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REINVIGORATING SOUTH ASIAN NUCLEAR TRANSPARENCY AND CONFIDENCE-BUILDING MEASURES

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SUMMARY

● This SIPRI Insights paper explores a series of nuclear transparency and confidence-building measures (CBMs) proposed by military, nuclear, political and regional experts from China, India, Pakistan, Russia and the United States to address nuclear challenges in South Asia. It categorizes these bilateral, trilateral and multilateral measures into doctrinal dialogues and joint threat assessment exercises; communication lines, pre-notification and de-alerting; and development and employment of strategic technologies. The paper then provides a spectrum of viability across which it identifies proposals with the greatest potential, moderate potential and the least potential for reinvigorating nuclear transparency measures and CBMs in South Asia.

I. Introduction

Nuclear transparency and confidence-building measures (CBMs) in South Asia have a lengthy but fraught history, with a recent report from the International Institute for Strategic Studies indicating that this has contributed to 'CBM fatigue'.[1] This Insights paper is part of a broader SIPRI project on nuclear challenges in South Asia, which seeks to reinvigorate the discussion by inviting a diverse group of military, nuclear, political and regional experts from China, India, Pakistan, Russia and the United States to contribute to interviews, reports, workshops and a video series.[2] Based on the project's workshop and interview findings, the paper matches nuclear

[1] Levesques, A., Bowen, D. and Gill, J. H., 'Nuclear deterrence and stability in South Asia: Perceptions and realities', International Institute for Strategic Studies, May 2021, p. 52. Some examples of previous works on nuclear CBMs in South Asia include: Krepon, M., Wheeler, T. and Dowling, L. (eds), *Off Ramps from Confrontation in Southern Asia* (Stimson Center: Washington, DC, 2019); Dalton, T., 'What's the future of CBMs in South Asia?', *South Asian Voices*, Carnegie Endowment for International Peace, 26 May 2016; Javaid, U., 'Confidence building measures in nuclear South Asia: Limitations and prospects', *South Asian Studies*, vol. 25, no. 2 (July–Dec. 2010); Ashraf, T. M. and Rajain, A., 'The role of transparency in achieving strategic stability in South Asia', Cooperative Monitoring Center Occasional Paper, Sandia National Laboratories, July 2005; Chari, P. R., 'Nuclear CBMs between India and Pakistan', Institute of Peace and Conflict Studies (IPCS) Issue Brief no. 24, July 2004; and Kanwal, G., 'Indo-Pak nuclear CBMs: Time to move forward', Observer Research Foundation, 16 June 2004.

[2] SIPRI, 'SIPRI hosts workshop on nuclear confidence-building measures in South Asia', 12 May 2021; Saalman, L. and Topychkanov, P., *South Asia's Nuclear Challenges: Interlocking Views from India, Pakistan, China, Russia and the United States* (SIPRI: Stockholm, Apr. 2021); SIPRI, 'Perceptions of nuclear challenges in South Asia—new video series', 10 Feb. 2021; Saalman, L., 'USA–India strategic continuity in the Biden administration transition', SIPRI WritePeace Blog, 29 Jan. 2021; SIPRI, 'SIPRI hosts workshop on nuclear challenges in South Asia', 14 Dec. 2020; Saalman, L., 'India's no-first-use dilemma: Strategic consistency or ambiguity towards China and Pakistan', SIPRI WritePeace Blog, 2 Dec. 2020; Saalman, L., 'China's detachment from the South Asian nuclear triangle', SIPRI WritePeace Blog, 8 Sep. 2020; Topychkanov, P., 'Russia's nuclear doctrine moves the focus from non-Western threats', SIPRI WritePeace Blog, 1 Oct. 2020; and Topychkanov, P., 'New trends and developments in border tensions between China and India', SIPRI WritePeace Blog, 29 June 2020.

challenges to nuclear transparency measures and CBMs in order to expand the range of options and to evaluate their viability in South Asia.[3]

Using this methodology, a divide becomes apparent within expert perspectives and approaches. Indian, Russian and US experts tended to take a broader view of the countries affecting South Asian nuclear dynamics. Among them, Indian experts highlighted an overly narrow international focus on India–Pakistan dynamics, emphasizing that China's nuclear modernization and its regional ties, as well as Russian and US nuclear advances, have a strong and often underappreciated impact on South Asia. They stressed that despite its perceived preoccupation with India, Pakistan also continues to attempt to draw in external powers to complicate India's strategic calculus. US experts reflected a degree of this external impact through their discussion of the US role in South Asian crisis management, as well as China's growing influence on Pakistan's and India's border and maritime domains and US Indo-Pacific strategy. A Russian nuclear expert framed these trends as a 'cascade security dilemma' in which China undertakes actions to compensate for its strategic and regional imbalances with the USA. India then responds to address its growing asymmetry with China, thereby compelling Pakistan to alter its own course to react to India's shifts. This expert argued that these linkages suggest that progress and engagement with South Asia will remain hindered until India's and Pakistan's nuclear status is recognized and China joins Russian–US multilateral arms control efforts.

