Revisiting Societal Verification for Nuclear Non-proliferation and Arms Control: The Search for Transparency

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ABSTRACT

The last couple of decades have seen a surge in non-state actors wielding increasingly accessible information and communication technologies to provide intelligence to relevant publics and governments on a range of issues, including on nuclear activities of concern. This has prompted the impression that more transparency would translate almost surely to a world secure from nuclear danger arising from treaty-violating nuclear proliferation or nuclear arsenal expansion. As a matter of fact, the idea of involving civil society in treaty verification – or “societal verification” – hails from the post-WWII scientists’ peace movement. In this commentary, it is argued that some of today’s prominent instances of societal verification deviate significantly in spirit from initiatives suggested by the original conception. Today’s efforts have lent themselves to co-optation by states in the service of US and Western hegemonic interests and do little to curb nuclear danger. Indeed, they conform to a depoliticized conception of societal verification. This commentary sketches the evolution of the theory and practice of societal verification and calls for the launch of a community conversation to rethink societal verification in such a way as to avoid the further entrenchment of the status quo.

Introduction

The last couple of decades have seen a surge in non-state actors wielding increasingly accessible information and communication technologies to provide intelligence to relevant publics and governments on a range of issues, from human rights violations, to humanitarian disasters, to environmental catastrophes, to nuclear activities of concern. The raging Russia–Ukraine conflict is but the latest testimony to the indelible impact of non-state efforts on the intelligence front – from the investigation and reporting of atrocities in the most documented war to date (Hendrix 2022) to monitoring signals of an imminent Russian nuclear strike (Broad 2022).

As far as the nuclear realm is concerned, some civil society efforts over the last couple of decades proclaiming to reduce nuclear proliferation risks and the risk of use of nuclear weapons through surveillance technologies may have furnished the impression that ever-increasing transparency driven by citizens would lead to a world that is overall more...
secure from nuclear danger. In fact, Manhattan Project scientists active in the post-war scientists’ movement believed some form of monitoring and inspection by the citizenry to be a crucial component of a prospective international system for the control of atomic energy, besides demanding transparency in governments’ deployment of scientific labor (cf. Szilard 1946; Smith 1965). But those civil society efforts deviate from those scientists’ vision – if not in the objective of ensuring a world free from nuclear danger, then at least in spirit.

A term that captures those efforts in the nuclear non-proliferation and arms control discourse is “societal verification”. On the one hand, the term speaks to the two salient aspects manifested by those efforts. First, the primary objective of those efforts is to demonstrate the compliance of states with their treaty obligations using gathered information, a process traditionally referred to as “verification” (Krass 1985). Second, societal verification ensues primarily through the actions of civil society members, involving publicly accessible means. This is in contrast to traditional treaty verification, which is conducted either by governmental employees as in the context of US–Russia arms control, or by an incumbent international organization such as the International Atomic Energy Agency (IAEA) – in both cases through mutually agreed mechanisms for information collection that might involve proprietary or classified technologies.

On the other hand, the use of the term “societal verification” serves to underscore the fact that the concept has undergone contestation since its coining in the early nineties. As I demonstrate in this commentary, contemporary societal verification efforts conform to a re-appropriated, co-opted, depoliticized version of the original concept. At stake is the question of whether the sense of transparency articulated and supported by today’s version leads genuinely to a safer world.

A Classical Conception of “Societal Verification”

This conception dates back to Joseph Rotblat, Manhattan Project physicist and one of the founders of the Pugwash Movement. Rotblat coined the term “societal verification” in his 1992 article “Towards a Nuclear Weapon-Free World: Societal Verification” (Rotblat 1992) following the end of the Cold War, the collapse of the Soviet Union, and the uncovering of the Iraq clandestine nuclear weapons program.

