Global Nuclear (Back-Up) Hotline: Building Communication Norms Across NC2

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ABSTRACT
So far nuclear-armed states failed to create a global security framework that could improve global security and reduce the role of nuclear threat in relations between nuclear-armed states. All nine nuclear-armed states are engaged in nuclear weapons development and modernization aiming at diversity, precision, rapid mobilization and survivability, thereby increasing the probability of swift crisis escalation between nuclear-armed adversaries endangering the security of entire international community. Amid this weapons development and modernization, lack of and weak lines of communication between nuclear-armed adversaries during crises is crucial to work on as this could bring the world perilously close to sailing directly into the headwinds of nuclear war. The importance of building and maintaining communication between nuclear-armed states during crises is indisputable. Hence, building an information flow via a backup hotline among supreme nuclear commanders based on agreed standard operating procedures (SOPs) for its operation could serve to reduce nuclear risk should it ever be needed. This hotline will socialize nuclear commanders and national leaders to be ready to: 1) disentangle communication during crises from domestic political pressures by practicing agreed SOPs of hotline before a crisis occurs, 2) build confidence among nuclear-armed states – and the international system in general – that the means to control escalation exists, even if the political will is lagging, and 3) open opportunities for nuclear-armed states to broaden their discussion from the specifics of a nuclear hotline to the need to develop new norms that cover the entire nuclear command-and-control system.

Introduction

A secure, stable and reliable hotline is a key to establish and maintain steady communication among nuclear-armed states during crisis to ensure escalation control and crisis stability. The hotline, as argued by different scholars, contributed to stabilise crisis among adversaries by reducing the chances of misinterpretation, miscalculation and inadvertent escalation resulting from incomplete information and lack of communication (Schelling

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It can also be “an essential war-termination device” (Miller 2020). Regardless, hotline has been in use since 1960s yet still faces challenges that need to be addressed. New technologies such as cyber, artificial intelligence (AI), machine learning, hypersonic missiles are capable of undermining hotline’s contribution towards crisis stability (Perkovich and Vaddi 2021; Klare 2018; Falcone 2019). Moreover, a chaotic situation within a country as a result of a natural calamity or pandemic where affected and confusing communication among different organizations and/or different provinces/states could raise doubts about any message sent over a hotline to an adversary (El Khalid and Mcheick 2019; Kishorbhai and Vasanthbhai 2017; Macfarlane 2020) To mitigate these challenges, this paper finds the need for a global standard for hotline communications among nuclear-armed states.

There have been examples where either a hotline in particular or communications in general (both within state and among states) came under strain, leading to doubts about its contribution towards crisis stability. For instance, the Moscow-Washington hotline was established post-Cuban missile crisis to address communication problems faced by the United States and former Soviet Union during the crisis (Beschloss 1991, 524; Hudson 1973; Smoke 1984, 138). The efficiency of hotline against diplomatic channels can be challenged when diplomatic communications proved more effective and efficient during late 1960s (Kissinger 1979, 909), however, a hotline remained in use by states at different occasions when diplomatic channels were available and intact because the integrity of diplomatic channels can be compromised by deception (Dobrynin 1995, 84, 85, 97). On another occasion, during 2019 India–Pakistan crisis the hotline remained in place but seemed redundant when Indian prime minister did not rely answering a call from Pakistani prime minister (The Indian Express 2019) primarily due to domestic political reasons. While swiftness can be an essential criterion for an efficient hotline against diplomatic channels, yet to avoid redundancy a hotline also needs to circumvent situations like 2019 India–Pakistan crisis, to work safely and securely in the presence of emerging technologies and to overcome impact of natural calamities and disasters (including global pandemic). To meet these criteria, there is a need to build a reliable, modern and standard back-up communication link among nuclear command and control (C2) nodes of nuclear-armed states in bilateral and multilateral ways based on a rigorous normative structure.

Existing literature on the NC3 attempts to investigate all major aspects of nuclear C2 and also emphasises upon the need to uphold command and control to ensure regional strategic stability, global security, arms control and disarmament (Bracken 1983; Ball 1981; Blair 1985, 1993; Feaver 1992/93; Lavoy, Sagan, and Writz 2000; Steinbruner, Zraket, and Carter 1987; Gregory 1996; Acton 2018; Cimbala 2001). There are two gaps in exiting literature – lack of studies on communication that is the most vulnerable aspect of NC3 and on international cooperation to strengthen NC3 at global level.