Indian experts highlighted an overly narrow international focus on India–Pakistan dynamics

In contrast to their Indian, Russian and US counterparts, Chinese and Pakistani experts tended to concentrate their commentary and proposals more narrowly on India–Pakistan nuclear dynamics. Nevertheless, some of their recommendations indicated openness to diverse trends and forums as foundations for greater engagement. For example, while largely focused on India–Pakistan tensions, several Pakistani political and regional experts advocated for talks on common threats of pandemics, demographics and climate change to serve as pathways to dialogues on nuclear issues. Among the range of experts, however, Chinese experts concentrated to the greatest extent on India–Pakistan relations. Even when labelling the US role as destabilizing, they confined nuclear issues to South Asia, denying China's impact on regional nuclear dynamics and not offering support for China–India–Pakistan trilateral nuclear talks. Still, there were signs that some Chinese experts advocated broader multilateral engagement on South Asia, with one Chinese expert suggesting the Shanghai Cooperation Organisation (SCO), the Shangri-La Dialogue and even the Quadrilateral Security Dialogue (Quad) as potential forums for such discussions.[4]

To provide a more nuanced view on these trends, this Insights paper reviews Chinese, Indian, Pakistani, Russian and US expert recommendations for nuclear transparency measures and CBMs aimed at responding

[3] SIPRI, 'SIPRI hosts workshop on nuclear confidence-building measures in South Asia' (note 2); and SIPRI, 'SIPRI hosts workshop on nuclear challenges in South Asia' (note 2).

[4] For more information on the SCO, Shangri-La Dialogue and Quad see Alimov, R., 'The role of the Shanghai Cooperation Organization in counteracting threats to peace and security', UN Chronicle, [n.d.]; International Institute for Strategic Studies (IISS), 'The IISS Shangri-La Dialogue', accessed 28 May 2021; and Center for Strategic and International Studies (CSIS), 'Defining the diamond: The past, present, and future of the Quadrilateral Security Dialogue', CSIS Briefs, 16 Mar. 2020.

to nuclear challenges in South Asia. Drawn from SIPRI's workshops and interviews, these bilateral, trilateral and multilateral measures are categorized into: (*a*) doctrinal dialogues and joint threat assessment exercises; (*b*) communication lines, pre-notification and de-alerting; and (*c*) development and employment of strategic technologies. After exploring these various categories of proposals, the paper concludes by evaluating the viability of each in reinvigorating nuclear transparency measures and CBMs in South Asia.

II. Nuclear transparency measures and CBMs

Doctrinal dialogues and joint threat assessment exercises

Chinese, Indian, Pakistani, Russian and US experts tended to agree that expanded doctrinal dialogues and joint threat assessment exercises have merit. However, perspectives diverged on the format.

Bilateral

Whether characterized by their military, nuclear, political or regional expertise, Chinese experts by and large argued that the likelihood of a nuclear clash between India and Pakistan remains low. Instead, they emphasized these two countries' common desire to reduce tensions, with several Chinese regional experts citing Indian concerns over a two-front war with China and Pakistan as a mitigating factor. As an area of potential agreement, one Chinese nuclear expert suggested that a bilateral India–Pakistan or China–India strategic restraint regime that includes a no-first-use pact could be established. Nevertheless, the majority of Indian and Pakistani nuclear and political experts expressed scepticism that this pact could ever be achieved. In doing so, they cited India's conventional military superiority as a major factor limiting Pakistan's ability to relinquish first use of nuclear weapons.

Chinese experts argued that the likelihood of a nuclear clash between India and Pakistan remains low

Recognizing this conventional–nuclear asymmetry between India and Pakistan, Russian nuclear and political experts applied Soviet/Russian–US history in their recommendations for South Asia. One Russian nuclear expert suggested the formation of an India–Pakistan analogue to the 1990 Soviet–United States Joint Statement on Future Negotiations on Nuclear and Space Arms and Further Enhancing Strategic Stability.[5] In response, an Indian military expert stressed the difficulty of issuing a joint statement, arguing that India's and Pakistan's strategic culture resists formalization to avoid domestic 'public glare' and recriminations. This expert pointed to previous failed efforts and how they have shaped a general aversion to new statements, declarations and agreements in South Asia.

Recognizing these political constraints, one Pakistani political expert proposed joint threat assessment exercises oriented towards pandemics,

[5] Under this joint statement, both parties agreed to pursue talks on a politically binding commitment regarding nuclear postures and nuclear force build-up, predicated on retaliatory survivability and avoidance of a significant deployment of destabilizing weapon systems. George H. W. Bush Presidential Library and Museum, 'Soviet–United States Joint Statement on Future Negotiations on Nuclear and Space Arms and Further Enhancing Strategic Stability', 1 June 1990.

demographics and climate change. This expert argued that less polarizing issues offer vehicles of engagement that, while not expressly nuclear, could include emerging technology applications and even such issues as the demilitarization of the Siachen Glacier. As nuclear examples, Indian and Pakistani military and regional experts cited the significance of the Pulwama–Balakot crisis, noting India's use of nuclear-capable Mirage 2000H fighter jets and deployment of the nuclear-powered submarines *INS Arihant* and *INS Chakra* during the crisis.[6] Both groups of experts emphasized the escalatory nature of this crisis, with some US experts suggesting that it could serve as a foundation for future crisis management dialogues or threat assessment exercises.

Trilateral and multilateral

Indian, Pakistani and Russian military, nuclear, political and regional experts had a greater propensity to advocate for trilateral and multilateral talks than their Chinese counterparts. In particular, the latter were largely opposed to China–India–Pakistan engagement on nuclear issues, emphasizing the political sensitivities of trilateral talks in which China would be forced to take sides and acknowledge both India and Pakistan as nuclear weapon states. Nonetheless, one Chinese nuclear expert proposed unofficial bilateral forums between China and India, as well as the potential for nuclear-related multilateral discussions in such broader forums as the SCO, the Shangri-La Dialogue and even the Quad.[7] While reluctant to provide specifics, this expert noted that these talks could lay the groundwork for a 'transregional concert' of nuclear powers on regional and global strategic stability.

