Sandia National Laboratories

Cooperative Technology Solutions for India-Pakistan Leveraging Structured Confidence Building Measures

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THE COOPERATIVE MONITORING CENTER (CMC)

Formed in 1994 and housed within Sandia National Laboratories' (SNL) Center for Global Security and Cooperation (CGSC), the Cooperative Monitoring Center (CMC) offers a platform for technical and political experts to investigate how science and technology can assist different nations in implementing confidence-building measures (CBMs), treaties, and other agreements. The CMC utilizes a strategy focused on three primary functions: (1) Building multilateral security partnerships to develop technical solutions; (2) Hands-on technology, systems, and analytical tools training; (3) Hosting visiting research scholars to explore technical and diplomatic solutions.[1]

The CMC and SNL are uniquely positioned to offer options for U.S. policymakers to establish structured CBMs for a range of possible conflict outcomes and U.S. interests. The CMC studied three such outcomes and provides possible SNL options for each in the following passages.

INTRODUCTION

Beginning in 1947 with their independence from British colonial rule, India and Pakistan have engaged in frequent border disputes, predominately centered around the Kashmir region, that have often ignited into full-scale conflict, most notably the First Indo-Pakistani War (1947-1948), the Second Indo-Pakistani War (1965), and the Kargil War (1999). These tensions have been further heightened as both countries are nuclear powers, India having tested its first device in 1974 and Pakistan doing so in 1998.[2] Despite attempts at dialogue and ceasefires, incidents such as the 2008 Mumbai attacks and the 2019 Pulwama bombing have perpetuated cycles of violence and retaliation, complicating the path to peace.

The current tensions between the two countries again center around the Kashmir region, and began on April 22, 2025, when a group of militants carried out an attack killing twenty-six individuals. The Indian government blamed Pakistan for the attack and initiated retaliatory strikes on the country starting on May 7, 2025. In the following days, the two countries engaged in border skirmishes, but on May 12, 2025, an uneasy truce was brokered.[3] Because of the nature of the ceasefire, US Secretary of State Marco Rubio has called on a desire for the US to assist with the implementation of "structured confidence building."[4] The truce between India and Pakistan has held for now, but the future remains uncertain.

Looking ahead, three potential scenarios have been identified that could significantly impact US national security: 1) Concrete Ceasefire, 2) Escalation Prevention, and 3) Sub-Nuclear Threshold. Given its extensive history of creating cooperative monitoring, diplomatic, and technological solutions, the CMC is exceptionally equipped to provide a range of options for US policymakers considering these scenarios.

SCENARIO ONE – CONCRETE CEASEFIRE

The conflict may remain stable under the terms of the ceasefire, but several U.S. national security objectives would still be at risk. Both Pakistan and India are large and growing markets for U.S. goods. Of particular interest to U.S. are the number of agreements and partnerships in high-tech and defense industrial sectors that could be disrupted or jeopardized in the event of conflict flareups with Pakistan. Additionally, India is an integral node in the supply chain for critical and emerging technologies, such as semiconductors, and thus a conflict has the potential to disrupt this supply chain – particularly in the

[1] "Over a Quarter-Century of Global Technical Engagement," CMC: Cooperative Scientific Engagement in the Third Nuclear Age, accessed May 21, 2025, https://www.sandia.gov/cmc/cmc-25th-anniversary-2/.
[2] "Conflict Between India and Pakistan | Global Conflict Tracker," accessed May 21, 2025, https://www.cfr.org/global-conflict-tracker/conflict/conflict-between-india-and-pakistan.
[3] "How India and Pakistan Pulled Back from the Brink with US-Brokered Ceasefire | Reuters," accessed May 21, 2025, https://www.reuters.com/world/asia-pacific/how-india-pakistan-pulled-back-brink-with-us-brokered-ceasefire-2025-05-13/.
[4] "'I Said Let's Do Some Trade': Trump Reaffirms Claim of Brokering India-Pakistan Military Truce," *The Economic Times*, May 13, 2025, https://economictimes.indiatimes.com/news/india/i-said-lets-do-some-trade-trump-reaffirms-claim-of-brokering-india-pakistan-military-truce/articleshow/121144312.cms?from=mdr.

Western Gujarat region which plays an important role in semiconductor assembly and testing. Finally, the region is a strategic asset for the U.S., and both Pakistan and India are strategic partners for the counterterrorism and counterproliferation missions. To secure these objectives and promote peace, the CMC offers various technology solutions that have proven effective in the past and show promise for this situation.