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2Examples of natural disasters damaging communications include 2004 Hurricane Katrina when communications were seriously damaged resulting in challenges for first responders, 2000 explosion of fireworks depot in Netherlands that destroyed part of city and resulted in the Global System for mobile Communications being overloaded and went out of service, 2013 Uttarakhand flash flood that caused serious communication network failure etc. Many governments are even struggling with a widening trust deficit as they try to communicate with and provide their public information on the COVID-19 pandemic and its fallout.
However, Simon and Simon conducted a comprehensive study to explore the contribution of Moscow-Washington hotline towards crisis stability and suggested that hotline provides leaders an opportunity to communicate even if they have not developed interpersonal trust between them (Simon and Simon 2020). Likewise, there are studies that discuss actual use of Red Phone and Hotline during crisis (Nanz 2010), propose technical solution to ensure secure communications (Hall and Sands 2020), introduce few alternative NC3 approaches to strengthen nuclear stability (Jones 2019), suggest building hotline between national command and control authorities of arch-rivals (Hannah 2019), and assess the opportunities and challenges machine learning offers to the NC2 (Falcone 2019). With regards to international cooperation in NC3, Yarynich’s study specifically recognizes the need for cooperation among nuclear-armed states and suggests an open dialogue at international level in the NC3 field (Yarynich 2003). Recently the Nautilus initiated research programme to investigate possibilities and challenges of NC3 modernization and international cooperation to strengthen NC3 practices Scholars suggest international discussions on strategic stability and “developing norms of behaviour” (Rose 2018, 1–18), and including modernized NC3 within nuclear allies and alliances, and bilateral nuclear stability dialogues to support worldwide connectivity so that allies and partners in dialogue have secure and survivable networks for nuclear communications that will reduce risk of miscalculations and enhance stability (Jones 2019). However, studies focusing on communications (especially nuclear hotline) and international cooperation in the field of NC3 norms are still scant and needs more attention. This study is an attempt in this direction.

This study seeks to examine how hotline communication can be managed among nuclear adversaries during crisis. This hotline, as argued, is supposed to work within/along three information flows – vertical, horizontal and institutional, to ensure efficient, secure and reliable communication link when needed. In order to look into the possibility of building such a back-up hotline, this article asserts that a security discourse solely based on material competence and power distribution fails to contribute positively to international security, therefore, norms-based NC2 communication is an effective approach towards nuclear risk reduction (For detailed discussion on NC2 norms, see Shaheen 2019). Based on this assertion, this paper puts forth three key arguments. First, nuclear-armed states continue to develop and modernize their weapon systems and nuclear strategies/doctrines, as realist paradigm dictates, that has limited their ability to fulfill their commitments towards nuclear risk reduction and disarmament. Also, the dissolution of existing nuclear arms control treaties and other negative developments at the global and regional level further serve to increase the risk of nuclear war. Hence, active engagement among nuclear-armed states is required to develop a shared understanding about hotline (a nuclear risk reduction measure, an escalation control tool) as a step towards global security.

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Passive understanding in terms of confidence building measures (CBMs) and treaties already exists among nuclear-armed states, for instance, India and Pakistan had agreed to work on measures to reduce nuclear risks in South Asia under Lahore Declaration of 1999. Resultantly, both states signed bilateral CBMs agreement on early notification of ballistic missile tests and non-attack on nuclear facilities. Despite both sides remained compliant to those agreements during crises, India and Pakistan could not agree on an arms control agreement and installing nuclear risks reduction measures in region. Moreover, fate of arms control agreements between the United States and Russia is further deteriorating global security situation hence it is required that nuclear-armed states should actively involve into a norm building process to reduce nuclear risks.
With COVID-19 outbreak, this engagement has become more important than ever because adverse impacts of pandemic heightened tensions among nuclear-armed states (Wintour 2020). Second, nuclear-armed states have been sensitive in sharing knowledge about their nuclear operations primarily, according to realist view, to maintain relative advantage over adversary that has their reliance on nuclear weapons. This reluctance to share knowledge must be overcome so that, at minimum, nuclear-armed states adopt a norm by building and internalizing the need for a nuclear communication link – at a minimum – among supreme national nuclear commanders.

Third, the importance of building and maintaining communication between nuclear-armed states during crises is indisputable. Yet such an arrangement is also susceptible to adverse political will. Under these circumstances, building an information flow via a backup hotline among supreme nuclear commanders based on agreed standard operating procedures (SOPs) for its operation would serve to reduce nuclear risk and escalation control should they ever be needed. This hotline will socialize nuclear commanders and national leaders to be ready to: 1) disentangle communication during crises from domestic political pressures by practicing agreed SOPs of hotline before a crisis occurs, 2) build confidence among nuclear-armed states – and the international system in general – that the means to control escalation exists, even if the political will is lagging, and 3) open opportunities for nuclear-armed states to broaden their discussion from the specifics of a nuclear hotline to the need to develop new norms that cover the entire nuclear command-and-control system. Besides inter-state crises, communication challenge emerged when states are faced with global pandemic. The management of the COVID-19 pandemic demonstrates that states struggled to sustain communication with their respective societies to enforce and implement lockdown, self-isolation procedures and social distancing. Several states adopted surveillance measures such as using mobile phone operators records along with law enforcement agencies to trace people’s movement (Sweney 2020; Yang et al. 2020; Doffman 2020; Browne 2020; Trew 2020), to foster behavioural changes at mass level. This experience can be a useful real-time exercise the lessons from which can be learnt to apply in case of maintaining communication during nuclear crisis in future.

Given these arguments, this paper addresses the following questions: 1) why is it important to build communication norms for nuclear command and control nodes and their leadership? And 2) How can such norms be built? To answer these questions, this paper is divided into three sections followed by conclusions. Section one builds the rationale for why nuclear-armed states should engage in norms-building. The next section discusses how to develop NC3 norms. The final section explains the three information flows within NC2 necessary to build a new backup communication link among nuclear commanders at the international level.