Indian, Pakistani and Russian experts had a greater propensity to advocate for trilateral and multilateral talks than their Chinese counterparts

To achieve such aims, a Pakistani nuclear expert stressed the need for greater transparency in nuclear posture and strategies among China, India, Pakistan, Russia and the USA. However, this expert cautioned that this openness could not be achieved without greater India–Pakistan trust through CBMs. In the pursuit of greater transparency, both Chinese and Pakistani nuclear experts recommended the creation of a nuclear risk reduction centre to address nuclear security and radiological accidents in South Asia. A Russian nuclear expert also saw a role for external powers in calibrating arms sales to the region to limit the proliferation of 'disruptive and destabilizing' technologies. However, this Russian nuclear expert stressed that external countries should not attempt to orchestrate a regional arms control process and would best serve as facilitators or platforms for intra-regional dialogue. In response, a Pakistani nuclear expert suggested that external countries could instead explore an agreement to refrain from fuelling a strategic arms race in South Asia through their supply of weaponry and assistance.

[6] Saalman and Topychkanov (note 2); Indian Navy, 'Naval commanders' at Kochi for operational discussions', 18 Mar. 2019; and Bedi, R., 'Why the display of IAF's machismo on the Balakot strike anniversary was uncalled for', *The Wire*, 1 Mar. 2021.

[7] Alimov (note 4); IISS (note 4); and CSIS (note 4).

Communication lines, pre-notification and de-alerting

Chinese, Indian, Pakistani, Russian and US experts proposed a series of communication, pre-notification and de-alerting measures for nuclear crisis management. While the bulk were bilateral, the role of external countries also received attention.

Bilateral

Chinese, Russian and US military, nuclear, political and regional experts proposed a range of communication and pre-notification measures between India and Pakistan. Among these, Russian nuclear and regional experts emphasized the utility of hotlines; pre-notification of related military exercises, deployments, and missile and space vehicle launches; and declarations on excluding key strategic sites from targeting lists, including through cyber means. A US nuclear expert narrowed down these bilateral measures to focus on pre-launch notification of ballistic and cruise missile tests.[8] This expert further noted the necessity of greater military-to-military engagement to address the exacerbated time compression of such missile launches in South Asia.

To mitigate the regional reticence towards CBMs, several Chinese and Russian experts advocated for external countries to play a limited role

To these proposals, Chinese nuclear and regional experts added a range of bilateral CBMs, including exchanges between nuclear command centre liaison officers and information exchanges on nuclear safety and security. One Chinese nuclear expert listed a raft of India–Pakistan transparency measures, such as information exchanges on military budgets, command location and organization, force levels, doctrine, and accidental, unauthorized or unexplained nuclear incidents. This expert noted that these measures could foster the conditions needed for future agreement on bans on simulated attacks and forward basing of offensive weapons and support equipment, as well as ceilings and operational constraints on military manoeuvres. Noting that a number of these measures have already been attempted in various forms, one Pakistani nuclear expert cited a series of bilateral 'missed opportunities and violations' under such agreements as the Lahore Declaration.[9] This expert stressed that a history of stalled efforts means that there remains scepticism towards CBMs in South Asia, thereby alluding to the 'CBM fatigue' identified by some foreign experts.[10]

Trilateral and multilateral

To mitigate some of the regional reticence towards CBMs, several Chinese and Russian nuclear and regional experts advocated for external countries to play a limited role. While retaining a strong bilateral focus on India and Pakistan, one Chinese nuclear expert even included China in suggesting that these countries could formalize their pre-existing low-alert and

[8] O'Donnell, F., 'Launching an expanded missile flight-test notification regime', Stimson Center, 23 Mar. 2017.

[9] The Lahore Declaration covered a range of non-nuclear issues, but also included avoidance of the accidental and unauthorized operational use of nuclear weapons. Indian Ministry of External Affairs, 'Lahore Declaration', 2 Feb. 1999.

[10] Levesques, Bowen and Gill (note 1), p. 52.

de-mating commitments to bolster strategic stability.[11] However, this expert remained in the minority among Chinese experts interviewed and present during workshops. By contrast, several Russian nuclear and regional experts suggested that an external third party could play a mediating role or provide a platform for strategic stability talks, citing Russia's position during the 2020 tensions at the China–India border.[12]

In response, several Indian nuclear and military experts questioned whether India and China would accept a formal role for external countries on South Asian strategic stability issues, much less nuclear ones. Among them, one Indian nuclear expert advocated for greater Russian and US nuclear arsenal reductions prior to other countries engaging in more substantive nuclear transparency measures and CBMs. Moreover, several Indian experts identified China's nuclear and overall military modernization as an impediment to meaningful statements or agreements on low-alert and de-mating policies. They argued that without China's participation in nuclear talks, the chance of long-term progress on a range of CBMs in South Asia remained low.

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Development and employment of strategic technologies

Chinese, Indian, Pakistani, Russian and US experts debated the level to which technological development could be controlled in the light of civil–military crossover, particularly in emerging technology advances. As a result, they largely targeted their CBMs on employment, rather than on development.

Bilateral

Among the Russian nuclear experts, one stressed the challenging impact of multiple independently targetable re-entry vehicles (MIRVs) on nuclear stability, given their 'universal appeal' in exerting flexibility in counterforce and countervalue targeting.[13] In applying this concern to South Asia, this expert recommended an India–Pakistan ban on MIRVs for medium-range ballistic missiles (MRBMs) and intermediate-range ballistic missiles (IRBMs), to mitigate some of the pressure to shift from a countervalue to a counterforce posture. The rationale reflected views from some Western experts that India may be moving in the direction of counterforce.[14]

[11] Low-alert or de-alerted nuclear weapons are often de-mated or not mounted on their nuclear delivery platforms, thereby prolonging the procedure to engage in launch. They may be contrasted with those on high alert, which are launch-ready and capable of being launched in only a few minutes. Kristensen, H. M. and Korda, M., 'Status of world nuclear forces', Federation of American Scientists, updated May 2021, accessed 9 June 2021.