At his time of writing, there was serious discourse on disarmament that wasn’t dismissed as utopian. There were, however, valid concerns about the feasibility of disarmament in the absence of a treaty guarantee against member state cheating. After all, Iraq’s nuclear ambitions exposed the limitations of the IAEA’s accountancy function when it came to illicit nuclear activities if the nuclear material and facilities were not declared in a safeguards agreement.

In his article, Rotblat reasons that one can simply not have enough assurance of states’ commitments to their treaty obligations vis-à-vis non-proliferation or – especially – disarmament; cheating would remain a viable prospect, eroding mutual trust and confidence in the regimes achieving their ends. An effective safeguard against treaty violations would be to supplement traditional technical verification mechanisms through on-site inspections and national technical means with societal verification. Rotblat modeled societal verification on lay citizens’ reporting if these weren’t employed within a given state’s nuclear complex, and on whistleblowing or watchdog organizations if they were
employed within the complex. Wary of the inevitability of false alarms and state retaliation against especially whistleblowers, he pleaded for a clause to be appended to relevant treaties to protect citizens’ right to report treaty violations and require such reporting as a duty. Upon ratification, domestic laws would have to be adapted in accordance with that clause. Enabling and articulating such institutionalization would be a shift in loyalty such that it be directed to mankind rather than nation-states, especially in view of the growing interdependence among nation-states and of the resulting shift in the notion of sovereignty. It is transparency that would prevail in this new paradigm, making violations inconceivable; and media and educational efforts should be directed to bringing this paradigm about and sustaining it such that secrecy in scientific practice would eventually be delegitimized. Non-democratic governments reluctant to empower their citizenry to hold their rulers accountable wouldn’t risk abstaining from joining the treaty lest they be suspected by the international community of carrying out illicit nuclear activities.

Societal Verification Today

Today, contemporary societal verification is popularly recognizable as non-state open-source intelligence, or non-state OSINT. What retrospectively can be documented as the first instance of it was made possible by the advent of commercially available sub-meter resolution satellite imagery in the United States in the early noughties. The technology’s debut in the nuclear non-proliferation realm was in the context of the discovery of clandestine enrichment activities in Iran. The controversial National Council of Resistance of Iran, a coalition of Iranian dissident groups, had revealed in 2002 undeclared nuclear facilities in Iran, among which was the Natanz Enrichment Complex (NTI 2020– Iran Nuclear Overview; ElBaradei 2011, Chapter 5). But furnishing a compelling accompanying visual story for the perusal of not only the IAEA, but the world’s citizenry at large was the work of a US non-governmental organization (NGO), the Institute for Science and International Security, that published imagery by DigitalGlobe’s Quickbird satellite of the Natanz facility and their analysis publicly in 2002 (Lawrence 2019). This was a path-breaking development that ushered in a shift in the manner of engagement by different actors – commercial satellite companies, civil society analysts, the media, and the public – with revelations of nuclear treaty violations. It was a development that consolidated the era of global transparency. This is an era marked by the vilification of government secrecy, especially when that secrecy is exercised by challenging governments – Iran, North Korea, and China, for example. This era is also marked by the unwavering faith in the universal-emancipatory potential of a mythical objective truth accessible by the privileged vantage point of overhead high-resolution imagery and advanced omnipresent surveillance capabilities. Notably, the era of global transparency heralded the “democratization” of OSINT: once a capability exclusive to state intelligence agencies utilizing their own classified resources, OSINT could be practiced by the demos for the demos, using publicly available tools. Nevertheless, non-state OSINT has been skewed from its debut in both the degree of access to the tools as well as the degree to which certain locations around the world receive attention. The asymmetries are both political and structural in nature.

Similar instances of non-state actors unraveling contentious state-sponsored activities through some combination of investigation research, delegation of information
collection or problem-solving sub-tasks to the crowds, journalism, and activism, and utilizing rapidly evolving information and communication technologies have accumulated ever since – within and outside the nuclear realm.\(^1\) The enabling technologies have included free or commercial satellite imagery, geospatial analysis tools, Internet services including search engines, social media platforms (e.g. Facebook, Instagram, Twitter, YouTube, TikTok, Telegram, LinkedIn), and expert collaboration fora, machine learning algorithms for pattern recognition and classification, and network analysis tools for relationship discovery and link analysis.