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5 An adverse political will, here, is defined to be a state in which leadership of nuclear-armed state tends to undermine the spirit of escalation control by refusing, denying and breaking communication link for domestic political gains during crisis time when technology offers a secure and reliable communication link.
Need for Norm Building

Increasing global insecurity, especially in the nuclear dimension, is primarily due to the reliance of the national security leaders on (neo)realist (Cimbala 2017; Harrington 2016) and (neo)liberal (Moravcsik 2003, 161; Jervis 1999; Willett 2020; Tisdall 2020; Nye 2020; Foreign Policy 2020) assumptions to explain their choices and behaviour instead of using a constructivist approach. A security discourse solely based on material competence and power distribution fails to contribute positively to international security. This became obvious when faced with COVID-19 because it is unable to explain global pandemic outbreak as a threat to national security within its theoretical postulates, and provides no guidance on how to overcome impediments to realizing the requisite global cooperation to defeat a viral existence threat. (Walt 2020) The idea here is not to draw parallels between COVID-19 (a real-time global pandemic) and an interstate/global nuclear crisis but it is important to highlight that world has witnessed since pandemic outbreak how states (even nuclear-armed states) struggled to develop and maintain efficient and effective communication with different stakeholders notably with their own public to bring a substantial change in their behaviour. These, or novel, communication challenges could emerge during a nuclear crisis.

Hence, as an alternative paradigm, constructivism recognizes the influence of ideas, beliefs, norms and values on state’s identity interests and behaviour, (Onuf 1989; Wendt 1999; Checkel 1998; Goldstein and Keohane 1993) and puts the idea of norms center-stage in explaining international politics. Constructivist scholars study the ways agents (such as the individuals and organizations that constitute the national security leadership in states) construct their reality through normative and ideational structures (Klotz 1995, 13; Checkel 1998; Risse-Kappen 2002, 1994; Raymond 1997). Through a constructivist lens, we are able to understand the social environment that helps define an actor’s identity based on ideational factors such as beliefs, ideas, norms, values and discourses instead of solely through material factors (Checkel 1998; Risse-Kappen 1994). In light of this conceptual cul-de-sac, how might nuclear-armed states help to construct a less dangerous and more secure world, especially with regards to the risk of nuclear war? I suggest that the key is to start working collectively on cooperative nuclear risk reduction based on shared understanding of the threat on the one hand, and common risk reduction measures that serve shared security interests of all nuclear weapons and non-nuclear weapons states. In this regard, states need to work together to build a back-up hotline to strengthen NC3 norms as a measure to reduce nuclear risk capable of escalation control.

Engagement with constructivism requires us to understand what do “norms” entail. Norms are normal practices of states and “as a rule” guide how states engage in such

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6The realists emphasize that decision/policy-making in states is driven by the economic and military resource distribution in international systems so they rely more on material cost-benefit analysis to rationalize decision-making. The liberal theorists engage with normative structures but more in terms of institutions that can foster cooperation among states. However, neo-liberals do not consider the state’s relationship with its domestic institutional power structure; nor do they pay much attention to international society as a critical factor that determines and conditions a state’s behaviour. At the international level, the pandemic has generated a debate about a post-COVID-19 world order. Many countervailing trends and contested issues are in play, including the reliance of the international system of states on threats and military force while neglecting non-traditional security threats, China’s increasing influence in international politics, the relations of major powers with China, a global shift in power resources from West to East, and even the viability of democracies and liberal institutions.
practices (Thomson 1993, 81). Norms emerge out of shared understanding and intersubjectivity among actors (Klotz 1995) and help regulate and enable actors’ behaviour in their social environment (Jepperson, Wendt, and Katzenstein 1996, 33–70; Kratochwil 1989; Finnemore and Sikkink 1998). The norms constrain actors’ choices and thereby render their behaviour more consistent, predictable, and appropriate to the social expectations of the norm in question. However, it is also possible that an actor influences its social environment in a way that a new norm or a revised version of existing norm could emerge (Wendt 1992). Scholars have studied the causality and explanatory power of ideas and norms in international relations in general (Goldstein and Keohane 1993, 3–30; Yee 1996; Mearsheimer 1994/95, 13; Krasner 1982; Deitehoff and Zimmermann 2019), and have argued the impact of norms on nuclear decision-making in particular (Carranza 2019; Frey 2006; Rubble and Cohen 2018; Rubble 2009). For instance, Sagan (1996/97) argues that domestic politics and international norms, along with capabilities (based on realist security model), are important factors in understanding why states build nuclear weapons. The international norms such as nuclear non-proliferation, deterrence, and nuclear non-use remained effective in practicing nuclear restraint, however, norm-setting process towards nuclear disarmament is complex because abolition of nuclear weapons is “a mean to another end – preventing nuclear war” (Freedman 2013, 95–6).

Furthermore, in battlefields such as cyberspace norms are important in making dissuasion work (Nye 2016/17) – a battlefield where international regime of norms is weighed more than deterrence in order to regulate state behaviour (Taddeo 2018). Recently, the subject of NC3 is studied within domain of norms and norm-building (Shaheen 2019), but still needs more work in this direction. This research is aimed in that direction.

Norms tend to lend meaning to existing power capabilities and distribution in line with social expectations, separately from their role in how state level actors ascertain the interests of states in pursuing conflict or cooperation. Hence, this paper argues that the norms hold independent explanatory power, because in the contemporary world the security leaders and institutions of nuclear-armed states feel social pressure from counterparts in non-nuclear-armed states and civil society to fulfil their commitments to nuclear disarmament, regardless of their rational interests in maintaining and strengthening their deterrent postures7 (Gibbons 2018; Johnson 2014). Moreover, rapidly developing novel technologies and the global coronavirus pandemic that demands lowering of the magnitude of existential risks to humanity, nuclear-armed states (both members and non-members of the NPT) have an urgent imperative to take concrete and credible measures to reduce the risk of nuclear war. A key measure here is to strengthen NC3 by building global communication norms to help reduce nuclear risk and stabilise crisis. It must be noted that, once embedded in social structures, norms do not change quickly but evolve8 (Carranza 2019). Also, the “multilateralization of norms helps raise the reputational costs of bad behaviour” (Nye 2016/17, 62) hence the emphasis is to build global communication norms.