[12] Following the workshops, one Russian nuclear expert expressed reservations as to whether this would be feasible. Topychkanov, 'New trends and developments in border tensions between China and India' (note 2); and Roy, S., 'Explained: Why Russia has emerged a key player amid India, China tensions', *Indian Express*, 23 Aug. 2021.

[13] A posture or doctrine of counterforce in nuclear strategy is the targeting of an opponent's military infrastructure with a nuclear strike. It posits that a nuclear war can be limited and can be fought and won. By contrast, a posture or doctrine of countervalue targets an adversary's civilian sites, such as cities and industrial hubs. 'Counterforce doctrine', *Encyclopaedia Britannica*, 19 Aug. 2014.

[14] Clary, C. and Narang, V., 'India's counterforce temptations: Strategic dilemmas, doctrine, and capabilities', *International Security*, vol. 43, no. 3 (Winter 2018/19); and Rajagopalan, R., 'India

By contrast, Indian military, nuclear, political and regional experts turned their sights towards Pakistan, arguing that its development of tactical nuclear weapons was a common concern. One Indian nuclear expert recommended the formation of a regional tactical-nuclear-weapon-free zone, which would apply a ban on systems with ranges of up to 500 kilometres. However, this expert also cautioned that 'what is tactical to one country is strategic to another', noting that such a zone may be unachievable. This scepticism was echoed by several Indian nuclear and military experts, who again cited Pakistan's asymmetry dilemma as essential to its need to maintain a nuclear deterrent to counter India's conventional superiority.[15] Another Indian nuclear expert added that until tactical nuclear weapons are constrained internationally, regional CBMs would continue to falter.

Indian, Pakistani and US military, nuclear, political and regional experts also cited the maritime domain for its growing impact on nuclear dynamics in South Asia. One Pakistani nuclear expert noted that India's development of submarine-launched ballistic missiles (SLBMs) has increased the propensity for nuclear pre-emption, citing India's deployment of nuclear-powered submarines during tensions at Pulwama and Balakot.[16] This view was strongly contested by several Indian military and nuclear experts, one of whom stressed that the second-strike capability of nuclear-powered ballistic missile submarines (SSBNs) remains a 'cornerstone of strategic stability'. As a less polarizing measure, a Pakistani nuclear expert instead suggested that agreements on notification of nuclear accidents at sea could reduce tensions, while a Chinese nuclear expert recommended the creation of SSBN sanctuaries and anti-SSBN-warfare-free zones in South Asia.

Trilateral and multilateral

Marking a trilateral challenge, an Indian nuclear expert highlighted that China, India and Pakistan are all developing dual-capable missiles that could deliver conventional or nuclear warheads. This expert stressed that such advances complicate discrimination between nuclear and conventional delivery vehicles, thus exacerbating the potential for conventional attacks on nuclear forces.[17] A Pakistani nuclear expert echoed this concern, citing the heightened danger in South Asia, which is already marked by close geographic proximity and short reaction times. This expert noted that such challenges extend to India's advances in developing supersonic and future hypersonic BrahMos systems, which exacerbate the potential for pre-emption—whether conventionally-armed or hypothetically nuclear-armed.[18] To address these trends, one Indian

China, India and Pakistan are all developing dual-capable missiles that could deliver conventional or nuclear warheads

and counterforce: A question of evidence', Observer Research Foundation (ORF) Occasional Paper no. 247, May 2020.

[15] Waqar, A., 'The India-Pakistan imbroglio: A way forward?', Clingendael Institute, 16 July 2020.

[16] Pubby, M., 'Aircraft carrier & nuclear submarines deployed post Pulwama', *Economic Times*, 18 Mar. 2019.

[17] Kroenig, M. and Massa, M. J., 'Are dual-capable weapon systems destabilizing? Questioning nuclear-conventional entanglement and inadvertent escalation', Atlantic Council, June 2021; and Acton, J. M., 'The evolution of ambiguous weapons', *Is it a Nuke? Pre-Launch Ambiguity and Inadvertent Escalation* (Carnegie Endowment for International Peace: Washington, DC, 2020).

[18] Ali, S., 'Indian hypersonic weapons bring new challenges to South Asia', South Asian Voices, 13 Sep. 2019; and Mitra, J., 'Nuclear BrahMos: On the anvil?', Stimson Center, 18 Sep. 2020.

political expert again emphasized the necessity of China–India–Pakistan trilateral dialogues, while an Indian military expert advocated for a wider freeze or ban on dual-capable weapons.

Beyond dual-capable systems, one Russian nuclear expert stressed that threats to the survivability of non-hardened targets are growing in South Asia and abroad. The expert cited the challenge posed to nuclear systems by conventional precision-guided weapons, unmanned reconnaissance and strike vehicles and, in particular, hypersonic weapons. In this Russian expert's view, nuclear and precision-guided conventional counterforce advances are forcing countries both within and outside of South Asia to identify and target survivable assets, spurring regional and international arms races. To address this, an Indian nuclear expert suggested that rather than establishing limits on hypersonic glide vehicles and other technological developments, agreements on employment are more realistic. This view was supported by the majority of experts in attendance.