While “non-state OSINT” is the self-designation of the community of analysts and journalists using open sources for verification, the community’s practices have evolved to conform in fact to a redefinition of societal verification by the Nuclear Threat Initiative (NTI). The redefinition is an attempt at setting up a theoretical grounding for non-state OSINT practices as well as adjacent ones within the nuclear non-proliferation and arms control regimes of practices driven or shaped in large measure by the public using publicly accessible means – with a view to their institutionalization. In the NTI report, *Innovating Verification: New Tools & New Actors to Reduce Nuclear Risks. Redefining Societal Verification*, “societal verification” is redefined as a process “by which states or international organizations can use information generated and communicated by individuals or expert communities for arms control or non-proliferation treaty verification […]” (Hinderstein et al. 2014).\(^2\)

The report actually distances itself in no uncertain terms from Rotblat’s conception, as the rest of the definition reveals: “[Societal verification] should be based on sound, tested, and validated procedures that take advantage of the data now available to states. It would not rely on luck in finding a specific piece of information, mysterious analytical processes, or the tasking of citizens to become whistleblowers or amateur spies […]” The report therefore rails against Rotblat’s conception insofar as the latter endorses whistleblowing. In fact, the report also rails against the adoption of Rotblat’s conception by advocates of the Nuclear Weapons Convention (NWC) (Datan et al. 2007) in their quest for a nuclear-free world. Hailing as it does from a US-government–friendly NGO that is a proponent of the incremental approach to disarmament, the report cautions against undercutting the interest of governments in maintaining secrecy regimes for the protection of national security (Hinderstein et al. 2014).

**Institutionalization**

As far as the stated definition above is concerned, where do institutionalization efforts stand today? Looking to the IAEA safeguards regime for the verification of the compliance of non-nuclear weapon states with their obligation of the peaceful use of nuclear energy according to the Treaty on the Non-Proliferation of Nuclear Weapons,

\(^1\)A notable example outside the nuclear realm is the work of Bellingcat (https://www.bellingcat.com/). Bellingcat self-identifies as an “independent international collective of researchers, investigators and citizen journalists using open source and social media investigation to probe a variety of subjects.” These subjects span crime, human rights abuses, and conflicts. Investigations by Bellingcat that have attracted international attention include the downing of Malaysian Airlines Flight 17 in 2014 while flying over Ukraine, the use of chemical weapons in the Syrian Civil War, and the poisoning of former Russian spy Sergei Skripal in 2018 and Russian opposition leader Alexei Navalny in 2020.

\(^2\)Similar formulations have appeared in subsequent expert policy advice reports (cf. National Academies of Sciences, Engineering, and Medicine 2021).
“open sources” qualify as safeguards-relevant information. Those are understood to include government documents, operator publications, scientific and technical literature, and commercially available satellite imagery (IAEA n.d.). While operator publications and scientific and technical literature are certainly kinds of “information generated and communicated by individuals or expert communities” according to the aforementioned NTI definition, they don’t exhaust the range of information deemed today potentially valuable for verification. Indeed, the IAEA’s information technology system underwent an expansive overhaul that was completed in 2018. The revamped system can now collect and analyze at least a hundred-fold more pieces of open-source information than before, more capably identifying relationships and patterns among the data. The analysis of even social media has after all garnered the attention of safeguards researchers for their potential in supplying contextual information, providing early warning or real-time awareness of nuclear events, and permitting relationship discovery and link analysis. At the very least, satellite imagery analysts often use social media for data validation and corroboration. The IAEA state-level approach – aiming at a holistic, systematic evaluation of a state’s nuclear activities for more effective and efficient verification of treaty compliance by drawing on a broad range of information – certainly provides sufficient pretext for data collection and analysis at such a scale. For there can never be enough information to illuminate the context within which a state’s nuclear activities are undertaken.