7 Underlying this strain between nuclear-armed states and non-nuclear-armed states and civil society is a debate between humanitarian-based discourse versus deterrence-based discourse.

8 The nuclear nonproliferation norm is resistant to changes posed by states and non-state actors but the NPT is contested by Nuclear Ban Treaty however norms being relatively stable tend to evolve or change slowly.
How to Build Communication Norms Within NC2 – A Hotline

The communication norms invoked by a reliable backup or multilateral hotline in nuclear command-and-control context would provide nuclear-armed states with an alternative means to achieve their goals, that is, to contribute to global security by working on nuclear risk reduction and escalation control means in a pre-crisis or pre-war situation. Such a norm provides nuclear-armed states an opportunity to exhibit their responsibility towards global security and engage with their critics by building a widely held set of nuclear norms. But much of the benefit of constructed norms arises from the process of building the norm. Thus, the immediate task addressed below is how to undertake this task of norm building.

In order to construct a global communication norm among nuclear-armed states, consider Finnemore and Sikkink’s (1998, 895–6) idea of three-stage norm lifecycle, which includes norm emergence, norm cascade and norm internalization, as a starting point. At the first stage, norm entrepreneurs9 develop “strong notions about appropriate or desirable behaviour in their community” (p. 896) (the need for change) and undertake a process of “strategic social construction” to carry out “detailed means-ends calculations to maximize their utilities.” (p. 910) Hence norm entrepreneurs call others’ attention to an important issue, thereby crafting shared normative ideas and norm cascade occurs (Bjorkdahl 2002, 45). Several scholars criticised Finnemore and Sikkink’s norms life cycle model: norm entrepreneurs do not explore origins and internal transformations of norms, and practices of norms contestation (Krook and True 2012; Weiner 2007, 2009), or norm entrepreneurs can get hold of power of persuasion that can be used to exploit material factors involved and make norms inherently vulnerable for communicative distortions (Payne 2001; Deitelhoff 2009), and the model fails to address how to determine and measure the norm tipping point – the point where about one-third of critical states agrees, as well as to determine when cascading process will start (Berman 2001; Harrison 2004; Simmons and Elkins 2004). This criticism suggests that in order to build and maintain global NC3 norms it is important for norm entrepreneurs and followers to understand the context that necessitates the NC3 norms to originate along with existing norms and structures that could contest NC3 norm, the persuasion mechanism through which nuclear-armed as well as non-nuclear armed states are to be persuaded to help build NC3 norms, and the mechanism to determine and measure NC3 norm tipping point and cascading process.

Regardless, there are some fundamental concerns that need to be taken into account before applying Finnemore and Sikkink’s taxonomy of norm lifecycle: how much time is required for this cycle to be completed? How deep should the discussion among norm entrepreneurs be? What about deterrence? How to deal with or address the issue of nuclear-armed states from different regions with different social and cultural understanding of norms? The answers to these questions are beyond this paper’s focus however it is important to highlight few ideas that can potentially help answer these questions. One, a constructive turn in international politics has taken place and it is evident in ways states have been interacting over past several years, for instance Ban Treaty, Nuclear

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9 A norm entrepreneur may be an individual, from civil society, or even a government. Each entrepreneur has a specific role at the stage of norm emergence whereby they “attempt to convince a critical mass of states to embrace new norms.”
Security Summit process and notably Ottawa process for anti-landmines convention. Although nuclear-armed states hold matters pertaining to nuclear weapons operations secretive that makes it difficult for them to share and contribute to such norm build-up but at the same time those states have in place systems and procedures for management of nuclear weapons operations that share similar philosophies and practices (Shaheen 2019), which tend to make it less rough and less tedious for states to come together and accelerate NC3 norms build-up. Two, with possession of nuclear weapons all nine states share what it means to build and possess nuclear force not matter how minimum it is. It is evident from their official statements, lexicon and force build-up. This alludes to a cautious generalization that all nine states from different regions could develop a common understanding about NC3 norms.

In the context of nuclear command-and-control, it is important to highlight that all nine nuclear-armed states (norm entrepreneurs) matter in terms of building an understanding around the need to build a communication link that could emerge as a new norm through their practice. The non-nuclear states can assist norm entrepreneurs in developing this norm. It can be argued that only P5 or two to three nuclear-armed states (such as the United States and Russia or the United States, Russia and China) could start with building and practising such a norm and gradually it will cascade and be internalised within other nuclear commands at an international level. This “early champion” view has a practical value because it is easier to share and build understanding among few actors on such a strategic and critical issue. However, even if the great powers were to adopt this in practice, such a norm might not cascade and be internalised across nine nuclear-armed states because they differ so much from one another in terms of their geo-strategic environment, nuclear operations practices, and cultural and domestic setup for nuclear governance. Nonetheless, it is important to be inclusive at the outset to give the emerging norm the best chance to reflect these differences but still inform and affect all the decisions and actions of all nine nuclear weapon states, especially the inter-dependence of their behaviours which are not well understood in today’s globalized conditions. The critical part of norm building in the risk reduction context, therefore, is how to bring nuclear-armed states together and help them to build a strong conviction that new and improved communication links between state-level nuclear commanders are needed.