Further, a Russian nuclear expert tied employment constraints to deployment limits by proposing an 'unusual but relevant measure' of a pre-emptive ban on silo-based MRBMs and IRBMs. This expert suggested that such bans could mitigate alleged counterforce trends in India and a degree of the 'use-it-or-lose-it' pressure in Pakistan.[19] An Indian nuclear expert responded that such proposals should extend beyond simply India and Pakistan. In support of this, a Russian nuclear expert suggested that the USA could play a role in restraining the spillover effects of an offensive/defensive arms race through expanding its consultations with countries like China on missile defence and counterforce trends.[20] This expert argued that confronting the first tier of this 'cascade security dilemma' would be helpful in stemming the flow of instability into South Asia.

Some experts stressed that cyberattacks represent significant long-term threats to nuclear command, control and communications

On nuclear command, control and communications (NC3), Indian, Pakistani and US nuclear and military experts agreed that cyberattacks represent significant long-term threats. When combined with conventional counterforce, a US nuclear expert argued—and Indian and Pakistani experts in attendance agreed—that NC3 attacks offer a 'complete kill chain', consisting of target identification, force dispatch, decision and order to attack, and destruction.[21] Despite this common threat, however, one Pakistani nuclear expert cited the lack of information on India's and Pakistan's NC3 as an obstacle to CBMs. This expert suggested that greater multilateral work is required on the impact of emerging technologies and cyber threats on cross-domain deterrence. An Indian nuclear expert added that such international forums could improve transparency with benchmarks for progress on understanding threats to NC3. According to one Pakistani nuclear expert, if these proved to be successful, then engagement, agreements and notification on cyberattacks against critical infrastructure and NC3 could result.

[19] Logan, D., 'The varied roads to Armageddon: Unpacking the use-it-or-lose-it dilemma', Princeton University, 1 July 2020; and Tasleem, S., 'Pakistan's nuclear use doctrine', Carnegie Endowment for International Peace, 30 June 2016.

[20] Zhao, T., 'How (and how seriously) does US missile defense threaten China?', *Narrowing the US-China Gap on Missile Defense* (Carnegie Endowment for International Peace: Washington, DC, 2020).

[21] Perkovich, G. et al., 'China-US cyber-nuclear C3 stability', Carnegie Endowment for International Peace, 8 Apr. 2021.

Regarding emerging and space-based technologies, a US political expert further highlighted the challenges to placing limits on development, in particular since artificial intelligence (AI), robotics, and cyber and space technologies are connected to the private sector. This expert emphasized that civil–military crossover further complicates both arms control and verification, resulting in regional security dilemmas, arms races and escalatory spirals. Recognizing the cross-domain nature of these challenges, a Pakistani nuclear expert recommended greater engagement on such issues as AI and lethal autonomous weapon systems (LAWS), with a focus on their impact on nuclear deterrence in South Asia.[22]

Looking ahead, another Pakistani nuclear expert noted that anti-satellite (ASAT) capabilities are of increasing concern, as they complicate the concealment of both conventional and nuclear forces, thereby negatively impacting survivability and strategic stability. To mitigate these trends, one Indian nuclear expert suggested that the annual United Nations General Assembly Resolution on the Prevention of an Arms Race in Outer Space (PAROS) continues to hold relevance as a restraint measure.[23] However, a Pakistani nuclear expert responded that ongoing stalemates regarding PAROS and other such space-related measures indicate the need to expand and diversify multilateral exchanges on outer space. In agreement, a US nuclear expert added that there was a need for multilateral discussion of a prohibition on ASAT tests against targets in outer space to include countries in South Asia.

Anti-satellite capabilities are of increasing concern, as they complicate the concealment of both conventional and nuclear forces

III. Viability spectrum for nuclear transparency measures and CBMs

Having considered the nuclear transparency measures and CBMs above, this section places them on a spectrum from more to less viable.[24] By highlighting the strengths and weaknesses of each of the Chinese, Indian, Pakistani, Russian and US expert recommendations, it seeks to provide a targeted set of measures to mitigate often unactionable lists that contribute to 'CBM fatigue'.

More viable

South Asian threat assessment exercises on generic scenarios. By not focusing on specific cases of escalation and instead using generic scenarios that mirror past events, these exercises would be less sensitive and more likely to garner participation.

China–India nuclear dialogues. Since nuclear and security-related dialogues have occurred at the track-2 level, and bilateral talks are less objectionable

[22] Gill, A. S., 'The role of the United Nations in addressing emerging technologies in the area of lethal autonomous weapons systems', UN Chronicle, accessed 14 June 2021.

[23] United Nations, General Assembly, 'Prevention of an arms race in outer space', A/C.1/75/L.3, 6 Oct. 2020.

[24] Within the categories of 'more viable', 'moderately viable' and 'less viable', the individual points are not ranked.

than trilateral ones for China, nuclear dialogues could be regularized and expanded.[25]

A transregional forum on regional and global strategic stability. Given India's and Pakistan's position outside the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT), this would require a new platform.[26] However, there is track-2 level interest in enhanced P5+2 (China, France, Russia, the United Kingdom and the USA, plus India and Pakistan) engagement on strategic stability.

An India–Pakistan agreement on notification of nuclear accidents at sea. This could be less charged and more acceptable to India and Pakistan, as it would be oriented towards not expressly military accidents.

Multilateral dialogues on arms control in outer space. This has been occurring at the track-1 and track-2 levels and could be further expanded to more formal prohibitions on the use of ASATs against NC3-related targets in outer space, with countries like India playing a key role.[27]

Multilateral consultations on the impact of AI and LAWS on nuclear risk. Given the limited scope of the Group of Governmental Experts talks under the 1981 Certain Conventional Weapons Convention, this discussion could be broadened to explore nuclear and cross-domain impacts, including in South Asia.[28]

Moderately viable

India–Pakistan security dialogues that include pandemics, demographics and climate change. Broader security dialogues could build trust if they integrate CBMs on military escalation resulting from resource or border disputes. However, the question remains of how to integrate these issues without diluting nuclear discussions.