The mode of operation of societal verification thus outlined is one where the role of the societal actor has manifestly been reduced to that of an object of data extraction and surveillance. However, another mode of operation of societal verification in employment by the IAEA that conforms in a loose sense to the NTI definition is that of crowdsourcing the knowledge and skills of willing participants in its recent challenges in digital image processing (IAEA 2016a) and robotics (IAEA 2017) in support of verification activities. While not directly contributing to instances of treaty verification, the input accrued through these challenges serves to amass a rich repository of expertise to be drawn on as the need arises at a later point for assessing a given state’s compliance.

To be sure, non-governmental societal verification campaigns have continued apace independently of developments on the IAEA front. Another crowdsourcing endeavor, for example, was Geo4Nonpro, a project run by the James Martin Center for Non-Proliferation Studies (CNS) from 2016 to 2020 that brought together the efforts of experts, hobbyists, and novices to interpret and annotate satellite imagery of sites in Iran, Syria, India, North Korea, Russia, and Brazil, among others, in order to gain insights on weapons of mass destruction programs around the world (Geo4Nonpro Project). Yet another was the Underhanded C Contest in partnership with the NTI to crowdsourced counter-proliferation tactics (The 2015 Challenge: Faking Fissile Material).

Curiously, the contemporary definition of societal verification also applies to a case where the societal dimension has been stripped away all together. The case concerns a form of machine expertise: a fully mechanized analog of joint data collection and model building exemplified by work done at the Sandia National Laboratories (cf. Gastelum and

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3The project is “Modernization of Safeguards Information Technology” (MOSAIC), 2015–2018. See IAEA (2016b).

4See, for example, Sköld and Feldman (2014). For the potential of “new media” as they pertain more broadly to the nuclear realm, see Lee and Zolotova (2013).
Shead 2018) and the Lawrence Livermore National Laboratory (cf. Feldman et al. 2018). In the latter, for example, neural networks are trained by experts on an expansive repository of text, imagery, and video drawn from the Internet and annotated so that the network learns the salient features of a peaceful nuclear fuel cycle. Subsequently, the network is mobilized to be on the lookout in real-time for new content that exhibits features that deviate by some specified measure from those of a peaceful program and flag it for further scrutiny. The objective is a speedy early-alarm system for nuclear proliferation incidents – and, thanks to the ever-decreasing cost of complex, data-intensive computational labor, it’s cheap.

What all those practices share in common is the following: a) the relevant information is being generated by non-state actors, either wittingly or unwittingly; b) Conceptually and practically, a tendency has manifested towards the IAEA and the patron states of the present nuclear order capitalizing on every piece of generated information of potential relevance to nuclear risk assessment, wherever it may be found and through whatever available means.

The Limitations of Contemporary Societal Verification

Contemporary societal verification is not without challenges. Some challenges – technical, legal, ethical, diplomatic, strategic – have been pointed out elsewhere. However, the problem of interest to this piece is that the associated sense of transparency isn’t conducive to a safer world.

The perniciousness of this sense of transparency stems from the disproportionate development and deployment of the instruments of contemporary societal verification by actors predominantly situated in the United States and West. Moreover, much of contemporary societal verification produces certain intelligence that exposes presumably nefarious nuclear activity in the non-West. This intelligence is destined for consumption by certain audiences, furnishing them with directed narratives that affirm unhelpful beliefs about adversarial states. And, under the present conditions of knowledge production, all this proceeds in favorable alignment with US and Western strategic interests. The transparency afforded by much of contemporary societal verification is therefore lopsided and not without consequences for international security. For contemporary societal verification proceeds without the robust political arrangements to contain potential damage, either from almost inevitable false alarms (cf. Lewis 2015) or from a lack of insight into the adversary’s capabilities or intentions – a lack exacerbated no doubt by the adversary’s opacity. Contemporary societal verification operates today in the absence of the requisite mutual confidence among stakeholder states in order to achieve progress, be it on nuclear non-proliferation or arms control. In the absence of confidence, contemporary societal verification tends to invigorate security dilemma dynamics. The most recent manifestation of the galvanization of such dynamics is the case of Chinese

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5Recent attempts at conceptualizing societal verification include, for example, the aforementioned Hinderstein et al. (2014), but also Lee and Zolotova (2013); Gastelum (2020); National Academies of Sciences, Engineering, and Medicine (2021).