Here, the primary motivation for nuclear-armed states to proceed in this manner is the need to address the critical push of the non-nuclear and nuclear prohibition states that they must do more to reduce the risk of nuclear war than hitherto (Gower 2019). Another motivation could be to address uncertainties emanating from new technologies such as AI and machine learning that tend to take away human from command and control loop (decision-making loop) hence to bring some level of certainty in reducing nuclear risk by developing and strengthening standard communications it is important for humans (states) to take initiative to socialize and take firm control over NC3. Three, COVID-19 outbreak manifested real-time challenges and risks of building and maintaining communication among states and within states to avoid confusion and to communicate effectively and efficiently across all stakeholders for better management of global crisis. This pandemic, the 2019 hotline deadlock between India and Pakistan during Pulwama-Balakot crisis and North Korea’s lax attitude towards existing hotline communication are important reminders for states to build rigorous standard operating procedures (SOPs) that could hold states responsible in their communications.
Furthermore, current global pandemic not only presented an opportunity for states to work for togetherness but also raised urgency for a constructive approach towards building an international security system less of risks and dangers. Hence it is time for nuclear-armed states along with other non-nuclear-armed states to demonstrate leadership in working towards nuclear risk reduction. Lastly, if the P5 move first, then they may induce the other non-NPT nuclear weapons states to follow suit, or take the lead at a regional level. In this way, the new nuclear hotline communication norm might propagate and eventually cascade until the norm is internalized – at which time, the backup hotline norm would be universal in the community of nine nuclear-armed states. Over time, the consistent practice of such a norm lends it legitimacy and strengthens its institutionalization.

Before discussing three information flows within proposed global hotline, it is important to converse about two often interrelated terms – standard operating procedures and best practices. The fundamental aspect of norm here is to reduce nuclear risk, promote escalation control and strengthen crisis stability all nuclear-armed states agree upon hence it remains stable over time however the SOPs can be revised if and when required. The SOPs are inherently stringent as they involve documentation in detail about the purpose of, resources required for the implementation of and performance of a given SOP (Edelson and Bennett 1998, 45–46). In a way, the SOPs maintain quality through improved efficiency, output consistency and improved learning of a given process across the organizations (Edelson and Bennett 1998). This is what is expected here by building back-up communication link is to improve efficiency of communication during a crisis with a consistent output of connecting C2 nodes and over time the use of the global nuclear hotline would add to learning of nuclear-armed states together globally. The aspect of consistency is important here because the SOPs ensure quality performance across its domain of operations by performing operations always in a same manner. Several studies in organizational SOPs demonstrate a positive relationship between development and use of SOP and sense of competence among its users and improve performance across the organization (Adler and Borys 1996; Wood and Bandura 1989; Stajkovic and Luthans 1998). This indicates the need to involve in the development process of SOP all users because it will motivate users to observe the SOP later (Adler and Cole 1993), allow SOP users a degree of freedom and a chance to have an impact (Klein 1991). Hence, it is argued that all nine nuclear-armed states should be involved in this norm-building process.

The implementation and practice of SOPs, nevertheless, require verification by a regulatory agency. This verification requirement of global nuclear hotline could put off nuclear-armed states to engage in such a norm-building at first place due to sensitive and secretive attitudes nuclear-armed states exhibit towards their nuclear operations. However, to engage states in a norm-building process another option could be to observe and follow best practices that already exist with regards to communication between adversaries (including nuclear-armed states) during crisis. The idea behind best practices is “that instead of formulating an abstract ideal state we want to reach, we should develop what has been or is being implemented and is proven to work somewhere else” (Vesely 2011, 99). The term best practice refers to a comparatively best selected and efficient way of doing something (Bretschneider, Marc-Aurele, and Wu 2004, 309; Overman and Boyd 1994, 69).
Following best practice, according to practice theorists, implies a focus on practical knowledge of which norm is an important feature (Bueger 2016, 127). The practical knowledge that is already available in some form, for instance what existing modes of communication exist and how are they being practised. In comparison to formulating new SOPs, best practice appears to be more achievable in context of this research. A best example of existing best practice in context of nuclear communications is nuclear hotlines bilaterally. However, we have witnessed bad practice of such a good practice in case of North Korea and India when they either cut of all communication links or did not reply to a hotline call. Therefore, it is important to improvise existing best practices of nuclear hotlines by increasing participating actors/states that could ensure efficient way of implementing back-up communication link globally. And gradually, the SOPs can be agreed upon and written for this back-up to become a global standard. Nonetheless, to start with nuclear-armed states need to embrace uniformity across the following three information flows that could collectively form the basis of a global nuclear hotline.