A China–India strategic restraint regime with a no-first-use pact. Since China and India have unilateral no-first-use declarations, bilateral engagement and a tandem pledge would elicit greater clarity and enhance nuclear transparency. However, this would need to begin at the track-2 level given that China does not officially recognize India's nuclear status, as the latter remains a non-signatory to the NPT.

An India–Pakistan analogue to the Soviet–United States Joint Statement on Strategic Stability. The understanding and application of arms control precedents can be beneficial. However, whether these measures would

[25] Carnegie Endowment for International Peace, 'China's and India's nuclear posture and practice', 2 June 2011; and Saalman, L. (ed.), *The China-India Nuclear Crossroads*, Carnegie-Tsinghua Center for Global Policy (Carnegie Endowment for International Peace: Washington, DC, Sep. 2012).

[26] Treaty on the Non-Proliferation of Nuclear Weapons (Non-Proliferation Treaty, NPT), opened for signature 1 July 1968, entered into force 5 Mar. 1970, INFCIRC/140, 22 Apr. 1970.

[27] Raju, N., 'A proposal for a ban on destructive anti-satellite testing: A role for the European Union?', EU Non-Proliferation and Disarmament Consortium, Non-Proliferation and Disarmament Paper no. 74, Apr. 2021; and Rajagopalan, R. P., 'The Space Code of Conduct debate: A view from Delhi', *Strategic Studies Quarterly*, vol. 6, no. 1 (Spring 2012).

[28] United Nations, Office for Disarmament Affairs, 'Background on LAWS in the CCW', accessed 14 June 2021.

be accepted by countries with strategic cultures that purportedly resist formalization, as noted by some South Asian experts, remains in question.

China–India–Pakistan nuclear dialogues. Trilateral nuclear dynamics merit further exploration. However, China is reluctant to take part in trilateral talks that place it in the middle, suggesting the need to start at the track-2 level and include the USA and/or Russia.

A South Asia nuclear risk reduction centre to address nuclear security, radiological accidents and radiological terrorism. Such a centre could build on International Atomic Energy Agency programmes and national centres of excellence; also, India's and Pakistan's participation in the Nuclear Security Summits provides a notable precedent at track-1 level.[29] However, given past nuclear security incidents and ongoing bilateral and regional mistrust, there may be some reluctance towards such a mechanism.[30]

External limitations on the supply of disruptive and destabilizing systems to South Asia. This could be part of broader strategic stability consultations among supplier countries such as China, France, Israel, Russia and the USA and their recipients in the region. However, there are challenges to defining what systems are 'disruptive and destabilizing'.

India–Pakistan hotlines; pre-notification of military exercises, deployments, and missile and space vehicle launches; and declarations on excluding key strategic sites from targeting lists, including through cyber means. Some of these measures have been the subject of previous bilateral dialogues and agreements.[31] However, there remain issues in terms of implementation and expansion, particularly in relation to attribution of cyberattacks.

India–Pakistan information exchanges on military budgets, command locations and organizations, force levels, doctrine, and accidental, unauthorized or unexplained nuclear incidents. Such information exchanges have been occurring to an extent, as with the exchange of lists on nuclear installations.[32] However, there are obstacles to expanding them, as further specifics on deployments and doctrine could be used in military operations.

A China–India–Pakistan joint declaration on low-alert and de-mated status. Since these three countries maintain such postures, a more formalized

[29] International Atomic Energy Agency, 'Nuclear Security Report 2020', Report by the Director General, GOV/2020/31-GC(64)/6, 12 Aug. 2020; Dixit, A., 'Pakistan's national Centre of Excellence contributes to sustaining nuclear security', *IAEA Bulletin*, Dec. 2016; Mishra, S. and Jacob, H., 'Nuclear security governance in India: Institutions, instruments, and culture (2019)', Sandia National Laboratories, Sandia Report, Oct. 2020; White House, 'The Nuclear Security Summits: Securing the world from nuclear terrorism', Fact sheet, 29 Mar. 2016; and Nuclear Security Summit (NSS) Washington 2016, 'Countries and international organizations attending NSS 2016', [n.d.].

[30] Nuclear Threat Initiative (NTI), *Losing Focus in a Disordered World*, NTI Nuclear Security Index (NTI: Washington, DC, July 2020); Bose, M., '2 arrested with 7 kg natural uranium worth Rs 21.30 Crore', *Deccan Herald*, 6 May 2021; and Mowatt-Larssen, R., 'Nuclear security in Pakistan: Reducing the risks of nuclear terrorism', *Arms Control Today* (July/Aug. 2009), accessed 8 June 2021.

[31] Indian Ministry of External Affairs, 'Agreement between the Republic of India and the Islamic Republic of Pakistan on pre-notification of flight testing of ballistic missiles', 3 Oct. 2012; and Indian Ministry of External Affairs, 'Joint Statement, India-Pakistan Expert-level Talks on Nuclear CBMs', 20 June 2004.

[32] Press Trust of India, 'India, Pakistan exchange list of nuclear installations', *The Hindu*, 1 Jan. 2021; and Indian Ministry of External Affairs, 'Agreement on the prohibition of attack against nuclear installations and facilities between the Republic of India and the Islamic Republic of Pakistan', 31 Dec. 1988.

agreement may be possible. However, a trilateral agreement is difficult to negotiate given that (*a*) China rejects this format, (*b*) India and China are pursuing a nuclear triad with a sea-based leg, and (*c*) China may be trending towards launch-on-warning, MIRVed platforms and increases in nuclear warheads, which suggest a higher alert status and pre-mating of nuclear warheads to delivery platforms.[33]

China–India–Pakistan dialogues on dual-capable missiles, with a potential wider freeze or ban. These dialogues may be possible if expanded to include Russia and the USA. However, official trilateral talks are likely to be a non-starter for China and a freeze or ban is unlikely due to force structure and verification issues.

