimed at advancing discussions on IND.

¹⁰ Dr Nick Ritchie, “Provisional systems map of the UK nuclear weapons complex”, University of York, available at: <https://embed.kumu.io/72049ffc0af7e5f2e55234fea31f166f>

- Side events featuring expert panels could provide opportunities for State Parties previously uninvolved in IND deliberations to engage meaningfully.
- A joint statement should be developed with an inclusive process, reiterating previous commitments and fostering dialogue to refine language surrounding IND.
- National statements should echo this sentiment, reflecting individual States' perspectives on irreversibility.
- A working paper must be drafted which highlights progress made, emphasises the purpose and importance of IND discussions, and tailors concerns to all States, particularly NNWSs.
- Technical papers from NGOs and academia can offer additional insights and be submitted as separate working papers.
- Where possible, IND should be injected into the negotiation process for the Outcome Document and include areas where irreversibility can be achieved within specific steps in the NPT Action Plan.
- The community should revisit recent NPT PrepCom/RevCon notes and documents to find where IND could improve engagement in the room, and take those lessons forward.

Bring IND into other international fora, including the Conference on Disarmament (CD) and First Committee. IND could also be included in work happening on other topics related to Article 6 (e.g. Creating an Environment for Nuclear Disarmament (CEND)). This topic could also be brought to other conferences to test it on a wider audience, including Wilton Park's annual conference on the NPT review cycle.

Consider establishing a Group of Scientific and Technical Experts (GSTE) in this area.

Maintain dialogue for consensus, not polarisation. This topic has created a diplomatic space for free discussion, which should be maintained and protected. Move forward with things the community does agree on; in areas where the community does not agree, set them aside for later discussion.

The path forward – for everyone

Conversations between Tracks 1 and 2 are of immense benefit to the IND community. Continuing to have Wilton Park dialogues with expanded engagement and practical discussions would help the community frame its purpose and path. There will be one more dialogue (March 2025) before the 2026 NPT RevCon. However, it was noted that more political changes should flow from these dialogues; these should not simply turn into drafting sessions.

A plan needs to be developed for how to move forward after the 2026 NPT RevCon. While much of this will depend on the outcomes, thought should be put into this now.

Think about strategic framing, especially for diplomats. Offer solutions of how this work could feed into their NPT work writ large. Show how IND contributes tangibly to disarmament. Link technical with other concepts (i.e. norms, legal, political) to make it more understandable and palatable for non-technical individuals. Raise awareness among policymakers.

Expand engagement, even in the face of scepticism. More sectors and age groups need to be brought into the process. This involves conversations within the NPT (between NWSs and NNWSs) and external to the NPT (with nuclear-armed States outside the treaty). Increase regional representation, especially in civil society, and let States that do not typically

lead processes take the lead on some issues. Other communities could also be called upon to help strengthen thinking about IND, like the emerging and disruptive technology and effective altruism communities.

Participants emphasised the importance of already starting to build confidence and trust among stakeholders, recognising the significance of cooperation and the human factor in fostering a non-confrontational approach towards IND. There should also be a generational commitment backed by both funding and political will.

Conclusion

While the quest for a precise definition of IND may present challenges and differing perspectives, progress has been made towards fostering a common understanding of the concept.

- Understanding the nuances and interplay of irreversibility, verification, transparency and latency will be crucial in addressing the complexities inherent in the topic.
- Achieving a clear understanding of IND within the context of the disarmament process requires addressing key areas such as institutional involvement, technical considerations and normative and political factors.
- A post-disarmament world necessitates not only technical measures but sustained political engagement to ensure long-term monitoring and compliance.
- By clarifying the roles of institutions, fostering transparency and developing norms conducive to

disarmament, progress can be made, bolstered by trust, confidence and a shared commitment to IND.

Discussions devoted to next steps, developing further research avenues and discovering areas from which to draw lessons-learned provided a number of conclusions that can be utilised by the community as these efforts are propelled forward past the 2026 NPT RevCon.

- Future research could be composed of a series of tabletop exercises, end-state scenario mapping work and stakeholder surveys, in addition to areas identified throughout this report.
- Sustaining momentum and commitment is imperative for the advancement of IND efforts, requiring financial and political backing to prevent its marginalisation on the international stage.
- States Parties should leverage the 2024 and 2025 NPT PrepComs and 2026 NPT RevCon to promote engagement across diverse stakeholders and reinforce consensus-building efforts through the development of side events, a joint statement, national statements and a working paper, all seeking to progress IND efforts globally by framing the issue in a clear, concise manner.
- Fostering ongoing, substantive dialogue and collaboration between Tracks 1 and 2 remains crucial for the advancement of IND, with continued Wilton Park events serving as valuable platforms for practical discussions and expanded engagement.
- Embracing broader engagement across diverse sectors and age groups, both within and outside the NPT framework, will be vital in building confidence, trust and generational commitment towards realising irreversible nuclear disarmament.

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