**Information Flows in Nuclear Command-and-Control**

It is now clear that to reduce nuclear risks, nuclear-armed states should build new norms and construct new practices and worldviews by undertaking the norm lifecycle mentioned in the previous section. To further explicate how those states could engage in a communication norm-building process, this section highlights three key information flows within and across nuclear command-and-control. These levels are interlinked and must work together to ensure sustainability and efficiency of global back-up hotline. Each information flow has its own features and SOPs for communication, and faces challenges from emerging technologies capable of disrupting its working and from chaotic situation resulting from communication breakdown either due to technological interference, natural calamity or human error. However, if there is a uniformity in technical features and SOPs required for every information flow across all nuclear-armed states (the uniformity does exist) then it will be easier for states to include NC3 based on a back-up hotline in their bilateral or multilateral dialogue, hence developing and practicing a new communications norm. Working together by incorporating necessary technologies and SOPs, the information flows can ensure state authorities as well as other states against any advertent or inadvertent breakdown of communication channel, hence contribute towards escalation control and nuclear risk reduction.

1. Vertical Information Flow: this allows command orders and information/orders related to nuclear operations to flow from top-to-bottom and feedback to flow from bottom to top if and when needed. This flow could require communication channels to be centralised, delegated, or pre-delegated, depending on a particular nuclear-armed state’s strategic environment and weapon systems. But for every communication channel, safety, security, reliability, and integrity of communications hardware and software are critical features to maintain. This information flow should be able: 1) to work even after nuclear first strike, 2) to address challenges emanating from entanglement (For discussion on entanglement, see Acton 2018; Afina, Inverarity, and Unal 2020), 3) to be resilient against jamming and spoofing, cyber-attacks, disruption through EMP generated by a high-altitude
nuclear burst, a direct kinetic attack on ground-based or space-based assets by hypersonic weapons, precision-guided conventional weapons, or anti-satellite weapon, undersea cable cuts, and/or disruption caused as a result of collateral or unintended consequence of an attack aimed at targets other than nuclear and conventional military assets (Bracken 2020), 4) to be safe from threats in case of espionage or sabotage, and 5) to be resilient against attacks on civilian infrastructure such as electricity grid, water and other logistic requirements supporting land bases that host receiving stations and command posts.

These criteria have become important to maintain in present days than ever due to transition of nuclear postures of nine nuclear-armed states towards precision, rapid reaction/quick mobilization, and survivability (US DoD 2018; China Defence White Paper 2018; Ministry of Foreign Affairs of the Russian Federation 2020; Britain Integrated Review 2021; UK Ministry of Defence 2021; Indian Ministry of Defence 2018; Khalid Kidwai 2020; ISPR 2017), digitization of communications (Boulain 2019), and advanced technologies such as cyber, hypersonics, AI, unmanned vehicles. All nine nuclear-armed states have developed clear chains of command to communicate command orders and due to lack of sensitive information and secrecy attached to country’s nuclear operations, one must assume that the secure and reliable channels needed to transmit those orders are well in place.

For norm entrepreneurs, it is important that vertical information flow operating in all nine-nuclear armed states should meet the above-mentioned five criteria for its safe, secure and reliable working. However, it is important to highlight critical features, vulnerabilities of NC2 communications in order to assess the possibility of norm-building with regards to vertical information flow and determine key areas to work on. The vertical information flow involves two important features – hardware and data, the safety, security, reliability and integrity of which is important. The communication hardware includes land lines (land-based secure and non-secure phone lines), undersea communication cables, satellite links, radars, radios and receiving terminals at different locations, mobile and fixed command posts, and control centres. The communication channels cover the entire electromagnetic spectrum ranging from extremely/very low frequency to high frequency to transmit sensitive information or command orders to crew/commanders responsible for airborne asset, missile launchers and submarines. The data flowing through these communication channels along entire electromagnetic spectrum needs to be secured against any disruption and interruption. During Cold War, the NC3 was based on analog system that is considered less prone to cyber-attack and thus more secure to digital system which modern NC3 is based upon where communications involve integration of computers, networking and internet hence more susceptible to interruption (Larsen 2019; Hecla, Krentz-Wee, and Reddie 2019). Nonetheless, the digitization has benefits as it provides real-time information including photographs or video download from NC3 systems but requires ever-increasing bandwidth capabilities (Afina, Inverarity, and Unal 2020; Dumbacher and Stoutland 2020).

Importantly, the dependency of NC3 on civilian infrastructure is important to consider because any intended or unintended disruption on civilian side such as attack on power grid could undermine NC2 communications (Narayanan & et. al., 2020). However, the failure to conduct secure and reliable “pandemic command and control”
suggests that this assumption should be either fully demonstrated as part of a future norm, or relaxed in order to examine the implications of possible failure of nuclear command and control systems under stress, including from the pandemic itself. To assess the operability of those channels during crisis is beyond the scope of this research, but the emphasis here is that all nuclear-armed states are cognizant and responsive to the security and reliability of their channels rests on an assumption at this stage – and one that may be flawed or flatly wrong. Since this cognizance and responsiveness is critical for national security of each nuclear-armed state, hence this information flow could be a useful starting point for norm entrepreneurs to engage in a norm-building dialogue. This constructive engagement among nuclear-armed states could help reduce nuclear risks globally.

(1) Horizontal Information Flow: this involves information that is shared within command and control authority at the national level involving different actors (politicians, military personnel and scientists – the selection of actors involved in nuclear decision-making depends on state’s domestic political setup) for carrying out decision-making regarding nuclear use or non-use. The key in this flow is to provide the nuclear command-and-control centres the situational awareness based on which decision can be made. Situational awareness enables decision-makers to assess operating environment, detect nuclear and conventional attack, and distinguish between real attack and false alarms (Hersman & et. al. 2020). An improved situational awareness can positively contribute towards crisis stability and nuclear risk reduction. For improved situational awareness command and control requires different land-, air-, naval-, cyber-, and space-based Intelligence Surveillance and Reconnaissance (ISR) platforms alongside strategic early warning systems thus covering all war-fighting domains. All nuclear-armed states have deployed or are working to deploy these platforms according to their strategic requirements, and states like the United States, China and Russia are developing and deploying advanced ISR and early warning capabilities.