External mediation or platforms for South Asia strategic stability talks. Russia's position during the 2020 China–India border tensions serves as a non-nuclear precedent, given that it was able to provide a platform for China and India to engage.[34] However, a more formalized mediator role for an external country, particularly on nuclear issues, has been politically challenging in the past and is likely to be difficult to put into practice.[35]

Multilateral exchanges on nuclear issues at the SCO, Shangri-La Dialogue or Quad. Some Chinese experts indicated their support of track-2 level multilateral nuclear engagement, including on South Asia. However, China's ability to engage officially, particularly with the Quad, remains in doubt.

Multilateral limits on hypersonic glide employment. Given the number of countries working on these technologies, including in South Asia, a focus on employment limits is more realistic than one on development. However, there remain questions as to the scope of these limits and which countries should be involved.

Multilateral forums on cyberattacks against critical infrastructure and NC3. Such cyberattacks are a common concern among Indian, Pakistani, Russian and US experts. However, there remain sensitivities on the intersection between NC3 transparency and potential targeting.

Less viable

An India–Pakistan strategic restraint regime with a no-first-use pact. This is less likely to come to fruition than its China–India corollary, due to Pakistan's strategic ambiguity on nuclear first use to compensate for its conventional military inferiority against India.

[33] Korda, M. and Kristensen, H., 'China is building a second nuclear missile silo field', FAS Strategic Security Blog, Federation of American Scientists, 26 July 2021; US Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2020* (US Department of Defense: Sep. 2020); and Sanders-Zakre, A. and Davenport, K., 'Is India shifting nuclear doctrine?', *Arms Control Today* (May 2017).

[34] Lukin, A., 'How Russia emerged as key mediator in the China–India dispute', East Asia Forum, 23 Oct. 2020.

[35] Haegeland, H., 'Chinese mediation on the subcontinent?', Stimson Center, 17 Sep. 2019; Oliker, O., 'Be careful what you wish for: Legacies, realignments, and Russia's evolving role in South Asia', War on the Rocks, 27 Dec. 2017; and Sun, Y., 'Create a channel for a US-China dialogue on South Asia', Stimson Center, 14 Aug. 2017.

India–Pakistan threat assessment exercises based on real events. The sensitivity of focusing on highly charged events, such as the Pulwama–Balakot crisis, would most likely derail participation in these exercises.

India–Pakistan exchanges between nuclear command centre liaisons. These would be difficult to implement from an intelligence perspective, particularly in terms of engagement between active-duty officers.

South Asian bans on simulated attacks, and forward basing of offensive weapons and support equipment, combined with ceilings and operational constraints on military manoeuvres in South Asia. While some bans and ceilings may be achieved in the long term, the question remains at what stage confidence would be high enough for their implementation.

A South Asian ban on MIRVs for MRBMs and IRBMs. While conducive to mitigating a shift from a countervalue to a counterforce posture, this measure would target India more than Pakistan given its force composition and therefore is likely to be a non-starter.

A tactical-nuclear-weapon-free zone or ban on systems with ranges of up to 500 km. This is hindered by the absence of an agreement on tactical nuclear weapons among other nuclear powers, as well as Pakistan's dependence on tactical nuclear weapons to balance India's conventional military superiority.

Pre-emptive bans on silo-based MRBMs and IRBMs in South Asia. Such bans could mitigate counterforce trends and the 'use-it-or-lose-it' dilemma. However, they are unlikely to be accepted as targeted regional measures if they exclude the USA and China.

SSBN sanctuaries and anti-SSBN-warfare-free zones in South Asia. While addressing South Asia's emerging maritime domain, implementation is complicated by how best to identify, monitor and maintain these sanctuaries and zones.

IV. Conclusions

When calibrated along a spectrum of viability, the nuclear transparency measures and CBMs recommended by Chinese, Indian, Pakistani, Russian and US experts at SIPRI workshops and in interviews reveal several key patterns. Proposals falling at both ends of the spectrum—as 'more viable' and 'less viable'—are fewest in number. Among the 'more viable' proposals, South Asia-related threat assessment exercises, China–India nuclear dialogues, a transregional forum on regional and global strategic stability, multilateral dialogues on non-weaponization of outer space, and consultations on the impact of AI and LAWS on nuclear risk all have precedents at the track-2 level. This serves as a foundation on which they could be regularized, expanded or even perhaps transitioned to more official levels. China–India nuclear dialogues are eligible for regularization at the track-2 level, while multilateral dialogues and consultations with South Asia could be standardized at the track-2 level or even expanded to the track-1.5 or track-1 levels. Among the 'less viable' proposals, changing their format in certain cases could reduce existing obstacles. As an example, threat assessment exercises that concentrate on generic scenarios that take account of, rather than imitate, past crises are likely to gain more traction than those that

concentrate on specific events, such as the 2019 Pulwama–Balakot crisis or the 2020 China–India border conflict.[36]

Despite the tendency to be pulled towards one end of the spectrum, the largest concentration of nuclear transparency measures and CBMs remains at the centre. Each of these 'moderately viable' proposals contains promise, but also caveats that indicate the complexities of implementation. Still, these proposals could lead to progress if the impediments to them can be addressed. The proposals may also mitigate some of the over-optimism or pessimism that tends to plague the measures at the two extremes. At the centre of the spectrum, there are at least three groupings in which this applies.