The CMC has a strong track record in establishing remote data transfer systems for monitoring and analysis between parties. CMC could support the India-Pakistan border monitoring of unauthorized activities and non-state actor movements through sensor suites designed to detect concerning ground or aerial activities in contested regions such as the Siachen Glacier or Kashmir regions. Data and results from automated processing to detect anomalous behavior could be shared through a VPN link facilitating trilateral information sharing to ensure transparency. This concept has been proposed as an effective confidence building measure in the past.[5]

The CMC's expertise in on-site inspections and facility modeling capabilities could also aid in arms control verification and nuclear site evaluations.[6] This expertise could be leveraged to explore a framework for these inspections and train relevant inspectors should the political will for these activities exist. Furthermore, CMC has developed historical studies proposing CBMs, such as pre-notification of missile tests[7], joint scientific initiatives for glacier monitoring in the Siachen region[8] and tethered balloon-borne radar systems for detecting anomalous activities in contested border regions.[9] Each of these have the potential to contribute cooperative technology solutions to establish more robust confidence building between the parties.

SCENARIO TWO – ESCALATION PREVENTION

One possible outcome of the situation is the current ceasefire remains in place, but rhetoric escalates and confrontations begin, signaling a possible increase in tensions between the two sides. These tensions would likely surround the disputed region of Kashmir, another border area, attacks by non-state actors, or disruptions of the Indus River water flow into Pakistan by India.[10] In this scenario the US might tolerate some low-level skirmishes or a few exchanges of ordinance in border regions, but would seek to prevent outright conflict that spread to more areas or involved advanced weaponry. US decision-makers must implement solutions quickly to de-escalate tensions, addressing concerns from both sides while maximizing core American interests.

Two cooperative monitoring solutions that the CMC could propose in this scenario are Continuous Monitoring and Track II Dialogues. As in the previous scenario, several monitoring methods could be facilitated, including aerial monitoring in the Siachen Glacier region or ground-based systems in Kashmir. Both countries would have access to the data produced by this technology, lowering the risk of strategic surprise and allowing verification of agreements. The second solution is Track II Dialogues, which refers to the informal and unofficial discussions between influential members of opposing sides, often including academics, former officials, and civil society representatives. These dialogues aim to build trust, foster understanding, and explore potential solutions to conflicts without the constraints of formal diplomatic protocols. By engaging in Track II Dialogues, both India and Pakistan can create a safe space for candid conversations, allowing participants to address sensitive issues and generate innovative ideas for conflict

[5] "Precenting Another India-Pakistan War: Enhancing Stability Along the Border." Shirin Tahir-Kheli and Kent L. Biringer. (2000). CMC Occasional Papers. https://www.sandia.gov/cmc/publications-table/.
[6] https://modsimtools.sandia.gov/scribe3d/.
[7] "The Role of Transparency in Achieving Stragic Stbility in South Asia." Tariq Mahmud Ashraf and Arpit Rajain. (2005). CMC Occasional Paper. https://www.sandia.gov/cmc/publications-table/
[8] "Precenting Another India-Pakistan War: Enhancing Stability Along the Border." Shirin Tahir-Kheli and Kent L. Biringer. (2000). CMC Occasional Papers. https://www.sandia.gov/cmc/publications-table/.
[9] "The Role of Transparency in Achieving Stragic Stbility in South Asia." Tariq Mahmud Ashraf and Arpit Rajain. (2005). CMC Occasional Paper. https://www.sandia.gov/cmc/publications-table/
[10] "Preventing Another India-Pakistan War: Enhancing Stability Along the Border," accessed May 29, 2025, https://www.sandia.gov/app/uploads/sites/148/2021/07/sand98-050517-2.pdf., pg. 9

resolution. Due to its past efforts, SNL is well-positioned to facilitate these dialogues, and should utilize its existing contacts in India and Pakistan to promote intellectual exchanges between the two countries. While not guaranteed, such efforts have proven invaluable in resolving past conflicts.

While Continuous Monitoring and Track II Dialogues present promising avenues for de-escalation, several challenges may hinder their effectiveness. With Continuous Monitoring, technical limitations could lead to misunderstandings between the two nations (e.g., the reliability of data transmission and the potential for misinterpretation of monitored activities). Additionally, the implementation of such monitoring systems may face resistance from both governments, who might perceive them as infringements on their own sovereignty. Similarly, Track II Dialogues, while valuable, often lack formal authority and may struggle to translate discussions into actionable agreements. The success of these dialogues depends heavily on the willingness of both parties to engage sincerely and the ability to bridge deep-seated mistrust. Addressing these challenges is crucial for the effective implementation of these measures.