The force modernization, network warfare and emerging new technologies require transformation in situational awareness system of Cold War. For instance, information gathering and processing during Cold War was based on passive system consisting of early-warning radars, satellites, seismometers located across the globe and hydroacoustic stations. This system has some benefits such as: it was secure, it was difficult to be targeted by kinetic means due to its compartmentalized nature, it was capable of detecting an attack hence reducing the chances of inadvertent escalation, and it provided decision-makers confidence that the adversary would be deterred from attacking assets such as satellites associated with the NC3 (Hersman et al. 2020). However, it was limited in predicting an attack. Moreover, the development of new technologies such as drones and precision weapons (although they are conventional weapons), entanglement and reduced compartmentalization between nuclear and conventional domains presented a challenge for this passive system of situational awareness.

Besides the development of new disruptive technologies, the growing presence of commercial sector in developing and operating digital technologies is a critical factor. Now commercial entities developing communication technologies such as remote
sensing satellites that are linked to new situational awareness system (Borowitz 2019). This new system is complex. It is based on digitization, networks and entanglement, operates in real time that enables this system to address new and emerging challenges (Hersman et al. 2020, 4), and capable of providing possessor state information dominance over its adversary (Ardis and Keene 2018).

Considering the benefits and limitations of old and new situational awareness systems, it is argued that norm-entrepreneurs can take norm-building process as an opportunity to assess, work and agree on a hybrid form (based on partial compartmentalisation and partial digitization) of situational awareness system for NC3 in order to build required SOPs uniform across the NC3s of all nuclear-armed states. Such a dialogue should require working multilaterally, regionally or bilaterally to address the issue of entanglement and to limit the military applications of AI, especially within the NC3. For certain states, for instance China vis-à-vis the US, entanglement could help strengthen their deterrence yet it is dangerous as well. It could seriously hamper efficient, accurate and clear communication within the NC2 leading to escalation and crisis stability. During COVID-19 management, the world witnessed how lack of communication, confused communication, misinformation, false news and popular rhetoric adversely affect rapid, appropriate response to pandemic leading to massive loss of life and resources globally. One can argue that the current pandemic might not an example at par to the NC3 given the diverse nature of threat both pose but the intent here is to highlight the communication challenges world faced in real-time to fight a global health crisis. It simply unravelled states, even nuclear-armed states, preparedness to anticipate and manage a global crisis. Therefore, nuclear-armed states need to cooperate and incorporate issue of entanglement in their bilateral, regional and/or multilateral dialogue.

(1) Institutional Information Flow: this information flow involves bilateral and multilateral communication links called hotlines that are primarily designed for escalation control and crisis management. A hotline is an informal institution that helps build trust among its users as a norm by creating shared expectations about its use, providing state actors a template for action and putting pressure on counterparts to reciprocate (Bachmann and Inkpen 2011; Kroeger 2011). However, that’s not the case what has been witnessed during South-North Korean crisis of 2016 and 2020, and 2019 India-Pakistan crisis. Hence, it is argued here that a back-up hotline based on a normative structure (information flow SOPs) could serve as an instrument that would not only provide a sense of confidence among leaders about the presence of an additional layer of communication at global level but also put additional normative pressure on counterparts to respond to adversary’s hotline call, thus avoiding situations like South-North Korea’s crisis and India-Pakistan Pulwama-Balakot crisis 2019. Being part of a norm would help nuclear-armed states to not only negotiate the SOPs of NC3 (notably global hotline) but also hold them together as a community that respects its norms.

Currently, there are several hotlines in place at the bilateral level among different nuclear-armed states and between nuclear-armed and non-nuclear states. It is important here to assess the efficacy of existing hotlines among different states. For instance, the first nuclear hotline (direct communication link (DCL)) was established between
Americans and Soviets in June 1963 after the Cuban missile crisis (MoU 1963). This hotline worked well during Cold War (still operational) and provided leaders of both states a window of trust, however limited, within which they could communicate their intentions for peace during crisis and/or under likelihood of nuclear war (Simon and Simon 2020; Pious 2001). Moreover, it has been upgraded technologically since 1960s from relying exclusively on teleprinters, telegraphs and wire circuits10 (Blacker and Duffy 2002, 118; Dobrynin 1995, 96–97; Smith 1996, 280–81) to include relatively secure satellite communication circuits (MoU 1971) to facsimile transmission capability in 1984 (MoU 1984) to fiber optic cable along with chat and email functions in 2007 that made transmission of messages instant (Bohn 2013).