First, a number of these proposals have been attempted in the past with moderate to limited success, such as India–Pakistan hotlines, dialogues, pre-notification of military exercises, deployments and missile launches, exclusion of key strategic sites from targeting lists, and information exchanges. This suggests the necessity for integrating lessons learned from each of these previous measures to better configure future engagement. For example, the use of hotlines is frequently cited by experts as a CBM, but if these communication pathways remain unused or lack someone at the other end who is present to receive or empowered to act on the call, they have limited merit and can even result in miscommunication or escalation.

Second, there are proposals at the centre of the spectrum that remain limited by official constraints, such as Chinese aversion to a China–India strategic restraint regime featuring a no-first-use pact and China–India–Pakistan nuclear dialogues. When faced with these challenges, track-2 level nuclear initiatives offer interim solutions until track-1.5 or even track-1 level talks can be achieved. While official dialogues provide a stronger foundation for political action, unofficial engagement also has its merits. Many of those participating in track-2 dialogues and workshops have either held political office, served in high-ranking positions in the military or engaged in nuclear or advanced conventional technical work. This practitioner background allows them insights that, even if dated, carry relevance for actionable proposals. They have either witnessed or been a part of implementing CBMs and can offer concrete recommendations on what has, or importantly has not, worked. Moreover, in the case of US experts, many rotate between think tanks and government service with each election cycle, while a number of Chinese, Indian, Pakistani and Russian experts also continue to engage with political, military and technical active-duty counterparts through briefings or other events. Thus, while this project has revealed Chinese official and, in some cases, unofficial reluctance to engage India and Pakistan in trilateral nuclear talks, its workshops have also uncovered a willingness among some nuclear and regional experts

Each of the 'moderately viable' proposals contains promise, but also caveats that indicate the complexities of implementation

[36] Some of these types of exercises are already underway, such as track-2 crisis simulations and workshops run by the Naval Postgraduate School in the USA. Khan, F. H. et al., 'South Asian Stability Workshop 2.0: A crisis simulation report', Project on Advanced Systems and Concepts for Countering Weapons of Mass Destruction, Naval Postgraduate School, Report no. 2016-001, Feb. 2016; and Khan, F. H. and French, R. W., 'South Asian Stability Workshop: A crisis simulation exercise', Project on Advanced Systems and Concepts for Countering Weapons of Mass Destruction, Naval Postgraduate School, Report no. 2013-008, Oct. 2013.

to reconsider bilateral and multilateral forums for nuclear and emerging technology discussions on South Asia.

Third, some of these moderately viable proposals are constrained by an aversion to formalization or the inapplicability of external comparisons, such as an India–Pakistan analogue to the Soviet–United States Joint Statement on Strategic Stability, a South Asia nuclear risk reduction centre, a China–India–Pakistan joint declaration on low-alert and de-mated status, and external mediation or platforms for South Asia strategic stability talks. While joint statements and agreements may be desirable, the ability of China, India and Pakistan to imitate arms control milestones between the Soviet Union/Russia and the USA is limited. Moreover, much of the unravelling of such achievements in recent years—as with the 1987 Intermediate-range Nuclear Forces Treaty and the 1992 Open Skies Treaty—suggests that joint statements and agreements may hold limited appeal in South Asia, where the NPT has already met with strong reservations.[37] However, this impediment does not negate the ability of these external precedents to provide examples, or to offer platforms, for future discussions. For instance, there appeared to be an interest among some Russian nuclear and regional experts at the workshops, if not to officially mediate, then to offer a platform for talks between such powers as China and India, as occurred at the non-nuclear level during the 2020 China–India border tensions. When it comes to more formalized structures, such as nuclear risk reduction centres and nuclear strategic stability talks, Russia and the USA offer the most comprehensive history of engagement. Even while not always applicable to or accepted in South Asia, the above proposals on various bans, freezes, reductions and de-alerting indicate that Russia and the USA continue to have a sizable impact on how arms control is perceived in the region. As such, even when not a part of the discussion, these two countries have a definitive role to play in facilitating regional talks through their own actions and progress.

Russia and the USA have a definitive role to play in facilitating regional talks in South Asia through their own actions and progress

If the nuclear transparency measures and CBMs at the ‘more viable’ end and ‘moderately viable’ centre of the spectrum are to guide future progress, then the aforementioned obstacles must be addressed. Confronting and mitigating these shortcomings—rather than simply proposing an unactionable list of measures—may be the best way to begin to reinvigorate nuclear transparency and confidence-building measures and to transition from fatigue to function.

[37] Russian Ministry of Foreign Affairs, ‘Deputy Foreign Minister Sergey Ryabkov’s opening remarks at the briefing on the termination of the INF Treaty, Moscow, August 5, 2019’, 5 Aug. 2019; Pompeo, M. R., US Secretary of State, ‘US withdrawal from the INF Treaty on August 2, 2019’, Press statement, 2 Aug. 2019; Treaty on the Elimination of Intermediate-Range and Shorter-Range Missiles (INF Treaty), signed 8 Dec. 1987, entered into force 1 June 1988; Russian Ministry of Foreign Affairs, ‘Statement by the Ministry of Foreign Affairs of the Russian Federation on the beginning of domestic procedures for the withdrawal of the Russian Federation from the Treaty on Open Skies’, 15 Jan. 2021; US Department of Defense, ‘DOD statement on Open Skies Treaty withdrawal’, 21 May 2020; and Treaty on Open Skies, opened for signature 24 Mar. 1992, entered into force 1 Jan. 2002.

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