6For technical challenges, see, for example, National Academies of Sciences, Engineering, and Medicine (2021); for ethical, see, for example, Hinderstein et al. (2014); for legal, see, for example, ibid.; for strategic, see, for example, Vaynman (2021); “Open-source intelligence challenges state monopolies on information” (2021); for diplomatic, see, for example, Vaynman (2021); “Open-source intelligence challenges state monopolies on information” (2021).
intercontinental ballistic missile (ICBM) silos revealed by analyses by CNS (Warrick 2021) and the Federation of American Scientists (Broad and Sanger 2021) (two NGOs) of free and commercial satellite imagery. But these NGOs are turning satellite eyes on China to reveal a) that which has been hiding in plain sight and known for a while to the US military; b) that which China is arguably under no legally binding agreement not to pursue. But the effect on political discourse the revelations have had isn’t negligible. This discourse informs defense policies on both sides of the adversarial relationship. Indeed, the recent release of satellite imagery of alleged Chinese ICBM silos added momentum to hostile US rhetoric against China in a period of already tense relations. This rhetoric is reminiscent of Cold War US rhetoric against the USSR, and furnishes ready justification for calls on the US Congress for an exaggerated defense budget and for expanding modernization efforts.⁷ Notably, the recent revelations haven’t received much coverage in Chinese media, and if at all, then to accuse the United States of demonizing China. The revelations have also not been much the subject of discussion among Chinese citizens, expert or lay. The lack of discussion among experts in turn compromises the quality of domestic policy work (Zhao 2021).

Considering then how it caters – inadvertently or deliberately – to US strategic interests, the evolution of societal verification has amounted to the virtual absorption of the respective actors – active and passive – and deployed instruments into an updated conception of the US fleet of national technical means (NTMs): Whereas NTMs traditionally refer to intelligence tools owned and used by governments for remote monitoring and where the gathered intelligence is generally not publicly shared, the products of contemporary societal verification, as a modern form of NTMs, are generated through some sense of public engagement using publicly available means for the consumption of the public as well as policymakers. Ultimately, the transparency of societal verification practices itself is weaponized to shore up legitimacy for political decisions.

Transparency and Progress

The sense of transparency implied by contemporary societal verification stems from the fixation on the reduction of nuclear proliferation risk and strategic surprise in the current US-led nuclear world order. For example, the primary anticipated purpose of institutionalized contemporary societal verification in the context of non-proliferation as a supplement to the respective regime is to raise the alarm as early as possible on suspicious nuclear facilities and activities in violation of treaty obligations. There is an implicit understanding that many of the alarms might be false; the invariable increase in analytic and diplomatic burdens as a result is the tacitly accepted cost for timely risk detection and mitigation.

Contemporary societal verification has evolved then to become yet another instrument in an expansive toolbox the use of which has historically prioritized the reduction of nuclear proliferation risk and strategic surprise at the expense of resolving the conditions that foster nuclear arms racing and at the expense of realizing nuclear disarmament. But the pursuit of an end to arms racing and eventual disarmament would – in addition to seeking to reduce the risks of nuclear proliferation and nuclear

⁷See, for example, Tirpak (2022).
weapons use – aim to decrease the salience of nuclear weapons in defense planning and resolutely question the utility and legitimacy of nuclear deterrence. Such fetishization of nuclear risk reduction is symptomatic of US nuclear foreign policy since the end of the Cold War and the consolidation of Western hegemony.