The Moscow-Washington DCL was first used after the assassination of President Kennedy in November 1963 when Washington assured Moscow of political stability within the USA (Suri 2018). Subsequently, it has been used effectively during Middle East crises (the 1967 Six-Day war and the 1973 Yom Kippur war [Johnson 1971]) and contributed towards crisis management and nuclear risk reduction. The diplomatic channels were faster at that time hence were relied upon more in comparison to hotline but hotline was still used depicting leaders’ respect for confidentiality of messages and to convey urgency of the matter. (Nixon 1972) Beyond Middle Eastern crises, both sides used hotline during the 1971 Indo-Pak war and the 1974 Cyprus crisis to clarify the scope of deterrence in those crises that had potential of have expanded beyond their regions. However, the hotline proved less effective in crisis management between the USSR and the USA during the Soviet invasion of Afghanistan in 1979 and the 1981 Polish Solidarity crisis but mere exchange of messages succeeded in limiting possible miscalculations (Ball 1991).

Following Moscow-Washington communication link, hotlines were established between Paris and Moscow in 1966, (PRO FO 371/188,931, 966) between Moscow and London in 1967 (UK Parliament proceedings 1967), between China and Russia and between China and the US in 1998 (Suri 2018), and between China and India in 2010 (The Hindu 2016). A hotline can also be used below head-of-state level among foreign ministers and defence ministries. After 2008, China established a hotline at ministry of defence level with Russia (China Daily 2008), at naval and air force levels in 2008 (Rumer & et. al. 2020) and at defence chiefs’ level with South Korea in 2014 (Panda 2014), at military level (navies and air force) with South Korea in 2021 (Zhao 2021), at ministry of foreign affairs level with Vietnam in 2012 (Vietnam News 2012), and with Taiwan in 2015 between their chiefs of cross-Strait affairs (Reuters 2015). India and China agreed to establish hotlines between their armies in 2018 and between foreign ministers in 2021 (Krishnan 2021). Those hotlines were established to exchange views on regional and international dynamics and to enhance bilateral, military and strategic cooperation and to prevent accidents.

Two other hotlines are important to mention here. One, the hotline between North and South Korea that was established in September 1971 and gradually more telephone lines were added to the system resulting in total of thirty-three telephone lines – five are

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10 Teleprinters were used to avoid verbal communication as it could lead to misperceptions and miscalculations. Also telegraph allowed leaders to read and understand carefully before responding instead of telephone lines that require quick response.
used for daily communications, seven are used for transportation and commerce, and twenty-one lines are used for negotiations (Suri 2018). When tensions rose in 2016 the North Korea stopped responding to telephone calls (McCurry 2015), the hotline communication was restored in 2018 (Suri 2018) but last year North Korea cut off all communication lines with South Korea (Sang-Hun 2020). This lax attitude towards using hotlines tends to further raise nuclear risks especially in the regions where increasing frequency of crises and growing tensions between nuclear-armed states is alarming. For instance, India and Pakistan agreed to setup a telephone hotline between foreign ministers in June 2004 to prevent nuclear accidents (Foster 2004). In 2011, India and Pakistan also agreed to set up a post-2008 Mumbai attack “terror hotline” in order to allow Indian investigators to visit Pakistan (Constable 2011). The hotline also shares information about any possible militant attack. Regardless, in the tense time surrounding a recent India-Pakistan standoff of 2019, which included airstrikes and aerial dogfights in February 2019, Indian Prime Minister Modi did not answer the Pakistani Prime Minister’s calls during the height of the crisis.

To avoid such situations in the future, and to have better crisis management in practice, there is a serious need for nuclear-armed states to establish a simple back-up communication link that will not only ensure escalation control, but also socially bind those states within a normative structure (such as agreed standard operating procedures to build an information flow) to make them responsive towards nuclear risk reduction. Over time, this information flow/communication link might be institutionalised across different nuclear command authorities around the world.

Conclusion

This is an opportune time for nuclear-armed states to progress on their commitments, formal or informal either under the NPT or regional or bilateral level, towards nuclear risk reduction against mounting pressure from non-nuclear-armed states and civil society and acknowledge the need to build a communication link that could help nuclear-armed states in escalation control, and could help show that they are striving to reduce the risk of nuclear weapons and to contribute to global security. This acknowledgement would be a manifestation of active and constructive engagement by nuclear-armed states to develop a shared understanding about global hotline as a step towards global security. This engagement, which has become salient with COVID-19 outbreak, would also help nuclear-armed states to confront (neo)realist and (neo)liberalist tendencies driving competitive modernization in weapon systems and NC3 systems that are underway globally capable of further aggravating nuclear risks. Moreover, the inherent dangers in nuclear modernization and in light of emerging technologies should suffice to motivate nuclear weapons possessor states to build a shared understanding about the need for strengthening the management of nuclear operations. One way to do so is to build a back-up reliable communications link or hotline that eventually would embody another norm similar to that of the nuclear taboo.

In a move towards building nuclear communication norms, adopting three information flows among nuclear-armed states is crucial. To start with, states need to break the old frigid ice of being sensitive in sharing knowledge about their nuclear operations and start talking about things like SOPs of nuclear communications that are not so
sensitive, rather not so secretive, at bilateral, regional or multilateral level. Here, norm entrepreneurs (nine nuclear-armed states) should take a leadership role to work for and build hotline (nuclear communication link) based on a normative structure (agreed SOPs and best practices). The normative structure for such a hotline is emphasized here because it will facilitate leaders of nuclear-armed states to socialize and become reliable enough through normative pressure to respond to hotline calls of adversaries, and to build confidence among states during constructive engagement in international means to control escalation. Furthermore, the build-up of this communication link would provide further opportunities for nuclear-armed states to break old barriers and broaden their discussion to develop norm beyond hotline to cover entire NC2 system.

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Notes on Contributor

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