SCENARIO THREE – SUB-NUCLEAR THRESHOLD

The conflict may escalate regardless of U.S. intervention, necessitating the protection of vital U.S. interests, particularly to prevent the use of nuclear weapons. The potential for nuclear exchanges poses significant risks to U.S. national security, as a nuclear exchange could trigger retaliatory actions from others, such as China. This scenario could lead to a shift in the perception of nuclear weapons, prompting more nations to pursue their own nuclear programs, an outcome the administration has deemed unacceptable.[11] Additionally, the use of nuclear weapons between these two countries would result in the unnecessary loss of human life and create an avoidable tragedy on the populations of these countries as well as their neighbors. Each of these constitute outcomes that would significantly degrade U.S. interests in the region, as well as the world, and is a highly undesirable outcome. SNL is committed to the mission of nonproliferation to avoid such scenarios – and has several confidence building measures that could be leveraged to avoid this outcome in this scenario.

SNL has actively supported efforts to mitigate these risks through various initiatives. Collaborating with the IAEA and engaging trilaterally with countries, SNL has established CBMs on nuclear facilities. SNL has worked extensively with the IAEA, as well as trilaterally with countries to establish confidence building measures and controls on nuclear facilities of concern. This has been accomplished through the establishment of nuclear material accounting information sharing arrangements between Japan and Korea's nuclear fuel cycle facilities brokered by the US and supported by Sandia's technology solutions.[12]

SNL was also integral to facilitating inspections between Argentina and Brazil during the ABACC treaty through training of inspectors from both countries to conduct inspections effectively, deploying radiation sensors to monitor nuclear material movements, and ensuring transparency and compliance with treaty obligations.[13] This experience could be leveraged in arms control and nuclear facility transparency in the event of a kinetic conflict between the two to verify both countries' activities are intended to be below nuclear weapon use on the escalation ladder, should the political will exist for these activities.

With its extensive data analysis and intelligence capabilities, SNL can also facilitate strategic information sharing on activities of both countries during a conflict to reduce incentives around surprise attacks. This could be modeled after the strategic intelligence sharing facilitated by the U.S. government to Ukraine in advance of Russia's invasion. This would serve the benefit of both parties by helping to clarify intentions regarding nuclear weapon use and supporting peace through structured CBMs.

[11] https://www.timesofisrael.com/trump-wants-total-dismantlement-of-iran-nuke-program-might-allow-civilian-energy/.
[12] "An Information-Sharing Framework for Regional Nonproliferation Cooperation." U.S. DOE & JAEA. Project Action Sheet.
[13] Information based on interview with SNL subject matter expert involved in the ABACC Treaty negotiations.

While this is clearly the riskier version of events in which structured confidence building measures could be applied to maintain peace, it is nonetheless an area where SNL has and could support with key technology deployments.

CONCLUSION

Several organizations and think tanks are actively engaged in addressing the complex dynamics of India-Pakistan relations and promoting confidence-building measures. Notable entities include the United States Institute of Peace (USIP)[14], the Stimson Center[15], and the Carnegie Endowment for International Peace[16], all of which conduct research, host dialogues, and propose policy recommendations aimed at reducing tensions in the region. Additionally, within the U.S. government, several offices are particularly interested in the stability of South Asia and the promotion of confidence-building measures. Most notably, the Bureau of South and Central Asian Affairs[17] at the U.S. Department of State plays a crucial role in shaping U.S. policy towards India and Pakistan. The Cooperative Monitoring Center (CMC) can complement these efforts by providing technical expertise and innovative technological solutions that enhance monitoring and verification processes. Collaborating with these organizations could amplify the impact of CMC's initiatives, while improving these organizations' limited open-source access to data, ultimately fostering a more comprehensive approach to conflict resolution.

The enduring tensions between India and Pakistan, particularly surrounding the Kashmir region, pose significant challenges to regional stability and U.S. national security interests. The Cooperative Monitoring Center at Sandia National Laboratories is uniquely positioned to facilitate structured confidence-building measures that can mitigate these risks. By leveraging advanced technology and cooperative solutions, such as remote monitoring systems and Track II Dialogues, the CMC can foster transparency and communication between the two nations. Each proposed scenario, whether it be maintaining a concrete ceasefire, preventing escalation, or addressing the sub-nuclear threshold, highlights the critical need for proactive measures to avert conflict. The potential for nuclear exchanges underscores the urgency of these efforts, as the consequences would extend far beyond the immediate region. Through collaborative initiatives and innovative technological applications, the CMC can play a pivotal role in promoting peace and stability, ultimately contributing to a safer global environment.

[14] United States Institute of Peace, "Asia," accessed August 12, 2025, https://www.usip.org/regions/asia/.
[15] Stimson Center, "Stimson Center," accessed August 12, 2025, https://www.stimson.org/.
[16] Carnegie Endowment for International Peace, "Carnegie Endowment for International Peace," accessed August 12, 2025, https://carnegieendowment.org/.
[17] U.S. Department of State, "Bureau of South and Central Asian Affairs," accessed August 12, 2025, https://www.state.gov/bureaus-offices/under-secretary-for-political-affairs/bureau-of-south-and-central-asian-affairs/.