The preeminent focus on nuclear risk reduction is an element of a set of practices endorsed by that policy and that have been characterized by pragmatism: promoting non-proliferation among smaller states; measured arms reductions through negotiated arms control treaties; the proliferation of discourse on the reduction of risk of nuclear use. Seemingly vindicating the efficacy of advocacy for mere ameliorative steps rather than nuclear abolition were the post-Cold War developments: the revelation of the Iraqi and North Korean nuclear weapons programs, Libyan and Iranian nuclear weapon aspirations; nuclear weapons testing by India, Pakistan, and North Korea; the emergence of the threat of unwieldy non-state actors in whose hands nuclear weapons might end up. Not inconsistent with an ameliorative philosophy are in fact aggressive non-proliferation policies (using military force rather than diplomacy) in the form of counter-proliferation against actual or potential threats to the stability of the hegemonic world order, for the threat of proliferation is perpetually imminent and ready justification for war could be pulled up on demand. Case in point: the Iraq war.\(^8\)

Whether proliferation in non-nuclear weapon states or arms racing among certain nuclear weapon states, observed then is a lock-in in nuclear use risk reduction discourse. In this discourse, the two alternatives to the status quo, complete disarmament or more equitable access to nuclear weapons, are taken to heighten the risk of nuclear use, rather than call to question the logic of nuclear deterrence.\(^9\) Ultimately, nuclear forces are being increased or modernized; progress on global arms control, even by conservative standards, is under threat.

This discourse and its related practices, however, may be better equipped to serve what now seems to be a declining world order whose erstwhile stability lay in its unipolarity – that is, unchallenged US hegemony. It’s not clear whether and how this state of affairs could secure stability in a multipolar world order witnessing a reinvigorated arms race. Moreover, conflict escalation pathways have become unpredictable given technological advances beyond the nuclear arena (e.g. artificial intelligence, autonomous weapons, hypersonic missiles, cyber warfare, biological warfare) with less understood implications for conflict dynamics (Hersman 2020). Finally – and of central interest to this commentary – the propensity of contemporary societal verification to support a sense of transparency conducive to confidence-building among the nuclear powers is questionable – amid piling bilateral concerns about the imminent possibility of treaty parties cheating on their obligations if not reneging on a given treaty all together, as evidenced by the historical US–Russia treaty record and most prominently by the fate of the Intermediate-Range Nuclear Forces Treaty.\(^10\) And it is precisely on account of the issue of confidence-

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\(^8\)The point about the constitutive role of risk discourse in the present nuclear order is discussed in Craig and Ruzicka (2013).

\(^9\)In Waltz (1981), the proposition was put forth of more equitable access to nuclear weapons being a more effective means for ensuring international security than the non-proliferation status quo in the face of international anarchy and in acknowledgment of nuclear knowledge irreversibility – see also Waltz (2012).

\(^10\)For an example of Russian allegations of US treaty violations, see Comment by the Information and Press Department on the US Department of State’s report on adherence to and compliance with arms control, nonproliferation, and disarmament agreements and commitments (2016).
conducive transparency that I argue in this commentary for the need to launch a community conversation on tapping the potential of societal verification in such a way as to achieve genuine progress on nuclear matters of concern. So how to rethink societal verification in such a way as to avoid the co-optation of civil society efforts towards the consolidation of relevant state power and the entrenchment of the status quo? How to adequately integrate societal verification into a holistic strategy that addresses the root causes of nuclear proliferation and arms racing? Ultimately, Rotblat conceived societal verification as a contentious practice, by virtue of which citizens everywhere could hold their governments accountable in matters nuclear. The goals of nuclear non-proliferation and arms control would thus be elevated to the transnational level – for the issue of nuclear weapons is much too dangerous to be addressed at the governmental and intergovernmental levels alone. The objective would be security for all.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Notes on Contributor

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